CHAPTER 3 PRESENT CONDITIONS OF THE STUDY AREA

3.1 The Study Area

3.1.1 The Study Area

As stated in the S/W of the Study, the Study Area consists of 11 districts in Karakalpakstan excluding 3 southeastern districts and municipalities. They are Beruni, Nukus, Kegeily, Chimbay, Karauzyak, Takhtakupyr, Khodjeyli, Shumanay, Kanlikul, Kungrad and Muynak.

The total area is estimated in 247,000 km^2 which covers more than 90% of Karakalpakstan. All of the districts of the Study Area are agricultural regions which are fully or partially irrigated. The north and western areas of the Study Area are covered by desert or salty swamp with few residents as grazing zone.

A total of 6,539,000 of *fermer* farms and 115,500 of *dehkan* farms were operating the agriculture or livestock in the an area of 430 million ha and 26,800 ha respectively in the Study Area in 2006.

3.1.2 Natural Conditions

(1) Meteorology

The climate condition of the Study Area is characterized by small annual precipitation of 110 to 130 mm, dry and hot summer season and quite cold winter season.

Precipitation in the Study Area shows two peaks in a year: in March to May and another in November to December in general. The wettest months are March and April, whilst the driest are July to September. Precipitation in March and April occupies 31% of the year in average.

The average temperature of the Study Area is 11.4 ºC and it varies from 10.4 to 12.3 ºC by location. The hottest months are June to August, while the peak is observed in July. Contrarily, the coldest temperature is observed in January and February. Even though, the monthly average temperature varies between -5.1 to 27.9 ºC. The significant difference between the absolute maximum and minimum are observed due to the continental climate characteristics. It becomes less than -20 ºC in winter and over 50 ºC in the summer.

The wind direction is predominantly from the west. Rain is normally associated with depressions that originate in the eastern Mediterranean and then move in a northeast direction over the Caspian Sea where they are regenerated and strengthened. The cause of the wet spring weather is due to the seasonal increase in convective activity and the weakening of the Siberian anticyclone. Western cyclones change their direction in the summer over the Aral Sea from west-east to north-south direction. Strong ground winds are relatively frequent in the northwestern part of the Amudarya delta, with storms for about 50 days per annum. Wind velocity reaches a maximum of 20 to 25 m/s.

Table 3.1.1 Long-term Monthly Average Precipitation in the Study Area (1961-1990)

Unit: mm

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Nukus	10.1	8.7	16.4	19.3	12.2	3.9	3.5	2.1	3.0	8.7	9.4	13.6	111
Kungrad	8.7	8.0	18.8	18.1	13.7	11.0	4.7	2.0	2.1	8.1	11.1	10.5	117
Chimbay	12.7	10.1	18.9	21.5	13.7	4.2	3.9	2.6	3.2	9.6	10.4	13.3	124
Takhiatash	9.4	9.4	15.8	20.3	12.4	4.5	4.6	2.5	3.6	8.5	10.1	13.2	114
Takhtakupir	11.8	8.6	17.9	13.4	20.0	3.9	1.4	2.7	3.6	5.2	15.4	15.8	120
Muynak	11.0	7.9	18.1	20.0	7.7	8.0	4.8	4.5	3.9	12.4	18.0	12.2	129
Average	10.6	8.8	17.7	18.8	13.3	5.9	3.8	2.7	3.2	8.8	12.4	13.1	119

Source: Karakalpakstan Hydro-meteorological Department

Table 3.1.2 Long-term Monthly Average Temperature (^{o}C) in the Study Area (1961-1990)

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
Nukus	-4.9	-3.5	4.1	13.9	21.3	26.4	28.7	25.9	19.4	10.7	4.1	-1.7	12.0
Kungrad	-5.5	-4.4	2.7	12.6	20.3	25.2	27.4	24.8	18.4	10.0	3.5	-2.1	11.1
Chimbay	-5.5	-4.4	2.9	13.0	20.4	25.3	27.4	24.6	18.2	9.8	3.3	-2.3	11.1
Takhiatash	-4.4	-3.0	4.4	14.1	21.4	26.5	28.6	25.9	19.6	11.2	4.6	-1.2	12.3
Takhtakupir	-4.8	-3.6	2.9	13.5	20.2	26.5	27.9	25.4	18.4	10.8	2.7	-2.0	11.5
Muynak	-5.6	-5.9	0.6	10.4	18.7	24.4	27.3	25.0	18.8	10.1	3.4	-2.1	10.4
Average	-5.1	-4.1	2.9	12.9	20.4	25.7	27.9	25.3	18.8	10.4	3.6	-1.9	11.4

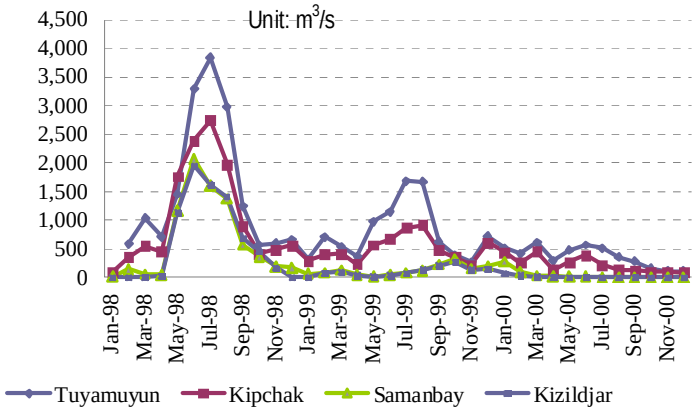
Source: Karakalpakstan Hydro-meteorological Department

(2) Hydrology

The only water resource of the Study Area is the Amudarya River. The water that flows into the Study Area is regulated by the Tuyamuyun Dam, with active capacity of 4,500 million m^3, located at the boundary of Karakalpakstan and Khorezm region. Some of the irrigated area in Karakalpakstan receive water from the Right Bank Canal and take water from the Tuyamuyun Dam, but the target districts of the Study Area take water from the river after the Dam.

The discharge of water flowing down the Amudarya River varies significantly from year to year, depending to climatic and other conditions. The Amudarya River carries almost twice as much water in a year of high flood compared to a year of drought, which has enormous consequences for the Study Area, the lowest downstream territory. The Amudarya is a glacier/snowmelt fed type river and its water resources reaches 68,63km^3 on average. The main flow volume (85%) is formed by the Vakhsh and Pyandj tributaries. The share of the Surkhandarya, Kafirnigan, and Kunduz rivers is only 15%. The average monthly discharges at the hydro-posts in the lower reaches of the Amudarya River from 1998 to 2000 are shown in the figure below. As shown in the figure, its uneven distribution through the year is well pronounced with 77-80% and 10-13% of total runoff in April - September and December – February, respectively.

In both 2000 and 2001 the Study Area suffered two consecutive droughts, which devastated annual harvests, led to severe water shortages and resulted in a large abandoned irrigated land, especially in the northern part of the Amudarya delta.

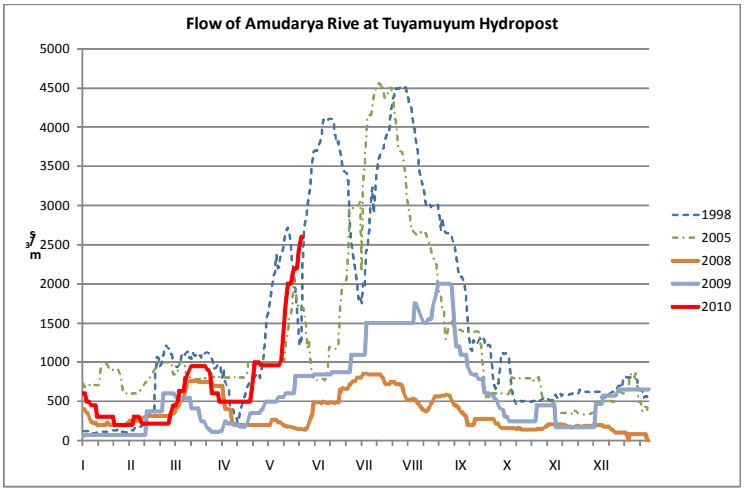


Location of Hydro-posts in Amudarya River

Source: The Report on Assessment of Drought Impact on Agricultural Sector and Drinking Water in the Republic of Karakalpakstan and Khorezm Viloyat, World Bank, 2001

Fig. 3.1.1 Average Monthly Discharge of Lower Amudarya (1998 – 2000)

The flow condition of the lower reach of the Amudarya in the recent years is presented below by the data of 2008 to 2010 at the Tuyamuyun hydropost, which can be recognized to represent the flow condition of the lower Amudarya. In 2008, the area had a severe drought through the year and it continued until the first half of 2009. After June of 2009, the flow of the Amudarya was significantly increased and the one of 2010 is expected to compare with the record of 1998 and 2005, which were recognized as the highest after 1990's.



Source: SANIIRI Karakalpakstan

Fig. 3.1.2 Flow Condition of Amudarya River at Tuyamuyun Hydropost in the Recent Years

3.1.3 Socio-economic Conditions

(1) Regional Economic Indicators

The total population in Karakalpakstan is 1.58 million persons. Among the 11 districts in the Study Area, Beruni and Khodjeyli hold 9% of Karakalpakstan's population. In contrast, Muynak has only 2% of the total population, followed by Shumanay, Kanlikul, Nukus, Karauzyak, and Takhtakupyr districts that have 3%. In general, the majority of Karakalpak ethnic lives in the center of the republic, including Chimbay, Kegeily, Kanlikul, and Nukus districts, whereas Kazakh lives in north and west districts. Most Uzbek lives in the Southeast districts such as Beruni.

Table 3.1.3 Socio-economic Profile of the Study Area

Itam	Kungrad	Muynak	Shumanay	Kanlikul	Kegeily	Chimbay	Khodjeyli	Nukus	Karauzyak	Takhtakupyr	Beruni	R.K. Total
Population/a	113,000	28,600	41,200	41,200	76,500	97,200	145,800	44,200	44,300	42,300	150,200	1,582,700
	7%	2%	3%	3%	5%	6%	9%	3%	3%	3%	9%	
Majority of Ethnicity (%)/a	100	100	100	100	100	100	100	100	100	100	100	
Karakalpak	22	46	40	70	83	80	30	58	20	47	-	
Kazakh	40	53	36	-	-	-	30	32	77	52	-	
Uzbek	-	-	-	15	-	-	30	-	-	-	66	
Others	38	1	24	15	17	20	10	10	3	1	34	
Distance from Nukus C. (km)	105	200	75	80	40	55	20	-	85	105	130	-
Agricultural Prod. (t)/b	34,159	2,938	26,992	34,076	37,231	37,261	46,836	75,741	33,517	31,730	51,743	627,219
Livestock Prod. (t)/b	7,541	931	7,318	9,004	10,381	12,715	19,160	5,550	7,334	6,542	37,677	224,947
External Trade Turnover (thou. US$)/	8,211	36	-	-	-	-	680	74	-	-	126	62,358
Export (thou. US$)	-	-	-	-	-	-	178	56	-	-	33	23,889
Import (thou. US$)	8,211	36	-	-	-	-	502	18	-	-	92	38,414
Industrial Prod. w/FDI (mllion. sum)/	77	-	-	-	193	-	1,195	3	-	-	24	3,158
Retail Trade Turnover (million. sum)/	17,353	973	2,528	1,685	3,425	6,896	16,745	1,586	2,629	4,831	8,814	132,917
Paid Service Volume (mllion sum)/c	1,694	138	328	346	384	707	1,681	321	387	274	1,056	21,568
Consummer Service (mllion. sum)/c	103	8	23	15	18	71	93	28	14	43	75	1,899

Source: a/ "Living Consitions in Karakalpakstan", A.A.Joldasov, March 2004 (data on 2004)
b/ The Ministry of Economy of the Republic of Karakalpakstan (data on 2006)
c/ "living Consitions in Karakalpakstan", A.A.Joldasov, March 2004 (data on 2003)

According to a living condition survey in Karakalpakstan, conducted by JICA in 2004, Nukus, Beruni, and Khodjeyli districts lead agricultural sector in terms of production volume, whereas Beruni and Khodjeyli lead livestock production in the Study Area. For industrial production, Khodjeyli, Kegeily,

and Kungrad contribute a lot, while for service sector, Khodjeyli and Kungrad are outstanding in view of trade volume among the 11 districts in the Study Area.

(2) Financial Indicators

According to the living condition survey in 2004, the budget of the Karakalpakstan was 85,023 million sum, including 50,852 million sum of subventions, which holds around 60% of the total budget. Tax revenue of the year was 31,466 million sum, which include land tax, value added tax, profit tax and property tax, for example. Budgetary expenditure in the same year was estimated in 84,244 million sum. One of the problems on local budget is the low revenue from taxes, which deeply rooted in delayed wage payment of entrepreneurs and local residents.

Table 3.1.4 Financial Indexes of the Districts in the Study Area

Itam	Kungrad	Muynak	Shumanay	Kanlikul	Kegeily	Chimbay	Khodjeyli	Nukus	Karauzyak	Takhtakupyr	Beruni	RK.K Total
Revenue												
Tax & Mandatory Fees (million sum)	4,335	168	323	360	457	980	2,552	413	298	312	2,189	32,683
Entrepreneurial Activities (million sum	68	3	8	6	16	34	104	14	7	9	53	759
Shortage of Budget Revenues (million sum	232	66	28	87	47	331	239	33	88	24	249	4,206
Subventions (million sum)	0	940	1,449	1,309	1,566	1,988	800	1,061	1,466	1,520	1,088	19,003
% of Subventions in Budget	0	86	81	76	75	59	18	68	83	77	24	39
Debit Indebtness (million sum)	2,816	191	28	145	231	747	766	1,354	213	278	636	19,761
Credit Indebtedness (million sum)	4,539	336	142	308	221	1,020	1,095	1,303	409	405	1,204	35,069

Source: "Living Consitions in Karakalpakstan", A.A.Joldasov, March 2004 (data in 2003)

Subventions to the districts were 19,000 million sum of the total in 2003. Among 11 districts in the Study Area, only Kungrad did not receive subventions, while 80% of total revenue was held by Karauzyak, Muynak and Shumanay.

(3) Social Institutions and Organizations

The community of Karakalpaks, the main ethnic group in Karakalpakstan, is still influenced by traditional tribal structures (tribes and *kin* groups). In Karakalpakstan, tribes of Karakalpaks are divided into 12 groups and there are 100 *kin* groups. Traditionally, *kin* groups own forests, pasture lands and irrigation canals belonging to tribal land and water communities and live in "*auls*" (the Karakalpak word for "village") belonging to the same *kin* groups or sub groups. Community social structures are stratified, with decision-making processes passing through families, tribal groups and public authorities. Traditional vertical divisions still remain.

Karakalpakstan today emphasizes the development of social partnerships between civil society organizations, public authorities and government agencies. As mentioned above in section 2.10, these are being given new roles as official organizations in traditional rural societies. The typical local communities in Karakalpakstan are *Makan-kenes*, village citizen councils (VCC) and *auls* (Fig. 3.1.3, page 3-61), and their organizations are positioned as civil society organizations.

The local communities are administratively divided into *Hakimiyat* (district offices), VCCs, villages and streets. For example, the Jan Apa Zap VCC in Kegeily district comprises 2,400 people, 684 households and 12 villages. The population per village is 200 people in 57 households. The small size of villages is one characteristic of Karakalpakstan. The structure of local communities can be summarized as follows:

1) VCC are legal organizations, positioned as the lowest level of local administration. In rural areas they are called VCCs, but in cities and towns they have been renamed as *Makan-Kenes* (city *Mahallas*).
2) Villages are traditional self-governing organizations for residents. They are governed by leaders selected by residents. Villages have no legally-defined status.
3) Each street has a leader selected by neighboring residents. Leaders are responsible for community activities, such as collection of local cleaning expenses and coordinate payment to support poor households.

Jan Apa Zap VCC in Kegeyli district is described below as an example of the VCCs, which are expected to take an important role among the above local communities in future developments, as the representatives of the public.

Jan Apa Zap VCC, as an administrative body, comprises of a board, administrative committee and chairman representing 12 *auls*, and below those there are many special committees (women's committee, youth committee, welfare committee, etc.) (Fig. 3.1.4, page 3-61). Jan Apa Zap VCC has eight special committees. These special committees act as executor of direct individual activities. The basic framework was defined in the ordinance "Citizen self-governing bodies (new edition)" in April 1999.

Chairmen are elected by citizens' general assemblies, but in general they are selected by a meeting of citizens' representatives. Chairmen require an approval from *Hakimiyat*. The term of office for a chairman is 2.5 years. The officers of the VCC, the chairman, secretary, head of vigilante corps and administrative committee chair receive government salaries, but the other committee members are volunteers.

The activities of VCCs are diverse, ranging from coordination of community events to official duties. The government decrees define matters such as the holding of citizens' general meetings, cooperation with the activities of *Hakimiyat*, protection of women, management of land usage, assistance of *dehkans* and *fermer*, and encouragement of tax payment collection.

3.1.4 Regional Development Plan and Projects

(1) Regional Development Plan

Karakalpakstan has prepared a draft program for social and economic development for 2007-2011 which was formulated by the Ministry of Economy. According to the explanatory note of the draft program, the government chronologically set numerical targets to every economic sector until the target year of 2011. The implementation of the program requires US$ 612 million by the end of 2011.[1]

(2) Previous Regional Development Studies and Projects

Projects in Karakalpakstan to date have mainly been sector-led development, with few instances of integrated regional development. The aim of this study is to formulate a regional development plan, focused on agricultural development, but projects related to livelihood improvement can also be indicated as similar. Support in this field began between 1998 and 2002. The major donors are UNDP, EU-TACIS and ADB. These activities mainly aimed to diversify income sources for low-income households, assist small-scale business started up by women and encourage participation by local authorities / local communities in decision making related to development processes. Among these efforts, the project "Enhancing Living Standards in Karakalpakstan (ELS)" by EU-TACIS and UNDP revealed some important lessons in the course of its planning and implementation.

The ELS, conforming to the WISP of RU, was intended to improve livelihoods by supporting the following three components. The project was implemented between 2005 and 2006.

- Regional development strategies: To contribute to the formulation of development strategies for Karakalpakstan as a whole, by supporting local authorities.
- Empowering Communities: To strengthen the participation of local communities in decision making related to socio-economic development, through implementation of pilot projects in three districts.

[1] Karakalpakstan Regional Report, Mr. Jahangir Kakharov, BISNIS Representative (Tashkent), (http://www.bisnis.doc.gov/bisnis/bisdoc/0601Karakalpakstan.htm)

- Income generation: Diversification of income sources for low-income households and *fermers*.

The ELS project provided the following lessons:

- Component 1, described above, requires discussion with the Council of Ministers of Karakalpakstan when formulating strategy.
- Component 2 has an important role for Karakalpakstan government, but the main activities were performed directly by communities. However, the cooperation of *Hakimiyat* is essential at that stage. It is also important for aid providers, working through community projects, to educate and inform communities about their active role in their own community development.
- Component 3 provides credit to low-income households and *fermers*, to assist them in starting small-scale businesses.
- Community residents have almost no previous experience of forming participatory projects. Therefore, workshops and similar methods are necessary to teach them the project life cycle management approach, the goals they should be working towards and other aspects.
- When activities began from the ELS target communities, the residents are suggested to set up community initiative groups, which contributed to the promotion of later activities.
- The ELS used local NGOs, which were well versed in local conditions and had relevant experience, from the formation stage of community projects.
- The formation of community projects is based on proposals put forward by the community, but some projects do not match the goals, or are inefficient to attaining them. When it happens, aid providers and community initiative groups must reassess proposals put forward by the community.

3.2 Agriculture

3.2.1 Crop Production

The total area of the Study Area is 14,686,000 ha (146.857 km^2). The actual cultivated area is quite limited due to insufficient supply of irrigation water. The irrigated area is only 2.7% of the total Study Area and the actual cropped area was about 44% of the irrigated area in 2006**.** Consequently, the cropping area in 2006 was only 68.3% of that of Karakalpakstan, while the total area of the Study Area occupies 91.2% of Karakalpakstan.

Cotton, cereals and fodder crops are major crops in the Study Area. These crops occupy more than 90% of the total major crops' planted area. Vegetables (including potato, melons and gourds) and fruits (including grapes) occupy only about 6% of the planted area. Though cotton and wheat are absolute major crops, the percentage of planted area of these crops is relatively low as compared with the percentage of Uzbekistan.

Cropping intensity of the Study Area in 2006 was a little bit higher than that of Karakalpakstan in spite of the severe water condition. However, the productivity in the Study Area in 2006 was lower than Karakalpakstan, except for fruits and rice. While Karakalpakstan is famous in rice production, 100% of Karakalpakstan rice is produced in the Study Area at present. Planted area of cereals, except maize, melon and gourd in the Study Area, have relatively higher share in Karakalpakstan. On the contrary, cotton, maize, fodder crops, potatoes, vegetables (excluding melons and gourds) and fruits (including grapes) have low share.

Table 3.2.1 Crop Production of the Study Area and Karakalpakstan in 2006

Crop	Study Area				Karakalpakstan				Study Area's Share (planted area)
	planted area		production	yield	planted area		production	yield	
	(ha)	*(%)*	(ton)	(ton/ha)	(ha)	*(%)*	(ton)	(ton/ha)	*(%)*
Cotton	62,897	*(32.1)*	103,536	1.65	106,698	*(38.3)*	193,725	1.82	58.9
Wheat	49,608	*(25.3)*	156,190	3.15	64,315	*(23.1)*	215,193	3.35	77.1
Maize (grain)	823	*(0.4)*	N/A	N/A	2,347	*(0.8)*	N/A	N/A	35.1
Other grains	27,098	*(13.8)*	N/A	N/A	30,195	*(10.8)*	N/A	N/A	89.7
Rice	22,789	*(11.6)*	55,504	2.44	22,789	*(8.2)*	55,504	2.44	100.0
Fodder crops	20,339	*(10.4)*	N/A	N/A	32,446	*(11.6)*	N/A	N/A	62.7
Potatoes	874	*(0.4)*	5,932	6.79	2,135	*(0.8)*	15,532	7.27	40.9
Vegetables	4,730	*(2.4)*	52,716	11.15	7,352	*(2.6)*	88,487	12.04	64.3
Melons & Gourds	3,890	*(2.0)*	28,062	7.21	5,310	*(1.9)*	41,527	7.82	73.3
Fruits	2,393	*(1.2)*	8,929	3.73	4,518	*(1.6)*	15,091	3.34	53.0
Grapes	305	*(0.2)*	1,355	4.44	494	*(0.2)*	2,160	4.37	61.7
Total planted area	195,746	*(100.0)*	—	—	278,599	*(100.0)*	—	—	70.3
Crop land area	172,671	—	—	—	252,848	—	—	—	68.3
Crop intensity	—	*113.4*	—	—	—	*110.2*	—	—	—

Source: The Ministry of Economy of the Republic of Karakalpakstan

3.2.2 Cropping Calendar

Information of cropping calendar in the Study Area was collected through interview with *fermers* and *dehkans*. Prevailing seasons of the seeding and the harvesting of major crops are shown in Fig. 3.2.1 (page 3-62), while the cropping season may change according to farming conditions like water availability, temperature, cropping pattern and so on.

Cotton, one of the major crops in the Study Area, is seeded in March to April and harvested in September to October. Another major crop in the Study Area is winter wheat which is seeded in September to October and harvested in late May to June. Tomato which is one of the major vegetables in the Study Area is seeded in late March to late April and harvested in July to October. Carrot is seeded in April to May and harvested in August to September. Melon and water melon, which is one of the famous products in the Study Area, are also seeded in April to May and harvested in late July to September.

Generally the most crops have almost similar cropping season, since temperature and irrigation water availability are absolute determination factors of the cropping season in the Study Area. Although there are some green houses in the Study Area which mainly grow tomato and cucumber. This type of production system is not popular due to unreliable supply of gas, electricity and water. As result, most crops are planted around April and harvested in July to September. On the other hand, there are no major crops harvested between December to March, except tomato and cucumber produced in green house. This trend suggests that many agricultural products might come from other region to fulfill the demand in off harvesting season.

3.2.3 Crop Rotation

Crop rotation is very essential and economical farming technology for soil conservation and improvement on long-term basis. This technology was introduced in Karakalpakstan during the Soviet era, since it has obvious effect on sustainable agriculture, especially in marginal area like Karakalpakstan. However, it is going out of practice in recent years in the Study Area due to the following reasons:

1) Dissolution of the collecting farming system spoiled a systematic farm management including crop rotation. In collecting farms, attached agronomist to the farms used to supervise farm management with proper technology. However, many *fermers* who newly entered into the farming business are not familiar with crop rotation because of less knowledge and attention
2) Since actual cropped area is decreasing, due to limited supply of irrigation water and shortage of farm machinery, *fermers* can not allocate enough farmland to fodder and green manure crops

3) The Government food self-sufficiency policy after independence has led *fermers* to replace fodder and green manure crops with wheat

Also, government supporting system to promote crop rotation is becoming weak in recent years. For example, the Crop Station of SCA in Chimbay has stopped its research activity on crop rotation since 2003 because the station could not get budget for the research.

Books on crop rotation system, published by Dr. Ismaylov Uzaqbay, Professor of Nukus Branch of Tashkent State University of Agriculture and former researcher of the Crop Station of SPCA in Chimbay, suggests many patterns of crop rotation applicable to Karakalpakstan. In the books, Karakalpakstan is divided into 3 regions, i.e. the Southern Amudarya (Beruni, Turtkul, Ellikkala), the central (Kanlikul, Kegeily, Khodjeyli, Shumanay) and the northern (Kungrad, Chimbay, Karauzyak, Takhtakupyr), and each of several patterns for 7 to 10 year's crop rotation are recommended according to 3 types of soil conditions, i.e. low salinity (not existing in the Northern region), medium salinity and high salinity. Cotton, wheat, alfalfa and green manure crops are combined in the patterns. It is also recommended to apply plenty of organic manure. The following figure shows a sample of the recommended patterns.

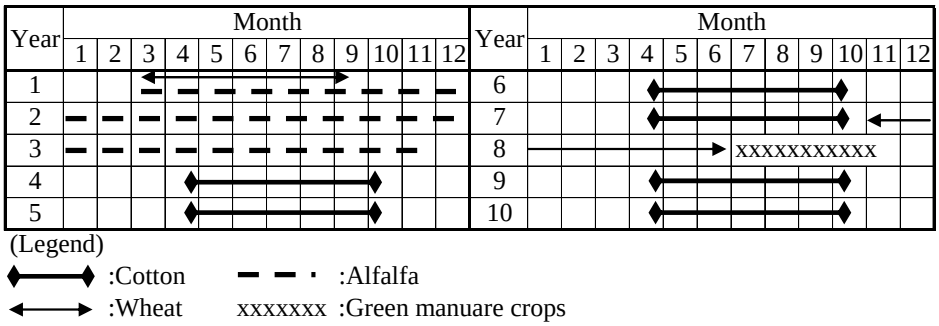


Fig. 3.2.2 Sample of Crop Rotation Recommended to Karakalpakstan

To apply the above crop rotation, *fermers* should divide their field into ten plots. Then, they should plant the first year's crop for the first pot, the second year's crop for the second plot and continue to plant up to the tenth plots accordingly. Then it is recommended to utilize organic manure.

The books also suggest that profit of the above crops rotation increases by 37.1 % compared with monopoly production of cotton, due to increased productivity of cotton and other crops, as well as increased number of livestock to be reared with fodder and green manure crops from the field.

3.2.4 Presence of *Fermer* and *Dehkan* in Crop Production

(1) Land Use

Fermers are main actor in crop production, especially in cotton and wheat, while *dehkans* have substantial share in the production mainly of vegetables and fruits. Farm management pattern of *fermers* and *dehkans* are quite different since their scale and anticipated roles by the Government are quite different. The management pattern also differs from type of *fermers* as a matter of course.

Table 3.2.2 Land-use of *Fermer* and *Dehkan* in the Study Area in 2006

	Land-use	*Fermer*		*Dehkan*	
		(ha)	(%)	(ha)	(%)
1	Arable land	337,665	*78.3*	18,680	*69.5*
	(1)Irrigated land	238,206	*55.2*	18,677	*69.5*
	(2)Crop land	127,079	*29.5*	16,431	*61.1*
2	Pasture	86,241	*20.0*	0	*0.0*
3	Others	7,332	*1.7*	8,200	*30.5*
4	Total area (1+2+3)	431,238	*100.0*	26,880	*100.0*

Source: The Ministry of Economy of the Republic of Karakalpakstan

The table on right shows the breakdown of land use by *fermers* and *dehkans* in the Study Area in 2006. *Fermers* manage 337,665 ha of arable land, while *dehkans* manage only 18,680 ha. The irrigated land, which might be a potential crop growing land, managed by *fermer* is only 55 % of the total land area

or 70 % of the arable land area.

There were 6,539 *fermers* and 115,517 *dehkans* in the Study Area in 2006. The numbers occupy 72.1% and 51.3% of the total number of Karakalpakstan, respectively. The average land use of individual *fermer* and *dehkan* in the Study Area in 2006 is shown in the table below.

In case of *fermers*, cotton and grains oriented *fermers* managed more crop land and few pasture. Then, livestock oriented *fermers* were just the opposite, and managed bigger size of farmland. Horticulture oriented *fermers* managed relatively small area for crop in general. The average farmland size of *fermer* at present must be larger than 65.95 ha (right table), maybe almost a double, since number of *fermers* are becoming small with the land optimization policy since 2008.

Table 3.2.3 Average Land-use of Individual *Fermer* and *Dehkan* in the Study Area in 2006

Land-use (Total number)	*Fermer* (6,539)	*Dehkan* (115,517)
1 Arable land	51.64	0.16
(1)Irrigated land	36.43	0.16
(2)Crop land	19.43	0.14
2 Pasture	13.19	0.00
3 Others	1.12	0.07
4 Total area (1+2+3)	65.95	0.23

Source: The Ministry of Economy of the Republic of Karakalpakstan

Average *dehkans* land in the Study Area, which is 0.23ha, is less than the standard of 0.35ha stated by the government regulations. Out of their total land area, a substantial part of the area is categorized into others (non-arable land and non-pasture). It is supposed that the others are mainly used for housing compound of *dehkans*. As result, the arable land is only 0.16ha which might be too small to make a *dehkan's* livelihood by farming. However, the Study Team has observed some *dehkans* who manage several ha of farm-land and generate a certain income from the land, and also gotten information that *tamarka* area of a rural *dehkan* is wider than that of an urban *dehkan* in general.

(2) Major Cultivated Crops

Planted area of major crops by *fermer* and *dehkan* in the Study Area in 2006 is shown as follows:

Table 3.2.4 Planted Area of Major Crops by *Fermer* and *Dehkan* in the Study Area in 2006

Crop	Fermer		Defkan		others		Total	
	(ha)	*(%)*	(ha)	*(%)*	(ha)	*(%)*	(ha)	*(%)*
1 Cotton	57,923	*39.4*	0	*0.0*	4,974	*15.8*	62,897	*32.1*
Share (%)	(92.1)	—	(0.0)	—	(7.9)	—	(100.0)	—
2 Wheat	28,662	*19.5*	5,055	*29.8*	15,891	*50.3*	49,608	*25.3*
Share (%)	(57.8)	—	(10.2)	—	(32.0)	—	(100.0)	—
3 Maize (grain)	273	*0.2*	299	*1.8*	251	*0.8*	823	*0.4*
Share (%)	(33.2)	—	(36.3)	—	(30.5)	—	(100.0)	—
4 Other grains	22,050	*15.0*	2,258	*13.3*	2,790	*8.8*	27,098	*13.8*
Share (%)	(81.4)	—	(8.3)	—	(10.3)	—	(100.0)	—
5 Rice	20,400	*13.9*	19	*0.1*	2,370	*7.5*	22,789	*11.6*
Share (%)	(89.5)	—	(0.1)	—	(10.4)	—	(100.0)	—
6 Fodder crops	11,554	*7.9*	4,113	*24.2*	4,672	*14.8*	20,339	*10.4*
Share (%)	(56.8)	—	(20.2)	—	(23.0)	—	(100.0)	—
7 Potatoes	225	*0.2*	640	*3.8*	9	*0.0*	874	*0.4*
Share (%)	(25.7)	—	(73.2)	—	(1.0)	—	(100.0)	—
8 Vegetables	2,232	*1.5*	2,248	*13.2*	250	*0.8*	4,730	*2.4*
Share (%)	(47.2)	—	(47.5)	—	(5.3)	—	(100.0)	—
9 Melons & Gour	2,382	*1.6*	1,301	*7.7*	207	*0.7*	3,890	*2.0*
Share (%)	(61.2)	—	(33.4)	—	(5.3)	—	(100.0)	—
10 Fruits	1,420	*1.0*	814	*4.8*	159	*0.5*	2,393	*1.2*
Share (%)	(59.3)	—	(34.0)	—	(6.6)	—	(100.0)	—
11 Grapes	61	*0.0*	238	*1.4*	6	*0.0*	305	*0.2*
Share (%)	(20.0)	—	(78.0)	—	(2.0)	—	(100.0)	—
Total planted area	147,182	*100.0*	16,985	*100.0*	31,579	*100.0*	195,746	*100.0*
Share (%)	(75.2)	—	(8.7)	—	(16.1)	—	(100.0)	—
Crop land	127,079	—	16,431	—	29,161	—	172,671	—
Share (%)	(73.6)	—	(9.5)	—	(16.9)	—	(100.0)	—
Crop intensity	—	*115.8*	—	*103.4*	—	*108.3*	—	*113.4*

Source: The Ministry of Economy of the Republic of Karakalpakstan

In terms of the planted area, *fermers* had a large share of cotton, cereals, melon & gourd and fruits, while *dehkans* had a large share of potatoes and grapes. Maize and vegetables were equally shared by

fermers and *dehkans*. *Fermers* tended to concentrate on government controlled crops (cotton & wheat), cereals and fodder crops. In contrast, *dehkans* tended to diversify into several crops, while they gave high priority to wheat and fodder crops probably for self-consumption and livestock.

It is interesting that *dehkan's* crop intensity was less than the *fermer's*, although *dehkans* managed small farm land. The followings are considered for the reasons.

1) Substantial number of *dehkans* did not work hard in *tamarka* since their life style became to non-agriculture oriented
2) Difficulty to get enough water and other necessary inputs as compared to *fermers*
3) % of land under perennial crops (fruits & grapes) was relatively high

Production of major crops by *fermer* and *dehkan* in the Study Area in 2006 is shown as follows:

Table 3.2.5 Production of Major Crops by *Fermer* and *Dehkan* in the Study Area in 2006

Crop	Fermer		Defkan		others		Total	
	(ton)	(ton/ha)	(ton)	(ton/ha)	(ton)	(ton/ha)	(ton)	(ton/ha)
1 Cotton	96,667	*1.67*	0	*0.00*	6,869	*1.38*	103,536	*1.65*
Share (%)	(93.4)	—	(0.0)	—	(6.6)	—	(100.0)	—
2 Wheat	97,167	*3.39*	16,428	*3.25*	42,595	*2.68*	156,190	*3.15*
Share (%)	(62.2)	—	(10.5)	—	(27.3)	—	(100.0)	—
3 Rice	50,261	*2.46*	39	*2.05*	5,204	*2.20*	55,504	*2.44*
Share (%)	(90.6)	—	(0.1)	—	(9.4)	—	(100.0)	—
4 Potatoes	1,315	*5.84*	4,591	*7.17*	26	*2.89*	5,932	*6.79*
Share (%)	(22.2)	—	(77.4)	—	(0.4)	—	(100.0)	—
5 Vegetables	32,474	*14.55*	18,008	*8.01*	2,234	*8.94*	52,716	*11.15*
Share (%)	(61.6)	—	(34.2)	—	(4.2)	—	(100.0)	—
6 Melons & Gourds	17,210	*7.23*	10,023	*7.70*	829	*4.00*	28,062	*7.21*
Share (%)	(61.3)	—	(35.7)	—	(3.0)	—	(100.0)	—
7 Fruits	5,596	*3.94*	3,083	*3.79*	250	*1.57*	8,929	*3.73*
Share (%)	(62.7)	—	(34.5)	—	(2.8)	—	(100.0)	—
8 Grapes	156	*2.56*	1,191	*5.00*	8	*1.33*	1,355	*4.44*
Share (%)	(11.5)	—	(87.9)	—	(0.6)	—	(100.0)	—

Source: The Ministry of Economy of the Republic of Karakalpakstan

The share of *dehkans* in the production was less than the share in the planted area as shown in the previous page**,** except for potato and grape, since *dehkan's* productivity was inferior to that of *fermer's* for major crops. It is generally understood in Uzbekistan that *dehkans* had a substantial share in crop production, except for cotton and wheat. Statistical data shows the bigger share of *dehkans* than the share of *fermers* in terms of total agricultural production value at national level. However, *dehkans'* share in crop production in the Study Area was not as large as commonly understood, as far as referring the above data of planted area and production in 2006.

The average annual production of *dehkan* in the Study Area and annual per capita consumption in Uzbekistan for major food crops are compared in the table on the right.

Table 3.2.6 Annual per *Dehkan* Production and per Capita Consumption of Major Crop

(kg/year)

Crop	per *Dehkan* production	per capita consumption
1 Wheat	142.21	161.43
2 Rice	0.34	9.05
3 Potatoes	39.74	29.51
4 Vegetables	155.89	137.63
5 Melons & Gourds	86.77	(incl. above)
6 Fruits	26.69	22.69
7 Grapes	10.31	7.62

Source: The Ministry of Economy of the Republic of Karakalpakstan (production in 2006) and FAO Statistics (consumption in 2003)

The table shows that an average *dehkan* in the Study Area produced almost one person's annual consumption of major food crops in *tamarka* in a year. Considering that the average family member is more than 6 in the Study Area, the table implies that the average *dehkan's* production was far below the family's consumption. Crops harvested from *tamarka* must be a subsidiary food source for *dehkan* family in the Study Area, while a seasonal surplus of them are sometimes marketed for getting an additional cash income.

3.3 Livestock

3.3.1 Livestock Population

The livestock population in the Study Area covering 11 districts is different by animal type. For example, a lot of cattle/cows that require plenty of fodder are mainly raised in Beruni district, located at the southeastern part of the Study Area. Beruni district is blessed in animal feed production than other districts, which resulted in a lot of livestock population. On the contrary, Beruni is ranked at 4th in the share of sheep/goats compared to Kungrad, Karauzyak and Takhtakupyr, which are dry areas than others. These districts have grazing ground suitable for sheep/goats tolerant for meager feeding. Conversely, it can be said that these districts are located at areas more relying on sheep/goat raising than crop production. However carrying capacity of grazing land is generally low to feed sheep/goats. Swine is currently rearing in populated and consuming area of Nukus district and Nukus city.

Table 3.3.1 Number of Livestock in the Study Area (2006)

District	Cattle	Cow	Sheep/Goat	Horse	Horse	Poultry
Kungrad	25,591	13,094	67,839	1,169	313	25,072
Muynak	7,940	5,042	9,319	748	0	14,073
Shumanay	32,007	9,777	44,138	707	124	37,040
Kanlikul	12,404	6,916	16,007	820	0	14,600
Kegeily	36,965	16,830	34,077	2,535	0	45,729
Chimbay	27,817	14,671	38,353	1,900	34	60,027
Khodjeyli	25,259	14,159	20,010	536	174	73,206
Nukus	12,772	9,123	14,705	740	911	47,201
Karauzyak	12,678	8,210	52,160	1,020	149	52,830
Takhtakupyr	9,353	8,327	75,401	1,591	0	22,368
Beruni	51,274	25,581	48,020	772	703	165,609
Study Area	254,060	131,730	420,029	12,538	2,408	557,755

Source: Ministry of Economy of the republic of Karakalpakstan

3.3.2 Living Condition of *Fermers* and *Dehkans* and their Dependence on Livestock

(1) *Fermer*

According to the data collected by the Study Team in May 2008, dependency on livestock of *fermer* is about 30% to 100%. In 2006, there were 6,539 *fermers* in the Study Area, having 65.3 ha on average, and mainly produced economically important food and industrial crops. Some 602 (9.2%) *fermers* out of them were specialized in livestock raising. In addition, there also existed *fermers* managing combined farming with livestock (mainly cattle and cows) and agriculture. But it was inferred that there was few full-time *fermers* for dairy production on commercial basis. It is considered in Karakalpakstan that cattle are reared mainly for meat production. Only part of the milk is marketed to consuming areas by small-scale milk factories and most of them are consumed by themselves. In Beruni, the Study Team observed *fermers* who were specialized in cattle fattening for beef production. Some of those *fermers* hired farm workers from their relatives and others managed only by family members. Major crops cultivated by *fermers* were cotton and wheat with restricted melon, watermelon and vegetables. All cotton was purchased by the Government and processed into textile and cotton oil in a factory. By-products of cotton meal and cake were sold to cotton growers (*fermers*) at lower price than prevalent market price on contract basis. For example in Chimbay, cotton growers could be bought cotton meal/cake at 120 sum/kg compared with 150 sum/kg of market price. Most of cattle/cows were fed with oil cake/meal mixed with forage crops (roughage). During interviews, *fermers* mentioned that cotton cultivation combined with cattle/cow raising was most profitable owing to availability of cheaper by-products of cotton. *Fermers* generally had large family size (8 to 17 members per family). Income sources of them were different depending on commodities such as cotton, wheat, livestock and cow milk etc.

(2) *Dehkan*

In 2006, there were 115,517 *dehkans* in the Study Area, who had small farm size of 0.23 ha each in average, available only for backyard farming, and cattle/cows, sheep/goat and chicken were also reared by them. Study Team observed a *dehkan* owning 20 ha in the interview survey. It is considered that *dehkan* can raise only a few livestock due to small area. If compared with cattle/cow, raising sheep/goats are easier for *dehkans* due to the availability of grazing land which is able to use commonly. However, in fact there were *dehkans* who gave up livestock raising because of lack of farm area for animal feed production. According to UNDP's data, the minimum number of livestock to live from livestock income was estimated at 5 to 6 head in the case of cattle or cows, or 20 to 20 head in the case of sheep/goats and 70 to 80% of low income stratum and about 80% of non-low income stratum have some kinds of livestock. But UNDP also reported that raising livestock does not necessarily guarantee a certain level of standard of living. If applying these indicators, the current number of livestock owned by *dehkans* is judged insufficient to feed a family if living only by livestock income. According to the reports prepared by UNDP concerning three (3) districts, 35 to 50% of low income stratum own only 2 to 3 head of cattle/cows, 8 to 16 % of them own 4 to 6 sheep/goats and 50 to 70 % of them rear 8 to 9 chicken.

The income sources of *dehkans* are from the sale of vegetables, fruits, livestock and cow milk in addition to farm-wage form *fermer* farm and non-farm wage from *shirkat* farm (40 to 50% according to UNDP). According to the result of the interview survey by the Study Team, the income from farm work was about 60,000 sum/month per capita, corresponding to 82 kg of wheat flour based on May 2006 price. In Uzbekistan, people consumed 161 kg of wheat flour per year per capita (2003, FAO), which was equivalent to 13.4 kg/month/capita or 9,826 sum (33,000/45kg x 13.4 kg). Considering this indicator, current wage rate can be said insufficient. The minimum salary written on newspaper on monthly basis was 21,000 sum per month per capita in April 2008.

(3) *Shirkat*

In 2007, it was reported that eight (8) *shirkats* still remained in the Study Area, who were rearing Karakul sheep, goats, horses, and cattle. One of *shirkat* at Karauzyak district had 440,000 ha in desert area and raised 20,400 karakul sheep with other livestock, and hired 105 farm workers. They also cultivated 800 ha for alfalfa, maize etc for animals. The remaining area was used for grazing. This *shirkat* produced and sold 1,000 pieces of skin of Karakul sheep in 2007, which were kid skins of 3 to 7 days old after born. In order to preserve female sheep, male kids are mainly marketed. Though marketed skins might be considered small for the number of sheep of 20,400 head, this is due to the strategy to secure pure Karakul sheep. Skins are shipped at 5,000 sum per piece to leather factory at Bukhara, and exported to Russia, England, India and Saudi Arabia, etc. Income sources of this *shirkat* were sales of hide and skins, live animals, and wool marketed to Tashkent at the prices of 270 to 300 sum/kg. Currently they don't have any financial support from the government.

3.3.3 Animal Products Production in the Study Area

Based on available data, Beruni is characterized as the center of livestock production in the Study Area. In fact, Beruni is ranked at top of animal products of meat, milk, eggs and Karakul skins, excluding wool. Beruni is blessed in environment for crop production than the other 10 districts of the Study Area. It can be also said that forage yield is higher in Beruni. Quantity and quality of forage affect directly in the productivity of meat and milk. Especially, a stable forage production is required for cattle/cows that feed a lot of forage (usually fresh fodder equivalent to 10 to 12% of body weight per day). It might be thought that Beruni almost meets that conditions and it reflects in the number of livestock and animal products production. On the other hand, the production environment for wool in Kungrad is different from Beruni from the viewpoint of dependency on natural grazing.

Table 3.3.2 Animal Products Production in the Study Area (2006)

District	Meat (ton)	Milk (ton)	Wool (ton)	Karakul Hide (thousand pcs)	Egg (million pcs)
Kungrad	1,832	4,533	808	4,800	363
Muynak	398	458	31	0	44
Shumanay	1,477	4,896	260	0	685
Kanlikul	2,028	6,718	76	10	182
Kegeily	3,409	5,592	120	0	1,260
Chimbay	2,952	7,906	276	0	1,581
Khodjeyli	2,625	14,591	413	0	1,531
Nukus	803	3,933	55	0	759
Karauzyak	2,552	3,832	477	1,400	472
Takhtakupyr	2,282	3,559	605	4,400	92
Beruni	7,697	17,979	318	7,900	11,675
The Study Area	28,055	73,997	3,439	18,510	18,644

Source: Ministry of Economy of Republic of Karakalpakstan

Based on statistical data, the main producing districts of animal products will be shown as below:

Table 3.3.3 Main Animal Products Producing Areas

Products	Main Producing Areas
Meat	Beruni
Milk	Beruni, Khodjeyli
Egg	Beruni
Wool	Kungrad, Takhtakupyr
Karakul Skin	Beruni

3.3.4 Gross Products of Livestock Sector

The gross output of livestock sector in the Study Area is 47% and 53% for crop production. This fact implies the importance of livestock sector for regional and Karakalpakstan economy. The following figure shows the total gross output and its breakdown (crop and livestock) in 2006. The figure clarifies that Beruni is the major contributor among 11 districts of the Study Area and about 60% originates from the livestock sector. While, Muynak's output is ranked as the lowest in the Study Area.

Table 3.3.4 Share of *Fermer* and *Dehkan* in Agricultural and Livestock Production in the Study Area (2006)

Unit: million sum

Subsector / District	Total		*Fermer*		*Dehkan*		By Others	
	Crop	Livestock	Crop	Livestock	Crop	Livestock	Crop	Livestock
Kungrad	6,829.0	4,090.5	5,761.5	194.8	589.7	3,560.4	477.8	335.3
Muynak	430.4	707.1	57.0	39.2	27.7	540.4	345.7	127.5
Shumanay	6,071.2	3,758.2	4,982.0	82.8	251.8	3,665.9	837.4	9.5
Kanlikul	5,754.7	5,047.1	3,910.1	41.8	685.8	4,950.1	1,158.8	55.2
Kegeily	8,588.1	7,129.4	6,927.7	96.5	1,238.7	6,888.0	421.7	144.9
Chimbay	8,043.8	7,029.5	4,963.8	150.9	1,941.2	6,789.8	1,138.8	88.8
Khodjeyli	10,748.4	8,220.7	7,353.5	267.3	1,981.9	7,876.0	1,413.0	77.4
Nukus	4,650.9	2,406.0	2,299.2	106.1	606.7	2,298.8	1,745.0	1.1
Karauzyak	6,766.1	5,199.2	5,054.2	66.5	1,244.1	5,020.0	467.8	112.7
Takhtakupyr	5,077.7	4,486.3	3,286.4	8.8	320.4	3,991.8	1,470.9	485.7
Beruni	13,352.4	18,728.8	9,310.7	855.7	3,472.6	17,571.3	569.1	301.8
The Study Area	76,312.7	66,802.8	53,906.1	1,910.4	12,360.6	63,152.5	10,046.0	1,739.9
Karakalpakstan	131,744.5	114,528.3	93,372.7	3,931.9	27,987.2	107,951.8	10,384.6	2,644.6

Source: Ministry of Economy of Republic of Karakalpakstan

3.3.5 State of Forage Production

Data of forage production in Karakalpakstan is shown only in acreage, not in tonnage. In 2006, Kungrad had the largest area of forage cultivated by *fermer* in the Study Area, followed by Khodjeyli, and the smallest was Muynak with only 14 ha. Meanwhile, forage production by *dehkan* was largest in

Khodjeyli, followed by Chimbay. As to prairie or desert owned by *fermer*, another feeding source, was concentrated in the northern part of Nukus, rather small in Beruni. When comparing the available grazing land per head of sheep/goats, Karauzyak is ranked at top with 46 ha/head. However, an important thing was to analyze the carrying capacity of grazing land, not merely acreage.

Table 3.3.5 Status of Forage Production in the Study Area (2006)

District	*Fermer*		*Dehkan*		*Shirkat*		Total (ha)
	Area (ha)	Share	Area (ha)	Share	Area (ha)	Share	
Kungrad	2,377	67.1%	498	14.1%	667	18.8%	3,542
Muynak	14	13.3%	6	5.7%	85	81.0%	105
Shumanay	1,003	68.6%	448	30.6%	12	0.8%	1,463
Kanlikul	333	79.1%	63	15.0%	25	5.9%	421
Kegeily	932	34.8%	336	12.5%	1,414	52.7%	2,682
Chimbay	1,027	49.0%	757	36.1%	313	14.9%	2,097
Khodjeyli	1,994	60.0%	1,136	34.2%	193	5.8%	3,323
Nukus	1,094	83.0%	89	6.8%	135	10.2%	1,318
Karauzyak	557	61.5%	344	38.0%	4	0.4%	905
Takhtakupyr	911	44.1%	87	4.2%	1,069	51.7%	2,067
Beruni	1,312	54.3%	349	14.4%	755	31.3%	2,416
the Study Area	11,554	56.8%	4,113	20.2%	4,672	23.0%	20,339

Source: Ministry of Economy of Republic of Karakalpakstan

3.3.6 Marketing and Processing of Animal Products at Farm Level

Some *fermers* and *dehkans* are selling cow milk to small-scale milk factories and milk traders (mainly women) who transport it to Nukus city every morning. Bulk of milk is consumed by the producer's households mainly due to the lack of market and lack of systematic milk collection system. When selling, milk brings them a stable income of about 2,000 to 3,500 sum every day during about 200 to 250 days of lactation period. Prices of fresh milk have been increasing since last year. If the milk is processed into yoghurt and butter at home, it will add 350 to 500 sum/liter to fresh milk. A bulk of wool and Karakul sheep skins are considered to be traded mainly by *shirkat*s, judging from current share of wool production.

Each district has an animal market which is open in a weekly basis. For example, the animal market located at outskirts of Nukus city has about 1.5 ha acreage but no office in the area. Here, calf, matured cattle/cows, horses, sheep and goats are dealt. A lot of sheep/goats are dealt than cattle/cows. The buyers are *fermer* and *dehkan*, including non-farmers living nearby the market. The market is under the management of Nukus district office, who charges the users (sellers) with 500 sum/day/ person. Trucks and horse carts are usually used for transportation. Negotiation is done between seller and buyer based on appearance of animal, body weight, estimated age, condition of health, etc. Auction system is not practiced yet. Though the price of animal is different depending on breed and size/age, a matured cow with a calf costs 600,000 sum, 1.15 million sum per mature horse, and 150,000 sum per doe with kid at the market. In case of cattle for meat, the price is usually estimated with prevailing price of red meat, estimated body weight and yielding ratio of meat (for example, 350kg/head x 50% x 4,800 sum/kg=840,000 sum/head).

The most expensive meat in a market is pork, followed by beef and lamb. The following table shows the current prices of animal products:

Table 3.3.6 Prices of Livestock Products

(unit: sum)

Cattle/Cow	Sheep	Goat	Fresh Milk	Karakul Raw Skin
600,000-1,000,000	100,000-250,000	50,000-100,000	650-700/lit	5,000
Beef	Egg	Milk	Yoghurt	Cotton Meal
4,800/kg	200/pc	600-700/lit	1,000-1,200/lit	700/kg

3.3.7 Veterinary Services

Animal Husbandry Department and Veterinary Department under the Ministry of Agriculture and Water Resources are responsible for various veterinary services and animal management, and demarcation between the two (2) departments are as shown below:

Department of Animal Husbandry	Veterinary Department
-	Prevention of epidemic animal diseases
Development of cattle/animal husbandry	Quarantine check of livestock
Arrangement of planting and planning of fodder crops	Taking statistics about animal diseases
Development of poultry and fishery etc	Laboratory works (Inspection and diagnosis of animals)
-	Organizing state veterinarians and learning about foreign country's experiences
-	Development of artificial insemination works

It is inferred that Veterinary Department provides more practical veterinary services on rural areas than Animal Husbandry Department. One of an important service provided by Veterinary Department is artificial insemination (AI). However, 4,218 heads of cattle/cows were inseminated artificially in 2007, which was equivalent to 34% of the target of 13,144 heads in the Study Area. In comparison of accomplishment by 11 districts, Muynak was ranked at the top, followed by Nukus, Takhtakupyr and Kanlikul. Beruni, the major livestock producing district, reached 25.5% in its accomplishment. It is inferred that the reasons for difference in accomplishment rate among 11 districts will be arisen from accessibility to veterinary service office, availability of equipment for AI. Inseminators and awareness of livestock owners of breeding, though more detailed study is necessary. The present charge of AI is 10,000 sum for the first insemination and free for the second one.

Up to now, frozen granular of semen produced in breeding company at Tashkent district has been used in Karakalpakstan, but the company shifted from granule type to straw type since August 2008. On July 2008, the company was granted various AI equipment by non-project grant from Japanese Government. The company, government factory with self-support accounting system, prepared a catalogue showing the quality of breeding bulls. About 30 bulls had higher score (about 9.0 and more) to meet the demand for AI service covering all over Uzbekistan. Before inseminating, a frozen granular is melt in an ampoule of liquid solution.

The current AI service is carried out based on the following procedure:

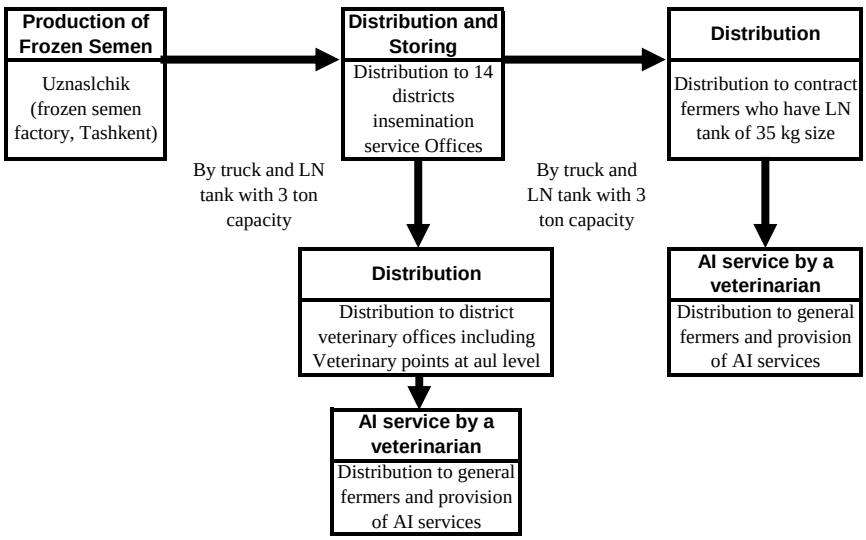


Fig. 3.3.1 Current Artificial Insemination Service System in Karakalpakstan

Various pay veterinary services other than AI are available in Karakalpakstan, for which the charge is imposed based on the rate of the minimum salary that is declared in the newspaper every month by the government, which was 21,000 sum/person/month in April 2008. These veterinary services are

providing at a veterinary point located at *aul* under the district veterinary office, though the conditions are different depending on the district. In January 2007, 38 veterinary offices were deployed in the Study Area.

3.4 Fisheries

3.4.1 Capture Fisheries

(1) Production[2]

Fishery production in Karakalpakstan has been increasing since the reformation operation of fishery activity, showing 131 tons in 2003 to 802 tons in 2007. The main species are common carp and silver carp (bighead carp is included probably). These two species consist in around 60% of the total production in recent four years. The production of pike parch were realized almost all (96.7% in 2007) in the lake Sarykamysh (Kungrad district, 200 km from Turkmenistan border with Karakalpakstan). Besides pike parch, some indigenous species such as roach, europian (wels) catfish (*Silurus glanis*) and bream (*Abramis brama*) are important species for its traditional consumption in the region and also concerning to ecological view, even though its contribution in total production is not high.

Table 3.4.1 Fishery Production in Karakalpakstan in Each District

	Capture production (realized)						(Planned Production)			
	2006		2007		increase		2008	2009	2010	2011
	(ton)	(%)	(ton)	(%)	(ton)	(%)	(ton)	(ton)	(ton)	(ton)
Kegeily	154.6	(25.5)	241.3	(30.1)	86.7	56.1				
Beruni	0.0	(0.0)	1.9	(0.2)	1.9					
Muynak	371.3	(61.3)	346.4	(43.1)	-24.9	-6.7				
Kungrad	32.5	(5.4)	146.1	(18.2)	113.6	349.7				
Karauzyak	7.8	(1.3)	21.6	(2.7)	13.8	175.6				
Kanlikul	0.0	(0.0)	0.0	(0.0)	0.0					
Takhtakupyr	11.6	(1.9)	35.6	(4.4)	24.0	206.7				
Khodjeyli	1.5	(0.2)	1.7	(0.2)	0.2	13.3				
Study Area	**579**	**(95.7)**	**795**	**(99.0)**	**215**	**37.2**				
Amudarya	2.0	(0.3)	0.3	(0.0)	-1.8	-87.5				
Ellikkala	2.5	(0.4)	4.9	(0.6)	2.4	99.0				
Turtkul	21.5	(3.6)	3.1	(0.4)	-18.4	-85.5				
Karakalpakstan	**605**	**(100.0)**	**803**	**(100.0)**	**198**	**32.6**	**1,000**	**1,200**	**1,400**	**1,600**

Source: Department of Animal Husbandry, MAWR of Karakalpakstan

The total area of registered water bodies for capture fisheries amounted 79,439 ha in 2007, which means 24% of increase since 2003. It seems that this increase degree is rather small compared to the degree of production increase, 512% since 2003, however, this difference is caused by the presence of some huge lake which traditionally has being used as fishery area such as the Lake Sarykamish and Lake Sudochie. The number of corporations and *fermers* which legislated for lease of water body has increased from 20 to 69 during this period. Capture production in 2007 was 802.9 tons, meaning in a increase of 32.6% since the previous year. Muynak district performs large proportion in fishery area and production, 76.8% and 43.1% of total amount respectively. However, regarding to the production, its performance has been slightly decreasing last several years. Kegeily district, with the second largest production area, realized its fishery production in only one lake near the Dawitkol lake, and performed the biggest production resource in 2007 (240 tons). The production of these two districts and Kungrad, Karauzyak and Takhtakupyr districts consisted of 98.5% of the total capture production in Karakalpakstan. Ministry of Agriculture and Water Resources and Fisheries Association of

[2] Statistical data is about all Karakalpakstan, including non-study area (Ellikalla, Turtkul, Amudarya). These districts contribute less than 1% of total production since 2004, except in 2006, 4.3%

Karakalpakstan are aiming to develop fisheries activity in the future, estimating 1,600 tons of fishery production. 11,000 ha of water bodies are estimated as available fishing area.

Table 3.4.2 Water Body Area Registered as Fishing Area in Karakalpakstan in Each District

District	Rented area (ha)						(Planned New Reclamation)			
	2006		2007		increase		2008	2009	2010	2011
	ha	(%)	ha	(%)	ha	(%)	(ha)	(ha)	(ha)	(ha)
Kegeily	5,633	(9.2)	4,633	(5.8)	-1,000	-17.7	n.a	n.a	n.a	n.a
Beruni	0	(0.0)	1,000	(1.3)	1,000					
Muynak	45,766	(74.9)	61,010	(76.8)	15,244	33.3				
Kungrad	3,481	(5.7)	4,661	(5.9)	1,180	33.9				
Karauzyak	406	(0.7)	644	(0.8)	238	58.6				
Kanlikul	0	(0.0)	241	(0.3)	241					
Takhtakupyr	3,160	(5.2)	3,160	(4.0)	0	0.0				
Khodjeyli	225	(0.4)	125	(0.2)	-100	-44.4				
Study Area	**58,671**	**(96.0)**	**75,474**	**(95.0)**	**16,803**	**28.6**				
Amudarya	81	(0.1)	50	(0.1)	-31	-38.3				
Ellikkala	2,004	(3.3)	3,697	(4.7)	1,693	84.5				
Turtkul	352	(0.6)	217	(0.3)	-135	-38.4				
Karakalpakstan	**61,109**	**(100.0)**	**79,439**	**(100.0)**	**18,330**	**30.0**	170	185	195	200

Source: Department of Animal Husbandry, MAWR of Karakalpakstan n.a: data breakdown not available

Fishery activity is practiced by private organizations, corporations and *fermers*. Most fishery bodies are in Muynak district, consisted by 26 and Kungrad follows with 11. After reformation operation aiming to de-monopolization of fishery activity in 2003, capture fisheries has started under new system by registration of water body use, with exclusive rights of capture fishery permitted by the Ministry of Agriculture and Water Resources. In 2003, fishery actors were only consisted by companies. Then, *fermers* begun to enter to the activity and increased gradually, reaching 16 registered *fermers* (29.6%) in study area in 2007.

Table 3.4.3 Number of Fishery *Fermer* (F) and Non-*Fermer* (NF) in Karakalpakstan by District

2003			2004			2005			District	2006			2007		
F	NF	Total	F	NF	Total	F	NF	Total		F	NF	Total	F	NF	Total
0	19	19	7	25	32	16	33	49	Kegeily	1	4	5	1	4	5
									Beruni	0	0	0	1	0	1
									Muynak	6	11	17	8	18	26
									Kungrad	1	6	7	1	10	11
									Karauzyak	1	1	2	1	3	4
									Kanlikul	0	0	0	2	0	2
									Takhtakupyr	1	3	4	2	2	4
									Khodjeyli	0	1	1	0	1	1
									Study Area	**10**	**26**	**36**	**16**	**38**	**54**
									Amudarya	0	1	1	0	1	1
									Ellikkala	4	1	5	8	1	9
									Turtkul	2	2	4	3	2	5
0	19	**19**	7	25	**32**	16	33	**49**	**Karakalpakstan**	**16**	**30**	**46**	**27**	**42**	**69**

Source: Department of Animal Husbandry, MAWR of Karakalpakstan

However, most part of the production still have been realized by companies (non-*fermers*). These companies rent water bodies from which large amount of capture production have been achieved after the Aral Sea decrease. Production from these area occupies 86% while 14% is from area rented by *fermers* in the Study Area.

Table 3.4.4 Number, Production and Rented Area by Fishery *Fermers* and non-*Fermers*

	2006		2007		increase	
	No.	(%)	No.	(%)	No.	(%)
Number of Fishery Body						
Study Area *Fermer*	10	(21.7)	16	(23.2)	6	60.0
Non-*fermer*	26	(56.5)	38	(55.1)	12	46.2
Total of Study Area	36	(78.3)	54	(78.3)	18	50.0
(other area of Karakalpakstan) *Fermer*	6	(13.0)	11	(15.9)	5	83.3.7
Non-*fermer*	4	(8.7)	4	(5.8)	0	0.0
Karakalpakstan	46	(100.0)	69	(100.0)	23	50.0
Production (t)	ton	%	ton	%	ton	%
Study Area *Fermer*	99.73	(16.5)	111.83	(13.9)	12.1	12.1
Non-*fermer*	479.64	(79.2)	682.82	(85.0)	203.2	42.4
Total of Study Area	579.37	(95.7)	794.65	(99.0)	215	37.2
(other area of Karakalpakstan) *Fermer*	2.33	(0.4)	4.75	(0.6)	2	103.9
Non-fermer	23.65	(3.9)	3.49	(0.4)	-20	-85.2
Karakalpakstan	605.35	(100.0)	802.89	(100.0)	197.5	32.6
Rented area (ha)	ha	%	ha	%	ha	%
Study Area *Fermer*	13,316	(21.8)	19,755	(24.9)	6,439	48.4
Non-*fermer*	45,355	(74.2)	55,719	(70.1)	10,364	22.8
Total of Study Area	58,671	(96.0)	75,474	(95.0)	16,803	28.6
(other area of Karakalpakstan) *Fermer*	1,973.8	(3.2)	2,396.4	(3.0)	423	21.4
Non-fermer	463.7	(0.8)	1,568	(2.0)	1,104	238.1
Karakalpakstan	61,109	(100.0)	79,439	(100.0)	18,330	30.0

Source: Department of Animal Husbandry, MAWR of Karakalpakstan

The main fishing season is from middle September to April. May and June is set as closed season by the government, aiming to conserve fish spawning in natural environment. In July and August, fishing activity is limited to be performed because of quality degradation of the products due to the absence of cold storage in high temperature. Main fishing method is gill-net using engine or rowing boat.

Aiming to preserve natural aquatic environment, State Natural Protection Committee obligates renters of water body to restock fingerling. Before 2003, this regulation was observed with the support of State Joint Stock Corporation *Uzbalik*, to which the government passed fishery cooperation's shares for management contributing budget for cooperation to buy fingerlings to restock. However, after the privatization of fishery cooperation in 2003 *Uzbalik* was dissolved and the responsibility of restock regulation was shifted completely to each fishery body resulting in the deterioration of the regulation.

On the other hand, some fishery body is restocking their rented water body to increase fishery resource to achieve more fish catch. They collect natural fingerlings, consisting of mainly common carp, silver carp, snakehead and crucian carp, from channel beside rice field.

Table 3.4.5 Obligatory Number of Alevin to be Restocked by District

District	2007	2008
Kegeyli	200	210
Beruniy	25	30
Muynak	850	1,050
Kungrad	240	330
Karauzyak	10	9
Kanlikul	60	80
Tahtakupir	65	75
Kodjeyli	5	4
Chimbay	5	4
Shumanay	8	80
Study Area	1,468	1,872
Ellikkala	15	16
Turtkul	10	8
Amudarya	7	4
Karakalpakstan	1,500	1,900

Source: Department of Animal Husbandry, MAWR of Karakalpakstan

Table 3.4.6 Number of Fishery Body which Practiced Alevin Restocking

	2006			2007		
	No. of fishery body	No. of restock (*1,000)	Density (fish/ha)	No. of fishery body	No. of restock (*1,000)	Density (fish/ha)
Muynak	3	2,656	202.1	4	2,070	71.7
Tahtakpyr	1	200	1212.9	2	91	39.2
Karauzyak	1	16	64.1	1	21	80.7
Total	5	2,872	211.8	7	2,182	69.4

Source: Department of Animal Husbandry, MAWR of Karakalpakstan

According to the production statistic in 2007 and 2008 (until April), more fish catch was realized in restocked areas and non-restocked areas were suggested to restock to increase fish catch. However, additional information, such as fishing efforts, it is needed to evaluate its effectiveness statistically,

Table 3.4.7 Difference of Productions between Restocking-practiced and Non-practiced Fishery Body

	No. of Fishery Body	Total Rented area (ha)	Production in 2007 (t) (A)	Production in 2008 (till Apr. (ton) (B)	B/A (%)
Restocking-practiced*	8	31,876	335.1	188.6	56.3
Non-practiced**	20	22,152	409.0	65.9	16.1

* Fishery body which practiced restocking in 2006 or 2007 (or in both years)

** Fishery body which produced more than 5t in 2007 and informed production in 2008

Source: Department of Animal Husbandry, MAWR of Karakalpakstan

3.4.2 Aquaculture

(1) Aquaculture Actors

In Karakalpakstan at present, fishery activity is consisted only of capture fishing leasing water bodies such as lakes and reservoirs. Aquaculture production using artificial pond have not been practiced except in few trial-base culturists currently as the following description.

Non-exploited area can be transferred with *hakim's* permission of each district to exploit new production area. A person in Nukus district started fish culture using pond constructed in his land applying the system mentioned above. He, had not have any land formerly, obtained 0.3 ha of land in 2006 and constructed a pond of 2 m depth by his own payment, 300,000 to 400,000 sum approximately. He introduced fingerling of grass carp from natural water channel in 2007, culturing it feeding cattle and poultry feed, Kombikorm. The first harvest is estimated in autumn next year.

In Turtkul district, not in the Study Area, one *fermer* started to lease 12 ha aiming to realize fish production in 2004. He released fingerlings (common carp, grass carp, silver carp and bighead carp) in 1.5ha artificial pond constructed by his own payment. He fed Kombikorm three times per day and the fish released in the first year already have grown to around 70 cm and harvested 2 to 3 times monthly to be offered in his café. The annual production of this farm was 1.1 ton in 2007.

Some swamps, which are not well adequate for capture fishery, are leased aiming to extensive aquaculture use, with additional digging for enough water depth and releasing alevin with additional feeding (kombikorm). This plan has not practiced and the availability of such kind of area in the Study Area is still not clear, yet its potential might be analyzed.

(2) Alevin Production

At present, there is no alevin production unit in Karakalpakstan, except only one trial-base unit by natural spawning in Turtkul (see below). No production unit practice artificial and natural breeding with broodstock produced by themselves. Therefore sources of alevin supply are limited. Only natural

alevin is collected in irrigation channel in autumn or cultured in Khorezm Balik nowadays. Formerly, one corporation in Muynak, Amudarya, had produced alevin of common carp and grass carp by artificial breeding during 1978 to 2002, aiming to release into their own area of fishing. However the activity has already totally be suspended. One corporation in Nukus, Nukus Balik, has tried artificial breeding only for two years (1988 and 1989).

Currently some trials to establish alevin production with artificial breeding have been planned. Nukus Balik constructed new hatchery building together with Russian capital as a joint business, aiming to do artificial breeding and alevin production by their own 300 broodstock (common carp, silver carp and grass carp) planning an annual production of 500 thousands grams of alevin. Above-mentioned *fermer* in Turtkul has practiced natural spawning in their pond since April 2008, using well-matured broodstock of common carp introduced from Khorezm Balik. And they also have introduced newly hatched larvae in trial, produced in Khorazm Balik, and these alevins were supposed to be distributed to capture fishery organizations to release into water bodies. They has a plan that construct their own hatchery beside their pond this year, however the project still have not commenced and practice of artificial breeding will be next spawning season in 2009 at least.

3.4.3 Fish Processing

Historically, in 1950-60's, Fish Industrial Association in Muynak had produced several kind of processed fish using fish of the Aral Sea. It recorded 2,000 tons of smoked fish, 1,400 tons of frozen fish and 20,000 units of canned fish in a year in its production peak. The production had drastically decreased due to the Aral Sea reduction and the factories closed. A trial to re-opening the factory was carried out using fish products caught from several water bodies around Muynak, but the project was suspended due to financial shortage.

Smoked fish is produced using all kind of commercial fish species and sold at the market in Nukus. Many of them are supposed to be produced by home-made scale. Nukus Balik produces smoked fish since 2006 in small scale (20-25 tons/year) and have plan to construct processing factory this year, estimating a production of 200-240 tons/year. They also have produced approximately 240 tons of frozen fish annually for 6-7 years using fish caught in their fishing area, the Lake Sariqamish and the Lake Dawitkol, including Pike perch (Stizostedion lucioperca), which is exported to Russia.

Some fishermen make salted fish to avoid decomposition of the products in hot season for local consumption.

3.4.4 Administrative Structure

The Department of Animal Husbandry, MAWR of Karakalpakstan is the prime organization of the fishery administrative structure in Karakalpakstan. The sector of Fishery in the Department of Animal Husbandry manages registration of water bodies by leasing period of ten years. Fishery Association was established in 2006, with 50 fishery corporations and *fermers*. The Fishery Association cooperate to promote fishery activities in Karakalpakstan with some principal role such as: 1) Get fishery information from fish farm about catchments about every quarter, 2) Provide assistance to fish farms in receiving necessary equipment and credits, 3) Provide assistance to fish farms to introduce new technologies, develop business plans and involve foreign investors, 4) Protect fish farm's interests and rights against the government institutions and deliver their demands to *Hakimiyats*, and 5) Provide assistance in solving conflicts in the court.

3.5 Irrigation and Drainage

3.5.1 Irrigation

(1) Irrigation System in the Study Area

As mentioned in the Chapter 2, the irrigated area of Karakalpakstan, which is approximately 500,000 ha, is serviced by 6 irrigation systems. Among them, 5 irrigation systems give irrigation services to an irrigation area of 395,000 ha in the Study Area, i.e., the Pakhtaaran-Nayman, the Kattagar-Bozataw, the Kizketken-Kegeyli, the Kuwanishjaram and the Suwenli irrigation System. As for the Pakhtaaran-Nayman Irrigation System, only Beruni District is included in the Study Area.

Within the main and inter-farm canal systems, there are 1,183 divisions and pump equipment is used to water delivering in half of the divisions. The ratio relying to pump is significantly high in Beruni District and rather lower in Kegeyli and Chimbay Districts.

Table 3.5.1 Irrigation System of the Study Area

Name of Irrigation Systems	Irrigation Area (ha)	Number of Division			Main canals	Major District
		Total	With Pump			
Pakhtaarna - Nayman*	33,031	237	202	85%		Beruni
Kattagar - Buzataw	54,253	145	67	46%	Kizketken, Anasai	Nukus
Kizketken - Kegeyli	86,542	227	73	32%	Kizketken, Kegeyli	Kegeyli, Chimbay
Suwenli	147,206	426	167	39%	Suenli, Paralleli	Khodjeyli, Shumanay, Kanlikul, Kungrad, Muynak
Kuanishjarma	73,697	148	80	54%	Kuwanishjarma	Karauzyak, Takhtakupyr
Total	394,729	1,183	589	50%		

* The table shows the figures of the territory of Beruni District, which is included in the Study Area.
Source: Lower Amudarya Irrigation System Department

The practical operation and maintenance of the main and inter-farm canal system is conducted by Irrigation Units established under ISD. The Irrigation Unit is located mostly in each district. In the case of Suwenli ISD, there are 7 Irrigation Units beside the head office located in Kanlikul. The ISD has 399 permanent staffs, of which 29 are for the head office and 360 are for the Irrigation Units. The organization and staff allocation of the Suwenli ISD is as shown below:

Table 3.5.2 Organization and Number of Staff of Suwenli Irrigation Department

Head office		Irrigation Unit	
Director's Office	3	Kungrad IU	50
Water Balance Unit	4	Shumanay IU	36
Hydraulic Facility and Irrigation System Operation Unit	2	Kanlikul IU	43
Transport and Mechanization Unit	2	Muynak IU	31
Accountant Unit	3	Khodjeyli No.1 IU	61
Controller's Office	4	Khodjeyli No.2 IU	50
Human Resources Unit	2	Tabankol-Suwenli IU	24
Telemeter and Communication Unit	1	Total in Irrigation Unit	295
Economical Analysis and Finance Unit	2	Transportation service personnel	75
Hydrometric Service Unit	1		
Maintenance and Monitoring Unit	2	Irrigation System Department	
Materials and Equipment Unit	1		
General Affairs Unit	2	Total in Suwenli ISD	399
Total in Head Office	29		

Source: Suwenli ISD

Construction machinery to maintaining canal system is allocated to each ISD. There are 59 excavators and 34 bulldozers, which are in use, in the Study Area as shown below. Most of machinery are Russian-made, which are old, and some are new China-made ones. The condition of machinery is not so good in general except for new China-made ones. The ISDs of the Study Area maintained 639 km of canals, which is 18% of the total length, and expensed 1,389 million sum to maintain the canal systems in 2007.

Table 3.5.3 Number of Active Construction Machinery for Canal Maintenance

Irrigation System Department	Length of Main and Inter-farm Canal (km)	Excavator	Bulldozer
Pakhtaarna-Nayman ISD, Beruni Branch	333	11	6
Kattagar-Bozataw ISD	396	7	3
Kizketken-Kegeily ISD	466	15	7
Chimbay		(9)	(2)
Kegeily		(6)	(5)
Kuwanishjarma ISD	339	9	3
Karauzyak		(5)	(2)
Takhtakupyr		(4)	(1)
Suwenli ISD	1,080	22	15
Total in the Study Area	2,614	64	34

As of September 1, 2008 Source: ISDs

(2) Irrigation Water Use and Irrigated Area

Among the irrigation area of 295,000 ha in the Study Area, 173,000 ha of farmland was irrigated (cropped) in 2006, which is equivalent to 44% of the total (refer to Section 3.2). The ratio of usage of irrigation land varies by districts. Khodjeyli, Beruni and Nukus Districts showed high usage of irrigation land and Muynak showed significantly low usage. The high usage rate was observed in the area in the upstream of main canals, (Khodjeyli is upstream of the Suwenli main canal system and Nukus is upstream of the Kizketken and Anasai main canal system) or close to the water source of the Amudarya River (Beruni takes water from the River directly by pump). Even though it cannot be concluded that the usage of irrigation land depends on the access to water that is considered as one of the important factor to decide usage of irrigation land.

Table 3.5.4 Irrigation Land and Cropped Area by District in 2006

District	Irrigation Land (ha)	Cropped Area (ha)	Ratio of Usage (%)
Beruni	33,115	21,459	64.8
Nukus	31,009	17,935	57.8
Kegeily	53,849	18,602	34.5
Chimbay	53,122	18,249	34.4
Karauzyak	35,383	14,412	40.7
Takhtakupyr	34,649	13,038	37.6
Khodjeyli	35,277	24,906	70.6
Kanlikul	34,661	12,549	36.2
Shumanay	28,697	12,985	45.2
Kungrad	41,540	17,330	41.7
Muynak	11,926	1,206	10.1
Study Area	393,228	172,671	43.9
Karakalpakstan	500,383	252,848	50.5

Source: The Ministry of Economy of the Republic of Karakalpakstan

(3) Condition of Main and Inter-farm Irrigation System

The main and inter-farm canal systems are operated and maintenance by irrigation system departments under the governmental finance. The following table shows the design capacity and present capacity of canals assess by the irrigation system departments. The Kizketken Main Canal, which functions as a headrace of the Kegeyli, and the Kuwanishjarma Main Canals as well as supplying water to its own beneficiary area, was designed for a capacity of 400 m^3/s and at present it has 66% of the design capacity. The Kegeily, the Kuwanishjaram and Anasai Main Canals have capacity of 71%, 60% and 44% of the designed one respectively. For the inter-farm canals, the present capacity varies by canals, but it is assessed 76% in average for Kizketken-Kegeily Irrigation System, 61% for Kuwanishjarma Irrigation System and 61% for Kattagar-Bozataw Irrigation System. The reduction of the discharge capacity is mainly caused by sedimentation in the canal bed and clasp of canal embankment. Even there is significant reduction of discharge capacity of canal system, the water distribution in the main and inter-farm canal system is not pointed out because the present irrigated area (cropped area) was

reduced due to the limit of available water resource in the river or dams. The present capacity is considered to be enough to distribute water at the present level, however, it is expected to become a problem when the re-expansion of irrigated (cropped) area reaches the former level.

Table 3.5.5 Design and Present Capacity of Some of Main and Inter-farm Canals

Name of canal	Length (km)	Design Capacity (m^3/s)	Present Capacity (m^3/s)
Kizketken-Kegeyli Irrigation System			
Kizketken Main Canal	25.2	400	66%
Kegeyli Main Canal	55.4	160	71%
Major 3 inter-farm canals	1010	20	69~80% (76% in average)
Kuwanishjarma Irrigation System			
Kuwanishjarma Main Canal	82.1	200	60%
Major 14 inter-farm canals	231	2~60	45~83% (61% in average)
Kattagar-Bozataw Irrigation System			
Anasay Main Canal	13.5	342	44%
Major 15 inter-farm canals	376	3~180	25~100% (61% in average)

Source: Irrigation System department of Kizketken-Kegeyli, Kuwanishjarma and Kattagar-Bozataw

It is required a big effort of maintenance works in order to maintain the function of the canal system even in the level mentioned above. The Irrigation System Departments make efforts to clean and dig and repair the related facilities every year. The work amount for the maintenance of irrigation systems are shown below. The irrigation system departments maintained 639 km of canals, which is 18% of the total length, and expensed 1,389 million sum for maintenance of canal systems in 2007.

Table 3.5.6 Maintenance Work of Main and Inter-farm Canal System in 2007

Irrigation System	Total Length (km)	Cleaning of Irrigation Canal			Repair of Hydraulic Structure		Repair of Hydro-post	
		Distance (km)	Amount of work (m^3)	Cost (1000 sum)	No.	Cost (1000 sum)	No.	Cost (1000 sum)
Pakhtaarna-Nayman	973	195	1,929	375,317	40	89,779	29	18,203
Mangit-nazarhan	289	92	954	154,400	12	9,448	34	7,505
Kattagar-Boztaw	396	37	178	33,800	14	32,600	47	5,700
Kizketken-Kegeyli	466	93	317	66,903	26	24,700	45	21,830
Kuwanishjarma	339	70	578	116,600	14	30,624	43	9,821
Suwenli	1,080	152	849	219,403	56	118,262	48	54,150
Total of Karakalpakstan	3,542	639	4,805	966,423	162	305,413	246	117,209

Source: LABM

(4) Condition of Internal Irrigation System

There are 13,434 km of internal canals in the Study Area where 18,510 km are in Karakalpakstan. The density of internal canal is calculated to be 34 m/ha in the Study Area and it is considered to be sufficient or close to sufficient level from the aspect of density.

The internal canal system is operated and maintained by WUA by its own budget. The condition of internal canal is generally poor. Due to lack of machinery and budget, WUA cannot maintain canals and other hydraulic structures properly. Sedimentation and collapse of embankments reduce the canal capacity. Damages of crossing work with roads or drainage canals sometimes cause stagnation of water in the canal. In addition, lack or damage of water facilities in the canal system such as division box, intake of farms, hydro-post (water measurement facility) make proper water management in the internal canal system difficult and increase water loss in the canal.

Due to poor condition of canal and its hydraulic systems, the water management in the internal irrigation system is not efficient and water loss is large. According to the Study of GEF/WEMP, in Uzbekistan, 25% of water withdrawn from rivers is lost during conveyance in the main and inter-farm canal system, 24% of water is lost during transportation in the internal canal and another 24 % of water lost in operation in the internal canal.

According to the Irrigation System and Hydro-technical Facility Unit of the Lower Amudarya Basin ISD, 3,555 km of internal canal was cleaned in the Study Area in 2007, which was carried by the budget of WUAs and famers. It was equivalent to 19% of the total length in a year. However, it should be considered that half of it was cleaned manually, which was only weeding and light earth work. Even WUAs and farmers make big effort to maintain the internal canal system, but it is not enough to maintain its necessary function.

Table 3.5.7 Maintenance Work of Internal Canal System in 2007

Items	Total Distance (km)	Total of Cleaning Work		by machine		by hand	
		Distance (km)	Work amount (1000 m^3)	Distance (km)	Work amount (1000 m^3)	Distance (km)	Work amount (1000 m^3)
Study Area	13,434	3,555	5,773	1,968	5,378	1,587	395
Karakalpakstan	18,510	5,307	7,854	2,750	7,199	2,557	655

Items	Repair of Hydraulic Structure		Repair of Hydro-post		Repair of Intake	
	No.	Cost (1000 sum)	No.	Cost (1000 sum)	No.	Cost (1000 sum)
Study Area	231	55,674	769	47,563	2,000	71,260
Karakalpakstan	342	76,772	1,229	71,561	3,451	126,233

Source: LABM

(5) Irrigation in Field

Irrigation Technique in Field

Most farmers apply gravity type irrigation in their field in the Study Area such as furrow irrigation for cotton, wheat, vegetables, etc. and sometimes basin irrigation is applied to fruits trees. During the Soviet era, large scale sprinkler irrigation systems were introduced in some parts, however, it disappeared due to the high cost and difficulty to maintaining the equipment. Drip irrigation systems are observed in large scale green houses , which can be found in Nukus and Kungrad Districts. Green houses located in Nukus District are operated as a state company and the others are operated by private enterprise.

Because gravity type irrigation is the majority, the surface condition of the field affects directly to the amount of water use. Due to the lack of machinery and fuels, farmers cannot make enough land leveling work to their field and thus farmers tend to give more than necessary water to the field in order to cover the whole crops. It does not only make water use inefficient but also upraising groundwater table by surplus of irrigation water.

Irrigation Water Requirement and Irrigation Schedule

The water requirement for crops varies from the soil conditions, especially the salinity condition. In the Study Area, the Irrigation System Departments gives information on the water requirement applying irrigation scheduling to farmers. For example, water requirement of cotton varies from 4,700 m^3/ha to 6,100 m^3/ha and maize varies from 4,937 m^3/ha to 5,900 m^3/ha. A 0.74 of the conveyance and management efficiency is considered to plan the water distribution to decide the water volume to be delivered to the farms. The sample of irrigation schedule from Nukes District is shown in the following table.

Table 3.5.8 Irrigation Water Requirement (Samples of Few Districts)

Sample	Nukus District		Chimbay District		Karauzyak District	
Crop	Times of Irrigation	Water Requirement (m^3/ha)	Times of Irrigation	Water Requirement (m^3/ha)	Times of Irrigation	Water Requirement (m^3/ha)
Cotton	5	6,100	5	5,300	5	4,701
Alfalfa	5	6,600	9	8,500	7	7,272
Maize	5	5,900	5	5,100	5	4,937
Vegetables			15	9,200	15	7,944
Rice	11	22,400	11	22,400	11	22,404
Wheat	2	3,000	2	3,000	2	3,037
Backyard Garden Plot		7,500		7,200		7,194

Source: Study Team, Interviewed with WUAs.

Fig. 3.5.1 Irrigation Schedule and Water Requirement (Sample of Nukus District)

Crop	Times of Irrigation	Water Requirement (m^3/ha)	April			May			June			July			August			September		
			I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III
Cotton	5	6,100						1,100	1,100	1,200		1,300	1,300	1,200	1,200					
Alfalfa	5	6,600			1,000	1,000	1,100	1,100	1,200	1,200	1,200	1,100	1,100	1,000	1,000					
Maize & Sorghum	5	5,900						1,100	1,100	1,200		1,300	1,200	1,100	1,100					
Vegetables	5	3,800				700	700	800	800	800		800	700	700						
Potato & Vegetables	11	7,700			700	700	700	700	700	700	700	700	700	700	700	700	700	700		
Orchard & Vineyard	3	3,700						1,200	1,200	1,200		1,300	1,300	1,200	1,200					
Rice	11	22,400				2,000	2,000	2,000	2,000	2,000	2,000	2,100	2,100	2,100	2,100	2,000	2,000	2,000	2,000	2,000
Wheat	2	3,000			1,500	1,500	1,500													
Other Grains	5	5,400						1,000	1,000	1,100		1,200	1,100	1,000	1,000					
Backyard Garden Plot		7,500	7,500																	

Source: Study Team, Interviewed with WUAs.

Leaching

The farmers have to wash out salt in their farmland before each cultivation period because of salinity problems in the field. The frequency and volume of leaching water depends on the salinity condition and farm condition, especially the leveling and drainage conditions. Usually the field leaching is carried from October to the beginning of April and the last leaching is done just before seeding the crop. According to the interview with a farmer in Karauzyak District, he uses 6,000 m^3/ha of water three times to leach high salinity fields and 4,000 m^3/ha in two times to leach moderate salinity fields. In another sample of interview in Kanlikul District, it was utilized 6,000 m^3/ha in tree times to leach heavy saline field, 2,500 m^3/ha in two times to leach medium salinity fields and 1,500 m^3/ha in two times to leach moderate salinity fields.

The field of which surface is not flat and drainage condition is poor requires lager volume of water for leaching. In appropriate leaching with larger water volume elevates the groundwater table that results in filed salinization. Thus, land leveling and maintenance of on-farm drainage are considered as key issues to increase the effect of leaching and efficiency of water use.

3.5.2 Drainage and Salinity Problems

(1) Drainage Systems in the Study Area

The construction of collector/drainage networks was started at the beginning of 1960's in Karakalpakstan,. At that time, the collector/drainage networks were constructed mainly on the existing and newly developed lands which needed improvement.

The drainage system of the right bank of the Amudarya River is composed of the main collector KS-1, KS-3 and KS-4, which covers Kegeyli, Chimbay, Nukus, Karauzyak and Takhtakupyr districts with an irrigated area of 83,800 ha. The drainage system of the left bank of the Amudarya River covers the territories of Khodjeyli, Shumanay, Kanlikul and Kungrad Districts. The main collector systems are the Kungrad Collector and the Main Left Bank Collector. The Main Left Bank Collector receives drainage water from 40,000 ha of irrigated land.

(2) Condition of Inter-farm and Internal Collectors

The category of drainage canals has been modified in inter-district collectors and inter-farm collectors under the implementation of the National Drainage Improvement Program, which were called main collectors, inter-farm collectors and internal collectors in the former category. The condition of collectors are explained in the form of the former category in this chapter to avoid any confusion in the categorization of drainage canals.

There are 2,148 km of main and inter-farm collector systems and 12,612 km of internal collector system in the Study Area in total. Principally, the main and inter-farm collectors are operated and maintained by the states organization and the Water Users Associations (WUAs) have the responsibility to maintaining the internal collectors. Part of the maintenance of internal collector is

burdened by the government since 1996 due to the difficulty to maintaining internal collectors by WUAs. According to the report by the Karakalpakstan Hydro-meliorative Expedition (Karakalpakstan HME), 17% was maintained (cleaned) by the governmental budget in 2007. The investment of the government to the maintenance of drainage systems were 658 million sum for the main and inter-farm collectors and 232 million sum for internal collectors in 2007.

Table 3.5.9 Maintenance Work of Main and Inter-farm Collector in 2007

	Total Distance (km)	Cleaning Work by Governmental Finance		
		Distance of work (km)	Work amount (1000 m^3)	Cost (1000 sum)
Study Area	2,148	409	3,325	474,000
Karakalpakstan	3,274	592	4,742	658,200

Source: Karakalpakstan HME

The condition of internal collectors and internal irrigation canals is considered poor. Some of the collectors are filled at the passing road and proper crossing work is not equipped. Many of the crossing works are damaged or sometimes buried, so they are out of function. The actual performance of cleaning works of internal collectors counts approximately 1,500 km that represents only 15 % of the total length. It means that it will take around 7 years to clean all distance though it is necessary to make cleaning work one time in 3 ~4 years to maintain the function.

Currently, the density of internal collectors is approximately 400m of intervals in average with 2 to 3 m depth. It is said that 50 to 70 m interval of internal canal is necessary in order to control groundwater table properly, thus, the current internal collectors are insufficient and it is necessary to be developed.

Table 3.5.10 Maintenance Work of Internal Collector in 2007

	Total Distance (km)	Financed by Government			Self-financed by WUA and Farmers	
		Distance of work (km)	Work amount (1000 m^3)	Cost (1000 sum)	Distance of work (km)	Work amount (1000 m^3)
Study Area	12,612	307	1,158	182,200	1,232	3,589
Karakalpakstan	16,421	404	1,462	232,400	2,024	5,866

Source: Karakalpakstan HME

(3) Salinity Problems

Karakalpakstan -HME is observing salt concentration of underground water and water level 4 times per year including the beginning of April which is after the leaching and October which is after the cultivation period using observation wells. On the other hand, salt concentration of soil is monitored once in two years by excavation of approximately 1.0 m hole per 25 ha. The results of the soil monitoring are divided into four categories based on the level of salt accumulation. The results of observations are compiled by Karakalpakstan -HME and submitted to MAWR of Karakalpakstan. In addition, Land Salinization Maps written in longhand are elaborated for each district except Chimbay and Kegeyli. Because district boundary between Chimayo and Kegeyli is not settled after elimination and consolidation of districts, therefore, topographical map is not elaborated for the two districts. Salt concentration of observation well, the result of evaluation of irrigation water and the result of soil analysis in 2007 compiled by Karakalpakstan -HME are shown in the following table. According to the analysis results, irrigation water contain salt in the whole Karakalpakstan and irrigation water has a salinity level of 1.0g/lit. to 2.0g/lit. in the Study area except Beruni. If salt concentration become more than 0.1 %, effect on growth of paddy rice which have resistance to salt damage relatively become marked and yield of paddy rice will widely be reduced. Therefore, it is imagined that salt concentration of irrigation water is the cause for the reduction of yield of other crops. In addition, it is understood that salinity is supplied by not only underground water but also by the Amudarya. On the other hand, the area ratio where are categorized in Medium and Heavy salt damage area out of four categorizes of soil analysis is 48.04 % as an average in Karakalpakstan and 6 districts of the 11 districts have salinity with more than the average ratio in the Study area. Especially, Kegeyli and Muynak marked very high ratio such as 66.87 % and 73.35 % respectively. Since districts, which

where marked with rates more than the average are located at the end of irrigation systems except Nukus, it is imagined that difference of salt accumulation will be occurred according to accessibility of irrigation water.

Table 3.5.11 Situation of Salt Accumulation in Karakalpakstan, 2007

No.	Name of District	Total developed irrigation area (ha)	Distribution of salt damage area classified by observation well data (ha)			Distribution of salt damage area classified by irrigation water (ha)			Distribution of salt damage area classified by soil (ha)				Ratio of Heavy and Medium salt damage (%)
			Less than 1.0 g/lit.	1.0 to 3.0 g/lit.	More than 3.0	Less than 1.0 g/lit.	1.0 to 2.0 g/lit.	More than 2.0 g/lit.	No salt damage	Light salt damage	Medium salt damage	Heavy salt damage	
1	Turtkul	31,751	510	27,041	4,200	31,751			7,740	10,420	10,100	3,491	42.80
2	Ellikqala	34,051	60	32,331	1,660	34,051			8,820	6,825	11,949	6,457	54.05
3	Beruni	33,115		31,125	1,990	33,115			10,880	8,160	9,426	4,649	42.50
4	Amudarya	39,583	30	34,503	5,050		39,583		7,040	13,553	13,252	5,738	47.98
5	Khodjeyli	35,488		29,238	6,250		35,488		9,200	15,706	9,110	1,472	29.82
6	Shumanay	28,697		25,967	2,730		28,697		3,500	9,437	10,361	5,399	54.92
7	Kanlikul	34,661	300	31,521	2,840		34,661		11,395	9,137	11,690	2,439	40.76
8	Kungrad	41,540	260	40,540	740		41,540		10,610	18,340	11,451	1,139	30.31
9	Nukus	31,009		25,487	5,522		31,009		6,802	9,293	10,858	4,056	48.10
10	Kegeyli	53,849		41,249	12,600		53,849		6,099	11,739	29,977	6,034	66.87
11	Chimbay	53,122		48,542	4,580		53,122		11,393	17,354	18,930	5,445	45.88
12	Karauzyak	35,383	40	33,680	1,663		35,383		6,044	10,713	11,780	6,846	52.64
13	Takutakupyr	34,649		20,510	14,139		34,649		6,220	11,313	12,131	4,985	49.40
14	Muynak	15,545		7,255	8,290		15,545		1,345	2,797	10,156	1,247	73.35
15	Other	1,559		1,559			1,559				1,559		100.00
Total of RK		504,002	1,200	430,548	72,254	98,917	405,085	0	107,088	154,787	182,730	59,397	48.04

3.5.3 Water Users Associations

(1) Legal Background of WUA and Its Responsibility

After the dissolution of *shirkats*, the Water Users Associations (WUAs) had been established in order to succeed the property of the internal irrigation and drainage system and maintain the machinery. The WUAs have authority and responsibility to manage the system by their own budget. As for legal background of WUA, the Law of WUA is usually considered as the basis of the legal and normative documents of government and it is the main legal document that enables to regulate WUA's formulation and management. However, the Law of WUA of Uzbekistan is still under process of enactment. Even though, it is still under consideration in the Council of Ministers of Uzbekistan. Thus, the Citizens Code and Law of NGO in Uzbekistan are applied as base for the WUA as below:

- Hire labor is regulated by the Labor Code.
- Buy equipment is regulated by the legal documents related with the contract.
- If the WUA's infrastructure facilities or its property are damaged, necessary punishment measures are taken in accordance to the remedial legislation.
- Taxes that should be paid by the WUA are regulated by the Tax Code.

For the activity of WUA, Appendix 7 of the Cabinet Ministry decree No. 8 accepted on 5th January, 2002 defines who can or cannot be users of water and members of WUA. Water Users are the legal and physical bodies who are engaged with water activities and other activities in re-established farms. They include also *fermers*, *dehkans*, and other legal and physical bodies. WUA is defined as an association of legal and physical people who are engaged with water use and other activities.

WUAs are organized according to the meeting of water users and coordination of water management authority (Irrigation System Department is proper for this authority). The rights of non-members of WUA, such as *Dehkans*, schools, nurseries, health departments, etc. are protected by the district office (*Hakimiyat*).

WUA makes contracts with water users to supply water and collect membership fee (water fee) for their services. WUA makes contracts for water use with Irrigation System Department as well.

As mentioned above, the legal background of WUA has not yet clarified by the Law of WUA at moment. Under such situation, the Government of Uzbekistan decided the amendment to the Water Law due to the deepening of the economic reforms in agriculture and water sector, which defines the water user in the irrigation sector as a consumptive water user and clarifies their duty of payment for water consumption.

Due to the change of definition of irrigation water user from water user to water consumer, the government started the re-registration process of WUA. In Karakalpakstan, the Council of Ministers of Karakalpakstan organized working group with related organizations (MAWR of Karakalpakstan, LABM, *Hakimiyat*, etc.) to implement the process on September and it was planned to complete the process on November 2010.

The definition of water consumer and re-organization of WUA will contribute to strengthen WUA's legal background to collect water fee from members and it is expected to increase water fee collection. At the same time, the process requires WUAs to renew the technical and administrative information of WUAs such as statement of assets, inventory of irrigation facilities, and inventory of member's farm land, as well as re-organizing the WUA based on the renewed statutes. The updating of information is expected to enhancing and improving the water management activity of WUA.

(2) Organization of WUA

The general structure of WUA is shown in the right figure. A council, board for audit and board for arbitration are set up under the general meeting of members and an operation body headed by the director is established under the council. It is said that at least 8 staffs including director and accountant are necessary to manage WUA suitably and some more staffs are required in case of managing large territory.

Fig. 3.5.2 Typical Organizational Structure of WUA

(3) WUAs in the Study Area

The establishment of WUAs was started in 2002 and a total 129 WUAs has been established in Karakalpakstan till 2007. In the Study Area, which consists of 11 districts, it was started in 2003 and 90 WUAs have been established, of which 91% was established till 2005. Most of WUAs in the Study Area are young organizations and they have only 3 to 5 years experience of managing their organization.

Table 3.5.12 Establishment of WUAs (Number of WUA)

	2002	2003	2004	2005	2006	2007	Total
Karakalpakstan	16	20	32	43	15	3	129
Study Area	0	19	28	35	5	3	90

Source: LABM

The characteristics of WUAs in Karakalpakstan and the Study Area are summarized in the Table 3.5.13 (page 3-58). The scale of WUA is characterized by the number of members and territorial area.

From the number of members, the WUAs in Beruni and Kungrad district is categorized into mid-large to large scale, and Shumanay and Kanlikul are small. The other districts are middle to mid-small. According to the crop area in their territory, Chimayo, Karauzyak, Kungrad are large, Beruni, Kegeyli and Shumanay are mid-large, and the others are mid-small to small. Nukus district is characterized by its variety of scale of WUAs from both of members and territory.

(4) Present Situation of WUAs

1) Questionnaire Survey for WUAs

In order to obtain information of the present situation of WUAs in the Study Area, a questionnaire survey was carried, as well as a series of interview survey. The questionnaire survey for WUAs was conducted with cooperation of the irrigation system departments and the district WUAs. As result, 70 WUAs replied their answers among a total of 90 WUAs in the Study Area. The number of answers and the occupancy rate of answering WUA are shown below.

Table 3.5.14 Result of Questionnaire to WUAs (Number of WUA)

Irrigation System	PN	KB	Kizketken-Kegeyli		Kuwanish jarma		Suwenli					Total
District	Beruni	Nukus	Kegeyli	Chimbay	Karauzyak	Takhtakupyr	Kodjeyli	Shumanay	Kanlikul	Kungrad	Muynak	
Total WUA	9	10	8	11	7	7	15	6	9	6	2	90
Answered	6	8	0	10	7	3	15	6	9	6	0	70
Rate	67%	80%	0%	91%	100%	43%	100%	100%	100%	100%	0%	78%

* PN: Pakhtaarna-Nayman Irrigation System, KB: Kattagar-Bozataw Irrigation System

2) Financial Situation and Water Fee Collection

WUAs have the duty to prepare their own business plan before beginning each fiscal year. According to the questionnaire survey, the budget of the business plan varies from 8,768,000 sum to 54,262,000 sum, of which the average was 15,172,000 sum in 2007. Those business plans are characterized by the great part of the budget is composed by staff salary in general. The staff salary composes more than 70% of total budget in 39% of WUAs and 41% of WUAs have 30 to 70% of the share.

Table 3.5.15 Share of Staff Salary in WUA's Business Plan 2007

Item	Share of Staff Salary in Business Plan			Number of samples
	>70%	30-70%	<30%	
Number of WUA	19	20	10	49
	38.8%	40.8%	20.4%	100%

Source: Study Team

WUAs are independent organizations and they have to cover the budget for their activity by water fee charged to water users principally. However, the average ratio of the collected water fee of the WUAs was 36.7% in 2007. As shown below, one third of WUAs collected water fee from less than 25% of their member farmers and another one third collected 25 to 50%. It is sometimes difficult to cover even the staff salary with this level of fee collection and it is hard to maintain the canal/collector systems properly by their own budget.

Table 3.5.16 Ratio of Collected Water Fee of WUA in 2007

Item	Ratio of collection of water fee				Number of samplers
	<25%	25-50%	50-75%	>75%	
Number of WUA	15	16	14	1	46
	33%	35%	30%	2%	100%

Source: Study Team

As result of low collection of water fee from members, WUA's activity is limited due to lack of its financial budget. Among the answering of WUAs, half of WUAs could actually expensed less than 30% of their business plans and only 12% of WUAs expensed more than 70% of the plan.

Table 3.5.17 Share of Staff Salary Among the Actual Expense in 2007

Item	Ratio of Actual Expense to Business Plan			Number of samples
	<30%	30-70%	>70%	
Number of WUA	17	13	4	34
	50.0%	38.2%	11.8%	100%

Source: Study Team

3) Type of Charging Water Fee

There are two kinds of tariff system in Karakalpakstan to charge water fee. The first is the water fee charged by cropped area and applying unified price to all crops, which varies from 2,140 to 11,200 sum/ha by WUAs. The majority of WUAs in Karakalpakstan applies this tariff system. The average tariff of water fee charged by cropped area is 5,809 sum/ha. Approximately half of WUAs applies the tariff of 4,000~6,000 sum/ha. The tariff becomes higher than that using gravity system in WUAs that utilize pump to withdraw and deliver water.

The second is the water fee charged by water volume applied to crops, which the tariff varies by WUAs. The sample of Kattagar arna WUA of Nukus District shows 0.441 sum/m^3. It must be noted that the water fee is charged by water volume calculated by irrigation norms by crops and planned cropping area and that is not charged to actual delivered volume of water. In this case, sometimes, the converted water fee calculated with tariff and norms by crop types, which is 1,620~6,700 sum/ha by crops, is applied in order to simplify the administrative procedure. According to the questionnaire survey, 61 WUAs applies the water fee charged by cropped area and 3 WUAs applies charged by water volume.

In addition to the water fee according to the water use, WUA can charge a membership fee to members. The membership fee is prescribed in the regulation of WUA, which shall be charged to new members when they joined to WUA.

Table 3.5.18 Range of Tariff of Water Fee (Number of WUA)

Applying Uniform Water Fee by Cropping Area					Applying Water Fee Charged by Water Volume
Less than 4,000 sum/ha	4,000~6,000 sum /ha	6,000 ~ 8,000 sum /ha	More than 8,000 sum /ha	Subtotal	
8	29	14	10	61	3

Source: Study Team

4) WUA's Capacity to Maintain Canal/Collector System

Lack of construction machinery to repair and dig canals is considered as an obstacle for WUAs to maintain canal/collector system. Most WUA utilizes machinery which s*hirkats* used for canal maintenance as well as canal/collector itself when *shirkat* were dissolved. Among the answers of the WUA, 40 WUAs have at least one machine for canal maintenance which is still working. The number of WUA possessing excavator, bulldozer and tractor is 31, 27 and 34 respectively. Among them, machines that have become malfunctioning because they are getting old are 16, 15 and 19 and machines not functioning are 7, 4 and 5 respectively. The condition of machines of WUA is considered seriously poor and it causes poor condition of the internal canal/collector system.

Table 3.5.19 WUA's Machinery for Canal/Collector Maintenance Work (Number of WUA)

Machinery	Excavator	Bulldozer	Tractor	Vehicle
WUA possessing machinery	31	27	34	14
Machinery is old and problem in function	16	15	19	5
Not in use	7	4	5	3

Source: Study Team

Due to the low collection of water service fee, most WUAs are not able to have enough budget for maintenance work of canal system. It is observed that canal maintenance is basically conducted by ad

hoc payment or provision of material by members. In most of cases, construction machinery is provided by ISD free of charge and only fuel and personal expense of operator are charged to ad hoc payment of members. Members contribute to the maintenance work by manual works as well. This kind of maintenance work is usually conducted by irrigation block or small distance of canal. *Tamarka* users (*dehkans*) also participate in the canal maintenance work in general. *Tamarka* users are organized to participate in the maintenance work by *aul* under the instruction of VCC and they contribute by their manual works and a part of payment. Because of this kind of the maintenance work, it is impossible to maintain systematically based on the mid-long term plan and the work becomes on a patchwork basis. In addition, the works taking cost such as reconstruction of water facilities tend to be avoided. In this situation, it is difficult to maintain the function of the canal system properly.

5) Number of Staffs of WUA

As mentioned in the organization of WUAs, the proper number of staffs for WUA depends on its scale but at least 8 staffs are required in general. As shown in the Table 3.5.20, 64 WUAs have less than 8 staffs, where 25 WUAs among them have 4 staffs or less, which is recognized significantly insufficient to manage the activity of WUA in properly.

In many cases, WUA is not able to employ necessary waterman, who will inspect and operate irrigation block in the field, due to lack of budget. In the case that WUA cannot keep enough watermen by themselves, ISD sends its staffs to WUA as operator of the system according to the request through *Hakimiyat*. The number of staff to be dispatched is the minimum to operate the irrigation system and is not enough for proper and accurate operation. Furthermore, the dispatched ISD staffs serve concurrently with their original job, thus, they sometimes cannot go for operation on time and is difficult to stay there for necessary period. It makes operation of the system difficult.

6) Water Use Planning by WUA

WUA makes a contract on water distribution with the Irrigation System Department (ISD) for each irrigation system, as well as makes contracts with members. WUA is required to coordinate water use contracts with members including cultivation plan, preparation of irrigation schedule and water distribution plan in prior to contract with ISD. Those schedule and plan are formulated based on the calculation of water demand applying norms of irrigation by crops and by soil conditions, which are set up by ISDs. Among the answers of the WUAs, which was 39 in total, 32 WUAs formulated the plan by themselves (equivalent to 82% of total), while the remaining 18% of WUAs did not have ability for planning by themselves and completely rely on ISD to prepare it. Even in for those that formulated the plan by themselves, 18 WUAs needed the support and coordination of ISD to make it. The reason why WUAs meet difficulty to make irrigation schedule and water distribution plan is considered that WUA does not have any specialist for irrigation planning in most case, even the former *shirkat* possessed irrigation specialists, that WUA staffs do not have opportunity to receive training and guidance, and that WUAs are not equipped with PCs, which helps complicated but form-fixed calculation.

Table 3.5.20 Capability of WUA for Formulating Irrigation Schedule and Distribution Plan (Number of WUA)

Formulating Irrigation Schedule and Distribution Plan			Total
by WUA	by WUA with coordination of ISD	by ISD	
14	18	7	39
35.9%	46.2%	17.9%	100%

* ISD: Irrigation System Department Source: Study Team

7) Transportation for WUA's Activity

Because of its large territory to be managed, it is pointed out by many WUAs that a lack of transportation and communication means makes WUA's regular activities of water management and

communication with members difficult. At present, most of WUA staff moves by walking or sometimes by bicycle. Due to limited transportation, frequent inspection of the irrigation system and water use, which is indispensable to make water management properly, are not realized. There is very limited opportunity to guide or instruct appropriate water use in the field to member farmers as well. In order to enhance WUA's activity and to raise up the capability for water management, equipping transportation means to WUA is considered as one of the key issues.

Table 3.5.21 WUA's Transportation Means for Water Management
(Number of WUA)

Condition	Number of WUAs
WUA possessing vehicles	14
Vehicle is old and problem in function	5
Not in use	3

Source: Study Team

3.6 Farm Management and Rural Livelihood

Several indicative factors concerning *fermer* management and rural livelihood of *dehkans* are analyzed based on collected information through the Farm Household Questionnaire Survey conducted by the Study Team in May/June 2008. A comprehensive summary of the survey is shown in 4.2.4.

3.6.1 Farm Management (*Fermers*)

Sample *fermers* are divided into 3 groups, i.e. small (<20ha), medium (20 to <60ha) and large (over 60ha) by their planted area in 2007[3]. 3 *fermers* out of 22 sample *fermers* are excluded from the analysis due to incomplete information collected from them.

Though the 22 sample *fermers* consist of 19 crop-*fermers* and 3 livestock-*fermers* based on the official category, there is no big difference in their farming business pattern between them, except for the size of non-irrigated farmland. Even a sample livestock-*fermer* does not grow any animals. The livestock-*fermers* manage bigger size of farm land than the crop-*fermers*.

(1) Major Agricultural Commodities Sold

Table 3.6.1 Number of Sample *Fermer* by Farming Size and their Agricultural Commodities Sold in 2007

Group	Planted Area (ha)	Sample Fermers	Number of Smple Fermers to Sell							
			Cotton	Wheat	Other grain	Fodder	Vegetables	Fruits	Livestock	Livestock product
1 Small	< 20ha	7	5	5	1	0	1	2	2	2
2 Medium	20 - < 60 ha	6	6	5	1	0	1	0	0	0
3 Large	Over 60 ha	6	6	4	2	1	1	0	2	1
Total		19	17	14	4	1	3	2	4	3

Source: Farm Household Questionnaire Survey by the Study Team

(2) Annual Sales

The table below, showing sales of the sample *fermers* in 2007, proves the above implication. Cotton and wheat occupy overwhelming majority of the sales. It shows that smaller *fermers* relatively depend on wheat as compared to the larger *fermers*.

[3] Average irrigated land area, crop area and pasture managed by *fermers* is 36.4 ha, 19.4 ha and 13.2 ha respectively in 2006 in Karakalpakstan, according to statistic data of the Ministry of Economy of Karakalpakstan

Table 3.6.2 Sales of Sample *Fermer* in 2007 by Farming Size Group

(Sum)

Group	Cotton	Wheat	Other grain	Fodder	Vegetables	Fruits	Livestock	Livestock product	Other	Total
1 Small	3,025,857	1,427,143	85,714	0	142,857	114,286	314,286	66,071	0	5,176,214
(%)	(58.5)	(27.6)	(1.7)	(0.0)	(2.8)	(2.2)	(6.1)	(1.3)	(0.0)	(100.0)
2 Medium	14,671,000	3,653,833	100,000	0	416,667	0	0	0	0	18,841,500
(%)	(77.9)	(19.4)	(0.5)	(0.0)	(2.2)	(0.0)	(0.0)	(0.0)	(0.0)	(100.0)
3 Large	19,731,333	4,333,333	191,667	83,333	50,000	0	466,667	50,000	116,667	25,023,000
(%)	(78.9)	(17.3)	(0.8)	(0.3)	(0.2)	(0.0)	(1.9)	(0.2)	(0.5)	(100.0)

Source: Farm Household Questionnaire Survey by the Study Team

(3) Annual Expenditure

The table below shows expenditures of the sample *fermers* in 2007. All farming size groups of *fermers* have similar expenditure pattern as same as the sales. Salary of staff and workers, farming inputs (mainly fertilizers and farm-machinery) and energy/fuel are the major expenditure items of the *fermers*.

Table 3.6.3 Expenditures of Sample *Fermer* in 2007 by Farming Size Group

(Sum)

Group	Salary	Farm	Facility	Irrigation	Energy/fu	Transport	Land tax	Tax &	Other	Total
1 Small	702,857	628,571	457,143	170,000	878,571	245,714	142,857	257,143	0	3,482,857
(%)	(20.2)	(18.0)	(13.1)	(4.9)	(25.2)	(7.1)	(4.1)	(7.4)	(0.0)	(100.0)
2 Medium	3,744,167	4,610,667	1,262,667	420,333	2,643,833	1,880,000	443,500	472,667	0	15,477,833
(%)	(24.2)	(29.8)	(8.2)	(2.7)	(17.1)	(12.1)	(2.9)	(3.1)	(0.0)	(100.0)
3 Large	5,931,667	6,695,167	1,575,000	780,000	5,329,000	439,667	605,667	2,006,333	50,000	23,412,500
(%)	(25.3)	(28.6)	(6.7)	(3.3)	(22.8)	(1.9)	(2.6)	(8.6)	(0.2)	(100.0)

Source: Farm Household Questionnaire Survey by the Study Team

(4) Annual Net Profit

Sample *fermers'* net-profit after taxes in 2007 by farming size group is shown in the following table.

The average net profit of all sample *fermers* is 2,195,000 sum and the profit does not have correlation with farming size. It implies that they, even large scaled *fermers*, could not always make good net-profits with the following reasons (refer to 2.5.4). Many *fermers* should resign themselves to the marginal profits of farming.

1) Many *fermers* depend on their farming business of cotton and wheat without diversifying their products[4]
2) *Fermers* in the Study Area have very small profit per ha or sometimes deficit from cotton production
3) Many sample *fermers* can not make profits from wheat, since their average production per hectare, which was 1.42 ton/ha in 2007, is far below the break-even yield that would be about 2.49 ton/ha, according to the study team's estimation

Table 3.6.4 Net-Profits of Sample *Fermer* by Farming Size Group in 2007

Group	(Sum)
1 Small	1,693,357
2 Medium	3,363,667
3 Large	1,610,500
Total	2,194,658

Source: Farm Household Questionnaire Survey by the Study Team

In a series of workshops carried out by the Study Team, not a few *fermers* expressed their hard financial conditions. Some of them were becoming bankrupt due to low productivity under a severe farming condition, high inputs prices and low government prices of cotton and wheat, according to them.

Many reports also say that the government procurement price of cotton and wheat is lower than the international price. The table below shows prices[5] of cotton and wheat and major fertilizers and

[4] An ADB report on "Republic of Uzbekistan: Implementation and Monitoring of Policy Reforms in Agricultural Sector, 2008" concluded that most profit of fermers was generated by secondary crops and livestock products that are not subject to state procuremen

[5] The ADB report also reported that the average procurement price of raw cotton in 2007 was equivalent to $275.5/ton, while the estimated export parity price was $376/ton, accounting the cotton fiber price at the Liverpool Cotton Association in

tractors in Uzbekistan and in other countries, mainly United States. All prices other than the prices in Uzbekistan were collected from various sources in web-sites.

Table 3.6.5 Comparison Prices of Cotton, Wheat and Major Farm Inputs[6]

Commodity	Country/Spec./Condition	Time (month, Year)	Price	Converted Price (US$)	Converted Price (unit)	Compare (%)
1 Cotton	Uzbekistan Government Price	Aug., 08	Sum 430/kg	0.32	kg	**100**
	US, Farm Price	Feb., 08	US$ 0.619/Lb	1.36	kg	422
	Senegal, Farm Gate	Winter 05/06	Euro 0.3/kg	0.36	kg	112
	Mali, Farm Gate	Winter 05/06	Euro 0.24/kg	0.29	kg	89
2 Wheat	Uzbekistan Government Price	Aug., 08	Sum 169/kg	0.13	kg	**100**
	Uzbekistan Free Market Price	May, 08	Sum 250/kg	0.19	kg	148
		Sep, 08	Sum 400/kg	0.30	kg	237
	US, Farm Price (hard red winte	Feb, 08	US$ 8.77/Bu	0.32	kg	254
	US No.1, (hard red winter), FO	Jan-Mar, 08	US$ 411/ton	0.41	kg	323
3 Ammonium Nitrate	Uzbekistan, Retail	May, 08	Sum 265,322/ton	199.5	ton	**100**
	US, Farm Price	April, 07	US$ 382/ton	382.0	ton	191
4 Urea	Uzbekistan, Retail	May, 08	Sum 317,085/ton	238.4	ton	**100**
	US, Farm Price	April, 07	US$ 453/ton	453.0	ton	190
	US, Farm Price (North America	May, 08	US$ 600/ton	600.0	ton	252
5 Ammonium Sulfate	Uzbekistan, Retail	May, 08	Sum 190,395/ton	143.2	ton	**100**
	US, Farm Price	April, 07	US$ 288/ton	288.0	ton	201
6 Tractor	Uzbekistan,80hp, Retail,	2008	Sum 28 million/unit	21,053	unit	**100**
	Belarus, 80hp, FOB	2008	US$ 21,500/unit	21,500	unit	102
	US, Retail Price, 70hp	May, 08	US$ 28,000/unit	28,000	unit	133

(Conversion)
US$ 1.00 = Sum 1,330 (Aug.,2008), US$ 1.00 = Euro 0.83 (Feb., 2006)
1Lb = 0.4536 kg, 1Bu = 27.2155 kg

The table shows the following implications:

1) The Government procurement price of cotton is about 1/4 of the US farm price, which is subsidised and almost equal level with the price in West-African countries in 2005/06
2) The government price of wheat is about 30% to 40% of the US farm price, while the present free market price in Karakalpakstan is almost equal to the US farm price
3) Prices of nitrogen fertilizers in Uzbekistan is almost half of the US farm price
4) Prices of tractors in Uzbekistan is almost equal to the international prices

3.6.2 Rural Livelihood (*Dehkans*)

The average family size of sample *dehkans* (110 samples) is 6.9 persons/family. About 2/3 of the members are in working age, while the number of children under 15 years old is 2.0 persons/family and the number of aged members over 60 years old is 0.4 person/family.

(1) Annual Income and Expenditure

The sample *dehkans* are divided into 6 groups based on family income level in 2007 and the average income of each group is calculated as shown in the table below. The annual income of sample *dehkans* was 2,016,000 sum, while the lowest was 480,000 sum and the highest was 8,100,000 sum. While salaries/wedges and pension are major income sources of the common sample *dehkans*, the higher income group has various income sources. Though pension is not a major income source for the lower income groups, public supports are important income source instead. Sales of agricultural outputs including livestock products are subsidiary income source of sample *dehkans*.

September 2007, it was $1,360/ton, value of by-products and other costs for transport, handling, etc.

[6] Since international commodity prices change remarkably in a short time during the study period, the comparison only represents very rough ideas about the price difference

Table 3.6.6 Grouping of Sample *Dehkans* by Family Income Group (in 2007)

Group	Family Income in 2007 (sum/year)	Number of Samples	Ave. Family Income (sum/year)	Ave. Family Expenditure (sum/year)	Ave. Family Balance (sum/year)
1 Very low income	< 1.0 million	14	755,286	826,786	-71,500
2 Low income	1.0 - < 1.5 million	25	1,210,640	1,183,040	27,600
3 Lower middle	1.5 - < 2.0 million	27	1,728,481	1,845,111	-116,630
4 Upper middle	2.0 - < 2.5 million	20	2,142,384	2,093,234	49,150
5 High income	2.5 - < 5.0 million	21	3,224,286	3,215,048	9,238
6 Very high income	more than 5.0 million	3	7,903,000	11,611,667	-3,708,667
Total		110	2,016,142	2,138,042	-121,900

Source: Farm Household Questionnaire Survey by the Study Team

The average annual family expenditure of sample *dehkans* in 2007 by family income group is also shown in the table. The average expenditure of the total sample *dehkans* was 2,138,000 sum, while the lowest was 480,000 sum and the highest was 13,600,000 sum. As result, their average balance of payment in 2007 showed a deficit of 121,000 sum. It is interesting that the highest income group had the largest and substantial amount of deficit among the groups. Expenditure pattern of the sample *dehkans* by the income group is very similar. Foods, clothes, social relations and public services are major expenditure items of all groups.

The tables below show magnitude of income sources and expenditure items of sample *dehkans.*

Table 3.6.7 Magnitude of Income Sources of Sample *Dehkans* (in 2007)

Income sources	Principal (%)	Major (%)	Subsidiary (%)	Very minor (%)	None (%)
1 Salary or wages from *fermer*/*shirkat*	5.5	24.5	17.3	9.1	43.6
2 Salary or wages from non-*fermer*/*shirkat*	9.1	24.5	13.6	0.9	51.8
3 Own-business	0.9	4.5	2.7	1.8	90.0
4 Sales of crops produced from *tamarka*	1.8	7.3	29.1	9.1	52.7
5 Sales of livestock/milk	0.0	10.9	20.9	10.9	57.3
6 Sales of handicraft	0.9	0.0	0.9	0.9	97.3
7 Pension	4.5	23.6	18.2	0.9	52.7
8 Remittance	7.3	7.3	7.3	4.5	73.6
9 Public supports	2.7	3.6	31.8	13.6	48.2
10 Other	0.0	0.9	1.8	0.0	97.3

Source: Farm Household Questionnaire Survey by the Study Team

Table 3.6.8 Magnitude of Expenditure Items of Sample *Dehkans* (in 2007)

Items of expenditure	Major (%)	Minor (%)	Very minor (%)	None (%)
1 Foods & beverage	90.0	10.0	0.0	0.0
2 Cloths	37.3	49.1	12.7	0.9
3 Housing, home-consumables and fuel	4.5	36.4	28.2	30.9
4 Electric appliances, furniture and durable goods	1.8	20.0	14.5	63.6
5 Medical care & health	4.5	50.0	30.9	14.5
6 Education and recreation	9.1	49.1	20.9	20.9
7 Social relation	14.5	74.5	7.3	3.6
8 Public services	14.5	76.4	9.1	0.0
9 Agricultural inputs and management	10.0	59.1	20.9	10.0
10 Others	0.0	0.0	1.8	98.2

Source: Farm Household Questionnaire Survey by the Study Team

An ADB report on "Republic of Uzbekistan: Implementation and Monitoring of Policy Reforms in Agricultural Sector, 2008" shows annual income and expenditure of *dehkans* based on their survey result covering 17 districts in whole Uzbekistan. According to the result as shown below, *dehkans*

depend much on livestock sub-sector for their income, and crops and wages are subsidiary income sources. The result implies that *dehkans* in the project area are less active in farming including livestock farming and much rely on external employment, comparing *dehkans* in the other areas in Uzbekistan.

Table 3.6.9 Annual Revenue and Expenditure of *Dehkans* in Uzbekistan (in 2007)

Revenue	US$	(%)	Expenditure	US$	(%)
Agricultural output (crops)	829.51	21.8	Supplies	340.23	9.7
Sales of live animals	758.81	19.9	Purchase of live animals	448.55	12.8
Sales of livestock products	1,227.09	32.2	Personal expenses	2,555,84	72.7
External employment	630.00	16.5	Cost of financing	141.30	4.0
Social benefits	366.39	9.6	Taxes	27.62	0.8
Total	3,811.80	100.0	Total	3513.54	100.0

Source: Republic of Uzbekistan: Implementation and Monitoring of Policy Reforms in Agricultural Sector, 2008, ADB

(2) Job Opportunity

The table below shows job opportunities of sample *dehkans* in 2007 by family income group. It shows the tendency that higher family income groups have better job opportunities, especially for permanent job, though the opportunities do not differ between low-income, lower-middle and upper-middle groups. About gender gap in the job opportunity for permanent jobs, there is a clear gap in higher class income groups and the lowest income group, while there is no clear gap in middle class groups which occupy 65.5% of the samples. However, there is a clear gap in all groups except for the upper-middle group in case of seasonal jobs.

Table 3.6.10 Job Opportunity of Sample *Dehkans* in 2007 by Family Income Group

Group	Permanent Job (person/family)			Seasonal Job (person/family)		
	Male	Female	Total	Male	Female	Total
1 Very low income	0.4	0.2	0.6	0.6	0.4	1.0
2 Low income	0.9	0.7	1.6	0.5	0.1	0.6
3 Lower middle	0.7	0.5	1.2	0.6	0.3	0.9
4 Upper middle	0.8	0.8	1.6	0.3	0.2	0.5
5 High income	1.3	0.7	2.0	0.5	0.1	0.6
6 Very high income	2.3	1.0	3.3	1.3	0.3	1.6

Source: Farm Household Questionnaire Survey by the Study Team

In the table below, the sample *dehkans* is divided into two groups based on job class of the head of family when *shirkat* existed, and income per job-person of the *dehkans* is compared by the family income group. The table shows that the higher family income group has higher percentage of family-head who had a post in managerial class in *Shirkat*, and higher income per job-person. It is considered that job opportunity is a major factor to determine family income of *dehkans*, and a *dehkan*, who has advantageous entitlement, e.g. educational background, social status, etc., has a better access to better jobs.

Table 3.6.11 Jobs in *Shirkat* and Income per Job-Person by Family Income Group

Group	Job Position in Shirkat		Income per Job-Person (sum/year)
	Manage (%)	Labor (%)	
1 Very low income	14.3	85.7	585,364
2 Low income	32.0	68.0	600,452
3 Lower middle	25.9	74.1	1,092,577
4 Upper middle	40.0	60.0	1,159,818
5 High income	61.9	38.1	1,333,316
6 Very high income	100.0	0.0	2,518,175

Source: Farm Household Questuinnaire Survey by the Study Team

Table 3.6.12 Size of Sample *Dehkan's Tamarka* by Family Income Group

Group		Average Tamarka Area (ha)
1	Very low income	0.24
2	Low income	0.34
3	Lower middle	0.34
4	Upper middle	0.31
5	High income	0.33
6	Very high income	0.35

Source: Farm Household Questionnaire Survey by the Study Team

The above table shows size of sample *dehkans' tamarka* by family income group. It shows that *tamarka* is equally distributed to all *dehkans* except for very low income group. The size of *tamarka* would not be a major factor to determine *dehkan's* family income, since 52.7% of sample *dehkans* do

not sell products from *tamarka*. Very few sample *dehkans* say that the products are their principal or major income source, while about 38% of them say the products are their subsidiary or minor income source. It is interesting that higher income group sells more products from *tamarka* except for the upper-middle group.

3.7 Marketing and Processing

3.7.1 Distribution and Marketing of Agricultural Products

(1) Vegetables and Fruits Distribution

Based on the interview survey to wholesalers and retailers, the distribution channels of vegetables and fruits are as given below. The major distribution channel is indicated in bold-red arrows in the diagram. Throughout a year, most vegetables and fruits are brought from other regions, particularly from Samarkand, Kashkadarya, Surkhandarya, Navoiy, and Namangen, and inter-regional traders play an important role in this transaction. Some *dehkan*s in rural area directly carry their products to the central bazaar and sell them by themselves. Also, some local traders in Nukus City often go to other regions, such as Arai Bazaar in Tashkent, to purchase fresh vegetables/ fruits and carry it to Nukus for wholesale transaction. Each district has local bazaar and local traders play a key role in this transaction.

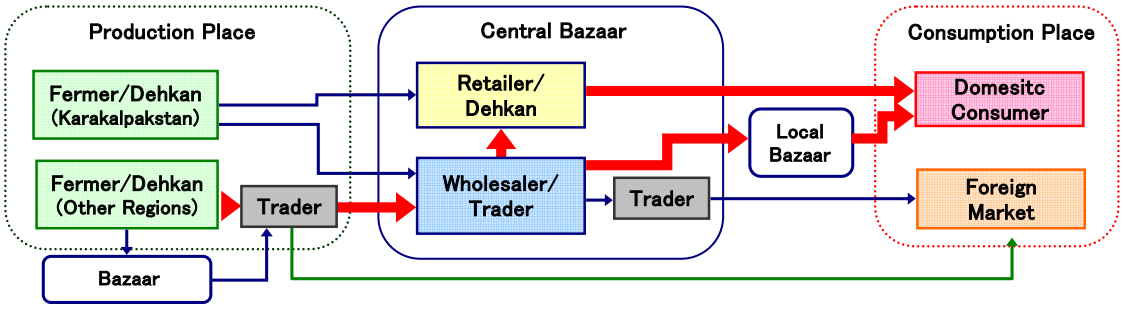


Fig. 3.7.1 Distribution Channel of Vegetables and Fruits

The following table shows the number of trucks and places of origin observed at Nukus Central Bazaar on May 4, 2008. Out of 45 large-sized trucks (8-10t class) parked in wholesale section, trucks from Samarkand accounts for 40%, while that from Surkhandarya and Kashkadarya hold 30% and 20% of the total respectively.

Table 3.7.1 Number of Trucks and Place of Origin at Nukus Central Bazaar (May 4, Sunday, 2008)

Region/ City	No of Trucks	Products Carry-in	Region/ City	No of Trucks	Products Carry-in
Samarkand	18	Cabbage, Apple, Potato, Carrot, Onion	Andijan	1	Carrot
Surhandarya	13	Cabbage, Potato	Bukhara	1	Strawberry
Kashkadarya	8	Carrot, Potato	Khorezm	1	Potato, Onion
Navoiy	3	Strawberry	Tashkent City	1	Potato
Namangan	3	Potato	**Total**	**45**	—

The distribution facilities of vegetables and fruits, including collection and storage facilities, are hardly developed, at least as result of collective action of farmers group. However, in some cases were found during field survey. Rice-growing farmers in Beruni constructed a storage house near their houses and after milling rice by their co-owned milling machine. They bring the rice directly to local market so as to maximize their profit. Also, farmers in Andizhan store carrot and potato under the ground to keep their products and shift shipping season.

(2) Meats and Dairy Products (Milk) Distribution

In general, livestock is slaughtered at farm gate and brought to the market by farmers to sell to wholesalers. At the time of slaughter, veterinarian inspector examines sanitary and veterinary conditions of meat and issues a certificate if it is normal. Without the certificate, the farmer cannot sell the meat at the market. No cold facilities are available in the supply chain of meats. Meat retailers in Nukus Central Bazaar can be divided into two types: (1) selling at brick- or concrete-made retail shop, and (2) selling at a tent on the ground. The latter's sanitary condition is worse because of hot weather during summer and the dust from the ground.

Fresh milk is one of important food item in Karakalpakstan, where rice porridge with milk is a popular menu for breakfast. Calorie intake from milk in the Uzbekistan holds 10% of the total of adult person per day, which is remarkably high. However, its distribution is not systematized and the sanitary condition is significantly poor. Most milk in PET bottle, sold at local bazaar, is not processed, not passing through any pasteurization procedures and sold under open-air condition without any cooling facilities. Usually, a milk retailer sells only milk, sitting on the ground with 5-10 bottles of milk and most of them are women. While most vegetable/ fruit retailers make their trade at same place, milk retailers are scattered throughout the market.

According to the veterinary and sanitary inspectors in Nukus Central Bazaar, milk must be sold at fixed place in the bazaar, inside of the main building, but most milk retailer want to sell it in walkway and parking lot, where many customers come and go. The VSE officials can't inspect those milks sold at outside of the fixed area, and of course, never issue their certification to them.

On August 6, 2008, the JICA study team conducted a simple test to detect coliform bacilli from the PET bottle milk, using a coliforms detection paper maid in Japan. The team purchased raw milk at an apartment park near Nukus Central Bazaar at 8:00 am in the morning. After 12 hours, the sample started showing positive reaction and after 24 hours the color of the detection paper turned to red, indicating that the sanitary condition of the milk was not acceptable.

Most customers have experimental knowledge of that the milk sold at unfixed area is not safe and boiled it when they drink or use for cooking. Those people, who worry about sanitary condition and food safety, tend to buy processed milk produced in Tashkent, which is safer but more expensive (1,200 - 1,600 sum/litter, varied based on fat degree) than the raw milk in PET bottle (500 - 600 sum/litter). According to retailers who sell the processed milk from Tashkent, around fifty to one hundred packs of the milk (1 litter-pack) is sold in a day, indicating high demand for the safe-milk. In Karakalpakstan, "Karakalpakstan GO'SHSU'TSANNAATI" (Karakalpakstan Meat and Milk Industry), produces processed milk in Khodjeyli. However, their production scale is limited, only 1ton per day, and sells it only to hospital, kindergarten and orphan's home in the district.

Before the independence, there was a milk and meat collection system under the strong supervision of the government and safer products were supplied. Livestock Kolkhoz and Sovkhoz brought milk from one of fourteen (14) district branch offices of "Karakalpakstan Meat and Milk". The branch office had storing, cooling and pasteurization facilities. After the processing, the branch sent the products to milk factories, which were located in Nukus, Khodjeyli, Shumanay, and Khodjeyli districts each. The factories produced yogurt, batter, and ice cream, in addition to bottled milk. The factories didn't sell their products to wholesalers at market, but wholesale

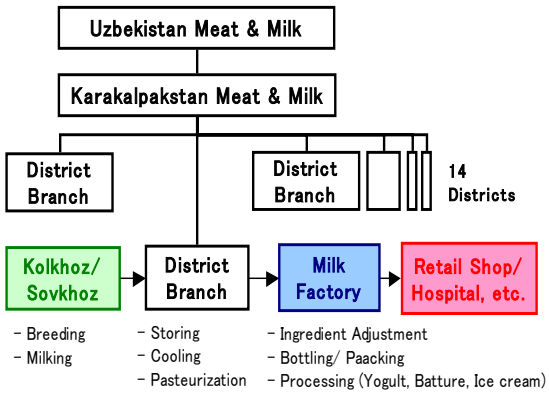


Fig. 3.7.2 Milk Processing System in Soviet Era

by themselves to retail shop, hospitals and nursery schools. The system was corrupted after the independence, due to lack of operating capital.

(3) Fish Distribution

Distribution channel of fish products is summarized in the figure below. According to the interview survey, fishes in Nukus Central Bazaar are mainly coming from Muynak and Takhtakupyr. Major markets of fishes are Nukus City, Khodjeyli and even other regions such as Urgench and Amudarya. This long-distance trade is limited in autumn to spring, except during hot summer due to the lack of cold chain technologies. A fish firm in Kashkadarya, Muynak district owns icehouse, which can store 3,000 ton of ice cube from nearby canal and can keep -5 to -10 degree inside the icehouse, used to market fresh and salted fishes even during summer season.

According to fish retailers in Nukus Central Bazaar, the volume of fishes transacted at the market is greater during November to April and the prices of fishes are higher in this period. This fact is contradicted to the price theory at a glance, which tells us that a price of goods decreases when the supply increases. However, the reason is quite simple. The condition of raw fish at market is worst in summer season and soon it will be rotten due to lack of cooling facilities and sanitary conditions. Therefore, consumers tend to avoid buying fishes during hot season, which result in heavy price fall.

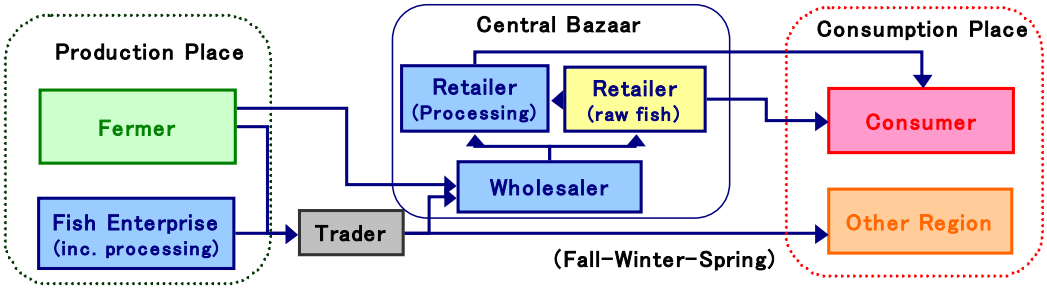


Fig. 3.7.3 Distribution Channel of Fish Products

(4) Distribution Means

In rural area, the major transportation means are minibus (Damas), public bus, donkey cart or two-wheeled handcart. Many farmers use a donkey cart or tractor to carry their farm products to the local bazaar. Most large town has a minibus on a regular route into the town centre or local bazaar. Some retailers at suburban bazaar of Nukus City get vegetables and other commodities at Nukus central bazaar in the early morning and carry it by minibus or light truck to the satellite bazaar. Also, long distance buses are regularly operating, connecting Nukus to Bukhara, Samarkand, and Tashkent city, and some local traders use this route to carry products in Nukus Central Bazaar. Traders from other regions use 8 to 10 ton-class truck for freight transportation. Only few traders, from Samarkand and Namangan for example, use cooler truck to carry fruits including apple and watermelon.

Farmers tend to market their perishable products directly from their field to local market without any post-harvest treatment or storage. According to ADB report (2006)[7], post-harvest losses have been estimated at 20-30%, and many products were distributed with inappropriate packing and traders tend to over load which resulted in increase in wastage of products.

(5) Marketing Body

Agro-firm is a marketing body to support marketing activities of vegetable and fruits growers, *fermers and dehkans*, who usually don't have enough production volume, hence suffering from less bargaining power. There is one Agro-firm operating in Nukus district in the Study Area, named "TAQIR KO'L" Agro-firm, but it's activities are limited.

[7] Inception Report, Preparing the Development of Market Infrastructure for Private Farms and Agribusiness Project, ADB, March 2006

1) Case study 1: “Taqirkol” Agro-firm, Turtkul VCC, Nukus District

“TAQIR KO’L” Agro-firm was established in 2006, by succeeding major properties from Wornek S*hirkat*, including storage house, icehouse and office building. However, the storage house and the icehouse are not working due to deterioration. According to the Agro-firm office, the firm has 45 member farmers that have a total of 565 ha of farmland, which includes 320 ha of vegetables and fruits (200 ha for vegetables, 60-70 ha for melon and 50 ha for fruits), and 245 ha of wheat. The land size of farmer members is ranging from 1 ha to 76 ha. Vegetables include tomato, cucumber, pumpkin, cabbage, carrot, onion, potato, gourd, melon and watermelon, whereas fruits include apple, pear and grapes. The firm’s members don’t plant cotton.

The management body of the Agro-firm consists of 5 members, which includes a director, an accountant and three collection/ transportation workers. The director was elected by the members and approved by Hakimiyat and Cabinet of Ministers in Tashkent. Then, the director selected the accountant and three collection workers. The salary of the management staffs comes from the revenue of the firm, of which, 4% is their salaries and 1% goes to repayment to bank and the remaining part goes to contract farmers.

At the time of its establishment, the firm didn’t collect capital fund from the members. Instead, the firm borrowed credit from the government; the Council of Ministers of Karakalpakstan, under the assistance of *Fermer’s* Association. The firm borrowed 10 million sum with 13% interest rate for three years.

The main activity of the firm is collection of vegetables / fruits and marketing. Their customer is the government organization in Nukus district. The firm doesn’t have any transportation means and must borrow tracks for this purpose. The firm doesn't have any storage facilities at present (but has unused old storage) and the drivers pick up agricultural products at the farm gate and bring them directly to the buyer.

The firm doesn’t have any processing activities. Neither technical trainings, nor machinery and input procurement service are provided to the members. The firm has a plan to export members’ products, e.g. to Kazakhstan, but it’s not easy for them due to the presidential degree, which put higher priority on supplying agricultural products to the domestic market.

2) Case study 2: “TO’RTKO’L-ME’ROJ” Agro-firm, Turtkul District

“TO’RTKO’L-ME’ROJ” Agro-firm was established in March 2006, and their activities includes (a) processing vegetables and fruits, (b) marketing the products to supermarket and bazaar in Turtkul district, (c) providing technical trainings to farmer members. The training includes technical guidance on seedling, planting, fertilizing and weeding. One of advanced farmer member provides lectures to other members. The main products of the firm are (1) tomato paste, (2) pickled vegetables (tomato, cucumber) and (3) melon jam. The total field of the 34 farmer members is around 70 ha, ranging from 0.5 ha to 4.0 ha.

The firm succeeded their properties, including vegetable processing factory and storage (1,000t capacity), from “Trade *Shirkat*”, which engaged in commercial activities, such as selling sugar, vodka and clothes, and had 100 retail shops in Turtkul district. The director of the Agro-firm is a founder of the dissolved *shirkat*, and at present, has 20 employees for processing activities.

At the time of the Agro-firm’s establishment, 35 investors contributed to the capital fund, that was on average 100 to 200 thousand sum per person, under the condition of receiving a share of the profit based on investment amount. Operation cost includes payment of raw materials to the 34 farmer members, which are basically composed by *fermers*. However, the firm buys also raw materials from *dehkans* when the production amount of the *fermers* is not enough. In 2007, the gross income was 37 million sum and around 35% of the revenue was a share to the investors. Their business is increasing year by year, and the total revenue in August 2008 was 45 million sum.

3) Comparison of Agro-firms

Agro-firm in Nukus district provides only marketing service to its members, whereas the other Agro-firms provide various services, including processing, training, consultation and group procurement of farm inputs. For example, "Mirishkor" Agro-firm in Samarkand support marketing activities of the farmers, finding customers through advertising in the exhibition, and makes contracts with the customers. The merits for the farmers being a member of the agro-firm is that the members can find customers even though production amount of the individuals are small, while the merit for customers is that they can purchase stable amount of products through the Agro-firm.

Also, "Meva-Uzum" Agro-firm in Tashkent organizes 10 days free training in winter (off-crop season), subjecting labor management, accounting, agricultural technologies and farm management. The firm calls persons from agricultural institute and irrigation institute for the training purpose. After the training, the firm tests members' attainment and issues certificate to those who pass the exam.

The variety of activities is just a result of the firm management efforts to afford members' incentives. The big difference between the Agro-firm in Nukus and the others might be whether they have a spirit of helpfulness to member farmers. It is significantly important for the Agro-firm in Nukus to learn the service spirit from other firms. For this purpose, a study tour to learn other firms' business is recommendable to activate Nukus Agro-firm.

The following table shows a comparison of activities between Agro-firms visited by the study team.

Table 3.7.2 Comparison Table of Visited Agro-firms

	Nukus District	Turtkul District, Karakalpakstan	Tashkent Region	Samarkand Region
Name	Taqir Ko'l	To'rtko'l-Me'roj	Meva-Uzum	Mirishkor
Member	45, with 565ha	34, with 70ha	66, with 450ha	400
Activity	Marketing	Marketing, processing, technical guidance	Marketing, training, lease tractors, group purchasing, business consultation (including production adjustment)	Marketing assistance, business consultation, training, input procurement
Main products	Fresh vegetables and fruits	Tomato paste, pickled vegetables (tomato, cucumber), melon Jam	Fresh vegetables and fruits	Grapes, wheat, apples and other fruits
Place to sell	The government organization	Supermarket, local bazaar	The government organizations, hospitals, kindergartens, foreign traders	Samarkand, Tashkent, Russia, Kazakhstan
Properties	Ruined storage, ruined icehouse	Processing factory, storage	Storage (500t), 4 tracks (5t), 6 tractors	Storage with refrigerator

4) Workshop with "TAQIR KO'L" Agro-firm in Nukus District

Objective of the Workshop

A participatory workshop with members of the "TAQIR KO'L" Agro-firm, organized by the Study Team, was held on September 10, 2008, at Taqirkol VCC in Nukus district. The objective of the workshop is to discuss current problems and necessary actions of the Agro-firm. Seventeen (17) farmer members of the Agro-firm, including the chairman of VCC and the director of the firm, participated in the half-day workshop. Also, a representative form *Fermer's* Association joined the workshop and support farmers' discussions.

Methodology

The workshop was carried out in a participatory manner, using Post-it card to secure equal opportunity for all participants to express their opinions. The workshop stared from 10:00am with opening remarks by the director of Agro-firm and then proceeded to the situation analysis applying SWOT and Problem analysis. After grasping SWOT (Strengthening, Weakness, Opportunity and Threat) and problems that the Agro-firm faces currently, the participants discussed necessary actions to be taken. The discussion was compiled in the action plan.

Problems Raised in the Workshop

The most significant findings for the Study Team were that the member farmers did not see the Agro-firm as their own and that the members frankly expressed their complaints against the management side of Agro-firm. The reason might be related to the fact that, at the time of the establishment, farmer members didn't contribute any capital fund to the firm. However, the main reasons might be that the Agro-firm has not been able to provide any service that the member farmers want. In 2007, the Agro-firm made a contract with only one farmer to market his products, while no contracts have been made until now since 2008.

The followings are the major problems that brought up during the situation analysis:

- No processing factory/ storage. The main constraints to equip processing machine is unstable supply of electricity, gas and water. Electricity is available only during 7:00 am to 11:00 am and 7:00 pm to 12:00 pm
- Difficult to find buyers for some products due to over production within the district and low quality of products
- Lack of retail place in Nukus Central Bazaar due to conjunction at retail section
- Agro-firm is not trustable since they don't pay the products, rather a buyer in Samarkand is trustable because they pay as according to the contracted, even though their (Samarkand's) contract price is quite cheap
- Lack of farm inputs (machinery, irrigation water, pump, electricity for pump, chemical pesticide, fuel, organic manure) and poor farming environment (soil salinity)
- Difficulty in export due to lack of production volume, lack of information about trade partner, lack of information about custom procedures, illegal collection of custom tax, sudden export van and no guarantee for the loss

Action Plan

The following table shows the action plan formulated in the workshop. The discussion was focusing on necessary actions to solve their problems, main actor for the actions, institutional supports and time frame. Members' expectations to the Agro-firm, in other words, candidates of the Agro-firm's next actions are indicated in the table below.

Table 3.7.3 Action Plan Formulated in the Workshop

Actions	Actor	Institution of support		Time frame
		Who	How	
Processing production **-Drying production** -Making juice **-Canning** **-Construct factory in Nukus** - Contract w/ factory	 **Agro-firm** Farmer Farmer, **Agro-firm** Farmer, **Agro-firm** Farmer	 *Hakimiyat* *Hakimiyat*, VVC Processing factory	-Credit, -Joint venture -Facilities -Utilities (Water, gas, electricity) -Trust	Jun - Dec
Cleaning irrigation system	Farmer, WUA	*Hakimiyat*, ISD	Machinery	w/in year
Cleaning of collectors	Farmer, WUA	*Hakimiyat*, ISD	Machinery	w/in year
Lack of information	**Agro-firm**	Chamber, Council of Ministers of Karakalpakstan	Workshop	
Buying chemical pesticide	Farmer, **Agro-firm**	Bank	Finance	
Buying seeds	Farmer	Seed Inspection	Improve seed quality	
Buying local manure	Farmer			
Providing with machinery (agricultural ones)	Farmer	Bank	Preference credits	
Providing with water	Farmer	Hydro-meliorative expedition	Search	
To get license for export	**Agro-firm**	Council of Ministers of Karakalpakstan	To give license	

Action for the food processing, particularly for dried and pickled vegetables/ fruits, was discussed in the planning at first, indicating farmer's high expectation for this activity. However, at the same time, unstable provision of electricity, gas and water supply, were pointed out as the major constraint to the activity. The participants concluded that the support from *Hakimiyat* is necessary to solve the utility issue. One possible alternative raised during the discussion is the construction of processing factory in the center of Nukus city, where the supplies of utilities are relatively stable.

The provision of information regarding marketing was also raised. In fact, it is quite difficult for individual farmers to acquire information of export procedures and foreign buyers. Therefore, farmers' high expectation for the information service from Agro-firm was stated as a part of marketing issues. In this connection, a farmer suggested to enhance the function of the information management in the firm, through providing training opportunity to the firm management. The member of Agro-firm also discussed that they expect service from the Agro-firm to purchase chemical pesticide and to assist to acquire export permission.

It is clear that activities of "TAQIR KO'L" Agro-firm are quite limited, when we look at the other Agro-firms in other regions. For example, Agro-firm in Tashkent region provides not only marketing service, but also processing, trainings, input procurement and their activities increase the bargaining power of small-scale farmer members. Therefore, it is important to activate the existing Agro-firm in Nukus district by providing appealing services to the farmer members. Consequently, the Agro-firm identifies candidates of the next actions to become a reliable business partner of farmer members. After the formal session of the workshop, some participants told to the Study Team that if Agro-firm does something useful for them, they are ready to pay for the service.

(6) District Central Bazaars

There are twenty (20) district central bazaars and one (1) clothes bazaar in Karakalpakstan. The district central bazaars are joint stock organization, whose 51% of stock is held by *Hakimiyat* of each concerned district and the remaining are shared by others. Nukus Central Bazaar is the largest bazaar in Karakalpakstan, located in the center of Nukus City. The bazaar has eight (8) branches within Nukus city and Nukus district, including livestock market and fodder crop market. Khodjeyli, Kungrad, Turtkul, and Chimbay districts also have a large central bazaar in the district center, reflecting their large size population. These central bazaars open every day. In contrast, the scale of Muynak Central Bazaar is rather small due to the population size and the bazaar opens only one day (Thursday) in a week. The following table shows basic information of the district central bazaars in Karakalpakstan.

Table 3.7.4 Basic Information on District Central Bazaars in Karakalpakstan

Name of Bazaar	Area (ha)	Number of Branches	Total Retail Place/a	Agri. Products	Capacity of Livestock Market	Revenue (Jan-Aug)		Gross Income/c	
						Gross Income	Profit/b	(per $10m^2$)	(per day)
1 Trutkul	10.20	2	650	650	100	77,525	38,556	7,600	352,384
2 Beruni	9.50	3	340	240	130	41,328	20,643	4,350	187,854
3 Elliqala	1.45	3	200	200	100	12,265	5,338	8,459	55,750
4 Mangit	4.07	4	565	515	150	45,751	22,402	11,241	207,960
5 Taxiatash	1.41	2	402	364	80	33,175	17,043	23,528	150,794
6 Khodjeily	5.07	7	1,017	715	500	168,043	84,580	33,144	763,830
7 Shumanay	2.04	2	240	240	90	6,429	2,968	3,152	29,224
8 Kanlikul	3.82	3	108	108	70	6,201	3,116	1,623	28,185
9 Kungrad	5.46	4	620	360	150	99,419	49,483	18,209	451,903
10 Nukus	10.38	8	1,000	962	750	201,391	91,584	19,402	915,411
11 Aq Mangit	3.29	2	60	55	50	5,514	2,805	1,676	25,063
12 Xalqabad	1.05	2	200	200	50	7,308	3,573	6,960	33,218
13 Kegeyli	1.05	2	160	160	80	12,089	5,809	11,513	54,950
14 Qazanketken	1.22	2	50	50	20	1,079	540	884	4,905
15 Chimbay	3.26	1	600	440	-	51,307	26,115	15,738	233,212
16 Karauziak	1.22	2	160	160	105	12,376	6,216	10,144	56,253
17 Takhtakupur	0.76	2	160	160	80	15,910	7,769	20,934	72,319
18 Aychin Jol	0.07	1	999	0		25,017	16,033	357,391	113,715
19 Chimbay Livestock	2.43	1	150	0	150	11,507	5,785	4,736	52,306
20 Automobile	1.17	1	60	0		14,750	6,965	12,606	67,043
21 Muynak	1.07	1	22	22		524	265	490	2,382
Total	69.99	55.00	7,763	5,601	2,655	848,906	417,587	573,782	3,858,661

Source: Dehkan Bazaar Association, August 2008
a/ Average size of retail place is 1.5m × 1m
b/ Profit is estimated by extracting tax from (gross) imcome
c/ Revenue from January 1 to August 8

Transactions in the district central bazaars are monitored by the Bazaar Association (DIYXANBAZARI), a joint stock organization (51% for Hokimiyat with district central bazaar offices, and 49% for others). Member of the association are all district central bazaars in Karakalpakstan. The association plays a role of coordination body of the district central bazaars in Karakalpakstan, and mainly in the following activities:

(1) Information collection (number of sellers a day, price of commodities)
(2) Monitoring market transaction (fairness, cleanness)
(3) Supervising market management (revenue, project monitoring)

The association has 7 staffs and reports the collected information to the Ministry of Finance and the Council of Ministers of Karakalpakstan. The price information is collected every morning at each district central bazaar in Karakalpakstan.

(7) Market Operation

District central bazaar office takes a responsibility for daily operation, and for example in Nukus Central Bazaar, totally 65 staff including chief manager, administration staff, accountant, sanitary inspectors, and security officers, are working in 6 branches. Main activities of the Bazaar office are (1) monitoring and supervising market transaction, (2) monitoring market price and volume of trade at daily base, (3) collection of charge for space at market, (4) maintenance of market facilities.

Main revenue is the charge for space at market. For example, Nukus Central Bazaar sets the charge based on type of goods, ranging from 250-700 sum per space (1.5m×1.0m), at retail section. On the other hand, 3,000 sum/truck/day is equally charged to wholesalers since they usually do business with large-sized truck. Total revenue is approximately 40 million sum per month in Nukus central bazaar. However, 50% of revenue goes to tax, and the rest is not enough and difficult to allocate maintenance work for market infrastructure, according to an officer in the bazaar.

Recent years, volume of trade at major district central bazaars, such as Nukus and Khodjeyli central bazaars, is growing. Particularly, number of retailers is increasing, resulting in congestion of retail section. In deed, many retailers are overflowing into walkway and even parking lot, and sitting on the dusty ground to sell agricultural products. As a result, most goods are covered with dust and tiny sand when wind blows. For this background, a severe economic situation in Karakalpakstan is pointed out, such as lack of employment opportunities for getting stable income. Since retail trade and catering sector are relatively easy to enter, an officer in bazaar forecasts that the number of retailer will increase from now on.

According to wholesales in the several bazaars, problems at wholesale section are (1) dusty and dirty road condition at the wholesale section, (2) lack of sanitary consideration at wholesale section (e.g. lack of toilet, garbage store), (3) lack of accommodations (hotels located outside of market has less beds and are expensive, some traders have to sleep in or beside their truck), (4) lack of shed to prevent strong sunshine and rainfall, (5) very cold at winter season. Compared with Khodjeyli Central Bazaar, space of wholesale section in Nukus Central Bazaar is smaller, and traffic congestion at the entrance of bazaar is observed in early morning, at the time of the busiest in the wholesale section.

(8) Price Setting and Market Price

Market prices of most agricultural products are determined by direct transaction. Neither producers nor traders of vegetables and fruits can be a price maker at least during the summer because of many competitors at the market. Usually, wholesalers set their wholesale price based on retail price in the bazaar.

At Nukus central bazaar, market office records price of goods (highest and lowest) every day, the collected price includes both wholesale price and retail price. Trading amount of each commodity is also recorded by the office for daily base. However, information dissemination system on market price is not established. Some *fermer* obtain price information from middleman by mobile phone. But most

dehkans, who directly sell their products in the market, cannot obtain price information until they arrive at the market. Most traders from other regions use personal connections to acquire a price information at several bazaars, calling friends of other bazaars and get wholesale price.

In general, price level in Nukus is lower than other region in Uzbekistan (e.g. wheat and rice). However, price of vegetables in Karakalpakstan skyrocket in winter because of undersupply. In contrast, competition among traders at bazaars in eastern regions, including Tashkent and Samarkand, is keen due to lots of commodity inflow from neighboring production place. Therefore, many traders come to Nukus to gain more profit from the regional differences. Under this condition, retailers can easily change wholesalers (traders) if the wholesaler impose higher price than others.

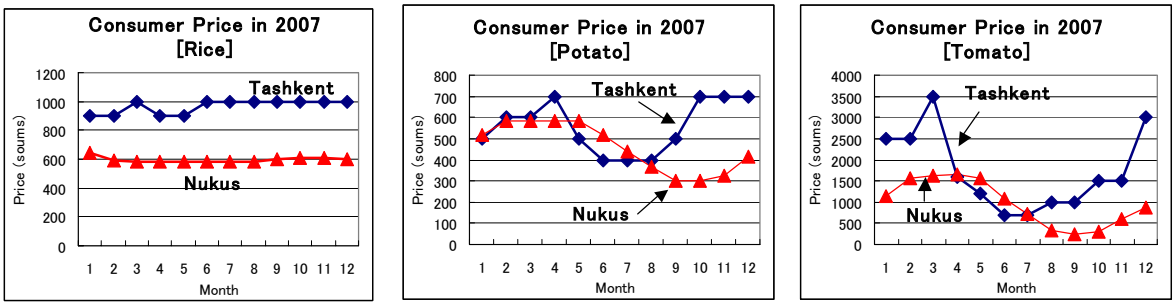


Fig. 3.7.4 Price Comparison Between Tashkent and Nukus

At harvest season, locally produced vegetables and fruits are carried into local markets at once, which result in a heavy price down in market price of the products. Particularly, price fall of cucumber, tomato and potato is quite heavy during the summer season and rapidly increases during the winter season. For example, in 2007, the highest price of cucumber was 1,700 sum/kg in March and April, while the lowest was 400 sum/kg in July to September, falling to more than one fourth from the highest. Also price of cucumber falls from 1,650 sum/kg during the winter to 220 sum/kg during the autumn, falling more than one seventh from the top. In the summer season, unsold vegetables, which are difficult to store, tend to be thrown out without being consumed.

When we look at the regional disparities in some selected commodity prices among 20 bazaars, price levels tend to be lower in the northern districts, while higher in the southern districts. For example, price of rice is higher in Kungrad, Beruni and Nukus, but lower in Karauzyak, Takhtakupyr and Kegeyli. Also, negative correlation between the distance from Nukus and the price can be observed, indicating that price of products is lower if the district is far from Nukus city. Furthermore, there is a tendency that, if self-sufficiency rate of the products in the district is lower, the price is higher.

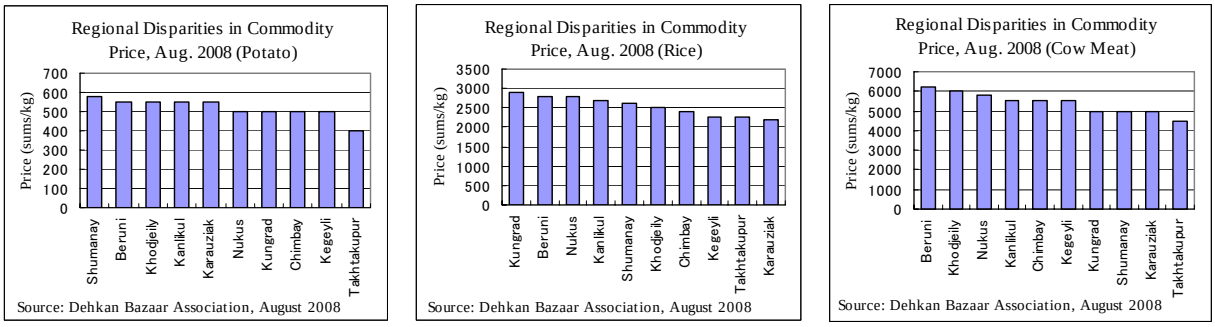


Fig. 3.7.5 Regional Price Disparities (August 2008)

(9) Food Safety Measures

1) Veterinary and Sanitary Control

Republic Veterinary Laboratory takes responsibility for food safety, particularly veterinary and sanitary aspects, and is attached under Department of Veterinary in MAWR of Karakalpakstan. Main

roles of the Laboratory are (1) to prevent spread of animal diseases and (2) to prevent distribution of depredated food to consumers. For these purpose, the organization conducts (1) diagnosis for animal diseases and (2) periodical inspection of agricultural/ livestock/ fishery products at bazaars.

It has 9 District Veterinary Laboratories at district level (Nukus, Chimbay, Turtkul, Amudarya, Elliqara, Beruni, Takhtakupyr, Kegeily, Khodjeyli, and Kungrad) and 2 City Veterinary Laboratory in Nukus and Takhiatash. Under the District/ City Laboratory, 21 Veterinary and Sanitary Expertise (VSE) in each district central Bazaar checks veterinary and sanitary conditions of perishable foods, including livestock products (meat, milk, egg, honey), vegetables, fruits and fishes every day.

The VSE has the power to suspend perishable food transaction, if any problem is observed. Then, it sends the sample to the Republic Veterinary Laboratory for further inspection, which sends report to central level if necessary. The VSE cannot check internal organs of livestock such as liver and other intestines, since their inspection equipment is limited. Therefore, the District/ City Veterinary Laboratory carry out the veterinary inspection of internal organs.

On the other hand, Department of Veterinary in MAWR of Karakalpakstan has 14 branch offices at district level, and 82 veterinary points at VCC or *aul*, which carry out biopsy, taking blood and milk samples from living body for veterinary inspection at farm gate.

According to the inspector of Nukus Central Bazaar, two types of inspection are carried out at the laboratory: the daily monitoring and the periodical inspection. When wholesalers arrive at the bazaar, they must carry a sample of their products into the laboratory for the inspection, and have to be issued a certificate before selling to retailers. For retailers, the sanitary inspectors periodically go around the retail section to conduct surprise inspection, and issue a certificate if the commodities pass the inspection. Five officers, including two veterinary doctors, two laboratory inspectors and one sanitary staff, carry out the daily monitoring and two veterinary doctors shoulder the responsibility at the Nukus Central Bazaar.

The station has its own sanitary check plan, and the plan covers vegetables, fruits, seedlings, livestock products (meat, egg, milk, fish, honey), and processed foods such as vegetable salad and dry fish. The check items of sanitary inspection are roughly categorized into two types: bacteriological examination and physicochemical examination. Followings are check items of each product. However, products are not entirely tested in accordance with the check items due to lack of test equipment.

Table 3.7.5 Check Items of Veterinary and Sanitary Inspection

Category	Products	Check Items
Meat	Beef, Mutton, Pork, Chicken, Other Animal Meat, Internals, Fish, Egg	Organoleptic Evaluation, Bacterioscopy, pH, Peroxides, $CuSO_4$, Formalin, Sulfuretted Hydrogen, etc.
Dairy Products	Milk, Sour Cream, Yogurt, Yogurt Products, Curd	Organoleptic Evaluation, Acidity, Thickness, Fattiness, Mechanic Dirty, Peroxides, Humidity and dry substance, etc.
Plant Oriented Products	Fruits and Vegetables, Dry Fruits, Corn Products	Organoleptic Evaluation, Amount of Nitrate, Radioactive Contamination, etc.
Fresh Vegetables	Tomato, Cabbage, Cucumber, Mushroom, etc.	Organoleptic Evaluation, Acidity, Salinity, etc.

Source: Veterinary and Sanitary Laboratory, Nukus Central Bazaar

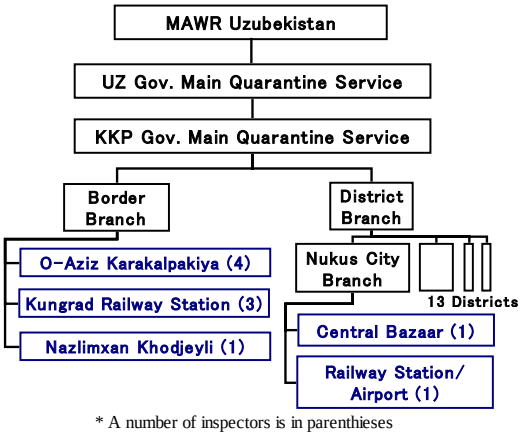
The laboratory can inspect agrochemical residues, such as nitrogen and nickel, through testing instrument. They also have an equipment to test milk in view of acidity, fattiness and Peroxides. Flesh milk filled in PET bottle is directly brought from farm gate without passing any procedures such as centrifugation (cleaning), homogenization and low-temperature pasteurization.

However, according to the officials in the laboratory, no problems have been observed on fresh milk because milk sold at the district central bazaar is basically quite fresh. Rather, fruits and vegetables sometime have problem on its quality. Two years ago, many maggot of fruit fly were observed in melon, due to warm winter, which allows the insects surviving even during winter season. Vegetable salads including homemade Kim chi tend to have problems in terms of freshness.

Since testing tools at the laboratory are old and too simple, the veterinary and sanitary inspectors want to improve their testing tools in accordance with consumers' requirement. Some consumer requires freshness and food safety, which result in increase in demand on organic vegetables and less chemical contamination.

2) Plant Quarantine Control

The Karakalpakstan Government Plant Quarantine Service under the MAWR of Karakalpakstan is the authority concerning plant quarantine control. It has fourteen branch offices at city and district level and three branch offices at the border area, including O-Aziz office at Karakalpakiya, Kungrad railway station and Nazlimxan office at Khodjeyli district. Nukus quarantine office has tree quarantine control stations: Nukus central bazaar, Nukus air port and Nukus railway station. Karakalpakstan Government Plant Quarantine Service is attached under the Uzbekistan Government Plant Quarantine Service (Tashkent).



* A number of inspectors is in parenthieses

Fig. 3.7.6 Quarantine Service in Karakalpakstan

Main activity of the quarantine office at Nukus central bazaar is to inspect plant products, including fruits and vegetables, to prevent spread of plant insects and diseases, based on quarantine regulation. The service station also inspects plant seed whether harmful weed seeds are mixed in.

Inspection method is basically a visual inspection using magnifying glass. The agronomist-inspector directly goes to wholesale section to conduct the visual inspection basically from 7:00am to 9:00am every day. The wholesalers cannot sell their fresh products without the certificate issued by the quarantine office according to their regulation. The service office sends the sample to Tashkent for further inspection if the inspector finds some problems. At Nukus central bazaar, the insect problems are found in persimmon and pomegranate for example, mainly during the summer and autumn. However, their inspection method is too simple without any tools for detail inspection, such as microscope and an optical microscope, in the Nukus Central Bazaar office. Also, according to the inspector, lack of information regarding to foreign quarantine situations and harmful insect (no picture/ sample/ textbook) and lack of transportation means (motor bike for district, vehicle for border area) are the constraints to perform their daily activities.

(10) District Central Bazaar Improvement Plan

The district central bazaar improvement projects started in 2007 at each district central bazaar in Karakalpakstan, based on the presidential degree No.330 (2007). The objectives of the projects are (1) improvement of transaction environment of sellers and buyers and (2) mitigation of congestion at retail section due to increase in retailers. The projects mainly focus on physical improvement and each district central bazaars have to formulate their own master plan based on the presidential degree. However, there is no fund from the government for the project implementation and each district central bazaar must raise the budget from their own revenue.

According to the Government Committee for Architecture and Construction, which supervise architectural design including the design portion of the district central bazaar improvement project, the design concepts of the project are as follows.

(1) Separation of perishable food (vegetables, fruits) and other goods (clothes, electric appliances, daily necessities, toys, etc.)
(2) Establishment of cold section for meat, milk and fish with air conditioners and refrigerators
(3) Establishment of washing area of vegetables and fruits
(4) Improvement of the sanitary conditions
(5) Asphalt pavement on dusty road (walkway and inner-road)
(6) Separation of wholesale and retail section

The improvement project in Nukus Central Bazaar started in 2007 and the planning stage was completed in 2008. The project was divided into 2 stages: (1) main building improvement and (2) separation of perishable food section and other sections. The second stage includes establishment of cold section for dairy products, meat and fishes to improve sanitary condition of their transaction. According to the District Central Bazaar Association, the total project cost is 1,191 million sum, including 565 million sum for the first stage and 626 million sum for the second stage. The first stage has already started from 2007 and the second stage was completed in 2009. However, the Nukus Central Bazaar can't have enough ability to arrange the project budget, resulting in delayed implementation of the project.

Table 3.7.6 Progress of the District Central Bazaar Improvement Project (2008)

Name of Bazaar	Current Capacity (retail place)	Reconstruction Cost (mil. sum)	Progress		Planned Date of Completion
			Disbersement in 2008 (mil. sum)	Completion (%)	
Kanlikul	121	120	60	50.0	Nov.30,2008
Takhtakupyr	150	163	38	23.0	Nov.30,2008
Khodjeyli	450	650	65	10.0	Dec.1, 2008
Kungrad	300	300	80	27.0	Nov.30,2008
Turtkul	700	443	164	37.0	Nov.30,2008
Nukus	1010	626	224	37.3	4th Quarter, 2009
Mangit	600	221	159	71.8	Sep.1, 2008
Ellikala	300	172	129	75.0	Nov.30,2008
Shumanay	100	138	25	18.0	Nov.30,2008
Beruni (Shobboz)	426	250	75	30.0	Oct.1, 2008
Kegeyli	160	156	81	51.6	Nov.30,2008
Chimbay	600	700	466	65.5	Dec.25,2008
Kegeyli (Xalqabad)	70	117	26	22.3	Nov.30,2008
Karauzyak	160	82	20	24.6	Nov.30,2008

Source: District Central Bazaar Association

3.7.2 Processing and Manufacturing

Karakalpakstan used to produce raw materials of cotton for ginnery, wheat for flouring, sheep for skin/hide processing, meat/sausage and milk. However, the collapse of Soviet Union crashed the distribution system to CIS countries and the collection system from collective farms. Large-scale factories of dairy products, meat and wool fabric are not operating now. Seven (7) cotton ginnery factories operate in Karakalpakstan but there is limitation of harvested volume due to water shortage and two factories had been closed and one factory sold to private investor.

For production of vegetables and fruits, Karakalpakstan products have limited competitiveness with ones of Samarkand and Fergana due to availability of irrigation water. The harvest periods are almost the same of other areas. Therefore, large-scale *fermer* and traders are exploiting for markets in local areas and exporting to Kazakhstan, Russia and Ukraine.

The available resources for agro-processing are rich in Karakalpakstan as shown in the next table.

Table 3.7.7 The Available Resources for Agro-processing in Karakalpakstan

Products	Available materials	By-products
Livestock products	cow meat, bovine milk, cow skin, karakul sheep skin & wool	Manure
Vegetables	tomato (long, small, convince verities), cucumber, carrot, onion, chili, potato, spring onion, paprika, water melon, sweet melon , aubergine, pumpkin	water melon seed
Fruits	apple, grape, apricot	damaged products
Cereal crops	Wheat, sorghum, (paddy)	wheat bran, (rice bran)
Oil crops	sesame, sunflower	
Industrial products	raw cotton, cottonseed oil, liquorice root	Cotton cake
Fodder crops	liquorice leave, alfalfa, stems of sorghum and maize	
Others	rock salt	

Processed Meat and Sausage: The meat and sausage factory was located in Kungrad for exporting to the former Soviet Union, but collapsed due to loss of distribution routes and collection incentives for *fermer*. A private company operated the smoke sausage of cow meat since 2008 using own grown meat cows. A machinery manufacturer of EU will provide technical training and processing equipment. At present, one trade company manufactures sausage in small-scale in Nukus.

Dairy Product: The large-scale milk factories were located in Kungrad, Khodjeyli, Chimbay and Nukus. According to the change of main producers from *shirkat* to *dehkan*, the large-scale factories could not collect raw milk. In Uzbekistan, the milk consumption ranked second after wheat at 221 kilo-calorie in 2003 in the average daily per capita consumption, therefore the government is promoting livestock production by Presidential Decree No.308. Small-scale milk plants will help to secure nutrient and hygienic conditions for rural town and cities.

Far Skin and Wool: Specialized *shirkats* for livestock are raising Karakul sheep in isolated semi-arid areas in order to keep their genetic purity. The most valuable products are fur skin of newborn sheep with one week. The live sheep are transported to factories in Bukhara because feasible operation of the processing factory is difficult due to lack of water for souring.

Wheat Flour: Large-scale processing of wheat flour had been operated in Karakalpakstan, *fermer* are obligated to product those crops under contract with supply of fertilizer and seeds. The function of wheat guaranteed supply system has an important role to the population for food security, but shortage of water creates a difficult situation to secure contracted supply between those factories and *fermer*. The management body, UzDonMashulot[8], adjusts importing volume of wheat out of region and provides the fixed volume at the fixed price to local distributors/ shops. Small-scale flour processing equipment (0.5-1.0 ton/hour capacity) are demanded in rural areas to produce the surplus out of contracted obligated volume. Wheat produced in Karakalpakstan is mainly used for bread, noodle and macaroni.

Horticultural Crops: According to the transition of the economy, the government promotes horticultural agro- firms by Presidential Decree No. 255. The agro-firms are exempted from income tax, single, assessed, value added (except for value added tax for import) taxes for three years and this resulted in further expansion of economic opportunities to the farms and enterprises. The limited number of *fermer* started processing business for domestic and export markets. However, the conscious on marketing and food processing for value-added concept for *fermer* and *dehkan* has not been improved according the results of PCM workshops conducted by the Study Team. The main reason is the interruption of power, gas and water supply in rural areas and difficulty in accessing small-scale agro-processing equipment.

Food Oil: Cottonseed oil is consumed commonly for Karakalpakstan population due to price factor. But there is possibility on contamination of gossypol in cottonseed oil, so that the cotton ginnery companies are requested to install refining plants for crude cottonseed oil. Some consumers purchase sunflower oil imported from Russia or Tashkent.

In these economical conditions, Council of Ministers of Karakalpakstan and the concerning ministries are requested to promote small-scale agro-processing technologies for income generation of *fermer* and *dehkan*. Necessary measures are summarized as below:

- Strengthening the function of MAWR of Karakalpakstan in agro-processing and its promotion
- Leadership of *Hakimiyat* in agro-processing and marketing of specialized products to other areas and countries

[8]Denationalization and privatization of state owned properties are deepening by the Presidential decree No.408, 2006. The former state enterprises and government facilities are sold by means of the exchange, auction and tendering of stocks including MTP, meat wholesale trading enterprises, irrigation management buildings, local veterinary service stations, *Hakimiyat* owned communal centers in Karakalpakstan for 2006-2008. For wheat flour enterprise, 51% of stocks are owned by private.

- Utilization of current infrastructure in terms of power, water and gas supply and existing building or establishment of special manufacturing zone in each town
- Low interest credit scheme, less than 5 %, for purchasing agro-processing equipment
- Organize the exhibition for small-scale machinery and equipment for agro-processing at Nukus by Ministry of Foreign Economic Relations including manually-operated equipment
- Improve communication for trading information (internet and mobile phone network)
- Contract farming supplying seeds and NPK fertilizer and promote organic products
- Participation of women in agro-processing
- Linkage of animal feed production and dairy production between by-products distribution of cotton ginnery and wheat flouring, fodder cropping, fodder trading points, cattle farmers, slaughtering and milk processing
- Support agro-firms and voluntary groups of *fermer* and *dehkan* for marketing and agro-processing in terms of marketing, processing technologies and training of management skills through *Hakimiyat* agricultural officers and *Fermer's* Association

The competitiveness of value-add products in Karakalpakstan using available resources is summarized in Table 3.7.8 (page 3-59). Karakalpakstan has much potential in agro-processing for meat, dairy products, feeds, vegetables, liquorice and cereals. The introduction of small-scale processing will be important during the economical transition period in order to create initiatives of *fermer* and *dehkan*.

3.8 Social Infrastructure

3.8.1 Education

The following table shows the current status of educational infrastructure in Karakalpakstan. There were 761 general schools in Karakalpakstan with 305,000 pupils in 2006/07. Pupils (or students) school ratio is one of indicators to measure the status of development in education sector. According to the published statistics, the ratio of general school in Karakalpakstan is lower than that of national average, whereas the ratios of gymnasium, academic lyceum and university/ institute in the republic are higher than the national average. Also, Karakalpakstan had 407 kindergartens with 31,870 children in 2005.

Table 3.8.1 Development Status of Education Infrastructure in Karakalpakstan (2006/2007)

Schools/ Facilities	Number of Schools	Number of Pupils/ Students	Pupils-School Ratio	National Average of the Ratio
General School	761	305,000	401	582
Lyceum	17	5,774	340	339
Gymnasium	2	2,346	1,173	700
Academic Lyceum	7	5,220	746	536
Professional College	76	83,657	1,101	1,072
University/ Institute	2	17,604	8,802	4,618

Source: Annual Statistics of Uzbekistan 2007

The major problems in the education sector stipulated in the draft social and economic development program for 2007-2011 are: (1) for the general secondary education – insufficient quantity of textbooks/ schoolbooks, low quality of trainings, lack of retraining opportunity for qualified pedagogical cadre, (2) for the special secondary education – weak interrelation/ cooperation/ integration between trainings and production, (3) for the higher education – low quality of professional trainings. To address these issues, the government will promote: provision of necessary equipment / materials, improvement of education standard and training programs, enhancement of teachers' training, improvement of professional trainings and enhancement of basic science technologies.

3.8.2 Water Supply

Provision of safe drinking water is an urgent issue in Karakalpakstan. According to a UNEP article on the website, written by Oral A. Ataniyazova[9], 65% of the piped water does not meet chemical standards and 35% of water does not clear bacteriological standard. Also the article indicated that around 150,000 ton of toxic chemicals flowed into the Amudarya River in the past decade, which in turn has resulted in highly polluted water, contaminated by nitrogen, phosphorous, pesticides, phenols, organ chlorine compounds and minerals.

According to the living condition survey in 2004 by JICA, the total served population by centralized water supply system was 70% in Karakalpakstan. The lowest coverage rate was 41% in Shumanay, followed by 42% in Beruni, whereas the highest coverage rate was 87% in Kungrad.

Table 3.8.2 Served Population by Central Water Supply System (%)

Kungrad	Muynak	Shumanay	Kanlikul	Kegeily	Chimbay
87.4	73.6	40.7	76.7	64.4	73.0

Khodjeyli	Nukus	Karauzyak	Takhtakupyr	Beruni	**Karakalpakstan**
65.3	76.7	72.1	72.3	42.2	**70.1**

Source: Living conditions in Karakalpakstan, A.A.Joldasov, March 2004, JICA

The Government of Karakalpakstan planned to increase the served population with a centralized water supply system, from 71.8% in 2005 to 72.4% in 2011, according to the draft social and economic development program for 2007-2011. The increase of the served population with centralized water supply system will be achieved by the construction of a new water supply system and the fund is expected to come from foreign investors.

3.8.3 Energy Supply

Power industry is one of key industry in the Karakalpakstan economy, and Takhiatash and power plants fill the electric power demand not only of Karakalpakstan, but also of neighboring regions of Khorezm and even Turkmenistan. In 2006, the industry produced 962 million kV with a loss of 21.7%. The draft regional development program for 2007 to 2011 stated 3.5% increase in power production with a loss reduction of 1.7%. According to the program, the major issues in the power supply sector are: (1) necessity to construct power transmission lines and transform station in newly developed settlements and (2) necessity of capital investment by consumers on power transmission lines.

The Karakalpakstan government will bolster up oil and gas production, and expects that the share of the production in GDP will increase from 14% in 2005 to 29% in 2011, according to the draft social and economic development program of Karakalpakstan. The program also indicated that the government would increase the served population of gas from 92.4% in 2005 to 93.5% in 2011. According to the living condition survey (JICA), the population coverage rates are low in Beruni and Muynak (72% and 73% respectively).

Table 3.8.3 Population Coverage Rate of Natural Gas Service (%)

Kungrad	Muynak	Shumanay	Kanlikul	Kegeily	Chimbay
99.8	72.6	87.0	99.8	87.7	97.0

Khodjeyli	Nukus	Karauzyak	Takhtakupyr	Beruni	**Karakalpakstan**
97.0	98.2	90.5	92.0	72.2	**90.4**

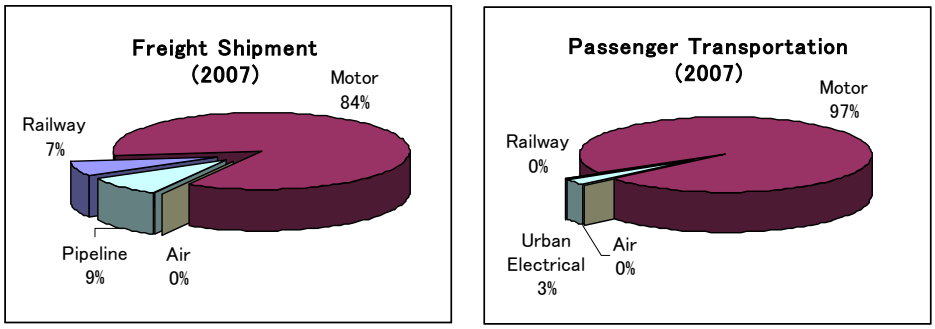
Source: Living conditions in Karakalpakstan, A.A.Joldasov, March 2004, JICA

[9] Dr. Oral A. Ataniyazova MD, PhD, Chairperson of the Karakalpak Center for Reproductive Health and Environment (Center PERZENT) and Head of the Reproductive Health department of the Karakalpak Branch of the Uzbek Academy of Science (http://www.unep.org/OurPlanet/imgversn/113/atan.html)

According to the interview survey to farmers, conducted by the study team, one of serious problem on energy supply is the unstable supply of gas, particularly in winter season, which in turn results in a constraint to the agricultural production in green houses in the rural part of Karakalpakstan.

3.8.4 Transportation and Communication

The major means of freight transportation in Uzbekistan is road transportation, which holds 84% of the total freight shipment, followed by pipeline (9%) and railway transportation (7%). Road transportation is also the most popular transportation means for passenger, which accounts for 97% of the total passenger transportation in 2007. In contrast, the major mean for exported freight is the railway, where 6,425,000 tons of freights were shipped by railway in 2007, accounting for 14% of the total exported freight in Uzbekistan. Around 60% of cotton is brought by railway via Turkmenistan to Bander-Abbas in Iran.



Source: Statistical Review of the Republic of Uzbekistan 2008

Fig. 3.8.1 Major Means of Transportation

The major transportation means is also vehicles in Karakalpakstan. The volume of freight shipment by road is 13 times larger than the railway. The total length of paved road for general use in Karakalpakstan is 4,100 km, and the road network connects Karakalpakstan with other regions in Uzbekistan in the southeast, the Republic of Turkmenistan in the south and the Republic of Kazakhstan in the northwest. However, around 75% of the roads for general use have already passed its repairing period and it requires maintenance.

Railway is also an important transportation mean for Karakalpakstan, which lies on one of the main railway lines linking Tashkent to Moscow. The operational length of Railway Lines was 844 km in 2006. The main stations in Karakalpakstan are at Konghirat, Nukus and Turtkul. It takes about 26 hours to go from Nukus to Tashkent.

In addition, Karakalpakstan has a small international airport in Nukus city with daily connections to Tashkent, Bukhara, Samarkand and nearby countries. Muynak, Kungrad and Turtkul also have local airports for internal air traffic. However, air traffic is not popular for the rural population due to its high prices. The following table shows the status of transportation infrastructure of Karakalpakstan.

Table 3.8.4 Development Status of Transportation Infrastructure in Karakalpakstan (2006)

Item	Uzbekistan	Karakalpakstan	Share of Karakalpakstan
Operational Length of Railway Lines (km)	4,005	844	21%
Railway Density (km/km^2)	0.008	0.005	62%
Length of Paved Road for General Use (km)	41,600	4,100	10%
Road Density (km/km^2)	0.085	0.025	29%
Freight Transportation by Railway (1000t)	50,007	1,732	3%
Freight Transportation by Motor (1000t)	689,800	23,500	3%
Freight Turnover by Motor (million ton/km)	16,054	423	3%
Passenger Transportation by Motor (million people)	4,045	97	2%
Passenger Turnover by Motor (million people/ km)	4,224	828	20%

Source: Annual Statistics of Uzbekistan 2007

3.8.5 Health Care

Maternal and child health care is the main issue of health sector in Karakalpakstan. Maternal and infant mortality are higher in the Karakalpakstan than in other regions of Uzbekistan. According to the Ministry of Public Health, maternal mortality in Karakalpakstan in 2001 was 34.1 per 100,000 live births, and infant mortality was 19.9 per 100,000 in 2002. Also, according to UNEP article written by Dr. Oral A. Ataniyazova, a statistical research on health conditions of women in reproductive age in Karakalpakstan indicated that:

- 87-99% have anemia
- 90% have complications during pregnancy and childbirth
- 30% have kidney diseases in pregnancy
- 15% have a miscarriage
- 23% have thyroid pathology, mainly goiter and hyperthyroidism, probably due to iodine deficiency

The following table shows the development status of health and medical infrastructure in Karakalpakstan. The quantities of health care and medical facilities in Karakalpakstan, which present concerned items, are not inferior to the national average, except number of beds in medical institutions. The government has made efforts to shift health reimbursement system in Karakalpakstan from centrally planned and state financing system to joint (state-private) management system.

Table 3.8.5 Development Status of Health and Medical Infrastructure in Karakalpakstan (2006)

Item	Quantity	N° of Item per 10,000 people	National Average of the Ratio
Number of Medical Institutions	73	0.5	0.4
Number of Beds (1000)	9.3	53.9	19
Number of Outpatient-Policlinic	292	1.8	2.0
Number of Attendance in Shift (1000)	22	141.5	153.2
Number of Obstetrical-Gynecological Cabinets	156	1.0	0.9
Number of Children's Outpatient-Policlinics	220	1.4	0.9
Number of Doctor (1000)	3.8	24.0	28.4
Number of Paramedical Personnel (1000)	16	101.1	102.9

Source: Annual Statistics of Uzbekistan 2007

However, the republic still suffers in view of quality of the services and has the necessity of reforms in: (1) provision of modern medical equipment, transportation and communication, (2) provision of immunization, enrichment of foodstuff with deficit elements, information dissemination regarding to health care, in view of disease prevention, (3) improvement of sanitary and epidemiological conditions at public and household level, (4) strengthening medical and health care network on socially significant diseases including tuberculosis and HIV/AIDs and (5) improvement of health care financing system.

3.9 Characteristics of the Districts in the Study Area

3.9.1 Irrigated Land and Crop Land Conditions

The irrigated land and crop land area in the target districts in 2006 is shown in the table below. The irrigated land in the Kungrad was the largest in the target districts with 41,540 ha. On the other hand, the irrigated land in Muynak was the smallest in the target districts with 11,926 ha. However the range of the irrigated land in the total area of each district was from 0.3 % in Muynak to 46.6 % in Kanlikul. The percentage of Shumanay, Kanlikul, Kegeily, Chimbay, Khodjeyli and Nukus were higher and those of Kungrad, Muynak, Karauzyak, Takhtakupyr and Beruni were lower.

The crop land of Khodjeyli (24,906 ha) was the largest and Beruni (21,459 ha) presented the second largest crop land in the target districts. On the other hand, the crop land in Muynak (1,206 ha) was the

smallest in the target districts. The range of crop land in the total area for each district was from 0.03% in Muynak to 18.8 % in Nukus. Comparatively the percentage of Shumanay, Kanlikul, Khodjeyli and Nukus were higher and those of Kungrad, Muynak and Takhtakupyr were lower.

Furthermore, percentages of crop land in irrigated land are also shown in the table below. The range was from 10.1 % in Muynak to 70.6 % in Khodjeyli. The average percentage in the target districts was 43.1 %. Comparatively the percentage in Khodjeyli, Beruni and Nukus were higher and in Muynak was significantly lower. Especially the percentage of irrigated land and crop land in Beruni was comparatively lower, however the area of crop land was larger because of the high percentage of crop land in irrigated land. The remaining irrigated land was not used mainly because of shortage of irrigation water.

Table 3.9.1 Area of Irrigated Land and Crop Land in the Target Districts in 2006

District	Total area		Arable land		Irrigated land		Crop land		% of crop land in irrigated land
	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)	
Kungrad	6,948,911	100	1,238,127	17.8	41,540	0.6	17,330	0.25	41.7
Muynak	3,675,836	100	130,029	3.5	11,926	0.3	1,206	0.03	10.1
Shumanay	81,432	100	48,979	60.1	28,697	35.2	12,985	15.95	45.2
Kanlikul	74,409	100	46,402	62.4	34,661	46.6	12,549	16.86	36.2
Kegeily	260,301	100	120,183	46.2	53,849	20.7	18,602	7.15	34.5
Chimbay	219,831	100	131,456	59.8	53,122	24.2	18,249	8.30	34.4
Khodjeyli	**235,285**	**100**	**143,133**	**60.8**	**35,277**	**15**	**24,906**	**10.59**	**70.6**
Nukus	95,289	100	50,008	52.5	31,009	32.5	17,935	18.82	57.8
Karauzyak	589,107	100	415,416	70.5	35,383	6	14,412	2.45	40.7
Takhtakupyr	2,112,218	100	1,463,805	69.3	34,649	1.6	13,038	0.62	37.6
Beruni	393,059	100	324,213	82.5	33,115	8.4	21,459	5.46	64.8
Total	14,685,678	100	4,111,751	28.0	393,228	2.7	172,671	1.18	43.9

Source: The Ministry of Economy of the Republic of Karakalpakstan

3.9.2 Agriculture and Livestock Condition

The cropped area of the major crops is shown in Table 3.9.2 (page 3-60). The share of cotton is the highest in Shumanay, Kegeily, Chimbay, Khodjeyli and Beruni. However the share of wheat is less than that in Karakalpakstan in Khodjeyli and Beruni. It means these two districts, Khodjeyli and Beruni, are more specialized in cotton production than the other districts. Khodjeyli and Beruni have the higher percentage of crop land in irrigated land, so the high percentage of cotton production might have any relation to it. The share of wheat in cropped area is the second highest in Shumanay, Kegeily and Chimbay. In Kungrad, Kanlikul, Karauzyak and Takhtakupyr the share of wheat and other grains including rice is higher and the share of cotton is the second.

In the case of Nukus, the share of cotton is significantly low, however the share of other grains, rice, vegetables and fruits are comparatively higher than the other districts. It means that the agriculture production in Nukus is more diversified than the other districts in the Study Area.

In the case of Muynak, the cropped area is the smallest in the districts in the Study Area. The share of wheat is the highest in the district, however, the share of cotton is significantly lower than the other districts. Although the cropped areas are small compared with the other districts, the share of vegetables and melons & gourds are comparatively higher than the other districts.

In Kungrad, Kegeily and Takhtakupyr, the percentage of the fodder crops is comparatively higher than the other districts.

The number of livestock is shown in Table 3.9.3 (page 3-60). In Beruni, the numbers of cattle, cow and poultry are higher than the target districts. The numbers of cattle and cow in Kegeily are also higher than the other districts. The number of sheep & goat is the highest in Takhtakupyr and in

Kungrad is higher than the other districts. On the other hand, the number of livestock in Muynak is the lowest in the target districts. Summarizing, the livestock production might be more active in Beruni, Kungrad and Takhtakupyr. In the case of Kungrad and Takhtakupyr, the share of fodder crops in cropped area is higher than the other districts.

3.9.3 Characteristics of Districts in the Study Area

According to the conditions mentioned above, the characteristics of the districts are summarized as:

Districts	Characteristics
Kungrad	Wheat and other grains, including rice, share most part of the cropped area and the share of cotton is the second. The number of sheep and goat is comparatively high.
Muynak	The rate of crop land in irrigated land is the lowest and the cropped area is the smallest in the target districts. The number of livestock is the lowest in the target districts.
Shumanay	The share of cotton in cropped area is the highest in this district. And the share of wheat is the second. The number of cattle is comparatively high.
Kanlikul	Wheat and other grains, including rice, share most part of cropped area and share of cotton is the second.
Kegeily	The share of cotton in cropped area is the highest in this district. The share of wheat is the second. The number of cattle and cow is comparatively high.
Chimbay	The share of cotton in cropped area is the highest in this district. The share of wheat is the second. The number of cattle and cow is comparatively high.
Khodjeyli	The share of cotton in cropped area is the highest in this district. However the share of wheat in cropped area is lower than that in Karakalpakstan. The rate of crop land in irrigated land is the highest in the target districts.
Nukus	The share of cotton in cropped area is very low. However the crop production is more diversified (wheat, rice, vegetable and fruits) than the other districts. The rate of crop land in irrigated land is comparatively high in the target districts. However the number of livestock is not so high.
Karauzyak	Wheat and other grains, including rice, share most part of cropped area and the share of cotton is the second. The number of sheep and goat is comparatively high.
Takhtakupyr	Wheat and other grains, including rice, share most part of cropped area and the share of cotton is the second. The number of sheep and goat is the highest.
Beruni	The share of cotton in cropped area is the highest in this district. However the share of wheat in cropped area is lower than that of Karakalpakstan. The share of fruits in cropped area is higher than the other districts. The number of cattle, cow and poultry is the highest in the target districts.

3.10 Environmental Protection Systems

3.10.1 Requirements for Environmental and Social Considerations

Under the Law on State Environmental Examination (further referred to as “Environmental Examination Law”, May 25, 2000) and Resolution of the Cabinet of Ministers of the Republic of Uzbekistan on State Environmental Examination (further referred to as “Resolution on Environmental Examination”, December 31, 2001), the procedures for State Environmental Examination (which can be referred to as the process for Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA)) are categorized depending to the type and scale of the item to be examined.

Table 3.10.1 Category and Procedures for State Environmental Examination

Item			Procedures for State Environmental Examination (Documents to be examined)	Organization to conduct Examination
Pre-project and project documentation, existing enterprises and other subjects, negatively impacting the environment and health of people, units with a special legal regime	Planned Activities	Category I	- Draft Statement about Impact to the Environment - Statement about Impact to the Environment* - Statement about Environmental Consequences*	Central Department**
		Category II		
		Category III		Regional Departments***
		Category IV	- Draft Statement about Impact to the Environment	
	Existing Activities	Category I	- Draft of Voluntary Environmental Restrictions / Norms on the Conducted Activates - Statement about Impact to the Environment* - Other documents voluntarily submitted by the Implementer of the Activity	Central Department**
		Category II		
		Category III		Regional Departments***
		Category IV		

Materials of comprehensive investigation of the territories with the purpose of entitling them a status of special protected natural areas, areas of extreme ecological situation and natural disaster		- Materials of comprehensive investigation of the territories with the purpose of entitling them a status of special protected natural areas, areas of extreme ecological situation and natural disaster	Central Department**
Documents of developing new types of techniques, technology, materials, substances, products		- Documents of developing new types of techniques, technology, materials, substances, products	Central Department**
National programs, concepts, schemes of allocation and development of production forces, fields of economy and social sphere		- Draft documents for national programs, concepts, schemes of allocation and development of production forces, fields of economy and social sphere	Central Department**
Urban planning documentation for designing subjects	With the population of more than 50,000	- Draft Statement about Impact to the Environment - Statement about Impact to the Environment* - Statement about Environmental Consequences*	Central Department**
	With the population of 50,000 or less		Regional Departments***
Normative-technical and directive-methodical documents regulating economical and other activities related to use of natural resources.		- Documents on normative-technical and directive-methodical documents regulating economical and other activities related to use of natural resources.	Central Department**

* to be submitted if judged necessary as result of State Environmental Examination on the "Draft Statement about Impact to the Environment"

** Central Department: Central Department for State Environmental Examination

*** Regional Departments: Regional Departments for State Environmental Examination, Tashkent Special Department for State Environmental Examination, State Environmental Examination Department of the Republic of Karakalpakstan.

3.10.2 Requirements of Initial Environmental Examination (IEE)

The Master Plan on Regional Development in Karakalpakstan is regarded as a regional development plan, thus not corresponding to the process for National programs / concepts / schemes of allocation and development of production forces, fields of economy and social sphere, as described in section 2.12.3. However, individual activities to be incorporated to the Master Plan, particularly those concerning to production facilities, may be obliged to go through the process of State Environmental Examination at the time of feasibility study / designing stage. This will involve the preparation and examination of the documents below, with activities under Category I and II to be examined under the Central Department for State Environmental Examination in Tashkent, while those under Category III and IV are to be examined under the State Environmental Examination Department of the Republic of Karakalpakstan.

Activities under Category I, II and III

(1) Draft Statement about Impact to the Environment

The Draft Statement about Impact to the Environment shall be prepared and submitted during the planning / concept stage of the Project. SCNP will review the documents and will give decisions whether the projects can be approved or will require further measures to mitigate environmental impacts. The validity of the results of examination is for 3 years after being approved.

The document shall include the following information:

- Features of the project area before the project implementation, including population density, land use and situation of the environment
- Topographical map with information such as recreational areas, residential areas, irrigated areas, area under land improvement, agricultural land, electric power lines, transportation network, water supply, gas distribution network, and others
- Possible risks to the environment that may be incurred by the installation or operation of main / secondary facilities or machines, technology, natural resources that are used or by the items produced.
- Expected negative impact that may be incurred from waste, wastewater and other discharged materials and measures for mitigation of their negative impact to the environment.

- Measures for retaining, storing and recycling waste
- Considerations made on the decision among possible alternatives for the planned activities and technologies used from the point of nature protection in regard of the advanced scientific technologies.
- Decisions made for organizational, structural and technical measures to mitigate negative impact on the environment.

(2) Statement about Impact to the Environment

If examination of the submitted Draft Statement about Impact to the Environment results in requirements for further measures to mitigate environmental impacts, the Statement about Impact to the Environment shall be prepared.

The Statement about Impact to the Environment shall be submitted before starting implementation of the projects, by the stage of examining its technical and financial feasibilities.

The document shall include the following information:

- Evaluation of environmental issues at the target area based on results of additional investigation on engineering, model experiments and other surveys
- Analysis of technologies in identifying environmental issues in the field
- Results of interviews to local residents (when required)
- Verification studies for measures to mitigate negative impact to the environment occurring from the implementation of the project

(3) Statement about Environmental Consequences

For projects of which preparation of Statement about Impact to the Environment was required, a Statement about Environmental Consequences shall be prepared and submitted before the completion of construction works. The approval of this document will be the final stage for State Environmental Examination.

The document shall include the following information:

- Revisions of the project planning and additional measures adopted as result of examination on the "Draft Statement about Impact to the Environment" by SCNP and comments raised through the interviews to local residents
- Voluntary environmental restrictions / norms limiting the planned activities
- Standards for operation and measures taken from the viewpoint of Nature Protection
- Basic conclusions on the possibility of implementing the Activity

Activities under Category IV

(1) Draft Statement about Impact to the Environment

For Activities under Category IV, the Draft Statement about Impact to the Environment is the only document to be examined in the Sate Environmental Examination procedure. The document shall be submitted at the planning / concept level and consists of the following contents.

- Location map of the planned activities with information on land use
- Descriptions on technologies to be used in the activity
- Existence of sewage system and information on voluntary restrictions/ norms on wastewater
- Amount and kind of waste
- Amount and conditions of waste to be stored
- Measures for Nature Protection

Table 3.5.13 Characteristics of WUAs in Karakalpakstan and Study Area

	Karakalpakstan	Study Area	Beruni	Nukus	Kegeyli	Chimbay	Karauzyak	Takhtakupyr	Khodjeyli	Shumanay	Kanlikul	Kungrad	Muynak
Number of WUAs	129	90	9	10	8	11	7	7	15	6	9	6	2
Number of Members													
Small: <50	51	35	0	2	4	5	0	4	8	4	6	0	2
Middle: 50 - 100	53	35	2	3	4	4	5	3	7	2	2	3	0
Large: >100	25	20	7	5	0	2	2	0	0	0	1	3	0
Classification			large	various	mid-small	mid-small	middle	mid-small	mid-small	small	small	mid-large	small
Crop Area in Cropping Plan of 2008													
Small: <1500 ha	22	17	0	5	0	2	0	1	4	0	3	0	2
Middle:1500 - 3000 ha	61	33	5	2	4	2	0	4	10	3	3	0	0
Large: >3000 ha	46	40	4	3	4	7	7	2	1	3	3	6	0
Classification			mid-large	various	mid-large	large	large	middle	middle	mid-large	mid-small	large	small
Ratio of Cotton and Wheat in Cropping Plan of 2008													
Small: <50%	69	58	0	10	3	10	7	4	9	3	6	6	0
Middle: 50 - 75%	50	28	9	0	5	0	0	2	6	3	3	0	0
Large: >75%	10	4	0	0	0	1	0	1	0	0	0	0	2
Classification			high	mid	high	low	mid-low	various	mid-high	mid-high	various	middle	high
Number of Staffs													
Significantly insuf.: 1 - 4	29	25	0	1	8	1	0	5	3	0	3	2	2
Insufficient: 5 - 7	50	39	0	7	0	10	3	1	2	6	6	4	0
Sufficient: 8-	49	25	9	2	0	0	4	0	10	0	0	0	0
Classification			Suf.	Insuf.	Insuf.	Insuf.	Suf.	Insuf.	Suf.	Insuf.	Insuf.	Insuf.	Insuf.

*: As of January 1, 2008
Source: LABM

Table 3.7.8 Competitive Analysis of Agro-Processing Products

Raw Material	Agro- Products	Major Player								Competitiveness in Uzbekistan	Local Demand in Karakalpakstan	Export Opportunity from Karakalpakstan
		Private	*Fermer*	*Dehkan*	Trader	*Shirkat*	JV Company	Agro-firm	Women Group			
Cattle Meat	Frozen beef	◎	◎	◎						High	Low	High
	Jerked beef	◎								High	Low	High
Meat (cattle, chicken, pig)	Sausage, ham, salami	◎	◎	◎						Fair	Fair	Fair
Cow Milk	Cow milk	◎	◎	◎						High	High	Low
	Yogurt, cheese, butter	◎		◎						Fair	Fair	Low
Other Milk (goat, camel)	Processed milk	◎		◎						High	Low.	Fair
Cattle Hide	Leather	◎	◎	◎	◎					Low	Low	Fair
Karakul Sheep	Karakul Sheep Far Skin				◎	◎	◎			High	Low.	High
Sheep	Wool		◎						◎	Fair	Fair	High
Wheat	Wheat flour	◎	◎				◎			Fair	High	Low
	Bread, noodle, macaroni, sweets	◎								Fair	High	Low
Cereals (Wheat, Sorghum)	Vodka, Spirits	◎								High	High	Fair
Sorghum	Sorghum flour	◎	◎							High	High	Low
Sesame, Sunflower	Cooking Oil	◎	◎							High	High	Fair
Cotton By-Product	Cotton-seed oil, Cotton cake						◎			High	High	Low
	Bio-diesel						◎			Fair	High	Low
Paddy	Milled rice	◎	◎							Fair	High	Low
Tomato	Tomato paste	◎	◎							High	Low	Fair.
	Dried tomato	◎	◎							High	Low·	Fair
Tomato, Cucumber, Spring onion, Herbs	Pickled, salted or fermented vegetables	◎	◎	◎				◎		Fair	High	Fair
Pumpkin, Onion, Potato, Carrot, Leaf veg., Others	Dried vegetable, Juice powder	◎	◎	◎						Fair	High	Low
Liquorice (*Boyan*)	Compiled roots						◎			High	Low	High
Sweet Melon, Apple	Jam, Confectionery	◎	◎	◎				◎		High	High	Fair
	Juice	◎	◎	◎				◎		Low	High	Low
Alfalfa	Fined seed	◎		◎						High	High	High
	Hey cube	◎								High	High	Low
Cereals and by-products	Concentrate feed	◎								High	High	Low
Bee Keeping	Honey	◎	◎	◎						Low	Fair	Low
Silkworm	Silk products	◎	◎	◎						Fair	Fair	Fair

Note: 'Private' means private enterprise established by *Fermer*, traders and other investors.

Table 3.9.2 Cropped Area of Major Crops and the Share in Target Districts in 2006

Crop	Karakal-pakstan		Target Districts									
			Kungrad		Muynak		Shumanay		Kanlikul		Kegeily	
	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)
Cotton	106,698	38.3	4,311	22.6	120	8.0	6,314	47.0	3,450	22.7	7,763	39.4
Wheat	64,315	23.1	5,615	29.4	510	34.0	4,020	29.9	5,370	35.3	5,522	28.0
Other grains	30,195	10.8	2,504	13.1	286	19.1	739	5.5	2,730	17.9	1,653	8.4
Rice	22,789	8.2	1,943	10.2	236	15.7	569	4.2	2,557	16.8	1,138	5.8
Corn (grain)	2,347	0.8	195	1.0	32	2.1	2	0.0	14	0.1	9	0.0
Potato	2,135	0.8	34	0.2	9	0.6	22	0.2	14	0.1	54	0.3
Grape	494	0.2	30	0.2	0	0.0	10	0.1	28	0.2	18	0.1
Vegetables	7,352	2.6	319	1.7	93	6.2	135	1.0	200	1.3	397	2.0
Melons & Gourds	5,310	1.9	507	2.7	83	5.5	134	1.0	293	1.9	310	1.6
Fodder crops	32,446	11.6	3,542	18.5	105	7.0	1,463	10.9	421	2.8	2,682	13.6
Fruits	4,518	1.6	102	0.5	26	1.7	28	0.2	152	1.0	141	0.7
Total cropped area	278,599	100.0	19,102	100.0	1,500	100.0	13,436	100.0	15,229	100.0	19,687	100.0

Crop	Target Districts											
	Chimbay		Khodjeyli		Nukus		Karauzyak		Takhtakupyr		Beruni	
	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)
Cotton	5,793	29.6	12,990	46.8	1,200	4.9	4,210	24.7	3,442	22.1	13,304	59.7
Wheat	4,980	25.4	3,455	12.4	6,387	26.0	4,898	28.7	4,693	30.2	4,158	18.7
Other grains	2,927	15.0	3,530	12.7	6,587	26.8	3,254	19.1	2,534	16.3	354	1.6
Rice	2,000	10.2	2,837	10.2	6,134	25.0	2,932	17.2	2,443	15.7	0	0.0
Corn (grain)	183	0.9	140	0.5	121	0.5	25	0.1	23	0.1	79	0.4
Potato	144	0.7	212	0.8	44	0.2	65	0.4	24	0.2	252	1.1
Grape	21	0.1	60	0.2	25	0.1	8	0.0	6	0.0	99	0.4
Vegetables	673	3.4	425	1.5	1,779	7.2	186	1.1	86	0.6	437	2.0
Melons & Gourds	636	3.2	461	1.7	529	2.2	447	2.6	154	1.0	336	1.5
Fodder crops	2,097	10.7	3,323	12.0	1,318	5.4	905	5.3	2,067	13.3	2,416	10.8
Fruits	122	0.6	333	1.2	456	1.9	116	0.7	71	0.5	846	3.8
Total cropped area	19,576	100.0	27,766	100.0	24,580	100.0	17,046	100.0	15,543	100.0	22,281	100.0

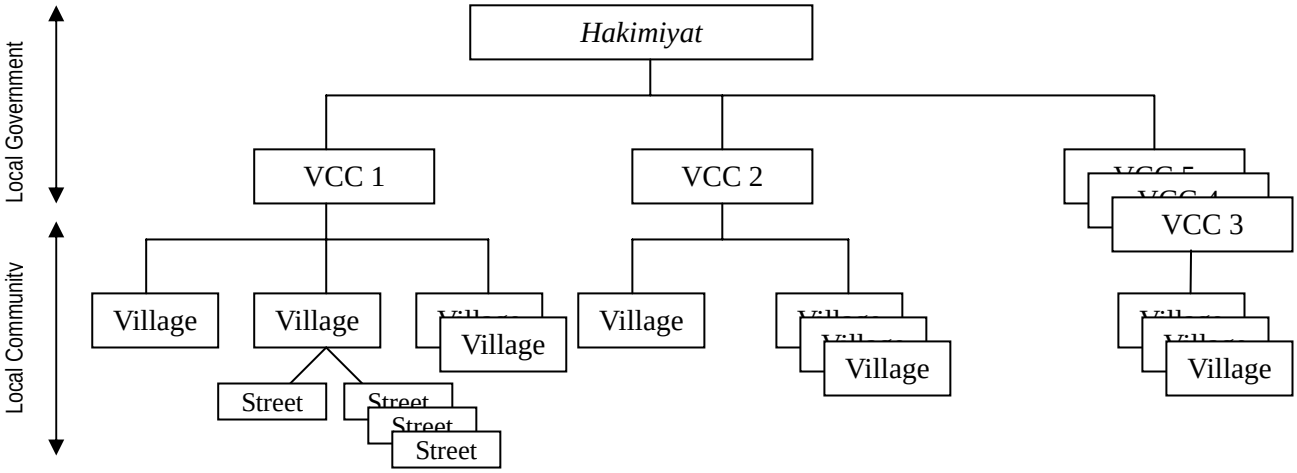
Source: The Ministry of Economy of the Republic of Karakalpakstan

Table 3.9.3 Number of Livestock in Karakalpakstan and the Target Districts in 2006

Livestock	Karakal-pakstan	Target Districts				
		Kungrad	Muynak	Shumanay	Kanlikul	Kegeily
Cattle	391,679	25,591	7,940	32,007	12,404	36,965
Share(%)	100.0	6.5	2.0	8.2	3.2	9.4
Cow	209,286	13,094	5,042	9,777	6,916	16,830
Share(%)	100.0	6.3	2.4	4.7	3.3	8.0
Sheep & Goat	622,337	67,839	9,319	44,138	16,007	34,077
Share(%)	100.0	10.9	1.5	7.1	2.6	5.5
Pig	3,377	313	0	124	0	0
Share(%)	100.0	9.3	0.0	3.7	0.0	0.0
Poultry (x 1000)	967,647	25,072	14,073	37,040	14,600	45,729
Share(%)	100.0	2.6	1.5	3.8	1.5	4.7

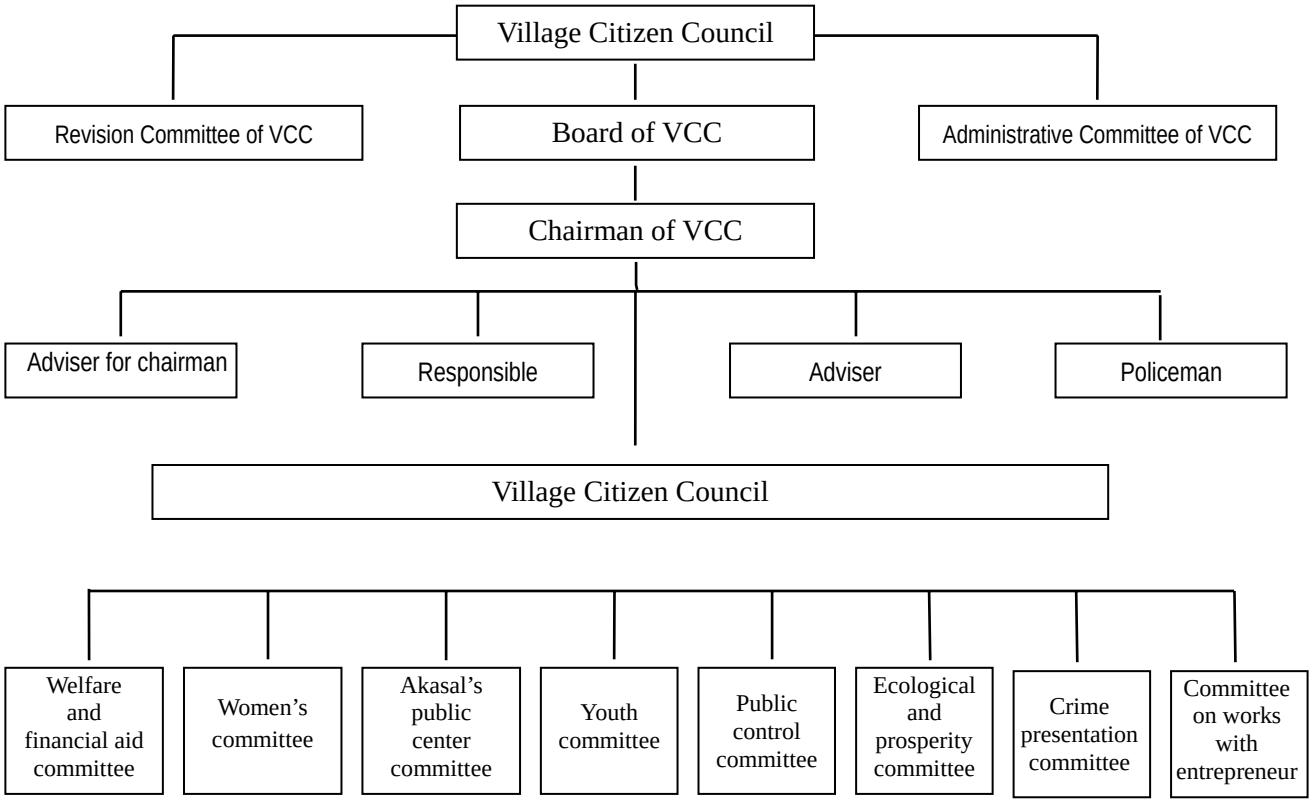
Livestock	Target Districts					
	Chimbay	Khodjeyli	Nukus	Karauzyak	Takhtakupyr	Beruni
Cattle	27,817	25,259	12,736	12,678	9,353	51,274
Share(%)	7.1	6.4	3.3	3.2	2.4	13.1
Cow	14,671	14,159	9,123	8,210	8,327	25,581
Share(%)	7.0	6.8	4.4	3.9	4.0	12.2
Sheep & Goat	38,353	20,010	14,705	52,160	75,401	48,020
Share(%)	6.2	3.2	2.4	8.4	12.1	7.7
Pig	34	174	911	149	0	703
Share(%)	1.0	5.2	27.0	4.4	0.0	20.8
Poultry (x 1000)	60,027	73,206	47,201	52,830	22,368	165,609
Share(%)	6.2	7.6	4.9	5.5	2.3	17.1

Source: The Ministry of Economy of the Republic of Karakalpakstan



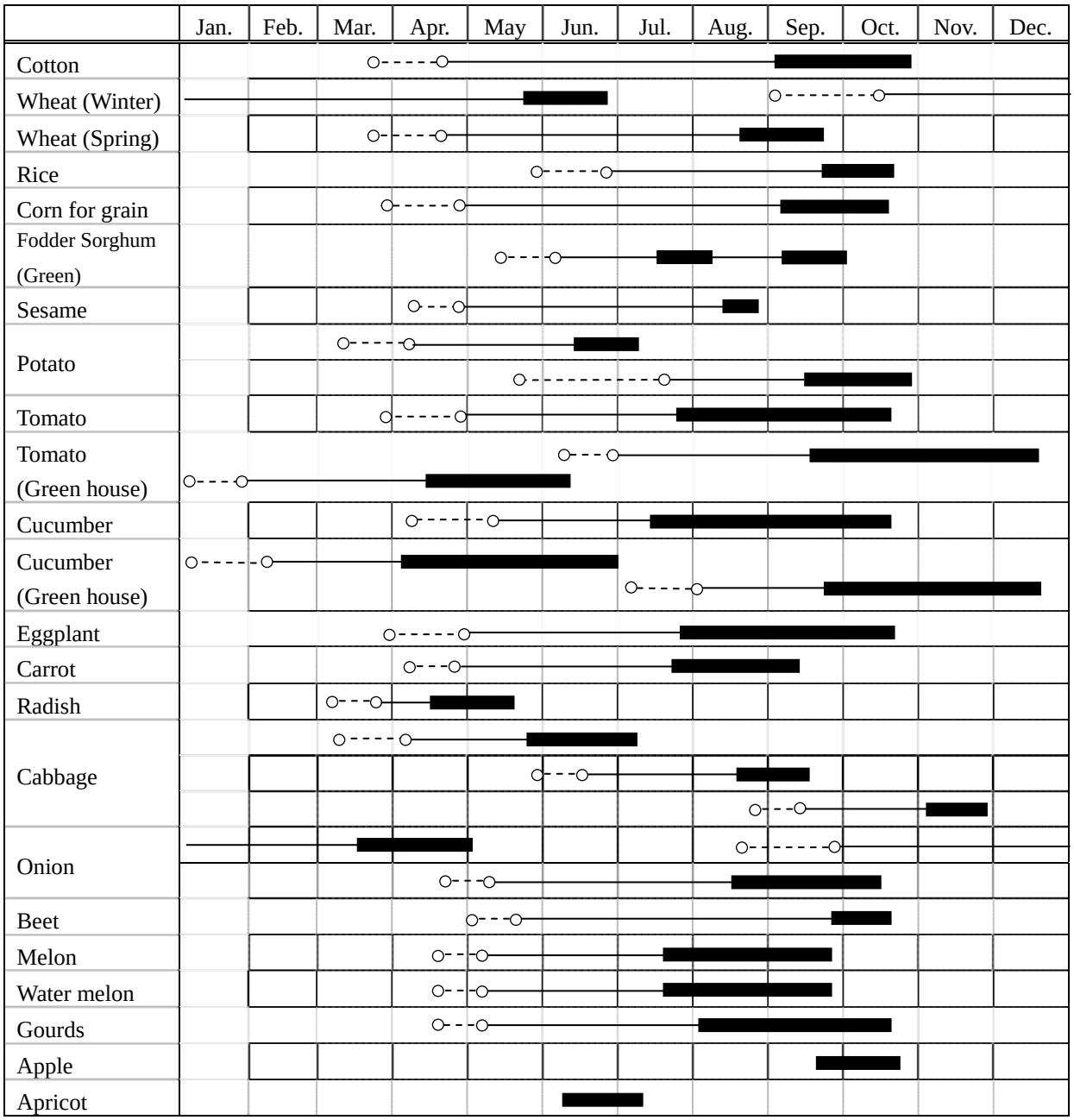
Source: UNDP Nukus office

Fig. 3.1.3 Structure of the Local Community



Source: JICA study team and UNDP Nukus office

Fig. 3.1.4 Organization Structure of Jan Aba Zap VCC in Kegeyli District



○: Seeding, ■: Harvesting

Source: Interview with *Fermers* and *Dehkan*s in Karakalpakstan

Fig. 3.2.1 Cropping Calendar in Karakalpakstan

CHAPTER 4
ANALYSIS OF THE PRESENT CONDITIONS OF THE STUDY AREA

4.1 Methodology to Analyze the Present Conditions of the Study Area

In order to understand the current conditions of the Study Area and to identify the issues that the agricultural sector faces, literature survey on existing documents such as statistical data has been carried out with site reconnaissance by the Study Team members and interviews to various stakeholders. The results of these works are indicated in Chapter 2 and 3. In addition, workshops and questionnaires surveys were carried out to collect more specific information and comments on issues of which the government and farmers confront. Issues identified were organized through the formulation of problem tree structures based on the collected information.

4.1.1 Questionnaire Survey

The first direction of *dehkans* development is to increase the production for self consumption and then increase income through marketing of excess agricultural products. A baseline is required to be set at the current state of production and livelihood level by quantifying factors such as household economy, labor force and basis of production, in order to prepare Development Plans for poverty reduction. The questionnaire survey targeted not only *dehkans* but also *fermers* in order to compare them in the same level.

On the other hand, in-depth qualitative data, such as problem analysis, is required to examine measures to improve the situation of which the *dehkans* are in. In regard of these points, on-site interview surveys, based on questionnaires, were conducted by the Study Team and Counter Parts for the *dehkans* in the Study Area.

4.1.2 Workshops

(1) Kickoff Workshops

A Kick-off Workshop, targeting relevant officials of MAWR of Karakalpakstan, administrative officers of each district and relevant personnel of the Fermer's Association (FA), was held at the early stage of the Study. The main objectives of the Workshop were to: 1) share the objectives, schedule of the Study and request cooperation for the Study, 2) identify the issues of what the government and Fermer's associations confront and 3) confirm the classification of the priorities of the Study Area through the Workshop.

In the problem analysis, cards marked with problems and constraints were prioritized in order to clarify the understandings of the government and FA on the issues to be solved.

(2) District Workshop with Farmers

Workshops were also held for *fermers* and *dehkans*. These workshops were held at 9 districts of the Study Area and problem analysis and prioritization were conducted. Through these workshops, problem trees consisting of problems and constraints of which *fermers* and *dehkans* confront were organized. These problem trees were re-organized into one, to form an integrated problem tree indicating the issues of the Study Area.

(3) Workshop with WUA

Furthermore, in order to clarify common problems of WUAs, workshops targeting representatives and members of WUAs were held in the up-stream, mid-stream and down-stream sections of the irrigation system area. Problem analysis was conducted with problems specific to WUAs as core problems.

Furthermore, after the problems were clarified, the participants of the workshop discussed about necessary measures to cope the problems with high priority, particularly those related to production activities. The intentions of WUAs to solve these issues were confirmed through this process.

4.2 Contents and Results of Questionnaire Survey and Workshops

4.2.1 Questionnaire Survey

(1) Outline of the Survey

A questionnaire survey was carried out during May to June, 2008, in order to collect basic information and to understand the current situation of *fermers* and *dehkans* to formulate the Master Plan. The survey mainly focused on farm-business management and agricultural activities, including animal husbandry of *fermers* and *dehkans*, and importance of the activities for the livelihood of *dehkans*.

The survey, which was conducted in 40 days, consisted in three works: preparatory, interview and reporting works.

The sample *fermers* and *dehkans* were selected through cooperation and consultation with *Hakimiyat* based on the before-arranged selection manner.

The interview works were carried out in 13 days in 11 districts. The enumerators visited the selected samples and interviewed the questionnaires in Karakalpak language, filling the answers in the questionnaire forms by themselves. It means that the survey was carried out by individual face to face interview with the selected samples. The collected data were inputted and analyzed to prepare the survey report after the interview works.

(2) Sampling and Questionnaire of *Fermers*

2 *fermers* in each district, in a total of 22 *fermers*, were selected based on the selection method shown in Table 4.2.1 (page 4-28). The sample *fermers* should be a member of the Water Users Association (WUA). And the nature and the preferable range of land size of the *fermers* were fixed for each district. However, the conditions could not be applied strictly due to unavailability of appropriate *fermers* in the districts.

(3) Sampling and Questionnaire of *Dehkans*

10 *dehkans* in each district, with a total of 110 *dehkans*, were selected based on the selection method to select standard *dehkans* in each district. The sample *dehkans* should have *tamarka* (entitled land) and live around the sample *fermers.* 5 *dehkans* were selected around one sample *fermer*. The preferable range of land size for the sample *dehkans* to select standard *dehkans* in each district was as shown on the right. Furthermore, the relation between *dehkans* and *fermers* was considered in order to select various kinds of sample *dehkans.* At least 2 *dehkans* in the 5 sample *dehkans* were selected from those that were not employed by the sample *fermer*.

Table 4.2.2 Land Size of Sample *Dehkans*

District	Land Size (ha)
Kungrad	0.05 - 0.25
Muynak	0.05 - 0.15
Shumanay	0.30 - 0.50
Kanlikul	0.10 - 0.30
Kegeily	0.15 - 0.35
Chimbay	0.15 - 0.35
Khodjeyli	0.20 - 0.40
Nukus	0.10 - 0.30
Karauzyak	0.20 - 0.40
Takhtakupyr	0.10 - 0.30
Beruni	0.10 - 0.30

(4) Summarized Results of Questionnaire Survey

1) Result of the Survey to *Fermers*

- In the 22 sample *fermers*, 19 were crop *fermers* and 3 were livestock *fermers*. 18 managers of the sample *fermers* worked in agricultural sector before the establishment of *fermers*. Few managers were from non-agricultural sectors. The most popular reason to start *fermer* business was “making profit”.
- The average number of permanent working labors in sample *fermers* was 5 to 6, while the number of temporary or seasonal employees was about 40. The sex ratio of them was almost equal.

- The average annual sale of crop *fermers* was 14,427,000 sum, while the average expenditure was 12,211,000 sum in 2007. The average profit in 2007 was 2,215,000 sum. Cotton dominated with 77.1% of the total sales. Farm inputs (30.8%) and personnel expenses (23.0%) were major items among the expenditures.
- Average annual sales of livestock *fermers* were 22,865,000 sum, while the average expenditure was 20,780,000 sum in 2007. The average profit of livestock *fermers* in 2007 was 2,085,000 sum. The sales of livestock *fermers* also depended much on cotton (72.2%) and wheat (22.0%).
- Both types of *fermers* gave highest priority to increase production of cotton and wheat in their business strategy.
- The average land area of crop *fermers* was 57.9 ha. The irrigated area occupied about 2/3 of the area in the 57.9 ha, while about 1/4 of the irrigated area (8.6 ha) was not planted. The average land area of livestock *fermers* was 247.8 ha. The irrigated area was 122.0 ha, while only 78.3 ha were planted with crops in 2007. Pasture/grazing land occupied more than 84.5% of non-irrigated area. Both types of *fermers* claimed that lack of irrigation water was the most serious reason of the existence of not planted farm land.
- Crop *fermers* cultivated mainly cotton and wheat in 2007. Though some crop *fermers* grew rice, sorghum, fodder crops and melons/gourds, the production was very minimal compared to cotton and wheat. Livestock *fermers* also grew mainly cotton and wheat.
- Only few crop *fermers* raised small numbers of livestock in 2007. Out of 3 livestock *fermers*, one *fermer* did not raise any livestock. In the case of the other 2 livestock *fermers*, 1 *fermer* grew only cattle, while another *fermer* grew many kinds of livestock.
- Many *fermers* sold cotton and wheat to the government or the government agents at farm-gate. Other crops were mostly sold at bazaar to wholesalers and retailers.
- Out of 22 sample *fermers*, 15 *fermers* used gravity irrigation system, while 7 *fermers* used pump irrigation system. Most *fermers* got irrigation water directly from the distribution canal. 15 *fermers* said that they could not control the timing and volume of irrigation water.
- All *fermers* who grew cotton and wheat, and many *fermers* who grew rice and vegetables used commercial seeds. About a half of *fermers* used organic manure for cotton, wheat, rice and vegetables. All *fermers* who grew cotton and wheat applied chemical fertilizers, while few *fermers* applied chemical fertilizers to other crops. A limited number of *fermers* used agricultural chemicals to control pests and weeds.
- None of the sample *fermers* utilized artificial insemination technology for livestock. Only one *fermer* applied commercial feeds and hormones. Application of vaccine and medicine was common among the sample *fermers*.
- About 60% of *fermers* had agricultural tractors, while very limited number of *fermers* had other farm machinery. Many *fermers* depended on farm mechanization services for cotton and wheat growing.
- Almost no extension services for non-cotton/wheat crops were provided to the sample *fermers*. Government agency and Fermer's Association were major providers of the extension services.
- "Salinity of land", "high cost of machinery/mechanization services", "low selling price", "low productivity of the crops" and "high inputs cost" were serious problem for the sample *fermers* to grow cotton and wheat. For crops other than cotton and wheat, "salinity of land", "land fertility" and "pests and diseases" were serious problems for sample *fermers*. "Availability of inputs and machinery/mechanization services", "high cost of machinery/mechanization services" and "access to credit" were also problems for *fermers*. In case of livestock, "low and unstable market price", "access to credit", "lack of technical information/services" and "high input costs" were major problems for the *fermers*.

- The most interesting technology to sample *fermers* was “water saving farming system/ technology”. Other technologies in which the *fermers* were interested were “biological pest control of crops”, “food processing/preservation”, “green-house cultivation” and “organic fertilizer/ manure production”.

2) Results of the Survey to *Dehkans*

- The sample *dehkans* received *tamarka* during the period of 1982 - 2007. Less than 10 *dehkans* received *tamarka* in one year even during the peak period. 29.1% of the sample *dehkans*, the highest percentage, were agricultural workers in *shirkat* before dissolving *shirkat*.
- One *dehkan* family was composed of 3.6 males and 3.3 females, with an average of 6.9 peoples. 76.4% of the families had permanent employment and the numbers of permanent employees per family were 0.9 males and 0.6 females. 40.0% of families had temporary employment and the number of temporary employees per family was 0.6 males and 0.2 females. 11.8 % of the families did not have any employment, even temporary.
- The salary and pension were principal or major income sources for most sample *dehkans*. 78.1% of *dehkans* had income source of salary or wage. 52.7% of *dehkans* didn’t sell crop products and 57.3% of *dehkans* didn’t sell livestock products in 2007. The major expenditure was food and beverage. 10% of *dehkans* didn’t invest in “agricultural inputs and management”. The average income per family was 2,016,142 sum, while average expenditure was 2,138,042 sum in 2007.
- Many *dehkans* gave higher priority in “increasing crop production”, “educating children” and “increasing the number of livestock” in their strategy to increase the family’s living standards.
- The average area of *tamarka* was 0.32 ha. 0.25 ha was for crop production and 0.05ha was for housing. Most part of the area for crop production was irrigated.
- *Dehkans* grew various kinds of crop. The planted area of winter wheat was the largest in the crops planted in 2007, though the percentage of *dehkans* who grew vegetables was the highest, with about 50%. While 31.8% of *dehkans* grew winter wheat and the average area was 0.22ha, the planted area of vegetables was only 0.07ha. Husbands had main works to manage crop production, while wives and other adults did assistant works.
- About 85% of *dehkans* had cows and the average number of cows per *dehkan* was 3. After cows, the percentage of *dehkans* who had poultry and goat were relatively high. In the case of livestock, except poultry, husbands did the main works of management the livestock, while their wives assisted.
- 80% of the production of crops and livestock were for self-consumption. Especially wheat, potato, melons & gourds, chicken/poultry meat and egg had higher percentage of self-consumption. There was no product from *tamarka* fulfilling 100% of demand for self-consumption. Only about 30% of the demand for self-consumption was provided from *tamarka*.
- The number of *dehkans* who sold crops or livestock products was not so high. The numbers of *dehkans* who sold coarse grains, milk, vegetables and beef meat were relatively higher than other products. Main buyers of the products were retailers at the bazaar.
- Most *dehkans* used gravity irrigation system for their *tamarka*, while some *dehkans* had electric pumps. Irrigation water mainly came directly from distribution canals and 43% of *dehkans* answered that they could control the timing and volume of irrigation.
- About 50% of *dehkans* who grew crops, except fodder crops and fruits/grape, used commercial seeds in 2007. About half of *dehkans* used organic manure for crop production, except for fodder crops. More than half of wheat growers used chemical fertilizers, while the rate was about 30% for other crop growers. Utilization of pesticides/herbicides was very limited. 34.3% of wheat growers used agricultural machinery.

- About 40% of *dehkans* who had cattle/cow used commercial feeds. Vaccination and medicine for livestock were comparatively popular, while use of artificial insemination and hormones was very limited.
- *Dehkans* procured agricultural inputs mainly from private/market, except for organic manure. *Dehkan* themselves produced organic manure.
- 9.1% of *dehkans* had tractor, while most of the *dehkans* didn't have other machineries.
- About 30 - 40% of *dehkans* received agricultural information through TV, radio and news papers, and not from government extension services.
- "Salinity of land" was the most serious problem for sample *dehkans* to grow crops. "Pests and disease", "land fertility", "productivity of crops" and "machinery/mechanization service cost" were also problems to grow crops. "Price of feeds", "grazing land", "pests & disease" and "access to credit" were major problems to raise livestock.
- The technology of which the sample *dehkans* were most interested in were "water saving farming system/facility". Other technologies were "food processing/preservation technique", "hygiene for food processing", "green-house cultivation" and "biological pest control of crops".

4.2.2 Kickoff Workshop with Government Officials

The kickoff workshop for government officials was held on May 2nd, 2008 at Nukus Agricultural Collage. A total 26 of the officers from target districts and representatives of relevant organizations participated in the workshop. Two (2) kinds of analyses, comparative analysis and problem analysis were made during the workshop.

(1) Comparative Analysis

Comparative Analysis was made based on a matrix with the 11 target districts arranged horizontally, and selected 10 indicators (Soil salinity, Irrigation water availability, Cotton production, Cereals production, Vegetables production, Fruits production, Livestock production, Fishery (fish pond) production, Road condition and Living standard) arranged vertically. The participants were requested to evaluate the 11 districts for each indicator with comparative scores ranging from 1 to 5.

The table below shows the analysis result. According to suggestions from the participants, only scores 1 to 3 were adopted for indicators for "Soil fertility" and "Irrigation water availability". They stressed that none of the districts were expected to have higher scores, 4 or 5, for these items. This suggests that the 2 issues are the most serious fundamental issues in the study area.

Scores for the indicators about agriculture and livestock production are almost consistent with concerned statistical data.

Table 4.2.3 Results of Comparison Analysis (Kickoff Workshop on May 2nd, 2008)

Indicator	Target Districts										
	Kungrad	Muynak	Shummanay	Kanlikul	Kegeily	Chimbay	Khodjeyli	Nukus	Karauzyak	Takhtakupyr	Beruni
1 Soil salinity	2	3	2	2	3	3	3	2	3	3	3
2 Irrigation water availability	1	1	2	2	3	2	3	2	2	1	3
3 Cotton production	3	1	4	3	4	4	**5**	2	3	3	**5**
4 Cereals production	**5**	1	3	**5**	4	4	3	**5**	4	4	3
5 Vegetables production	4	1	3	3	3	4	4	4	2	2	**5**
6 Fruits production	3	1	2	3	3	2	4	**5**	2	2	**5**
7 Livestock production	**5**	3	4	3	**5**	4	4	3	3	4	**5**
8 Fishery (fish pond) production	3	**5**	2	1	4	4	2	3	3	**5**	4
9 Road condition	3	2	4	4	3	4	3	3	3	3	4
10 Living standard	**5**	2	2	3	3	4	**5**	3	3	3	**5**
Total	34	20	28	29	35	35	36	32	28	30	42

Source: The Study Team

Beruni district had the highest total score among the 11 districts. It is generally considered that the district was blessed with relatively better climatic condition for agriculture, as well as Beruni people were observed to be hard workers comparing to people in the other districts. Kungrad, Kegeily, Chimbay and Khodjeyli had relatively higher scores following Beruni. On the contrary, Muynak had the lowest total score since all scores of the district were not more than 4, except for fishery production.

Scores of cotton and livestock production were correlated with scores of living standard. It implies importance of cotton and livestock production to regional economy and people's life in the Study Area.

(2) Problem Analysis

PCM (Project Cycle Management) Problem Analysis was made after the Comparative Analysis. "Income from farming (crops, livestock and fishery) is low" was set as the core problem of the problem analysis. The following six (6) groups of problems were clarified by the participants through the analysis.

1) Ability and Discipline of Farmers and Agricultural Staff

This problem is one of the highlighted problems in the workshop. Since participants consisted in government officials and community leaders of the agriculture sector, this problem was obvious to be their common concern. The participants showed much concern for farm management issues rather than agricultural technical issues on farmers' ability. They also did not mention much about technical extension and research. It implies that the participants are making much effort to support farmers (*fermers*) to be independent in business entities. The following figure summarizes the clarified problem on this issue.

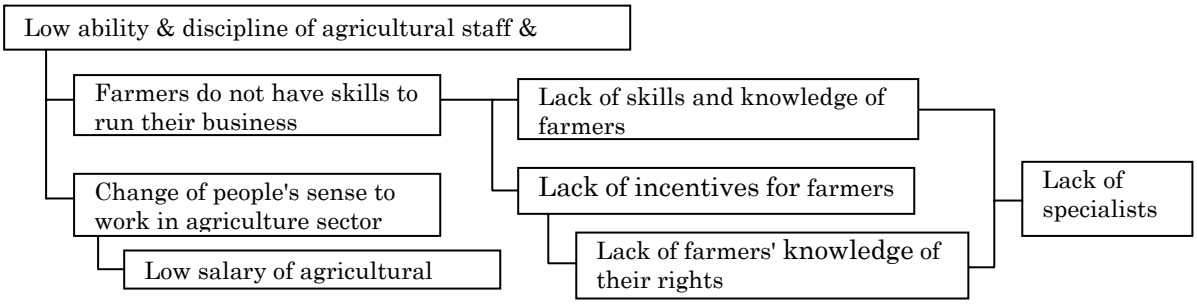


Fig. 4.2.1 Problems of Ability and Discipline of Farmers and Agricultural Staff

2) Irrigation Water and Soil Salinity

As mentioned above, the 2 issues must be the most serious and fundamental issues in the study area. In the kickoff workshop, soil salinity issue was more highlighted than the issue of irrigation water. The figure below summarizes the clarified problem on these issues.

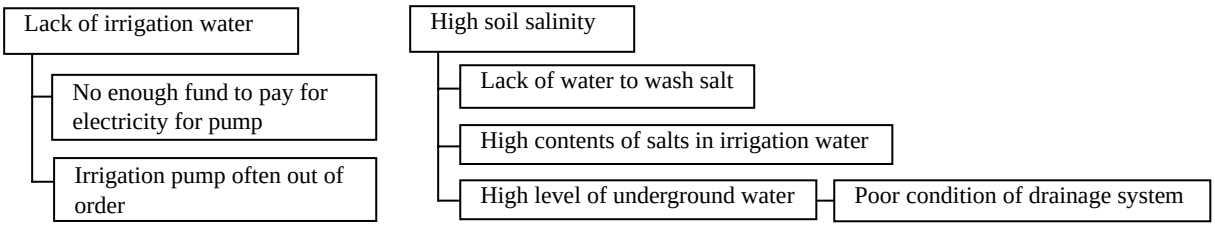


Fig. 4.2.2 Problems of Irrigation and Soil Salinity

3) Farm Machinery and Chemical Fertilizers

Farm machinery including fuel was one of the participants' concerns among the problems. Though, they mentioned several problems about chemical fertilizers in the kickoff workshop, none of them mentioned about seeds and chemicals for plant protection, which also were assumed to be important inputs to the farmers. The clarified problems on these issues are summarized in 2 charts indicated below.

4) Livestock

Only three problems arose in the kick-off workshop concerning livestock production. It was assumed that this is due to few participants from the livestock sector. The three problems were:

- Improper development of cattle raising
- Low level of cattle raising measures
- Not enough attention is paid to livestock raising

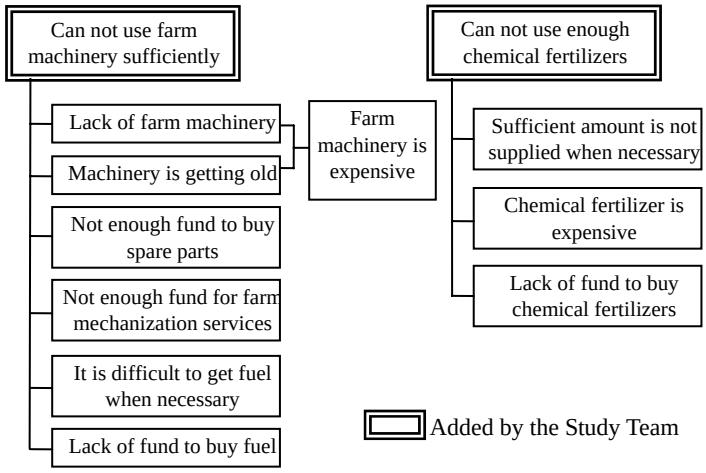


Fig. 4.2.3 Problems of Farm Machinery and Chemical Fertilizers

5) Low Profits

This problem was the highest concern of the participants in the kickoff workshop. The participants indicated many problems about "high cost and low price" related to agricultural products. However, no participants clearly mentioned problem of low production or productivity, though the problem might be another very critical reason of low profits. The chart indicated in the right summarizes the clarified problem on the issue.

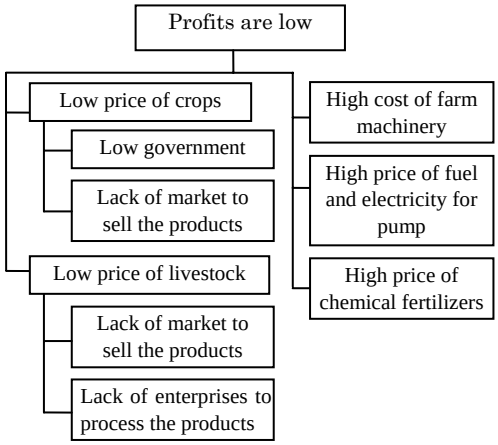


Fig. 4.2.4 Problems of Low Profit

6) Miscellaneous

Other miscellaneous problems that arose in the kickoff workshop are listed below. It seems that agricultural research was the main concern among the problems.

- Agricultural conditions are not researched completely
- Lack of agricultural research laboratories
- Lack of foreign originated advanced technology in agricultural sector
- Pests damages

4.2.3 District Workshops with *Fermers* and *Dehkans*

(1) Objective

The objective was to understand the present situation and problems of *fermer* & *dehkan* in the target districts through discussing their livelihood and farming activities.

The workshop aimed to not only getting the expected output, but also to formulate a sense of ownership on the output among the participants, who had different background and interests.

(2) Methodology

For the above objectives, the workshop was staged into two-days; one for *fermers* and one for *dehkans*. As a guideline, each workshop was set to be attended by 20-30 people. The workshops comprised of two sessions. In the first, the participants analysis session, participants were asked to give brief descriptions of their farming and economic activities. That was then followed by the problem analysis in the second session. The problem analysis took the core problem for *fermer* as "Business management of *fermer* is difficult", for *dehkans* as "Life is difficult" and participants identified individual problems. Next, the solutions to the identified problems were examined. The actors who

should implement such solutions, together with what could be done by the participants themselves were considered and the problems were prioritized.

(3) Record

Workshops took place, with a total of 303 *fermers*/*dehkans* as shown table below, between 12th and 28th of May 2008. Attendance of *dehkans* at the series of workshops was poor, and in some districts it was necessary to round up *Tamarka*-owning *dehkans* at short notice on the day. The *dehkans* who did participate were rural in Beruni, Kanlikul and Nukus, but participation was wide enough to include urban *dehkans* in districts such as Kegeily.

Workshops in 11 districts targeted by the Study were envisaged. However, workshops in Khodjeyli, Takhtakupyr and the workshop for *dehkans* in Shumanay district could not be realized. The workshops for Kungrad and Muynak districts were merged.

Table 4.2.4 Records of Workshops with *Fermers* and *Dehkans*

	Beruni		Kungrad/ Muynak		Kanlikul		Karauzyak		Chimbay		Nukus		Shumanay		Kegeily	
Date;																
Fermer	08/05/12		08/05/15		08/05/15		08/05/19		08/05/22		08/05/22		08/05/27		08/05/27	
Dehkan	08/05/13		08/05/16		08/05/16		08/05/20		08/05/23		08/05/23		-		08/05/28	
Location	Beruni		Kungrad		Kanlikul		Karauzyak		Chimbay		Nukus		Shumanay		Kegeily	
Participants	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D
-*Dehkan*		10		24		14		14		19	3	10	1			19
-*Fermer*	17	5	15	1	24	1	17		20		19	12	12		17	
-VCC	1	1	1			1										3
-FA			1					1								
-*Hakimiyat*	1		1		1	1	1	2			1	1			1	1
-Others	3	4			2		3	3	3						1	1
Total	22	20	18	25	27	17	21	20	23	19	22	13	13		19	24

(4) Results

1) Participants Analysis

Fermer

Table 4.2.5 (page 4-28) summarizes the characteristics of the participants. Most of the participating *fermers* from districts other than Nukus were specialized in cotton and wheat. The presence of *fermers* managing multiple activities with crops and raising small numbers of livestock were confirmed in the districts of Kungrad/Muynak and Kegeyli. Between all the *fermers*, only two concentrated on livestock were cultivating wheat, and none of those cultivated cotton. In Nukus, approximately 30% of participants were confirmed to produce mainly vegetables and tree fruit. It was preferable to have around one third of female *fermers* participants, but most commonly there were only two or three female participants per workshop, with the greatest female attendance numbering five (in Nukus).

Dehkans

Table 4.2.6 (page 4-29) summarizes participating *dehkans*. Between the participants, 24% (27 people) worked with *fermers*, 42% (47 people) sold products from their Tamarka land in 2007 and 21% (24 people) sold livestock. Looking at the income sources of the participants, the most important items was pension (28%), followed by labor wages (23%), livestock (18%), products from *Tamarka* (15%), remittances (10%), *fermer* wages (4%) and others (2%). These figures suggest the importance of livestock for dehkans. The combined figure for livestock and Tamarka comes to 33%, so both income sources are important for *dehkans*. The *dehkans* that participated in these workshops included many pensioners, and in some districts the workshops attracted urban *dehkans*, so it is not possible to categorize them by district. However, it was able to confirm that some *dehkans* emphasized maintaining their livelihoods from Tamarka and livestock, such as those in Kanlikul, Nukus and Beruni. It was also confirmed instances such as the *dehkans* of Nukus, in which the number was relatively small but 5 people emphasized their jobs with *fermers*. In the *fermers* workshops, many expressed the opinion that it is too difficult to run farm activities and that even enough laboring work

was hard to find. That fact may also influence the characteristics of *dehkans* participants in these workshops.

2) Problems Identified in the Workshops

Fermers

Workshops for *fermers* took the premise that the core problem to clarify common problems of *fermers* was "Business management of *fermer* is difficult as a private enterprise". Therefore, participants worked through problem analysis with reference to this core problem.

First of all, it is important to note the opinion stated by participants, that profitability of farm business is poor because of high production costs and low prices of the products. The problems raised by the participants were broad as listed below. These individual problems are interlinked, so of course, solutions affecting only individual problems would make little contribution to solve the core problem.

- Shortage of water
  This was one of the problems most often mentioned by participants. It includes the shortage of irrigation water and insufficient water distribution when it is required. These problems are also closely related with the next problem: Irrigation and drainage. Irrigation depends on drawing water from rivers, and cannot be solved to increase water volume artificially. However, *fermers* are aware of the idea of using water efficiently, through water-saving cultivation (such as growing crops with low water requirements) and maintaining water channels.
- Insufficient facilities for irritation and drainage
  This problem is closely linked to water shortage and soil salinity. Therefore, the necessity of excavating irrigation and drainage canals and maintaining them thoroughly was indicated. It was also pointed out that such work involves the related problem of obtaining machinery such as excavators and bulldozers.

  In the workshops, few opinions were expressed concerning the Water Users Associations (WUA), which have an important role in making efficient use of water.
- Insufficient machinery services
  This problem includes aspects such as unavailability of machinery services from MTP during busy farming seasons, the lack of funds to buy new machinery, and the difficulty of obtaining credit.
- Lack of fuel
  The fuel problem is inextricable for the use of machinery. Participants complained that fuel is expensive and that it might not be available when required. The average land area per *fermer* household is approximately 60ha, based on the assumption of mechanized farming, so fuel and the use of machinery are life or death issues.
- Lack of fertilizer
  Fertilizer supply has the same problems as those for fuel above. There were complaints of high prices and lack of availability at times when fertilizer is required. Cultivation is based on the assumption of chemical fertilizer input, so the amount of fertilizer has a major impact on yield.
- Soil salinization
  This problem was not discussed as much as those above. The solution is leaching before planting, but drainage canals are needed for an effective leaching. Therefore, this problem is closely linked to those of irrigation and drainage and crop cultivation above.
- Bad soil conditions
  The reason for *fermers* thinking soil is bad is soil salinity, in most cases. Another problem is low fertility of soil, but it they pay not much attention. Measures proposed to improve soil include application of organic manure and plowing in fall (the reason is unclear). Some also ventured the opinion that they should increase their livestock to have easier access to organic manure. However, considering the land areas, the absolute volume of organic manure applied is undeniably inadequate.

- Insufficient bank service
  The difficulty of borrowing farm management funding from banks was widely mentioned. Participants saw high interest rates and failure of funding to arrive in time when it is needed as the main problems. With the harsh conditions for farm management, it is to be expected that banks will apply harsh scrutiny to business plans for obtaining finance. Measures to cope with this problem include sale of owned cattle, borrowing from friends, and other practical proposals.
- Low selling price
  There were complaints that the government purchase prices for cotton and wheat, the main crops produced by *fermers*, are too low. That is not something that can be improved by *fermers'* efforts, so while it was seen as the most serious problem, no solutions were proposed.
- Lack of agriculture information
  The FA (*Fermer's* Association) provides *fermers* with training and field trips, etc., but this problem was still raised, partly due to limited participation. The background is that *fermers* are not well aware of government support services, and have few opportunities to train or join seminars. Some said that they want to exchange opinions between *fermers*, and to learn how things are done in advanced regions and apply the lessons to their own farming. One of the solutions raised was to rely on the FA.
- Financial problems
  Financial problems for management of farming activities included high cost of agricultural inputs and difficulty of tax payment were raised.
- Seeds of cotton and wheat have low quality
  The complaint was made in several workshop that the quality of seeds for cotton and wheat is low. The participating *fermers* put forward no solutions to deal with this problem. However, since state controlled crops are excluded from the scope of the Study, this complaint was not included in the problem tree.
- Other problems raised in the workshops
  Other problems raised in the workshop were related to; difficulty in freely selecting crops to be cultivated, difficulty in marketing agricultural products, and lack of agro-processing facilities.

Dehkans

Workshops for *dehkans* took the premise that the core problem to clarify common problems of *dehkans* was "Life is difficult". Therefore, participants worked through problem analysis with reference to this core problem.

The core problem differs between *fermers* and *dehkans*, and the discussions have to begin from an understanding of differences in each group's level of dependence on farming activity, and the areas of the land farmed. The core problem for the *dehkans* is broad in scope, addressing a wide range of farming and non-farming issues. Within those problems, the aim was to look for ways to improve future farming activity. The problems raised by participants were broadly as listed below. Many of the problems were the same as those raised by *fermers*, but the solutions differed.

- Shortage of Water
  Like the problem of *fermers*, the largest number of participants pointed out the shortage of water. The solutions to this problem were very different from those for *fermers*. A few suggested the same kinds of methods as *fermers*, such as excavating and cleaning irrigation canals, but most solutions were suitable for small land areas, such as digging wells, installing hand pumps, using plastic bottles to pour water, and pouring water onto the roots of crop plants.
- Lack of Drinking Water
  This was among the top problems. Piped water is not widespread in rural areas, so irrigation water is often used as drinking water as well, and *dehkans* are very concerned about access to safe drinking water. Proposed solutions included hand pump installation, well digging, taking water from canals, filtration and pipeline installation.

- Soil Salinization
  In contrast to *fermers*, this problem was the second most serious, behind water shortage. The solutions differed from those used by *fermers*, including application of ash and organic matter, crop rotation, and cultivation of maize and alfalfa. Solutions matching those for *fermers* were cleaning of drainage canals and leaching.
- Difficulty in Marketing
  This problem was not regarded as important among *fermers*, but in workshops it was raised in a number of districts for *dehkans*. Specific problems mentioned were that prices for *dehkans'* product are low (apparently because they bring the product in small quantities), there are no means of transport, markets are far, they need a stronger position in negotiations, and once they consider transport costs they had to sell at any price. The study team conducted separated question and answer sessions after the workshops to learn more details. Views expressed at the Chimbay workshop were positive, saying there were no marketing problems, and product was sold at a VCC bazaar. At the workshop in Kanlikul, *dehkans* indicated that it was a problem that transport to the sale point cost 700~1,000 sum.
- Increased Insects
  This problem was not mentioned by *fermers*, but was raised frequently at *dehkans* workshops. Proposed solutions included spraying artificial or natural pesticides.
- Lack of Fertilizer
  This problem was mentioned more offer that not, with the universal solution of applying organic matter, with weeding and crop rotation offered as solutions in some areas.
- Financial Problems
  Financial problems for management of farming activities included high cost of agricultural inputs and difficulty of tax payment were raised.
- Other Problems Raised in the Workshops
  Other problems raised in the workshop were related to; lack of farm machinery, difficult access to credit for livestock, insufficient amount of fodder, low income from non-agricultural activities, limited cropping area, insufficient veterinary service, lack of agro-processing facilities, poor rural infrastructure and sanitary conditions.

3) Major Problems Raised in the Workshops

In the problem analysis process, the participants raised their individual problems, which were grouped under common problems, forming sub-groups. After that, the solutions to their problems (see Table 4.2.7 and 4.2.8, pages 4-30 and 31) were considered and all participants graded the importance of the grouped problems[1], with reference to their solutions.

Fermers

For *fermer* participants, the biggest problem was shortage of water in all districts except for Kanlikul and Kungrad/Muynak. The second-ranked problem varied between districts, but problems of irrigation and drainage facilities, obtaining agricultural inputs (machinery services, fertilizer, fuel), soil condition (salinization and others), bank financing, low product prices, shortage of funds and other were identified as common to all. Many mentioned that they could do anything if they had enough water. However, practically speaking, it would be difficult to achieve a state in which more water could be used than is available now, and opinions on how to use the current level of water supply economically and efficiently called for improved facilities in most cases, with few opinions calling for introduction of more profitable crops.

[1] Due to limited time for workshops, not all of the problems raised in the workshops were discussed in detail. Some issues were raised in the workshops but not discussed, because more time was used to discuss problems of which participants showed more interest in. Moreover, some issues, such as "Insufficient bank service" and Unemployment in the workshops for dehkans in Karauzyak and Beruni, were newly raised at the time of scoring and were graded with relevantly high scores. Therefore, issues raised for the scoring of important problems do not completely cohere. This is also applied to the formulation of problem trees (Figures 4.2.5, 4.2.6), as well as the discussions in the workshops for WUAs.

Dehkans

Commonly with *fermers*, *dehkan* participants were most highly concerned about water shortage problems. Drinking water and soil salinization were the next most pressing problems. Problems of insect damage and marketing, which were seldom mentioned in *fermer* workshops, also ranked high.

Table 4.2.9 Importance of Problem Groups in *Fermers* Workshops

Main Problems \ District	Kungrad/ Muynak	Shumanay	Kanlikul	Kegeily	Chimbay	Nukus	Karauzyak	Beruni	Score*
A. Shortage of water	**3**	**1**	**2**	**1**	**1**	**1**	**1**	**1**	**6.8**
B. Insufficient facilities for irrigation and drainage		**1**	**7**		**2**	**2**			**2.1**
C. Insufficient machinery services	**2**		**1**	**3**	**5**	**5**	**2**	**5**	**2.9**
D. Lack of fuel		**1**	**5**	**2**	**3**				**2.0**
E. Lack of fertilizer		**1**		**2**	**6**	**3**			**2.0**
F. Soil salinization			**4**			**6**			**0.4**
G. Bad soil conditions			**3**					**6**	**0.5**
H. Insufficient bank service		**2**		**5**	**4**		**3**		**1.3**
I. Low selling price	**1**	**1**	**6**			**4**	**3**	**3**	**3.1**
J. Lack of agriculture information						**6**		**7**	**0.3**
K. Financial problems	**1**			**4**				**2**	**1.8**

Note: Numbers in the table are degree of priority.
* Scores were calculated by adding reciprocal of the figures indicating importance. Maximum score is 8

Table 4.2.10 Importance of Problem Groups in *Dehkans* Workshops

Main Problems \ District	Kungrad/ Muynak	Kanlikul	Kegeily	Chimbay	Nukus	Karauzyak	Beruni	Score**
A. Shortage of water		**2**	**2**	**1**	**1**	**1**	**1**	**5.0**
B. Lack of drinking water			**1**	**1**		**2**		**2.5**
C. Soil salinization	**1**	**1**	**3**	**2**	**2**			**3.3**
D. Difficulty in marketing		**3**		**3**		**5**	**4**	**1.1**
E. Increased insects	**4**	**4**	**3**		**5**			**1.5**
F. Lack of fertilizer	**2**	**6**			**3**			**1.0**
G. Financial problems	**3**	**5**		**4**	**4**		**2**	**1.0**
H. Lack of farm machinery				**3**	**3**			**0.7**
I. Insufficient bank service*				**5**		**3**		**0.6**
J. Insufficient amount of forage			**4**	**5**				**0.5**
K. Environment*		**7**			**6**	**4**		**0.5**
L. Unemployment*							**3**	**0.3**

Note: Numbers in the table are degree of priority.
* These items were newly raised at the time of scoring of problems
** Scores were calculated by adding reciprocal of the figures indicating importance. Maximum score is 7

4) Summary of Problems Analysis for *Fermers* and *Dehkans*

Fermer

In workshops for *fermers*, the participants expressed strong concerns about the cultivation of cotton and wheat, and mentioned many individual problems. Participants from all districts said that the farming situation is severe, mainly due to high production costs and low purchasing prices for their product. The shortage of irrigation water and the failure of water distribution to come at the right time were viewed as the most severe problems behind the low volume of production, followed by salinization of soil and problems with the use of machinery. On the other hand, with the harsh farming situation, there was little interest and few opinions or problems concerning to crops other than cotton and wheat. There were almost no comments about problems with rearing livestock. That appears to have been the case because few livestock *fermers* participated and because there is little linkage between crops and livestock within individual farms. The Study Team arranged the problems and problems groups into a problem tree by assessment of expert. The generated problem tree is shown in Figure 4.2.5 (page 4-33).

Dehkans

As the above analysis of participants indicated, the *dehkans* households participating in these workshops had diverse sources of income, and they were not necessarily highly dependent on farming activities (wages as agricultural laborers, sale of product from their own farms). The majority of the

participants had sold crops or livestock that they produced themselves within 2007, indicating the importance of farming activities for self sufficiency or as an emergency cash source. The Study Team arranged the problems and problems groups into a problem tree by assessment of expert. The generated problem tree is shown in Figure 4.2.6 (page 4-34).

4.2.4 Workshops with Water Users Association (WUA)

(1) Methodology

A series of workshops targeting representatives and members of WUAs were held in order to clarify common problems of WUAs. Problems analysis was conducted by the participants with problems specific to WUAs as core problems, i.e., "It is difficult to manage water appropriately". After clarifying the problems, the participants discussed about necessary measures to cope with the problems with high priority. Participants were requested to identify what WUA can do, what members can do and which kind of external support was necessary during the discussion on the countermeasures.

The target WUAs were divided into 6 groups, as shown below, because the problems of WUAs were expected to significantly vary depending on its location. The grouping of WUAs was basically decided based on the territory of major irrigation systems. 10 WUAs were invited to each workshop considering the workshops scale. The selection of WUAs, if necessary, was left to the irrigation system departments and the District WUAs. From each WUA, 2 member farmers were invited as well as the head of the association.

Table 4.2.11 Groups of WUAs for Workshop

Group	Group-1	Group-2	Group-3	Group-4	Group-5	Group-6
Irrigation System	Pakhtaarna-Nayman	Kattagar-Bozataw	Kizketken-Kegeyli	Kuwanish jarma	Suwenli (Upstream)	Suwenli (Downstream)
Location and Water Resources	Right Bank of Amudarya River	Right Bank of Amudarya	Right Bank of Amudarya	Right Bank of Amudarya	Left Bank of Amudarya	Left Bank of Amudarya
	Direct withdrawal from Amudarya River by inter-farm canals with pumps	Upper reach of Kizketken Main Canal	Mid-lower reach of Keizketken-Kegeyli Main Canal	Whole basin of Kuwanish janrma Main Canal	Upper reach of Suwenli Main Canal	Mid-lower reach of Suwenli Canal
Target District	Beruni	Nukus	Kegeyli, Chimbay	Karauzyak, Takhtakupyr	Khodjeyli, Shumanay	Kanlikul, Kungrad, Muynak
Number of Total WUAs*	9	9	22	21	17	16

*: 4 WUAs belong to multiple irrigation system.

(2) Record of Workshops

The series of workshop with WUAs were held from May 26 to June 2, 2008, just after the district level workshops. The record of the workshops is as below. It was rather difficult to join member farmers who were expected to participate to gather both of ideas from operational body and member farmers of WUA, than head or staffs of WUA. As a result, more than half of participants were of WUA staffs and other officials except for Group-3.

Table 4.2.12 Records of Workshop with WUA

Group	Group-1	Group-2	Group-3	Group-4	Group-5	Group-6
Date	2008/06/02	2008/05/26	2008/05/26	2008/05/30	2008/06/02	2008/05/30
Location	Beruni	Nukus	Chimbay	Karauzyak	Khodjeyli	Kanlikul
Participants						
- Head of WUA	6	7	6	8	13	7
- Staff of WUA	-	4	-	4	2	4
- Member of WUA	-	2	10	8	12	4
- District WUA	1	1	1	2	2	2
- ISD	-	2	-	2	6	7
- Others	3	-	-	-	-	-
Total	10	16	17	24	35	24
WUAs	Beruni - 6	Nukus - 7	Chimbay - 6	Karauzyak-6 Takhtakupyr - 4	Khodjeyli - 10 Shumanay - 5	Kanlikul – 6 Kungrad - 3

(3) Results of Workshops

1) Major Problems Raised in Workshop

Throughout the workshops, it was pointed out as the most important issue that the maintenance work of internal canal and collector system is difficult for WUAs due to lack and malfunctioning of construction machinery. These issues caused the internal canals and collectors serious problems in their conditions. In addition, the hydraulic structures in the canal/collector systems, such as distribution works or crossing works, are short and malfunctioning, even existing, so that water management in the territory of WUA becomes difficult. The above problems are directly or indirectly caused by the poor financial condition of WUAs, which is a responsible organization to manage those systems. The financial problem of WUA was considered as a key issue during the workshops and it is indispensable to solve this issue, so as to improve the water management activity of WUA.

The financial problem of WUA, such as “Lack of money”, was one of the most important issues in all workshops. No payment, partial payment and payment not in time were pointed to be the direct cause of shortage of WUA budget during the workshops. The participants of workshop considered that there is a difficulty to pay water fee due to poor financial condition of member farmers.

Even though, it was expected that some differences or characteristics of raising problems due to the location of the irrigation systems, it was not found significant difference between workshops and common issues mentioned above that were covered in all workshop. However, the problem related to pump facilities were emphasized in the area highly relying pump facilities such as Beruni District and the Right Bank area of Amudarya River.

The importance of problems groups in workshop was assessed as below:

Table 4.2.13 Importance of Problem Groups in WUA Workshops

Problem Groups \ WUA Group	Group-1	Group-2	Group-3	Group-4	Group-5	Group-6	Score*
A. Problems related to water delivery and quality			**4**	**7**	**3**	**1**	**1.7**
B. Problems related to pump equipment		**2**		**6**			**0.7**
C. Problems related to shortage of construction machinery	**2**	**5**	**5**	**2**	**5**	**4**	**1.9**
D. Problems related to canal system and water management facilities	**4**	**4**	**1**	**1**	**1**	**3**	**3.8**
E. Problems related to WUA finance	**1**	**1**	**3**	**3**	**3**	**2**	**3.5**
F. Problems related to WUA’s activities	**3**	**2**		**4**	**6**	**6**	**1.4**
G. Problems related to Farmer’s ability		**5**			**6**	**5**	**0.6**
H. Problems related to salinity and abandoned land			**2**	**5**	**2**	**6**	**1.4**

Note: Numbers in the table are degree of priority.
* Scores were calculated by adding reciprocal of the figures indicating importance. Maximum score is 6

2) General Problem Tree

Based on the results of workshops, the Study team arranged the problems and problems groups into a problem tree by assessment of expert. The generated problem tree is shown in Fig. 4.2.7 (page 4-35).

3) Countermeasures Proposed in Workshop

During the workshop, participants were requested to discuss the countermeasures to solve their problems. Even some of countermeasures were too optimistic or insufficient to solve the problems; those ideas are valuable to understand the participants mind. The prioritized countermeasures of each group are shown in Table 4.2.14 (page 4-32).

All groups put high priority to the WUA’s financial problem especially for the collection of water fee. Three groups put the first priority to that and 2 groups put it in the second place. To solve the problem of water fee collection, two approaches were proposed in general. One is the strengthening of the

collection system through coordination with the power of *Hakimiyat* or Tax Department and another is to enhance member's understanding of water fee and importance of WUA's activities. Developing water measurement facilities were considered as contributing to the second approach as well as improving water management practice.

The lack of machinery and maintenance of canal/collectors was also high prioritized problem group, which was put in the second priority to be solved by 2 groups and the third by 4 groups. The major idea to solve this problem was to repair old machinery or obtain new one, however, it is difficult for WUAs to obtain them by themselves and it is necessary to consider external support for this issue.

4.3 Review of Problem Analysis

(1) Summary of Workshops

As mentioned in sub sections 4.2.2 to 4.2.4, 3 types of workshops were held in order to understand the general conditions of agriculture sector in the Study Area and the situation of WUA's. The problems identified in each individual workshop were weighted by their degree of priority to establish an overall priority ranking. The main features of the three workshops are summarized in the table below.

The problems mentioned by government officers could mainly be categorized under extension service, production management and farm management, with inadequacies indicated in each area. Among the problems, the government officers emphasize the management perspective.

Fermers emphasized problems of water shortage, irrigation systems, agricultural equipment and materials, farm management, and extension services. Problems mentioned by *dehkans* included those, but they also emphasized drinking water, marketing and livestock problems.

The WUA workshops have shown WUA's financial problems as the most important issue. Management of facilities was the next most important problem. The management of WUA is closely linked to the management status of the *fermers* who pay the water usage fees. So it is essential to build relationships of mutual trust and raise collection rates for water usage fees.

Table 4.3.1 Main Features of the three Workshops

	Workshop with Govt. Staff	Workshop with *Fermer*/*Dehkan*	Workshop with WUA
Date	2008/05/02	2008/05/12 – 2008/05/28	2008/5/26 – 2008/06/02
Objective	• Understanding of general agricultural conditions of the study area • Sharing the agricultural problems with counterparts	• Understanding of agricultural conditions of the study area • To explore the agricultural problems and prioritize them	• Understanding of WUA's conditions of the study area • To explore the agricultural problems and prioritize them
Core problem	*Income from faming is low.*	[*Fermer*] *Business management of fermer is difficult as a private enterprise.* [*Dehkan*] *Lifer is difficult.*	*It is difficult to manage water appropriately.*
Main Participants	Staff of MAWR of Karakalpakstan Staff of *Hakimiyat*	*Fermers* *Dehkans* Staff of *Hakimiyat*	Head of WUA Staff of WUA Member of WUA District WUA
Major Problem Groups clarified	• Problems related to Ability and discipline of *fermers* and agricultural staff • Problems related to irrigation water and soil salinity • Problems related to farm machinery and chemical fertilizers • Problems related to livestock • Problems related to low profits	[*Fermer*] • Shortage of water • Insufficient irrigation and drainage facilities • Insufficient machinery services • Lack of fuel • Lack of fertilizer • Soil salinization • Bad soil conditions • Insufficient bank service • Low selling price • Lack of agriculture information	• Problems related to water delivery and quality • Problems related to pump equipment • Problems related to shortage of construction machinery • Problems related to canal system and water management facilities • Problems related to WUA finance • Problems related to WUA's

		• Financial problems [*Dehkan*] • Shortage of water (for irrigation) • Lack of drinking water • Soil salinization • Difficulty in marketing • Increased insects • Lack of fertilizer • Financial problems • Lack of farm machinery • Insufficient bank services • Insufficient amount of fodder • Environment • Unemployment	activities • Problems related to Farmer's ability • Problems related to salinity and abandoned land

(2) Review of Problem Analysis

The problems indicated in sub section 4.2.5 are those pointed out from the viewpoints of the actual actors for agriculture in the Study Area. However, certain points such as issues for improvement of livelihood of the *fermers* and *dehkans* seemed to be missing fro the picture. Therefore, the Study Team supplemented these problems, taking into account the findings from the questionnaire survey, literature survey and site reconnaissance. The supplemented items mainly consist of items to strengthen farm management and improve farmers' livelihoods, namely; improvement of cultivation techniques, promotion of crops other than cotton and wheat, promotion of livestock and fish raising, assisting *fermers* and promoting distribution and processing. The reviewed problem trees are indicated in Fig. 4.3.1 and 4.3.2 (pages 4-36 and 37).

4.4 Constraints and Potential for Regional Development

The results of literature survey on existing documents such as statistical data, site reconnaissance surveys by the Study Team members, interviews to stakeholders, questionnaires surveys and workshops were carefully examined in order to identify the constraints and potential for regional development in the Study Area.

4.4.1 Constraints for Regional Development

(1) General

Karakalpakstan is situated in the most ecologically vulnerable area in the Central Asian countries. Due to both natural and man-made factors, Karakalpakstan faces immense environmental challenges, including: (a) degradation of water resources and arable lands and salinization of water; (b) desertification; and (c) increased vulnerability to natural and man-made disaster.

Based on the field survey and the workshops, the general constraints of the Study Area are summarized as follows;

1) Harsh Climate Conditions

The climate condition of the Study Area is characterized by arid and small precipitation from 110 to 130 mm per annum, dry and hot summer season and quite cold winter season. The temperature varies from less than -20 ºC in winter season and over 50 ºC in summer season because of continental climate. Therefore, the agricultural production of the Study Area is limited directly by these climate factors. Basically, irrigation is indispensable to cultivate any crop.

2) Unstable Irrigation Water Supply

The only water resource of the Study Area is the Amudarya River. The discharge of water flowing down the Amudarya River varies significantly from year to year, depending on climatic and other conditions. In addition, as the Study Area is located in the lowest downstream territory of the Amudarya River, the Area has limited freedom to take water from the River. The inflow of water to

Karakalpakstan has been reduced within the last 30 years due to the growth of the population and irrigated lands in upper Amudarya areas.

3) Low Quality of Water

The quality of water of Karakalpakstan is poor because of the sewage from the provinces located in upper Amudarya. In rural area of Karakalpakstan, the access to safe water is a serious problem for people because that they drink irrigation water from canals sometimes.

4) Soil Salinity

Until recently Karakalpakstan agriculture was adjusted to single cropping: cotton growing. It has resulted in serious deterioration of soil and salinization. Preventing the soil from salinity is the main problem to continue the cultivation.

5) Low Population Density

The Republic of Karakalpakstan has its own peculiars, which define the character of its economy and infrastructure. Low density of population and vast area of land accounts for high dispersion of *auls* and the system of settlement of households. The density of population in Karakalpakstan is 9.7 persons/km^2 (2008) and the figure is extremely low in the other provinces of Uzbekistan. Specially, the following 3 districts are very low density: Muynak 0.7, Kungrad 1.5 and Tahtakupir1.9. This factor significantly increases the cost of investment and social services, as well as result in its underdevelopment.

6) Low Living Standards and Poverty

The Study Area, especially people in rural area, presents low living standards. According to UNDP, the ratio of the poverty people is 11.3 % in total Karakalpakstan, 9.8% are in extreme poverty. These figures of Karakalpakstan are higher than that of Namangan province to be implemented ELS project by UNDP as a more poverty province. Karakalpakstan ranks in 12th out of 14 provinces in term of socioeconomic development according to WISP. Within the Republic, there is a widening gap between urban and rural area in terms of availability of job, social services etc.

Table 4.3.2 Comparison of Poverty in Karakalpakstan and Other Areas

	Incidence of poverty	Incidence of extreme poverty	Share of poor in population	Share of extreme poor in population
Karakalpakstan	39.4	12.2	11.3	9.8
Namangan	39.7	7.7	8.2	4.9
Tashkent city	9.2	2.9	2.9	2.6

Source: Inception Report, March 2005 EU/UNDP Supported Project Enhancement of Living Standards in Karakalpakstan

7) Low level of tax revenue for the Government

As of 2004, tax revenue of the Government of Karakalpakstan is considerable low compared to budgetary expenditure. This is assumed to be one of the factors affecting implementation of government development projects, including research and development of agricultural information / technologies.

8) Lack of involving Community in Development

One of the roots of the Study Area (Karakalpakstan) is that local communities have hardly ever been involved in planning, decision making, monitoring and evaluation in their development. Many Aral Sea programs have been executed in the Study Area. Unfortunately, it is said that these programs have brought no real outcomes for local people. As a result, population has become disillusioned with external assistances.

9) Under Transition Process

Since the independent in 1991, the Government has made big efforts to transit to market economy. Agrarian and rural sector reforms were carried out so far. In rural society, "*Mahalla* system" and "VCC system" were introduced. On the other hand, in rural sector the dissolution of *shirkat* brings so many private *fermers* and *dehkans*. Among of these processes, local people need more times to well

adapt to the new system mentioned above. In addition, it requires more time to establish a well functioned system to support local community by the government and civil society organizations.

(2) Agriculture

1) Climate

Karakalpakstan is not blessed with good climate condition for crop growing in general. The very low annual precipitation and relatively cold winter and hot-dry summer cause low productivity for major crops comparing to other regions in Uzbekistan. Though there are several greenhouses in Karakalpakstan in order to grow vegetables during cold season. The number is still limited due to unreliable supply of natural gas, which is an energy source of heating, in rural area in Karakalpakstan.

2) Soil Condition

Soil salinity is the most serious impeding factor for growing crops with irrigation water problem, according to the result of workshops carried out by the Study Team. A crop rotation system combining legume crops or salt absorption crops, e.g. alfalfa, sorghum, etc. might be an effective agro-biological countermeasure for sustainability. Then, many crop growers have already understood the idea. However, most of the growers do not apply the crop rotation system due to the following reasons;

- Water shortage (cotton and wheat are actually given priority in allocation of water)
- Lack of quality seeds
- Replacement of fodder crops with wheat in order to increase foods production

3) Access to Technology/Information

Though some agencies, e.g. Fermer's Association, agricultural colleges, etc. are providing trainings to *fermers*, there is no systematic agricultural extension service system in Karakalpakstan. They are carried out on ad hoc basis and mainly concerned to institutional and financial management subjects. On the other hand, outputs of agricultural research institutes, which are applicable to local conditions, are not reaching to crop growers due to weakened function of the institutes and lack of integrated coordination system for the dissemination. Crop growers need to have a good access to technical information sources when they get troubles.

As a result, many crop growers do not have enough knowledge or technology, especially for growing crops other than cotton and wheat. Many *fermers* and *dehkans* can only get the crops' yield far less than their potential. Moreover, substantial number of them cannot harvest quality products to meet the market requirements, since they don't familiar with a proper technology for fertilizer application, pest and disease control, thinning or pruning, etc. Though the government has a policy to promote agro-processing and marketing, prevailing such low quality standard of farm products must be a bottleneck of the policy.

4) Access to Inputs and Supporting Services

Access to agricultural inputs, e.g. seeds, chemical fertilizers, chemicals for plant protection, etc. and supporting services, e.g. credit, mechanization service, etc. would be a big problem when someone wants to grow crops other than cotton and wheat. They are not easily available for many growers to produce other than cotton and wheat under the present supply system.

Moreover, each input or service is provided from different company or institution by advanced-contract basis in most cases. This situation makes troubles to crop growers to access the inputs and services in accordance with the changeable whether and crop conditions. They may need to have more flexible supply system in which they will get necessary inputs and services, whenever they want at one place within their reach. Since the government has just started to introduce a flexible distribution of chemical fertilizers, such improvement measures should be expanded to the other inputs and services, and integrated at the growers' level for their convenience.

5) Mechanization

A series of workshops carried out by the Study Team suggests that many crop growers have difficulty to get sufficient agricultural mechanization services when they need, especially in the beginning of planting season. MTP (Machinery and Tractor Park) and Alternative-MTP provide the services to the growers. However, many of them are not satisfied with the services, maybe for the following reasons:

- Number of machinery and tractors is limited
- Reduced working efficiency of machinery due to becoming old
- Some machineries are not suitable (too big) to operate in some fields

It seems that MTP and Alternative-MTP still have excessive facility and manpower, especially for workshops. It is recommendable to divide the services responsibilities as shown below between the MTP and Alternative-MTP in order to reduce their financial burden. However, Alternative-MTP may lose their share in the mechanization services due to increased number of large-scaled *fermer*, in other word, decreased number of small-scaled *fermer* after the Land Optimization Policy.

- MTP: Maintenance and repair services of machinery as a District Central Workshop
- Alternative-MTP: Mechanization services to growers, and a local sales agent of machinery attaching regular maintenance service function

6) Management of *Fermer*

The Study Team has been informed that many *fermers* are struggling to adopt the present agricultural reforms. Substantial numbers of *fermers* still have difficulty in having a sense of ownership and in becoming financially independent entity. Under the present situation, they should only concentrate on growing cotton or wheat, which are major crops for the common *fermers*, without turning their attention to other crops which might be a key to open the doors to a market oriented economy.

Fermers are expected to be the main actors of agricultural development and have a big potential to activate the regional economy providing job opportunities to the rural population. Continuous and more flexible government support, which makes *fermer* sound independent entity, would be needed for agricultural development, as well as regional development.

7) *Dehkan*-Farming

Not all *darkens* are eager in producing crops in *tamarka* since they have a wide range of diverse jobs and lifestyles. Substantial amount of crops as wheat, fodder crops, vegetables and fruits are produced in *tamarka*. The majority of the production is expected to be consumed by *dehkans* themselves, though the production is far less than the demand in general. The production has to contribute to improve the living standards of their families through providing fresh foodstuffs and small cash income sometimes.

The presence of *dehkans* in the production is relatively limited in the study area comparing to other areas. However, *dehkans* have a certain potential that if motivated *dehkans* could get a proper incentive, especially in vegetables and fruits production. Several supporting measures targeting *dehkans* has taken by the government, mainly from a view point of social welfare. However, *dehkans* still have more difficulty than *fermers* to access to irrigation water, agricultural inputs and services when they want to grow crops in *tamarka*.

(3) Livestock

1) Low Productive Capacity of Livestock

In general, productivity of livestock in Karakalpakstan is considered to be low. Especially cattle/cows, which are the most beneficial animal for *fermer* and *dehkan*, go to scale at 350 kg on average even at matured age. Dressing cattle of this size, only 175 kg of red meat can be produced if applying 50% of yielding ratio. The milk produced by a cow with 200 to 250 day-lactation period is at most 1,250 kg. One of the reasons for the lower productivity can be attributable to the inadequate supply of feeds, not

only in quantity but also in quality apart from productive ability that a breed has originally. Cattle fattening in Beruni is notable from the viewpoint of proper feeding system for cattle/cows, which will be a good model for *fermers* who are raising cattle/cows for milking purpose.

2) Insufficient Supply of Forage and Low Quality of Animal Feeds

The major sources of animal feeds are sorghum, alfalfa, reed, wild grasses and by-products of cotton seed. However, the nutrient value of these feed are generally low, excluding the by-product of cotton seed and alfalfa. For example, leaves and stalks of sorghum practically feeding to cattle/cows are mostly in lignifications, containing higher fibers but low quantity of protein, especially for dried sorghum in winter season. This can be said for reed, other main feed for cattle in winter season.

Forage containing higher digestible crude protein (DCP) is alfalfa. However, the current cultivation of alfalfa is not so popular in the Study Area, not only for feeding during spring to summer but also dried forage for winter season. Therefore, options to improve the present feeding condition will be the increase of yield of forage crops and more production of alfalfa seed and expansion of forage cultivation. As a strategy for *dehkan*, who has only small area, collective cultivation by organized *dehkans* will need to be studied involving people who are interested in the plan as well as about availability of land for the plan. Despite of production of cotton meal/cake, wheat bran, rice bran, alfalfa hay and bone meal that can be processed into concentrate feed, it is estimated that the current concentrate feed production meets only 60% of the demand.

Table 4.3.3 Nutrient Value of Animal Feeds

	DCP (%)	TDN (%)
Sorghum (fresh)	0.8	17.3
Reed (dried)	2.1	46.9
Cotton seed cake	36.9	80.7
Maize (fresh	0.7	9.4
Wheat straw	0.3	33.7
Rice straw	1.0	37.1
Alfalfa (fresh)	19.5	12.6
Alfalfa (hay)	12.2	48.8

Source: Ministry of Agriculture, Forestry and Fisheries of Japan
Notes: DCP=digestible crude protein, TDN=total digestible nutrients

3) Low Carrying Capacity of Grazing Lands

Young cattle/cows and sheep/goats are grazing on grazing land until November when dry feeding starts. Grazing areas are composed of post-harvest farms, roadside, desert area and grassland with bushes around residential area. However, their carrying capacity is low for grazing a lot of animals and sufficient feeds are not secured in quantity and quality. One of the reasons for the small body of livestock is attributed to improper and inadequate feeding system. As UNDP pointed out, overgrazing is observed around residential areas where *fermer* and *dehkan* herd animals.

4) Inaccessibility to Veterinary and Artificial Insemination Services

District veterinary department and veterinary pointed that *Aul* level are responsible for veterinary services for *fermer* and *dehkan*. Some district veterinary office have laboratory like Beruni, equipped with AI tools such as LN2 tanks etc, though they are insufficient. However, district veterinary offices have not vehicles necessary for various veterinary services at rural level. For example, in Kegeily district veterinarian who can make AI service goes by bicycle carrying 60lit LN tank on his back when they are asked by telephone. Their opinion is that AI and other medical services will be improved if they have portable type LN tank of 3 liters. Most of *fermer* and *dehkan* also have no transportation means to access district veterinary office or veterinary points to receive their services. Moreover, the number of veterinarians who have AI technology is insufficient according to the Veterinary Department. Probably due to these reasons, the current accomplishment of AI in the 11 districts of the Study Area was only about 31% of the target in 2007. Liquid nitrogen is produced in Tashkent and Navoi cities, but the lack of transportation means to Nukus and other districts is the most serious issue for Veterinary Department.

5) Lack of Animal Products Processing Facility

Animal products processing activity is underdeveloped in the Study Area. There are 5 private meat and milk factories in the Study Area, in which a milk factory with capacity of 30 ton/day is the largest one. Out of that, one in Nukus city processes ice cream in small scale using milk powder imported from Tashkent. Both *fermer* and *dehkan* consider that cattle/cow is the most profitable animal from the

economical point of view probably due to stable income by selling milk at 650 to 700 sum/lit for above 200 days. Currently, *fermer* and *dehkan* are facing lack of processing facility along with marketing channel. In fact, one of staff of Shumanay district *hakim* office asked JICA Study Team to implement small scale milk processing factory since they have enough milk production. It will be necessary to study more detail about the feasibility to establish small scale plants to process animal products (meat and milk) in order to improve regional economy and people's standard of living.

6) Lack of Hygienic Slaughterhouse

The slaughterhouse in Nukus city not operates since 2004. It was reported that the management could not continue due to less users because they slaughter animals themselves. Another private slaughterhouse in Takhiatash, slaughtering 5 to 6 cow per day, has not satisfactory sanitary condition and is not equipped with cold storage. It will be necessary to improve slaughtering facility if considering giardiasis, echinococcus, bacillus coli, etc, from the viewpoint of safe food supply to the consumers.

7) Insufficient Technology of *Fermer* and *Dehkan*

Though there is the manual on proper feeding system prepared in 1990, practically it is not used among livestock owners. As pointed out above, one of the reasons for the low production capacity is attributed to the currently prevailing poor feeding in quality and quantity. It will be necessary to train livestock owners, including *fermer* and *dehkan*, about balanced- feeding system using locally available animal feeds taking into consideration the production capacity of the animals, as well as proper animal care, breeding etc.

8) Necessity for Strengthening Livestock Experts

At present, services on livestock sector at rural level are focusing veterinary activities. Under this condition, it will be necessary to strengthen services for AI, diseases control and medical treatment, which are indispensable to increase the animal productivity in the Study Area. In addition to these, it will also be necessary to strengthen extension services for livestock management, forage production, nutritious feeding technology and market-oriented livestock raising. If considering the current lopsided veterinary service, it will be necessary to foster and strengthen livestock expert that can support *fermer* and *dehkan* from overall point of views concerning livestock.

(4) Fishery

Constrains of fishery activity in study area is as follows.

1) Limited area of water bodies for capture fishery and its insufficient research

Large proportion of capture fishery production is provided from some principal huge lakes already acquired. Lack of appropriate research to existent fishery area may prevent increase of production providing adequate and sustainable fishing regime.

2) Lack of aquaculture

Historically, fishery activity has progressed only by exploiting water bodies for capture fishing and until now aquaculture had not given attention, resulting in a lack of one essential source of fishery production. Even some beginning can be observed, aquaculture is still not recognized popularly and it is making fishery development get behind.

(5) Irrigation and Drainage

Due to lack of maintenance work, the condition of the facilities in the internal canal/collector networks in the Study Area is quite inadequate and it causes improper water management and inefficient water use. Lack of irrigation water due to restricted available resources and poor condition of canal network and the soil salinization due to inadequate drainage condition cause low productivity of the crops. Some of irrigated lands are consequently abandoned at present. The dominant reasons of the inadequate maintenance work of the internal system are the lack of financial and technical ability of WUAs, to which the systems had been transferred from the former *shirkat*. The problem of financial

position of WUAs is directly influenced by the financial position of member farmers, which is dominated by low productivity due to lack of irrigation water and soil salinity that makes difficult the collection of membership fee. Those problems formulate some vicious circle in the regional development. The following issues are considered as constraints for the regional development from the irrigation and drainage subsector.

1) Inadequate Canal Condition and Water Management
   - The condition of the internal canal networks is quite inadequate. The flow capacity of canal systems is restricted by sedimentation, collapse of slopes, overgrowth of weeds, damages of crossing works over roads or collectors, etc., which are caused by inadequate maintenance work. The malfunctioning of the canal network makes water management difficult and increases loss of water in the system as well.
   - Water measurement facilities like hydro-post is aging and short after the diversion from the inter-farm canal. Distribution boxes and farm intake facilities are not developed in general. Thus, effective water management is difficult in the internal canal network.
   - WUA has the responsibility to operate and maintain the internal canal network. However, WUA does not have financial and technical capability as mentioned in the followings.

2) Inefficient Water Use in the Field Level
   - Accurate and careful water management is not operated in the field level. Irrigation technique suitable for large scale farm system is applied even in small scale farm system. Configuration of soil surface causes excessive amount of water consumption for irrigation in the field.
   - Amount of delivering water is not measured at farm intake. The member ship fee of WUA is charge based on the irrigated area instead of the volume, which the price is fixed among crops in most cases. This tariff system of membership fee causes lack of motivation to reduce water consumption in the field.
   - Excessive irrigation water application causes upraising of groundwater table and accelerates secondary salinization in the field.

3) Soil Salinization
   - The Study Area is under the severe natural condition such as high contents of minerals in the soil, high concentration of salt of irrigation water, high groundwater level and heavy evaporation, thus, the soils suffer salinity problem easily. In addition, human activity in and around the field causes secondary salinization.
   - The density of internal collector network is not sufficient. The condition of existing collector network, both of inter-farm and internal system, is quite inadequate and their functions are not sufficient to control groundwater level. The raising up of groundwater level causes water logging in the field. The lack of control of groundwater level makes leaching in the field ineffective or low efficient, so that the amount of water applied for reaching practice increases, as well.
   - A huge amount of leaching water is required in the Study Area. The necessary amount of leaching water varies depending on the soil and salinity conditions. It requires 4,000~6,000m^3/ha per annum in the area with heavy salinity, which is comparable with irrigation water requirement for the crop or more. Under the limited availability of water resources, the consumption of excessive water for leaching becomes constraints to maintain and/or increase agricultural production.

4) Less Capability of WUAs
   - WUA, which is a Key Actor of operation and maintenance and of water management in the internal canal/collector system, has many problems and meets many difficulties in its activity. The most fundamental problems that WUA faces are caused by its financial condition. The

improvement of farmer's financial position is essential to solve the problems of WUA's financial condition, if external support cannot be expected, because the membership fee is only the financial source of WUA at the moment.

- The collection of membership fee is low. Approximately one third of WUAs is paid less than 25% of the invoice and another one third is less than 50%. The financial capacity of WUA for insuring management and maintenance of the internal canal/collector system is weak. WUAs do not have financial means other than membership fee and they do not have access to credit system.
- Many of WUAs do not have enough number of staffs to manage their system and organization. Approximately two third of WUAs meets problem of lack of staffs. Especially the lack of experts makes WUA's technical capacity insufficient and WUAs suffer difficulty in water management and O/M of the facilities.
- Even though many WUAs received construction machinery for maintaining canal/collector systems from the former *shirkat*, but most of WUAs suffers the lack of machinery due to malfunctioning caused by aging and insufficient maintenance. As mentioned above, WUAs do not have financial capacity to purchase new machinery or even purchase spare parts. Lack of machinery limits WUA's capability on conducting maintenance work of the canal/collector systems.
- The organizational management capacity of WUA is insufficient. This is caused for both of the executing body and the members of WUA. Farmers do not have enough experience in work with farmer's organization and the ownership is not well understood among the member farmers.
- Currently WUAs cannot work with the member farmers to improve water management in the field level. This is caused due to WUAs do not have sufficient technical capacity to training or guiding farmers and that WUAs cannot keep close communication with members due to lack of transportation. Lack of transportation makes difficulty on regular water management activity of WUA.
- The member of WUA is practically limited to *fermers*, and *dehkans*, who are recognized Tamarka users, participate in the WUA indirectly through VCC. Thus, *dehkans* do not contribute to water management activity of WUA at the moment.

(6) Distribution/ Marketing/ Processing

Constrains of Distribution / Marketing / Processing in the study area is as follows.

1) Weak Bargaining Power

The production volume of individual *dehkan* is limited since the farm lot of *dehkan* is quite small. Therefore, basically most *dehkans* produce agricultural products to meet self-consumption. In addition, collective actions of small-scale farmers to collect, distribute and sell their products are rarely seen in the study area. Accordingly, most *dehkans* have to carry in and sell their products by themselves. Under this condition, only few *dehkans* have experience to sell their products at local market. For this reason, the bargaining power of *dehkans* is weak in general.

2) Low Accessibility to Commodity Market

Participants of workshop at Beruni and Kanlikul for example indicated that low accessibility to local bazaar is one of constraints on marketing. Their reply on further questions from the Study Team are basically summarized in the following 3 items: (1) lack of transportation means to carry-in local market, (2) long distance to the nearby local market and (3) difficult to find local buyers/ traders. Indeed, accessibility from farm to village center is quite poor in rural Karakalpakstan due to deeply rutted road condition or long distance. Also, some livestock *fermer* don't sell the wool due to difficulty in finding local buyers. However, most participants of the workshop produce vegetables and fruits only for self-consumption and don't have any experiences on marketing of their products.

3) Unstable Market for Vegetable

Price fluctuation of cucumber and tomato is remarkable. It once heavily falls in summer season and then skyrocket during winter period. Direct reason of this phenomenon is quite simple: overproduction in summer and underproduction in winter. During the summer, vegetables produced by local farmers flow into market at once, which result in heavy price fall. In contrast, in winter season, lack of production technology to shift shipping season, such as green house farming, causes the price increase. In addition, during the winter season, the demand for vegetables also increases in northern countries, such as Kazakhstan and Russia and the demand reduces the transaction volume of vegetables at the domestic market, which result in an acceleration of the severe shortage. As a result, price of vegetables increases during the winter period and the government often has to orders an emergency embargo on vegetables to protect domestic market.

4) Lack of Processing Technology

In general, processing activities on agricultural and livestock products are not active in Karakalpakstan and most are processed for self-consumption, or brought into market without any steps of processing.

Volume of milk consumption in Uzbekistan is high. Around 10% of daily calorie is absorbed from milk, according to FAO's statistics on food consumption. People in Karakalpakstan also prefer milk for dairy consumption. However, most milk at market is directly brought from farm gate without passing from any procedures such as centrifugation (cleaning), homogenization and low-temperature pasteurization, and is sold in PET bottle under the open-air condition. Even though veterinary inspectors periodically go around the retail section for surprise inspection, milk tends to deteriorate faster under such a condition.

5) Lack of Technology on Food Safety

Veterinary and sanitary officers supervise food safety in Nukus Central Bazaar. The officers inspects foodstuff based on the checklist, which includes bacteriological examination and physicochemical examination. However, products are not entirely tested in accordance with the check items due to lack of test equipment. Since existing testing tools are old and too simple, the veterinary and sanitary inspectors want to improve their testing tools in order to meet consumers' requirement for food safety.

4.4.2 Potentials for Regional Development

(1) Agriculture

1) Academic and Technical Human Resources

There are 9 stations and one institute under the Karakalpakstan branch office of the SCA, each working on its specific theme on agricultural research. Due to shortage of revenue, activities of such stations and institute may be currently stagnated at a certain extent. However, these stations / institute have well experienced staff with high technical / academic background, and if they can have sufficient financial resources, they have the potential of developing and introducing agricultural technology suitable for new and current crops / livestock.

Also, the Nukus Branch of Tashkent Agriculture University in Tashkent provides high education regarding agriculture. Agricultural colleges are also seen in each district of Karakalpakstan. The Uzbekistan Government regularly organizes a 5-day training course for training *fermers*, and this training course is conducted in the district agricultural colleges. Such system can be utilized for further enhancing the dissemination of agricultural technologies.

Furthermore, due to insufficient employment opportunities, people such as skilled agronomists and engineers can be found in the rural areas of Karakalpakstan. Such human resources can be utilized to implement agricultural projects in rural areas.

2) Promising Crops

Karakalpakstan has been well-known as a production center of rice, melon, water-melon and alfalfa seeds. Many farmers still have in mind to produce them, since the crops are suitable to local conditions. However, their production has reduced in recent years due to the following reasons:

- Rice: water shortage
- Melon & water melon: infestation of fruits flies causes a loss of foreign market
- Alfalfa seeds: reduced supporting system and good markets, water shortage

The production of those crops shall be reactivated with strategic support measures of the government since there are many local producers to have experience and a mind in the production.

Many farmers in the study area, who actually grow vegetables, say that they can sell their products as much as they produce without serious difficulty. According to interviews with middlemen in Nukus bazaar, a substantial part of vegetables and fruits in the bazaar come from other regions in almost all the year. The Study Team also estimates that the total vegetable and fruit production in the study area is still far below the total demand of the area based on the available statistical data. These things suggest that there are still large space for local vegetables and fruits in local markets, rather than much intending export.

3) Technical Capacity of MTP

There is one MTP in each district, together with a large number of A-MTPs in Karakalpakstan. Again, financial situation are not in a desirable state for most MTPs/A-MTPs. Furthermore, many of the agricultural tractors are now superannuated. However, the facility and workers of the MTPs / A-MTPs can be a potential to maintain agricultural machineries if they are newly introduced.

4) Network for Distribution of Agricultural Inputs

Though distribution systems of agricultural inputs are not easy for individual growers, the infrastructure is rather well equipped. The state company Uzselhozhimiya (Uzbekistan Agricultural Chemical Co.) has 134 agro-chemical centers, which are the end distribution points in Karakalpakstan. Such facilities and management system can be efficiently utilized to distribute agricultural inputs if a more flexible system is applied.

(2) Livestock

1) Marketing Potential for Milk

Processed milk produced in Tashkent is sold as common merchandise in the markets of Karakalpakstan. This is assumed to be due to the lack of producers providing hygienic milk in Karakalpakstan. One the other hand, calorie intake from milk in Uzbekistan holds 10% of the daily consumption of an adult, and is remarkably high. These facts indicate that there is potential need for hygienic local milk.

2) Karakul Sheep

Karakul sheep is one of the potential livestock in the Study Area. This is well known in the world market, particularly in the world of fashion. Fur coat made of the skin of fetal and newborn Karakul lambs is famous for its color variety, lightweight and reversible use of both fur side and suede leather side. The Karakul lamb coat retails from around $5,000 to $12,000 in the world market[2]. Widely known fashion makers use the Karakul skin, including Christian Dior, Kenzo, Gucci, Yves Saint Laurent, etc. The distribution chain of Karakul skin is already connected to the world market through Kazakhstan and China, but unfortunately, most added values on this products fall outside of Uzbekistan, mainly due to the lack of technology.

[2] Furs. com. http://www.furs.com/price.html

(3) Fishery

1) Market Potential of for Fishery Activities and Possible Introduction of Aquaculture

Fishery consumption in Uzbekistan has reduced drastically from 10kg to less than 1kg per-capita during the last 30 years. Considering that it is because of national economical and environmental issues, it is reasonable to assume that the demand can increase in the study area.

In Karakalpakstan, aquaculture has not been practiced except in a few trial-base activities. From the fishery viewpoint, land resource is quite new area for its production and may provide high possibility to be exploited. Even it contains huge component of stakeholders and conditions and requires considerable attention for use, consideration of pond aquaculture suggest large improvement of fishery production. It also provides possibility of new entry to fishery activity, including *fermers* and *dehkans* utilizing their land.

Roughly, cost-benefit calculations of grow-out fish production are shown in the table below on trial only using running costs. This estimation resulted in 1,160,000 sum/ha profit in one season. However each factor used is rough and reliable information is needed by practical experiment to set standard data in this area.

Furthermore, cultured fish in pond may have advantage supplying fish during the capture close season, which prohibit capture fishery to conserve natural spawning. By propagating cooling system, the market of fish still can be enlarged expanding fishery season in summer, which restricts fish supply due to rapid quality degradation. Synchronous increase of fish supply and price (about twice of in warm season) in winter suggests high demand of fish in adequate condition. In such present situation, it can be estimated that fishery product has market potential with high demand.

Table 4.3.4 Cost-benefit Calculation of Grow-out Fish Production per ha

Value (sum)

Cost	
Seed	150,000
Feed	1,000,000
Fertilizer	90,000
Total cost	1,240,000
Sale	
Fish (1,200 sum/kg)	2,400,000
Total sale	2,400,000
Total profit	1,160,000

(4) Irrigation and Drainage

1) Existing Structure of WUAs

Contrary to many constraints that the WUAs have, the fact that WUAs have been established and water users have been organized into WUA over the Study Area can be regarded as a potential to improve irrigation and drainage. Currently, the Law of WUA is under the process of enacting. WUA has a position of legal entity and its role, responsibility and competence, including collection of membership fee, under legislation. Even though there are many problems or constraints on the capability of WUA at the moment, it is to be considered as a potential for the regional development. Through strengthening the organization of WUA and enhancing its activity, it is expected to realize the proper operation and maintenance of the internal canal/collector system and the improvement of water management.

2) High Priority to Irrigation Subsector of the Government of Uzbekistan

Irrigation and drainage is regarded to be an important issue by the Government of Uzbekistan and Karakalpakstan. In 2007, a decree for fundamental improvement of collectors in the irrigation area has been issued, deciding the implementation of NDIP. Also, DIWIP, was implemented I south Karakalpakstan up to 2010. This is regarded to be the first stage of the general strategy to improve the efficiency of the extensive irrigation and drainage infrastructure and stabilize the ecological and socio-economic impacts along the right bank of the Amudarya River in south Karakalpakstan. Experiences and resource of such existing policies, funds and projects can be applied or replicated for the improvement of irrigation and drainage in the Study Area.

3) Supporting Institutions

A number of institutions such as ISD, PI and SANIIRI-Karakalpakstan, which have long experience in development and implementation of irrigation and drainage technologies, are present in

Karakalpakstan. With adequate budget and definition of their roles, such institutions are well capable to support the WUAs for better water management in the field.

(5) Distribution / Marketing / Processing

1) High Demand for Off-season Vegetables

The prices of off-season vegetables, such as tomato and cucumber, which skyrockets in winter season due to less commodity inflow at market, indicates strong demand for winter vegetables of local residents.

Food sufficiency rates of vegetables and fruits are still low in Karakalpakstan and imported goods from other regions in Uzbekistan fulfill the shortfall. The main reason of the shortage is the low agricultural productivity and difficulty in marketing. Also, most local residents prefer cheaper price products, reflecting their low household income. This situation indicates that some rooms are remaining to supply local products to the market. However, it should be noted that timing of shipping should be carefully considered to avoid sudden price fall due to simultaneous shipment by local farmers.

2) Location in the Middle of the Silk Road

Karakalpakstan is located in the middle of the Silk Road, which connects East Asian countries, Middle East countries and Western countries. For example, Khodjeyli is historically one of transit point of international transaction of the Silk Road. The condition has fostered receptive capacity of Karakalpak peoples, which result in current ethnic variety in Karakalpakstan.

Ethnic variety is one of strength of Karakalpakstan. There are many languages spoken in Karakalpakstan, that includes Karakalpak, Uzbek, Kazakh and Russian and the diversity allows Karakalpak people to transact directly with foreign traders using such varied languages. Many literatures on economic development indicate that there are strong correlation between personal ability on language variety and household income, particularly from non-farm activities including trade.

Furthermore, being located at the gateway to Kazakhstan, Turkmenistan and to the Russian federation, Karakalpakstan has potential advantage in terms of exportation.

3) Warm Climate Condition Compared to Northern Countries

Uzbekistan has warmer climate conditions compared with northern neighbors, including Kazakhstan and Russia. During the Soviet period, the relatively warm and suitable climate conditions for agricultural production enabled Uzbekistan to provide around 90% of cotton, 65% of grapes, 40% of fruits including watermelon and melon consumed in the former USSR. The demand of fresh vegetables and fruits in the northern neighborhood is still high and Uzbekistan exports these products.

4) Established Brand Name

Some Karakalpak products have an established brand name or reputation. Besides melon and the internationally known Karakul sheep, the short grain variety Karakalpak rice, together with those of Khorezm, is famous in Uzbekistan due to its taste and cheaper price. Traders from other regions buy them at markets in Karakalpakstan and carry them back home. Rice is one of the staple foods in Uzbekistan and self-sufficiency rate of rice is still below 100%. Therefore, domestic demand for rice is still high and there is space to expand rice production, if irrigated.

4.4.3 Identification of Items Required for Regional Development

Based on the analysis of constraints and potentials for regional development, items to be considered in preparation of the strategies for regional development in the Study Area were examined. The items to be incorporated in the strategies were examined, so that they correspond to the tertiary problems indicated in the problem trees of *fermers* and *dehkans* after the analysis of the Study Team (Fig. 4.3.1 and 4.3.2, pages 4-36 and 37). As result, 21 items were identified (Fig. 4.4.1, page 4-38). These items were further grouped into individual sub-sectors for regional development in order to formulate strategies of the Master Plan for Regional Development.

Table 4.2.1 Selection of Farmers for Questionnaire Survey

District	WUA	Nature of *Fermer*	Land Size (ha)
Kungrad	Arba ketken	Grain production oriented	70 - 90
	Qiyatjargan-gidroxiz		
Muynak	Aral	Grain production oriented	40 - 60
	Jauinger		
Shumanay	Diyxanabad	Livestock oriented	90 - 100
	Dosliq bayragi		
Kanlikul	Sari altin	Grain production oriented	80 - 100
	Altinkol		
Kegeily	Murab	Livestock oriented	80 - 100
	Miyrbek suuvchi		
Chimbay	Suushi	Cotton production oriented	55 - 75
	Sagindiq Murab		
Khodjeyli	Aybek	Cotton production oriented	50 - 70
	Azatliq		
Nukus	Maten Juldiz	Vegetable production oriented	20 - 40
	Nukus	Rice production oriented	
Karauzyak	Dosnazarov arna	Grain production oriented	65 - 85
	Marka uzyak		
Takhtakupyr	Qoyshiqkol taxta	Wheat production oriented	50 - 70
	Badraq-yab	Rice production oriented	
Beruni	Jumaniyazov	Cotton production oriented	25 - 45
	Ulugbek		

Table 4.2.5 Characteristics of *Fermers* Participated in the Workshops

District	*Fermer*[1)]	Production[2)]	Largest area[3)]	Livestock[4)]	FA[5)]
Kungrad/Muynak	10 pers.	Cotton 5 pers. Wheat 5 pers. Cattle 6 pers. Sheep and Poultry 4 pers.			6 pers.
Shumanay	10 pers.	Cotton 10 pers. Wheat 9 pers. Fruit 2 pers.	Cotton 10 pers.		10 pers.
Kanlikul	22 pers.	Cotton 22 pers. Wheat 22 pers. Gourds 22 pers.			22 pers.
Kegeily	16 pers.	Cotton 16 pers. Wheat 10 pers. Gourds 1 pers. Fruit 1 pers. Cattle and poultry 2 pers. Goat/sheep 16 pers.	Cotton 16 pers.	1 pers.	nobody
Chimbay	20 pers.	Cotton 20 pers. Wheat 11 pers. Vegetable. 5 pers. Fruit 1 pers. Cattle and poultry 2 pers.	Cotton 20 pers.	1 pers.	20 pers.
Nukus	16 pers.	Wheat 12 pers. Watermelon/melons 3 pers. Fruits 2 pers.	Wheat 13 pers. Fodder crops 4 Watermelon 3	no	16 pers.
Karauzyak	15 pers.	Cotton 14 pers. Wheat 12 pers. Watermelon/melon 4 pers. Cattle 1 pers.	Cotton 10 pers. Wheat 5 pers.	no	15 pers.
Beruni	16 pers.	Cotton 16 pers. Watermelon/melon	Cotton 16 pers.		

1) Are you a *fermer*?
2) What did you produce in 2007?
3) What did you grow in the largest area of land in 2007?
4) Is cattle breeding more important than your farm work?
5) Are you a member of Fermer's Association?

Table 4.2.6 Characteristics of *Dehkans* Participated in the Workshops

District	*Tamarka*[1)]	Full time worker at *fermer*[2)]	Sales from *Tamarka*[3)]	Livestock sales[4)]	Family income source[5)]
Kungrad/Muynak	23 pers.	no	3 pers.		Pension Remittances Labor wages
Kanlikul	11 pers.	3 for full 3 for part time	8 pers.		***Tamarka*** **Livestock** Pension Labor wage *Fermer* wages
Kegeily	18 pers.	1 for full 1 for part time	7 pers.	9 pers.	Pension Labor wages Remittances *Fermer* wages
Chimbay	19 pers.	no	4 pers.	no	Labor wages Pension
Nukus	5 pers.	5 pers.	5 pers.	2 pers.	***Tamarka*** **Livestock** *Fermer* wages Labor wages
Karauzyak	19 pers.	2 for full	3 pers.	13 pers.	Labor wages Pension Remittances
Beruni	17 pers.	1 for full 11 for part time	17 pers.		**Cattle** Labor wages ***Tamarka*** Pension Remittance

1) Do you have *tamarka*?
2) Are you a permanent employee of *fermer*?
3) Did you sell products from your *tamarka* in 2007?
4) Did you sell livestock in 2007?
5) What is main income source in your family?

Table 4.2.7 Countermeasures Prioritized for *Fermers* in the Workshops

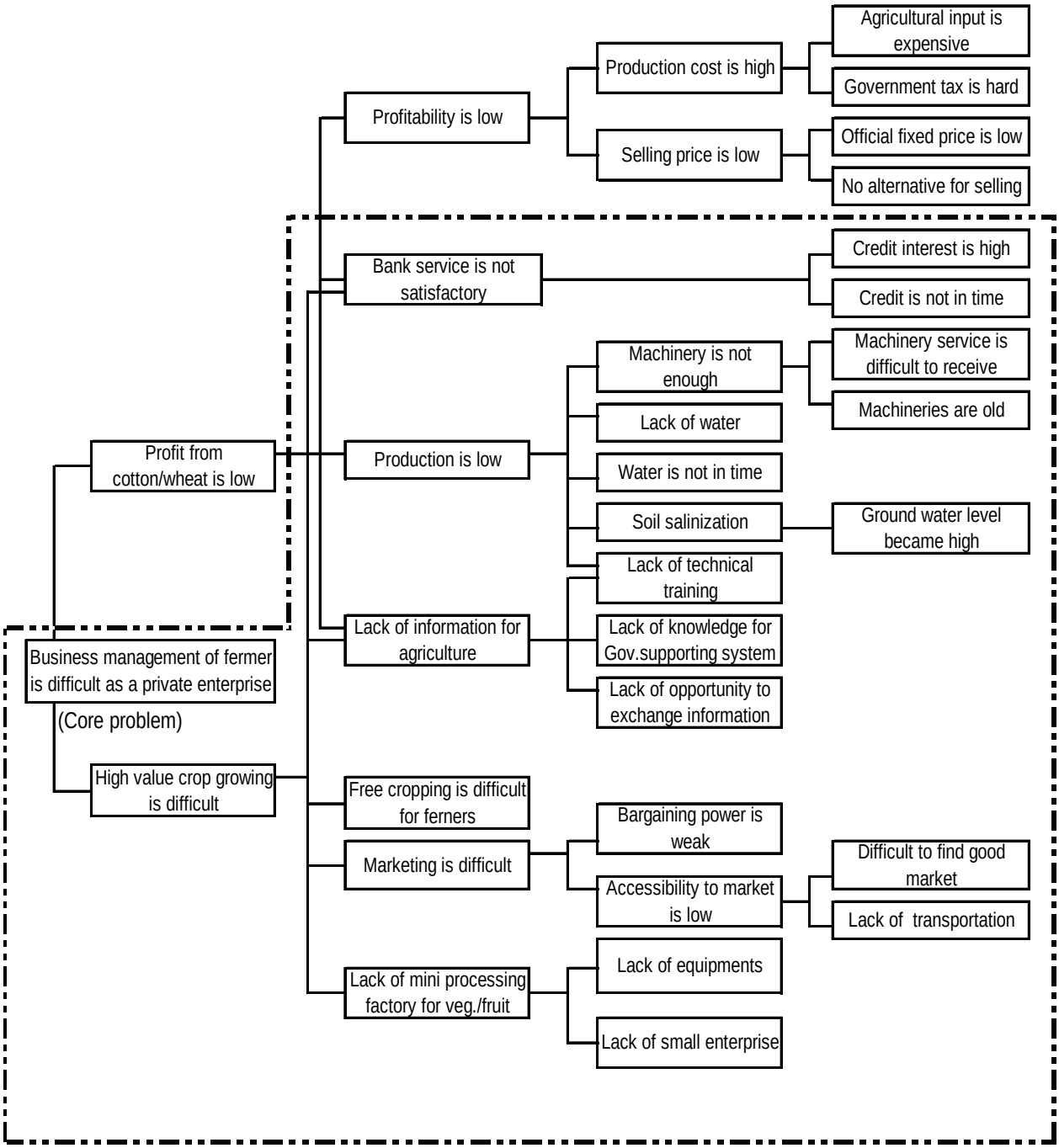
No.	Main problem	Countermeasures	Responsible person
Kungrad/Muynak			
1	Production inputs	• To find finance for water, fuel, fertilizer, machinery	*Fermer*
2	Selling price is low	• To get processing machinery • To find client • To provide with package	*Fermer*
3	Lack of machinery	• To take credit • To take lease	*Fermer*, *Hakimiyat*
Shumanay			
1	Lack of water	• To use water economically • To grow crops which need less water such	*Fermer*, WUA *Fermer*
2	Lack of agriculture inputs	• To get government subsidy • To take low interest credit	Government *Fermer*
3	No freedom for selling	• To sell surplus of harvest by *fermer*'s own price	Government
Kanlikul			
1	Lack of Machinery	• To rent machinery • To repair old machinery	*Fermer* *Fermer*
2	Lack of water	• To use water economically • To grow crops which need less water such • To clean canals	*Fermer* *Fermer* *Fermer*
3	Soil condition is bad	• To use manure • Crop rotation • To level land	*Fermer* *Fermer* *Fermer*
Kegeily			
1	Lack of water	No measure	
2	Fuel is expensive	• To buy at free price	*Fermer*
3	Fertilizer is expensive	• To use manure • To level land	*Fermer*
Chimbay			
1	Lack of water	• To economize water • To dig water canal • To grow crops which need less water • To establish drainage system	WUA *Fermer* WUA, *Fermer* *Fermer*
2	Insufficient irrigation and drainage system	• To use excavator and bulldozer • To clean water canals • To dig water canals	MTP, WUA Hydro-meliorative *Fermer*
3	Lack of fuel	• To ask government to make fuel cheaper • To use fuel economically	Government *Fermer*
Nukus			
1	Lack of water	No measure	
2	Selling price is low	No measure	
3	Lack of machinery	• To rent machinery	*Fermer*
Karauzyak			
1	Lack of water	• To clean canal • To grow crops which need less water such as sesame, maize, sorghum, gourds)	*Fermer* *Fermer*
2	Lack of machinery	• To buy old tractors and repair them • To rent machinery	*Fermer* *Fermer*
3	Lack of transport and processing machinery	• To processing home consumption • To sell raw product without processing	*Fermer* *Fermer*
Beruni			
1	Lack of water	• To clean canal • To grow crops which need less water such as sesame, maize, sorghum, gourds)	*Fermer* *Fermer*
2	Finance	• To use manure in the field • To use donkey cart • To use own machinery	*Fermer* *Fermer* *Fermer*
3	Selling price is low	No measure	

Table 4.2.8 Countermeasures Prioritized for *Dehkans* in the Workshops

No.	Main problem	Countermeasures	Responsible person
Kungrad/Muynak			
1	Soil salinity	• To clean collectors and drainages • Crop rotation • To level land • To apply organic manure	WUA *Dehkan* *Dehkan* *Dehkan*
2	Lack of agricultural machinery and fertilizer	• To use organic manure • To get credit (for long period and low interest rate) • To use lease	*Dehkan* *Dehkan* *Dehkan*
3	Difficult to sell	• To find clients • To buy mini-processing machinery for vegetables • To use middlemen service • To storage food	*Dehkan* *Dehkan* *Dehkan* *Dehkan*
Kanlikul			
1	Soil salinity	• To wash salinity • To apply organic manure • To grow alfalfa, maize	*Dehkan* *Dehkan* *Dehkan*
2	Lack of water	• To use hand pump	*Dehkan*
3	Increase of insects	• To apply insecticide • To make traps • To bring cats	*Dehkan* *Dehkan* *Dehkan*
Kegeily			
1	Lack of hand pump	No measure	
2	Lack of drinking water	• To ask water from neighbor • To take water from wells or canals	Family of *dehkan*
3	Lack of water for field	• To water with plastic bottles • To water plant from bottom • To dig well	Family of *dehkan* Family of *dehkan* Owner of land
Chimbay			
1	Lack of water	• To dig water canal • To economize water • To distribute water correctively • To grow crops which need less water	WUA, *Dehkan* WUA *Dehkan* Dehkan
2	Lack of drinking water	• To install pipelines • To dig well • To fix faucet • To use filter	Water distribut. office *Dehkan* *Dehkan* *Dehkan*
3	Soil salinity	• To dig and clean collectors • To wash soil • To use organic manure	WUA *Dehkan* *Dehkan*
Nukus			
1	Lack of water	No measure	
2	Soil salinity	No measure	
3	Lack of fertilizer	• To use organic manure • To grow crops which improve soil condition (alfalfa, maize) • To make land level high	*Dehkan* *Dehkan* *Dehkan*
Karauzyak			
1	Lack of water	• To dig well • To bring water by water carrier	*Dehkan* *Dehkan*
2	Soil salinity	• To wash soil • To dig soil(drainage) • To use organic manure	*Dehkan* *Dehkan* *Dehkan*
3	Insufficient drainage system	• To dig drainage canals • To dig wells and then bring water to field	*Dehkan* *Dehkan*
Beruni			
1	Lack of water	• To install taps • To dig wells and clean canals • To install pumps with hashar	*Dehkan* *Dehkan* *Dehkan*
2	Finance	• To work in foreign countries • To sell products (crops) in the market	Head of family
3	Unemployment	• To open small scale enterprise in the village	Head of family

Table 4.2.14 Countermeasures Proposed in the Workshops

No.	Main problem	Countermeasures	Responsible person
Group-1 (Beruni)			
1	Collection of water fee	• Coordination with *Hakimiyat* • To organize explanatory activities to farmers.	WUA WUA
2	Lack of machinery.	• To hire the ISD machinery • To take machinery by grant.	WUA
3	Lack of transportation	• To use the private transport. • Taxi.	WUA
Goup-2 (Nukus)			
1	Collection of water fee from member farmers	• Tax Department won't accept their report documents for those who don't pay water fee. • Issuing reference about paying fee • Preference credits will not be given to the farmers who don't pay water fee.	WUA WUA WUA
2	Fulfill the contract	• To take measures if someone uses the water without the agreement • Close relations with Inspection of Agricultural Unit of *Hakimiyat* (SPH)	WUA
3	Maintenance of canals	• To dig and clean the canals with manual power • To brisk up getting the fee from the *fermers*.	Farmer WUA
Group-3 (Chimbay)			
1	Farmers cannot pay water fee due to lack of money	• To take credits • To export the production • Investments	Farmer
2	Lack of water	• To use water economically • To get water saving technique in irrigation • To make the period of watering shorter • To clean internal canals	Farmer, WUA
3	Lack of machinery for canal maintenance	• To get payment from farmers in time • To take credits • To find foreign investments	Farmer
Group-4 (Karauzyak)			
1	Water measurement equipments.	• Purchasing,	WUA.
2	Shortage of machinery.	• To repair the machinery by own hand. • To search machinery for grant.	WUA.
3	Financial position of WUA is poor	• To activate the collection of membership. • To apply for grant.	WUA & Farmer.
Group-5 (Khodjeyli)			
1	Lack of water	• To dig the water canals • To repair the water facilities • To use water economically • To sow plants that don't need much water	ISD, WUA, Farmer ISD, farmer Farmer, *dehkan* Farmer, *dehkan*
2	Financial position of WUA is poor	• Improvement of bank operations • Financing WUA from the state budget • Timely payment of water charges • Increase the share of water charges compared to other farming inputs	Government, Bank Government Farmer, bank Government
3	Lack of machinery	• Receiving credits • Leasing of machinery	Farmer, WUA Farmer, WUA
Group-6 (Kanlikul)			
1	Lack of water	• To economize water • To plant crops which need little amount of water • To clean canals and collectors • To increase the number of livestock • To decrease the farmlands	WUA, Farmer Farmer, *Hakimiyat* WUA, Farmer Farmer, *Hakimiyat* *Hakimiyat*
2	Financial position of WUA is poor	• Financing WUA from the state budget • To get fees with the help of Tax Department	Government
3	The condition of water facilities is poor	• To get credits • To find sponsors • To get fee from dehkans • Financing WUA from the state budget	WUA, Farmer WUA, Farmer WUA Government



Note: indicate the target area of the study.

Fig. 4.2.5 Problem Tree of *Fermers* Based on the Workshop Results in the Study Area

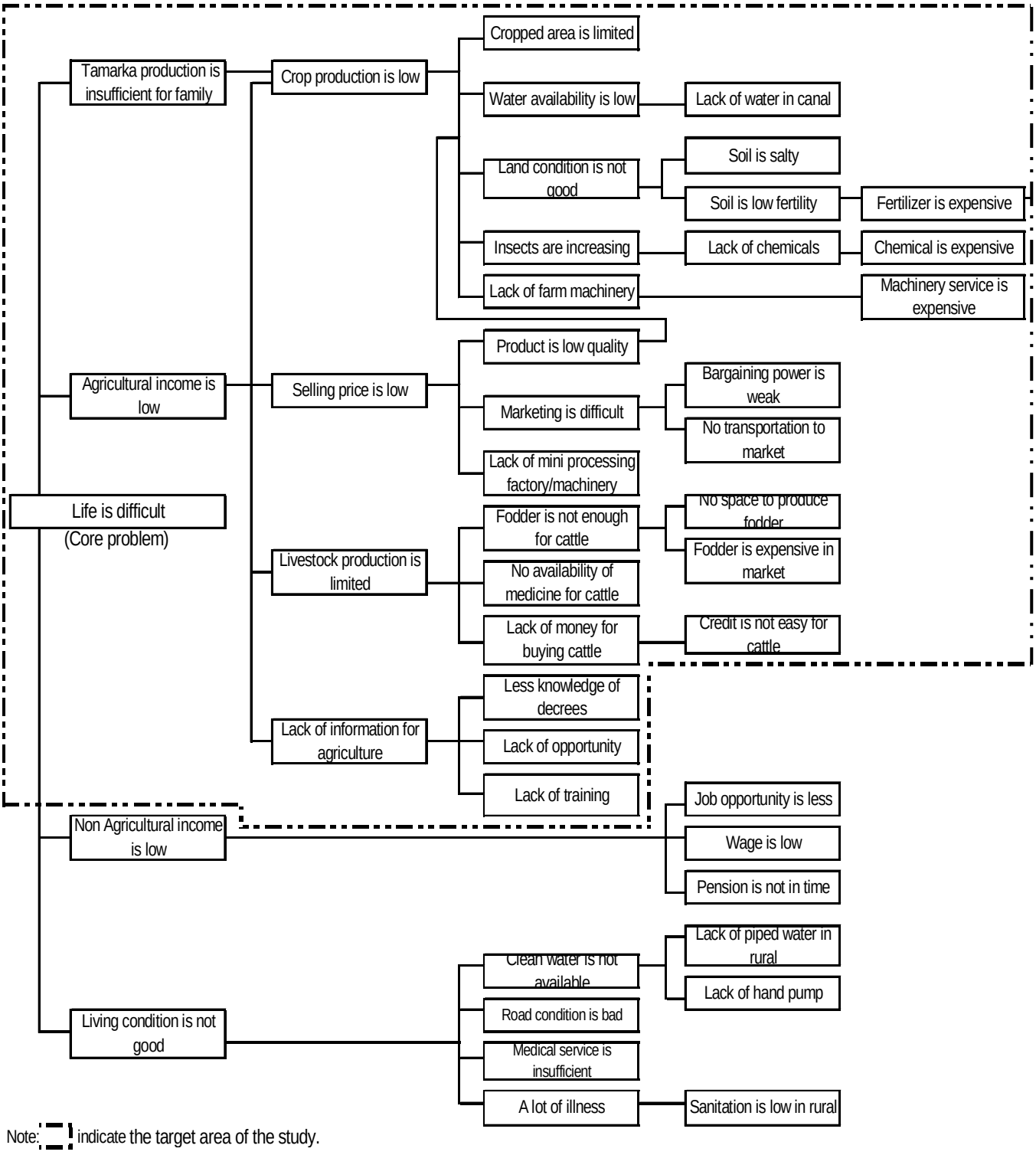


Fig. 4.2.6 Problems Tree of *Dehkans* Based on the Workshop Results in the Study Area

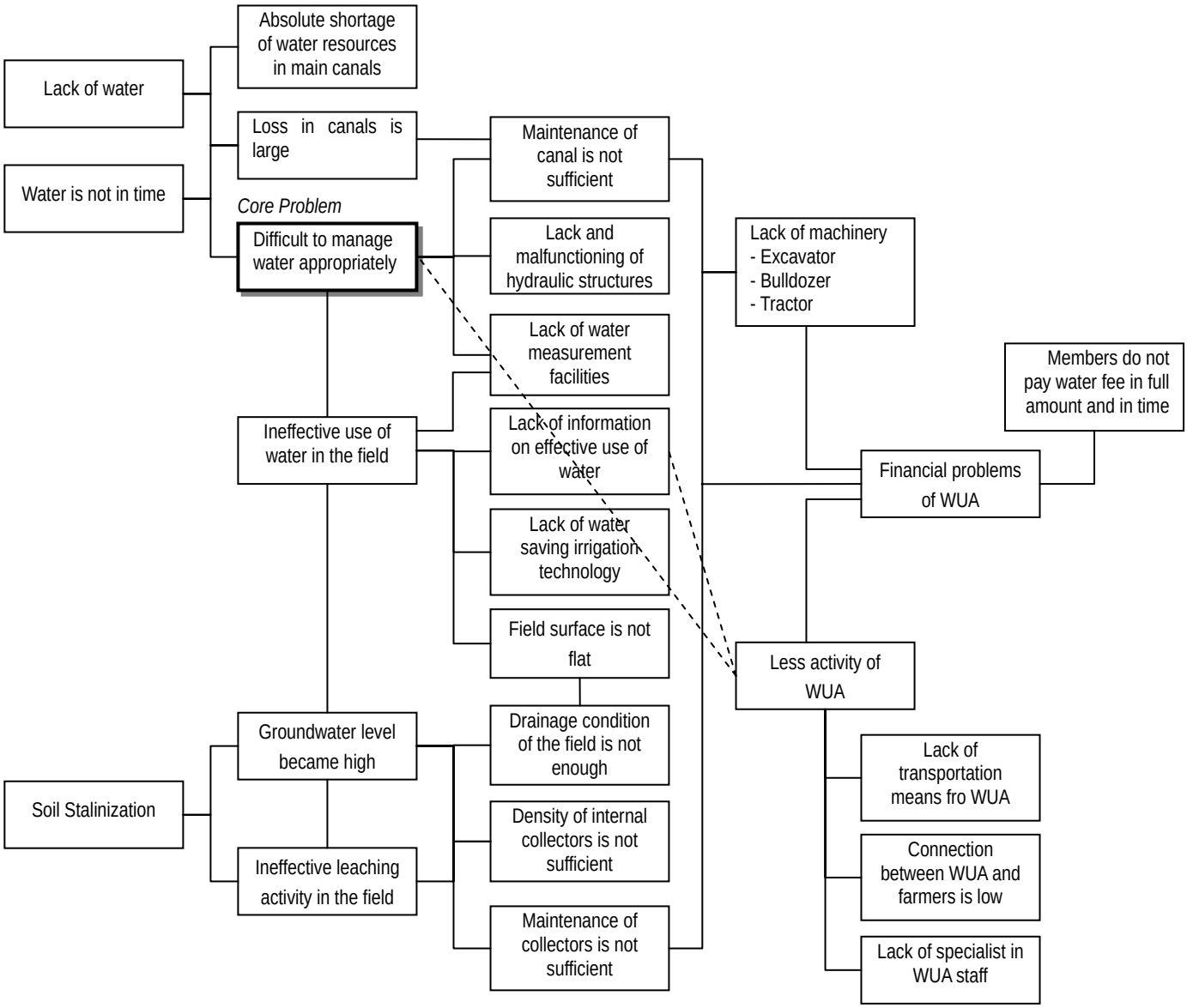
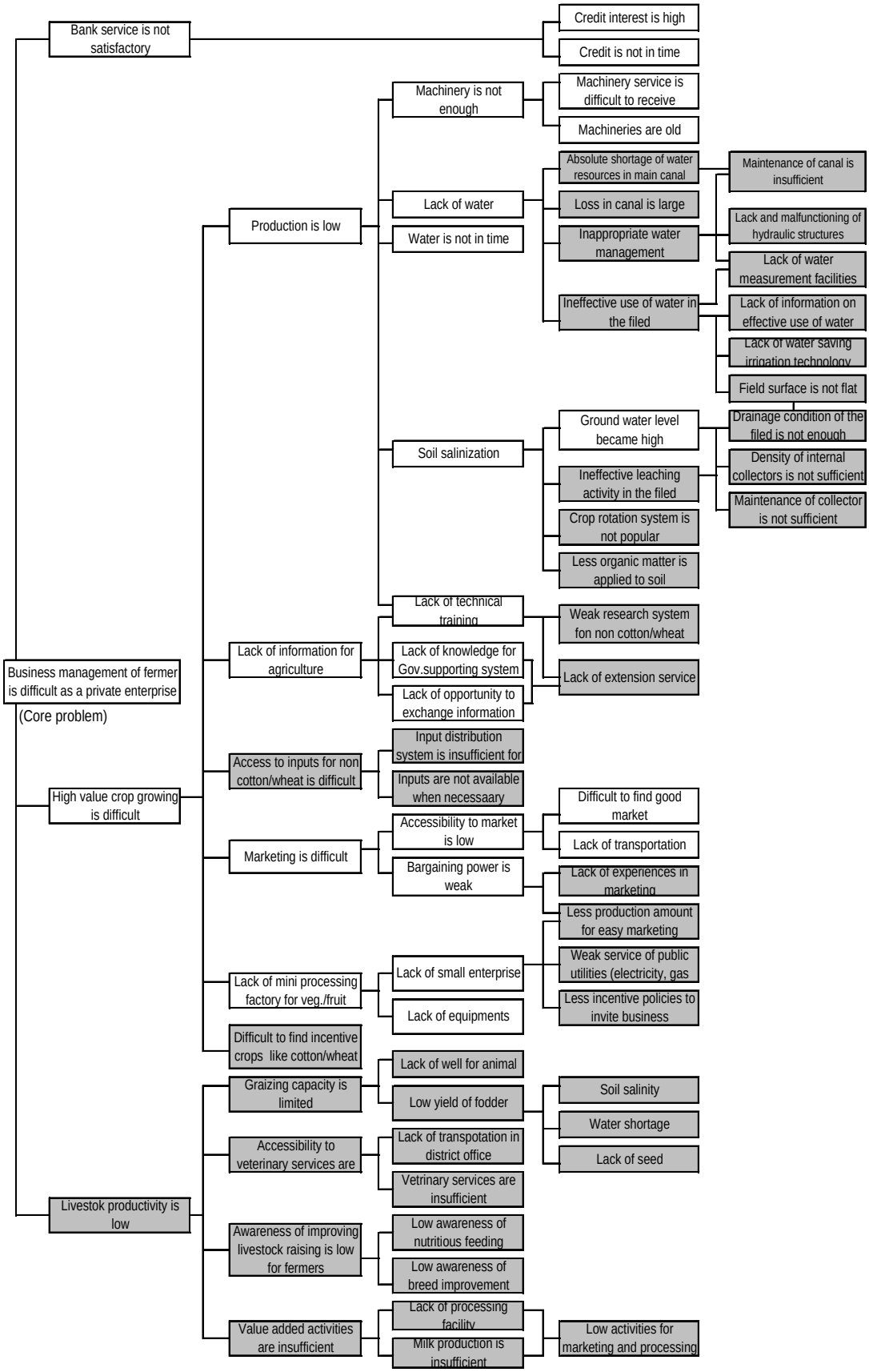
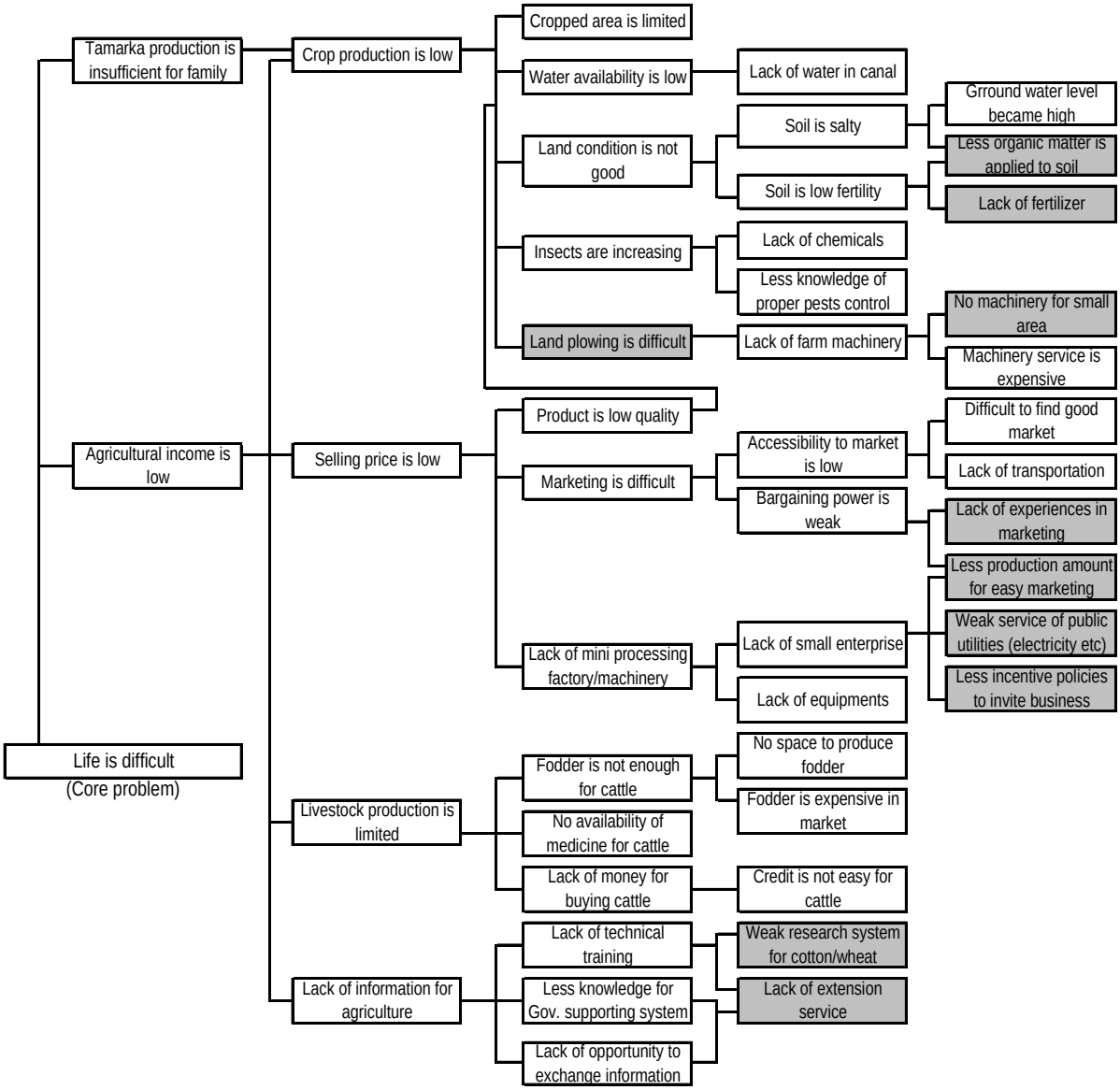


Fig. 4.2.7 Problem Tree of WUAs Water Management Activities



Note: Problem in the back shaded boxes are added by the Study Team

Fig. 4.3.1 Problems Tree of *Fermers* After Analyzing in the Study Area



Note: Problem in the back shaded boxes are added by the Study Team

Fig. 4.3.2 Problems Trees of *Dehkans* After Analyzing in the Study Area

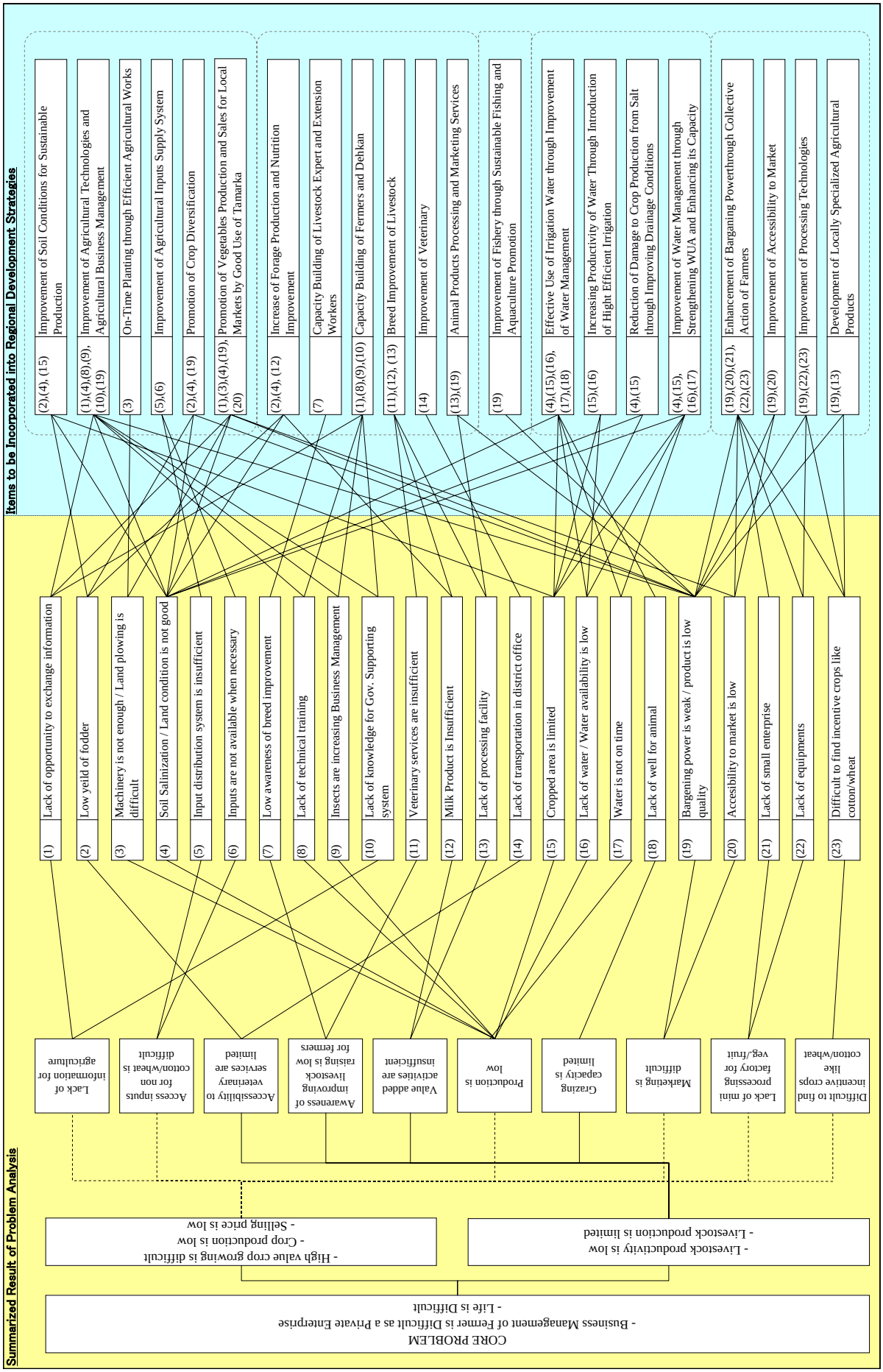


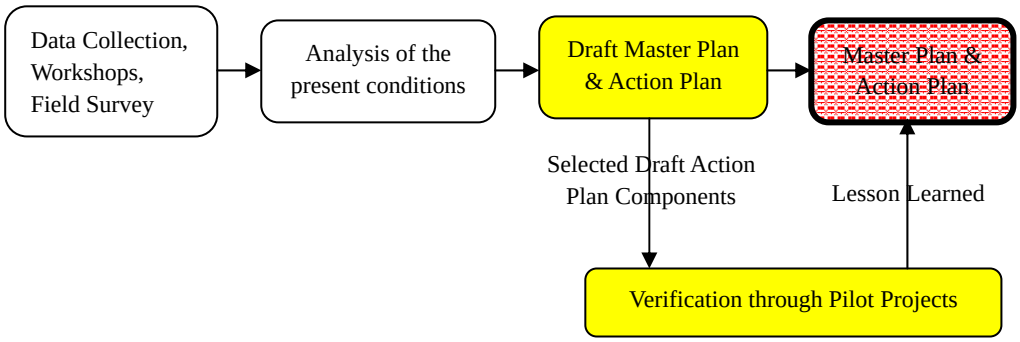
Fig. 4.4.1 Correspondence of Problem Analysis and Items to be Incorporated into the Regional Development Strategies

CHAPTER 5

STUDY ON THE REGIONAL DEVELOPMENT IN KARAKALPAKSTAN

5.1 Study on the Regional Development in Karakalpakstan

Based on the analysis of the present conditions, vision of the regional development and basic approach and development strategies of each sub-sector were studied together with activities required for the regional development. They are compiled as draft Regional Development Master Plan. In order to achieve the Master Plan, the draft Action Plan was prepared to implement the projects combined with the inter-subsectoral activities of the draft Master Plan. Procedure to formulate the final Regional Master Plan and Action Plan are shown in below:



After the verification study described hereinafter, the draft Master and Action Plans were finalized as Master Plan and Action Plan as described in Chapter 6 for further details.

5.2 Verification Study with Pilot Projects

In the Report, only summary of the Verification is presented. Pictures of the activities of each pilot projects are shown after the Study Area location map in front of the main text of the Report. More detailed descriptions is available in the Annex (Data Book) prepared separately.

5.2.1 Verification Study of the Preliminary Draft Action Plan

(1) Objectives of Pilot Project Implementation

The objectives of selecting and implementing Pilot Projects of the Verification Study are to identify various constraints and obstacles, as well as measures to overcome such difficulties and improve the function / effect of the activities through actual implementation of the activities of the Action Plan. Such findings from the implementation of Pilot Projects will be fed back to the Action Plan in order to formulate a more comprehensive and realizable Master Plan for Regional Development in Karakalpakstan.

(2) Preliminary Draft Action Plan and Candidate for Verification Study

Pilot Projects were selected among the following components of preliminary draft Action Plan. Detailed activities of each program are shown in Table 5.2.1 (page 5-41).

1) Market-oriented Agriculture

- Program for Soil Conservation and Improvement by Crop Rotation
- Program for Improvement of Agricultural Extension Service to *Fermer*

- Program for Promotion of Renewal of Agricultural Tractors
- Program for Improvement of Accessibility to Agricultural Inputs for Agricultural Producers
- Program for Research and Development of Melons and Apple
- Program for the Strengthening of Women's Vegetable Production in *Tamarka*

2) Integrated Farm Management by Fodder Production and Animal Breeding

- Program for Fodder Production and Promotion of Livestock
- Program for Training on Animal Husbandry
- Program for Artificial Insemination and Veterinary Services

3) Development of Fisheries and Aquaculture

- Program for Sustainable Fishery Promotion
- Program for Aquaculture Development

4) Improvement of Irrigation Water Use Efficiency and Reducing Crop Damage by Senility

- Program for Improving Internal Canal System
- Program for Strengthening Water Management in the Field
- Program for Introducing Water Saving Technology
- Program for Improving Drainage Conditions in the Field
- Program for Strengthening WUA and Enhancing its Activity

5) Distribution and Marketing by Farmers Cooperatives

- Program for Joint Marketing by Farmer Group (Model Agro-firm Establishment)
- Program for Improvement of Marketing Support Infrastructure
- Program for Small-scale Slaughterhouse

6) Value Adding of Agricultural and Livestock Products

- Program for Improvement on Small-scale Agro-processing Technologies
- Program for Improvement of Food Safety Technologies

7) Institutional Capacity Development for the Supporting Farmers

- Program for Enhancement of Communication for Local Agriculture Administration
- Program for Reinforcement of VCC Coordinating Abilities

5.2.2 Selection of Pilot Project

(1) Criteria for Activities to be Verified through Pilot Projects

Prior to the preparation of candidate Pilot Projects, each activity of the Action Plan was examined and the items which should be verified were identified. Based on the importance and whether such items can be verified through the Pilot Project schemes, activities to be implemented in the Pilot Projects were selected for the formulation of Candidate Pilot Projects.

Taking into regard the general features and limitations of Pilot Projects/Schemes, the criteria to select activities for the Candidate Pilot Projects were set as follows:

1) Items that can be verified within the time span of Pilot Projects
2) Items that require actual implementation of activities to verify its appropriate function / effect
3) Items that can be verified through implementation of activities in relevantly small scales
4) Activities that do not require institutional reforms

(2) Selection of Pilot Projects to the Verification Study

Based on the above criteria, the following 9 projects were selected as candidate of Verification Studies (Table 5.2.1, page 5-41).

1) Development of On-farm Technical Manual for *Fermer*
2) Trial for Development of Melons and Potential Crops Cultivation
3) Pilot project for the promotion of Women's Vegetable Production in *Tamarka*
4) Dairy Promotion Package Project
5) Improvement of Canal System and Water Management by WUA
6) Improvement of Water Use and Drainage Condition in the Field
7) Model Agro-firm Establishment
8) Improvement of Small-scale Agro-Processing Technologies - Milk Processing
9) Improvement of Small-scale Agro-Processing Technologies - Vegetable and Fruit Processing

These were further merged in accordance to their project site to formulate the following 6 Pilot Projects.

1) Development of On-farm Technical Manual for *Fermer*
2) Trial for Development of Melons and Potential Crops Cultivation
3) Promotion of Women's Vegetable Production in *Tamarka*
4) Dairy Promotion Package Project (including small-scale milk processing)
5) Improving Water Management in Internal Canal System and Water Use
6) Model Agro-firm Establishment (including small-scale vegetable and fruit processing)

5.2.3 Implementation Plan of the Pilot Project

(1) Implementation Schedule and Institutions

1) Implementation Schedule

6 Pilot Projects for the Verification Study were implemented 2 years starting in March 2009 to October 2010. Their implementation schedules are shown in Table 5.2.2 (page 5-44).

2) Institutional Arrangement

In order to verify the implementation and management capacity of the Master Plan, the Study Team made contracts with local institutions/organizations to monitor the Pilot Project based on the regulations and procedures of the JICA.

(2) Implementation Status of State Environmental Examination

As indicated in section 2.12.2, the State Committee for Nature Protection (SCNP) of the Republic of Karakalpakstan has provided authorization to all Pilot Projects requiring State Environmental Examination. The comments given by SCNP are summarized in the following table. These results conclude that there are no significant issues for the Pilot Projects under the Environmental Legislation of Karakalpakstan.

Table 5.2.3 Summary of Comments Given by the SCNP

Verification of Improving Internal Canal System and Water Management by WUA*	In process of the rehabilitation work the different type of machinery usages will be expected so the potential environmental impact related to construction. - Engine emissions (diesel fuel, gasoline) - Excavation materials (amounts of sediment from canals) - Construction materials (cement dust and others) Project formulation, location, design, implementation, and operation will have no substantial negative environmental impacts. The findings of Environmental Examinations are that a follow-up Environmental Impact Assessment or further detailed environmental impact study is not required. The Project area is not considered environmentally sensitive, and adverse environmental impacts will be minor.

Verification of Improving Water Use and Drainage Condition in the Field*	Expected impacts are: - Engine emissions (diesel fuel, gasoline) - Construction materials (cement dust and others) Estimation of environment condition revealed that impact level on air, surface water, soil, animals and plants is insignificant.
Small-scale Milk Processing component of Diary Promotion Package	With the proper maintaining of all processing equipments and absolute management for the process of reception and storage of raw materials insignificant waste will be formed which can be removed to the special dumping place. Thus, initial Environment Examination shows that by operation small scale milk processing plant there will be no significant adverse environmental impacts to the air, soil, irrigation water, as well as to the fauna and flora at the area. The findings and assessment of the initial Environment Examination for the Pilot Project for Improvement on small-scale agro-processing technologies in VCC Kerder, illustrate that the expected milk processing plant can be function on the selected area on the assumption of necessary utilization measures.
Small-scale vegetable & fruit processing component of Model Agro-firm Establishment	Majority of wastewater and solid waste is formed in the process of cleaning, rinsing, sorting, inter workshop transportation, peeling vegetables and fruits, blanching, conserving in hermetic package, mixing, cooking, as well as during production room cleaning process. Emission to the atmosphere is low. However, in some cases, it is possible to produce some strong odor. Maintenance of equipment shall be in appropriate manners in order to minimize the amount and effect of waste, which shall be temporarily stored before it is sent to the disposal site. Assessment of natural environment conditions indicated that the impact of vegetable and fruit processing workshop to the atmosphere, soil, surface water, fauna and flora will be insignificant, with premise that the above measures are taken.

* "Verification of Improving Internal Canal System and Water Management by WUA" and "Verification of Improving Water Use and Drainage Condition in the Field" were merged into a single Pilot Project for Improving water management in internal canal system and water use in the field), taking into regard that they are implemented in the same project site.

5.3 Implementation of Pilot Projects

In the Report, only summary of the Verification is presented. Pictures of the activities of each pilot projects are shown after the Study Area location map in front of the main text of the Report. More detailed descriptions is available in the Annex (Data Book) prepared separately.

5.3.1 Development of On-farm Technical Manual for *Fermer*

(1) Objectives

A technical manual for practical use in the field will be prepared based on technical information from / discussions with the Scientific Center for Agriculture in Karakalpakstan, Nukus Branch of Tashkent State University of Agriculture, and Agriculture College, with the MAWR of Karakalpakstan working as the secretariat. The selection of target crops for the manual was finalized taking into regard the needs of farmers (excluding wheat and cotton).

(2) Items to be Verified

1) Coordination system to ensure a smooth implementation of joint works to develop the manual by concerned agencies
2) Validity of training to teachers of district agricultural collages to deepen their understanding of the manual and to refresh their teaching ability
3) Appropriate technical level of the manual to *fermers*

(3) Activities and Outcomes

1) Set up Inter-agency Working Committee

The Deputy Minister of Agriculture and Water Resources of Karakalpakstan appointed the persons

from concerned agencies to the members of inter-agency working committee to develop the manual in the first editorial meeting on March 18th, 2009.

2) Organize Editorial Meetings of the Manual

The members of inter-agency working committee and other personnel concerned gathered seven times for preparation of a draft manual. The date and major topics discussed are shown below.

No	Date	Major Subjects Discussed
1	Mar. 18, 09	Inauguration of the inter-agency working committee and work schedule
2	Apr. 5, 09	Chapters of the Manual
3	Apr. 15, 09	Contents of the chapters and nomination of the draft writers
4	June 23, 09	Progress of the draft making
5	July 30, 09	Progress of the draft making and editing the draft
6	Oct. 1, 09	Confirmation of the final draft and preparation of agri-college teachers' training
7	Oct. 5, 09	Confirmation of printing schedule and preparation of agri-college teachers' training

3) Prepare Manuscripts of the Manual

Manuscript preparation work started from May 1st, 2009, and all writers submitted their first manuscripts by the third week of August, 2009.

4) Edit the Manual

Contents of the manuscripts were carefully examined by members of the inter-agency working committee. The contents were also checked by third-party scientists. The final draft was approved by the inter-agency working committee on October 1st, 2009.

5) Print and Bind the Manual

Immediately after internal procedures of MAWR of Karakalpakstan, the work had proceeded to the printing and binding process. The manual was completed and delivered from a printing company on December 28th, 2009. An official receipt of the manual was issued by MAWR of Karakalpakstan on March 26th, 2010 after confirming the delivery of the manual to the concerned districts for distribution to *fermers*.

6) Train Teachers of District Agricultural Colleges

A five-days training was held to make teachers of district agricultural colleges familiar with the developed manual. The teachers were expected to have an opportunity to train *fermers* with the manual in the following annual *fermer* training seminars. MAWR of Karakalpakstan and the contractor worked on preparation of the teacher's training. After the training, trainees were requested to fill-in a simple questionnaire for the evaluation.

- Period: February 9 – 13, 2010
- Venue: Nukus Agricultural College
- Topic: Cultivation of vegetables and gourds in Karakalpakstan
- Trainees: 23 teachers from 11 districts
- Trainers: 7 persons (officials of MAWR of Karakalpakstan, University professor, Private farm owner, etc.)

7) Give Lectures in *Fermer* Training Seminars

Annual *fermer* training seminars at district level held by the Council of Ministers of Karakalpakstan were scaled down this year due to budgetary constraint. A simple field-day was organized by each district office (*Hakimiyat*) before major planting season, instead of the seminars. Therefore, the trained teachers could not have an opportunity to show results of the training in the seminars.

8) Evaluation

The Study Team evaluated the verification items of the pilot project after completion of the training to district agricultural college teachers and delivery of the manual to *fermers*.

<Evaluation Results>

Smooth implementation of joint works to develop the manual by concerned agencies

There is no big problem or trouble during the implementation so far. All works to prepare the manual and the training of district agricultural college teachers were carried out accordingly under supervision of the inter-agency working committee. Editorial meetings of the inter-agency working committee were organized timely with the leadership of MAWR of Karakalpakstan and the contractor who has been hired by the Study Team to facilitate this pilot project. The minutes of meetings were also taken every time after the meetings.

Validity of training to teachers of district agricultural colleges

The participated teachers were satisfied with the training and all participants understood almost 100% of the contents of the manual according to their self-evaluation. They also evaluated that technical level of the manual was acceptable to general *fermers* in Karakalpakstan. All participants were confident that they can teach the contents of the manual to *fermers*, except the subject of eggplant growing. The followings are suggestions made by the participants.

- This kind of seminar should be held at district level, since introduced technology in the manual is useful in the condition of Karakalpakstan
- Contents of the training should be modified in accordance with the local condition of each district. The condition of the northern districts is particularly different from other districts
- A new training method experienced in foreign countries shall be applied

Appropriate technical level of the manual to fermers

Fermer's self-evaluation result about understanding the manual showed higher score (Very well or fair) in all subjects of the manual. Relatively higher educational background of *fermers* could contribute the result. While there was a certain percentage of *fermers* who did not read the contents for every subject, many *fermers* read only selective subjects based on their own interest. Degree of understanding could be influenced by the *fermer's* interest.

More than 50% of *fermers* found new technologies/ideas "Very much" or "Much" in every subject of the manual. Also, more than 50% of *fermers* answered that technologies described in the manual were "Very much" or "Much" useful/applicable except for the subjects of "Advantage of using mulch for vegetables" and "How to grow Onion". The subject which *fermers* were interested in the most is "How to grow Potato". This year's government potato promotion campaign must have a great influence on the result. Subjects on popular crops among Karakalpakstan *fermers*, i.e. tomato, melon and water-melon, had a higher score of *fermer's* interest.

Many *fermers* were asking to introduce more advanced technology, academic information and scientific data, as well as they were asking to introduce simpler and more applicable technologies to the local condition. They are anxious to have much information from the manual. Many *fermers* also commented that the manual should be written with easier terminology understandable to *fermers* and be attached more pictures, drawings, figures, tables, etc. for easy understanding. Though the manual was prepared on visually oriented principle for easy understanding, many *fermers* actually demanded easier description and editing. Many *fermers* appreciated that the manual was written in Karakalpak, since this is the first full-scale technical manual on agriculture written in the local language.

Other *fermer's* comments were dominated by positive one, e.g. "They want to apply the introduced technology to their actual farming", "They want to have the similar manual on other topics, such as pests and diseases control, wheat and cotton, livestock, etc. based on their interest".

(4) Problems and Issues encountered during Implementation

The only problem was that annual *fermer* training seminars at district level held by the Council of Ministers of Karakalpakstan had scaled down this year due to budgetary constraint. This pilot project expected that the seminars could be a good occasion to disseminate the contents of the manual to *fermers* through trained district agricultural college teachers. If the annual seminars were carried out as usual, more contents of the manual could be effectively disseminated among *fermers*.

(5) Evaluation

1) Items to be Verified by the Pilot Project

Coordination system to ensure a smooth implementation of joint works to develop the manual by concerned agencies

The inter-agency working group functions without big trouble. All works were smoothly carried out under the leadership of MAWR of Karakalpakstan. The Ministry is capable of managing the coordination system to develop an agricultural technical manual.

Validity of training to teachers of district agricultural colleges to deepen their understanding of the manual and to refresh their teaching ability

All participated teachers have understood the contents of the manual almost 100% according to their self-evaluation and they are confident to teach the contents to *fermers* after the training, except one subject of growing eggplant. It is concluded that the training is very effective in enhancing the teachers' ability, so that they will be ready to play a role in teaching the contents to *fermers*.

Appropriate technical level of the manual to fermers

The result of questionnaire survey to *fermers* implies that the manual was prepared according to *fermers'* technical ability. The trained district agricultural college teachers also evaluated that technical level of the manual was acceptable to general *fermers* in Karakalpakstan. However, the manual will be edited in easier style, since many *fermers* commented that the manual should be written with easier terminology understandable to *fermers* and be attached more pictures, drawings, figures, tables, etc. for easy understanding.

2) Evaluation at Viewpoints of DAC Criteria

Criteria	Evaluation
Relevance (A)	The Government of Uzbekistan has organized annual *fermer* training seminars at district level during off-agriculture season, though the seminars were scaled down this year due to budgetary constraint. The seminars basically cover all *fermers* every year. Since low technical ability of *fermers* is one of the reasons of low productivity of agriculture, the Government is seriously concerned with improvement of *fermers*' technical level. Especially, transition from cooperative farming system to individual *fermer* system has spotlighted the importance of each individual *fermers'* technical ability. The project approach to address the issue of *fermers*' ability is relevant to the Government concern. In order to realize the Master Plan's basic policy, i.e. "Development of Market Oriented Agriculture on Sustainable Basis", it is desirable to promote crop diversification rather than concentration on cotton and wheat production. Improvement of *fermers*' technical level is indispensable to promote the crop diversification, as well.
Effectiveness (A)	This pilot project has clear objective aiming at improving *fermers*' technical level in the target area through providing not only the developed technical manual in Karakalpak language but also lectures given by trained agricultural college teachers in the annual *fermer* training seminars. Synergistic effect of the both inputs could lead effective dissemination of farming technology in the manual among *fermers*.
Efficiency (B)	Since agencies concerned to the implementation of the pilot project are also working for the annual *fermer* training seminars, it is expected that the agencies could share the *fermers*' needs and could make necessary coordination arrangements without big trouble. Full utilization of the existing implementation system of the annual *fermer* training

	seminars could contribute to the efficient implementation. Also, Karakalpak language used in the manual could lead *fermers* to smooth understanding of the contents. The developed manual is the first coherence technical manual of agriculture written in Karakalpak language.
Impact (B)	It is expected that agricultural productivity will increase in the target area through improvement of *fermers*' technical level. In addition, the agricultural extension system confirmed by the pilot project could be developed to a nationwide system.
Sustainability (B)	The Government of Uzbekistan has organized the annual *fermer* training seminars. The pilot project implies that *fermers* could be given more effective training in the seminars with a minimal additional budget. However, the seminars were scaled down this year due to budgetary constraint. This fact suggests a gloomy prospect of the effective implementation of the project on sustainable basis. Once the manual was distributed to *fermers*, they could refer it whenever they need it. Since a technical manual targeting *fermers*, especially written in the local language, is not well developed in Karakalpakstan, the distribution of the manual could contribute to sustainable improvement of *fermer's* technical ability.

Notes; A: Confirmed, B: to be expected, C: Needs more efforts

(6) Lessons Learned

An applicable on-firm technical manual targeting *fermers* can be developed by local human resources in Karakalpakstan, if the Government appropriates a necessary budget for the project.

Trained district agricultural college teachers might be valuable resources for activating agricultural extension, if they are strategically mobilized for the extension by the Government. Since every district has an agricultural college in general, the college, in cooperation with MAWR of Karakalpakstan, can be a window of the agricultural extension to *fermers*.

5.3.2 Trial for Development of Melons and Potential Crops Cultivation

(1) Objectives

Production technologies for development of melons and dissemination of the technologies to Agro-firms are examined. Some crops other than melon and gourd which are going to be introduced to Agro-firms as a potential crop will also be produced for trial.

Objectives of the pilot project are to verify priority technologies which need to be researched and possibility of technical extension to Agro-firms by researchers of the Scientific Centre for Agriculture in Karakalpakstan.

(2) Items to be Verified

1) Priority production technologies to be researched and developed for promotion of melons
2) Adaptability of the potential crops for local conditions
3) Possible extension approach to bridge research institute and the Agro-firm for promotion of melon

(3) Activities and Outcomes

1) Trial Cultivation in Experimental Field

About 1 ha of land on the premises of experimental field of Karakalpak Branch of Uzbek Scientific Research Institute for Rice was allocated for the trial cultivation in 2009 and 2010.

Trial of raising seedling for open field cultivation of melon

The seeds sown in a nursery under a plastic tunnel in the middle or late April germinated and grow well in both of 2009 and 2010. Although there was a minor difficulty to acclimate the seedlings to

open condition, the seedlings grew without big problems after transplanting. The harvesting time and the yield was not big different from the general cultivation, direct sowing, in the both years.

Trial of raising seedling plus forcing cultivation for early harvesting of melon

Seeding in seedling pots under a plastic tunnel was made in the middle of April, 2010. The seedlings were transplanted under a plastic tunnel in the main field in the early May. Some plots were covered transparent plastic mulch with tunnel. The melon transplanted to the main field grew without serious trouble. The melon was harvested about half a month earlier in comparison with the control cultivation. The yield was slightly higher than the control.

Trail of direct sowing with tunnel and plastic mulch for early harvesting of melon

The trial was made in two cases, tunnel with black plastic mulch and only tunnel, in 2009 and three cases, tunnel with transparent plastic mulch, only tunnel and only transparent plastic mulch, in 2010. The melon seeded in the early or middle of April was harvested about 10 days earlier in comparison with the control cultivation. The yield was higher than the control cultivation in the both years.

Comparison of mulch materials for melon

A trial was made to confirm effectiveness of four (4) mulching materials, i.e. black plastic film, wheat straw, rice husk and wood chips, for melon cultivation in 2009. There was no difference in harvest time between the control cultivation (no mulch) and the four kinds of mulching cultivations. The productions of all mulching cultivations were lower than the control cultivation.

Comparison of application dose of fertilizer for melon

A trial was made to confirm applicability of fertilizer standards of Karakalpakstan. The three different fertilizer dosages, the standard, high and low dosage, were applied to three varieties from different origins in 2009. It was observed that the higher dosage is the higher production for all varieties, while the sugar contents showed the reverse result.

Trial of melon varieties

A trial was made to confirm and compare adoptability of seven melon varieties to the northern Karakalpakstan in 2009. All varieties grew well without serious trouble.

Trial of plant protection of melon

A trial was made to compare four different plant protection technologies for insects control; usual chemicals, biological, mixed (usual chemical and biological) and net, for melon in 2010. The production under the biological plant protection method was lower than those under other protection methods, usual chemicals, mixed and net. There was no clear difference of production among the three methods.

Trial of simple irrigation technology to melon

A trial was made to examine effectiveness of simple irrigation technology using plastic bottles in 2010. Plastic bottles which had small holes in the bottom were set near each plant. The water was poured once in every 3 or 4 days. Water poured into the bottles flowed out from the holes in the bottom to surface of soil. The irrigation technology showed lower water requirement and almost equal production of the melons. However, the technology required much works to pour water.

Trial of optimum sowing timing for raising melon seedling

Seeding was made once a week from the late March to the late April. All seeds were sown in seedling pots and raised in a tunnel. The germination and growth were observed. All seeds, except seeds sown in the late March, germinated and grew well. The early April was the earliest sowing timing for raising seedlings of melon under a tunnel in 2010.

Cultivation of potential crops

A trial was made to confirm possibility to grow several crops in the northern Karakalpakstan in 2009 and 2010. Several crops, e. g. okra, patisson, haricot, eggplant (new variety) could grow well.

2) Demonstration Cultivation in Farmer's Field

About 0.2 ha of land on farmer's field in Taqirkol VCC, Nukus District was allocated for the demonstration cultivation in 2010. Cultivation of four varieties of melon by using four kinds of cultivation methods, combinations of tunnel and transparent vinyl mulch, were demonstrated. Melon of the four varieties in four kinds of the methods grew well without troubles. According to the farmer's impression, using tunnel and mulch was not so difficult technologies and acceptable for the farmer. The farmer expects continuing to use these technologies and seeding in much earlier season for early harvest. However, these technologies are suitable for small scale cultivation, since these technologies require more labor works and initial costs. Furthermore, neighbors and people on the road could see the cultivation and were interested in it. Therefore, it is suggested that the technologies are acceptable for the farmer and the demonstration is effective on extension of cultivation technologies.

3) Field-Day

Twice of field-day in a year were held in order to share information of the trial and demonstration cultivation among the farmers and researchers concerned. Member of the Agro-firm in Taqirkol VCC, Nukus District were main target group of the field-days. The participants observed the trial and demonstration fields and asked questions. The researchers explained the trial and demonstration cultivation and answered the questions. The participants were satisfied with the field-days and they got some information. It is suggested that the field-day was effective to show results of trials as a part of agricultural extension activities and good opportunity for researchers and farmers to exchange information.

(4) Problems and Issues Encountered during Implementation

1) Unreliable Irrigation

Although an irrigation pump and a water storage tank were set up near the trial field, availability of irrigation water was the problem throughout the cultivation period in 2009. There was no serious problem on irrigation in 2010, since the trial plot was shifted to other place where is more accessible to irrigation water.

2) Tough Natural Conditions, Especially during the Early Stage of Growing

The ambient temperature is still not enough and not stable for planting in the northern Karakalpakstan until the late April. A strong wind, soil crust after rain or watering to soil surface and rodent damage were also problems on cultivation.

3) Unfamiliarity with Intensive Farming

Agriculture in Karakalpakstan has been developed with a policy to promote large scale farming with mechanization. Under this circumstance, researchers and field workers engaged in the trial were not familiar with intensive farming technology. Input materials applicable to intensive farming were also not popular in Karakalpakstan.

(5) Evaluation

1) Items to be Verified by the Pilot Project

Priority Production Technologies to be Researched and Developed for Promotion of Melons

Results of the trial and demonstration cultivation imply possibilities of forcing melons under a plastic tunnel for early harvest, raising seedlings to mitigate damages during the early stage of

growth and new varieties to be introduced to Karakalpakstan. On the other hand, the results imply a new burden (additional field work and material costs) of introduced technologies to farmers and other technical points to be improved for application at farmer level.

As far as the trial implies, melon flies were not a critical issue at present in the trial and demonstration field in Nukus District. Although the improvement of plant protection technology against melon flies might have low priority, the results imply effectiveness of net against melon flies and possibility of combination of chemical and biological plant protection for melons.

Adaptability of the Potential Crops for Local Conditions

The trial proved that several crops, e.g. okra, patisson, haricot, eggplant (a new variety), could grow well in Karakalpakstan. It is recommended that potential crops are going to be examined in further trials and research including accessibility to seeds, demand and economical aspects.

Possible Extension Approach to Bridge a Research Institute and the Agro-firm for Promotion of Melons

Active involvement of Agro-firm in Nukus District in the extension approach was expected from 2009 in the original plan. However, the Agro-firm had been struggling against complicated issues before launching into their expected activity. The situation of the Agro-firm became better in 2010 and the members were invited to the both field-days in 2010. In addition, the demonstration cultivation gave interest to the members. As a result, the members and researchers exchanged information each other through the demonstration cultivation and field-days. It implies that the extension approach has possibility to bridge the research institute and the Agro-firm.

2) Evaluation at Viewpoints of DAC Criteria

Criteria	Evaluation
Relevance (A)	Government of Karakalpakstan is promoting crop diversification in addition to the promotion of cotton and wheat, in order to advance profitable and steady farming. The pilot project is relevant to the Government policy, since it aims at developing cultivation technology to cope with the diversification. Especially, melons are suitable for growing under the local environment, heat and dry, and used to be famous agricultural products in Karakalpakstan. Recovery of the famous product must be a common need of farmers in Karakalpakstan.
Effectiveness (B)	The trial and demonstration cultivations showed positive results about possible technologies to be researched and developed for promotion of melon in the future, e.g. forcing melons by using a tunnel and raising seedlings. Though they must be modified to the applicable technologies through further research works, they could be effective basic technologies for improving melon production in Karakalpakstan. Promotion of exchanging information among farmers and researchers was started by the demonstration cultivation and field-days. This approach may have effectiveness for agricultural extension.
Efficiency (A)	It is concluded that activities of the pilot project was efficiently carried out without serious trouble with following reasons. a) Experienced researchers and field workers Researchers and field workers engaged in the cultivation showed good discipline and performance. They could adopt themselves to new cultivation technologies and systems. They also properly handled and utilized provided inputs and equipment. b) Utilization of the existing facilities and equipment The Karakalpak Branch of Uzbek Scientific Research Institute for Rice allocated a part of its experimental field for the trial that was properly managed and maintained. Additional arrangements for developing the plots were not necessary. Tractors and other necessary equipment provided from the institute were in working condition, though they were very old. c) Advanced and experienced farmer The farmer who provided and managed the demonstration field showed good performance and contribution. The farmer positively tried the new cultivation technologies and effectively handled the inputs.

Impact (A)	Some farmers who observed the demonstration cultivation were interested in the technologies, especially forcing cultivation by using a tunnel, and expected to apply them to their cultivation next year. It shows that activities of the pilot project gave positive impact to the farmers. If the research works will be continued as a government project under its long-term agricultural development policy and the developed technologies will be disseminated to farmers, they could have a substantial impact upon the advancement of profitable and steady farming in Karakalpakstan.
Sustainability (A)	Through the pilot project, it was confirmed that there were still capable human sources to carry out the expected research and extension works in Karakalpakstan. There are also necessary facilities and equipment in working condition in the research institute. This condition provides a base of sustainable development of agricultural research in Karakalpakstan.

Notes; A: Confirmed, B: to be expected, C: Needs more efforts

(6) Lessons Learned

1) Promising Technology

Results of the pilot project imply some possible melon cultivation technologies to be developed in Karakalpakstan. Forcing cultivation with tunnel for early harvesting must be a very promising technology, if farmers could recover the necessary additional costs from early marketing. It is also confirmed that melon flies were not a critical problem for growing melon around Nukus at present, since they can be controlled to acceptable level by locally available chemicals.

2) Strategic Introduction of the Technologies

The technologies need to be developed further under a strategic target of agricultural development. The cultivation technologies will be introduced under a gradual long-range approach considering the both aspects, the technical possibility and the farmers' acceptability.

3) Government Policy regarding Research Institutes

Although there are still capable human resources and minimal facilities and equipment for agricultural research in Karakalpakstan, they are very close to a crisis of extinction due to shortage of revenue. The private sector in Karakalpakstan is still reluctant to invest to the research works, since it takes long time for recovering due economic returns. It is desirable that the Government should loose up the present autonomous policy considering the circumstances in Karakalpakstan.

4) Linkage between Research and Extension

Agricultural research works should be strategically linked with agricultural extension works under the government agricultural development policy in order to extend developed cultivation technologies to growers. Although Agro-firms could be the proper growers for melons, it is desirable that the Government should continue its commitment to Agro-firms, so that they will be independent agri-business entities. Furthermore, it is considerable that agriculture colleges as well as research institutes are involved to agricultural extension works, since extension works need to be strengthened more.

5.3.3 Promotion of Women's Vegetable Production in *Tamarka*

(1) Objectives

The purpose of the pilot project is to verify the dissemination of production techniques and activities in order to improve the livelihoods of *dehkans* through the effective utilization of *tamarka*. Verifications are made to help improve *dehkan* vegetable cultivation techniques through technical seminars and interchange meetings between a model farm (model *dehkan*) and the surrounding *dehkans*. The verification activities will also help to obtain some of the lessons learned that will help make modifications to the approaches and activities proposed in the suitable methodology and the Action Plan.

(2) Items to be Verified

The following items will be verified in order to determine the level of technologies and activities which can be disseminated from the model *dehkan* to the surrounding *dehkans*.

1) Dissemination of technologies and activities
   - Number of *dehkans* and *auls* involved extensional effects
   - Improved technologies for the participating *dehkans*

2) Activities of the Women's Committee within VCC
   - Status of support for interchange meetings and other efforts to coordinate with the local residents

(3) Activities and Outcomes

1) Activities Implemented

Preparation Works

Preparatory workshops were held in candidate areas and Makhan-kenes No. 1 in Chimbay District for 2009 and Beskopir VCC in Kanlikul District were selected.

Kickoff Workshop

Objectives, activities and role of participants, model *tamarka* and other organizations concerned were explained. Crops to be cultivated, necessary inputs to be procured and location of model *tamarka* were discussed among the participants. Baseline data was collected from the participants. 25 women in each area were fixed as participants of the pilot project (the Participants) through coordination of the chairman of Makhan-kenes/VCC.

Set up a Model *Tamarka*

Location of the model *tamarka*, crops to be cultivated and cultivation methods were decided through discussion among the Participants and chairman of Makhan-kenes/VCC.

Technical Seminar

The technical seminar was held for four days. About 20 – 25 participants participated in the seminar. Land preparation, sowing, raising seedlings, transplanting, fertilizer application, irrigation, pest and diseases control, harvesting etc. for vegetables were lectured. In addition, study tour to Beruni District was held in 2010. Each participant decided kinds of vegetables to be cultivated and location of each vegetable (cropping plan) by themselves.

Input Procurement

Based on cropping plans and discussion on necessary inputs in the kickoff workshop, necessary inputs and their amount were decided. The inputs were vegetable seeds, fertilizers, pesticides and agricultural tools.

Technical Support and Monitoring

An agronomist who lived in the pilot project area visited each *tamarka* twice or more in a month for technical support and monitoring. The Participants recorded the activities in their *tamarka* and their harvest. The technical support and monitoring were carried out from April to September in 2009 and from April to August in 2010.

Interchange Meeting

Interchange meetings were held in sowing and harvesting season. The Participants, non-participating residents, representatives of *Hakimiyat* and *Makhan-kenes*/VCC in the areas were participated. The participants observed several *tamarkas* and exchanged their experience and knowledge on cultivation in *tamarka*.

Evaluation Workshop

The evaluation workshop was held at the end of each year. The Participants, residents, representatives of *Hakimiyat* and *Makhan-kenes*/VCC in the areas participated. The activities implemented and summary of vegetable production were reported. After the report, change on agricultural technologies, positive and negative impacts and necessary improvement for future project were discussed.

2) Dissemination of Information for Cultivation in *Tamarka*

The technical seminar provided practical cultivation technologies. The model *tamarka* showed new technologies and normal cultivation methods for vegetables. The Participants could directly watch the technologies in their area and recognize the effectiveness. As a result, the Participants followed the cultivation methods. The Participants started exchanging information regarding their cultivation in *tamarka* each other. In addition, the Participants told their experience to their neighbors. These imply that the pilot project promoted communication for cultivation among residents and gave good opportunities to improve their cultivation in *tamarka*.

3) Vegetable Production in *Tamarka*

Work in *Tamarka*

Major works in each month were sowing in April, watering and weeding in May and June, watering and harvesting in July, harvesting and selling in August and September. The Participants were the busiest in harvesting in August.

Baseline data of the production and sale

Major vegetables harvested before the pilot projects were tomato, cucumber, eggplant, potato, pumpkin, etc. in both areas. Average total harvested value was about 300,000 sum/respondent in both areas. About 34% of the harvested value, 103,000sum/respondent, were sold in *Makhan-kenes* No. 1. About 18% of the harvested value, 56,000sum/respondent, were sold in Beskopir VCC.

Production and Sales

In case of *Makhan-kenes* No. 1, the production value increased by about 83% and the sold value increased by about 170% than the baseline data. In case of Beskopir VCC, expected production value until the end of September will increase by about 35% than the baseline data. The sold value increased by 148% than the baseline data even though the recorded value didn't count that in September.

(4) Problems and Issues encountered during Implementation

1) Irrigation Water Supply Schedule

Since reliable irrigation schedule was not informed to *tamarka* users, it was difficult to adjust vegetable cultivation schedule to the irrigation water supply schedule. As a result, some participants sowed the vegetable seeds several times, since the irrigation water was not supplied at expected timing in 2009.

2) Modification of Plan

Because of the delayed irrigation water supply, water-logging etc., the Participants needed to change their cropping plan. The first interchange meeting in the first year was behind the schedule to wait germination of the vegetables.

3) Monitoring of the Production

The Participants recorded their activities and harvest in the *tamarka*. However, they didn't use to record them and there were many mistakes and contradictions.

(5) Evaluation

1) Items to be Verified by the Pilot Project

Dissemination of Technologies and Activities

The number of participants in the pilot project was 50 in two years and the number of participants in the interchange meetings was about 150 in total. The target group of dissemination of technologies and activities in the pilot project was mainly these participants.

Many participants were interested in the experience and new technologies through the technical seminar and interchange meetings. As a result, the most participants were satisfied with the activities of the pilot project and felt that their vegetable cultivation was improved through the activities.

In addition to the improvement of their cultivation, some changes on dissemination of technologies, e.g. information exchange, dissemination to their neighbors, were recognized by the Participants.

Activities of the Women's Committee within *Makhan-kenes*/VCC

The leaders of Women's Committee assisted the chairman of *Makhan-kenes*/VCC and NGO on arrangement of the participants and venues for the events without troubles. It seems that the Women's Committees in *Makhan-kenes*/VCC were capable of arranging women within the territory.

2) Evaluation at Viewpoints of DAC Criteria

Criteria	Evaluation
Relevance (A)	*Tamarka* has an important position in vegetable production, since a certain part of vegetables produced in Karakalpakstan were produced in *tamarka*. Women have more important roles in vegetable production in *tamarka*. A certain part of vegetables produced in *tamarka* is sold and it is one of income sources for their families. However, there has never been any systematic technical support targeting women working in *tamarka*. Therefore, technical support for vegetable production in *tamarka* is necessary to improve the production and livelihood of the people. Furthermore, the Government is promoting the rural development and *tamarka* usage. The pilot project approach to improve vegetable production in *tamarka* by women is relevant to cope with the Government concern.
Effectiveness (A)	It was confirmed that women were appropriate target group, since women use to work in *tamarka* and have capacity to understand cultivation technologies for the improvement. The technical seminar and interchange meetings provided practical and applicable technologies and knowledge to the Participants. The Participants could easily see the effects and results of the technologies in *tamarka* in their areas. As a result, the most participants were satisfied with the activities and recognized the improvement of their vegetable production in *tamarka*. In addition, the Participants recognized that the advantage of diversification of the production based on the technical seminar, interchange meetings and information exchange among the Participants. These results imply effectiveness of the pilot project.
Efficiency (A)	Agronomists who lived in the target areas carried out monitoring and technical support. The Participants who had known the agronomists could rely on the agronomists. Therefore, the pilot project seems to be efficiently managed. The agricultural inputs procured in the pilot project were decided through discussion with the Participants. On the other hand, the Participants learned practical vegetable cultivation knowledge through activities of the pilot project to fully use the agricultural inputs. Therefore, the inputs seem to be used efficiently.
Impact (A)	The Participants recognized the value of *tamarka*, how mach the production in *tamarka* contributed to their livelihood, through recording the production. The Participants and their neighbors have started sharing their knowledge. These show that the pilot project gave impact to cultivation and dissemination of cultivation technologies. Although long term impact cannot be evaluated at this time, it is expected that the Participants and their neighbors will disseminate their experience and knowledge to other people.

Sustainability (A)	While the pilot project didn't require high cost inputs and high technologies, the Government might be able to manage the necessary resources in the area. *Hakimiyats* in the areas showed much interest in the pilot project and extended close cooperation on the implementation. *Hakimiyats* have intention to implement a similar project and it may be possible to prepare human resources by themselves, although scale and implementation of the project might be depended on preparation of budget. It implies possibility to implement a similar project. On the other hand, the Participants understood value and effectiveness of vegetable production in *tamarka*. They wanted to continue improvement of *tamarka* use. Some participants continued sharing information and collaborative procurement for improved seeds after the pilot project. This also implies the sustainability of the pilot project.

Notes; A: Confirmed, B: to be expected, C: Needs more efforts

(6) Lessons Learned

1) Irrigation Water Supply Based on the Schedule

The pilot project implies that irrigation water, timing and volume, is the critical issue for improving *tamarka* cultivation. Almost all *dehkans* are not informed of reliable irrigation water supply schedule. Therefore, they are not able to take necessary actions to avoid the risk. Setting of hand tube wells in *tamarka* could be a practical counter measure if the groundwater condition allows.

2) Flexibility of Implementation

Vegetable growth was delayed and insecure and participants frequently had to change their cropping plan at the beginning stage due to irregular supply of irrigation water, unstable temperature, water-logging, etc. The project implementation plan should be flexibly modified in order to achieve the expected goal of the project.

3) Availability of Human Resources

The agronomists who live in the pilot project areas carried out monitoring and technical support. The Participants relied on them and could accept technical support. This contributed to efficient implementation of the pilot project. Such reliable human resources in project areas should be involved in this kind of project, since many agronomists without permanent jobs are present in rural areas after the dissolution of *shirkats*.

4) Simple and Practical Technologies

Cultivation technologies lectured in the technical seminar and shown in the model *tamarka* were practical and simple technologies. The Participants could observe the technologies near their homes. It contributed to easily understand and accept the technologies. In addition, advanced or complicated technologies were not required to improve the cultivation, since the most participants who just followed normal cultivation method in Karakalpakstan could increase their production.

5) Competition Among the Participants

The Participants competed with each other to make their production better than others. The competition was good motivation for them. In addition, the Participants discussed market situation and considered what they would produce next year. These may be foundations of market oriented agriculture. Therefore, it is implied that the pilot project, especially group activities and communication among the Participants, contributed promoting market oriented agriculture and raising the awareness.

5.3.4 Dairy Promotion Package

(1) Objectives

The Dairy Promotion Package Pilot Project is designed to encourage dairy production in Karakalpakstan by covering from fodder production to processing and marketing of milk. Its

components (activities) are composed of 1) collective fodder production, 2) trainings on silage making and livestock technologies for *fermer*/*dehkan* and livestock extensionists, and 3) operation and management of the small-scale milk plant. Through these activities, the pilot project aims attaining increase in livestock productivity, increase of income of milk producers, creation of employment opportunity, and capacity development of livestock extensionists and *fermer*/*dehkan*.

(2) Items to be Verified

Verification items are the following;

- Effectiveness and validity of collective fodder production by *fermers* and *dehkans*
- Effectiveness of silage using the existing banker silo for winter feeding for cows
- Capacity building of *dehkans* and *fermers* on animal husbandry technology
- Capacity building of livestock extension staff on animal husbandry technology
- Identification of constrains in initial operation of milk production

(3) Activities and Outcomes

1) Collective fodder production

Sorghum and alfalfa were cultivated for two years. The harvested sorghum was used by *dehkans* and reduced their expenses for purchasing animal feeds, and used for the training of silage making. However, it is necessary to institutionalize this activity for sustainability.

2) Silage making for winter feeding

Silage was made and fed at Qoniratobay-Mehri Livestock Farm. As a result, milk production for winter season was remarkably increased from 300lit/day milk to 600lit/day, 100% increase. Increase of 300lit/day is equivalent to increase of income of 240,000 sum (300 x 800 sum) /day.

3) Training for *fermers* and *dehkans* on animal husbandry

The training was provided for 54 *fermers* and *dehkans*. According to questionnaire survey at the end of the training, most of them achieved objectives of the training and acquired animal husbandry technology.

4) Training for extension workers of the concerning departments

34 livestock extension workers (veterinarians) invited from districts were trained. As a result, their rate of right answerers were raised up from 55% to 80%, implying that their knowledge about animal husbandry was improved, and their extension service will be improved to increase animal productivity.

5) Establishment of small-scale milk plant

A modernized milk plant with capacity of 500 lit/day was established in Qoniratobay-Mehri Livestock Farm in Kerder VCC in Nukus District in order to process hygienic milk. The plant created employment opportunity for 11 employees. The plant is the first case of modernized milk plant in Karakalpakstan, and also the first case in its operation by milk producer group. We are waiting for certificate of Republican Sanitary and Epidemiology Station (RSES) as of beginning of October 2010. Assuming purchasing cost for raw milk at 800 sum/lit, FIRR was estimated at 20%.

(4) Problems and Issues encountered during the Implementation Period

1) Lack of sense of sanitary supervision

RSES has instructed to improve hygienic condition of the milk plant and workers through two times inspections, since village people's sense about importance of hygienic practice has not developed enough.

2) Electricity supply and steep rise of fuel for generator

Electricity for the milk plant is not supplied for 24 hours. A generator was provided but fuel cost was sharply raised, in addition, it was difficult to procure necessary quantity of fuel on time at reasonable price.

(5) Evaluation

1) Items to be Verified

Effectiveness and validity of collective fodder production by *fermer* and *dehkan*

The trial could attain 7 to 8 ton yield/ha, namely 77 to 88 ton in 11ha, which is normal yield in the area nearby according to the owner of the farmland. It is necessary to attain the goal that the Animal Husbandry Department should have initiative to extend collective fodder production by *dehkans* by the proposed activity.

Effectiveness of silage using the existing banker silo for winter feeding for cow

Effectiveness of silage is especially higher for *fermers* who have large number of cattle.

Capacity building of *dehkan* and *fermers* on animal husbandry technology

The effects of the training might be difficult from short-term viewpoints, but possible from mid to long-term viewpoints since awareness of *dehkan* and *fermer* will be improved gradually

Capacity building of livestock extension staff on animal husbandry technology

The effects of the training might be difficult from short-term viewpoints, but possible from mid to long-term viewpoints since extension worker's capacity will be improved through the training.

Milk processing at the small-scale milk plant

The established milk plant has functions to pasteurize milk, packing and selling (1 liter. pack at 1,200 sum) as the first modernized milk in Karakalpakstan, though it is small scale with 500 liter/day capacity. In that context, establishment of a hygienic milk plant itself can be considered as outcome of the Pilot Project under the market oriented economy. In addition, operation by the organized milk producers group is also the first case in Karakalpakstan. The milk plant also creates employment opportunity for 11 persons including women from milking to processing and selling. The financial internal rate of return (FIRR) was estimated at 29% in case of 800 sum/liter of raw milk.

2) Evaluation of DAC's 5 Aspects

Criteria	Evaluation
Relevance (A)	Necessity : Current marketing volume of milk is estimated at only about 50% due to lack of milk factory, and poor marketing system. Animal' productivity is generally low due to inadequate animal husbandry technology of *dehkan*, *fermer* and even extension works. The proposed project becomes a good model for that purposes. Priority : Karakalpakstan government has been encouraging meat and milk processing. Therefore, the project is consistent with the policies. Suitability as a mean: The site is blessed in accessibility and easy milk collection and marketing as well. Milk processing, silage making, and collective fodder production are carried out here in the village.

Effectiveness (A)	Forecasting for attaining project goal: 500 lit./day of pasteurized milk is processed and marketed. This is the first production of packed pasteurized milk in Karakalpakstan, and also first case of processing and marketing milk by milk producers themselves. It is expected that the pilot project will contribute to value-added milk, stable feeding of feeds, improvement of household economy of producers, and creation of employment opportunity. Cause-and effect logic : In order to attain project goal, close solidarity of the working group under strong leadership for sustainable processing, and stable demand of consumers for safe milk are indispensable.
Efficiency (B)	Degree of attainment of output: Modern equipment to produce 500 lit milk/day was procured from Italy, and test run along with training for operators was done on February 2010. Cause-and effect logic : It is considered that capacity of 500 lit/day is not excessive scale for the safe milk production as a model. Input for sorghum production in 11 ha is also standardized one. Timing : The collective fodder production by *dehkans* was done according to normal cropping pattern in Karakalpakstan. The start of full operation is delayed due to delayed procurement of equipment and adjustment of equipment. Cost : Standardizes input was dosed for the collective fodder production. The small-scale milk plant with 500 lit/day is considered suitable input as a model.
Impact (A)	Foresting for attaining overall goal : It is inferred that hygienic milk production by *dehkans* and *fermers* will give impact on processing and marketing of milk in Karakalpakstan, and contribute to improve living standard of milk producers by selling value-added safe milk. Impact on the collective fodder production will depend on aggressive involvement of the Animal Husbandry Department and *dehkans* themselves. Cause-and effect logic : There is no misfit between overall goal and project goal. Spreading impact : Under the encouragement of animal products processing by the Karakalpakstan government, no negative impact is predicted since modern equipment was installed for milk processing. And no negative impact is forecasted in the collective fodder production.
Sustainability (C)	Political and institutional aspects : The Karakalpakstan government has been encouraging livestock sector and animal products processing. Institutional credit is also available. As to fodder production, *dehkans* have no idea to date to produce fodder collectively, implying necessity of promotion of this method by the Animal Husbandry Department. Organizational and financial aspects : The working group members are solidified under the strong leadership of the leader (owner of the farm). The leader markets milk everyday to the Nukus Central Bazaar. Therefore, the project is considered sustainable under the working group members. Operation and management will be done by running milk profit since governmental financial support is not expected. Technical aspect : O&M of the plant is not considered so difficult but daily attention to hygienic management is indispensable. Sorghum production itself has been practiced for long time in Karakalpakstan.

Notes; A: Confirmed, B: to be expected, C: Needs more efforts

3) Necessity for course correction

There is not necessary to correct course in this project since this package project is proposed taking into consideration results of the survey on dairy industry sector in Karakalpakstan.

(6) Lessons Learned

1) Procedures for certification

There are some authorities concerning food processing in Uzbekistan such as Uzstandard, Republican Sanitary and Epidemiology Station (RSES), Association for Meat and Milk Products. The Study Team, counterparts and sub-contractor of the Pilot Project did not understand on these organizations, processes and the concerning laws. It is one of the reasons for the delay of getting certificates of pasteurized milk from the authorities.

2) Awareness on hygiene

In general, milk producers have insufficient hygiene concepts on milk processing and processing plants, it is necessary conduct hygienic awareness campaigns in rural area.

3) Training material for *dehkans*

As compared to *fermer*s, *dehkan'*s educational status is considered to be low. Therefore, it is desirable to prepare training materials and other documents for *dehkans*, and also to make them visual as much as possible using Karakalpak language,

4) Monitoring of pilot projects

The local staff's employment is indispensable to promote and supervise the pilot projects when the Study Team is absent. It is risky to leave all activities to the sub-contractors.

5.3.5 Improving Water Management in Internal Canal System and Water Use in the Field

(1) Objectives

The Pilot Project has two aspects which are water management in internal canal system and water use in the field. The Objectives of the Project are:

1) To improve water management in the internal canal system by renovating canal system and installing division box ("*Shandur*") and to enable WUA to maintain canal system properly by strengthening activity of WUA. Through the activity of the Project, the activities for strengthening WUA's function proposed in the Master Plan will be examined its validity and adaptability.

2) To increase water use efficiency in irrigation and leaching and increasing effect of leaching to salt removal by implementing land leveling and improving water use practice in the field in the model farm. The effect of these measures will be examined the validity and adaptability. The measures will be demonstrated to *fermers* in the model farm and the acceptability of measures to *fermers* will be assessed through the Model Farm Project.

(2) Items to be Verified

1) Improve water management in the internal canal system

- Improving water management by renovating canal system and installing division boxes
- Fulfilling proper maintenance of internal canal system by strengthening activities of WUA

2) Increase water use efficiency in irrigation and leaching

- Land leveling to increase water use efficiency and effect of salt removal in leaching
- Assessment of adoptability of measures and acceptability to farmers

(3) Activities and Outcomes

1) Preparation works and Construction work

The Katlaban Irrigation Block of the Kattagar arna Water Users Association, Nukus District was selected as a pilot project site and 12 farmers agreed to participate to on January 2009. The implementation plan was agreed among participants at the Kick-off Meeting held on March 2009. The construction work had implemented from May 2009 to April 2010. In the Pilot Project, the following works were carried out: i) cleaning and digging canal, repairing pump and digging discharge pond of pump, ii) constructing gate divisions, water measurement equipment and division boxes, and iii) development of the verification plot.

2) Improving water management by renovating canal system and installing division box

WUA carried out operation of irrigation system with the existing facilities in the vegetation period of 2009 and with the improved system in 2010.

Business Plan and Budget of WUA

WUA collected 33.3 % of total bill of water fee including unpaid in the past years in 2009. The budget which can be used for staff salary was limited because the commuted amount of farmer's contribution occupied 37.4 % of total income. As a result, WUA had to work with limited active staffs in the field. The situation was continued in 2010, even there is expectation of increase of water fee collection owing to abundant water and good harvesting.

Training of WUA staffs and technical seminar to farmers on water management

The training to WUA staffs for water management in the improved system was conducted on May to June 2010. A series of technical seminars on water management and irrigation practice targeting farmers was held in combination with demonstrations in the verification plots. The topics of seminars were; i) Necessity and importance of rotation water use in the irrigation system (May 2009), ii) Step by step water use in the field (July 2009), iii) Irrigation practice for potato cultivation (June 2010), and iv) Demonstration of water management practice and water measurement (August 2010).

Operation of the irrigation block by WUA

In the vegetation period of 2009, WUA controlled the water delivery to two major irrigation blocks. After that, farmers operated water delivering by earth work, that was embanking and cutting soil by hand whenever open and close the canal. It caused difficulty in frequent and in time operation so that farmers tended to take water into their farm at once in each blocks. After the improved canal system placed in service in 2010, WUA operates 9 gate division works which control the water delivery to small blocks that consists 1 to 2 farm owners each. As a result, rotational water use by small blocks was fulfilled by the initiative of WUA. On the other hand, even water measurement facilities were equipped and WUA staffs were trained, water measurement was not implemented in regular water distribution, expect for pump intake and the verification plots.

Owing to the improvement of irrigation facilities and water management, the index of water use efficiency, that was obtained by dividing [theoretical water demand for the actual cropped area] by [total amount of water taken at the pump] in the project, increased from 0.556 to 0.644.

3) Fulfilling proper maintenance of internal canal system by strengthening activity of WUA

Operation of repaired mini-excavator of WUA

A mini-excavator (a tractor equipped with shovel arm attachment) of WUA was repaired for increasing WUA's capability of canal maintenance. It started to be in use on April 2010 and resulted in approximately 700 m of digging canal within one month, before stopping due to mechanical trouble. WUA showed its ability for mechanical works and members understood the impact of mini-excavator that it would prevent farmers to miss irrigation water by quick and in time canal maintenance.

Maintenance work of canal system by WUA and participation of members and *dehkans*

WUA carried out several repairing or maintenance of canal system, which were conducted with farmer's contribution as well as ad hoc charge. This had been continued even in 2010. In comparison with 2009, the frequency and work amount of canal maintenance arranged by WUA was significantly increased in 2010. Each work was conducted in good organization and manner of farmer's participation. In 2010, WUA organized water user's meeting with *dehkans* in some settlement, and WUA implemented canal maintenance by *dehkan's* participation.

4) Improving water use and drainage condition in the field

A comparative cultivation upon on-farm irrigation technology was carried out in cotton cultivation in the vegetation period of 2009. Due to the change of the governmental policy on promotion crop in the

Nukus district, a comparative cultivation was continued by changing crop in 2010, i.e., potato, sesame and sunflower.

Results of improving water management in the field

In order to compare and demonstrate the effect, three on-farm irrigation technologies were applied, i.e., Type-I: Traditional furrow irrigation (One way furrow application), Type-II: Over furrow irrigation (Skipping furrow application), and. Type-III: Counter furrow irrigation (Two-way furrow application).

Type-II and Type-III showed higher crop yield and water economy than Type-I in each crop and period. While Type-II showed the most economic water use among technologies, it was pointed out by farmers that it is difficult to apply the required frequent water application and accurate management of irrigation timing under the condition of present irrigation process. Thus, Type-III was recommended for wide application to farmers through demonstration at the field.

Implementation and results of leaching in the verification plot

Filed leaching was implemented in two periods, at the beginning of December of 2009 in winter and from the middle of March to April of 2010 in spring in the verification plots.

The results of monitoring showed that the amount of leaching in the winter period had enough for soil desalinization up to the acceptable level for crop. It was observed that the spring leaching was to be implemented for maintaining soil moisture before sowing and partially played desalinization role.

5) Evaluation workshop

In order to evaluate the results of the project and opinions of participants, the following workshops were held through the project.

- 1st workshop for wrap-upping and assessing the activity of WUA, farmers and the project during the vegetation period of 2009 held on October 14, 2009
- 2nd workshop for assessing the activity of maintenance work by WUA held on June 21, 2010
- 3rd workshop for wrap-upping and assessing the results of the project held on September 21, 2010

(4) Problems and Issues encountered during the Implementation

Electric supply for irrigation pump

A regular electrical power switching resulted in frustration to farmers in planned sowing works. In addition, it causes difficulty in taking full water from the main canal within the scheduled days in the drought condition. Unfortunately, there is no measure to solve this issue in short term because it would be required re-arranging the power supply network.

Antitheft measure for equipment after completion of construction work

Rising up owner ship mind of farmers and increasing concern to equipment through a campaign is essential to protect the vulnerable of irrigation system to property loss or mischief. In addition, the act for the responsibility on irrigation facility between WUA and each member will be effective to clarify the responsibility of each user in use as well as above purpose.

(5) Evaluation

1) Evaluation from the Items to be Verified

Improving water management by renovating canal system and installing division boxes

WUA started to control water distribution by small blocks with improved irrigation system and rotational water use has been established in the system. As a result of improvement of irrigation facilities and water management, the index of water use efficiency increased by 16 %, which was

0.556 in 2009 to 0.664 in 2010. It was also observed positive changes in relation to WUA among members so that farmers started to agree schedule and volume of water supply with WUA and among themselves. Because the abundant water resources in 2010 is considered to contribute to the result, it is wondered if WUA is able to manage water distribution under the strong pressure from members in the case of serious water shortage.

Without water measurement and record, the water distribution tend to be carried out by the manner trying to take fully the delivered (allocated) water in the main canal and to distribute it to farms as much as possible, without consideration of effective use of water. It is necessary to give more effort to increase the awareness of WUA and farmers on water measurement and record keeping in the water management.

Fulfilling proper maintenance of internal canal system by strengthening activity of WUA

Due to limited income of WUA, it was still difficult to fulfill salary of staffs even in 2010. Because immediate increase of revenue cannot be expected, it is necessary to pay the first priority on staff salary to secure active staffs for water management in the field for a while.

The operation of mini-excavator could demonstrate the ability of WUA and member's expectation to WUA service was observed to be highly increased. WUA can make prompt action against the trouble and minimize the affect to water delivery by operating excavator. It is expected to contribute to rise up the member's sense of security or reliability on WUA's water management activity, so that the member's intention to paying water fee will be increased.

The technical information of the internal canal system such as survey and design result prepared by the project was provided to WUA. To share the technical information will contribute to increase capability for management and maintenance work of WUA.

WUA arranged farmer's participation to canal maintenance effectively and in time by taking initiative in organizing collective work, arranging materials and equipment and guidance of the work. In addition, WUA succeeded to involve *dehkans* to water management and canal maintenance. It can be appreciated as a one of achievement of the project activity.

Improving water use practice in the field to increase water use efficiency

Among the field irrigation technologies, Type-III (Counter furrow irrigation) was promoted to famers in consideration of the balance of economic water use and irrigation planning (the condition of unreliable water supply in the main canal). It was pointed out that land leveling was indispensable to be developed in order to achieve the improvement of water management in the field. Most participants expressed their strong interest in the improved practice and intention to introduce to their farm in the next vegetation period. Because their farms have a various condition such as fluctuation of flatness within plot or condition of field irrigation, it is necessary to continue to keep close contact and monitoring with them.

2) Evaluation at Viewpoints of DAC Criteria

Criteria	Evaluation
Relevance (A)	Maintaining the internal canal system and keeping its function adequately are essential for fulfilling effective use of irrigation water. It meets to famer's demand who seeks the sustainable irrigation as well. For these purpose, establishing adequate support and strengthening of WUA is required immediately. Because the problems of WUA or the internal canal system are common over the Karakalpakstan, the way to improve WUA's activity on water management can be widely useful in order to fulfilling the appropriate water management and effective use of water resource.
Effectiveness (A)	By improving the canal system and activity of WUA, WUA could control the water distribution by small block and a rotational water use was achieved in the area. The water measurement and record keeping was not fulfilled in the water management. It is necessary to increase awareness of WUA's staff and farmers on them in order to increase efficiency of water use, to increase water fee collection and to achieve adequate water distribution in water shortage condition. The mini-excavator increased member's expectation and reliance to WUA's service by demonstrating the result of digging canal. WUA organized the participation of member farmers and *dehkans* in canal maintenance. It will contribute to improve water management and increase effective water use in farm and settlement. The results of effective water use by improving water management in the field were demonstrated. Most participants expressed their strong interest in the improved practice and intention to introduce to their farm.
Efficiency (C)	Even delay of the construction work made some confusion at the beginning of the irrigation period of 2010, WUA and members had finally established with rotational water use by small blocks. A quantitative analysis on the effect of land leveling on water use efficiency in leaching could not carried out due to delay of land leveling work in the verification plot. It was expected for WUA to have a contract service using mini-excavator and obtain small budget, however, it was not realized due to limited operation period. Technical seminars and demonstration in the field were implemented as scheduled and they received high appreciation of farmers. Farmers understood the necessity and practical techniques for the field irrigation technology.
Impact (B)	By the proper operation and maintenance of WUA, the improved irrigation system would realize its function into the future and water would be used effectively. A spread effect to strengthening activity of WUA in Karakalpakstan is expected through showing good practice of water management.
Sustainability (B)	Once WUA maintain canal system properly and provide adequate service to members, it would contribute to improve the finances of WUA through increasing water fee collection. As a result, it will enable WUA to make proper management of the system sustainably and continuously. If WUA manage machinery adequately, it can be expected that WUA will provide service using excavator under the contract and be able to complement the finances for his activity, in addition to regular maintenance of the canal system. It will contribute to improve the finances of WUA.

Notes; A: Confirmed, B: to be expected, C: Needs more efforts

(6) Lessons Learned

1) Improvement of facilities

Improvement of internal canal system

WUA showed its ability to manage local and small scale repair of canal and faculties by coordinating collective work and famer's contribution. However, it was also made clear that WUA dose not have financial ability for a large scale construction work covering the system and the external support for finance is indispensable to full-scale rehabilitation by itself.

Improvement of drainage system

It was observed that the shortage of capability of drainage system in and around the site affected to up-lifting of groundwater level and obstacle to leaching effect in the verification plot. The NDIP is expected to be implemented surely and quickly.

2) Improvement of water management

Water management in the condition of water shortage

Under the serious water shortage in the main canal, where the days for water taking is strictly limited or the scheduled water supply is suddenly canceled before completion, it is necessary to introduce an operation of rotational water division by quarter a day or hours instead of usual daily operation. To realize that, it is important to increase response of the water delivery in the system, to operate water distribution in time, to reduce irrigation time required for one watering in the field, and to enhance the coordination of irrigation planning among farmers by strong initiative of WUA.

Visualization of water distribution and record keeping

Through the experience of the project, it was understood that it establishing relationship of mutual trust among farmers and WUA and increasing a sense of fairness of farmers on water distribution were the most important issue for introducing rotational water use. Owing to improvement of canal system, especially by equipping gate facilities, farmers can understand the situation of water distribution to farms and plots visually, and it contributed to create farmer's sense of fairness. The visualization inhabited the hidden water intake or operation in breach of rules by farmers as well. Water measurement and keeping record is expected to increase the visualization to farmers in water management.

3) Maintenance work

Management of canal lot and clarifying the responsibility of WUA and farmers for facilities

There were many trees planted by farmers within the canal lot, in some case within the slope of earth canal, even the canal lot is protected as a property of WUA and restricted to plant trees by regulation. Because it causes constraints to the canal maintenance work, it is required for WUA to manage their territory adequately and to enhance the control of canal lot through inspection and guidance to farmers. In consideration with its large territory, it is difficult to carry out daily inspection all over the territory by WUA under the condition of shortage of human resources. Thus, farmer's cooperation and assistance are indispensable for management of facilities. It is required to clarify the responsibility of WUA and farmers (users) and to confirm that both sides jointly having the responsibility for appropriate use and maintenance of facilities.

Operation of mini-excavator and supply system of parts and materials

WUA showed its ability on operating mechanical work and daily maintenance of machinery, so that farmer's reliance and expectation to the WUA's service increased significantly. Besides, it has to be noted that WUA dose not have a financial ability on repairing the machinery by its budget at moment. It is required to collect ad-hoc charge or contribution in kind from farmers for repairing. WUA usually procures necessary spare parts or materials for pump and tractor in the market by second hand articles. It causes difficulty to obtain in time and problem in quality of parts. It is required to establish the supply route or system of parts and materials for hydraulic gate, pump and tractor.

4) Enhancing WUA's activity and improving water fee collection

Appointing necessary staff of WUA and cultivating farmer's leaders on water management

Appointing necessary staff of WUA is considered the most essential issue in the improving water management. During the shortage of staffs, it is required to involve famers to operate gate division works under the clear rules and responsibilities. To enhance the relationship between WUA and member farmers and increase understanding on WUA's activity, it is required to cultivate leaders among members who understand necessity and importance of WUA activity and water management.

Equipping PC for WUA administration

WUA is required to show member farmers its ability on irrigation planning and administration work such as preparing the contract limit with ISD, preparing the contract with each members, etc., in

order to let members to understand the importance or necessity of WUA's function. In this regard, PC will contribute to WUA.

Collective work and contribution of member farmers

WUA had organized collective work and farmer's contribution for canal maintenance well. On the other hand, some farmers express their objection to water fee by the reason that they burden the maintenance work of irrigation system and WUA do not fulfill its role mentioned in the regulation or contract. There might be a danger that WUA member farmers would lose reliance to WUA's role, if WUA continues to rely maintenance work on ad hoc famer's contribution excessively. After the water fee collection starts to increase, it is necessary to increase the portion of the maintenance work based on the business plan of WUA.

Finding income for short term fund of WUA

Because there is no way to improve the financial condition of WUA quickly and drastically, it is required WUA to find a tentative income for its activity in addition to water fee for the moment. Providing contract service using the mini-excavator is possibly a mean for income of WUA. However, such contract service out of water management shall be a tentative manner, and a clear and strict rule for use shall be established including account reporting to members.

5.3.6 Model Agro-firm Establishment

(1) Objectives

Objective of the Pilot Project is to enhance bargaining power of *fermers* and *dehkans*, through activating existing Agro-firm, Taqirkol Agro-firm in Nukus district.

(2) Items to be Verified

Items to be verified will be as follows:

- Effectiveness of participatory marketing planning to afford incentives of member farmer
- Adequacy of marketing plan which formulated through participatory approach
- Economic benefit from collective action for marketing
- Identification of constrains in initial operation of processing facilities; transaction method, necessary tool and equipment, collection method, critical quality control point

(3) Activities and Outputs

1) Identify demand oriented service menu of the Agro-firm

Through a series of discussion and 1st year's activities, the Agro-firm members identified and established their service menu as follows:

- technical training (plant protection, farming skill, marketing, business planning, etc.),
- food processing (dried vegetables and fruits),
- joint Marketing (collection and marketing, provision of market information, coordination of market transaction), and
- production support (charcoal vinegar production, on-site demo for plant protection).

2) Developing business plan which shows a business model to generate profit

Draft business plan was developed at the business planning WS on February 1st, 2010, and finalized after whole project activities conducted. The business plan includes organization structure, services, properties, products, market analysis, and financial plan. To compensate initial investment cost within 6 years, as shown in the financial plan of the business plan, it is necessary to market fresh vegetables and fruits, in addition to dried agricultural products.

3) Enhancement of management body of the Agro-firm

One of weakness of the Agro-firm was poor management of board members. After discussions with member farmers, a leader farmer was assigned to deputy director. Since then, the project activities started substantially.

Through the project, the Agro-firm established an institutional network with Nukus Branch of Tashkent State University of Agriculture, Ministry of Foreign Economic Relations, Fergana Research Center, Chimbay Bio-laboratory, and Business Incubator.

As of September 2010, nine core members contributed capital fund, and the land title with building are now under the Agro-firm's balance. In addition, through the joint production with Khodjeyli factory, the Agro-firm gained the 1st profit from their activities. Their capital accumulation is just stared.

4) Generating economic benefit through collective marketing

Through the joint production with Khodjeyli factory, the Agro-firm established a business model that; 1) the firm buy fallen apples from members and sell them at higher price, and 2) the Agro-firm gained commission from processing and marketing support to the factory. From the activities, the first profit was generated on July 2010.

Protection support program with a professor from a university resulted in a good harvest of tomato and apples. Damages on tomato reduced from 30-50% to 5%, whereas that of apples reduced 70% to 50% at experimental field.

(4) Problems and Issues Encountered During Implementation

1) It was found that the existing Agro-firm in Nukus district, officially established in 2006, had no activities in fact. Therefore, to receive the government support of tax exemption, new Agro-firm, namely "Taqirkol-Darbent" Agro-firm, was established (registered) on June 26th, 2009.
2) Since farmer was not included in the Agro-firm board member, the Study Team suggested adding at least one member from the farmers. As a result, a leader farmer was assigned to the deputy director. Now, the deputy director is absolutely necessary person for the Agro-firm's operation, and it is sure that success of the Agro-firm can not be obtained without him.
3) Forty-four (44) founding members were listed in the original statute of Taqirkol Agro-firm, but it was found that the some members were listed up without any advance announcement to be a member of the Agro-firm. Therefore, twenty (20) core members were selected at the time of the renewal, and 9 members had contributed to the capital fund raising by the end of September 2010.
4) Under the current system, Agro-firm director is nominated by the *hakim*, and what members can do is just approve the candidates. Accordingly, the past directors did not show positive attitude toward the Agro-firm's operation, and could not concentrate in the firm's activities due to other tasks. After the assignment of the deputy director from farmers, the project activities started substantially.
5) Many farmers in Taqirkol VCC had a bitter experience regarding work with processing factory, since they could not collect their account receivable. Since then, farmers in the VCC do not trust processing factory. Building up trustful relations with farmer members though assuring their income is necessary to dissolve this problem.
6) Unstable supply of electricity and water is bottleneck of food processing factory in Nukus district. To overcome these drawbacks, the Agro-firm decided to collaborate with other factories located in the better operating environment. For further operation at the Agro-firm processing plant, *hakim's* support for the utility issues is necessary.
7) To make profit from fresh vegetables and fruits, export to the Northern countries including Kazakhstan and Russia, is key option of the Agro-firm members. However, it was found that

export of fresh vegetables and fruits is quite difficult in the Karakalpakstan due to the government policy to fill the domestic market first.

(5) Evaluation

1) Evaluation of Verification Items

Effectiveness of the business model to enhance bargaining power of the small-scale farmers

Through the two-year activities with the Agro-firm members, a business model of the Agro-firm is established. It is sure that the Agro-firm can generate 2 million sum from 25 tons of fallen apples through the joint production with Khodjeyli factory. If the Agro-firm expands activities utilizing their advantages, the Agro-firm could gain more than 24 million sum of profits as shown in the business plan in 2010. Though the full model can not be materialized within the project period, it is possible to see the effectiveness of the business model to enhance bargaining power of the farmer members in rural Nukus.

Economic benefit from collective action for marketing

In our business model, member farmers of the Agro-firm can gain profit from fallen apples which is used to be sold at throwaway prices for animal feed. In case of the joint production with Khodjeyli Silk Factory, the Agro-firm purchased the fallen apples at 40 sum/kg and sold them to the factory at 80 sum/kg, generating 800,000 sum of net profit (excluding transportation cost) from 25 tons of damaged apples. By adding value on the fallen apples and support marketing of the value-added products, the Agro-firm can gain 2 million sum in total, and proved that they can sell the damaged products at higher prices.

Applicable and acceptable processing technologies for vegetable and fruit

Applicable and acceptable processing technologies can be determined by market condition of the targets. As a result of marketing survey, conducted by the working group from October 2009 to January 2010, the Agro-firm identified target products, method of processing, usage and form of the products, and their price range. The first products, dried apple, produced with the Khodjeyli Silk Factory was sold at 1,000 sum/kg to a trader. This fact indicated that their processing technology meet the foreign market's demand.

Identification of constrains in initial operation; transaction method, necessary tool and equipment, collection method, critical quality control point

Followings were the serious constraints to attain the project purpose.

- Less interest in vegetables/ fruits marketing among the key person of VCC
- Sense of mistrust among farmers against processing factory
- Poor conditions of utilities in Taqirkol VCC
- Catastrophic damages on the target plant
- Export control of fresh vegetables and fruits
- Poor quality of fresh products and necessity to improve them through plant protection for example
- Lack of cash in the bank is one of serious obstacle of business in the Karakalpakstan, and farmers tend to not accept transaction through bank transfer

2) Evaluation at Viewpoints of DAC's 5 Criteria

Criteria	Evaluation
Relevance (A)	National Policy: The government of Uzbekistan promotes establishment of Agro-firm as a part of agrarian reform policy. Therefore, activation of the existing Agro-firm, which was only one Agro-firm in the study area, still meets the agrarian policy of the Uzbekistan Government. Necessity: Farmers in Taqirkol VCC still need the implementation of the pilot project, since vegetable and fruits growers hardly receive support from the government, which,

	rather, intensively support cotton and wheat production. In this regard, the project still meets target group's needs. Relevance as a Mean: At the time of pilot project formulation, only one Agro-firm was existed in the study area. At the kick-off workshop on April 11th, 2009, farmers in Taqirkol VCC showed their strong expectation to the operational success of the Agro-firm. In this regard, the project approach to enhance the existed Agro-firm was relevant.
Effectiveness (B)	Attainment of the Project Purpose: The project purpose is to enhance bargaining power of small-scale farmers through promoting collective action for marketing of vegetables and fruits. As a result of the second year's implementation, the Agro-firm could get their first profit from damaged apples which were used to be sold at throwaway prices. The transaction is not yet completed since the agro-firm is still waiting the best season to sell. The Agro-firm members can see that the Agro-firm can make from its transaction. The Agro-firm is now the decision maker to sell their dried apples, meaning their bargaining power is enhanced. In this point of view, it can be said that the project purpose can be attained. However, it is necessary to keep watching their activities since their marketing activity is just started. To generate more income to recoup the initial investment, further transaction is necessary as shown in the business plan. Marketing of fresh tomatoes and more profitable dried products including apricot is required in the next year's operation. Assumption to the Attainment of the Purpose: The Optimization policy was introduced from December 2009. Purpose of the policy is to reorganize farmland to materialize effective farm management. The *Hakimiyat* has an obligation to implement the policy in their jurisdiction, and have to merge inefficient farmlands to promising farm owners. According to the Agro-firm members, After the 1st optimization in December 2009, 170 farmers in Taqirkol VCC had reduced to only 98 farmers. For the Agro-firm members, 4 farmers out of 20 core members could not keep their farmland. It is said that the policy will be implemented again in 2010, and many farmers feel fair for the policy implementation. If the remaining core members of the Agro-firm lose their farmland, it is possible that the Agro-firm's operation will be run upon the sunken rock.
Efficiency (C)	Timing of Input: Due to the delay of project activities in 2009, particularly that of identifying land plot for processing facility and land title transfer, rehabilitation of the facility did not start until October 2009, resulting in delay of procurement of processing equipment. Timing of Activity: Due to delay of the rehabilitation of processing place and the procurement of processing equipment, the first year's operation of dried food processing using their own equipment had to be canceled and the farmer members lost their income generating opportunity in 2009. Investment Cost: The total investment cost of the processing activity is 24,540 thousand sum, which is composed of; 1) processing equipment, 2) building rehabilitation, 3) shallow well installation, and 4) office equipment. The investment cost can be compensate within 6 years if the Agro-firm successfully operate their processing and marketing activities based on the business plan. In this regard, project cost for the processing activities is enough reasonable comparing with the project output.
Impact (A)	Spillover effect: Other farmers in Nukus district faces the same problem as the one target group faces. Therefore, once the firm can establish a business model to make profit from the collective marketing and processing of vegetables and fruits, it is enough possible that their business model will be spread over the district. Also, many farmers in the Karakalpakstan faces difficulty in marketing of their agricultural products, and the successful result of the project can be a good model for the other farmers in the Karakalpakstan. Employment opportunity: The successful operation of the Agro-firm can generate employment opportunity in the rural Nukus. At the time of the joint production at Khodjeyli Silk Factory, the factory employed 27 labor/days for cutting and 35 labor/days for drying. According to their business plan, when the Agro-firm start processing activities of dried apricot and dried apples, they will employ at least 67 labor/days for dried apricot and 75 labor/days for dried apple, which provides employment opportunity to the rural residents. Regional Vitalization: If the Agro-firm can show successful operation of vegetable and fruit marketing and generate enough profit to the members, the local government recognizes their existence value and put more importance on their activities. In addition, other vegetable and fruit growers encourage in their activities, which may result in re-vitalization of the former production center of vegetables and fruits under the Soviet era.

Sustainability (B)	Adequacy as a model: In the course of the project implementation, the firm accumulates lots of experiences, from the establishment procedures of the Agro-firm to the making a profit from their activities. Among their experiences, many difficulties such as lack of leadership of past directors and unstable utilities as a bottleneck of their operation are included. All these experiences are now in their hand. Therefore, the Taqirkol-Darbent Agro-firm can show how to establish the agricultural marketing organization, and can be a good model to the followers. Killer Assumption: There is a fear among small-scale vegetable and fruits growers that the local government merges small farm plot to larger farmland to increase farming efficiency. The fear is based on the government order for land integration, so called optimization, which was implemented by the end of year 2009. If the policy is executed again, the existence value of the Agro-firm, which intends to materialize small-holder's collective marketing, would be lost. Also, the director of Agro-firm is nominated by the *hakim*. At the initial stage of the pilot project, the position had changed four times, due to political reason in most cases. Through this experience, it is enough possible to see that the director of Agro-firm will be changed whenever *hakim* is changed. If the next *hakim* changes the Agro-firm director based on his political interest, independency of the Agro-firm could not be kept and sooner or later the firm's healthy management will be lost. Ownership: At the initial stage of the pilot project, lack of ownership among key staff of the Agro-firm was observed. During the first-year operation, the Agro-firm director had been changed four times, and nobody show leadership to the firm's operation. Rather, they often showed a waiting attitude to the Study Team's support until the assignment of the leader farmer to the deputy director. In this regard, assignment of an active leader farmer to the board is a key to activate the Agro-firm. The leader farmer can involve fellow farmers to his operation, which may neuter a sense of ownership among members.

Notes; A: Confirmed, B: to be expected, C: Needs more efforts

(6) Lesson Learned

1) Importance to find key person for the Agro-firm operation

The strong leadership is quite important particularly at the initial stage of the business. However, the past directors did not show positive attitude toward the Agro-firm's operation, the Agro-firm's director was changed four times during 6 months of the set-up stage, which in turn result in the lengthy delays of the project activities. After joining a leader farmer to the board members, substantial activity of the Agro-firm had started. Now he is the deputy director of the Agro-firm, and is absolutely necessary person for the Agro-firm's operation. It is sure that success of the Agro-firm can not obtain without him. Lesson learned from this experience is the importance of identifying a key person for the success of agri-business operation.

2) Necessity of the demand oriented services

During the first year project implementation, farmer members showed their strong interest in the pest and disease control. For this reason, the project added the plant protection activities from the second year. At the time of final evaluation workshop, farmer participants expressed that the most useful activities was plant protection including bio-pesticide application and charcoal vinegar production. Therefore, to provide demand oriented services to the farmer members is quite important to attract farmer members to the Agro-firm's activities, and to gain their full cooperation.

3) Poor utility conditions in rural Karakalpakstan

Unstable supply of electricity and water is bottleneck of food processing factory in Nukus district. To overcome this drawback, the Agro-firm decided to collaborate with other factories located in the better operating environment. Also, domestic water from public network is available only one hour in Taqirkol. Therefore, the Agro-firm had to fix water tank in the processing plant to store water when it is available. Working with other factories in the urban area, including Khodjeyli and Amudarya Agro-firms, is also one of solution of the problem.

4) Necessity of production diversification

As far as the Agro-firm deal with agricultural products, it is necessary to diversify their products to cope against unexpected factor. Dry apricot production was initially planned in June, but the activity has to be canceled due to the cold wave in March, which damage on 90% of apricot flower. As a result, market price of apricot (4,500 sum/kg) becomes 20 times higher than the last year (200 sum/kg). The lesson from this experience is necessity of products diversification to reduce risk against natural disasters.

5) Ensuring Independence from the Government

Director of Agro-firm is nominated by the *hakim*. Therefore, it is enough possible to see that the director of Agro-firm will be changed whenever *hakim* is changed. The Agro-firm is neither a political supporter nor a political tool, but a business entity which tries to maximize its profit through executing their activities based on business plan and contract obligations, and through utilizing their resources rationally and reasonably. The Presidential Decree # 3709 issued on January 9th, 2006, ensures the political independence of the Agro-firm. If the firm receives political interference from the government continuously, the Agro-firm does not work enough, and will be broken down eventually.

5.3.7 Environmental and Social Considerations for Pilot Project Implementation

(1) Results of Environmental Monitoring

Most of the activities of the Pilot Projects are oriented towards establishment / strengthening of organizations. Furthermore, activities concerning installation / rehabilitation of facilities have been limited to considerably small scale. Therefore, the overall negative impacts by the pilot projects were expected to be relevantly small.

However, in order to ensure that the outcomes of the Pilot Projects meet the results of environmental studies, a set of monitoring plans has been prepared in January, 2009. These plans have been further modified based on the proceedings and the changes of project contents.

Conducted monitoring activities and results are summarized in the following.

Table 5.3.1 Environmental Monitoring Activities and Results

Pilot Project	Item to be monitored	Index	Method	Results
Dairy Promotion Package Project (including small-scale milk processing)	Milk processing facility is equipped with simplified septic tank of appropriate size	Facility Plan Operation status	Check facility plan Site reconnaissance	Simplified septic tank installed and operating
	Facility cleaning plan is prepared and executed as appropriate	Situation of facility cleaning plan Situation of regular cleaning	Check cleaning plan Check cleaning record	• No specific cleaning plan • Regular cleaning before and after processing activities • Use of Hypochlorite salts, Sodium Bicarbonate and household detergent for sterilizing and cleaning
Project for Improving water management in internal canal system and water use in the field	Contents of construction work is explained to and agreed with local residents	Situation of explanation	Record of explanatory workshops	Explanation made in workshop held in March 2009
	Watering of construction sites is being done when necessary during works near residents.	Situation of residential areas	Site reconaissance	Residential area not located within 50m from major construction sites.
	Operation of construction machines is limited to daytime of working days	Situation of machine operation	Site reconnaissance	• Operation of machines limited to daytime. • Works on weekends occurring at limited extent.

Model Agro-firm Establishment (including small-scale vegetable & fruit processing)	Vegetable & fruit processing facility is equipped with simplified septic tank of appropriate size	Facility Plan Operation status	Check facility plan Site reconnaissance	Simplified septic tank installed and operating
	Waste born in the process of vegetable & fruit processing is appropriately treated, such as by incineration within own premise	Facility Plan Operation status	Check facility plan Site reconnaissance	• Regular works not started. • Waste born by several tens of kilograms. • This has been buried in site adjacent to facility. • Temporary dumping site not constructed.
	Facility cleaning plan is prepared and executed as appropriate	Situation of facility cleaning plan Situation of regular cleaning	Check cleaning plan Check cleaning record	• No specific cleaning plan • Regular cleaning before and after processing activities, however, not thoroughly practiced. • Claims of neighboring residents on odor when drying onions.

Delay was found for the preparation of cleaning plan and installation of temporary dumping site for the Model Agro-firm Establishment Pilot Project. However, taking into regard that the facility is under test operation, negative impact was found to be minor. These items would be necessary before starting full-scale operation of the facility. In overall, the management of environmental and social aspects of the Pilot Projects was evaluated to be carried out in appropriate manner.

(2) Implementation Status of State Environmental Examination

State Environmental Examinations were conducted for the implementation of four Pilot Projects. All four projects were considered to have insignificant negative impact to the environment due to the nature of the Project Site, and the relatively small scale of activities. In addition, further follow-up or detailed environmental studies are not required under environmental legislation.

Table 5.3.2 Results of State Environmental Examination

Pilot Project	Status	Remarks
Verification of Improving Internal Canal System and Water Management by WUA	Approved (17.03. 2009)	Follow up / further detailed studies not required
Verification of Improving Water Use and Drainage Condition in the Field	Approved (03.06.2009)	Follow up / further detailed studies not required
Small-scale Milk Processing component of Diary Promotion Package	Approved (06.04.2009)	Follow up / further detailed studies not required
Small-scale vegetable & fruit processing component of Model Agro-firm Establishment	Approved (16.04.2010)	Follow up / further detailed studies not required

5.4 Results of Pilot Projects

5.4.1 Conclusion of Verification Study and Considerations for Formulating Action Plan

Several topics had been verified or confirmed through the implementation of the Verification Study and the following points are required to be reconsidered and to be modified if necessary the contents of draft Action Plan.

No	Action Plan	Considerations for Formulating the Action Plan	PP*
141	Improvement of Agricultural Extension Service to *Fermer*	Confirmed that the inter-agency working committee could smoothly function as a coordination body	(1)
		Considered that the technical manual could be developed by local human resources	(1)
		Confirmed that almost *fermers* could understand the technical manual	(1)
		Confirmed that most of the trained agro-college teachers could understand the technical manual well	(1)
		Considered that agro-college teachers could be a good human resources for activating agricultural extension	(1)
		Considered that agro-colleges should be involved in agricultural extension together with research institutions	(1)

151	Research and Development of Melons and Apple	Confirmed that forcing by plastic tunnel, seedling raising and some new varieties might be promising for melon	(2)
		Considered that melon-flies could be controlled to acceptable level by locally available pesticides	(2)
		Confirmed that quality improvement and reduction of pest damages of products must be preconditions for development of agro-processing industry	(2)
		Confirmed that demonstration production and field-days provided an opportunity to start exchanging information between researchers and *fermers*	(2)
		Considered that strategic consideration should be paid for introduction of technologies based on technical and economical feasibility on a long-term basis	(2)
		Considered that the policy to make an economic autonomous body of research institutions should be loosened in order to utilize the existing human resources and facilities & equipment fully	(2)
161	Strengthening of Women's Vegetable Production in *Tamarka*	Confirmed that almost participants felt their technical improvement in vegetable production	(3)
		Confirmed that simple and practical technologies were effective for improvement in *tamarka* production	(3)
		Confirmed that the participants were motivated by competition among them and started to share market information, etc.	(3)
		Confirmed that bargaining power of small-scaled growers increased through group production and marketing	(3)
		Confirmed that leaders of women's committee were enough capable to coordinate members for the project	(3)
		Confirmed that local specialists, e.g. agronomists were valuable human resources for implementing the project	(3)
		Considered that availability of irrigation water (volume & timing) should be a critical factor for *tamarka* production	(3)
211	Fodder Production	Confirmed that *dehkans* could save the cost for forage through collective production of sorghum and alfalfa	(4)
		Confirmed that milk productivity of cow increased by introducing silage	(4)
261	Training Program on Animal Husbandry	Confirmed that almost *fermers* and *dehkans* felt that they could master animal husbandry technologies after the training	(4)
		Confirmed that the test score on animal husbandry technology of extension workers remarkably increased after the training	(4)
311	Improving Internal Canal System	Confirmed that WUA and its members could improve their water management by operating the improved internal canal system.	(5)
		Confirmed that the external financial support is indispensable for the full-scale rehabilitation of the internal canal system.	(5)
		Confirmed that minute and flexible water distribution through introducing rotational water use and improving water management in the field will contribute to cope with water use in the water shortage condition.	(5)
312	Strengthening Water Management in the Field	It is necessary to give more effort to increase the awareness of WUA and members on water measurement and record keeping in the water management.	(5)
		Combination of counter furrow irrigation (applying water from both sides of furrow) and land leveling was promoted to famers as a field irrigation technology, in consideration of the balance of economic water use and irrigation planning. Most participants expressed their strong interest in the improved practice and intention to introduce to their farm in the next vegetation period.	(5)
		Confirmed that minute and flexible water distribution through introducing rotational water use and improving water management in the field will contribute to cope with water use in the water shortage condition.	(5)
		Confirmed that visualization of water distribution contributes to increase the sense of fairness among water users. Water measurement and record keeping are to be fulfilled from the aspect of visualization.	(5)
321	Introducing Water Saving Technology	Confirmed that the improved technologies demonstrated in the technical seminar were attractive and acceptable to water users and most participants expressed their strong interest in the improved practice and intention to introduce to their farm in the next vegetation period.	(5)
331	Improving Drainage Conditions in the Field	Confirmed that the improved technologies demonstrated in the technical seminar were attractive and acceptable to water users and most participants expressed their strong interest in the improved practice and intention to introduce to their farm in the next vegetation period.	(5)
341	Strengthening WUA and Enhancing Its Activity	Confirmed that the first priority in the business plan shall be paid to staff salary to secure active staff for water management in the field for a while. Leaders of water users shall be cultivated as well as securing the active staffs of WUA.	(5)
		WUA showed its ability on operating mechanical work and daily maintenance of machinery, and confirmed that operation of mini-excavator by WUA is effective for increasing water fee collection as well as canal maintenance.	(5)
		Confirmed that WUA shall manage its territory adequately and enhance the control of canal lot. It was also confirmed that it is important to clarify the responsibility of WUA and water users for irrigation facilities.	(5)

		Confirmed that establishing supply system of parts and materials for pump, gate structure, tractor (mini-excavator), etc. in order to fulfill the adequate management and operation.	(5)
		Confirmed that equipping PC to WUA will contribute to show the importance of WUA and its activity and to raise up member's expectation to WUA, as well as to increase capability of WUA in water management.	(5)
		It is necessary to consider ad hoc maintenance work of canals by famer's contribution under coordination of WUA at moment. However, it was confirmed that it shall be shifted to the maintenance based on the business plan of WUA.	(5)
411	Joint Marketing by Farmer Group (Model Agro-firm Establishment)	Effectiveness of the business model to enhance bargaining power of the small-scale farmers was confirmed, through the experience of joint production of dried apple and collective action of marketing.	(6)
		Economic benefit from collective action for marketing was confirmed, through the experience of joint production of dried apple and collective action of marketing.	(6)
		Importance to find key person for the Agro-firm operation was confirmed.	(6)
		Confirmed that to provide demand oriented services to the farmer members is quite important to attract farmer members to the Agro-firm's activities, and to gain their full cooperation.	(6)
		Confirmed that ensuring independence of management of agro-firm from the Government is essential for promoting agro-firm establishment.	(6)
		Confirmed that Business Incubator, which has experiences and know-how regarding market information and support for management, is appropriate to take the role of marketing support to agro-firms.	(6)
431	Improvement on Small-scale Agro-processing Technologies	Effectiveness of the business model to enhance bargaining power of the small-scale farmers was confirmed, through the experience of joint production of dried apple and collective action of marketing.	(6)
		Economic benefit from collective action for marketing was confirmed, through the experience of joint production of dried apple and collective action of marketing.	(6)
		Applicable and acceptable processing technologies for vegetable and fruit were identified through the marketing survey on target products, method of processing, usage and form of the products, and their price range.	(6)
		Confirmed that unstable supply of electricity and water is bottleneck of food processing and that it is required to consider to collaborate with other factories located in the better operating environment in order to overcome this drawback.	(6)
		Confirmed that as far as the Agro-firm deal with agricultural products, it is necessary to diversify their products to cope against unexpected factor such as natural disasters.	(6)
		Confirmed that a modern milk plant with the capacity of 500lit/day created jobs for 11workers	(6)
		Evaluated that FIRR of the milk plant would be 29% based on a calculation with the present market price of milk	(6)
433	Improvement of Food Safety Technologies	Confirmed that it required careful preparation to get certifications or approvals from agencies concerned in food processing industry	(6)
		Confirmed that milk producers did not have an adequate sense of hygienic management in general	(6)

PP*: Pilot Project in which "Considerations for Formulating the Action Plan" were identified.

(1) Development of On-farm Technical Manual for *Fermer*
(2) Trial for Development of Melons and Potential Crops Cultivation
(3) Pilot project for the promotion of Women's Vegetable Production in *Tamarka*
(4) Dairy Promotion Package Project (including small-scale milk processing)
(5) Improving Water Management in Internal Canal System and Water Use
(6) Model Agro-firm Establishment (including small-scale vegetable and fruit processing)

5.4.2 Follow-up for Future Continuation of Pilot Project Activities

The Pilot Projects implemented in the Study ended all activities in October 2010. However, some activities, such as small-scale milk processing, small scale vegetable and fruits processing, are expected to be continued by the participants of the project. Furthermore, continuous/expansive implementation of certain activities are expected to enhance the agricultural production and economic activities, even apart from the Master Plan / Action Plan itself. In order to realize such situations, support of the Government of Karakalpakstan is particularly required for the following.

(1) Development of On-farm Technical Manual for *Fermer*

Though the developed on-farm technical manual was distributed to *fermers*, they did not have an opportunity to be explained the contents systematically due to scaled down of the annual *fermer* training seminars. It is recommended that each district agricultural college shall organize an alternative technical seminar since they have teachers who are familiar with the manual.

(2) Dairy Promotion Package

- Training for *fermer*, *dehkan* and livestock extension workers
  The training for extension workers should be continued to uplift their capacity to enable them to give proper advice on animal husbandry technology to *dehkan* and *fermer* to increase livestock productivity. In the same way, the training for *fermer* and *dehkan* should be also continued.
- Collective fodder production
  Dehkan should be supported to make stable their forage production. It will be better to set up institutional system involving *Hakimiyat* office, *dehkan* and *fermer* groups, and Department of Animal Husbandry of MAWR of Karakalpakstan.
- Milk processing
  Though being small-scale, the JICA Study established a modernized and sanitary milk plant at Kerder VCC in Nukus. This small milk plant will become a good sample to extend the same ones in other districts. The Karakalpakstan government should follow up milk processing activity in the site with provision of stable electricity and water supply and marketing of processed milk.
- Extension of silage making
  Silage making is going to extend to Chimbay district in 2010 as effectiveness of feeding silage was confirmed through the pilot project. Therefore, Veterinary Department and animal Husbandry department should to follow up this activity to extend silage making in a part of extension services.

(3) Improving Water Management in Internal Canal System and Water Use in the Field

- Set the project site, Katlaban block, as a model area of improvement of water management and continue to improve activity of WUA and farmers by guidance and instruction.
- Monitor the effectiveness of improving water management in the water shortage condition by reducing time required for water conveyance to the farms in time operation of water distribution by gate equipment and reducing irrigation time required for one watering in the field.
- Use the verification plot as a model farm proposed in the Action Plan for demonstration of water management in the field such as use of division box, land leveling and field irrigation technology.

(4) Model Agro-firm Establishment

- Keep monitoring impact of the optimization policy on the Agro-firm operations
- Entering into contract with electricity, water and gas companies, and stable supply of utilities to the Agro-firm building
- Acquisition of sanitary and other certification of the processing facilities and products from the authority

5.4.3 Required Modification of the Draft Master Plan and Action Plan

(1) Development of On-farm Technical Manual for *Fermer*

There is some doubt expecting the annual *fermer* training seminars at district level as a reliable tool to disseminate contents of the developed manual to *fermers* under the present situation. An alternative tool which will be able to work without a huge additional budget on sustainable basis should be incorporated into the action plan. Also, a practical system which makes good use of resources of district agricultural colleges in agricultural extension shall be designed.

(2) Trial for Development of Melons and Potential Crops Cultivation

The number of Agro-firm established in Karakalpakstan is low and activities of the Agro-firm are still stagnated. Although the pilot project implies that the extension activities were effective, target farmers for extension works would be little in the extension approach. Therefore, farmers who are not member of the Agro-firm but have motivation to improve their cultivation technologies need to be involved to target of the extension works. In this case, agriculture colleges may become players as extension service provider and also provide demonstration cultivation in their territory. It means that the agriculture colleges are windows for motivated farmers to get agricultural information.

(3) Promotion of Women's Vegetable Production in *Tamarka*

The *Makhan-kenes*/VCC chairman and Women's Committee in the areas had initiative to coordinate the residents and arrange events in the pilot project. The coordination and arrangement were done well. Therefore, VCC chairman and Women's Committee may be able to work instead of the Initiative Group. And the participants may be able to assist the chairman's activities.

Gathering the Participants within one *aul* was a little trouble in the pilot project. As a result, the Participants were residents in several *auls* in one *Makhan-kenes*/VCC but within walking distance each other. There was no trouble to communicate each other. Therefore, it is better that the area is flexibly modified within walking distance, although one *aul* is a standard of project area. Participants of the interchange meetings can be basically residents within the *Makhan-kenes*/VCC that can easily communicate each other.

(4) Dairy Promotion Package

It is considered that modification of the preliminary draft of Action Plan for the Dairy Promotion Project is not necessary in principle because the dairy promotion project is designed as package project covering from fodder production to marketing of processed milk inclusive of training for *fermer* and *dehkan* and livestock extensionists, which are necessary means to increase productivity and total production of animal in Karakalpakstan.

(5) Improving Water Management in Internal Canal System and Water Use in the Field

1) Program for Improving Internal Canal System

For maintaining the improved system, it is necessary to consider ad hoc maintenance work by famer's contribution under coordination of WUA at moment. After the financial condition of WUA starts to improve, it shall be shifted to the maintenance based on the business plan of WUA.

2) Program for Strengthening Water Management in the Field

The combination of land leveling and improving irrigation practice in the field such as counter furrow irrigation, which will contribute to increase water use efficiency as well as reducing labor work and time required for water applying in the field, will be proposed as a technology for improving water management in the field. Technical seminars will be proposed to combine with the model farm and extension activity of the Program for Introducing Water Saving Technology and Improving Drainage Conditions in the Field, in order to increase the effectiveness.

Enhancing famers' awareness on the record of ordinary operation of water division and clarifying the responsibility of WUA and users for record keeping will be focused in the seminar.

3) Program for Introducing Water Saving Technology and Program for Improving Drainage Conditions in the Field

Land leveling is considered as a key technology to be widely and immediately developed among field water management water saving technology and drainage condition in the field. Preparing construction machinery and preference credit system which are able to apply for land leveling are required to start to prepare immediately.

An optimum water use for leaching according to the soil and salinity condition shall be promoted to avoid affects of over irrigation. Technical consultation for optimum leaching will be provided by ISD and MAWR of Karakalpakstan branches in coordination with the model farm activity. Karakalpakstan HME is expected as a source of technical information on salinity conditions.

4) Program for Strengthening WUA and Enhancing Its Activities

Appointing necessary staff for water management shall be set as a first priority among the activities. As an immediate measure, support of human resources from ISD and entrusting a part of operation to farmers under the clear rules are considered.

Management of canal lot by WUA shall be enhanced as well as preparation of inventory and technical information for operation and maintenance work. It is required to clarify the rules of use of canal lot and enhancing farmers understanding through general/regular meeting of WUA and technical seminars in the Actions.

Equipping mini-excavator to WUA is expected to increase reliance and expectation of farmers to WUA's service as well as increase WUA's ability on canal management. Due to a large investment in total, it is proposed to implement in combination with repairing existing machinery belongs to WUA and renting construction machinery and providing machinery service.

Amount based tariff of water fee is considered difficult to introduce at moment due to lack of human resources of WUA for water measurement and keeping record. It is necessary to make effort to increase water fee collection under the present area based tariff system for a moment.

(6) Model Agro-firm Establishment

1) Implementing Body

In the initial action plan, Fermer's Association is included in the working group to take on marketing support. However, the association was not involved in the project activities. Rather, Business Incubator is appropriate to take the role. At the district level, *Hakimiyat*, the Business Incubator (BI), and board members of the newly established Agro-firm should be included in the working group.

2) The BI's active involvement to establish Agro-firm in other district

To expand the *Taqirkol-Darbent* Agro-firm's experiences to other district, the Business Incubator can be a good guide since the business support organization also shares the firm's experiences as a contractor of the Study Team. The Business Incubator monitored and supervised al project activities, and provided advices from view of business support entity. Therefore, it is recommended that utilizing the Business Incubator's know-how is one of short cut to the successful expansion of the *Taqirkol-Darbent* Agro-firm's experiences to other district.

5.4.4 Other Issues Concerning Project Implementation in the Region

(1) Poor Social Infrastructures

1) Poor Rural Infrastructure for Agro-industry Development

To avoid the concentration of development activities in Nukus municipality, Pilot Projects are selected in rural area where the main target area of the Study. For the development of agro-industry in rural area, for the improvement of social infrastructure, especially electricity, water and gas supply system, is indispensable.

In the Study Area is not always supplied the electricity for 24 hours. Pump irrigation and processing agricultural and livestock products can not be operated without electricity. Therefore, electric generators were provided for agro-processing and milk processing pilot projects of the Study for uninterrupted electricity supply during processing. Diesel generator operation costs are very high and always face the shortage and raising prices of fuel during the Study.

According to the state electricity supply Nukus district branch, rural electricity supplied from national electricity grid, and distribution volume is limited at 50000 KWH/day. In general, electricity supply in rural area is intercepted 2 hours during lunch time. The distribution priority is set the first category for hospitals and special offices, the second category for milk plant, greenhouse, etc. and third category for agriculture. As for as milk, and agro-processing programs are concerned, they can be supplied electricity depend on the request as the second priority. Government owned Irrigation pumps also can be supplied based on the request during irrigation season.

All of Pilot Project sites, rural water supply system are not installed and only private well is the source of water for living. Rural water supply is operated at some area in Nukus District. Taqirkol VCC, where the agro-processing program locates has rural water supply system connected with national water supply pipeline. It can be connected to the processing factory but its supply is limited only few hours a day and volume is limited.

State owned Gas Supply Company distributes the gas to most villages in Karakalpakstan. Gas pipeline to Kerder, where milk processing plant of the Study locates, is under construction to increase the distribution capacity based on the increased demand.

2) Improvement of Banking and Short Term Credit System

According to the Government regulation for the financial means of technical assistance, grants and humanitarian assistance of foreign governments and non-government organization, the payment of transferred to Uzbekistan contractor by donor country or organization shall be monitored by the Grant Committee of the Government (hereinafter referred to as “the SGA system”).

Under the SGA system, it is required minimum one month to withdraw from their special bank account after received transferred disbursement of contracts from the headquarter of Study Team in Tokyo. This two to three months waiting the approval is big damage for the project to be completed within short period such as this Pilot Project of JICA. This caused the delay of projects/activities with the sub-contractors in the Pilot Project who has less stock of saving for required project expenses. It is expected to shorten the assessment period of the Grant Committee and early approval for withdrawal of the sub-contractors from their special bank account. Otherwise, investment of the technical assistance with the short period projects such as the technical cooperation of JICA can not implemented. In order to the smooth implementation of projects, more accessible short term credit of bank will be arranged as a countermeasure for SGA.

For the procurement of equipment from foreign manufacturer such as milk pasteurizer for the Study, there are also difficulties for the Uzbek suppliers or agents for receiving and payment transfer under the Government foreign currency control.

(2) Local Human Resources and Sub-contractors for Project

1) Capability of Local Human Resources and Sub-contractors

The Study Team conducted Pilot Projects together with 10 subcontractors and 2 suppliers. All of subcontractors are companies/organizations/NGOs located their head office in Karakalpakstan. Through the implementation of Pilot Project, the Study Team found that their staffs have almost sufficient knowledge with high academic carriers to implement their services. But it is necessary to improve their management especially monitoring of the process and accounting with the traceability, accountability and compliances regulations.

Subcontractors for Manual preparation and Trial cultivation

Recently, academic researchers in Uzbekistan had less chance to apply their carriers because of the Government policies and budgets. Two Pilot Projects in the Study, on-farm technical manual and trial cultivation, are expected to conduct the project with highly academic knowledge due consideration with the conditions of farmers. Participants are prepared the outputs with their higher academic knowledge. It is found there are sufficient human resources with academic carriers in Karakalpakstan, how to involve them in the regional development shall be considered by the Government.

Subcontractors for consulting services

Three sub-contactors for guiding, supporting, training participants and monitoring activities in each Pilot Project have experiences work together with international organization/institutions. Most of them performed almost enough services except on their financial shortage during services under the SGA system of the Government. Until they get permission to withdrawal of their initial payment transferred by the Study Team, their activities were slow and items to purchase material/equipment under their contract could not realized on time. As a result, they could not complete the services before termination date of contracts. Two sub-contractors among them are not familiar with the services, not full understanding the scope of works of the contract and some activities were prepared by the Study Team.

Subcontractors of construction

Three engineering subcontractors worked irrigation and drainage and building rehabilitation. Even though they completed the works, but their performances were very low, especially on their quality management of technical and financial. They have not the common sense as a contractor. They did not prepared the construction plan including the arrangement of the human resource, required equipment and material for construction together with fund for expenses. This is one of the reasons the completion delayed together with farmers' cultivation and irrigation. The Study Team held the weekly coordination meetings among sub-contractors together with monitoring subcontractor. It was not effective to implement the construction on schedule. The contractors need more experienced and qualified engineers to control and monitoring their quality and administrations. In case of the large scale construction work is expected contractors shall be selected among national or international contractors. Other major reasons are subcontractors' financial conditions. They have less capacities of their own fund for the project implementation. Under the SGA system, it is required minimum one month to withdraw from their bank account after received disbursement to contracts from the headquarter of Study Team in Tokyo. In order to the smooth implementation of construction, more accessible bank short term credit will be arranged.

2) Participants and farmers' Organization in the Pilot Project

The Government agriculture reform under the transitional stage and agriculture optimization is underway since 2009. In the Pilot Project Area, several *fermers* of the Pilot Project participants were lost their agriculture lands in 2009. *Fermer* participants worry so much they loose their field by the next optimization. It is expected early competition of the agriculture optimization.

Even though many project on the health and sanitary improvement conducted in Karakalpakstan, rural people in the Pilot Project area do not pay attention to the sanitation. Especially on the milk processing scheme of the Pilot Project, milk processing workers' have less awareness on hygienic for their food processing and processing plant. It needs more health and sanitation health awareness campaign shall be continued in rural area in parallel with the Regional Development Project to be formulated by this Study.

3) Collaboration with External Resources Persons and Organization for the Rural Development Project

Through the implementation of milk processing program, we found many governmental organizations concerning food processing in Uzbekistan and Karakalpakstan working under the laws on food processing such as Uzstandard, Republican Sanitary and Epidemiology Station, Association for Meat and Milk Products. The Pilot Projects were implemented under the collaboration with relevant organizations. Linkage of these organizations and personal linkage was developed. These experiences will be effective for the further implementation of Regional Development Project

Table 5.2.1 Selection of Pilot Projects Based on the Criteria (1/3)

Development strategy		Program/Project		Activities		Items to be verified	Items that can be verified within the time span of Pilot Projects	Items that require actual implementation of Activities for verification	Items that can be verified through small-scale implemenaion	Activities that do not requre institutional reforms	Items to be verified through Pilot Projects
1-1	Improvement of Soil Conditions for Sustainable Production	111	Establishment of Crop Rotation System and Supply of Manure	1111	Soil survey	-	-	-	-	-	
				1112	Development of a comprehensive program	-	-	-	-	-	
				1113	Arrangements with the central government	-	-	-	-	-	
				1114	Research on alternative crops	-	-	-	-	-	
				1115	Expansion of farmland under crop rotation	-	-	-	-	-	
1-2	Improvement of Agricultural Technologies and Agricultural Business Management of Fermer	121	Improvement of Agricultural Extension Service to Fermer	1211	To establish and manage a committee to develop agricultural technical manuals	Smooth coordination system to implement joint works to develop the manual by concerned agencies	○	○	○	○	○
				1212	To edit, print and distribute agricultural technical manual (10,000 copies)	Appropriate technical level of the manual to fermers	○	○	○	○	○
				1213	To train teachers of agricultural collages	Validity of training to teachers of district agricultural collages to deepen their understanding of the manual	○	○	○	○	○
1-3	On-Time Planting through Efficient Agricultural Works	131	Promotion of renewal of agricultural tractors	1311	To introduce favorable lease system for fermers to procure agricultural tractors	Affordable lease conditions to general fermers in Karakalapakstan				○	
						Necessary improvement in business management for the lease company to meet the increased customers		○			
				1312	To renovate workshop facilities and equipments of MTPs	-	–	–	–	–	
				1313	To train mechanical staff of MTPs	Appropriate training contents to mechanical staff to make them familiar with facilities/equipments and models of tractors		○	○	○	
1-4	Improvement of Agricultural Inputs Supply System	141	Improvement of Accessibility to Agricultural Inputs for Agricultural Producers	1411	To assist in establishing “One Stop Agro-inputs Shops” (Targets: 10 shops to cover the 11 districts)	Applicable business model to manage an attractive "One Stop Agro-inputs Shop" to local customers		○	○	○	
						Effectiveness of FA's consultation activities to bridge producers/agents to "One Stop Agro-inputs Shops"		○	○	○	
				1412	To provide a credit for supporting initial running costs of the “One Stop Agro-inputs Shops”	-	–	–	–	–	
				1413	To provide consultation about establishment and management of the “One Stop Agro-inputs Shops	Effectiveness of FA's consultation activities to bridge producers/agents to "One Stop Agro-inputs Shops"		○	○	○	
						Appropriate logistic distribution system of inputs from producers/agents to "One Stop Agro-inputs Shops"		○	○	○	
1-5	Promotion of Crop Diversification and Production Center Development	151	Research and Development of Melon and Apple	1511	To establish trial and demonstration field equipped with facilities	-	–	–	–	–	
				1512	To study and research production technologies of melons by joint research	Priority production technologies to be researched and developed for promotion of melons	○	○	○	○	○
						Adaptability of potential melon varieties for local conditions	○	○	○	○	○
				1513	To produce melon seeds of recommended varieties	Possible seed/scions multiplication and distribution system of promising varieties		○	○	○	
				1514	To study and research production technologies of apple by joint research	Priority production technologies to be researched and developed for promotion of apple		○	○	○	
						Adaptability of potential apple varieties for local conditions		○	○	○	
				1515	To maintain mother plants of recommenced varieties of apple	Possible seed/scions multiplication and distribution system of promising varieties		○	○	○	
				1516	To provide seeds/scions and agricultural technologies mainly to agro-firms	Possible seed/scions multiplication and distribution system of promising varieties		○	○	○	
						Possible extension approach to bridge research institute and the Agro-firm for promotion of melons	○	○	○	○	○
						Applicability of potential production technologies to the Agro-firm		○	○	○	
1-6	Promotion of Vegetables Production and Sales for Local Markets by Good Use of Tamarka	161	Strengthening of Women’s Vegetable Production in Tamarka	1611	Select target VCCs.	Whether demonstration technologies efficiently extend to dekhans around model dekhans or not?	○	○	○	○	○
				1612	Setup model farms						
				1613	Technical seminars/ supports (seminars and demonstrations).						
				1614	Interchange tour						
2-1	Increase of forage production and nutrition improvement	211	Fodder Production	2111	Rotational cropping (including distribution of alfalfa seeds, and AI service for selected 500 fermers)	Effectiveness of rotational cropping with alfalfa and crops on soil improvement and fodder production	○	○	○	○	○
				2112	Strengthening of alfalfa seed production in 50 ha at SRIC	Effectiveness to improve livestock condition and to quality of livestock products				○	
				2113	Collective fodder production by dehkans	Relevance of collective fodder production by Dehkans who have less than one ha	○	○	○	○	○
				2114	Silage production in a fermer farm with silo construction	Effectiveness on milk production in winter season	○	○	○	○	○
2-2	Capacity building of Fermer and Dehkan, and Livestock expert of Veteribary Department	221	Training Program on Animal Husbandry	2211	Provision of training for 105 femers/dehkans (35 trainees x 3 times) per year (1,050 fermers/dehkans for 10 years)	Effectiveness to improve livestock condition and to quality of livestock products			○	○	
				2212	Provision of training for 20 livestock experts per year (200 experts for 10 years)	Effectiveness to improve livestock condition and to quality of livestock products			○	○	
2-4	Breed improvement of livestock, and Mobile Veterinary Services	241	Artificial Insemination and Veterinary Services	2411	Establishment of artificial insemination center in Nukus	Effectiveness to improve livestock condition and to quality of livestock products				○	
				2412	Provision of AI tools and vehicles	Effectiveness to enhance extension activities	○		○	○	
				2413	Fostering of artificial inseminators						
				2414	Provision of vehicles for mobile veterinary service						
2-7	Improvement of fishery through sustainable fishing and aquaculture promotion	271	Sustainable Fishery Promotion	2711	Rehabilitation of Association	Functionning of fisheries association			○	○	
				2712	Establishment of seed distribution system	Effieciveness of assistance by fishery associations			○	○	
		272	Aquaculture Development	2721	Establishment of system for aquaculture development and promotion	Effect of aquaculture promotion		○	○		
				2722	Establishment of aquaculture model for study area	Effectiveness and adoptability of of new system for aquaculture			○	○	

Table 5.2.1 Selection of Pilot Projects Based on the Criteria (2/3)

Development strategy		Project/ Program		Activities		Items to be verified	Items that can be verified within the time span of Pilot Projects	Items that require actual implementation of Activities for verification	Items that can be verified through small-scale implementaion	Activities that do not require institutional reforms	Items to be verified through Pilot Projects
3-1	Effective use of irrigation water though improvement of water management	311	Improving Internal Canal System	3111	Establishing Special Fund for Irrigation Improvement and publication of procedures	-	–	–	–	–	
				3112	Formulating technical guidance for the internal canal system improvement and its publication	-	–	–	–	–	
				3113	Formulating the improvement plan of the internal canal system, preparing application form	Preparation of improvement plan by WUA with cooperation of working group		○	○	○	
				3114	Conducting survey work and facility design based on the improvement plan, preparation of inventory and technical information for operation and maintenance work of the internal canal system	Fully use of inventory and technical information by WUA	○	○	○	○	○
				3115	Cleaning and digging work of internal canal and repairing canal facilities	Improvement of water distribution by equipping gates and water measurement facilities	○	○	○	○	○
				3116	Repairing, renewal and establishing gate and water measurement facilities	WUA's capability to operate and maintain improved internal canal system properly.					
		312	Strengthening Water Management in the Field	3121	Installing division box with water measurement tool (Shandur) at the intakes of farm	Operation of division box and measuring distributed water amount by members Improvement of water management in the canal system by measuring distributed water amount to farms	○	○	○	○	○
				3122	Measuring amount of water distributed to farms						
				3123	Holding technical seminars to members on improvement of irrigation planning and water use in the field						
				3124	Land leveling in the field (Including "Program for Improving Drainage Conditions in the Field")	Effect of land leveling and re-arrangement of on-farm ditches for effective use of irrigation water	○	○	○	○	○
3-2	Increasing productivity of water through introduction of high efficient irrigation	321	Promoting Water Saving Technology	3211	Setting up model farms and extension through operating model farms	Operation of model farms for demonstrating technologies Fermer's acceptability to effective water use, water saving and drainage improvement Motivating fermers to introduce technologies for effective water use, water saving and drainage	○	○	○	○	○
				3212	Setting up consultation desk to fermers on technical and materials for water saving technology	Functioning consultation desk to fermers on technical and materials for water saving technology		○	○	○	
				3213	Research and development of water saving technology and necessary materials	-					
				3214	Preparation of seminar text and materials for extension	Effectiveness of materials to fermers		○	○	○	
3-3	Reduction of damage to crop production from salt through improving drainage conditions	331	Improving Drainage Conditions in the Field	3311	Model farm and extension (Including "Program for Promoting Water Saving Technology")	Effect of land leveling and under drain for increasing leaching efficiency	○	○	○	○	○
				3312	Preparation of technical assistance to Fermers (Including "Program for Promoting Water Saving Technology")	Use of drainage improvement technology by fermers		○	○	○	
				3313	Preparation of support system of material for improving field water management, water saving technology and improving field drainage (Including "Program for Promoting Water Saving Technology")						
				3314	Preparing construction machinery for drainage improvement in the field	Renting construction machinery to femres to carry out land leveling		○		○	
				3315	Preparing preference credit system for drainage improvement in the field	Ability of fermers to pay for drainage improvement work		○	○	○	
				3316	Research and development on effective and efficient leaching technology	-	–	–	–	–	
3-4	Improvement of water management through strengthening WAU and enhancing its activity	341	Strengthening WUA and Enhancing Its Activity	3411	Appointing necessary staffs of WUA for water management	Activating WUA's water management activity	○	○	○	○	○
				3412	Equipping Personal Computer for irrigation planning and WUA						
				3413	Training WUA staffs in operation and maintenance of canal system and planning of irrigation and water distribution						
				3414	Equipping transportations for water management of WUA						
				3415	Formulating regular and mid/long term plan of maintenance work by WUA	Formulating regular and mid/long term plan of maintenance work by WUA		○	○	○	
				3416	Preparation of inventory and technical information for operation and maintenance work	Fully use of inventory and technical information by WUA	○	○	○	○	○
				3417	Equipping construction machinery for canal maintenance work to WUA	Operation of construction machinery by WUA using own machinery or rented machinery	○	○	○	○	○
				3418	Providing spare parts and maintenance service to WUA's machinery						
				3419	Renting construction machinery and providing machinery service for canal maintenance work						
				3420	Preparing supply system of parts and materials for hydraulic structure (gate, gauge, concrete flume, etc.)						
				3421	Activating WUA's communication and coordination for collective works of maintenance	Organizing collective work of members for maintaining canals	○	○	○	○	○
				3422	Improving water fee system and business plan of WUA	Revising water service fee system to amount –base from area-base fee	○	○	○		
				3423	Preparing consultation to WUA on accounting, tax management and legal issues	Increase of WUAs capability in accounting, tax management and legal issues		○	○	○	
				3424	Propaganda and enlighten campaign to members on importance of WUA activity and water fee	Increasing water fee collection		○	○	○	
				3425	Promoting tamarka user's (Dehkan) participation to water management activity through VCC	Organizing tamarka user to participate to water management activity through VCC	○	○	○	○	○

Table 5.2.1 Selection of Pilot Projects Based on the Criteria (3/3)

Development strategy		Project/ Program		Activities		Items to be verified	Items that can be verified within the time span of Pilot Projects	Items that require actual implementation of Activities for verification	Items that can be verified through small-scale implementaion	Activities that do not requre institutional reforms	Items to be verified through Pilot Projects
4-1	Enhancement of bargaining power through collective action of farmers	411	Joint marketing by farmer group (Model Agro-firm establishment)	4111	Establishment of task force	Effectiveness of the project implementation structure	○	○	○	○	○
				4112	Focus group discussion and establishment of agro-firm	Effectiveness for collective action of Fermers and Dehkans	○	○	○	○	○
				4113	Business planning (needs assessment, marketing strategy, study tour, business seminar, technical training, action planning)	Effectiveness to enhance bargaining power of Fermers and Dehkans	○	○	○	○	○
				4114	Products development (collection, processing, packing)						
				4115	Marketing (channel establishment, identifying transport means)						
4-2	Improvement of accessibility to market	421	Improvement of marketing support infrastructure	4211	Holding stakeholder meeting to formulate market improvement master plan	-	–	–	–	–	
				4212	Integration of control system for perishable food	Effectiveness to mitigate congestion at retail section, and to increase farmers' accessibility to market				○	
				4213	Separation of perishable food section and other commodities	Effectiveness to mitigate congestion at retail section, and to improve sanitary condition of perishable foods				○	
				4214	Establishment of cold section	Effectiveness to improve sanitary condition of perishable food, and to increase reliability among buyers	○		○	○	
		422	Small scale slaughterhouse	4221	Construction of small scale slaughterhouses	Effectiveness to improve veterinary and sanitary condition of meat and reliability among buyers	○		○	○	
4-3	Development of processed products	431	Improvement of Small-scale Agro-Processing Technologies	4311	Alleviation of barriers on initial operation and sale of smal-scale agro-procesing productsl	Constrains on operation; transaction mode, collection method, cashflow, quality control, processing season period, negative intervention	○	○	○	○	○
						Consious of consumers for local-made agro-processing product				○	○
				4312	Research on applicable and acceptable small-scale agro-processing technologies including involvement of women	Processing method in different natural and social conditions	○	○	○	○	○
						Commercialization of products using women's idea and workforce	○	○	○	○	○
						Extention of researched products				○	
				4313	Formulation of flamework on promotion of small-scale agro-processing technologies by MAWR	Necessary institutional intervention	○	○			○
						Promotion of local-made agro-processing products to other regions and countries					
						Change of consious for Fermer and Dehkan from production to processing				○	
				4314	Improvement on accesibility of information and procurement of small-scale processing equipment	More comvinient information acquisition in specifications and prices of equipment					
						Application of low interest credit for procurement of equipment					
				4315	Necessary insfrastructural improvement for small-scale processing	Improvement of infrastructure for small-scale processing in benefit/cost base					
						Financial sources					
						Alternative supply of water/gas/power supplies				○	
		433	Improvement of food safety technologies	4231	Review of Food Safety Standard	Appropriateness of current food safety standard	○		○		
				4232	Improvement of Sanitary Control Plan	Appropriateness of current sanitary control method	○		○		
				4233	Capacity Building of VSE (including upgrading VSE equipment)	Effectiveness to uplift food safety technologies and standard			○	○	
				4234	Promotion of Enlightenment Activities	Effectiveness to uplift food safety consciousness of producers and consumers, and to increase reliability of products in market			○	○	
5-1	Strengthrning on Abilities of Local Administration Unit	511	Strengthening of Communication for Local Agricultural Administration	5111	Install information tools (computers etc.) at Hakimiyat and VCC	-	–	–	–	–	
				5112	Train the staff for VCCs	Capacity improvement of staff, necessary within vegetable project	○	○	○	○	○
				5113	Prepare and submit progress reports by VCCs	-	–	–	–	–	
				5114	Joint evaluation meeting	-	–	–	–	–	
		512	Reinforcement of VCC Coordinating Abilities	5121	Setup IG in VCCs	-	–	–	–	–	
				5122	Prepare the activity plan by IG	-	–	–	–	–	
				5123	Support the vegetable program by IG	Availability of IG within vegetable project	○	○	○	○	○
				5124	Monitor and evaluate the vegetable program by IG	-	–	–	–	–	

Table 5.2.2 Planned and Actual Implementation Schedule (1/2)

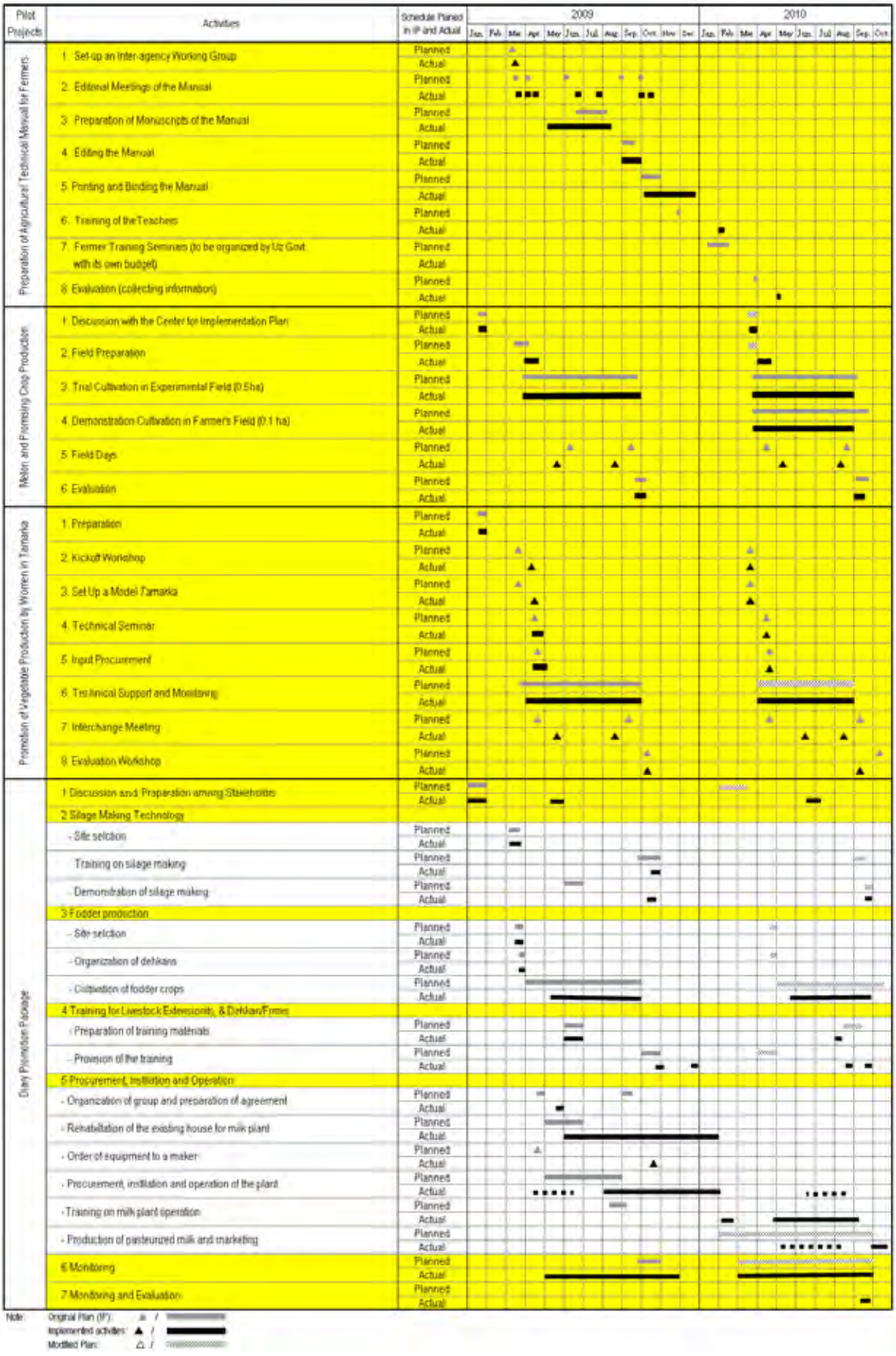


Table 5.2.2 Planned and Actual Implementation Schedule (2/2)

CHAPTER 6 REGIONAL DEVELOPMENT PLAN

6.1 Master Plan for Regional Development

6.1.1 Necessity of the Regional Development

(1) Objectives and Contents of the Study

Karakalpakstan is located at the most northern and western part of Uzbekistan and most of the area is covered by desert or salty wet land around the Aral Sea. The dry climate of the region implies that agriculture can only be done under irrigation which the source is diverted from lower reaches of the Amudarya. Under these sever natural conditions, the regional economy of Karakalpakstan is one of the least developed area in Uzbekistan indicating the share of GDP at 2.3% of Uzbekistan, GRP per capita (2004) at 44% of Uzbekistan's average, high poverty ratio (2002) at 36.4% comparing to 27.5% of Uzbekistan.

As stated in the Scope of Work (S/W) of the Study agreed and singed between the government of Republic of Uzbekistan and Japan on April 27th, 2007, the objective of the Study is to formulate the Master Plan on the regional development in Karakalpakstan. Also it was agreed that the Master plan shall 1) focus mainly on agriculture sector in Karakalpakstan, 2) be utilized in to formulate the "Program on Social and Economic Development of Republic of Karakalpakstan", 3) target the *fermer* and *dehkan* based on the market economy. The draft Action Plan to implement the Master Plan is to be verified through the pilot projects on the course of the Study.

Additionally, it was agreed that the central government controlled/managed crops such as cotton and wheat but also the primary irrigation and drainage system are excluded because the Master Plan is to be implemented by the Government of Karakalpakstan

(2) Necessity of the Regional Development Master Plan

The problems faced on the agriculture and animal husbandry, including livelihood of *fermers* and *dehkans* and their opinions to solve the problems, were identified through field survey, several workshops, interviews and questionnaire survey. Participants of workshops identified themselves what they can do to solve the problems, but some of them required supports of government.

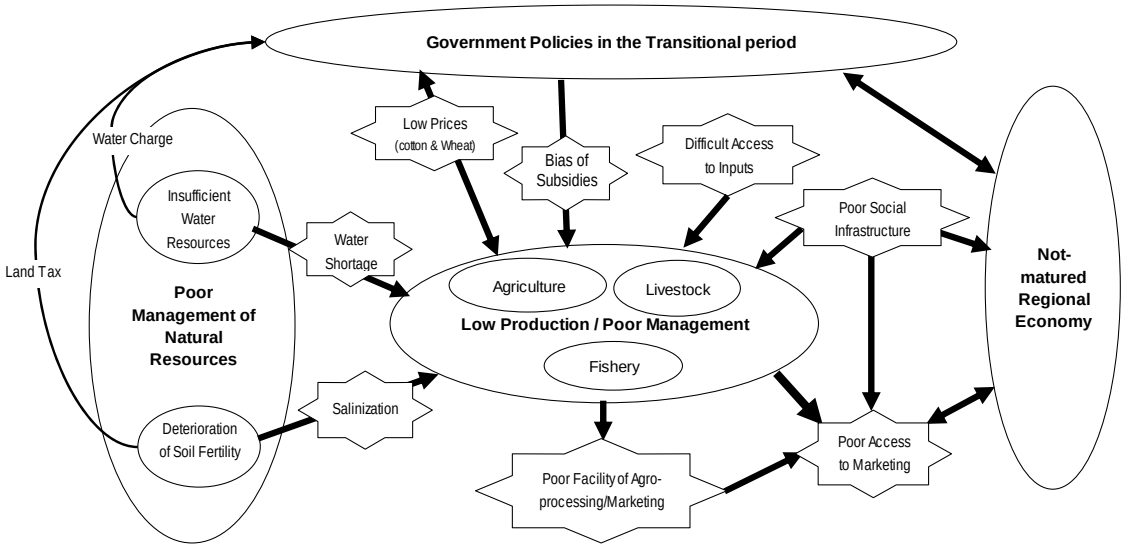


Fig. 6.1.1 Problems Surrounding the Agriculture, Livestock and Fisheries

Uzbekistan is in a transition stage to reach the market economy after the independence. In the agriculture sector, *fermers* and *dehkans* were recently established through the dissolution of *shirkat*, and they have not yet matured to manage their production without a clear direction of farming.

It is confirmed that it is necessity to formulate a Master Plan to indicate an integrated plan with a clear direction to target a market oriented agriculture sector development and livelihood improvement thought the field survey.

6.1.2 Basic Concepts of Regional Development Master Plan

(1) Vision of the Regional Development

The Regional Development Master Plan shall include the following factors considering the present condition and circumstances of the Project Area:

1) Plan of market oriented agriculture sector development including animal husbandry and fishery
2) Livelihood improvement plan of the small scale farming and animal husbandry to reach the demand of self-consumption and sell the excess to the local market

Then, Regional Master Plan shall be prepared under the vision of ***"People make a good livelihood through development of market oriented farm management and good use of tamarka (backyard farming), in consideration of regional management"***.

(2) Objectives of the Master Plan

The Master Plan for the Regional Development in Karakalpakstan aims to elaborate a development of market-oriented farm management and good use of *tamarka* (backyard farming), so that people living in the region can have a good livelihood.

(3) Target Year

The target year of the Master Plan is established for 2020. The project period is set as 10 years from 2011 to 2020.

(4) Target Area

The target area of the Master Plan is 11 districts of Karakalpakstan, excluding 3 southeastern districts and municipalities, which consist of Beruni, Nukus, Kegeyli, Chimbay, Karauzyak, Takhtakupyr, Khodjeyli, Shumanay, Kanlikul, Kungrad and Muynak. Out of the total area (approximately 247,000 km^2), the farm land of 173,000ha (including 16,500ha of *Tamarka* 156,500ha of irrigated area) will be targeted under the Master Plan, on the basis that the area of farmland in 2006 shall be maintained.

(5) Target Group

The benefited target through the execution of the Master Plan is about 825,000 people that live in the 11 districts. Totally 3,000 *fermer* farms and 11,500 *dehkans* households will be directly benefitted by the execution of the Master Plan which is focused on the agriculture, livestock and fisheries.

The sub-sectoral master plans are described hereinafter. The vision, basic approach of the sub-sectoral development, strategies and program/projects are summarized in Table 6.1.1 (page 6-83).

6.1.3 Agriculture Development

(1) Basic Approach

It is recommended that agricultural development of the Project Area should be materialized through ***"Development of Market Oriented Agriculture on Sustainable Basis"***, based on the following

hypotheses which have been implied by information collected through the Study. The figure shown below outlines the basic approach.

1) Diverse crops, in addition to cotton and wheat, should be promoted to improve the development of the agriculture in the Project Area
2) Soil should be well managed to increase crop production on a sustainable basis
3) Crop production and livestock should well be combined in a farming system of *fermer*

There are two major components in the approach, i.e. “crop diversification” and “soil conservation and improvement”. Production of promising crops, mainly vegetables and fruits, should be increased by providing necessary services and inputs. As well as, development of production center of certain strategic crops and good use of *tamarka* should be strategically promoted to diversify the crops. Crop rotation systems, combining cotton, wheat and main fodder crops, should be developed and disseminated to cotton and wheat growers to improve the soil condition on a sustainable basis. As a result of fulfilling the crop rotation systems, the crop intensity of the target area is expected to increase to 130 % by 2020 from the present situation in 2006 which is 114 %. The concerned government agencies should play an important role in planning a regional crop rotation plan, since the government still has a substantial influence on cotton and wheat growers.

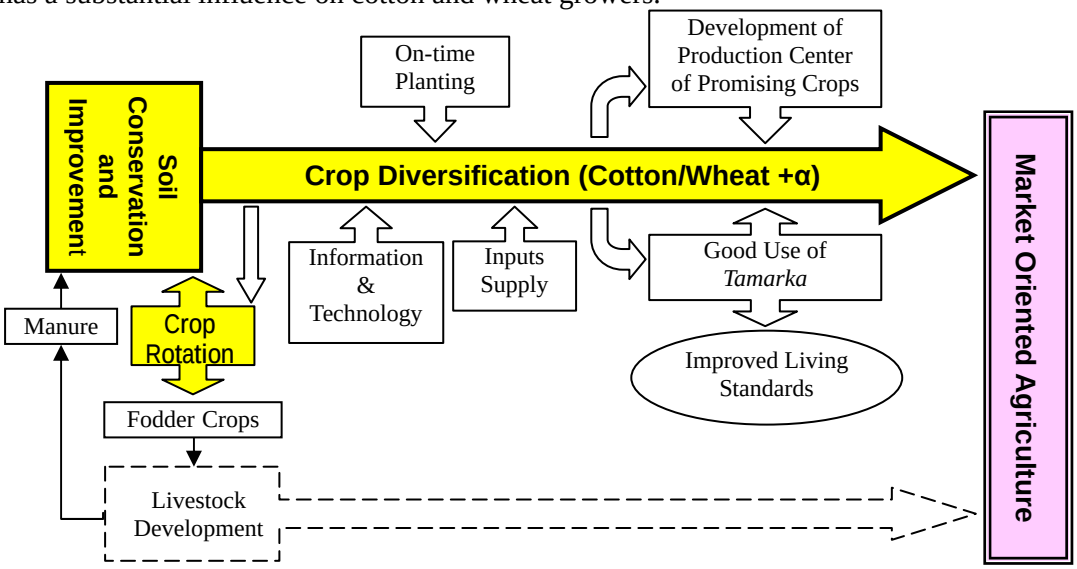


Fig. 6.1.2 Basic Approach for Agricultural Development

All necessary measures should be taken under an integrated implementation mechanism in order to achieve the expected goal, since there must be many stakeholders participating in the implementation. A strong coordination body should be established in the government of Karakalpakstan.

(2) Development Strategy

1) Improvement of soil conditions for sustainable production

The Project Area suffers severe problem of low soil fertility, combined with low content of organic matter and salinization. Furthermore, majority of land is exclusively used for cotton and wheat production for long year. Due to such low fertility soil and mono-culture, the land productivity tends to decrease recently. If such situation continues, crop growers would not be able to have reasonable returns from their harvest. There is a possibility that crops including cotton and wheat might not have an expected harvest in the Project Area. It means that sustainability of agriculture in the Project Area is very close to a crisis at present. It is, therefore, suggested that soil improvement and conservation on sustainable basis must be paid serious attention for better agriculture in the Project Area.

A crop rotation system combining cotton, wheat and fodder crops is proposed to improve and conserve the soil condition. Simultaneously, livestock growing will be promoted to utilize the fodder produced

under the crop rotation system. Also, manure generated from livestock will be returned to the crop land in order to increase soil organic matter content. So, an organic cycle system between agriculture and livestock will be established based on the crop rotation system. It has an advantage for both of agricultural production and livestock production. The crop rotation will contribute to promote crop diversification, as well.

2) Improvement of Agricultural Technologies and Agricultural Business Management

Development and dissemination of technology to cultivate crops, other than cotton and wheat, are weak in the Project Area. But the producers are looking for appropriate and effective technologies. Not only cultivation technologies of each crop but also combination of the crops, agricultural inputs, soil management, plant protection, environmental issues, economic and marketing issues and business management are necessary to be researched to promote the market oriented agriculture. Agricultural producers need to have integrated knowledge to manage independent agricultural entities under a market oriented economy regime.

Therefore, the agricultural research and extension are necessary to be strengthened to improve the agricultural production. Research organizations will be maintained and focus on priority topics regarding to the development of market oriented agriculture. The topics and crops are systematically selected and allocated to the appropriate research stations in order to concentrate a limited budget on certain strategic crops. Also in the extension sector, the roles and responsibilities will be systematically allocated to the concerned organizations, so that each organization will be able to carry their mission under an integrated policy in cooperation with the research organizations.

3) On-time Planting Through Efficient Agricultural Works

Since agriculture is strongly relied on the natural conditions, agricultural producers must follow and adjust their works in fields to seasonable natural conditions. If they miss the proper time of the works, it will affect the productivity and quality of the product. For that, agricultural producers need to manage their resources to do on-time works. A lot of producers in the Project Area do not have their own agricultural machineries and use agricultural machinery services provided by MTP (Machinery and Tractor Park) or Alternative-MTP to manage their fields. However, many producers are not satisfied with the services because they are not often provided on time. The producers can not manage effectively their fields without machineries, because they manage relatively large scale farms. Insufficient agricultural machinery services mainly cause this situation.

Therefore, the function and management capacity of the agricultural machinery services providers will be enhanced in order to provide efficient services, including maintenance and repair, which will contribute to on-time planting and improve the agricultural production. Furthermore, the MTP and Alternative-MTP services shall be gradually replaced by personal operation system of individual producer, since the average land size of *fermer* becomes bigger with the Land Optimization Policy. Considering the average land size, personal operation of tractors and other machinery must be a quite reasonable system rather than the collective operation system.

4) Improvement of Agricultural Inputs Supply System

Agricultural inputs also should be prepared and applied on-time to get good harvest, as same as planting. However, the sales of the inputs such as mineral fertilizers, agricultural chemicals for plant protection, seeds and fuel for agricultural machineries are sold in separate places and the procedures to purchase them are complex. Furthermore, the inputs are sometimes not available when the producers need them, especially for crops other than cotton and wheat.

Therefore, it is proposed an improvement of the inputs sale system, such as quality seeds, mineral fertilizers, agricultural chemicals for plant protection, feed for livestock and fuel for machineries. So, the consumers will be able to purchase easily them at any time. The time and costs to purchase them

will be reduced and also appropriate inputs will be applied on time. It will contribute to improve the agricultural production and to an efficient agricultural works.

5) Promotion of Crop Diversification

Most *fermers* are mainly producing cotton and wheat, and a substantial number of *fermers* in the Project Area has difficulty in managing the farm management at present because of the low productivity and profitability of these two crops in the Project Area. Also the present mono-culture systems may cause problems of soil quality deterioration. Therefore, it is recommended the promotion of crop diversification. Cultivation of fodder crops and promising crops, other than cotton and wheat, is proposed in this strategy.

Vegetables, fruits, oilseeds and other products, which have a comparatively high profitability and contribute to a sustainable crop production, will be promoted based on the market demand and local conditions. Necessary measures to assist the promotion such as research and extension of concerned technologies and inputs supply will be carried out in combination with this strategy.

6) Promotion of Vegetables Production and Sale to Local Market by Good Use of Tamarka

In the Project Area, certain portion of crops, especially vegetables and fruits are produced in *tamarka* even though the products are mainly consumed by producers themselves. The agricultural diversification and the production increase will be expected, if the good use of *tamarka* will be promoted strategically with developed supporting system, since the potential of *tamarka* to produce the crops such as vegetables is high. Many producers who have *tamarka* have a mind that they want to sell the products if it is possible. The production and sales would contribute to improvement of livelihood of the producers.

Therefore, the capacity building of *dehkans* for good use of *tamarka* will be promoted in order to increase the production in *tamarka* and the sales of the products to local markets. For the good use of *tamarka*, production, marketing and resource management including soil conservation will be assisted though research and extension activities.

(3) Programs for Agricultural Development

1) Establishment of Crop Rotation System and Supply of Manure

A crop rotation system will be proposed and introduced with an organic manure supply system to improve the soil condition. Planted are of fodder crops, especially legume fodder crops or salt absorption crops in combination with cotton and wheat, will be extended in the expected activities. In this case, institutional and systematical planning might be required because cotton and wheat are still substantially controlled by the government. Since livestock promotion will be proposed in combination with this program, fodders will be used to livestock. A linkage with fodder crops, livestock and organic manure will be developed in this program.

2) Improvement of Accessibility to Agricultural Technologies and Information for Agricultural Producers

The marketing and farm management, establishment of an appropriate system to disseminate the information is suggested since information regarding to agriculture is a very important resource to improve the production. A strong central management body will be needed in order to coordinate organizations concerned and their activities in this program. And then, the concerned organizations, for examples Karakalpakstan Fermer’s Association, district agricultural colleges and agricultural research organizations, will share the roles and responsibilities. The contents of the extension activities are not only production technologies but also management of agribusiness, marketing and others are included because integrated knowledge is needed for agricultural producers to adapt themselves to market economy. The central management body, in cooperation with the concerned organizations, will arrange publishing and distribution of technical manuals in local language and also organize periodical training, including study tours and a long-term practical training in advanced producing areas, for the agricultural producers.

3) Strengthening Agricultural Research and Development

Agricultural technologies, including marketing and management of businesses, should be researched and developed to support the development of market oriented agriculture. For this purpose, a sound research system concerning to agriculture should be developed and strengthened first. Since a research system covering all subjects from the initial stage is not realistic considering to the present circumstances, priority shall be given strategically to several research topics, e.g. seed development and production, plant protection technologies and market economy research in connection with the crop diversification policy.

4) Renewal of Agricultural Machineries

There are two kind of agricultural machinery services in the Project Area. One is governmental (MTP) and another is private (Alternative MTP) service providers. The roles and responsibilities of the two service providers will be clarified and reviewed. For example, a MTP provides heavy maintenance and repair services for the machineries at district level, and an Alternative MTP provides mechanization services and daily maintenance services to agricultural producers. After that, each function, based on the roles and responsibilities, will be strengthened in order to develop the capacity. As well as, sales of tractors and other basic agricultural machinery to individual *fermers* will be promoted. Special supporting measures, i.e. a favorable credit or lease system for the service providers and individual *fermers*, might be required for the capacity development and also procurement of new machinery.

5) Improvement of Accessibility to Agricultural Inputs for Agricultural Producers

Improvement of the sales system is suggested in order to improve producer's accessibility to agricultural inputs. Outlets of the inputs such as seeds, mineral fertilizers, agricultural chemicals for plant protection and fuel for agricultural machineries might be united into one place (one–stop-shop) at VCC level, and the organization, for example the state fertilizer sales company (Uzselhozhimiya) or Karakalpakstan Fermer's Association in districts, will manage the shop as an sales agent of each concerned supplier. Users can save their time and cost to purchase inputs and efficiently apply them on time since the users can buy them at one place at any time when they need. Furthermore, if the shop will have a role of an agent of agricultural credits, agricultural producers can access to concerned information and apply to the credits more easily. As well as, other necessary information about new technology, marketing, etc. would be available at the shop. It is expected that the shop would function not only as a shop but also as an agro-community center in the area in the future.

6) Revival of Melons and Gourds Production

Since Karakalpakstan used to be a famous production center of melons and gourds and they are suitable crops to the Project Area, they have high potential to be leading crops to promote crop diversification. The selection of suitable varieties, production of quality seeds and development of the seed supply system might be priority issues in order to activate melons and gourds production. Since there is a problem of insect damages, especially for melon fruits fries, the plant protection technologies and management against insects is simultaneously needed to be researched and developed. The management of the production resources, including workers, input materials and funds, by each producer also needs to be improved for a sustainable production.

Among fruits, apple is a popular crop among *fermers* for commercial production in the Project Area. However, the productivity and the quality stay at lower standard level due to improper management. Moreover, a number of aged trees, infested diseases in most cases, are not rejuvenated. Many apple growers also want to introduce new varieties having a good nature of high-productivity, high-quality and high–resistance to diseases. A comprehensive technical measure to tackle these issues should be taken by *fermers* under a proper guidance of specialists.

7) Promotion of Fodder Crops Production

Fodder crops production, for example legume fodder crops, sorghum and so on, is suggested to promote a crop rotation system in combination with cotton and wheat. The production supplies fodder for livestock, can also contribute to improving soil condition. Seed production and the supply system for the fodder crops might be proposed as one of the necessary activities. Development of planning and coordinating structure of the cropping system at regional administration level also might be required because the government sector is strongly involved in cotton and wheat production at present.

8) Strengthening of Vegetables Production by Group Activities

Group activities are proposed to promote vegetables production in *Tamarka*. The groups, consisted of producers who have *Tamarka* and motivation to produce and market the products, will be formulated within certain areas. And the groups will make a consensus on their strategy for the production and marketing at the beginning stage and then the group members will produce the products based on this strategy. It is better for the members to produce the same product for having a better bargaining power because generally traders want to purchase a certain amount of products, for example 2 or 3 tons at once, with uniform quality. The growers' senses and capacity regarding the production and marketing will be developed through the actual activities regarding to the production and marketing. The group members will be able to build their confidence in marketing and other group activities to improve their living standards. At the same time, development of supporting system for the groups is proposed by improving the accessibility of agricultural technologies and information, namely strengthening of extension system for the production technologies and market information.

9) Improvement of Work Efficiency in Tamarka by Introducing Improved Tools and Mini-agricultural Machineries

Simple farming tools might be improved in order to promote production in *Tamarka*. *Dehkans* use very limited tools at present. To make the work in *Tamarka* efficient, the improved tools such as a hoe, a watering can, a wheelbarrow and so on might be introduced. If necessary and economically feasible, mini-agricultural machineries such as a mini-cultivator might be introduced to MTPs (Machinery and Tractor Park) or Alternative MTPs.

6.1.4 Livestock Development

The basic approach of livestock development is set as "***High profitability and stable production/ supply of animal products through increase of fodder production, breeding improvement and extension services***".

It will be difficult to expect fruitful effects, if various countermeasures implement individually. Therefore, it is necessary to implement proposed strategies in a comprehensive way in combination with each strategy to attain the target in livestock sector as shown in the following figure.

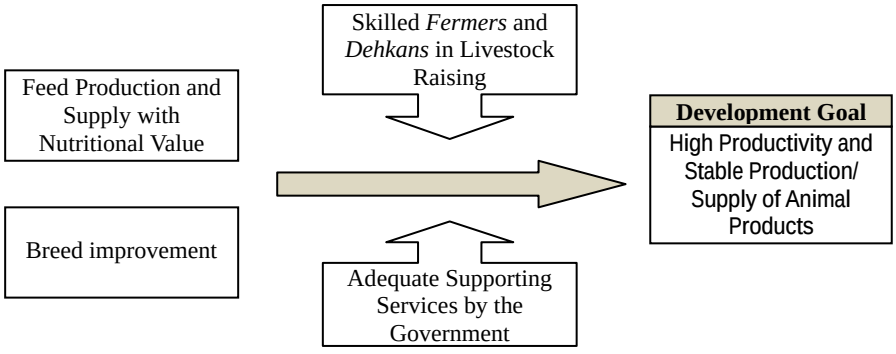


Fig. 6.1.3 Basic Approach for Livestock Development

(1) Development Strategies

As shown in the above figure, it is necessary to implement the proposed strategy in a comprehensive way in combination with each strategy to attain the targets of the livestock sector. There are activities to be done by the Government and by individual livestock owners in the procedure and it can be said that the target will be attained when both recognizes their role and executes them absolutely.

It is suggested that the constraints in the livestock sector mentioned before will be solved according to the following strategies.

1) Increase of Forage Production and Nutrition Improvement

The stable supply of fodder is one of the keys to the promotion of livestock production in the Project Area. Forage production will be strengthened taking into consideration the insufficient supply of fodder crops and also insufficient supply of nutrient values for livestock, which cause low productivity in the Project Area. The components are increase of yield and expansion of planted area of forage crops, such as sorghum, alfalfa and maize etc.

An increase of yield will be tried through planting on time, on-time irrigation, proper dosage of input, proper crop management and on-time harvesting. Cultivation manual showing appropriate technologies will be prepared for such purposes.

Alfalfa contains much higher protein than sorghum and reed, which are prevailingly utilized in the Project Area. Therefore, the establishment of an alfalfa seed farm is proposed in order to expand and to improve the nutrient condition of the livestock, aiming at more productivity, to expand alfalfa cultivation.

2) Capacity Building of Livestock Experts and Extension Workers

Livestock expert includes veterinarian and livestock extension worker under MAWR of Karakalpakstan. Currently, services in livestock sector have been conducted centrally on veterinary services by veterinarian on demand basis. However, as seen the 31% of accomplishment rate of AI, these services don't meet the demands of *fermers* and *dehkans* who have been raising livestock under the severe climate conditions. It is considered that strengthening and fostering veterinarians and extension workers, who have appropriated technologies not only on animal breeding, AI, disease control, nutrient and feeding management for matured livestock and young animals, animal products processing and market-oriented livestock raising but also agronomy concerning forage production and its storing, will be indispensable to strengthen services for *fermers* and *dehkans*.

3) Capacity Building of *Fermers* and *Dehkans*

Livestock owners in the Project Area are composed by *fermer*, *dehkan*, *shirkat* and other non-farm people. Especially, *dehkan* plays the leading role in animal products production. There are 8 *shirkats* in Karakalpakstan, but these will be transformed gradually into *fermer* according to the promotion of market-oriented economy of the country. Therefore, the targeted people of the livestock sector development in the Master Plan will be considered to be *fermer* and *dehkan*. And for non-farm people, trained *fermer* and *dehkan* will be expected to work as an extensionist in order to transmit necessary modernized technologies at rural level.

4) Breed Improvement of Livestock

In order to improve the productivity of livestock, AI is one of the important methods of livestock breed. In the Project Area, accomplishment rate of AI is only 31%, therefore, it needs more extension efforts to increase the accomplishment rates of AI for the improvement of livestock quality and quantities.

At present, frozen semen granules produced in Tashkent and Navoyi cities are transported to Nukus by liquid nitrogen (LN_2) container to distribute it to other districts. Considering the convenience and

higher conception rate, it is suggested to shift from granules to frozen semen straw. In the proposed AI Center, several quality breeding bull will be reared after quarantine inspection in order to produce frozen semen straw. LN_2 gas will be procured in Tashkent or Navoyi city. AI Center will be composed by burns for bulls, laboratory for inspection of semen and its treatment, feed warehouse, inspection equipment, LN_2 tanks, semen-sampling room etc.

5) Improvement of Veterinary Services

It can be said that AI service implemented by the Veterinary Department under MAWR of Karakalpakstan maintain a certain level to produce frozen semen (granular), supply LN_2 and AI tools. Even for district offices, though being insufficient, LN_2 tanks and some kind of AI equipment are distributed. Frozen semen of granular is produced in Tashkent and Novoiy cities and LN_2 is also available there. The main reasons for low accomplishment of AI services, showing 31%, are lack of transportation mean from Tashkent and Novoiy cities to Nukus city and each district level as well, lack of veterinarians who can make AI service, lack of AI equipment such as LN_2 tanks, AI tools, transportation mean etc., in some districts, and low awareness of livestock owners for breed improvement. It will be expected a higher accomplishment of AI, increase of livestock productivity and enlightenment of people concerning to breed improvement. To be more precise, the provision of AI equipment and transportation mean, training to increase the number of artificial inseminators etc., need to be considered. For the purpose, inventory survey on current status of AI equipment and others of each district veterinary office shall be conducted at early stage of the Master Plan implementation.

6) Animal Products Processing and Marketing Services

There are five small-scale milk and a meat processing factories in the Project Area. All of them are managed privately. Cattle/cows raising in the Project Area is popularly practiced by *fermer* and *dehkan*, including *shirkat*, but processing meat and milk products is not so active, though part of the milk is processed at home for self-consumption and marketed to local markets. As Shumanay district has a plan to establish a small-scale milk plant, some district offices may have plans for animal products processing. The milk and meat processing will bring livestock owners additional income than selling only raw materials. Major milk producing area, such as Beruni and Khodjeyli, will be surveyed with more detail to identify producing VCC or *aul*, including identification of number of producers, production volume and people's willingness to establish min-plants as model project in order to activate regional economy through demonstration of safe food production along with creation of employment opportunity, mainly for women.

It is proposed to construct a small-scale slaughterhouse at Nukus city, which is the biggest consuming area and capital of Karakalpakstan Republic in consideration to safe meat supply to the consumers. The capacity of the slaughterhouse will be designed as a model to process 5 to 8 head of cattle/cows per day as well as the existing one in Tahiatash city

(2) Programs of Livestock Development

In order to achieve the high productivity and stable production/supply of animal products, the following program and activities are expected.

1) Increase of forage production and nutrition improvement

- Forage production
- Collective production of fodder crops
- Establishment of alfalfa seed farm

2) Capacity Building of livestock experts and extension workers

- Training Program for livestock experts and Extension Workers

3) Capacity building of *Fermers* and *Dehkan*

- Training Program for *Fermers* and *Dehkans*

4) Breeding improvement of livestock

- Provision of AI tools and vehicles
- Construction of AI center
- Fostering of AI

5) Improvement of Veterinary services

- Provision of vehicles for mobile veterinary services

6) Animal products processing and marketing service

- Small-scale animal products processing
- Small-scale slaughterhouse

6.1.5 Fisheries Development

(1) Basic Approach

Through the dissolution of the Soviet Union and privatization operation of fishery, fishery bodies is obliged to realize their activity in a difficult condition with limited supply, technical and financial support, etc. This situation may cause sluggish development in fishery and environmental deterioration without inadequate control. In consideration of these present conditions of fishery sub-sector, the basic approach of the development set as "***High profitability and stable production/supply of fishery production by sustainable fishing and aquaculture promotion***".

Aquaculture, which is hardly practiced in Karakalpakstan, has potential to expand the fishery activity and improve fishery production, though it depends on water supply issue. However, its introduction and development is still in a further difficult situation due to inadequate public support system for fishery activity.

In such circumstances, a basic concept of master plan in fishery should give priority to arrange public support system rehabilitating and strengthening the fishery sector of government and Fishery Association as a first phase. Establishment of public support system with reliable administrative fund is an essential matter for long-term and sustainable development of fishery activity, including aquaculture.

(2) Strategy for Fisheries Development

In order to achieve the "Improvement of fishery through sustainable fishing and aquaculture promotion", the two strategies are formulated consisted by: 1) Achievement of adequate capture production and its sustainable development and 2) Aquaculture development and promotion.

The first component is aiming to achieve capture fishery development through sustainable capture production and progress of effective fishing activity. The activities expected are in charge of several stakeholders, MAWR of Karakalpakstan, Fishery Association, State Nature Protection Committee, Academy of Science and private fishery bodies. The establishment of overall administrative system, including these stakeholders, is the first priority to be initiated.

The second component is set to introduce aquaculture activity as a new source of quantitative fishery production increase. Pond aquaculture, which is set as principal culture system in this strategy, has more possibility to entry than capture fishing, which requires limited water area. It is a quite new activity in the Project Area, so it needs to establish some basic factors for achievement. Many of these factors, such as seed production and distribution, technical assistance to farmers, public relations, etc.,

should be carried out by public initiatives. In fact, each activity will be prioritized and carried out by an appropriated order to achieve this component.

(3) Programs for Fishery Development

1) Achievement of Adequate Capture Production and Its Sustainable Development

Fishery resource management is carried out aiming to an appropriate use of natural water bodies as field of capture fishing activity. To exploit new fishing area, feasibility study is practiced on available water bodies. Restocking to water bodies and analysis for its effectiveness is carried out. Technical promotion of fish seed production and establishment of stable supply for capture fishing are also included. Strengthening of the Fishery Association is carried out to achieve the above activities.

2) Aquaculture Development and Promotion

Aiming to develop aquaculture production, pond fish culture is introduced as the main target culture system. To promote it, technical standard is established by practicing pilot production and collecting data. Alevin production is carried out for distribution and technical support to farmers is also provided. For its effective promotion, system for public relations to propagate aquaculture activity is also established. Establishment of credit system, which enables newly entry to this activity and system for stable input supply, such as feed, fertilizer and other equipment for activity, are also included.

6.1.6 Irrigation and Drainage Development

(1) Basic Approach

The basic approach for the irrigation and drainage subsector is set ***"to aim for increasing production and productivity in the field through realizing effective use of water resources and mitigating damages of salinity by improving water management"***.

Lack of water in time and in amount to the field due to the lack of water resources is one of the major reasons to abandon irrigated land in the Project Area. It is difficult to expect to recover or increase available water from the Amudarya River, which is the only water source in the Project Area, due to the significant increase of water demand in the upper stream. Thus, it is proposed to increase and stabilize agricultural production by using limited water resources effectively through improving water use efficiency in the irrigation system. The water use efficiency is to be improved by reducing infiltration and management losses in the irrigation system and by improving cultivation techniques and water management in the field.

Salt accumulation in the field is to be pointed to be another major reason of the low productivity and abandon of irrigated land in the Project Area. Salt accumulation is caused by minerals in the soil upraising by capillarity phenomena and staying in the soil surface under high groundwater level and heavy evaporation conditions. Improper water management and lack of adequate fertilization practices in the field accelerates the accumulation as well as high salinity contents of irrigation water. The damage by salinity is aimed to be reduced by controlling the salt accumulation in the field through proper control of groundwater level, effective leaching practice and proper water management during irrigation.

In order to fulfill the improvement of water management in the irrigation and drainage systems, it is essential that the Water Users Association (WUA), that is the responsible for the internal canal/collector network, operates and maintains the system properly. Thus, it is proposed to activate WUA's activities and elevate the quality through strengthening and enhancing the capability of WUA.

The improvement of the water management in the internal systems, which are managed by WUAs, is targeted in the Study, while the main and inter-farm systems operated by the State are not included in the objectives.

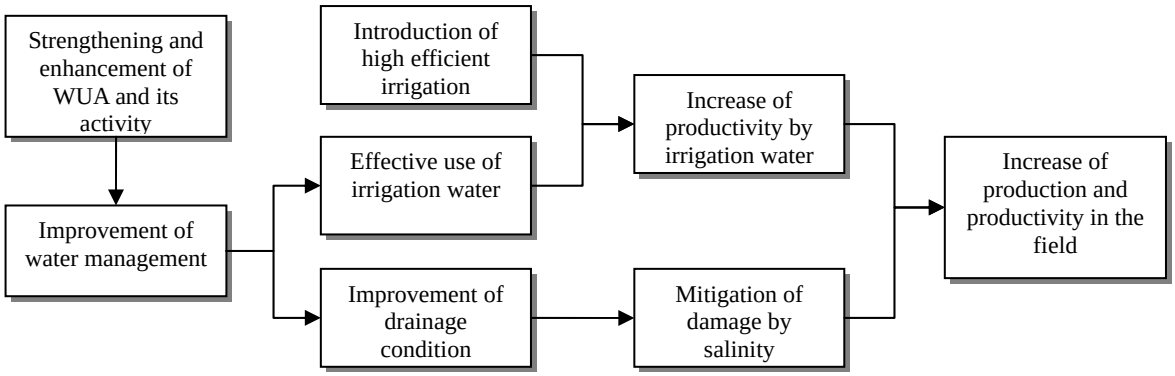


Fig. 6.1.4 Basic Approach for Irrigation and Drainage Development

(2) Development Strategy

According to the above sub-sectoral basic approach, 4 development strategies are set for the subsector as below.

- Effective use of irrigation water through improvement of water management
- Increasing productivity of water through the introduction of high efficient irrigation
- Reduction of damage of crop production by salinity through improving drainage conditions
- Improvement of water management through strengthening WUA and enhancing its activity

1) Effective Use of Irrigation Water though the Improvement of Water Management

The water once distributed to the internal canal network from the inter-farm canal will be used as much as effective for agricultural production by reducing the conveyance and management losses due to lack or malfunctioning of hydraulic structures in the internal canals. The cleaning and digging of internal canals that are to be carried out by WUA and the necessary circumstances will be prepared. The simplified cleaning work of canals is to be conducted as a collective work of member farmers under the coordination of WUA, while the digging work requiring construction machinery will be implemented by the WUA budget. It is important to repair or develop hydraulic structures such as crossing works over roads or drainage collectors in order to maintain the canal function, as well as cleaning and digging of canals. For the development of structures, it is necessary to be supported by the government by both of finance and techniques.

Aged hydro-posts in the internal canals will be repaired or developed for the purpose of proper water management in the system. Gate off-take regulators and measurement weirs/flumes will be promoted at the farm intakes in order to measure the actual amount of water distributed to the farms and to realize proper and fair water distribution. It is indispensable that related activities with this Strategy will be fulfilled under the close coordination by strengthening and enhancing WUA's activities proposed in the Strategy-4).

In parallel with the efforts to improve water management in the system, necessary training and guidance to member farmers for enhancing irrigation planning and water management practices will be implemented for the purpose of improving water management and increase effectiveness of irrigation water use in the field. Physical development such as land leveling to blow over the configuration in the field will be promoted to reduce the required irrigation water in the field level.

2) Increasing Productivity of Water through the Introduction of High Efficient Irrigation

It is promoted to introduce high efficient irrigation technologies, in parallel with the strategy of delivering water to the field efficiently as mentioned above, to use the water as much as effective in the field. By introducing drip irrigation and small sprinkler irrigation, it is aimed to increase productivity and quality of products by the combination of accurate irrigation management and

fertilization practices, as well as increasing the application efficiency of irrigation. It is expected to increase the productivity in both of quality and quantity by a limited volume of water. High efficient irrigation technologies such as drip irrigation or small sprinkler irrigation will be promoted to the farmers by developing support activities and systems such as establishing demonstration farms with advanced irrigation practices, technical support to introduce new irrigation equipments, servicing credit for irrigation equipments, etc.

Drought tolerant crops will be promoted which can cope with expected drought or water shortage flexibly as well as to secure the production under the limited irrigation water. The Strategy will be forwarded under a close coordination with programs for enhancing farmer's ability for irrigation planning as mentioned in the Strategy-1) and Program-3.1.3 in order to produce the desired effects.

3) Reduction of Damage on Crop Production from Salt through Improving Drainage Conditions

Insufficient development of internal collectors and malfunctioning of them due to inadequate maintenance causes control of groundwater level inside and around the field difficult. Solving water logging problems, controlling salt accumulation and realizing effective water saving for leaching practices will be accomplished by developing and improving the internal collector network. The same can be said about the internal canals. Cleaning and digging of internal collectors carried by the WUA and the necessary circumstances will be prepared to solve its problems. A simplified cleaning work of the collectors is going to be conducted as a collective work of member farmers under the coordination of WUA, while the digging works that requires construction machinery will be implemented by the WUA budget. It is important to repair or develop hydraulic structures such as crossing works over roads or canals in order to maintain the collector's function, as well as cleaning and digging of the collectors. It is necessary an active support from the governmental budget to conserve the agricultural land resources, because developing and maintaining the collector networks takes a large budget and WUAs and farmers meet difficulties to conduct it by their own finance in many cases.

The improvement of field drainage will contribute to an effective groundwater level control and an efficient leaching practice in the field in parallel of securing the function of internal collectors. The effect of leaching will be improved by introducing land leveling works in the field. In addition, new technology for low cost and high effective leaching practices, such as leaching with deep furrows instead of basin check method, biological drainage, etc. will be expected to be developed, verified in the field and promoted in the Project Area.

4) Improvement of Water Management through Strengthening WUA and Enhancing Its Activity

WUA is the responsible entity for managing internal canal/collector systems and its duty consists of maintaining the facilities in the system and gives proper water services to the members. The capability of the WUAs shall be developed for developing and maintaining canal/collector network and fulfill proper water management.

As for the improvement of WUA's capability for developing and maintaining internal canal/collector network, it is aimed to organize members into an effective collective work and to coordinate the regular maintenance schedule as well as improving capacity for mechanized works. A fair and efficient water management will be fulfilled by improving the skills of WUA staffs for irrigation planning and water management activity as well as developing internal irrigation system which can measure and control the volume of water delivered to the farms individually. These strategies are necessary to be implemented under the close coordination with the Strategies 1) and 2).

Currently, many of WUAs face critical situation in their financing condition and, due to lack of money, it is difficult for them to carry out necessary development or maintenance of canals/collectors systems and activities for water management. Financial capacities of WUAs shall be reinforced by promoting collection of membership fee. To increase collection of membership fee in amount and in time, it is

essential to improve the financial capacity of the member famers by improving farm management. On that basis, it is important to promote better understanding of the members about the membership fee and the importance of WUA's activities through strengthening communication between WUA and members, as well as to improve charging and accounting system of water fee to be fair and clear.

In addition, it will be promoted between the users of *tamarka* farmland (*dehkans*), who are not direct members of WUA but participate to that through VCC, to participate in the water management activities such as cleaning of canals/collectors. It is expected that WUA will make approach to *tamarka* users to improve water management in *tamarka* through these activities.

(3) Programs for Irrigation and Drainage Development

In order to realize the effective use of irrigation water through improvement of water management, the following program and activities are expected.

1) Program for Improving Internal Canal System and Strengthening Water Management

- Maintaining and recovering functions of internal canals by cleaning and digging
- Development of hydraulic structures in the internal canal system
- Development of water measurement facilities in the internal canal system
- Measurement of actual amount of water to distributed farms

2) Program for Strengthening Water Management in the Field Level

- Strengthening farmers capability of irrigation scheduling and preparing application of water to WUA in time
- Reducing losses of irrigation water by land leveling of the farms

In order to realize the increase of productivity of water through introduction of high efficient irrigation, the following program and activities are expected.

3) Program for Introducing Water Saving Irrigation Technology

- Introduction of drip irrigation and small scale sprinkler irrigation
- Promotion of water saving crops and cropping pattern

In order to realize the reduction of damage to crop production from salt through improving drainage conditions, the following program and activities are expected.

4) Program for Improving Drainage Conditions in the Field Level

- Development of internal collector network
- Maintaining and recovering functions of internal collectors by cleaning and digging
- Development of hydraulic structures in the internal drainage system
- Reducing the amount of leaching water by land leveling of the farms
- Technical development of effective leaching and drainage method, such as furrow leaching, instead of basin check method, applying biological drainage, etc.

In order to realize the improvement of water management through strengthening WUA and enhancing its activity, the following program and activities are expected.

5) Program for Strengthening WUA and Enhancing Its Activity

<u>Activities Related to Increasing Water Management Capability of WUAs</u>

- Strengthening WUA's capability of irrigation scheduling by equipping IT equipment and staff training
- Measurement of actual amount of water to distributed farms by developing water measurement facilities

- Equipping transportation measures of WUA for water management activities(*)
- Program for increasing canal/collector maintenance capability of WUAs
- Preparing spare parts of machinery for canal maintenance
- Strengthening of WUA's coordination on collective works of members for canal/collector maintenance

Activities Related to Improving Financial Condition of WUAs

- Improvement of charging and collection activity of water fee
- Strengthening propaganda and enlightening activities of the importance of WUA's activity and water fee

Activities Related to Improving Communication of WUAs

- Increasing WUA staff's visiting members
- Equipping transportation measures of WUA

6) Promoting Participation of *Tamarka* Users (*Dehkans*) to the Water Management Activities

- Promotion of participation of tamarka users (*dehkans*) to the water management activity such as cleaning canals through the coordination of VCCs

6.1.7 Marketing and Processing Development

(1) Basic Approach for Marketing and Processing Development

Agricultural production scale of Karakalpakstan is relatively smaller than those of other regions in Uzbekistan due to the severe environmental conditions for agricultural production, including scarcity of irrigation water and soil salinity for example. In 2006, Karakalpakstan's share of food crop production accounts for only 3% of the total Uzbekistan, whereas the share of Karakalpakstan's population was 6% of the total nation. As a result, as shown in the table below, Karakalpakstan's food self-sufficiency rates of basic foodstuff are generally low, except rice. In fact, most vegetables and fruits sold at Nukus central bazaar come from other regions such as Samarkand, Surkhandarya, and Kashkadarya.

Table 6.1.2 Self-sufficiency Rate of Basic Foodstuff in Karakalpakstan

Crop	Production /a (ton)	Consumption /b (kg/year/capita)	Demand /c (ton)	Balance (ton)	Self-sufficiency (%)
Wheat	215,193	161.43	251,782	*-36,589*	85.5
Rice	55,504	9.05	14,115	*41,389*	393.2
Potato	15,532	29.51	46,027	*-30,495*	33.7
Vegetables (+Melons & Gourds)	130,014	116.06	181,019	*-51,005*	71.8
Fruits (excluding Grape)	15,091	22.69	35,390	*-20,299*	42.6
Grape	2,160	7.62	11,885	*-9,725*	18.2
Milk	143,728	137.63	214,662	*-70,934*	67.0
Egg (conversion: 1pc.=40g)	1,184	3.16	4,929	*-3,745*	24.0

Source: a/ The Ministry of Economy of the Republic of Karakalpakstan (2006)
b/ FAO Statistics (2003)
c/ Living Conditions in Karakalpakstan 2004, JICA-Uzbekistan (population = 1,559.7 thousand)

This situation indicates that there is space to promote shipment of vegetables and fruits from intra-regional farm to local market, if their products have comparative advantage to the products from other regions. In this regard, the farms have a comparative advantage to supply fresh and cheaper vegetable and fruits to the local market. Many consumers still prefer cheaper products than better alternatives, reflecting low level of household income according to the interview survey to retailers at Nukus Central Bazaar. Accordingly, price of agricultural products at the bazaar varies according to its size and quality, and even low quality products, such as dry-fruits made in Karakalpakstan, have customers who prefer the cheaper products.

According to the workshop results, however, the major constraints on marketing are (1) weak bargaining power of *fermers* and *dehkans* and (2) poor accessibility to market. Most participants don't have enough experience on marketing their products due to these restrictions. Therefore, these constraints should be addressed at first to earn more income from their marketing activities. Fresh food items such as vegetables and fruits should be selected and the initial target market should be local markets to enhance marketing activities of *fermers* and *dehkans*, so that they can exploit their comparative advantage of "freshness" and "cheaper price". At the same time, adding values to the raw products should be considered to earn more income from their products.

High value added products should be developed in consideration of export to other regions in Uzbekistan and even foreign countries after establishing marketing channels and accumulating experience of marketing. "High value added products" includes those products which meet widely accepted food safety standards. Export of fresh vegetables to the northern countries is a possible idea, since Karakalpakstan has comparative advantage in view of warm climate condition. Some private enterprises already accumulate experiences using their own marketing channels. However, it is necessary to put first priority on the supplying domestic market to stabilize vegetable the market in Karakalpakstan.

The basic approach of marketing sub-sector, therefore, is; ***"enhancement of marketing activities of Fermers and Dehkans to earn more income from agricultural production"***. The basic approach will be attained through the following steps:

1) Enhancement of bargaining power through collective action of farmers
2) Improvement of accessibility to market
3) Improvement of Processing Technologies to add values of the raw materials
4) Development of Local Specialty of Agricultural Products

(2) Development Strategy

1) Enhancement of Bargaining Power through Collective Action of Farmers

It is difficult to place the *tamarka* farming on a commercial footing since the planted area in *tamarka* is quite limited. As a matter of fact, the main purpose of *tamarka* farming is just to fill self-consumption in a local regiment and *dehkans*, in particular, do not have experience to market their products to local bazaar. The bargaining power of *dehkans* is extremely weak due to the limited volume of products and a collective action is required to tackle the drawback. Also, bargaining power of *fermers* in Karakalpakstan is lower than other regions including Samarkand, Surkhandarya, and Kashkadarya due to the lack of marketing channels. Therefore, enhancement of bargaining power of *fermers* and *dehkans* through promoting collective action of vegetable and fruits growers is necessary to earn more income from agricultural production. In this regard, enhancement of Agro-firm is effective for promoting collective action of *fermers* and *dehkans* in Karakalpakstan.

2) Improvement of Accessibility to Market

Many participants of the workshop emphasized the limited access to local bazaar regarding to marketing issues. The reasons are mainly summarized in two answers: (1) far distance to nearby market and (2) lack of transportation means. In this context, it should be considered the improvement of transportation means and functional improvement of local bazaars in each district. These physical measures should correspond to the social and economic development program for 2007-2011, in which infrastructure development for marketing is included.

3) Improvement of Processing Technologies to Added Value on Raw Materials

Improvement of processing technologies is quite important to add values on the raw agricultural products and to earn more income from it. The introduction of small processing plant, improvement of processing support infrastructures and the improvement of food safety technologies are recommended

for this purpose. The initial ideas on small processing plant are: rice mill, flour mill, smoked fish, milk, ice cream, sesame oil and pellet type feed. It should be noted that the products should be determined based on comparative advantage, cost effectiveness and market needs.

For example, though people in Uzbekistan consume a lot of milk and absorbed 10% of daily calorie intake from milk, most milk sold at Nukus Central Bazaar does not pass any steps to ensure food safety. Milk-processing system was under a strong supervision of government and safe products were supplied to the consumers under the Soviet era. However, the system was corrupted after the independence, due to the lack of operation capital and raw material of milk. This sort of process is quite important, particularly during summer season to ensure food safety of milk and dairy products. Also, milk production can contribute to improve livelihood of rural residents through providing rural women with regular daily income. Therefore, improvement of milk processing technologies is highly recommendable.

Processing plant requires support infrastructures. For example, milk processing requires cooling facilities at collection station, where stable supply of electricity is necessary. In this regard, the introduction of a power generator for safety purpose should be discussed. Also, one of the constraints on green house farming in Karakalpakstan is an unstable supply of natural gas. Therefore, availability of utilities should be studied at the planning stage and, if necessary, improvement of the support infrastructure should be implemented after careful examination of technical feasibility and cost benefit analysis.

Food safety measures can also increase value of products. Food safety measures should be taken at the front line of the consumers (e.g. bazaar) and at the critical control point of supply chain (e.g. farm gate). For this purpose, it should be considered the capacity building of sanitary check officers in the district central bazaars, upgrading sanitary check equipment at Veterinary and Sanitary Laboratory in the district central bazaars and improvement of supply chain in view of food safety. Since testing tools at the central bazaar's laboratory are old and too simple, the veterinary and sanitary inspector cannot check all items in accordance with their own check plan. It is necessary, at least, to improve their testing tools and equipment to ensure food safety.

4) Development of Local Specialty of Agricultural Products

High value added products should be developed in order to expand *fermers* and *dehkans* marketing activities further after establishing channels and accumulating experience on marketing. In this stage, export to other regions in Uzbekistan and even foreign countries are taken into consideration. For this purpose, enhancement of R&D on agricultural products, promotion of "one-village one-product" movement and export promotion are required.

Regarding to the market for vegetables, it should be noted that the market price of cucumber and tomato in Karakalpakstan is quite unstable, due to over inflow in summer season and less inflow in winter. A part of the reasons might be a lack of marketing strategy. If *fermers* and *dehkans* can shift shipping season of cucumber and tomato, by introducing tunnel multi or green house technology, they can have more income from its sales. However, the introduction of these technologies should be determined based on technical feasibility and cost effectiveness.

Also, heavy prices down in summer may also be mitigated if *fermers* and *dehkans* can allocate their limited resources to other vegetables or plants. According to the interview survey to local traders, one of promising products in Karakalpakstan is melon, which used to be locally specialized products but is decreasing in production volume due to spreading fruits fly. In either case, further R&D is required on agricultural production including marketing. The following table shows possible locally specialized agricultural products by districts in Karakalpakstan.

Table 6.1.3 Locally Specialized Agricultural Products in Karakalpakstan

Item	District
Rice	Nukus, Takhtakupyr, Kanlikul, Chimbay, Kungrad
Potato	Beruni, Nukus
Grape	Beruni, Khodjeyli
Vegetables	Nukus
Melon & Grounds	Khodjeyli, Nukus, Kegeily
Fruits	Nukus, Beruni

Item	District
Meat	Beruni, Kegeily, Chimbay, Khodjeyli
Milk	Beruni, Khodjeyli, Kegeily
Egg	Beruni
Wool	Kungrad, Takhtakupyr, Karauzyak
Karakal Hide	Beruni, Takhtakupyr, Kanlikul

Since environmental conditions are so severe, Karakalpakstan has comparative disadvantage in land productivity compared to other regions in Uzbekistan. To overcome the disadvantage, adding higher value on the agricultural raw material should be considered, which is produced both in Karakalpakstan and in other regions. In this regard, “one-village one-product” movement is recommendable to pull up peoples’ mind to further development stage. The initial ideas for the high value products are livestock products including wool and skin, licorice processing, sesame oil and plywood cottonseed byproducts.

(3) Programs for Marketing and Processing Development

Enhancement of Bargaining Power through Collective Action of Farmers

1) Program for Joint Marketing by Farmers Group (Model Agro-firm Establishment)

- Focus the group discussion on marketing and group formulation
- Business plan (needs assessment, marketing strategy, study tour, business seminar, technical training and action plan)
- Products development (collection, grading, processing, packing)
- Marketing (channel establishment, identify transport means)

Improvement of Accessibility to the Market

2) Improvement of Marketing Support Infrastructures

- Stakeholders meeting to formulate market improvement master plan
- Integration of control system of perishable food
- Separation of perishable food section and other commodities
- Establishment of cooling facilities

3) Small-scale Slaughterhouse

- Construction of a small-scale slaughterhouse

Value-added Agricultural and Livestock Products

4) Introduction of Small Processing Plants

- Focus the group discussion on the business, identification of product and target market
- Preparation of business plan and establishment of management body
- Procurement and operation of processing plant

5) Program to Improve Food Safety Technologies

- Review of food safety standard
- Improvement of sanitary control plan
- Capacity building of VSE (veterinary and sanitary expertise)
- Promotion of enlightenment activities

6.1.8 Consideration for *Dehkans* in the Regional Development

The workers and staffs were allowed to bid for land, where they will farm privately, during the *shirkats* restructuring process. However, many workers and staffs were unsuccessful or did not bid. As a result, it seems that many of them became *dehkans*, except becoming *fermers*. As private, commercially oriented *fermers*, they are under no obligation to retain former employees. This may have significant consequences, especially in view of the fact that the former *shirkats* tended to have excess employees. As a result, *dehkans* are not able to be employed stably by *fermers* established newly like the former *shirkats*. By lows and regulations concerned, *dehkans* are not given a right to manage a farm-land, even a tenant farming is not allowed, except for growing crops in their tiny backyard (*Tamarka*).

According to the Report on the Development of *dehkan* and Farm Enterprises in the Republic of Karakalpakstan (JICA 2007), *dehkans* occupy a substantial part in agricultural production, including livestock in Karakalpakstan, and exceeds approximately 220,000 inhabitants. So, this indicates that supporting schemes for *dehkans* are important not only for agricultural production but also for creating employment opportunity. However, *dehkans*' productions are no better than for supplementary self-consumption because of limited land with 0.21ha (2006) in average.

Many *dehkans* are therefore engaged in non-agricultural activities. The products from own *Tamarka* are mainly for self–consumption and sometimes they sell it if surplus rose. Nearly, every family cultivates the *Tamarka* with food crops. Most *dehkans* have a mixed farming system: they produce cereals, fodder crops vegetables, fruits and breed some cattle/sheep/poultry. *Dehkans* have the right to manage their *Tamarka* according to their own needs. Previous study[1] reported that as the case of village in Uzbekistan, villagers can unite in horticulture and viticulture partnerships and the land should be used for vegetable production as potato and melons. The minimum size is determined to be 0.06ha per member of a horticulture and viticulture partnership. Although the features of *dehkans* vary widely from redundant workers after the dissolution of *shirkats*, legal *dehkans* and new entry *dehkans* have possibility to contribute more to their livelihood through making *Tamarka* farming active.

WISP, one of the national strategies, emphasizes the necessity create jobs and improve the livelihood by rural developments, as well as to contribute to the economy, especially for regions where agriculture is the most important industry such as the Republic of Karakalpakstan, which is one of the most depressed regions.

Based on the field survey and as mentioned above, concerning to support *dehkans* who occupy majority in rural area, the Study Team are going to emphasize on the point of improving livelihood rather than that of actors of agricultural development. Considering an actual environment of *dehkans*, *Tamarka* which is the only production mean owned by them shall improve their use.

6.2 Action Plan of Regional Development in Karakalpakstan

6.2.1 Action Plan of the Master Plan

The Action Plan, including individual programs/projects with detailed description of targets, objectives, activities, actors/supporters, implementation schedule, preliminary costs, etc., is formulated for the actual implementation of the Master Plan.

The component programs/projects shown in the framework of Master Plan are based on the sub-sector of agricultural development. It was estimated 40 programs/projects.

There are three programs/projects that are inter-sector programs/projects among the formulated programs/projects. Program of Fodder Production were identified in the agriculture sub-sector for the

[1] Agrarian reform; The pathway to sustainability: a case study of Utra, Yutu, Yukori and Quyi chirchik, Environmental Policy Group, Social Science Group, Wageningen University 2007

crop rotation to improve the soil fertility and it was proposed by livestock sub-sector to increase and improve the animal products. Both sub-sectors give were with high priority and they cannot separately being operated. So, they were combined as one program of the agricultural development. The result of the review showed some combined programs/projects within each sub-sector considering the combination of activities. Furthermore, 2 components, which were not included in the Framework for Regional Development, were newly added in order to facilitate the smooth implementation of the Action Plan through institutional strengthening of local government. Totally, 23 programs/projects were formulated for the Action Plan. These component programs/projects are summarized in the Project Design Matrix (PDM) as shown in Appendix of this Report.

The sub-sector wise components are combined and rearranged as shown in Table 6.2.1 (page 6-85) considering their co-relation. The 23 programs and projects are listed as follows:

1) Development of Market Oriented Agriculture
   - Soil Conservation and Improvement by Crop Rotation (No. 111)
   - Improvement of Agricultural Extension Service to *Fermer* (No. 121)
   - Promotion of Renewal of Agricultural Tractors (No. 131)
   - Improvement of Accessibility to Agricultural Inputs for Agricultural Producers (No. 141)
   - Research and Development of Melons and Apple (No. 151)
   - Strengthening of Women's Vegetable Production in Tamarka (No. 161)

2) Integrated Farm Management by Fodder Production and Animal Breeding
   - Fodder Production and Promotion of Animal Breeding (No. 211)
   - Training Programs on Animal Husbandry (No. 221)
   - Artificial Insemination and Veterinary Services (No. 241)

3) Development of Fisheries and Aquaculture
   - Sustainable Fishery Promotion (No. 271)
   - Aquaculture Development (No. 272)

4) Improvement of Irrigation Water Use Efficiency and Reducing Crop Damage by Salinity
   - Improving Internal Canal System (No. 311)
   - Strengthening Water Management in the Field (No. 312)
   - Introducing Water Saving Technology (No. 321)
   - Improving Drainage Conditions in the Field (No. 331)
   - Strengthening WUA and Enhancing Its Activity (No. 341)

5) Distribution and Marketing by Farmers Cooperatives
   - Joint Marketing by Farmer Group (Model Agro-firm Establishment) (No. 411)
   - Improvement of Marketing Support Infrastructure (No. 421)
   - Small-scale Slaughterhouse (No. 422)

6) Value-adding of Agricultural and Livestock Products
   - Improvement of Small-scale Agro-processing Technologies (No. 431)
   - Improvement of Food Safety Technologies (No. 433)

7) Institutional Development for the Support Farmers
   - Enhancement of Communication for Local Agriculture Administration (No. 511)
   - Reinforcement of VCC Coordinating Abilities (No. 512)

6.2.2 Development of Market Oriented Agriculture

As described in the Master Plan, agricultural development of the Project Area should be materialized through "***Development of Market Oriented Agriculture on a sustainable Basis***".

There are two major components in the approach, i.e. “soil conservation and improvement” and “crop production improvement”. The crop rotation systems combining cotton, wheat and fodder crops should be promoted to improve soil condition on a sustainable basis for soil conservation and improvement. This component and “Integrated Farm Management by Fodder Production and Animal Breeding” as described in Section 6.2.3, should be promoted as they both have a complementary relation on each other.

Mainly production of vegetables and fruits should be increased, in addition to cotton and wheat to improve the crop production, by providing necessary information and technology services and inputs, e.g. tractors, seeds, fertilizers and pesticides/herbicides. Development of production center of promising crops should also be strategically promoted through the enhancement of research works and empowerment of intended producers for crop diversification. Also, “Strengthening of Women’s Vegetable Production in *tamarka*”, as described in Section 6.2.2 (6), could contribute to the crop diversification.

(1) Soil Conservation and Improvement by Crop Rotation[2]

1) Concept

As described in Chapter 2 Uzbekistan has been suffering from a general deterioration in land quality and water resources. The deterioration must be a very serious problem. Unless quick measures to prevent the deterioration, agriculture in Uzbekistan will soon reach a point at which crops cannot be grown on sustainable basis. The agriculture will eventually collapse from lack of reasonable yield of crops.

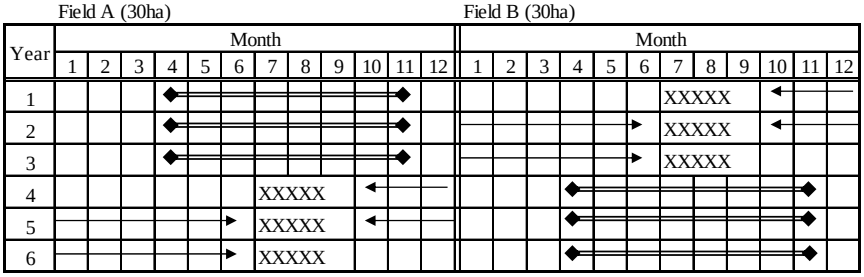
It is quite clear that introduction of crop rotation allowing more room for alternatives to cotton and wheat at the farm (*fermer*) level is the only answer with technical feasibility on sustainable basis. The priority area to pursue a technically sound agriculture with crop rotation shall be the area of low quality soils.

Since cropped area of cotton and wheat is almost 60% of the total cropped area in the Project Area in 2006, it is impossible to examine the sound crop rotation system without referring the both crops. Though the study does not target the both crops, the study team cannot ignore them for examining this part.

The following figures show two cropping patterns of *fermer* managing 60ha for reference, since 60ha might be the present average size of irrigated farmland managed by *fermer* in the Project Area. The first one is a typical cotton and wheat cropping combining green sorghum (Present Model) in the Project Area, and the later one is a recommendable crop rotation (Recommendable Model) to the Project Area with cotton + wheat + alfalfa + sorghum. According to the rough calculation of the study team, the *fermer* can expect 1.5times of net profit from the Recommended Model (11,476 thousand sum/year) as compared with the Present Model (7,507 thousand sum/year). Though production of cotton and wheat decreases to 2/3, the number of cows to be reared by fodders from the farmland becomes almost 3 times in the Recommended Model. Also, it might be possible to increase per ha yield of cotton and wheat due to the recovery or the improvement of soil fertility after several rotations in the Recommended Model.

[2] A report on “Uzbekistan: Implementation and Monitoring of Policy Reforms in Agriculture Sector, ADB 2008” has suggested a further reform program of agricultural sector in Uzbekistan. The Study Team shares with the ADB report basic approach to the further reforms. The Study Team recommends that this program for soil conservation and improvement by crop rotation should be linked with the ADB’s recommended reform program.

Present Model (Cotton + Wheat + Sorghum)



Recommended Model (Cotton+Wheat+Sorghum+Alfalfa)

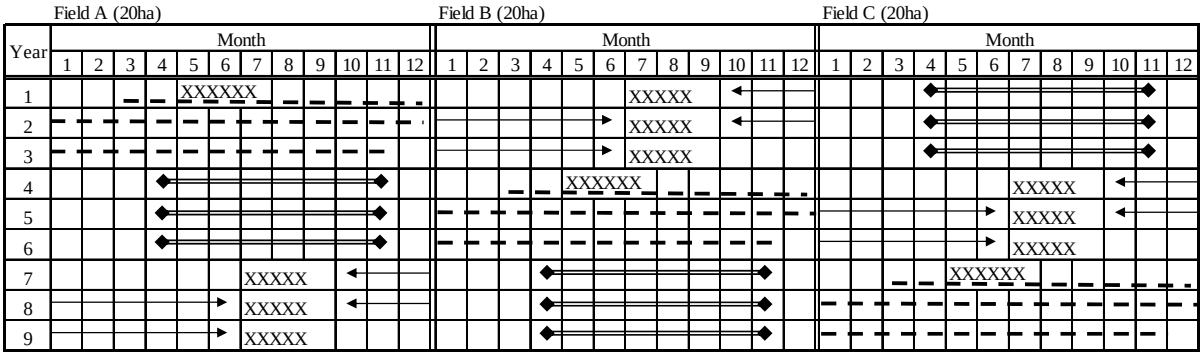


Fig. 6.2.1 Crop Rotation Models in the Project Area

2) Proposed actions and actors

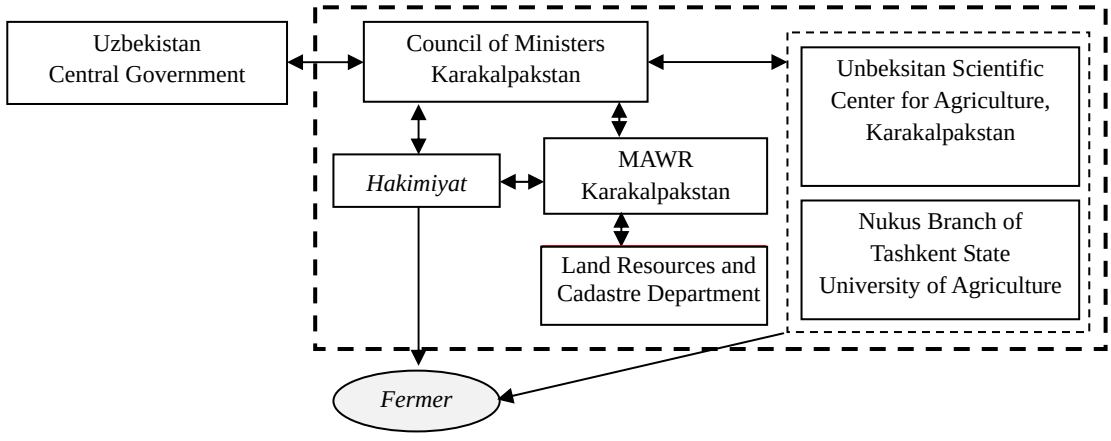


Fig. 6.2.2 Conceptual Diagram of Collaboration among Stakeholders on the Soil Conservation and Crop Rotation Program

- Council of Ministers of Karakalpakstan, in cooperation with MAWR of Karakalpakstan and concerned *Hakimiyats*, confirms the latest soil survey result, prepared by the Land Resources and Cadastre Department of MAWR.

- Based on the result of the survey, the Council of Ministers of Karakalpakstan develops a comprehensive program to introduce a crop rotation to all cotton and wheat area even gradually, as well as to make necessary arrangements with the Uzbekistan Central Government in order to implement the developed program.
- Simultaneously, the Council of Ministers of Karakalpakstan promotes a research on alternative crops such as alfalfa, oilseeds etc. to be combined with cotton and wheat in the crop rotation, in cooperation with the MAWR of Karakalpakstan, Uzbekistan Scientific Centre for Agriculture in Karakalpakstan and Nukus Branch of Tashkent State University of Agriculture.
- The program is implemented under the strong leadership of concerned Hakims, with a full support of the Council of Ministers of Karakalpakstan and cooperation of the MAWR of Karakalpakstan.

3) Implementation organization

<Implementation Agency>: Council of Ministers of Karakalpakstan
<Supporting Agency>: Concerned *Hakimiyats*, MAWR of Karakalpakstan, Uzbekistan Scientific Centre for Agriculture in Karakalpakstan, Nukus Branch of Tashkent State University of Agriculture

4) Implementation schedule

Activities	Year									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Confirmation of Soil Survey										
Development of a comprehensive										
Arrangements with the central										
Research on alternative crops										
Expansion of farmland under crop										

5) Necessary Input and Cost

Activity / Input	Cost (1,000 Sum)	
	Subtotal	Total
Setup of coordination office / expansion of farmland under crop rotation	1,603,084	
Research on alternative crops / experimental cultivation	266,657	
Coordination Office in the Council of Ministers	Regular*	1,869,741

* Cost included in Regular Activities of the concerned organization

(2) Improvement of Agricultural Extension Service to *Fermer*

1) Concept

The productivity of the major crops in Karakalpakstan is relatively low compared to other regions in Uzbekistan. The low technical ability of *fermers* could be another reason, while this is mainly due to the severe condition of weather and irrigation water availability. Uzbekistan Government annually organizes 5-days course of *fermer* training seminar in off-agriculture season (Jan - Feb) with its own budget in order to improve *fermers*' ability[3]. However the seminars do not have much time for practical agricultural technologies, since it covers comprehensive topics concerning *fermer* business. Also, abundant information about agricultural technology possessed by researchers in agricultural research institutes and academic institutes does not penetrate to actual producers with understandable terms. There is no practical on-farm technical manual in Karakalpak targeted to *fermers*. As a result, many *fermers* consider that they do not get enough agricultural extension services, except for cotton and wheat production according to the study team's field survey result. Various reforms in dissemination system of agricultural information and technologies should be made to improve *fermers'* technical ability in Karakalpakstan.

[3] The training seminar scaled down in Karakalpakstan this year due to budgetary constraint. It is not clear at this moment whether the scaled down is a temporary measure only for this year or not

With this program, practical agricultural technical manuals targeted to *fermers* will be developed in cooperation with several organizations concerned. One manual with new topics (e.g. technology for different crops) will be developed each year during the implementation of the Action Plan. Also, teachers of district agricultural colleges will be trained, who play a vital role in disseminating the developed manuals, as well as in activating agricultural extension as a window personnel to *fermers*. *Fermers* will be able to have more useful and applicable technology and information to actual daily works in the field through the nearest agricultural college. It is expected that many *fermers* could improve their ability in agricultural production aiming at increasing and diversifying their products with this program.

2) Proposed Actions and Actors

The outline of this program is shown below.

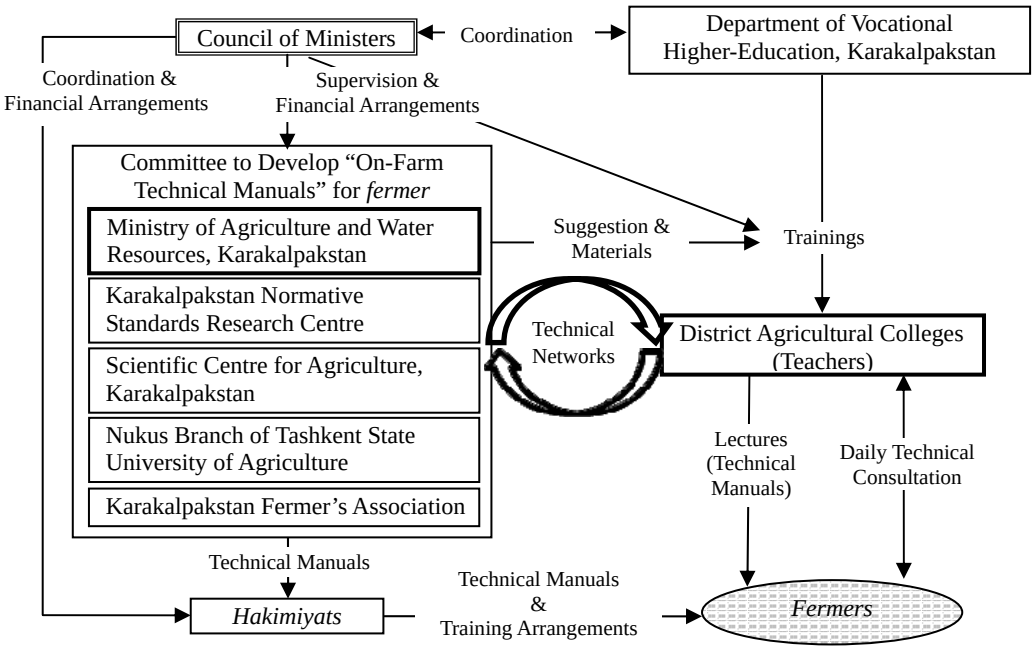


Fig. 6.2.3 Conceptual Diagram of Improvement of Agricultural Extension Service to *Fermer*

- A committee is established to develop "on-farm technical manuals" under supervision of Council of Ministers of Karakalpakstan. The committee is composed by the MAWR of Karakalpakstan as a coordination body, Karakalpakstan Normative Standards Research Centre, Uzbekistan Scientific Centre for Agriculture in Karakalpakstan, Nukus Branch of Tashkent State University of Agriculture and Karakalpakstan Fermer's Association
- The committee has a series of meetings to discuss subjects/topics of the manuals, share to write the manuals, schedule and so on. The committee also edits and prints the manuals. The Council of Ministers of Karakalpakstan arranges necessary budget. One manual will be developed every year for ten years and a total of ten manuals will be developed in the implementation period. On-farm technologies of cotton, wheat, fodder crops, vegetables & melons, fruits, agricultural machinery, irrigation, plant protection, soil improvement and livestock are suggested as examples of subjects/topics of the manuals.
- On the other hand, the Department of Vocational Higher-Education in Karakalpakstan organizes trainings for teachers of District Agricultural Colleges who will be lecturers to train *fermers* about the developed manuals. The trainings will be organized in cooperation with the Council of Ministers of Karakalpakstan and held once a year under its supervision. The trainings guide the teachers in accordance to the contents of the developed manuals.

- The committee provides suggestion and necessary materials on agricultural technical issues to the trainings of the college teachers. They are also major resources of lecturers to the trainings.
- The manuals developed in this program are provided to *fermers* through each *Hakimiyat* concerned.
- The *Hakimiyat* organizes a training seminar to introduce and disseminate the developed manuals to *fermers* in cooperation with the District Agricultural College in its territory. The Council of Ministers of Karakalpakstan coordinates the training seminar in each district and makes necessary financial arrangements.
- The trained teachers in the Districts Agricultural Colleges provide lectures on the technical manuals in the technical seminar.
- The District Agricultural Colleges, as well as, functions as a window agency for providing the agricultural extension services to *fermers*. The teachers are expected to play an important role in technical consultation to *fermers* on day-to-day issues at the closest point of *fermers*.
- A technical network system is established among the concerned agencies and District Agricultural Colleges, so that member agencies of the committee to develop the manuals are able to provide technical support to the colleges when necessary.

3) Implementation Organization

<Implementing Agency>: Council of Ministers of Karakalpakstan, *Hakimiyats* and District Agricultural Colleges

<Supporting Agency>: MAWR of Karakalpakstan, Karakalpakstan Normative Standards Research Centre, Uzbekistan Scientific Centre for Agriculture in Karakalpakstan, Nukus Branch of Tashkent State University of Agriculture, Department of Vocational Higher-Education in Karakalpakstan, and Karakalpakstan Fermer's Association

4) Implementation Schedule

Activities	Year									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
To organize and manage a committee to develop agricultural technical manuals	■	■	■	■	■	■	■	■	■	■
To edit and print the manuals	■	■	■	■	■	■	■	■	■	■
To provide the manuals		▲	▲	▲	▲	▲	▲	▲	▲	▲
To train teachers of district agricultural collages	■	■	■	■	■	■	■	■	■	■
To organize technical seminar for	■	■	■	■	■	■	■	■	■	■
To provide agricultural extension		■	■	■	■	■	■	■	■	■

5) Necessary Input and Cost

Activity / Input	Cost (1,000 Sum)	
	Subtotal	Total
Preparation of manuscript / printing of manual	172,188	
Training of agricultural college teachers	91,295	
Seminar for fermers	327,210	590,693

No additional costs are necessary for the "technical seminars for *fermers*" and the "agricultural extension services", since the both activities shall be carries out by the existing administration setups on a regular basis.

(3) Promotion of Renewal of Agricultural Tractors

1) Concept

There were 4,334 agricultural tractors in the Project Area in August 2008, while the number in Karakalpakstan was 7,081. The number in the Project Area for 2010 is not clear, while the number in Karakalpakstan is 10,426 as of July 2010. Out of the 10,426 units, MTPs have 680 units or 8.4%, and

Alternative-MTPs (A-MTPs) and individual *fermers*, and companies, have the rest of them. At present, MTPs or A-MTPs provide tractor services on contract basis mainly for land preparation with high-powered tractors and *fermers* and companies use their own tractors for the rest of the works. However, many *fermers* have difficulty in using tractors on-time due to insufficient operation of the tractors.[4] This situation causes late planting or abandonment of planting.

The above situation is due to high dependence on the overage tractors and low number of renewed tractors. Many of the tractors, which are working now in Karakalpakstan, were introduced before the independence and have being transferred to MTP, A-MTP or individuals when *shirkats* were dissolved. However, MTP and A-MTP cannot afford to renew the tractors due to their unfavorable financial condition. Then, the inefficient use of the tractors is one of the major causes of the financial situation of them. The financial condition of most *fermers* is also not so good due to severe circumstances of the agriculture, including unfavorable market condition of their major products. Though the government has carried out a tractor lease scheme for *fermers* since 2001, this scheme did not cover all potential demand for tractors. A substantial numbers of *fermers* used to default in the payment[5]. In consideration of the situation, the government has newly introduced relaxed lease conditions to the scheme.

On the other hand, the transition from collective-managed *shirkats* to individual-managed *fermers* is almost completed and merging of weak *fermers* is progressing by the land optimization policy. Use of tractors is also needed to shift from collective operation system to individual possession. The land scale can make full use of 2 to 3 numbers of 80 – 100 hp tractors since the average cropping area of *fermers* in the Project Area is expected to be about 60 ha or more. Tractor operation also would be more efficient by promoting individual possession. *Fermers* will be able to avoid contract and other coordination procedures with MTPs and A-MTPs after getting their own tractors.

This program aims at providing favorable condition to more *fermers* in the Project Area for procurement of new tractors through accumulating necessary funds in order to supplement on-going government tractor lease scheme. A total of 1,500 tractors shall be procured in 10 years under this program. The number may cover the gap between the potential demand of individual *fermers* and companies, and the expected supplied number of tractors by the existing government tractor lease scheme including the scheme of Uzbekistan Agricultural Machinery Leasing Co.. Then, maintenance and repair ability of MTPs in the Project Area for tractors will be empowered, so that the MTPs can provide workshop-services to individual *fermers* and companies as the central workshop at district level. A-MTPs will provide minor maintenance services and spare parts of tractors as a local sales agent of major tractor and other farm-machinery manufacturing companies.

Increasing the number of tractors and improving the working efficiency lead *fermers* to enjoy increased cropped area and crop productivity through on-time farming practices.

2) Proposed Actions and Actors

The outline of the program is shown below.

[4] As calculated in Chapter 2, the number of tractors in itself may be sufficient in Karakalpakstan. However, many *fermers* still complain about unavailability of tractors when they need .

[5] About 32% customers have defaulted in payment, though economic benefit from introduction of tractor is expected according to Karakalpakstan MAWR's calculation

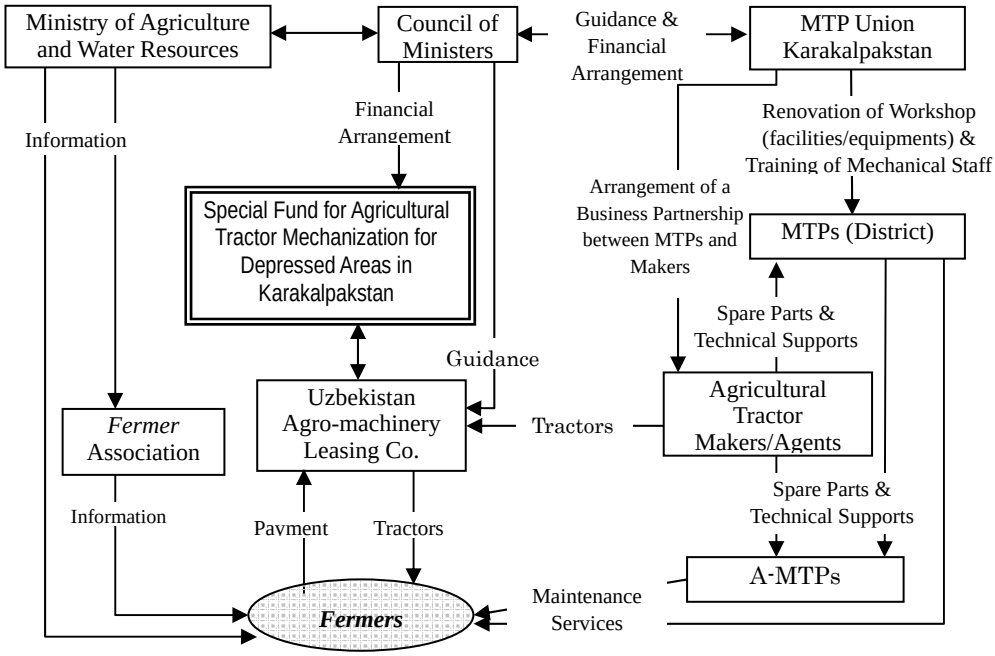


Fig. 6.2.4 Conceptual Diagram of Promotion of Renewal of Agricultural Tractors

Tractor Lease Scheme

- The Council of Ministers of Karakalpakstan establishes a new tractor lease scheme exclusively for individual *fermers* in the Project Area for procurement of agricultural tractor in consultation with MAWR of Karakalpakstan. The condition of the new lease scheme should be same or more favorable than the existing government tractor lease scheme, so that common *fermers* in Karakalpakstan will be able to afford a tractor
- The Council of Ministers of Karakalpakstan arranges necessary funds for the lease scheme called the “Special Fund for Agricultural Tractor Mechanization for Depressed Areas in Karakalpakstan”, in consultation with the central government on utilizing a donor’s fund, if necessary.
- The Council of Ministers of Karakalpakstan arranges a financial pipeline between the funds and the Uzbekistan Agricultural Machinery Leasing Company
- The Council of Ministers of Karakalpakstan provides the Agricultural -Machinery Leasing Company necessary guidance to implement the lease scheme
- The MAWR of Karakalpakstan informs the lease scheme to all *fermers* in the target area in cooperation with Karakalpakstan Fermer’s Association
- The Agricultural Machinery Leasing Company carries out the lease scheme

Improved Function of Workshops of MTPs

- The Council of Ministers of Karakalpakstan makes a basic plan to enhance workshop function of MTPs in the target area in consultation with Karakalpakstan MTP Union
- The Council of Ministers of Karakalpakstan arranges necessary finance for the plan
- The Karakalpakstan MTP Union makes the detailed plan for renovation of the concerned MTPs’ workshops and training of mechanical staff of the MTPs
- The Karakalpakstan MTP Union implements the plan
- The Karakalpakstan MTP Union arranges a business partnership between MTPs and tractor makers

3) Implementation Organization

Tractor Lease Scheme

Implementation Agency: The Council of Ministers of Karakalpakstan and the Agricultural Machinery Leasing Company

Supporting Agency: The MAWR of Karakalpakstan and Karakalpakstan Fermer's Association

Improved Function of Workshops of MTPs

The Council of Ministers of Karakalpakstan and Karakalpakstan MTP Union

4) Implementation Schedule

Activities	Year									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Implementation of the tractor lease										
Planning of MTPs' workshop										
Facility renovation and equipment procurement										
Training of MTP mechanical staff										

5) Necessary Input and Cost

Activity / Input	Cost (1,000 Sum)	
	Subtotal	Total
Tractors with plow (150 units, 10 years)	55,350,000	
Renovation of workshop facilities	3,690,000	
Workshop equipment of MTPs	3,690,000	
Trainig for MTP mechanical staff	36,715	62,766,715

(4) Improvement of Accessibility to Agricultural Inputs for Agricultural Producers

1) Concept

Agricultural inputs, i.e. seeds, fertilizers and pesticides/herbicides are very basic inputs for a good and a stable harvest, though overuse of chemical materials must be eliminated. They should be available on time to every agricultural producer (*fermers*/*dehkans*).

The present distribution system of fertilizers is substantially monopolized by the state company[6] and it is difficult for many agricultural producers to procure fertilizers, except for contract cultivation of cotton and wheat. In the case of seeds and pesticides/herbicides, the distribution systems are still underdeveloped in Karakalpakstan, except the case of cotton/wheat seeds which are distributed from companies who make a production contract with *fermers*. Other crops' seeds are commonly sold at open stalls in local bazaars. Agricultural producers sometimes get poor quality of seeds. A limited amount of pesticides/herbicides are sold mainly through the government channel (Plant Protection Stations).

As a result, many *fermers* only use seeds and fertilizers mainly for cotton and wheat. Very limited *fermers* use pesticides/herbicides even for cotton and wheat, though they are suffering from damages of plagues and diseases. Most of *dehkans* don't use such inputs, except for vegetables seeds. This situation must be one of the major causes of low crop productivity in Karakalpakstan.

A movement of the private sector to enter into agricultural inputs distribution business is increasing, though the movement is still in a very beginning stage. Now is good timing that the government creates favorable conditions to promote the inputs distribution system to the end users through private channel, since many agricultural producers look for easy access to the inputs. While Karakalpakstan Fermer's Association has already started to support a *fermer* who entered into fertilizer distribution

[6] Under the relevant regulations, private sector can go into the business of fertilizer marketing, as well as seeds and pesticides/herbicides, except for Ammonium Nitrate due to security reason according to collected information through interviews to concerned personnel.

business[7], the support has not yet been systematized. It needs to establish a strategic supporting system, so that the private distribution system will be developed by motivated pioneers in all Karakalpakstan.

This program aims at improving the functions of outlet stores of *Uzselhozhimiya* (Uzbekistan Agricultural Chemical Co.) to be "One Stop Agro-inputs Shops" where any customers can buy all necessary agricultural inputs (seeds, fertilizers and pesticides/herbicides) in one place without difficult procedures at district level in the Project Area in order to demonstrate a business model of agricultural inputs distribution. It is expected that this program triggers a movement to establish similar shops at VCC level by local investors. Agricultural producers will be able to have easy access to quality inputs at reasonable price with the increase of the number of "One Stop Agro-inputs Shops" in rural area.

2) Proposed Actions and Actors

The outline of the program is shown below.

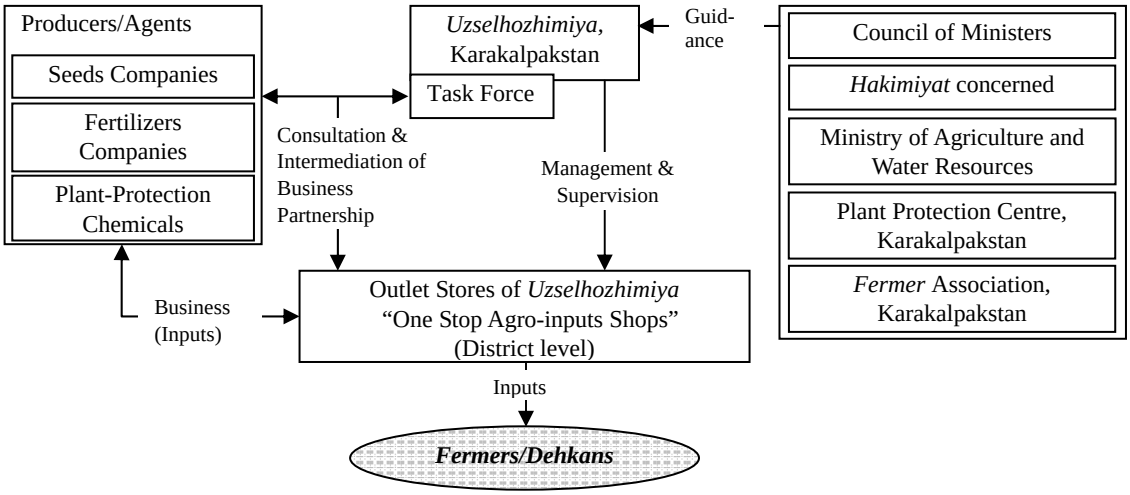


Fig. 6.2.5 Conceptual Diagram Improvement of Accessibility to Agricultural Inputs for Agricultural Producers

- Uzselhozhimiya (Uzbekistan Agricultural Chemical Co.), Karakalpakstan Fermer's Association makes framework of the program in consultation with Council of Ministers of Karakalpakstan, *hakims* of concerned districts, MAWR of Karakalpakstan and Plant Protection Centre in Karakalpakstan
- *Uzselhozhimiya* arranges necessary finance for establishing and managing "One Stop Agro-inputs Shops". The Council of Ministers of Karakalpakstan makes arrangements to support the financing, if necessary.
- Uzselhozhimiya makes contacts with producers and/or sales agents of seeds, fertilizers and pesticides/herbicides who are interested in making business with the "One Stop Agro-inputs Shops"
- Uzselhozhimiya starts the "One Stop Agro-inputs Shops" by improving the functions of its outlet stores in 10 districts in the Project Area (one shop/district) gradually, except for Muynak District, (1st year: 3 shops, 2nd year: 3 shops and 3rd year 4 shops).
- Uzselhozhimiya establishes a task force to provide consultation services to the "One Stop Agro-inputs Shops", mainly the intermediation between the producers and/or sales agents and the shops. Organization trainings for safety and appropriate handling of toxic chemicals and fertilizers and how to store seeds are another important part of the services. The services shall be continuously provided for 3 years from the establishment of the shops. Uzselhozhimiya arranges

[7] A *fermer* in Amudarya district has started the business since April, 2008. According to the *fermer*, he could manage the business even he depended on a bank credit in the beginning. Now, he gets a favorable credit from the *Fermer* Development Fund.

a business promotion expert for the consultation services with a technical cooperation program, if necessary.

3) Implementation Organization

Implementation Agency: *Uzselhozhimiya* (Uzbekistan Agricultural Chemical Co.)Karakalpakstan
Supporting Agency: Council of Ministers of Karakalpakstan, District Offices Concerned, MAWR of Karakalpakstan, Plant Protection Centre in Karakalpakstan and Karakalpakstan Fermer's Association

4) Implementation Schedule

Activities	Year									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Contracting with producers and/or sales agents of seeds, fertilizers and pesticides/ herbicides	▬									
Renovation of existing outlet stores to be suitable for the "One-Stop Agro-inputs Shops"	▬	▬	▬							
Establishment of "One-Stop Agro-inputs Shops"	▲	▲	▲							
Consultation services to "One-Stop Agro-inputs Shops"		▬	▬	▬	▬	▬				

5) Necessary Input and Cost

Activity / Input	Cost (1,000 Sum)	
	Subtotal	Total
Renovation of facilities	43,050	
Setup of supporting office / consultation services to "One-stop agro-inputs shops"	248,139	291,189

(5) Research and Development of Melons and Apple

1) Concept

Melon used to be a famous agricultural product in Karakalpakstan, while the production is stagnating because of melon flies and loss of traditional markets. Apple is a major fruit which is produced in Karakalpakstan and relatively suitable for local climate conditions. Melon and apple must be leading crops to increase income from agricultural producers through crop diversification in Karakalpakstan. The conditions to promote the production of both crops should be strategically prepared for developing the crops as special products of Karakalpakstan. However, the basic research on the crops and supply of seeds/seedlings of promising varieties are very limited at present.

This program targets *fermers* and *dehkans* who are mainly concerning to afro-firms. It aims to strengthening study and research works on production technologies of melon and apple and disseminating the technologies to target groups for promoting the crops as special products of Karakalpakstan. The outputs of the study and research works will be strategically transferred to the target groups since agro-firms are expected to be a major driving force to promote agri-business in Uzbekistan.

Promising varieties of melon and apple will be selected and also the seeds and seedlings will be produced to distribute to the target *fermers* and *dehkans* in this program. Simultaneously, the production technologies for the both crops will be developed and disseminated to the target groups. While the project goals of this program are increasing the planted area and production of melon and developing a system to provide scions and technologies for apple, the goals shall be achieved through strengthening the study and research works in order to lay a sound foundation for the development of both crops.

2) Proposed Actions and Actors

The outline of this program is shown below.

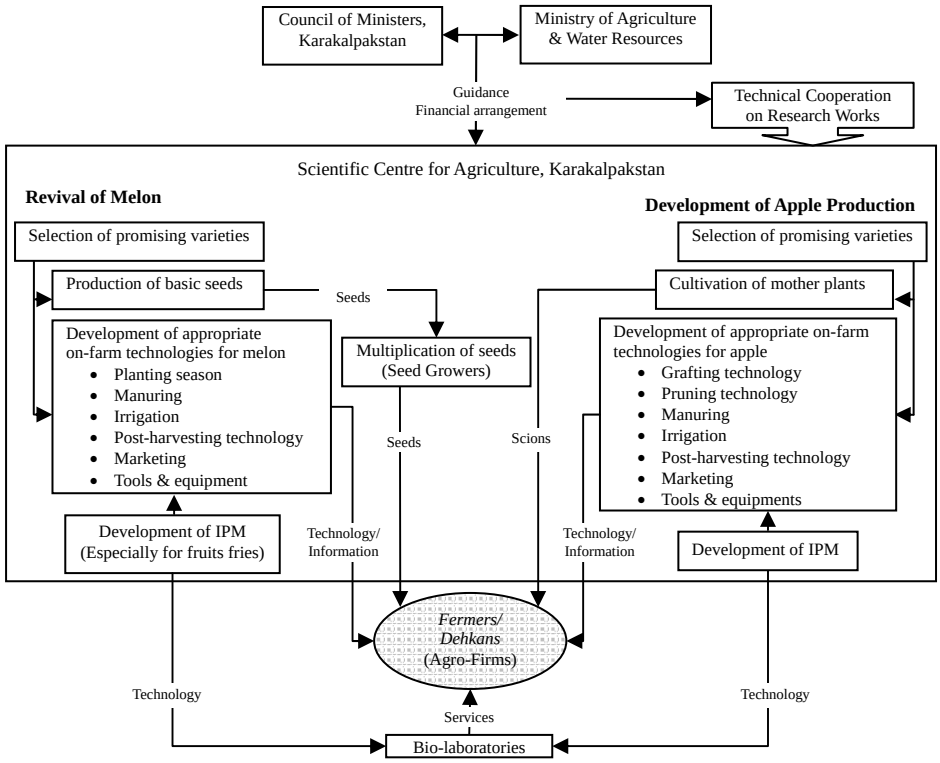


Fig. 6.2.6 Conceptual Diagram of Research and Development of Melon and Apple

- The Council of Ministers of Karakalpakstan gives guidance for the program to the Uzbekistan Scientific Centre for Agriculture in Karakalpakstan in cooperation with MAWR of Karakalpakstan and makes financial arrangement.
- The Council of Ministers of Karakalpakstan arranges a technical cooperation program for joint research activities extended from a donor in consultation with the Centre simultaneously
- The Centre establishes a trial and demonstration field in its Kegeily research farm and also the Centre renovate facilities to manage the field like office and research spaces
- The Centre carries out research on production technologies of melon by a joint research program. The subjects to be researched will be promising varieties, planting season, fertilization, water saving irrigation, pests & diseases control especially for melon flies control[8], post-harvesting, marketing and tools & equipments
- The Centre transfers developed technology to control melon fries to bio-laboratories
- The Centre produces melon seeds of recommended varieties in the field trial. Seed multiplication and distribution system with seed growers is also developed
- The Centre carries out research on production technologies of apple by the joint research. The subjects to be researched will be promising varieties, grafting, pruning, fertilization, water saving irrigation, pests & diseases control, post-harvesting, marketing and tools & equipments
- The Centre manages mother plant of recommended varieties of apple for supplying scions

[8] Practical control measures of melon flies are not yet developed in Uzbekistan, because the flies are new insects transmigrated only to Karakalpakstan and Khorezm Region since around 2000. The measures even can not exterminate the flies, have to be developed and disseminated in order to revive melon production in Karakalpakstan by integrating the existing technologies (IPM) based on ecological habit of the flies.

- The Centre provides seeds/scions and information of production technologies of melon and apple mainly to *fermers* / *dehkans* concerning agro-firms
- The Agro-firms support the Centre arranging the dissemination of seeds/scions and information to *fermers*/*dehkans*

3) Implementation Organization

Implementing Agency: Uzbekistan Scientific Centre for Agriculture in Karakalpakstan
Supporting Agency: Council of Ministers of Karakalpakstan and MAWR of Karakalpakstan

4) Implementation Schedule

Activities	Year									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
To establish a trial and demonstration field and facilities	■									
To study and research recommended varieties and production technologies		■	■	■	■	■	■	■	■	■
To provide production technologies					■	■	■	■	■	■
To produce and distribute melon seeds				■	■	■	■	■	■	■
To cultivate mother plants of apple				■	■	■	■	■	■	■
To provide apple scions								■	■	■

5) Necessary Input and Cost

Activity / Input	Cost (1,000 Sum)	
	Subtotal	Total
Establishment and renovation of research field and facilities	743,221	
Study and research on technologies of melons and apples (Joint research)	9,246,638	
Dissemination of seeds / scions and information / technologies	88,088	10,077,947

(6) the Strengthening of Women's Vegetable Production in *Tamarka*

1) Concept

Many women in rural area are very much in need of agricultural assistance, but the availability of such assistance is limited at present. Women have a certain role in *tamarka* production and that is more important in the production of vegetables than other crops. Nevertheless, there has never been any systematic technical assistance targeting women.

In this situation, extension of production skills to female *dehkans* is necessary to improve *dehkan* livelihoods by making effective use of *tamarka*.

The project intends to promote vegetable production in *tamarkas*, from the perspective of assistance to women under the instruction of the women's committee, to improve living standards of *dehkans*., A model vegetable promotion *aul* (including model *tamarka*) from among 11 districts each year is established and supported as a the procedure of implementation. The progress of this project depends on the supply of water to *tamarkas*, so it should be integrated with "Program to Reinforce the Activities of Water Users Associations – (4) Promoting participation of *tamarka* users (*dehkans*) to water management activities through VCC", with priority implementation for *auls* which participate in water management works.

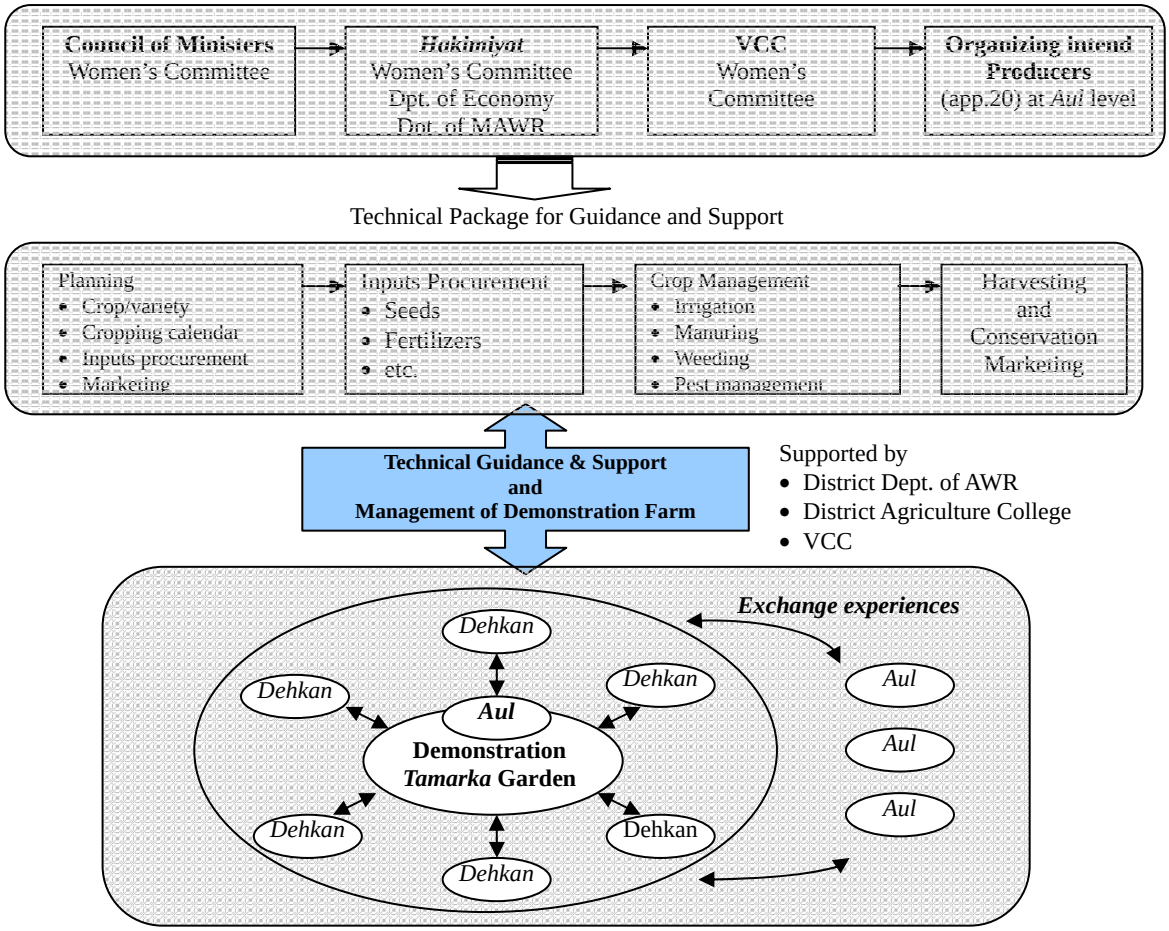


Fig. 6.2.7 Conceptual Diagram of Strengthening of Women's Vegetable Production in *Tamarka*

2) Proposed Actions and Actors

This program is instructed by the women's committee in the Council of Ministers of Karakalpakstan to lower administrative units as a strategy for promoting women's activates. The women's committee in VCC supports the VCC chairman on activities of the program.

Activities	Major actions and actors
Activity I-1: Select target VCCs.	• *Hakimiyat* selects target VCCs under consideration of the progress for "Program to Reinforce the Activities of Water Users Associations".
Activity I -2: Select participants within VCCs.	• The VCC chairman and women's committee select the motivated participants within the VCC. Around 20 women are involved in each *aul*. • With the assistance of consultants, the VCC chairman discusses with the participants and decides the role of the participants
Activity I -3: Setup model *tamarka*.	• The VCC chairman and participants setup a model *tamarka* from advanced *tamarka* grower within the VCC. With the assistance of consultants, the VCC chairman and participants discuss and decide the role of the model *tamarka*.
Activity II -1: Technical seminars (seminars and demonstrations).	• District department of MAWR of Karakalpakstan executes technical seminars (3 hours/days ×5 days) and starts assisting demonstration activities with the assistance of consultants or specialists of agricultural college. • The participants make a cropping plan at the end of seminars. The size of *tamarka* is recommended to start from a small size of 500 m^2 to avoid excessive works for the participants.
Activity II -2: Implement input support.	• District department of MAWR of Karakalpakstan will support participating *dehkans* and a model *dehkan* for the necessary input according their plan with the assistance of consultants
Activity III-1: Support to the model *tamarka* for extension activities.	• District department of MAWR of Karakalpakstan explains the role of model *tamarka* to the grower and supports the appropriate manners for visitors with the assistance of consultants.

	• District agriculture staff and specialist of agriculture college recommend the technologies introduced on the model *tamarka* based on the participants' needs • The grower of model *tamarka* receives assistance. The grower contributes for extension works
Activity III 3-2: Implement interchange meeting (with surrounding *dehkans*).	• District department of MAWR of Karakalpakstan conducts interchange meetings between the model *tamarka* and the surrounding *dehkans* in the model *aul* with the assistance of consultants.
Activity III -3: Implement interchange meetings (with *dehkans* in other *auls*).	• District department of MAWR of Karakalpakstan conducts interchange meetings between the model *aul* and other *auls* with the assistance of consultants.

3) Implementation Organization

Implementing Agency: *Hakimiyat*, District Department of MAWR of Karakalpakstan and VCC
Supporting Agency: Agricultural College and NGO

4) Implementation Schedule

The program is implemented in 5 years from 2011 to 2015 and a model vegetable promotion *aul* including a model *tamarka* per district is established every year. Totally, 55 model *tamarka* are established in the target area of 11 districts in the plan period.

Activities	Year									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Implementation in Model Tamarka (1 District / Year)	■	■	■	■	■					

Annual Implementation Schedule

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1:Select target VCC		■										
2:Setup model farm		■										
3:Cultivating season			■	■	■	■	■	■	■			
4:Technical seminars/supports			■	■	■	■	■	■	■			
5:Interchange Meetings			■			■			■			

5) Necessary Input and Cost

Activity / Input	Cost (1,000 Sum)	
	Subtotal	Total
Community development expert (15days per month x 6 months)	131,918	
Kick off workshop (30 participants x 1 day)	20,295	
Agricultural Inputs (21 pers x 0.05ha x 1,098,000 Sum/ha)	184,685	
Technical Seminars (21 participants x 5 days)	24,355	
Vehicle, Fuel (90days), etc.	337,506	698,759

6.2.3 Integrated Farm Management by Fodder Production and Animal Breeding

The activities for the livestock sub-sector consist of 12 components. Fodder crop production, which is also regarded under the former mentioned "Program for Soil Conservation and Improvement by Crop Rotation (No. 111)" is taken into this sector in regard of the importance of fodder crop production for livestock. One the other hand, slaughtering of animals and milk processing were incorporated in "6.2.6 distribution and marketing by farmers cooperatives" and "6.2.7 value adding of agricultural and livestock products", respectively. The components for integrated farm management and fodder production and animal breeding are divided into 4 groups in consideration of their objectives as indicated in the following table.

Table 6.2.2 Correlation of Master Plan and Action Plan Components for the Livestock Sub-Sector

No.	Master Plan Component	Grouping for Action Plan Components			
		Forage producction	Training program on animal husbandry	Artificial insemination and veterinary services	*Value adding / Marketing and distribution*
1	Increase forage crop production	○	-	-	-
2	Collective production of fodder crop	○	-	-	-
3	Establishment of Alfalfa seed farm	○	-	-	-
4	Artificial insemination and veterinary services	-	-	○	-
5	Construction of AI Center	-	-	○	-
6	Fostering of artificial inseminators	-	-	○	-
7	Provision of vehicles for mobile vet. services	-	-	○	-
8	Small scale animal products processing*	-	-	-	○
9	Small scale slaughter house**	-	-	-	○
10	Training program for *fermer* and *dehkan*	-	○	-	-
11	Training program on Animal husbandry	-	○	-	-
12	Establishment of crop rotation system and supply of manure	○	-	-	-

* : details described in "6.2.7 value adding of agricultural and livestock products"
**: details described in "6.2.6 distribution and marketing by farmers cooperatives"

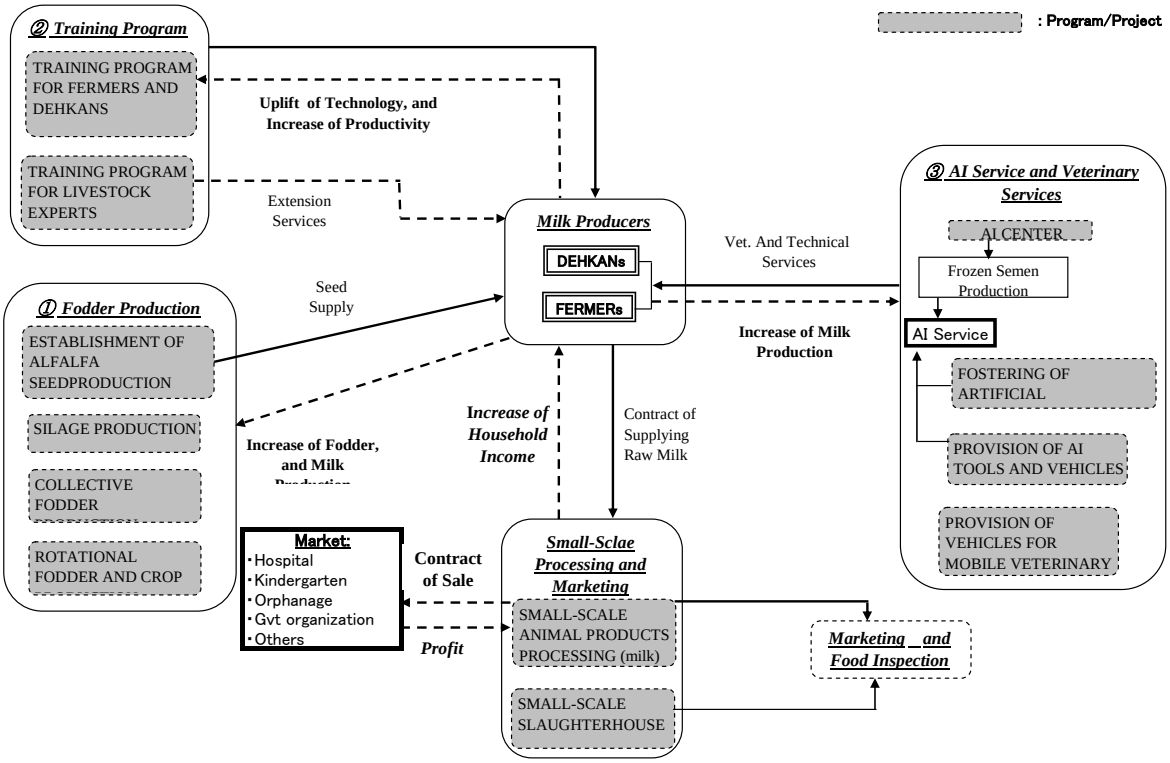


Fig. 6.2.8 Conceptual Diagram of Integrated Livestock Development

(1) Fodder Production and Promotion of Livestock

1) Concept

"Development program of livestock, especially cattle in all type of households in the period of 2006-2010, 2005, Nukus" has been issued to instruct direction of livestock development for 2006-2010. Specific measures in the plan are shown below.

- Development of fodder base
- Cattle breed development
- Veterinary service

- Organization of production activities in the private farmers
- Financing and crediting to purchase cattle and livestock products
- Organization of statistic accounting in *dehkan* households, and
- The sale and processing of livestock products.

The above program for 2006 to 2010 provides a background for formulating action plans in the livestock sector. This action plan is composed of: 1) Rotational fodder production, 2) establishment of alfalfa seed production center, 3) silage production and 4) collective fodder production. The stable supply of fodder is one of the key issues to promote livestock production in the Project Area.

SCA (Uzbekistan Scientific Center for Agriculture) at Chimbay has a long experience and technology to show technical guideline to implement rotational cropping concerning to the plan of proposed rotational cropping with leguminous crop and others. In the plan, annually 50 *fermers* will be selected and 750 ha (7,500 ha for 10 years) will be planned to adopt rotational sorghum production with alfalfa production using provided alfalfa seeds. Consequently, the current fodder area of 20,339 ha (2006) will be expected to increase up to 27,839 ha in 2020. 350 calves (3,500 head for 10 years) will be born by free artificial insemination in this program. Animal Husbandry Department and SCA will be required to work together to extend this technology in their routine works.

It is known that alfalfa growing in some limited areas in the Project Area contains higher nutrient value than grasses. But if considering more improved feeding, especially for cattle, alfalfa production must be expanded in the Project Area. An issue on alfalfa production is shortage of seeds, though SCA and a few *fermers* produce alfalfa seed for another *fermer* and *dehkans*. SCA has enough experience and technology for alfalfa seed production. Therefore alfalfa seed production will be encouraged by establishing proposed seed production center in SCA farm. Karakalpakstan Government is required to support SCA activities financially to strengthen alfalfa seed production by allocate fuel, operation and maintenance costs for agricultural machinery.

Although silage has been prepared in SCA in Chimbay in the past using banker-typed silo, its utilization has not been expanded. Silage is effective roughage especially for long winter season. In order to improve winter feeding for cattle, silage production is proposed by constructing a model silo in the selected area. One model banker-type silo (20 silos for 10 years) will be constructed in a year in *fermer's* farm for demonstration on how to produce silage and construct silo. Technical guidance is available from SCA and a few *fermers* who have experience of making silage using silo. And Animal Husbandry Department can be able to support the project in their scope of the routine works. Construction cost shall be shouldered by livestock owners.

Collective fodder production is proposed to encourage forage production amongst *dehkans* who are the main producers of animal products. Stable supply of fodder will bring them more cash income through increased milk and meat production. Some 20 *dehkans* (200 *dehkans* for 10 years) will be organized per year to conduct collective fodder production using 30 ha (300 ha for 10 years) as model activity. Collective silo may be constructed combined with this project if beneficiaries are interested. Local *Hakimiyat* is expected to work for the arrangement of idle land for the project in cooperation with Animal Husbandry Department. It is most advisable for *dehkan* beneficiaries to share the cost for seeds, fertilizers and rental of machinery.

2) Proposed Action Plans and Actors

Concerning to actors who will be involved in implementation, the JICA Study Team had a meeting with counterparts on how to implement each program/project based on a draft proposal about concerning agencies. A part of the proposal was modified according to the counterpart's suggestion and finally both groups agreed basically with the proposed implementing and supporting agencies as shown in the following.

Activities	Actors	
	Implementing Agency	Supporting Agencies
I Distribution of alfalfa seeds for rotational fodder and crop production	MAWR of Karakalpakstan and MAWR at local district	Animal Husbandry Department of MAWR of Karakalpakstan, Veterinary Department, Uzbekistan Scientific Center for Agriculture in Karakalpakstan, Karakalpakstan Fermer's Association
II AI service for free	Veterinary Department, Local *Hakimiyat*	Animal Husbandry Department, Karakalpakstan Fermer's Association
III Strengthening of alfalfa seed production at SCA	MAWR of Karakalpakstan	Scientific Research Institute of Crops, Animal Husbandry Department of MAWR of Karakalpakstan
IV Collective fodder production by *dehkans*	Local *Hakimiyat*, Animal Husbandry Department	MAWR at local district, NGO
V Silage production	Local *Hakimiyat*, Animal Husbandry Department	Uzbekistan Scientific Center for Agriculture, Karakalpakstan Fermer's Association

3) Implementation Organization

Concerning to silage production and rotational fodder production and collective fodder production by *dehkans*, Animal Husbandry Department of MAWR of Karakalpakstan will be responsible to coordinate all activities of producing fodder crops and giving technical guidance at district level in cooperation with local MAWR office deployed in *Hakimiyat*. *Hakimiyat* is required to organize *fermers* and *dehkans* in cooperation with the Karakalpakstan Fermer's Association. Veterinary Department of MAWR of Karakalpakstan will be responsible for providing artificial insemination services to the selected 500 *fermers* in cooperation with the staff of veterinary point at *aul* level. MAWR of Karakalpakstan will be responsible to implement alfalfa seed production in cooperation with the SCA at Chimbay who has experience of producing alfalfa seeds and silage.

4) Implementation Schedule

Implementing schedule for 2011 to 2020 was planned as shown below in which each activity will be basically implemented in one district taking into consideration the budget allocation and also seasonality of farming.

Activities	Year									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Alfalfa seed production center at SRIC in Chimbay										
Silage production										
Collective fodder production										
Rotational production of crops and fodder (alfalfa)										

5) Necessary Input and Cost

Activity / Input	Cost (1,000 Sum)	
	Subtotal	Total
Alfalfa seed production center at SCA in Chimbay	267,161	
Silage production	107,857	
Collective fodder production by dehkans	91,279	
Rotational production of crops and fodder (alfalfa)	1,317,519	1,783,816

(2) Training Programs on Animal Husbandry

1) Concept

It is inferred that *dehkans* and *fermers* who own livestock are not adequately aware of the importance of "animal husbandry" not only to increase productivity but also to nourish livestock and this has been probably influenced by the low productivity of the animals. While livestock experts, who are mainly composed of veterinarians belonging to the veterinary department, have worked mainly for "veterinary" services to cure diseases and to provide Artificial Insemination (AI) in their routine works, the livestock production is low. It is reported that Karakalpakstan Government has been held training

course once a year. In this manner the government is required to allocate proper budget for uplifting capacity of livestock owners and concerning government staff to increase livestock production. Animal Husbandry Department will be responsible for this program in cooperation with the Veterinary Department institutes and colleges, since one of counterparts has lecture experiences in the training mentioned above.

The proposed training programs will be divided into two: 1) one for livestock experts belonging to the Veterinary Department and Animal Husbandry Department of the government and 2) another for *fermers* and *dehkans*. Current services by concerning departments have been conducting centrally on veterinary services by veterinarian on demand basis. However, capacity building of those staff will be needed in order to meet the demand on "Animal Husbandry Technology". The training content will be designed by consulting agricultural college, institute and Animal Husbandry Department etc. Karakalpakstan Fermer's Association is expected to be involved in this program, if considering sustainability of the program. Annually 20 livestock experts of the concerning departments will be provided 5-day training course. Consequently, 200 livestock experts will have strengthened their capability on "animal husbandry" in 10 years.

As well as livestock experts, *fermers* and *dehkans* must be trained to acquire proper technology and knowledge on "Animal Husbandry" such as breeding, artificial insemination, disease control, nutrient and feeding management, sanitary milking method, sanitary animal products processing and so on. The 5-day training course will be planned to be provide 3 times a year by inviting 35 *dehkans*/*fermers* per time. Thereby 1,050 *fermers*/*dehkans* will be trained in 10 years, which is equivalent to about one (1) person per VCC, who will function as a resource person to extend technologies.

2) Proposed Action Plans and Actors

A meeting was held with the counterparts concerning to implementing agencies of the action plans. The proposal was modified after the meeting according to the views suggested by attended counterparts, then finally both groups arrived basically at an agreement with the proposed implementing and supporting agencies as shown below.

Activities	Actors	
	Implementing Agency	Supporting Agencies
1. Training program for *fermers* and *dehkans*	Animal Husbandry Department of MAWR of Karakalpakstan	Veterinary Department of MAWR, College and Institute in Nukus
2. Training program for livestock experts	MAWR of Karakalpakstan	Agricultural university, college and institute, Karakalpakstan Fermer's Association

3) Implementation Organization

Animal Husbandry Department of MAWR of Karakalpakstan will be responsible in cooperation with Veterinary Department. In the preparation of training materials, both department will be required to cooperate with Agricultural College and Institute in Nukus to prepare suitable material by consulting resource persons. Karakalpakstan Fermer's Association will also work as coordinator to list up annual trainees in each district.

4) Implementation Schedule

The proposed training program was basically scheduled to be conduct in one district a year taking into consideration the budget allocation and seasonality.

Activities	Year									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Training program for femermers and dehkans										
Training program for livestock experts										

5) Necessary Input and Cost

Activity / Input	Cost (1,000 Sum)	
	Subtotal	Total
Training program for fermers and dehkans	256,221	
Training for livestock experts	176,753	432,974

(3) Artificial Insemination and Veterinary Services

1) Concept

It can be said that Artificial Insemination (AI) services provided by Veterinary Department of MAWR of Karakalpakstan has been maintaining a certain level though frozen semen produced in Tashkent has been used, as well as LN2 (from Tashkent). Even LN2 containers and some kinds of AI equipment are distributed in district offices of the Veterinary Department, though most of them have already degraded and out-of-date. At present, 18,000 sum is charged to AI service that is the income of the government. The revenue will be increased and this will resulted in enrichment of various services concerning livestock by uplifting AI service from 31%. According to the latest information, the government of Uzbekistan has a plan to shift AI service from government to private sector.

The main reasons for low accomplishment of AI service (31%) are attributed to the lack of transportation mean from Tashkent to Nukus and Nukus to each districts, lack of veterinarians who can make AI services, lack of AI equipment such as LN2 containers, especially portable types and low awareness of livestock owners for breed improvement. These conditions will be improved by the provision of AI tools and vehicles in relatively short-term. Moreover, AI technicians must be increased to expand AI services in the Project Area, since artificial inseminators are in shortage at present. Annually 10 persons in each district will be trained for AI service, which will be equivalent to 110 artificial inseminators in 10 years.

In the long-term, if considering the importance of livestock production Karakalpakstan's economy, it is recommendable to establish an artificial insemination center in Nukus, that will have function to produce frozen semen with 5 breeding bulls. It will contribute not only to improve cattle breed but also to increase productivity (calving rate, milk yield, daily gain etc). LN2 will be procured from Tashkent by car. Instruments necessary for AI services at district level also must be improved. Moreover, vehicles equipped with instrument for veterinary services will be necessary, considering the current conditions of difficult mobilization. Therefore, it was proposed to provide AI instrument and vehicles equipped with veterinary service tools for the 11 districts.

2) Proposed Action Plans and Actors

Activities	Actors	
	Implementing Agency	Supporting Agencies
Provision of AI tools and vehicles	Veterinary Department of MAWR of Karakalpakstan	Animal Husbandry Department of MAWR of Karakalpakstan
Establishment of AI Center	Artificial Insemination Office of MAWR of Karakalpakstan	Animal Husbandry Department of MAWR of Karakalpakstan, Frozen Sperm Factory in Tashkent
Fostering of artificial inseminators	Veterinary Department of MAWR of Karakalpakstan	Animal Husbandry Department of MAWR of Karakalpakstan, Frozen Sperm Factory in Tashkent, College and Institute in Nukus
Provision of vehicles for mobile veterinary services	Veterinary Department of MAWR of Karakalpakstan	Animal Husbandry Department of MAWR of Karakalpakstan

3) Implementation Organization

Veterinary Department of MAWR of Karakalpakstan will be responsible in cooperation with Animal Husbandry Department. The Frozen Semen Company at Tashkent will also be required to be involved in this program because of their abundant experiences, especially to the program of Fostering Artificial Inseminator.

4) Implementation Schedule

The artificial insemination center proposed only in Nukus was allocated for 2015 as a mid to long term project to supply frozen semen to whole Karakalpakstan. Others were proposed to be implemented on a yearly basis taking into consideration the budget allocation and its availability.

Activities	Year									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Establishement of artificial insemination center										
Fostering artificial inseminators										
Provision of AI tools and vehicles										
Provision of vehicles with vet. Intrument for mobile vet. Service										

5) Necessary Input and Cost

Activity / Input	Cost (1,000 Sum)	
	Subtotal	Total
Establishment of artificial insemination center	810,620	
Fostering of artificial inseminators	62,843	
Provision of AI tools and vehicles	934,988	
Provision of vehicle with vet instrument for mobile vet services	1,086,892	2,895,343

6.2.4 Development of Fisheries and Aquaculture

(1) Sustainable Fishery Promotion

1) Concept

Fishery production in Karakalpakstan has been remaining in low level of quantity despite its demand potential. Capture fishery activity, which composes all of fishery production in the Project Area, is practiced by private corporations, including *fermers*, by renting water body for long term period. Large amount of production is consisted of be catch by former national fishery companies which have been renting large natural lakes, where capture fishery was active since the 1990's. However, reasonability of quantity of catch is not explained and consciousness of appropriate fish catch has not been paid leaving fishery activity without assurance of sustainability. On the other hand, many fishery actors who newly entered to fishery activity have obstacle to achieve sufficient fishery production due to low productivity of water body and difficulty of fish gear supply. Moreover, though each fishery body is obligated to restock alevins into their rented water area by the control of State Natural Protection Committee aiming to protect natural environment, only few companies can abide it intending the increase of catch because of stopping of financial support for alevins after the policy of de-privatization in 2003.

Fishery Association, which was established aiming to support fishery bodies, have difficulty to carry out its mission due to the lack of financial and human resources and it is resulting inadequate situation of fishery activity in Karakalpakstan described above. Restocking activity, analysis for its effectiveness and appropriate method is needed more particularly, achievement of an effective use of fishery resources and activate fishery should be done by the Fishery Association to support fishery actors.

In such circumstances, this project set objects to achieve improvement of a sustainable capture fishery activity through the fish restocking by management of strengthened Fishery Association.

2) Proposed Actions Plans and Actors

<u>Activity I: Strengthening Fishery Association (Major actor: Fishery Association)</u>

I-1 Rehabilitation of Association

Temporally workers are employed for alevin distribution. Equipment for office work is introduced. General meeting is arranged annually to exchange information and to discuss about the activity among Association and members.

I -2 Improvement of Financial System

Regulation of fee system will be revised and arranged to increase the activity cost by arrangement descried above.

Activity II: Establishment of Seed Distribution System

II-1. Seed Production (Major actor: private fish farms)

Alevins for restock is produced in spring and autumn by private fish farm in Nukus, Turtkul and Khorezm as their own activity.

II-2. Seed Distribution and Verification of Effectiveness (Major actor: Fishery Association)

The target water body for restocking and number of alevins is decided in the annual meeting considering the order of State Natural Protection Committee and condition of fishery body. Alevin is purchased by the Association by making contract between fishery bodies to repay the cost from catch (during 4 years). Administrative consult is carried out until the repayment will be finished. Loan for equipment is also included corresponding to the fishery body's needs.

Effectiveness of restock is verified with support of State Natural Protection Committee and Academy of Science to analyze the adequate method of restocking.

II-3. Setting Appropriate Capture Production (Major actor: State Natural Protection Committee)

According to the results of fishery activity, an appropriate amount of capture production is set and informed by the Association to control sustainable fish catch.

II-4. Opening New Water Area (Major actor: State Natural Protection Committee)

New water area for fishery is certified by preliminary research to correspond the request.

3) Implementation Organization

Implementation organization will be Fishery Association. Certification of rent is owed by MAWR of Karakalpakstan, environmental issue is owed by State of Natural Protection Committee and scientific analyzes is supported by Academy of Science.

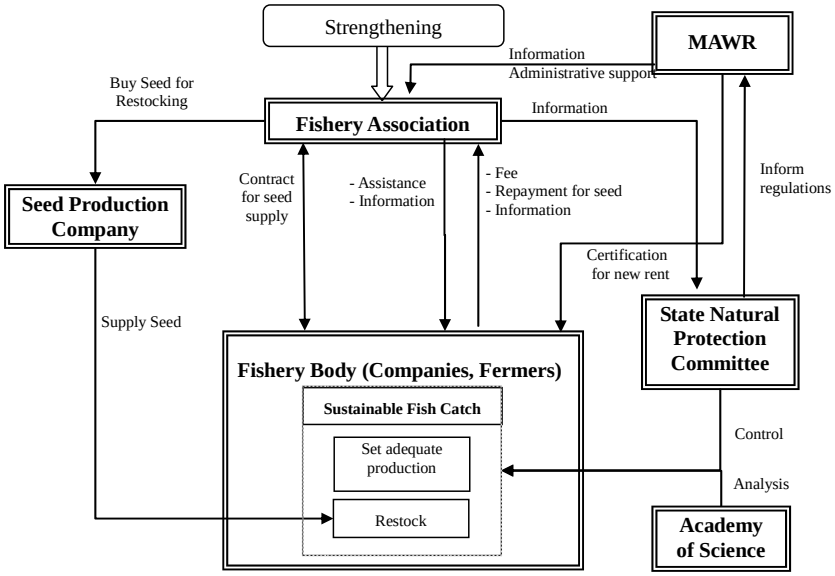


Fig. 6.2.9 Conceptual Diagram of Sustainable Fishery Promotion

4) Implementation Schedule

Implementation schedule is from 2010 to 2020. Initial rehabilitation and review of fee system is carried out at first year and revised when it is needed. Input is carried out in the first three years, including technical assistance by experts.

Activities	Year									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Rehabilitation of Association	■	■	■							
Improvement of financial system	■									
Seed production	■	■	■	■	■	■	■	■	■	■
Seed distribution and verification of effectiveness	■	■	■	■	■	■	■	■	■	■
Setting appropriate capture production	■	■	■	■	■	■	■	■	■	■
Opening new water area	at any time									

5) Necessary Input and Cost

Activity / Input	Cost (1,000 Sum)	
	Subtotal	Total
Strengthening Fishery Association	11,809	
Establishment of seed distribution system	1,303,800	1,315,609

(2) Aquaculture Development

1) Concept

Fishery product supply in Karakalpakstan is only relying to capture fishery from natural water body at present. However, water area for capture fishery is limited and its productivity is not enough. Aquaculture would be considered as a future component of fishery activity to increase the fishery product supply to responding the demand because of its higher productivity with limited water volume. Considering the actual situation in Karakalpakstan, with limited water and lack of material for fish feed, the culture system expected to be promoted in this area would be extensive pond culture. However, any aquaculture activity is not practiced in this area currently and there is no model which is well adapted to the natural and economical condition of this area to be an example for the entrepreneur. Furthermore, official support system for development of this activity, such as alevin supply, technical assistance and so on, has not established yet. Actually, Fishery Association should owe this position.

In such circumstances, this project is aiming to establish a basic system for future aquaculture development, conducted by Fishery Association of which management ability would have to be strengthened through the Sustainable Fishery Promotion Program (No. 271), forming support system and proposing production model which is suitable to this area.

2) Proposed Actions Plans and Actors

Activity I: Establishment of a system for aquaculture development and promotion

I-1. Staff training (Major actor: Fishery Association)
Recruit additional staff to be sent to the aquaculture farm (in other region of Uzbekistan) for training to introduce new human resource with skill and knowledge about aquaculture.

I-2. Arrangement of support system for aquaculture promotion (Major actor: Fishery Association)
A supply system of alevin, material and credit for aquaculture promotion will be arranged based on the supply system established through the Sustainable Fishery Promotion Program (No. 271).

I-3. Extension and publicity (Major actor: Fishery Association)
Dispatch periodical information to the members of the Association and relations.

Activity II : Establishment of an aquaculture model in the Project Area (Major actor: Fishery Association)

II-1.Implementation of a production model
An experimental production will be carried in the selected extensive pond fish culture in the Project Area, to propose an adequate aquaculture method evaluating the technical and economical conditions verified on the results of the production model. The Fishery Association will make a contract with some fishery body to construct a pond of 1 to 2 ha and water supply canal in their area to implement this activity, confiding the management to them. The analysis of results will be supported by the Academy of Science.

II-2. Elaboration of a manual and promotion
A technical manual will be prepared according to the results of the production model by the Association with cooperation of Science of Academy. It will be distributed mainly to the member of the Association and other related organizations aiming to promote and bring interests.

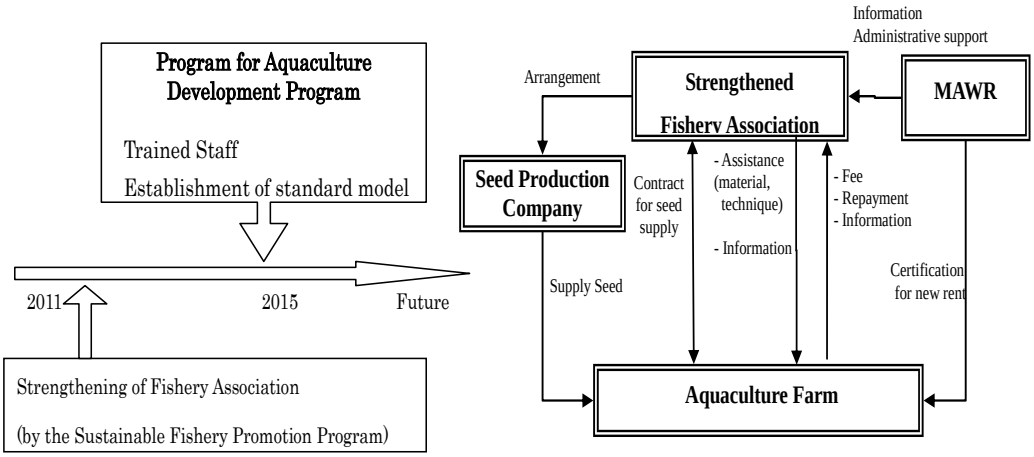


Fig. 6.2.10 Conceptual Diagram of Aquaculture Development

3) Implementation Organization

Implementation organization will be the Fishery Association. Arrangement of technical training for staff will be done by MAWR of Karakalpakstan. The analysis of the model project will be supported by the Academy of Science and private fishery body acts for the implementation of production model.

4) Implementation Schedule

It is needed to establish a management system of Fishery Association through the Sustainable Fishery Promotion Program (No. 271) to implement this project as a fundamental premise. Therefore, this project will be implemented from 2015. Technical assistance by experts will be done to execute the model production and prepare the manual.

Activities	Year									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Staff training					■					
Arrangement of support system for aquaculture promotion					■	■	■	■	■	■
Extension and publicity					■	■	■	■	■	■
Implementation of model production					■	■	■	■	■	■
Making of manual and promotion					■	■	■	■	■	■

5) Necessary Input and Cost

Activity / Input	Cost (1,000 Sum)	
	Subtotal	Total
Establishment of system for aquaculture development and promotion	369	
Establishment of aquaculture model for study area	630,990	631,359

6.2.5 Improvement of Irrigation Water Use Efficiency and Reducing Crop Damage by Salinity

The development target of the irrigation and drainage development sub-sector is to increase irrigation water use efficiency and reducing crop damage by salinity in order to increase production and productivity in the field. Four development strategies, i.e., effective use of irrigation, water saving, drainage improvement in the field and strengthening WUA are set in the master plan's sub-sector. Those strategies are fulfilled based on an appropriate water management in the main and inter-farm canal/collector system, in the internal canal/collector system and in the field level. According to the scope of works of the Study, the internal canal/collector system and the field level water management are considered in the Action Plan.

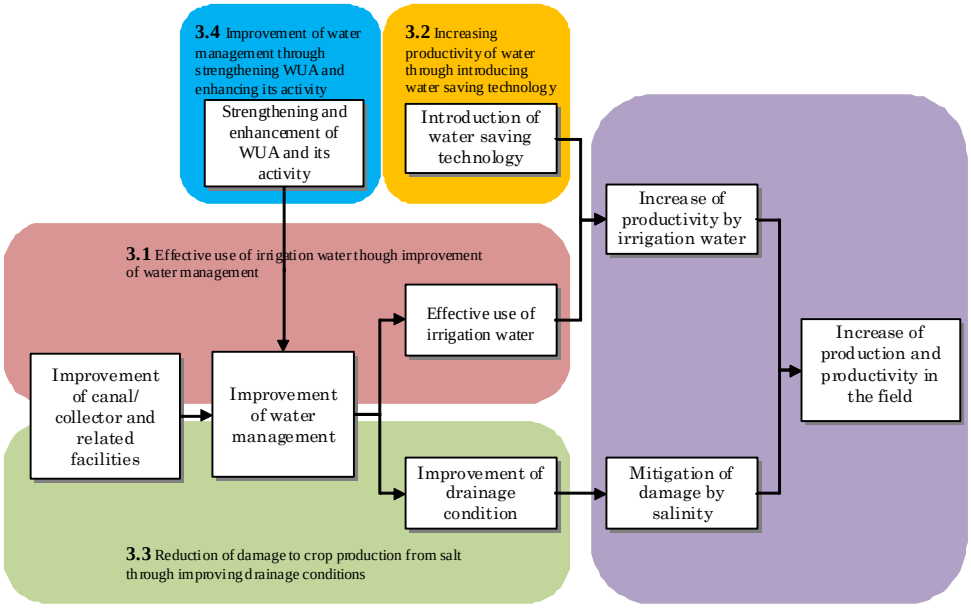


Fig. 6.2.11 Basic Approach for Irrigation and Drainage Sub-sector

WUA, who is responsible for managing internal canal/collector system, faces difficulty in manage the system and is not able to operate and maintain properly due to its inadequate financial condition in the present time. Enhancement and activation of WUA's activity is considered as the most important task in order to improve water management. It is necessary to secure the collection of water service fee, that is the only revenue source of WUA, and implement its activity under a healthy and realistic business plan to realizing this task. Sound financial condition of WUA through improving collection of water service fee will enable proper operation and maintenance of the system, so that the circumstance for appropriate water management will be developed. This circumstance will enable to improve agricultural production through a stable irrigation water supply, reducing crop damage by salt, resulting in an increase of the farmer's income. As a result, the financial condition of WUA will be improved through an adequate collection of water service fee.

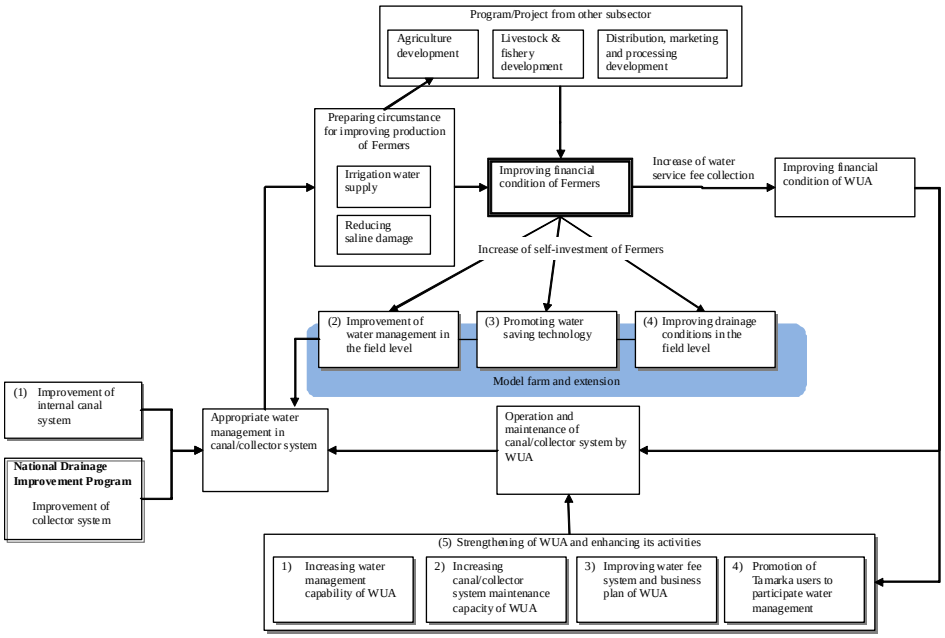


Fig. 6.2.12 Conceptual Diagram of Action Plan of Irrigation and Drainage Improvement

In order to drive this cycle, that is divided in many points and does not function, various internal and external participations are necessary. The Action Plan consists of the improvement of internal canal system to start this cycle, the support for farmers to enable improving water management in the field, introduce water saving technology and improve drainage condition in the field by farmers own investment and the support to strengthening WUA and enhancing its activity.

It should be noticed that the increase of farmer's income will not be fulfilled only by the improvement of production environment through improving water management, but also by the combination of the results of the actions proposed in the Master Plan.

(1) Improving Internal Canal System

1) Concept

The maintenance work of the internal canal system is not proper due to inactiveness of WUA caused by lack of revenue. Proper distribution and effective use of irrigation water will not be fulfilled if such improper maintenance persists. In order to tackle and break off this vicious spiral of financial shortage of WUA and improper operation and maintenance of canal system, it is proposed to repair the canal system and restore its function by external finance, so as to fulfill proper water distribution and effective use of irrigation water. Increase of agricultural production and profit of members of WUA will be expected by this investment, so that WUAs will become able to support proper operation and maintenance of the canal system by themselves through adequate collection of water service fee from the members.

The program for improvement of internal canal system consists of cleaning and digging the internal canal and repair and newly install water facilities such as gate and water measurement equipment, which will restore and enhance the function of canal system. For this purpose, it is proposed to establish a Special Fund for Irrigation Improvement in the state level and to supply financial source to WUAs, which are the implementing body of the improvement work of the internal canal system. The Lower Amudarya Basin Management (LABM) is considered as the organization in charge of managing the Program in the target area of this Action Plan.

WUA formulates its improvement plan in cooperation with Irrigation System Departments (ISDs), Distinct WUA and *Hakimiyat* and prepares the application form to the Special Fund. ISD shall examine the validity of the plan from the technical view point. ISD also has responsibility to assist WUA to manage the construction works during the implementation period. WUA's capability of management is expected to be improved through the experience of the improvement project. WUA is required to organize members' participation to the improvement project in the works. It will contribute to increase WUA's capacity to organize maintenance work with members as well as to raise members' awareness of ownership.

An investigation to assess the present situation of canal system and a survey and design for appropriate improvement work will be conducted before starting construction works. The results of these works are to be compiled into the inventory and technical information, which will be used by WUA for operation and maintenance works and planning.

The improved internal canal system will be operated and maintained by the WUA and the cost for operation and maintenance shall be covered by the revenue from water fee collected from water users., It is essential that the improvement of the system with financial support, enhancement of technical and financial capability of WUA will be implemented simultaneously to maintain the function of the system. It is expected to fulfill an appropriate operation of the system by arranging necessary WUA staffs and developing their capacity to an appropriate maintenance work by renting or providing construction machinery to WUA, as a result of (5) Program for Strengthening of WUA and Activity of the Action Plan. At the same time, increasing the understanding of the importance of water fee and

dissolving the sense of unfairness or unevenness on water distribution will contribute to improve water fee collection and secure the financial base of WUA.

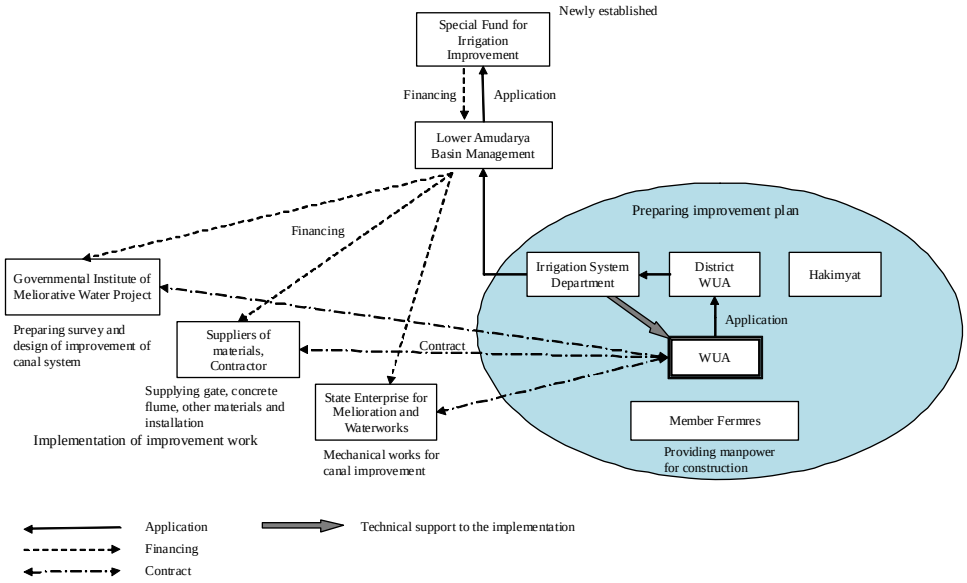


Fig. 6.2.13 Conceptual Diagram of Improving Internal Canal System

2) Proposed Actions plans and Actors

No.	Activity	Actor	Roles
I	Establishing Special Fund for Irrigation Improvement and publication of procedures	Ministry of Finance, Uzbekistan	- Preparing legal arrangement and establishing Special Fund
		LABM, ISD	- Public relation to WUA about institution and procedures of Special Fund by holding seminars
II	Formulating technical guidance for the internal canal system improvement and its publication	LABM, Project Institute	- Formulation of technical guidance - Preparing documents and materials for seminar
		LABM, ISD	- Public relation through distributing documents/materials and holding seminars
III	Formulating the improvement plan of the internal canal system, preparing application form	WUA, ISD, District WUA, *Hakimiyat*	- Formulating the improvement plan - Assisting WUA to prepare application form
		ISD	- Verification of validity of the plan
		WUA	- Submitting the application to the Special Fund through ISD-LABM
		Special Fund for Irrigation Improvement (Department)	- Judging the application from WUA and approving the application
IV	Conducting survey work and facility design based on the improvement plan, preparation of inventory and technical information for operation and maintenance work of the internal canal system	Project Institute	- Conducting survey work and facility design under the contract with WUA - Preparing inventory and design documents necessary for maintaining the internal canal system for WUA
V	Cleaning and digging work of internal canal and repairing canal facilities	SEMW	- Providing mechanical service under the contract with WUA
		WUA	- Providing hand work by organizing collective work of members
		ISD, Project Institute	- Providing technical assistance to WUA during implementation of construction work
VI	Repairing, renewal and establishing gate and water measurement facilities	Contractor	- Procuring parts/materials and installing equipment under the contract with WUA
		WUA	- Providing hand work by organizing collective work of members
		ISD, Project Institute	- Providing technical assistance to WUA during implementation of construction work

3) Implementation Organization

Level	Organization
Program management	LABM
Preparing improvement plan	Working group for planning is to be established, which consist of WUA, ISD, District WUA and *Hakimiyat*
Implementation body	WUA - WUA will make contract with Project Institute, material suppliers or contractor, SEMW, etc. - ISD and Project Institute provide technical assistance to manage improvement work.

4) Implementation Schedule

The improvement work of the internal canal system must start just after the completion of the National Drainage Improvement Program (NDIP) to avoid incompetence of construction machinery use in the area. Thus, the construction work is scheduled to start on 2013 and implemented in 8 years. The establishment of the Special Fund, preparation of necessary legal arrangement, formulation of technical guidance for the internal canal improvement, preparation of the improvement plan and application and approval of the plan must be completed during 2011 and 2012.

Activities	Year									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Establishing the special fund and preparation, formulating technical										
Preparing the improvement plan, application and approval										
Investigation, survey and design										
Cleaning and digging canal, repair and installation of gate and water measurement facilities										

5) Necessary Input and Cost

The target area of the improvement of internal canal system covers 156,500 ha, which was defined at Section 6.1.2 as a target irrigation area in 2020, with approximately length of 13,000 km in 90 WUAs in 11 districts.

Activity / Input	Cost (1,000 Sum)	
	Subtotal	Total
Establishing special fund for irrigation improvement and publitization of procedures	910	
Formulating technical guidance for the internal canal system improvement and its publitization	3,560	
Formulating the improvement plan of the internal canal system, preparing application form	Regular*	
Conducting survey work and facility design based on the inprovement plan, preparation of inventory and technical information for operation and maintenance work of the intenal canal system	4,427,385	
Cleaning and diffinf work of intenal canal and repairing canal facilities	17,052,720	
Repairing, renewal and establishing gate and water measurement facilities	26,949,300	48,433,875

* Cost included in Regular Activities of the concerned organization

(2) Strengthening Water Management in the Field

1) Concept

The target of the Program is to improve *fermer's* water management activity in the field and to contribute to make irrigation water use effective. Necessary measures are to be taken to involve *fermers* into the activities of improving water management because the water management activity to be improved will be done in the cultivation practices of *fermers* in their farm. The Program for Strengthening Water Management in the Field consists of grasping the amount of water delivered to

the farms and reflected to the water distribution, increasing *fermer's* knowledge on irrigation planning and water use. The Program consists of improvement of farm condition by land leveling, etc. for effective use of irrigation water. In order to achieve the target, the Program proposes to implement the combination of technical seminars and model farm activity proposed in the following programs, as well as installing necessary development of field conditions.

It is expected to raise f*ermer's* awareness to effective use of water as well as to enable proper water distribution and fair water service fee by measuring distributed water amount of farms. WUA will obligate water users (*fermers*) to install division boxes with water measurement tools, which is called as "*Shandur*", at the intake s of farm by their own budget and WUA will make necessary revision of the association's regulation following the necessary procedure. The water distribution to farms will be monitored by *fermers* in the usual operation of division box. WUA will inspect the water distribution regularly as a part of water management activity as well.

The poor financial condition caused by the inadequate water fee collection is considered as one of the most common cause of the week activity of WUAs. In order to dissolve this situation, it is necessary to change awareness of member *fermers* on water fee through increasing the understanding of the importance of water fee and dissolving the sense of unfairness or partiality on water distribution as well as increasing financial condition of member *fermers* so that they are able to pay the fee. Record of water distribution to farms, which is to say grasping the volume of water delivered to farms, will contribute not only to fulfill the fair and even water distribution in the internal canal system but create a sense of fairness and evenness on water distribution among member *fermers*. It is expected for member *fermers* to share the common understanding and to improve water fee collection.

In parallel with installation of division box, the seminars on irrigation planning and water use in the field are to be held aiming to increase the capability of *fermers* to manage the water. LABM and SANIIRI will prepare the program of the seminars and ISDs will arrange the seminars in their territory in cooperation with District WUA and MAWR District Office. WUA will organize members to participate seminars and supports members to keep relations to the technical information.

Land leveling will be promoted in combination with improved field irrigation practice such as counter furrow irrigation (applying water to the furrow from both ends), which will contribute to increase water use efficiency as well as reducing labor work and time required for water applying in the field.. It is expected that land leveling contributes to save water for leaching activity as well as for irrigation. Even though land leveling is a part of cultivation practices of *fermers*, the program of renting and providing service of machinery for land leveling, as bulldozer and scraper, with preference condition by ISD and the State Enterprise for Melioration and Waterworks (SEMW) is proposed in order to promote land leveling by *fermers*. In addition, the existing credit program such as Farming Activity Credit will be applied to improve water management in the field. Land leveling is included and to be implemented in the Program for Improving Drainage Conditions in the Field in parallel with land leveling for increasing efficiency of leaching.

It is essential to show the advantage of land leveling for an effective and efficient water use to increase *fermers*' motivation to invest in land leveling. Thus, technical seminars will be proposed to combine with the model farm and extension activity of the Program for Introducing Water Saving Technology and Improving Drainage Conditions in the Field, in order to increase the effectiveness. Enhancing famers' awareness on the record of ordinary operation of water division and clarifying the responsibility of WUA and users for record keeping will be focused in the seminar.

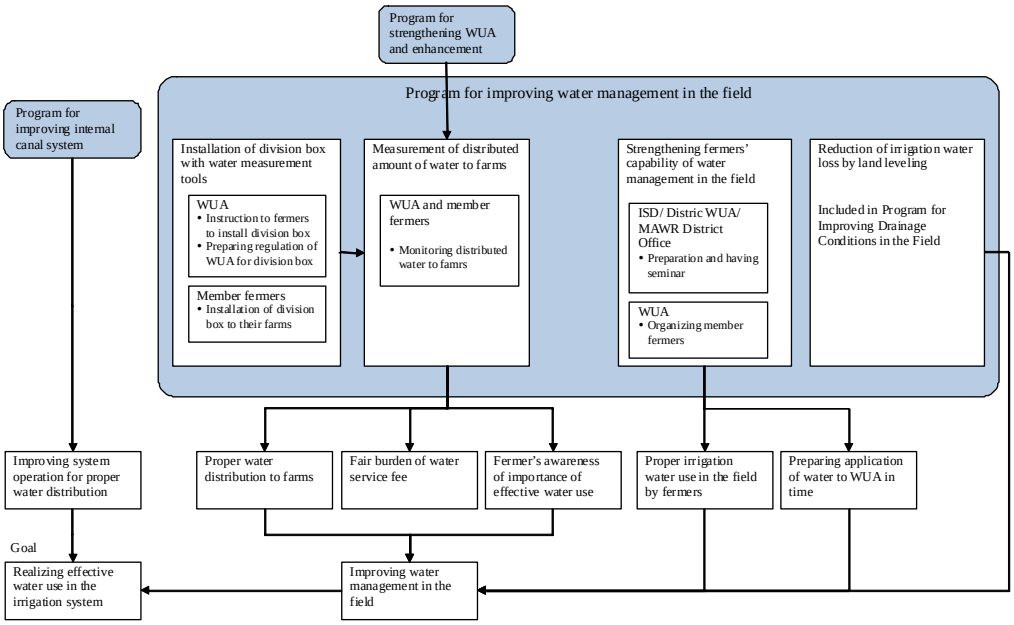


Fig. 6.2.14 Conceptual Diagram of Improving Water Management in the Field

2) Proposed Actions Plans and Actors

No.	Activity	Actor	Roles
I-1	Installing division box with water measurement tools (*Shandur*) at the intakes of farm	WUA	- Public relations to members on necessity of division box through seminars - Revising the regulation to obligate users to install division box by their budget - Order and instruction to users to install division box
		Members	- Installing division box at the intake of farm
		ISD	- Standardizing the division box - Technical assistance to WUA regarding division box
I-2	Measuring amount of water distributed to farms	WUA	- Regular patrol and inspection of water distribution
		Members	- Regular operation of division box and observation of water distribution - Record of operation of division box
II	Holding technical seminars to members on improvement of irrigation planning and water use in the field	LABM, SANIIRI	- Preparation of seminar material and text on improving water management in the field - Preparation of seminar program and schedule - Appointing lecturer
		ISD, District WUA, MAWR District Office	- Holding technical seminars in each district
		WUA	- Organizing members to participate to the technical seminar
		Members	- Participating to the technical seminar
		ISD, District WUA, MAWR District Office	- Set-up of technical consultation desk to follow up seminars
III	Land leveling in the field	Land leveling activity is described in the Program for Improving Drainage Conditions in the Field	

3) Implementation Organization

Level		Organization
Program management		ISD
Installation division box	Implementation body	WUA
Technical seminar	Seminar program	LABM, SANIIRI
	Implementation body	ISD in cooperation with District WUA and MAWR District Office

4) Implementation Schedule

In prior to the installation of division box, WUA will revise its regulation to obligate water users to install division box by user's own expense in the general meeting and will carry out public relations to spread information among users on 2012. The installation of division box will be implemented in parallel with the implementation of the improvement of the internal canal system, which will start on 2013 and be completed in 8 years.

The technical seminar on water management in the field will be held for water users of a target irrigation block in the canal system in each year. The seminar will be held in each district.

Activities	Year									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Revision of WUA's regulation and public relations, standardizing specification of division box		■								
Installation of division box at the intake of farm			■	■	■	■	■	■	■	■
Measurement of water amount distributed to farms			■	■	■	■	■	■	■	■
Technical seminar on irrigation planning and water use			■	■	■	■	■	■	■	■

5) Necessary Input and Cost

The target area of the installation of division box is 156,500 ha with 6,462 water users of 90 WUAs in 11 districts. The number of division box to be installed is estimated in 27,000. The technical seminar is planned to be held 5 times in each district.

Activity / Input	Cost (1,000 Sum)	
	Subtotal	Total
Installing division box with water measurement tool (Shandur) at the intakes of farms	2,539,261	
Masureing amount of water distributed to farms	Regular*	
Holding technical seminars to members on improvement of ittigation planning and water use in the field	324,105	
Land leveling in the field	AP331**	2,863,366

* Cost included in Regular Activities of the concerned organization

** Cost included in referred Component of the Action Plan

(3) Introducing Water Saving Technology

1) Concept

Research and development of appropriate and adaptable technology for water saving will be conducted and those technology will be promoted through the extension based on the model farm activity to introduce water saving technology to *fermers* and *tamarka* users in the target area. The water saving in the field level will be reached by improving cultivation and irrigation technology and by increasing water use efficiency in leaching.

The technology related to water saving and irrigation and drainage in the field will be demonstrated synthetically. The target technology to be demonstrated in the model farm will be assumed in the model farm as below.

- Water saving through improving water management in the field, such as improving irrigation efficiency by combination of land leveling and improving irrigation practice such as counter furrow irrigation
- Water saving through improving drainage condition in the field, such as increasing water use efficiency in leaching practice by land leveling and enforcing optimum water supply
- Water saving through improving or changing cultivation practices, such as introducing drip irrigation in combination with mulching vegetables, applying water saving crop or drought resistant variety

Among the above technologies, water saving by drip irrigation shall be considered as a mid-term target and it is necessary to study the possibility of expansion especially from the aspect of economic feasibility. On the other hand, the technologies specialized for small scale farm management (*tamarka*), such as simplified trickle irrigation equipment using PET bottle, irrigation with watering pod, mulching, etc., will be promoted through demonstration and extension in the Program for Strengthening of Women's Production of Vegetables in *Tamarka*.

The model farm will be set up in a certain *fermers*' farm who will participate in the program voluntarily, where the *fermer* will conduct cultivation practices under the close cooperation and technical guidance of ISD and SANIIRI. Technical seminar targeting *fermers* in the district will be held on the model farm to raise the motivation of water saving technology and technical extension.

In the program, 10 model farms are proposed to be set up in each district. The model farm for *Muynak* District will be combined to *Kungrad* District because of the number of *fermers*. At the beginning of the program, three model farms will be selected as pilot model farms, which are proposed to be set up in the district where ISD office is located. During 2 years of operation of the pilot model farms, it is expected to improve the management of the model farm and to prepare human resources that will be in charge of the management of the model farm in the remaining district. The model farm will be extended to the remaining districts sequentially based on the experience of the priority model farms.

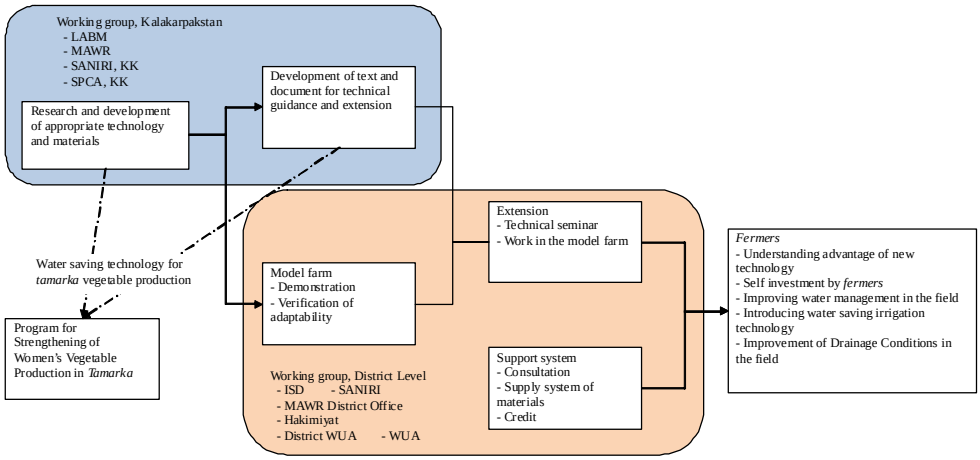


Fig. 6.2.15 Conceptual Diagram of Model Farm and Extension of Improving Water Management in the Field, Introducing Water Saving Technology and Improving Drainage Conditions in the Field

2) Proposed Actions Plans and Actors

No.	Activity	Actor	Roles
I	Setting up model farms and extension through operating model farms	LABM, MAWR of Karakalpakstan, SANIIRI-Karakalpakstan,	- Formulating overall plan of model farm activity and manage the progress
		ISD, SANIIRI--Karakalpakstan, *Hakimiyat*, District WUA, WUA, MAWR District Office	- Formulating plan of operation of district model farm - Selection of model farm site and *fermer* in charge - Support to developing model farm by machinery and materials
		WUA, Karakalpakstan-HME	- Development of irrigation and drainage system around the model farm site
		Fermer in charge of model farm	- Developing model farm, i.e., development to of on-farm ditches and drainage, land leveling, underground drain, etc. - Cultivation in the model farm
		ISD, SANIIRI-Karakalpakstan, MAWR District Office, WUA	- Guidance and instruction to *fermer* in charge of model farm - Monitoring of farming activity in the model farm

			- Holding technical seminar to *fermers* in the district using demonstration in the model farm
II	Setting up consultation desk to *fermers* on technology and materials for water saving technology	ISD, MAWR District Office	- Appointing person in charge of providing consultation to *fermers* on technology and materials in each district
		SANIIRI- Karakalpakstan	- Supporting to above consultation desk
III	Research and development of water saving technology and necessary materials	SANIIRI- Karakalpakstan	- Preparing research and development program for water saving technology and necessary materials
IV	Preparation of seminar text and materials for extension	LABM, SANIIRI-Karakalpakstan	- Developing text for technical seminars and other materials for public relations of water saving technology

3) Implementation Organization

Level	Organization
Work group in the target area level	LABM, SANIIRI, MAWR of Karakalpakstan, - LABM will lead the work group from the administration and SANIIRI will lead from technical issues.
Work group in the district level	ISD, SANIIRI, MAWR District Office, *Hakimiyat*, District WUA, WUA - ISD and SANIIRI will be responsible for guidance and instruction of model farm activity.

4) Implementation Schedule

Activities	Year									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Preparation of overall plan	■									
Setting up priority 3 model farms and operation		■	■							
Setting up remaining 7 model farms				■	■	■	■	■	■	
Extension using model farm		■	■	■	■	■	■	■	■	■
Setting up consultation desk to fermers on technical and materials for water saving technology			■	■	■	■	■	■	■	■
Research and development of water saving technology and necessary		■	■	■	■	■	■	■	■	■
Preparation of seminar text and materials for extension	■	■								

5) Necessary Input and Cost

Activity / Input	Cost (1,000 Sum)	
	Subtotal	Total
Setting up model farms and extension through operating model famrs	472,378	
Setting up consultation desk to fermers on technical and materials for water saving	AP312**	
Reserach and development of water saving technology and necessary materials	79,950	
Preparation of seminar text and materials for extension	36,900	589,228

** Cost included in referred Component of the Action Plan

(4) Improving Drainage Conditions in the Field

1) Concept

The improvement of drainage conditions in the field will be promoted in parallel with the implementation of the National Drainage Improvement Program (NDIP) in order to maximize its effect. The environment of crop can be managed suitably and the effect of leaching and efficiency of water use can be increased by improving drainage condition in the field. It will contribute to reduce crop damages by salinity in the field.

Land leveling and under drain are considered as possible drainage improvements technologies in the field level from the aspect of increasing slat wash effect and water saving in leaching. In consideration of the cost for the introduction, land leveling is set as a priority technology and under drain is

considered as a mid and long-term possible technology being a low cost method and its effect in the field shall be examined in the research and development activity.

The improvements of drainage conditions in the field will be implemented by *fermers* own investment. It is proposed to combine a technical and material/equipment support, i.e., model farm, extension and technical consultation, information on necessary materials and preparation of machinery, in order to promote and accelerate the improvement of the *fermers*. The extension activity, based on the model farm, is included in the Program for Introducing Water Saving Technology.

An optimum water use for leaching according to the soil and salinity condition shall be promoted to avoid affects of over irrigation. Technical consultation for optimum leaching will be provided by ISD and MAWR branches in coordination with the model farm activity. Karakalpakstan-HME is expected as a source of technical information on salinity conditions.

Renting machinery from ISD and providing machinery service by SEMW are to be prepared as well as fully using WUA's machinery with adequate maintenance to support *fermers* in machinery use. Necessary procedures to adopt existing credit systems such as Farming Activity Credit to drainage improvement work by *fermers* will be followed as well. Land leveling is considered as a key technology to be widely and immediately developed from the aspects of improving field water management, water saving technology and drainage condition in the field. Preparing construction machinery and preference credit system are required to start immediately.

Research and development on leaching technology to increase the effect and efficiency will be conducted as well as the promotion of drainage improvement by *fermers*.

Steady progress of NDIP is expected because the improvement of drainage system is essential to improve field condition.

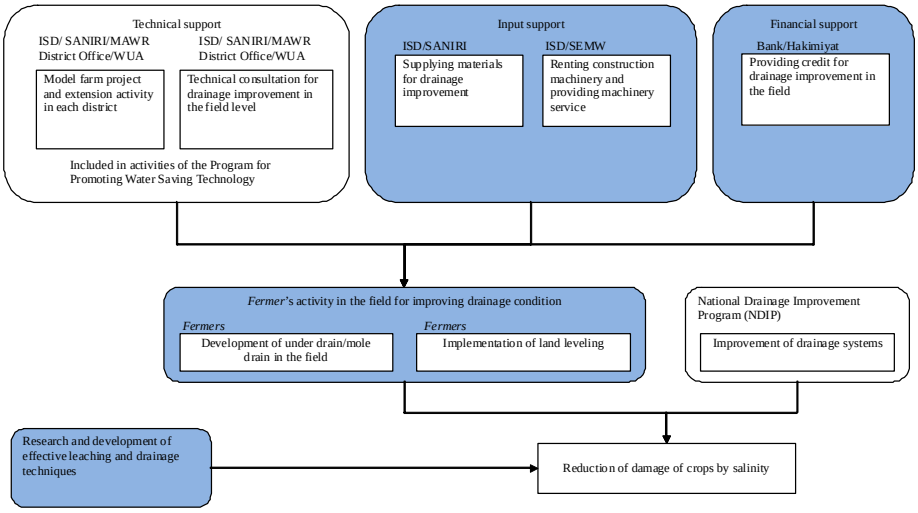


Fig. 6.2.16 Conceptual Diagram of Improving Drainage Conditions in the Field

2) Proposed Actions Plans and Actors

No.	Activity	Actor	Roles
I	Model farm and extension	The activities related to the model farm and extension, preparation of technical assistance and support system are described in the Program for Introducing water saving Technology	
II	Preparation of technical assistance to *fermers*		
III	Preparation of support system of material for improving field water management, water saving technology and improving field drainage		
IV	Preparing construction machinery for drainage improvement in the field	SEMW	- Providing machinery service under the contract with *fermers*
		ISD	- Renting construction machinery under the contract with *fermers*

		WUA	- Maintaining and operating machinery belonging to WUA - Providing machinery service to members
V	Preparing preference credit system for drainage improvement in the field	Bank	- Proceeding necessary procedure to adopt existing credit system (Farming Activity Credit) to the improvement work of drainage conditions in the field
		Hakimiyat	- Supporting *fermers* to obtain credit for drainage improvement in the field
VI	Research and development on effective and efficient leaching technology	SANIIRI	- Establishing research and development project for effective leaching technology and increasing efficiency water use in leaching practice
		MAWR-UZ	- Budgetary arrangement to above research and development project

3) Implementation Organization

Level	Organization
Program management	ISD
Implementation body	ISD, SEMW
Research and development	SANIIRI
Model farm and extension	ISD, SANIIRI, MAWR District Office, WUA

4) Implementation Schedule

Among the farm land in the target area, large-sized farms suffering salt damage is considered as a priority farm for land leveling and half of the priority area is scheduled to be implemented by 2020. Assuming that large-sized farm is expected to be approximately 63,000 ha and principally is occupied by cotton, the area that suffers from salt damage is approximately 32,000 that represent 51 % of the total, according to Karakalpakstan-HME. In this program, 16,000 ha of the farm will be the target for land leveling by 2020.

Because the construction machinery for water facilities (i.e., bulldozer) in the action plan area is expected to be concentrated on the implementation of NDIP during its project period, the land leveling by *fermers* will be scheduled to start after the completion of NDIP. The land leveling by *fermers* that starts on 2013 in 2,000 ha is planned to be implemented in each year, so that a total of 16,000 ha is expected to be improved in 8 years till 2020. Necessary construction machinery is expected to be covered by the machinery belonging to ISD, SEMW and WUA.

Activities	Year									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Preparation of machinery for drainagae improvement in the field										
Implementation of land leveling by										
Preparation of credit for drainage improvement in the field										
Research and developemnt on effective leaching technology										

5) Necessary Input and Cost

Activity / Input	Cost (1,000 Sum)	
	Subtotal	Total
Model farm and extension	AP321**	
Preparation of technical assistance to fermers	AP321**	
Preparation of support system of material for improving field water management, water saving technology and improving field drainage	AP321**	
Preparing construction machiery for drainage improvement in the field	295,200	
Preparing preference credit system for drainage improvement in the field	Regular*	
Research and development on effective and efficient leaching technology	830,250	1,125,450

* Cost included in Regular Activities of the concerned organization

** Cost included in referred Component of the Action Plan

(5) Strengthening WUA and Enhancing Its Activity

1) Concept

a. Activities related to increase water management capability of WUAs

It is important to increase the number and capacity of WUA staffs, who manages the canal system as well as to improve the function of the canal system to fulfill a proper water distribution. The capacities of the persons in charge of operating the system in the field and to planning the irrigation and water distribution in the office are required to be developed to capacitate the human resources of WUA. Even though, most WUAs do not have enough number of field staffs due to the lack of budget currently. It is indispensable to fill adequate staffs in parallel with the implementation of the improvement of the canal system in order to fulfill the expected effect of the improvement., It is necessary to continue the human resources support of ISD to WUA for the moment, so that WUA will be able to increase the employees successively considering the WUA current serious deficit of budget. At the same time, it is necessary to cultivate leaders of water users and involve them into the water management by entrusting a part of operation under the clear rules. Transportation will be equipped for WUA to increase the efficiency of water management activity by its staffs which is limited now.

WUA must show member farmers its ability on irrigation planning and administration work through preparation of contract limit with ISD, preparation of contract with each member, etc., in order to make members understand the importance and necessity of WUA's. In this regard, equipping PC to WUA administration and necessary training is proposed with high priority in order to raise WUA's presence among the members.

WUA's capability of communication and coordination with water users (members) is also to be increased for improving water management in the field. WUA is expected to act the role of liaison organization of technical support and extension by public organization described in the activities of Program for Strengthening Water Management in the Field, Program for Introducing water saving Technology and Program for Improving Drainage Conditions in the Field.

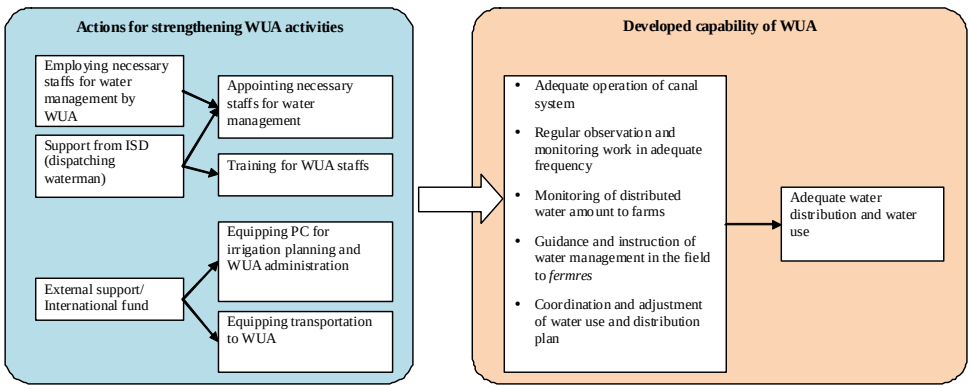


Fig. 6.2.17 Conceptual Diagram of Strengthening WUA and Enhancing Its Activity (1) Increasing Water Management Capability of WUA

b. Activities related to increasing canal/collector maintenance capability by WUAs

Increasing canal/collector maintenance capability of WUAs will be fulfilled by arrangement of inventory and technical information of canal system, such as improvement plans, survey and design documents, increase the capacity of WUA's machinery work by maintaining and equipping them with machinery, providing renting and machinery services and preparing supply system of necessary parts and materials for gate equipment and others.

The results of the investigation, survey and design of canal system will be prepared during the implementation of the Program for Improving Internal Canal System and they will be compiled to the inventory and technical information for maintenance work by WUA. Based on the developed

information, WUA shall enhance management of canal lot and other hydraulic assets. It is required to clarify the rules of use of canal lot and enhancing farmers understanding of rules through general/regular meeting of WUA and technical seminars in the Actions

Construction machinery for maintenance work of canal/collector system will be prepared to increase WUA's capacity. Mini-excavator should be equipped and operated by WUA for regular and minor maintenance works, while large-sized machinery will belong to ISD and SEMW and will be rented to WUA or provided as machinery service under contract. Equipping mini-excavator to WUA is expected to increase reliance and expectation of farmers to WUA's service as well as increase WUA's ability on canal management. Due to a large amount of total investment, this should be implemented in combination with repairing existing machinery belonging to WUA, renting construction machinery and providing machinery service. ISD and SEMW are considered to have enough machinery to provide services to WUA after the completion of NDIP. MTP is expected to provide maintenance service to WUA's machinery at its workshops, which shall be strengthened in "Promotion of Renewal of Agricultural Tractors" in the Agricultural Development Sub-sector. Workshops of ISD, SEMW and MTP will coordinate manufacturing and supplying spare parts for WUA's machinery, which is difficult to purchase in the local market. Currently, a part of machinery of ISD is rented to WUA without compensation other than fuel and human expenses. However, proper charging system needs to be introduced for renting machinery.

Supplying parts for water facilities, such as gate equipment and concrete flume, is an urgent subject for promoting proper renovation and maintenance of facilities. The system's supplying parts to WUA in low price and with constant supply is required to be improved by introducing a design standard and standardizing specification and by the coordination between ISD and the local manufacturers.

For maintaining the improved system, it is necessary to consider ad hoc maintenance work by famer's contribution under coordination of WUA at moment. After the financial condition of WUA starts to improve, it shall be shifted to the maintenance based on the business plan of WUA. Even during such provisional situation, it is indispensable to clarify and describe those works in the business plan in order to maintain member's reliance on WUA's activity.

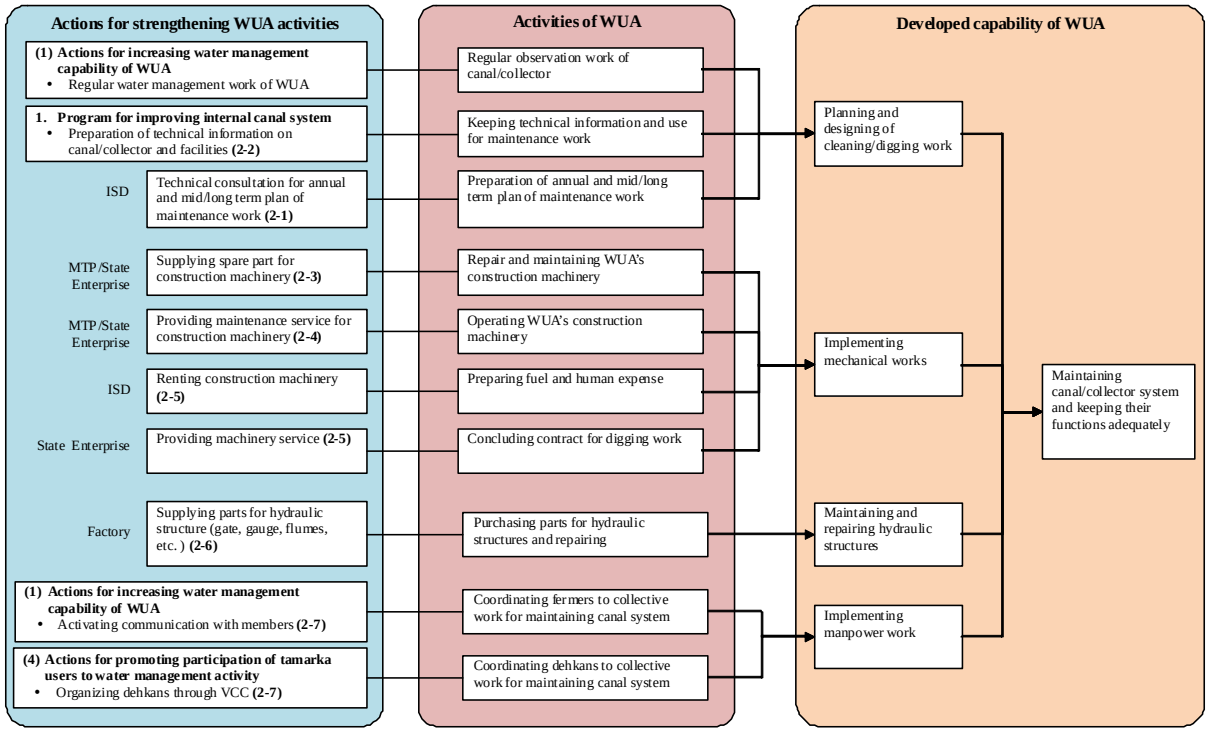


Fig. 6.2.18 Conceptual Diagram of Strengthening WUA and Enhancing Its Activity

(2) Increasing Canal/Collector Maintenance Capability of WUA

c. Activities related to improving water fee system and business plan of WUAs

Improvement of financial condition of WUAs is indispensable to activate its activities. Improvement of financial condition of member *fermers* is considered as a precondition to improve the collection of water service fee which decides the financial condition of WUA. The management of member *fermers* will be improved financially through the implementation of programs/projects proposed in the Master Plan, so that the collection of water service fee will increase. Because the enhancement of WUA's activity is a base of the improvement of production environment of *fermers*, all components of the Master Plan will be implemented comprehensively.

WUA is required to formulate an appropriate business plan in consideration with necessary machineries for an adequate maintenance work as well as operation cost to prepare the base of the improvement of the financial condition. The tariff of water service fee will be set based on the business plan. Fare water fee and collection system is also to be developed. In future, an amount base tariff system of water fee shall be introduced in order to raise user's awareness on water saving and effective use of water. However, it is considered to be difficult to introduce that at moment due to lack of human resources of WUA for water measurement and keeping record. It is necessary to make effort to increase water fee collection under the present area based tariff system for a moment.

The activity of publicity and enlightenment of member *fermers* to understand the importance of WUA's activity will be promoted.

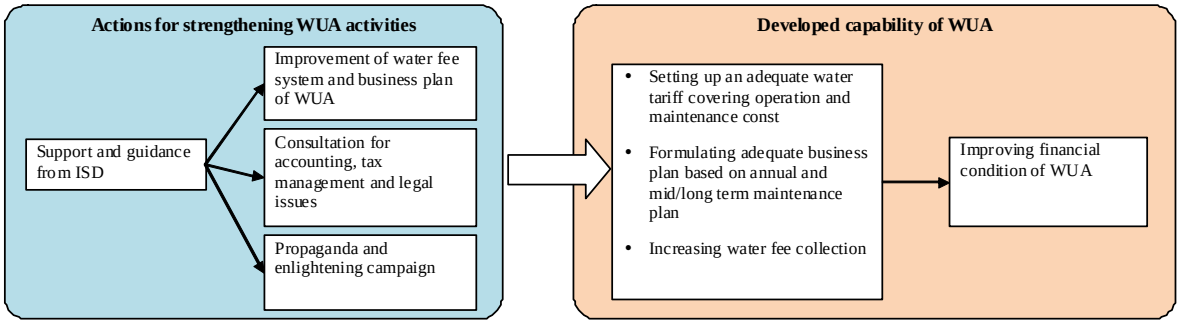


Fig. 6.2.19 Conceptual Diagram of Strengthening WUA and Enhancing Its Activity

(3) Improving Water Fee System and Business Plan of WUAs

d. Activities related to promoting participation of *tamarka* users (*dehkans*) to water management activities

Even though *tamarka* users are water users of the irrigation system, most of them are not member of WUA. It is necessary to involve *tamarka* users to the water management activity, such as maintenance work of canal system, closely. Participation of *tamarka* users to water management activity will be promoted by close cooperation of VCC/*aul* and WUA. VCC will organize *tamarka* users to regular water management activity and maintenance works of the canal system, including collective work and payment, through *aul*. Publicity and enlightenment of *tamarka* users are also expected due to the importance of water management activity through VCC/*aul*.

2) Proposed Actions Plans and Actors

a. Increasing Water Management Capability of WUA

No.	Activity	Actor	Roles
I-1	Appointing necessary staff s of WUA for water management	WUA	• Employing necessary staff for water management
		ISD	• Dispatching water man to WUA that is not able to employ necessary staff due to lack of budget, as a temporary step to fulfilling by WUA

I-2	Equipping Personal Computer for irrigation planning and WUA administration	ISD, District WUA	• Providing Personal Computers to WUA for irrigation and water distribution planning and other administration works • WUA staff will go to ISD office to use PC in case that WUA office does not supplied power
I-3	Training WUA staffs in operation and maintenance of canal system and planning of irrigation and water distribution	ISD, District WUA	Implementation of WUA staff training • Training to water man for operating irrigation canal system for which is renovated by the Program for Improving Internal Canal System and the Program for Strengthening Water Management in the Field • Training to administration staff for irrigation and water distribution planning and other administration work with PC • Providing information on support activities to *fermers* such as seminars, credit system and other support system , as well as technical information of irrigation and canal system
I-4	Equipping transportations for water management to WUA	ISD, District WUA	• Providing bicycle (or motorbike) as a transportation mean to water man for regular operation and inspection of canal system

b. Increasing Canal/Collector Maintenance Capability of WUA

No.	Activity	Actor	Roles
II-1	Formulating regular and mid/long term plan of maintenance work by WUA	WUA	• Formulating regular and mid/long term plan of maintenance work
		ISD	• ISD assists WUA to formulate above plans
II-2	Preparation of inventory and technical information for operation and maintenance work	WUA	• The result s of instigation, survey and design of canal and facilities prepared in the Program for Improving Internal Canal System are to be arranged and kept by WUA as an inventory and technical information for operation and management work • WUA will use these documents in daily work and planning for operation and maintenance • WUA will enhance the management of canal lot and other hydraulic asset based on the information.
II-3	Equipping construction machinery for canal maintenance work to WUA	Special Fund for Irrigation Improvement, LABM	• Supplying and equipping mini-excavators to 90 WUAs without compensation • Special Fund for Irrigation Improvement proposed in the Program for Improving Internal Canal System is expected to be a financial source for that
II-4	Providing spare parts and maintenance service to WUA's machinery	ISD, SEMW, MTP	• Coordinating workshops of ISD, SEMW and MTP to manufacture and supply spare parts for WUA's machinery that is difficult to purchase in the local market or is possible to manufacture in lower price than market, even though necessary spare parts are to be procured by WUA.
		MTP	• Providing maintenance service to WUA's machinery at the workshop of MTP, which is to be strengthened in the Program of renewal and Promotion of Self-owned Agricultural Tractor in the Agricultural Development Sub-sector
II-5	Renting construction machinery and providing machinery service for canal maintenance work	ISD	• Renting construction machinery for maintaining internal canal system under the contract with WUA
		SEMW	• Providing machinery work to WUA under the contract with WUA
II-6	Preparing supply system of parts and materials for hydraulic structure (gate, gauge, concrete flume, etc.)	ISD, LABM	• Preparing standard specification and design of small −sized gate equipment for internal canal system • Coordinating factories whish manufacture parts of gate equipment, concrete flume, etc. • Providing information on manufacture and

			procurement of parts of gate equipment, concrete flume, etc. to WUA
		Factory	• Manufacturing parts of gate equipment, concrete flume, etc. according with standard specification and design
II-7	Activating WUA's communication and coordination for collective works of maintenance	WUA	• Keeping close communication with members through general meeting and routine activity • Expressing requirement and schedule of member's participation to operation and maintenance activity for water facilities in the annual maintenance plan clearly • Obtaining approval of annual and mid/long term maintenance plan at the general meeting
		Members	• Formulating user group in each canal system and election of group leader • Clarifying role and responsibility of group leader • Participating to collective work for operation and maintenance of canal system

c. Improving Water Fee System and Business Plan of WUAs

No.	Activity	Actor	Roles
III-1	Improving water fee system and business plan of WUA	WUA	• WUA prepares an annual business plan based on annual and mid/long term maintenance plan. • Deciding appropriate tariff of water serve fee in consideration of necessary maintenance work in the business plan
III-2	Providing consultation to WUA on accounting, tax management and legal issues	ISD, *Hakimiyat*	• Establishing consultation desk for accounting, tax management and legal issues which are necessary in WUA's regular activity and providing consultation to WUA
III-3	Propaganda and enlighten campaign to members on importance of WUA activity and water fee	WUA	• Explaining accounting report and financial condition of WUA to members at various seminars as well as general meeting • Publicity and enlightenment of members on water service fee and activity of WUA

d. Promoting *Tamarka* User's Participation to Water management Activity through VCC

No.	Activity	Actor	Roles
IV-1	Promoting *tamarka* user's (*dehkan*) participation to water management activity through VCC	WUA	• Explaining maintenance plan and schedule to VCC and requesting organizing tamarka users to participate maintenance work • Publicity and enlightenment of *tamarka* users on importance of maintenance work of canal system through VCC
		VCC, *aul*	• VCC organizes *tamarka* users to regular water management activity and maintenance work of canal system, including collective work and payment, through *aul*

3) Implementation Organization

Level	Organization
Strengthening of water management capability	ISD, District WUA
Strengthening of maintenance of canal/collector capability	Equipping machinery to WUA is to be managed by LABM in the Program for Improving Internal Canal System
Improving water fee system and business plan	WUA
Promoting *tamarka* user's participation to water management activity	WUA, VCC and *aul*

4) Implementation Schedule

Activities	Year									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Appointing necessary field staff of										
Support of ISD to dispatch staffs										
Equipping Personal Computer to WUA										
Technical and administrative training for WUA staffs										
Equipping transportation for water management activity										
Formulating annual maintenance plan by WUA										
Formulating mid/long term maintenance plan by WUA										
Arranging inventory and technical information on canal system										
Equipping mini-excavator to WUA										
Providing spare parts and maintenance service to WUA's machinery										
Renting machinery and providing machinery service to WUA										
Preparing supply system of parts and materials for hydraulic structure										
Activating WUA's communication and coordination for collective works of maintenance										
Improving water fee system										
Providing consultation to WUA on accounting, tax management and legal										
Propaganda and enlighten campaign to members										
Promoting tamarka user's participation to water management activity through										

5) Necessary Input and Cost

Activity / Input	Cost (1,000 Sum)	
	Subtotal	Total
Increasing water management capacity of WUA	2,253,606	
Increasing canal / collecor maintenance capacity of WUA	19,454,518	
Improving water fee system and business plan of WUA	88,560	
Promoting tamarka user's participation in water management activity through WUA	8,856	21,805,540

6.2.6 Distribution and Marketing by Farmers Cooperatives

(1) Joint Marketing by Farmer Group (Model Agro-firm Establishment)

1) Concept

The government of UZ (MAWR) promotes establishment of Agro-firm as a part of agrarian reform policy. Since 2006, 208 Agro-firms has been established to support processing and marketing of vegetable and fruit growers, *fermers* and *dehkans*, who usually don't have enough production volume, hence less bargaining power.

There is one Agro-firm in the Project Area (Nukus District), but its activity is quite limited, when we compare with other Agro-firms in other regions, which provide not only marketing services but also processing, technical training and input procurement, for example. In this regard, establishment of a model Agro-firm by enhancing the existing Agro-firm at first and then expanding to the other districts is important to promote collective action of small-scale farmers in Karakalpakstan.

Therefore, the purpose of the project is to enhance bargaining power of *fermers* and *dehkans* through establishing and activating model Agro-firms in each district. The target of the project is *fermers* and *dehkans* who produce vegetables, fruits and also dairy products.

A key for a successful management of the Agro-firm depends on whether the firm can successfully provide incentives to its member farmers. Therefore, the program will conduct a participatory business planning, which includes grasping members' expectation to the firm's services, discussing/ analyzing the members' expectations in view of economical and technical feasibility, and then, making decisions on the firm's activities. Also, the business plan, which is often regarded as a calling card of business entity in the market economy, will enable the firms to acquire bank loan and/or private investment in the future. Once the Agro-firm develops practical and reliable business plan and verify their ability to manage the firm based on the plan, they can attract investment and expand their activities.

Conceptual diagram of the project is as follows.

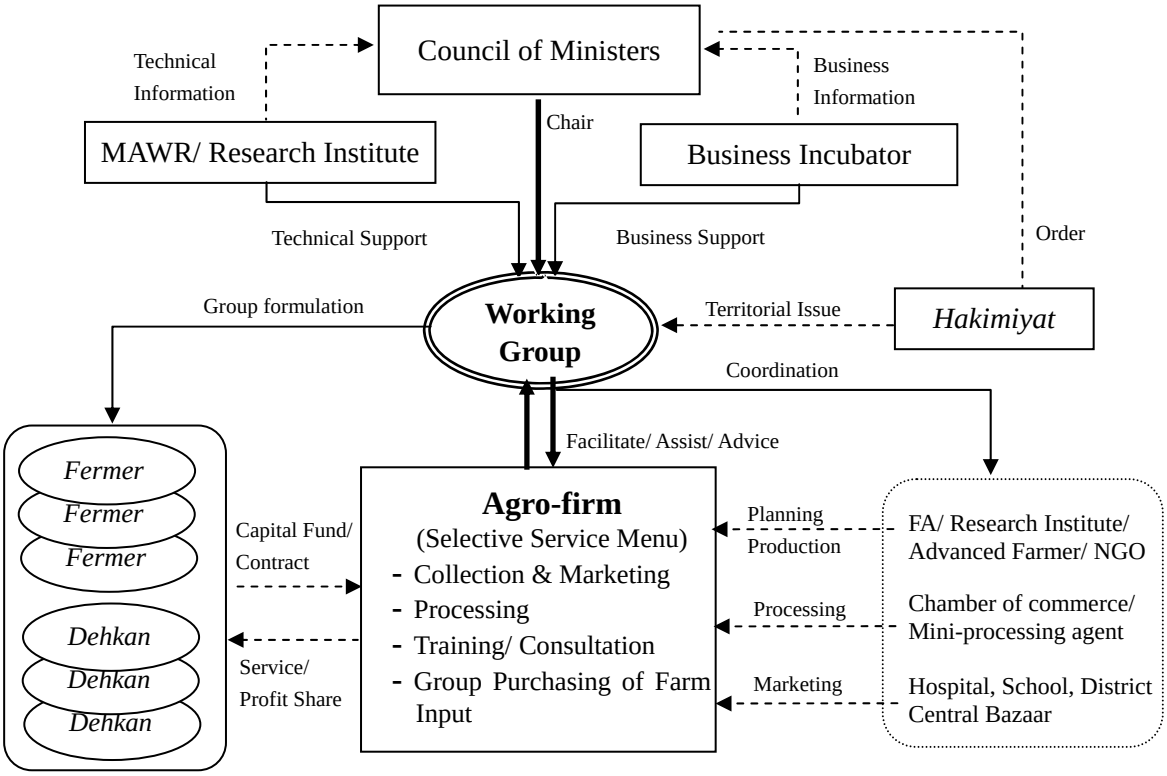


Fig. 6.2.20 Conceptual Diagram of Joint Marketing

2) Proposed Actions Plans and Actors

Activity I: Establishment of working group

It is necessary to establish a working group at central level for a smooth and effective implementation of the project. Council of ministers of Karakalpakstan will organize the working group with concerned ministries (e.g. MAWR, Ministry of Economy, and Ministry of Foreign Economic Relations of Karakalpakstan), research institutes (Uzbekistan Scientific Center for Agriculture in Karakalpakstan, Agricultural Collage) and the Karakalpakstan Business Incubator (BI). Research institute will assist technical issues, whereas BI handles business and marketing related issues. *Hakimiyat* also will join to the working group to assist and solve territorial issues.

Activity II: Focus group discussion and establishment of agro-firm

Agro-firm is a private entity is voluntary organized by investors, *fermers* and *dehkans*. Therefore, at the beginning of its establishment, the group discussion focusing with those people who have a willingness to participate in the Agro-firm's activities should be organized. *Hakimiyat* should take the initiative to organize the discussion. At the first meeting, it is recommended to discuss needs of farmer members to identify the range of activities of the Agro-firm. Then, the management body, participation way of members (capital fund), and the articles of association must be determined based on the law to establish Agro-firm.

In the case of existing Agro-firm in Nukus district, it is necessary to have a kick-off workshop with member farmers to review the role of the Agro-firm and to discuss farmers' expectation to the Agro-firm's services.

Activity III: Business planning

Business plan will show a profile of the firm and the essence of its activities, and will help to acquire bank loan and/or utilize private investment. The business plan will also help monitoring the achievement of the organizational objectives. Business planning is a necessary step to formulate a practical and effective plan of the Agro-firm's operation. Agro-firm can attain member's expectation to the firm's activities/services through the kick-off workshop. Feasibility of member's expectations will be discussed and analyzed during the business planning. For this purpose, the following activities are recommended:

- Developing a manual for business planning (working group)
- Discussion and analysis of economical / technical feasibility of members' expectation (Agro-firm)
- Needs assessment of buyers and identify promising products (Agro-firm)
- Development of marketing strategy (target, marketing channel, way of transportation, price) (Agro-firm)
- Study tour to advanced farmer and/or successful Agro-firm (Agro-firm)
- Business seminar to management body and technical training to member *fermers* and *dehkans* (Agro-firm)
- Action planning (Agro-firm)

The contents of the business plan are as follows;

Component of the Business Plan

- Executive summary
- Profile of the firm (name, representative, location, capital, number of employee, vision and objective, main service)
- Product or service (details of products/ services, comparative advantage, manufacturing process, equipment, sales volume)
- Marketing plan (target market, marketing channel, price, transportation means)
- Financial plan (revenue and expenditure, financial source, repayment plan, cash flow, ROI (return on investment), a break-even point, risk analysis)
- Action plan (2009-2010)

Management board of Agro-firm should organize these activities with support from the working group, which also introduce resource organizations and persons to the Agro-firm. The BI should support the working group regarding to business establishment and marketing related activities, including needed assessment, developing marketing strategy, study tour and seminar/ trainings.

Activity IV: Products development

This stage is quite important to provide incentives to member farmers. By adding values on raw products, including sorting, grading, packaging and processing, the members can gain more profit from their products. Particularly, adding value on the fallen fruits, which usually are thrown away or sold to livestock breeders at throwaway prices, might be an effective service to maintain members' interest to the firm's operation.

The Agro-firm will develop marketable and profitable products based on their business plan and the working group will support the firm's development activities by providing necessary information, technical training and credits. The BI must play a key role to provide information and technologies. Also, the working group should assist Agro-firm to find suitable processing equipment and procurement agent by providing information. Ensuring stable provision of electricity, gas, and clean water is important a role of *Hakimiyat*. In the case the Agro-firm establishes a processing factory, the products must meet UZSTANDARD and the necessary steps to acquire the certificate will be arranged by BI.

Activity V: Marketing

This action includes establishment of marketing channels and identification of transport means. At the beginning of the firm's operation, the main target market should be located in neighboring areas. Ideal neighboring buyers includes local schools, hospitals, orphanages or other government organizations in the district. District central bazaar is also an ideal place to sell, where many competitors also market their products and consumers show their preference to the products directly. It should be noted that promising buyers must be identified at the time of business planning before starting the production, since the scale of production will be determined by the expected demand. After establishing the processing line, test products and the process of its production should be shown to the promising buyers, so that the buyer can trust the quality of products, which in terms may result in a long term contract. For this purpose, a marketing specialist should be assigned in the Agro-firm.

3) Implementation Organization

The Agro-firm will be the main implementing body of the program. However, at the beginning of the model Agro-firm establishment, the engine for its promotion should be the Council of Ministers of Karakalpakstan, which chairs the working group and leads its operation. After establishing the model Agro-firm in each district, the main function of the working group can be shifted to the *Hakimiyat*. The member of the working group is mentioned in the action 1) establishment of working group.

4) Implementation Schedule

It is better to concentrate on enhancement of existing Agro-firm in Nukus district to show a model case of collective action of vegetable- and fruits-growers during the first three years. Then, the success story can be expanded to the other districts until 2020. Finally, at least one model Agro-firm will be established in each district in the Project Area.

Activities	Year									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Establishment of Working Group	▲									
Focus Group Discussion	▲									
Business Planning	▲									
Products Development	■	■	■							
Marketing	■	■	■							
Establishment of New 3 Agro-firms				■	■	■				
Establishment of New 3 Agro-firms						■	■	■		
Establishment of New 4 Agro-firms								■	■	■

5) Necessary Input and Cost

Input from the Government: Technical Training, Study Tour, Business Seminar, Manual development (business planning), Information on marketing, value adding and trading

Input from Agro-firm: Manpower, raw products, facilities and experiences of member farmers

Activity / Input	Cost (1,000 Sum)	
	Subtotal	Total
Establishment of working group	1,636	
Focus group discussion and establishment of agro-firm	12,177	
Business planning	52,161	
Products development	4,499	
Marketing	39,589	110,062

6) Proposal for further development stage: "One-village One-product" Movement

Since Karakalpakstan's environmental condition is so severe, the republic has comparative disadvantage in land productivity compared to the other regions in Uzbekistan. Adding higher value on the agricultural raw material, which is produced in Karakalpakstan and in other regions, should be considered to overcome the disadvantage. In this regard, "one-village one-product" movement is recommendable to pull up farmers' mind to further development stage.

The movement started in Oita prefecture, in the western Japan, in 1980s to activate depopulated rural society through developing regionally specialized products using locally available resources, including raw materials, human resources and locally accumulated knowledge and experiences, and mainly composed of: (1) local link, global reach, (2) self-reliance, originality and genuineness and (3) human resource development.

The locally specialized products includes agricultural products, livestock products and handicrafts, etc., and is developed though enhancing production skills, exerting local farmers' originality and genuineness and increasing the quality of the local products. The final goal is to produce locally specialized products in each district, which has enough competitive power in regional, national and finally the world market. The following activities are recommended to promote the movement.

- Establishment of the inter-ministerial implementation committee at central level, chaired by the president, so as to carry out it as a national movement
- Establishment of working groups at district level to directly organize local residents into the movement
- Enhancement of existing agricultural research institute to develop locally specialized products and processing technologies
- Establishment of extension system for technical support and marketing support to farmers
- Provision of seminars/ trainings to foster regional leader farmers
- Development of locally specialized products using locally available resources
- Establishment of registration system of the products generated under the movement
- Hold competitive contest of the products, holding at regional level and national level and give award to the superior products

One of uniqueness of the movement is to make farmers establishing their own and life-size goal (dream). For example, farmers in Oita prefecture established their own goal like this; "*let's go to Hawaii by planting peach trees!*". Then farmers made a great effort to realize their own dream. Now, Hawaii is the most popular place for Japanese travelers, but was not easy to go at the time of the movement started. The point is that the dream is not easy to realize, but enough possible if people make a great effort.

(2) Improvement of Marketing Support Infrastructure

1) Concept

The transaction volume at the major district central bazaar is growing recently. Particularly, the number of retailers is increasing, resulting in congestion at retail section. Some farmers indicated that it becomes very difficult to acquire retail place at Nukus Central bazaar due to its congestion. The bazaar's retail section is already full of its capacity, which prevents *fermers* and *dehkans* from easy access to the market. Since retail trade and catering sector are relatively easy to enter, the director of Nukus Central bazaar forecasts that the number of retailer will increase from now.

The congestion at the retail section causes another serious problem. In most district central bazaars, many retailers are overflowing into walkway and parking lot, sitting on dusty ground to sell even perishable foods, including vegetables, fruits, raw milk, meat and fish, which result in worsening of sanitary conditions and difficulty in conducting effective veterinary and sanitary monitoring. In this regard, establishment of cold sections for perishable food are quite urgent in view of food safety.

To overcome these situations, the district central bazaars reconstruction project has started since 2007, based on the presidential degree #330 (2007). The project mainly focuses on physical improvement, which includes separating retail section of perishable food and other commodities and establishing cold section for meat, fish and dairy products. However, there is no fund from the government and each district central bazaar must raise the budget from own revenue, resulting in delayed implementation of the project. According to bazaar officials in some district central bazaars, cold section establishment in particular has a low priority due to the budgetary constraints.

The purpose of project is to improve accessibility to district central bazaars through mitigating congestion in the major district central bazaars, including Nukus, Khodjeyli, Kungrad and Chimbay, and through increase absorbability of retailers in other local bazaars by providing better transaction environment. Bazaar is the most important point which is located in the center of food supply chain, from farms gate until customers, hence the project will enhance sanitary condition of a critical point of the perishable food distribution in Karakalpakstan. The following diagram shows a concept of the project.

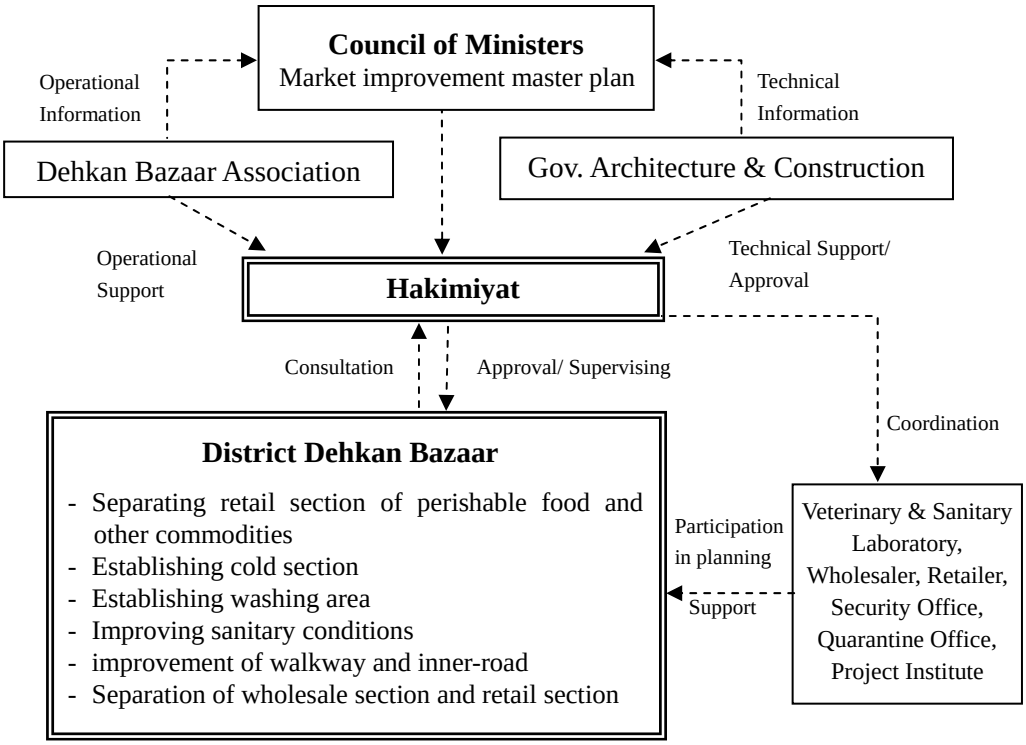


Fig. 6.2.21 Conceptual Diagram of Marketing Infrastructure Improvement

2) Proposed Actions plans and Actors

Activity I: Holding stakeholder meeting to formulate market improvement master plan

The Council of Ministers of Karakalpakstan will organize a stakeholder meeting to review geographical distribution of each district central bazaar in Karakalpakstan and their function. The purpose of the review is to mitigate the congestion of the major 4 district central bazaars (Nukus, Kungrad, Khodjeyli, and Chimbay) through increasing absorbability of other satellite bazaars. The result of the discussion will be compiled as market improvement master plan, which also includes market information dissemination system, fresh food distribution arrangement in off-crop season and community market promotion. The stakeholder includes *Hakimiyat*, district central bazaar offices, District Central Bazaar Association and Government Architecture Building.

Based on the master plan, *Hakimiyat* organizes a meeting to discuss market improvement plan at district level, by inviting district level stakeholders, including retailers and wholesalers (*fermers* and *dehkans*), Veterinary and Sanitary Expertise (VSE), quarantine officers and sedulity officers. The district market improvement plan should be mainly focusing on operational improvement, since physical improvement plan already exists. Operational improvement includes information management, logistic management, financial management, sanitary control and safety control. For practical and effective planning purpose, a study tour to advanced bazaars, including Tashkent and Samarkand, will be organized by *Hakimiyats*.

Activity II: Integration of control system of perishable food

Integration of control system of perishable food commodities includes establishment of special zone for perishable food transaction, development manuals for perishable food control and assignment of a responsible person for the management. This person is responsible for quality and quantity control of the perishables products. Also, the responsible person will closely corroborate with VSE officials to enlighten retailers and wholesalers to ensure food safety.

Activity III: Separation of perishable food section and other commodities

Hakimiyat and district central bazaars offices, under the initiative of Council of Ministers of Karakalpakstan, will implement the separation of perishable food section and other commodities, based on a physical layout plan. Detail design and cost estimation will be carried out by the project institute, and the plan will be approved by *Hakimiyat* and the Government Architecture and Building.

Activity IV: Establishment of cold section

This activity includes needs assessment of retailers and wholesalers, determination of location and scale of facility, establishment of operation and management plan, detail design, cost estimation, procurement and construction. For example, refrigerator will be rented to retailers and wholesalers and the profits will be revenue of the bazaars. *Hakimiyat* and district central bazaars offices, under the initiative of Council of Ministers of Karakalpakstan, will implement the activity.

3) Implementation Organization

Hakimiyats and district central bazaars offices are the main implementer of the project. Council of Ministers of Karakalpakstan takes initiative of the project activities. District Central Bazaar Association provides data and information on the business management to formulate market improvement master plan, whereas Government Architecture and Building provides technical support for infrastructure improvement.

4) Implementation Schedule

The project will be implemented during ten years until 2020. Priority areas are the major district central bazaars, including Nukus, Kungrad, Khodjeyli and Chimbay. Then, the project will be expanded to other districts in the Project Area.

Activities	Year									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Holding stakeholder meeting to formulate market improvement master	■									
Improvement of Major 4 Defkan Bazaar		■	■	■						
2nd phase: Improvement of additional 3 Dehkan Bazaar				■	■	■				
3rd phase: Improvement of additional 3 Dehkan Bazaar						■	■	■		

5) Necessary Input and Cost

Input from the government: Mater planning, Technical Training, Study Tour and Manual development (perishable food control)

Input from district central bazaar and *Hakimiyat*: Reconstruction works, Cold Storage, Refrigerators, Experiences and voices at grassroots level

Activity / Input	Cost (1,000 Sum)	
	Subtotal	Total
Holding stakeholder meeting to formulate market improvement master Plan	1,839	
Integration of control system of perishable food	20,547	
Separation of perichable food section and other commodities	3,916,935	
Establish of cold section	658,940	4,598,261

(3) Small-scale Slaughterhouse

1) Concept

The BSE crisis in 1996 caught worldwide attention on food safety and the traceability of food supply chain. Food safety measures should be taken at critical control points of the food supply chain, such as bazaars, processing factories and farms gate. In this regard, improvement of sanitary condition of slaughterhouse in quite is important. At present, cattle are slaughtered in poor hygienic environment, mostly at farms gate, which makes veterinary and sanitary inspection difficult and inefficient.

There are two slaughterhouses in the Project Area. However, the former has stopped its operation since 2004. The latter is operating, slaughtering 5 to 6 cattle per day. Although cattle are inspected by veterinarian before slaughtering, slaughtering is not done under hygienic conditions and the existing facility is not equipped with cold storage. If compared with the facility observed at Tashkent, it will be necessary to improve slaughtering facility when considering giardiasis, echinococcus, bacillus coli, etc., from the viewpoint of safe meat supply to consumers.

The direct objective of the project is to dress cattle in sanitary plant to sell hygienic and safe meats for consumers. The project is also aiming at enhancing food safety in supply chain of livestock products (meat) in the Karakalpakstan. Through the project, veterinary and sanitary condition of livestock products in Karakalpakstan will be improved, which will also improve accessibility to international market indirectly.

2) Proposed Action and Actors

JICA Study Team had a meeting with counterparts of Veterinary Department and Animal Husbandry Department of MAWR of Karakalpakstan who are responsible for animal health and animal husbandry on how to implement the proposed program/project of improvement of slaughterhouses. According to counterpart's suggestion, a part of the proposal was modified and finally the proposed agencies concerning the plan accepted and agreed as shown below.

Activities	Actors	
	Implementing Agency	Supporting Agencies
Construction of a small-scale slaughterhouse	Local *Hakimiyat*	Veterinary Department of MAWR of Karakalpakstan, Republic Veterinary Department

3) Implementation Organization

Four local *Hakimiyat* of Khodjeyli, Kegeily, Kungrad, and Nukus will be the implementing agency, which may be required to cooperate with Veterinary Department of MAWR of Karakalpakstan and Republic Veterinary Laboratory from view point of food inspection.

4) Implementation Schedule

The implementing schedule for 2011 to 2020 was planned as shown below in which each activity basically will be implemented in one district taking into consideration the budget allocation and also seasonality of farming.

Activities	Year									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Costruction of Small Scale Slaughter		■			■	■		■		

5) Necessary Input and Cost

Input from the government: Construction work

Activity / Input	Cost (1,000 Sum)	
	Subtotal	Total
Construction of small-scale slaughter house	376,972	376,972

6.2.7 Value-adding of Agricultural and Livestock Products

(1) Improvement on Small-scale Agro-processing Technologies

1) Concept

During the transition of the economic system, small-scale agro-processing should be promoted in regard of easier emergence into free market system operated with low initial investment. Promotion of processing and marketing activities of Agro-firm, *fermer* and *dehkan* groups and privates investors will be focused on the following fields:

- Local production and local consumption of dairy products
- Vegetable and fruit processing using currently- popular products
- Processing of unique or famous local products and drought resistance crops (rice, sorghum, oil seeds, etc.)

Furthermore, it is important the capacity building for the experts of MARW to promote the policy on small-scale agro-processing.

2) Proposed Actions Plans and Actors

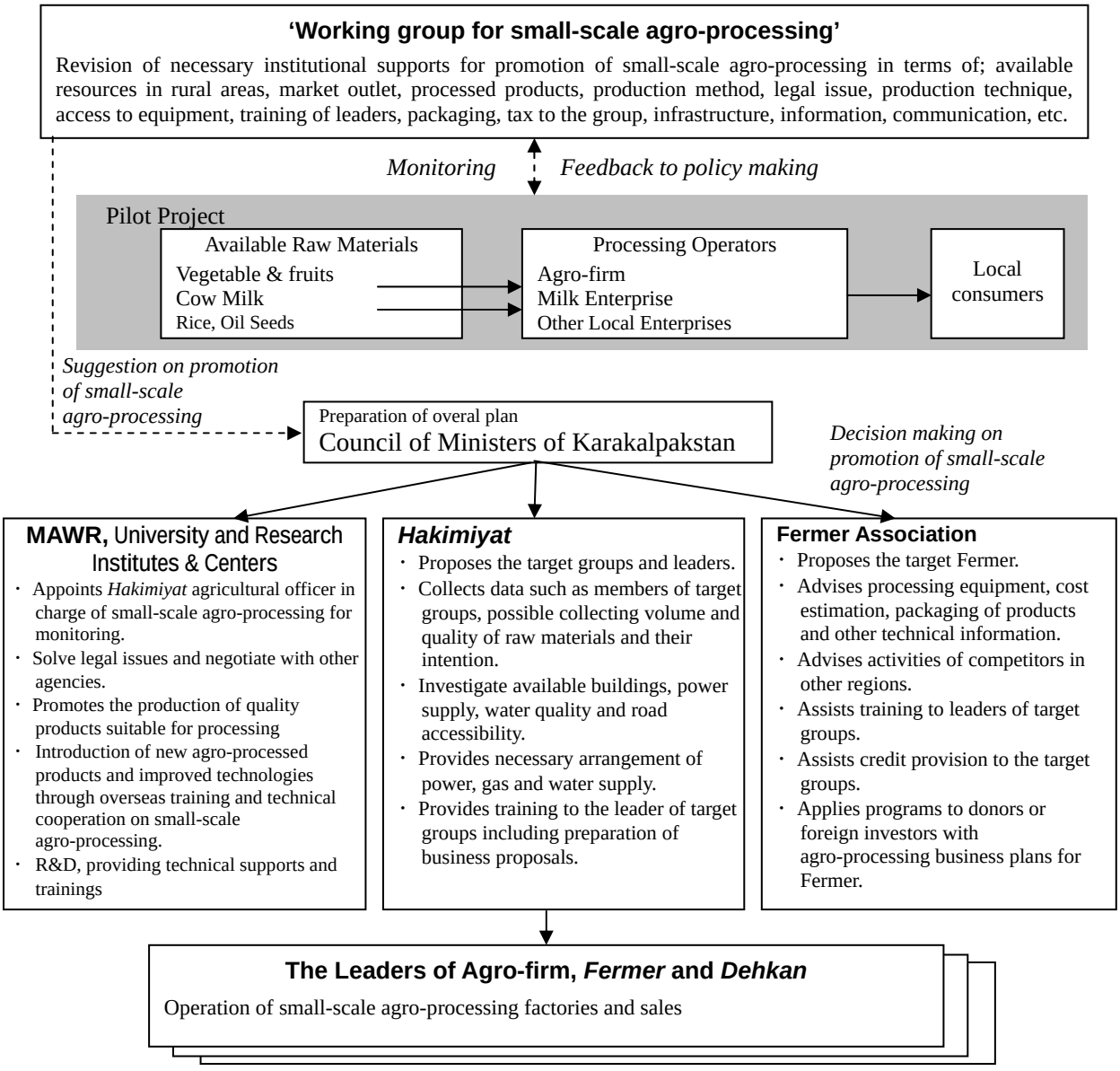


Fig. 6.2.22 Conceptual Diagram of Small-scale Agro-processing Technology

The major actors are the leaders of agro-firm, *fermer* and *dehkan*.

No.	Activity	Actor	Required Function
1	The disincentive factors will be clarified on entrepreneurial chances in agro-processing, and the measures will be settled.	MARW, Agricultural Research Institutes and Stations	Conducting survey on raw material production, distribution and quality
		Chamber of Commerce, Ministry of Foreign Economic Cooperation, Investment & Trade	Conducting survey on promotion of sales becoming a basement of One-Village One-Product in future Providing information of mini-processing equipment
2	Small-scale processing technologies applicable for *fermer* will be researched and development.	MARW, Karakalpakstan Fermer's Association	Conducting survey on applicability of processing technologies from leading areas or other counties to Karakalpakstan
		Nukus Branch of Tashkent State Agrarian University, Agricultural Research Institutes and Stations	Researching on post-harvest and agro-processing technologies applicable to local conditions Conducting survey and research on processing of drought resistance crops Holding seminars and trainings for leading *fermers* / concerned people
3	The experts on small-scale agro-processing will be trained and make its policy.	CM, MARW, *Hakimiyat* Agricultural Officer	Creating promotion policy on small-scale agro-processing, making actions and budgeting Conducting capacity development of MARW experts and *Hakimiyat* Agricultural Officer
4	*Fermer* and *dehkan* will get opportunities of credits for small-scale agro-processing equipment.	Karakalpakstan Fermer's Association	Implementing credit schemes to reliable *fermer* Providing information of specifications and procurement sources of processing equipment
		Karakalpakstan Business Incubator (NGO), Micro Financing Organizations	Consulting business proposals for applicants of micro credits Conducting training for management skills and accounting Implementing credit schemes
5	Infrastructures necessary for small-scale agro-processing will be improved.	CK, *Hakimiyat*	Power supply: Maintaining sub-stations and power lines Water supply: Supporting underground water survey, maintaining water pipelines and introducing tax preferable measure for privates dealing with water tank lorries Gas Supply: Maintaining gas pipelines

The actions of the master planning study will be handled by privates including *fermer* and *dehkan* using the financial sources such as NGOs, micro financing organizations and investors of Karakalpakstan, technical and financial assistance from international donor agencies.

3) Implementation Schedule

Activities	Year									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Confirmation of disincentive factors on initial operation (Pilot project)	■	■								
Research and development of small-scale agro-processing		■	■							
Trainijg of experts and policy making			■							
Credit facilitation and procurement of equipment				■	■	■	■			
Minimum improvement of insrastructure				■	■	■	■			

4) Necessary Input and Cost

Activity / Input	Cost (1,000 Sum)	
	Subtotal	Total
Confirmation of Distinctive Factors on Iitial Operation	294,824	
Research and Development of Small-Scale Agro Processing	32,398	
Training of experts and policy making	29,158	
Credit Facilitation and Procurement of Equipment	1,895,294	
Minimum Improvement of Infrastructure	1,397,982	3,649,656

The initial investment costs will depend on the kinds and scale of processing products. Regarding to the amount of projects, ADB provided the loan limit up to US$2.5 million for the project of Japanese fund for poverty reduction "Innovation Methods of Improving Standard of Life in Karakalpakstan" (2001-2004). The main activities were focused on micro-financing for small-scale agro-processing and business promotion. The proposed action plan has reality because its scale in costs is equivalent to the ADB project.

(2) Improvement of Food Safety Technologies

1) Concept

The BSE crisis in 1996 caught worldwide attention on food safety and the traceability of food supply chain. Since then, the food safety measure is no longer able to ignore in the world market economy, particularly when farmers want to access international market, including western countries. For export promotion purpose, to meet international standard, such as Hazard Analysis and Critical Control Point (HACCP), CODEX, Euro-Retailer Produce Working Group Good Agricultural Practices (Eurep GAP), and Organic Verification System, is necessary. Integration of food supply chain in accordance with internationally recognized food safety standard will also increase value of products of Karakalpakstan.

Food safety measures should be taken at critical control point of food supply chain, such as bazaars, processing factories and farms gate. For this purpose, improvement of sanitary control plan so as to meet international standard is recommended. In addition, capacity building of sanitary control officials is necessary.

The project purpose is to enhance food safety measures to increase value of agricultural products produced in the Karakalpakstan. Through the project, quality of agricultural products in Karakalpakstan will increase, and as a result, accessibility to international market will be improved. The following figure is a conceptual diagram of the project.

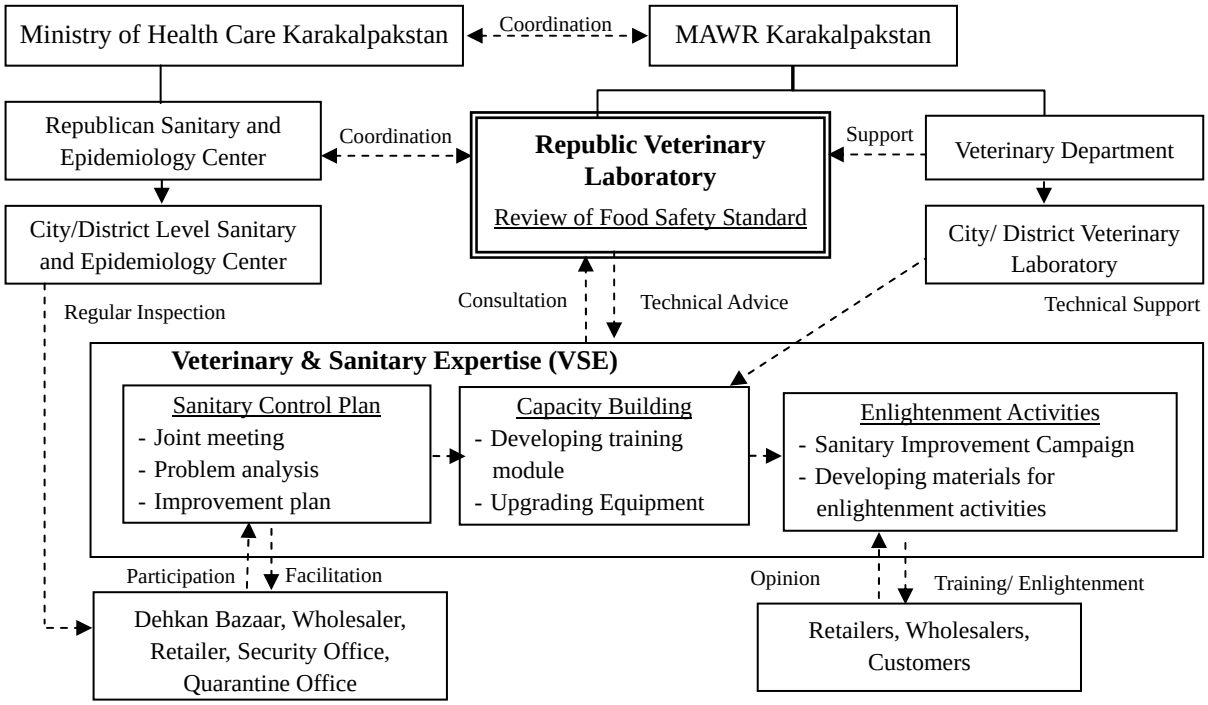


Fig. 6.2.23 Conceptual Diagram of Food Safety Technology Improvement

2) Proposed Actions and Actors

Activity I: Review of Food Safety Standard

Republic Veterinary Laboratory takes initiative of all project activities under the assistance of MAWR of Karakalpakstan. For export promotion purpose, international food safety standard, including Hazard Analysis and Critical Control Point (HACCP) and CODEX, will be reviewed. Check items, tolerance level and inspection method will be examined during this activity. Then, it is recommended to examine selected foods in detail based on international food safety standard to grasp current situation. The examination should be carried out by outsourcing.

Activity II: Improvement of Sanitary Control Plan

Food supply chain, particularly dairy products, meats and fishes, will be analyzed at joint meeting, organized by Republic Veterinary Laboratory, to identify critical point of veterinary and sanitary control. Stakeholders, such as VSE officials, *fermers* and *dehkans*, retailers and wholesalers, officials from Veterinary Department should be invited to the joint the meeting. Participants will discuss current problems on veterinary and sanitary system, critical control point of the priority products, inspection method, responsible organization and actions to be taken. Based on the result, sanitary control plan including daily monitoring plan, periodical inspection plan and sanitary control manual will be developed. The plan should follow the international standard examined in the action 1. For practical and effective planning purpose, a study tour to advanced regions, including Tashkent or Samarkand, will be organized by the Republic Veterinary Laboratory.

Activity III: Capacity Building of VSE

Based on the improved sanitary control plan, Republic Veterinary Laboratory will implement capacity development program to VSE staff. The plan includes development of training module and upgrading veterinary and sanitary control equipment. The development of training module includes knowledge enhancement, skills enhancement and training materials (textbook) development. Also, based on the international requirement, the existing inspection equipment will be reviewed and upgraded. Trainings to VSE officials will be delivered at the time of the delivery of upgraded equipment.

Activity IV: Promotion of Enlightenment Activities

VSE officials, under the initiative of Republic Veterinary Laboratory, will develop a plan for enlightenment campaign for sanitary improvement at bazaars and develop material for it, which includes poster, leaflet, video materials and training manuals. Then, VSE, with cooperation from district central bazaars offices, will carry on the campaign periodically toward retailers and wholesalers (*fermers* and *dehkans*).

3) Implementation Organization

Republic Veterinary Laboratory takes initiative to all project activities under the assistance of MAWR of Karakalpakstan. VSE is the main target of the capacity building stated in action 3 (trainers' training) and retailers and wholesalers (*fermers* and *dehkans*) are the main target of the enlightenment activities stated in action

4) Implementation Schedule

The project will be implemented until 2015. Priority VSEs are in the major district central bazaars, including Nukus, Kungrad, Khodjeyli and Chimbay and the project for them will be implemented until 2013. Then, all other VSEs are targeted in the next phase of the implementation.

Activities	Year									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Review of food safety standard	■									
Integration of control system of perishable food		■								
Capacity Building of VSE		■								
Promotion of enlightenment activities			■	■	■					

5) Necessary Input and Cost

Input from the Government	Technical Training, Study Tour, VSE equipment, Digital video and Digital camera
Input from Republic Veterinary Laboratory and VES	Experiences and voices at grassroots level and Manual development (sanitary control, food safety enlightenment)

Activity / Input	Cost (1,000 Sum)	
	Subtotal	Total
Review of food safety standard	32,718	
Improvement of sanitary control plan	11,316	
Capacity building of VSE	89,689	
Promotion of enlightenment activities	20,449	154,172

6.2.8 Institutional Development for Supporting Farmers

(1) Enhancement of Communication for Local Agriculture Administration

1) Concept

With the dissolution of the *shirkats*, the district agricultural supporting functions that were in the hands of the *shirkat* were divided between the district department of MAWR, MTP, FA and other bodies, and the related engineers were scattered. At present, the responsibility for district agricultural administration is divided between *Hakimiyat* economic department, district department of MAWR, and other bodies, under strong coordination of the *hakim*.

The content proposed in this master plan covers four sub-sectors – 1) agricultural development (cotton and wheat are excluded), 2) livestock and fishery development, 3) irrigation and drainage development and 4) marketing and processing development – and involves diverse activities and actors. If it is to reflect the needs of local people, it will require coordination work between officials responsible for district agricultural administration, and between that administration and local people. Project implementation at district level will be based on the *Hakimiyat* – VCC – *aul* line. A task force drawn from related departments must be set up in the *Hakimiyat*.

This program will build capability and improve information tools for mid-level staff of the *Hakimiyat* economic department and district department of MAWR, who are central to the district-level task force, and for the VCC staff who represent local people, in order to strengthen communication between *Hakimiyat* – VCC – *aul* lines. This program will serve as a model case through the implementation of the "Program for Strengthening of Women's Vegetable Production in *Tamarka*".

This program consists of two projects:

a. Project for strengthening the communication between district agricultural administration and communities.

b. Project for reinforcement of VCC coordinating abilities.

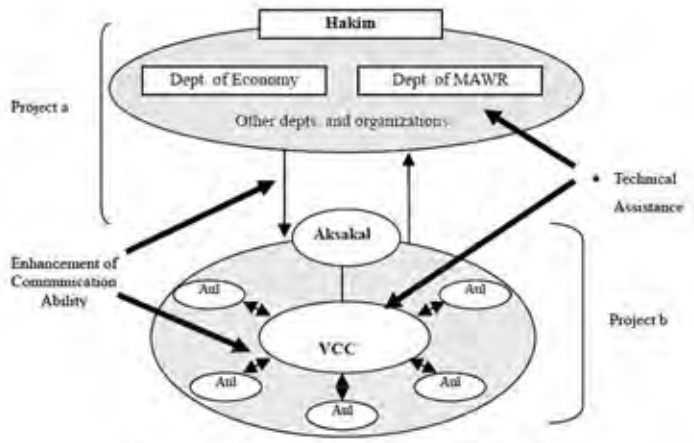


Fig. 6.2.24 Image of Enhancement of Communication

2) Proposed Actions and Actors

Activities	Major actors and actions
Activity I-1: Select target VCCs.	- *Hakimiyat* offices will select the same VCCs as those in the program for Strengthening of Women's Vegetable Production in *Tamarka*".
Activity I-2: Install computer equipments in *Hakimiyat* and VCC office.	- *Hakimiyat* offices will install computers, printers and other equipment for the economic department and district department of MAWR, and for VCCs.
Activity I-3: Share information on this project with VCCs.	- The *Hakimiyat* and district department of MAWR (or consultants) will explain the purpose of this project, its effects, the role of VCCs, and other aspects of this project to the VCCs.
Activity II-1: Train *Hakimiyat* staff.	- The Council of Ministers of Karakalpakstan (or consultants) will lecture mid-level staff in the economic department and the district department of MAWR on project planning, project management, participatory approaches etc.(half a day) - The Chamber of Commerce (or consultants) will lecture on agricultural marketing strategies, the current situation and its potential etc.(half a day)

Activity II-2: *Hakimiyat* staff train VCCs staff.	- The economic department, with the assistance of consultants, will lecture people involved with VCCs staff on project management, activity monitoring, and the preparation of necessary reports.(half a day) - The district department of MAWR, with the assistance of consultants, will lecture people involved with VCCs staff on agricultural marketing (half a day).
Activity III-1: Implement component 162.	- Program for "Strengthening of Women's Vegetable Production in *Tamarka*" begins.
Activity III-2: VCCs prepare and submit project progress reports.	- The staff of VCCs, with the assistance of consultants, will prepare monitoring and evaluation reports on vegetable project and submits them to the *Hakimiyat* (progress 1, progress 2, evaluation report).
Activity IV-1: Hold joint evaluation meetings.	- The economic department, with assistance of consultants, will hold joint evaluation meetings with the district department of MAWR, VCCs, project participant representatives and others. - VCCs will report evaluation results from the community perspective. - Representatives of project participants will report on results, problems, etc.

3) Implementation Organization

Implementation Agency: *Hakimiyat*, District Department of MAWR and VCC
Cooperation Agency: Council of Ministers of Karakalpakstan, Chamber of Commerce, Agricultural College and NGO

4) Implementation Schedule

The project will be implemented in 5 years from 2011 to 2015. The training and equipments supports to *Hakimiyat* offices will be only in the first year and the support to VCCs will be from the first to the 5th year. Target VCCs will be covered one per district per year. Totally, 55 VCCs will be supported in the target area of the 11 districts in the plan period.

Activities	Year									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Implementation										

Annual Implementation Schedule

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1: Install computer equipments												
2: Train the staff for *Hakimiyat* and VCCs												
3: Cropping period												
4: Prepare and submit progress reports by VCCs												
5: Joint evaluation meeting												

5) Necessary Input and Cost

Activity / Input	Cost (1,000 Sum)	
	Subtotal	Total
Community development expert	43,973	
Training for Hakimiyat officers	8,795	
Trainig for VCC officers	6,089	
Evaluation workshops	27,060	
Computer and printers, etc.	263,835	
Vehicle and fuel, etc.	93,358	443,110

6) Procedure and Consideration for Implementation

- The target VCCs for this project will be selected among those participating in "Strengthening of Women's Vegetable Production in *Tamarka*".
- Implementation of this project will be integrated with the "Project for Reinforcement of VCC Coordinating Abilities" as a model case of project management for "Strengthening of Women's Vegetable Production in *Tamarka*".
- Based on the policy background of promoting market-oriented agriculture, training for *Hakimiyat* staff will be involved in the marketing of agricultural product, added value in agricultural product, business management etc.
- VCC staff will be trained in methods for building consensus with residents and in participatory approaches for tasks such as identifying people's needs.

(2) Reinforcement of VCC Coordinating Abilities

1) Proposed Actions and Actors

Activities	Major actions and actors
Activity I-1: Select target VCCs.	- *Hakimiyat* will select a VCC from the beneficiary VCCs and *auls* for "341 Strengthening WUA and Enhancing its Activities" under consideration of the progress.
Activity I-2: Share information on this project with VCC residents.	With assistance of consultants, the *Hakimiyat* and district department of MAWR will explain the purpose and results of this project and the roles of the VCCs and expected results to the VCC residents.
Activity I-3: Setup initial groups within VCCs.	With assistance of consultants, the VCC chairman will set up the IG from active residents within the VCC and then discuss and decide the role of the IG.
Activity I-4: Use IGs to confirm community needs.	With the assistance of consultants, IGs will check the actual situation of vegetable production within the VCC and the needs of female *dehkans*.
Activity I-5: Use IGs to prepare the action plan for supporting project 162 by IG	With the assistance of consultants, IGs will draw up action plans for supporting vegetable project 162 by IG including the determination of a model *aul*, the location for setting up the model farm, and *dehkans* who will participate in vegetable project.
Activity II-1: Implement project 162	Vegetable project 162 will be started.
Activity II-2: Use IGs to assist demonstration farms.	With assistance of consultants, IGs will periodically monitor the circumstances of the demonstration farm and its neighboring *dehkans*, and provide assistance as needed.
Activity II-3: Use IGs to organize interchange meetings (with neighboring *dehkans*).	With assistance of consultants, IGs will organize interchange meetings (with neighboring *dehkans*).
Activity II-4 Use IGs to organize interchange meetings (with other *aul dehkans*)	With assistance of consultants, IGs will organize interchange meetings (other *aul dehkans*). IGs determine which *auls* will be participated the meetings, based on people needs.
Activity III-1: Monitoring and evaluation by IGs.	With assistance of consultants, IGs will make quarterly reports of the activities and an evaluation report at the end of September.

2) Implementation Organization

Implementation Agency: *Hakimiyat*, District Department of MAWR, VCC, NGO

3) Implementation Schedule

The program will be implemented in 5 years from 2011 to 2015 and supported a VCC per district per year. Totally, 55 VCCs will be reinforced in the target area of the 11 districts in the plan period.

Activities	Year									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Implementation										

Annual Implementation Schedule

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1:Setup IG												
2:Prepare the activity plan by IG												
3:Cropping period												
4:Support "women's vegetable production in *tamarka*" by IG												
5:Monitor "women's vegetable production in *tamarka*" by IG												

4) Necessary Input and Cost

Activity / Input	Cost (1,000 Sum)	
	Subtotal	Total
Community development expert	43,973	
Information workshop	27,060	
Training for VCC officers and IG	6,765	
Vehicle and Fuel, etc.	92,681	170,479

5) Procedure and Consideration for Implementation

- The VCCs covered by this project should match those with the "Strengthening of Women's Vegetable Production in *Tamarka*".

- This project will set up Initiative Groups (IG) within VCCs, in advance of the start of "Strengthening Women's Vegetable Production in Tamarka".
- The IG should clarify the role of the initiative groups, confirm women's needs related to vegetable production and draw up the action plan for supporting the "Strengthening Women's Vegetable Production in Tamarka" by IG.
- The basic activities of the action plan should include the selection of a model *aul* within the VCC, setting up a model tamarka farm within that *aul*, supporting a training seminar for female *dehkans* (around 20) and taking further action to extend the results to other *auls* in the VCC.
- The IG should support activities for extending the effects of the demonstration farm to other *auls*.
- The IG should evaluate the results of the activities and submit quarterly reports to the *Hakimiyat*, district department of MAWR.

6.3 Implementation of Action Plan for Regional Development in Karakalpakstan

6.3.1 Implementation Structure

(1) Institutional Arrangement

The Action Plan will be implemented under the overall supervision of the Council of Ministers of Karakalpakstan (CMK). The CMK will coordinate with the relevant government organizations of the Republic of Uzbekistan and establish a Steering Committee to discuss and decide necessary budgetary allocations and administrative / technical support. The actual implementation of the Action Plan will be carried out by individual implementing agencies with technical / administrative support of government organizations based on the orders of the CMK. Private / semi-private institutions such as Karakalpakstan Fermer's Association, Karakalpakstan Business incubator and relevant NGOs will also coordinate with the CMK to support for coordination with private organizations as well as cross sector activities.

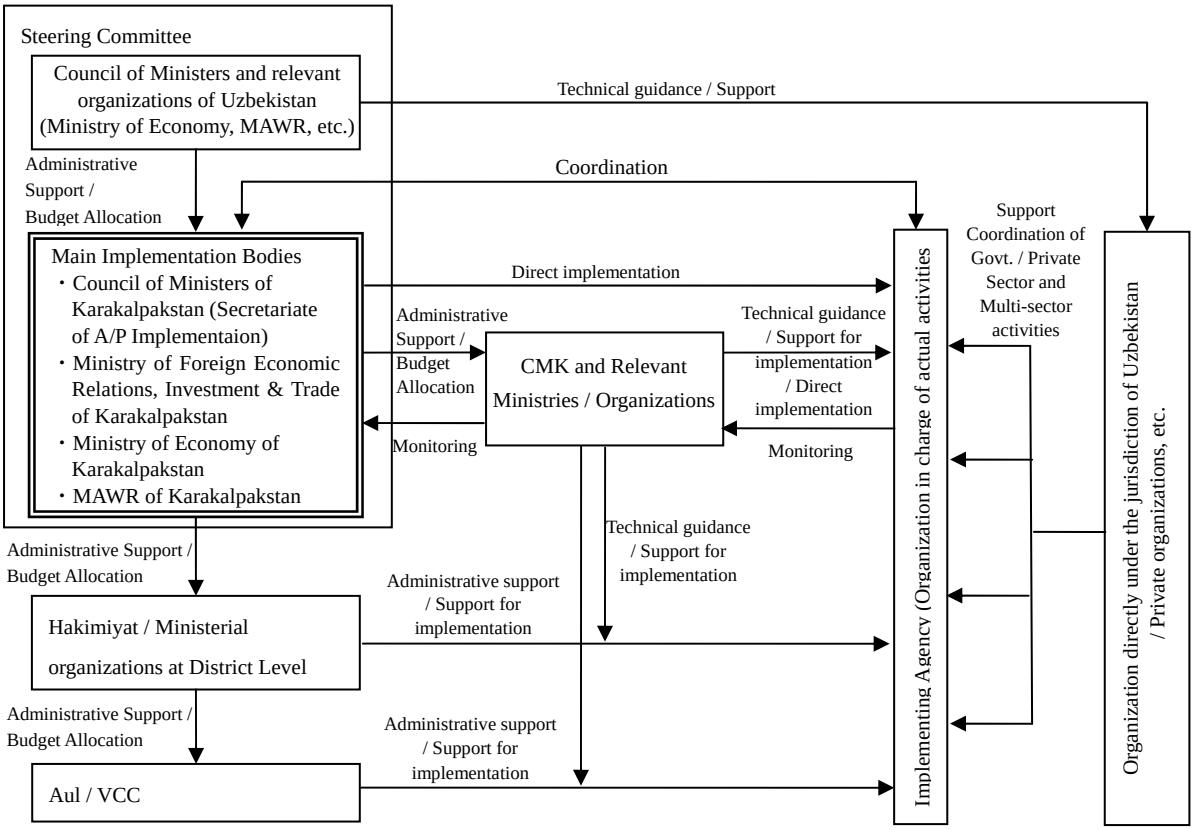


Fig. 6.3.1 Governmental Implementation Structure of the Action Plan

(2) Task Allocation among Stakeholders

As described in the previous sub-chapter 6.2, the Action Plan shall be implemented not only be Government, but also other actors such as framers, private enterprises, NGO/NPO, etc. The main actors for implementation, as well as executing government agencies ad supporters are identified and summarized in Table 6.3.1 (page 6-86).

6.3.2 Implementation Schedule

As stated S/W of the Study, the implementation period is between 2011 and 2020. Because of the Action Plan is at the master plan level, all component programs/projects require preparation activities such as confirmation of feasibility, detailed design and financial arrangement from 2011. After that the actual activities and/or construction will be started. Also the monitoring of the progress shall be continued up to the end of the program/project.

The implementation schedule of the Action Plan is summarized as shown in Fig. 6.3.2 (page 6-106).

6.4 Evaluation of Action Plan for Regional Development

6.4.1 Evaluation Method of the Action Plan

The evaluation of the Action Plan is conducted on the qualitative analysis applying DAC evaluation criteria, and the cost and benefit analysis. Also the environmental and social assessment is conducted.

6.4.2 Qualitative Analysis of Action Plan

Most of the programs / projects of the Action Plan can not obtain the quantitative outputs. After these outputs are combined, the quantitative outputs can be realized. Therefore, components of programs / projects are evaluated by qualitative analysis. The qualitative analysis applied by five viewpoints of DAC criteria that is based on five items, namely, “Relevance”, “Effectiveness”, “Efficiency”, “Impact” and “Sustainability”.

(1) Program / Project Relevance

The relevance of project has been examined in accordance with the following three factors:

a. Appropriateness of the Project (target, scale, approach)
b. Correspondence of objective and needs
c. Correspondence with development policy

Each program/project has been evaluated to be highly relevant as explained in Table 6.4.1 (page 6-88).

(2) Program/Project Effectiveness

a. Expected goal and outcomes
b. Contribution and obstruction towards effectiveness

Each program/project has been evaluated to be highly effective as explained in Table 6.4.2 (page 6-90).

(3) Program/Project Effeciency

The relevance of project has been examined in accordance with the following three factors:

a. Outcomes corresponding to investment of human (technical) and financial resources
b. Outcomes corresponding to executed activities (timing)

Each program/project has been evaluated to be highly efficient as explained in Table 6.4.3 (page 6-92).

(4) Program/Project Impact

The relevance of project has been examined in accordance with the following three factors:

a. Impact towards government policy
b. Impact towards society, implementing agency, beneficiaries, etc.
c. Impact towards technological innovation
d. Impact towards gender, human rights and poverty
e. Impact towards environmental protection
f. Impact towards the achievement of the overall goal

Each program/project has been evaluated to be high impacts as explained in Table 6.4.4 (page 6-94).

(5) Program/Project Sustainability

The relevance of project has been examined in accordance with the following three factors:

a. Sustainability of effect after the project
b. Analysis of political, economical, organizational, institutional aspects contributing to the effect of the project
c. Analysis of technical, socio-cultural, environmental aspects contributing to the effect of the project
d. Negative environmental impact that may defect the continuation of the activities
e. Obstructions that affect sustainability

Each program/project has been evaluated to be highly sustainable as explained in Table 6.4.5 (page 6-96).

6.4.3 Investment Costs of Action Plan

(1) Bases of Cost Estimate

Investment costs of programs/projects are estimated by the current price at Nukus in October 2010. Unit costs were obtained from counterparts and market research by the Study Team in Nukus and/or Tashkent in UZS (Uzbekistan sum) and converted in to US Dollars (USD).

Exchange rate applied at USD 1.00 = UZS 1,657 in January 2011 is applied.

Among estimation of the total investment cost, 10% of the project cost was applied for physical contingency.

(2) Total Investment Costs

The implementation cost of the Action Plan is approximately UZS 184.4 billion (equivalent to USD 111 million or 9.2 billion Japanese Yen Table 6.4.6, page 98), while the annual average cost is around 17 billion sum. These investment costs are composed with the Government routine and development budgets, bank credits for agriculture, livestock, investments of state/private enterprises and farmers. Furthermore, the special fund for renewal of agricultural tractors (section 6.2.2 (3)) holds around 33% (UZS 60.9 billion or UZS 55.4 million without physical contingency) of the total investment cost. This fund will be used for purchasing of agricultural tractors and then be repaid through lease fee of tractors.

(3) Annual Disbursement of Investment

Annual disbursement of the Investment cost has been estimated based on the implementation schedule of the Action Plan. Disbursement of the total Action Plan and individual programs and projects is indicated in Table 6.4.7 (page 6-100).

6.4.4 Benefit of the Action Plan

The Action Plan described in this Chapter indicates the contents and implementation procedures of the Master Plan for Regional Development in Karakalpakstan. The realization of the vision of the Master Plan "*People make a good livelihood through development of market oriented farm management and good use of tamarka (backyard farming), in consideration of regional management*" will benefit all people of the 11 districts in the Project Area in various ways. Each component of the Action Plan consists of measures to solve various issues raised in the sectors of agriculture, livestock and fisheries, which are the points of which have been analyzed in the Master Plan. Such measures are strongly related with each other. In consideration of estimating the benefit of the Implementation of the Action Plan, the above issues were taken into regard. As result, it has been considered that the increase of local agricultural production should be regarded as the net benefit of the Action Plan.

The implementation of the Action Plan will maintain the current level of cultivated area: 173,000ha (including 16,500ha of *Tamarka*). On the other hand, introduction of crop rotation and improvement of water and land management will increase the cropping intensity from 114% to 130%. Furthermore, aspects such as improvement of soil conditions through crop rotation, improvement of agriculture extension services, renewing agricultural machinery, improved access to agricultural inputs, and research on melons and apples, will further, contribute to increased production of those other that state controlled crops, and higher added value of such products. Stable supply of the irrigation water required to produce such crops is expected to be realized through improving the irrigation system and field level management. Production of fodder crops together with the introduction of crop rotation, introduction and production of silage, improvement of cattle breed by artificial insemination will contribute to the increased yield of milk. Taking into regard such factors, the agricultural land use and production at the year 2020, which is the target year of the Master Plan, has been assumed as follows:

Table 6.4.8 Cropped Area of Major Crops at the Target Year and Benchmark

(unit: ha)

Crops	Benchmark Year*			2020		
	Sub-Sector		Total	Sub-Sector		Total
	Fermer + others	*Dehkan*		Fermer + others	*Dehkan*	
Cotton	63,000	0	63,000	41,500	0	41,500
Wheat	45,000	5,000	50,000	27,700	5,000	32,700
Rice	23,000	0	23,000	23,000	0	23,000
Other Cereals (for food)	25,500	2,500	28,000	25,500	2,500	28,000
Fodder Crops & Green Manure	16,500	4,000	20,500	83,000	4,000	87,000
Melon & Gourd	2,600	1,300	3,900	2,600	1,300	3,900
Vegetables & Potatoes	2,700	2,900	5,600	2,700	2,900	5,600
Fruits	1,600	800	2,400	1,600	800	2,400
Grapes	60	240	300	60	240	300
Total Planted Area	179,960	16,740	196,700	207,660	16,740	224,400
Cropped Land	156,500	16,500	173,000	156,500	16,500	173,000
Crop intensity (%)	115.0	101.5	113.7	132.7	101.5	129.7

Note: *Data is processed based on statistical data of Karakalpakstan in 2006, due to unavailability of the latest data

Table 6.4.9 Incremental Benefit of the Action Plan (as of August 2020)

Commodity	Unit	Benchmark Year (2010)			2020			2020 - Present
		Production	Unit Value (Sum)	Total Value (thousand Sum)	Production	Unit Value (Sum)	Total Value (thousand Sum)	Total Value (thousand Sum)
Cotton	ton	103,500	785,000	81,247,500	83,000	785,000	65,155,000	-16,092,500
Wheat	ton	156,000	400,000	62,400,000	130,800	400,000	52,320,000	-10,080,000
Rice	ton	30,000	900,000	27,000,000	33,000	945,000	31,185,000	4,185,000
Other Cereals (for food)	ton	70,000	600,000	42,000,000	70,000	600,000	42,000,000	0
Melon & Gourd	ton	28,000	500,000	14,000,000	58,500	550,000	32,175,000	18,175,000
Vegetables & Potatoes	ton	58,700	600,000	35,220,000	67,200	630,000	42,336,000	7,116,000
Fruits	ton	9,000	1,000,000	9,000,000	10,000	1,050,000	10,500,000	1,500,000
Grapes	ton	1,355	900,000	1,219,500	1,355	945,000	1,280,475	60,975
Milk	000 lit	74,000	800,000	59,200,000	121,520	800,000	97,216,000	38,016,000
Animal Meat	ton	28,600	9,000,000	257,400,000	29,100	9,000,000	261,900,000	4,500,000
Egg	000 pc	18,700	230,000	4,301,000	18,700	230,000	4,301,000	0
Fish	ton	59,000	580	34,220	59,000	580	34,220	0
	Total	-	-	593,022,220	-	-	640,402,695	47,380,475

This assumption indicates that the annual amount of production (including livestock and fisheries), is expected to increase from UZS 567,687 million (US$ 343 million) in 2010 to UZS 611,049 million (US$ 369 million) in the Target Year 2020. The total incremental benefit during the period of 2011 to 2020 is approximately 166,632 million (US$ 101 million).

The incremental benefit of the Action Plan during the period of 2011 to 2020 slightly more than the total implementation cost without physical contingency

Table 6.4.10 Increase of Agricultural Production in the Study Area

(million UZS)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Total market Value without AP	593,249	593,249	593,249	593,249	593,249	593,249	593,249	593,249	593,249	593,249	
Total Market Value with AP	593,249	593,249	593,249	596,724	603,035	609,449	615,965	622,584	631,105	640,629	
Increment of Market Value	0	0	0	3,475	9,786	16,200	22,716	29,335	37,856	47,380	166,748

6.4.5 Economic Evaluation

Based on the estimations above, an indicative economic analysis for the overall programs and projects of the Action Plan has been conducted. The main assumptions for the economic analysis are as follows.

- Costs are expressed in constant prices in Late 2010 with implementation during the period of 2011 to 2020 and a project life of 20 years.
- The cost for procurement of tractors is excluded from the economic analysis in regard of its characteristics as a government fund.
- 10% of the cost for physical construction works for irrigation and drainage has been applied as operation and maintenance cost. Also, processing equipment shall be renewed every 10 years after installation.
- In reference to an economic analysis conducted for the Water Resources Management Sector Project[9], a standard conversion rate of 0.9 has been applied in order to convert the total investment cost into economic values. In addition, shadow price is not individually considered

[9] Report and Recommendation of the President to the Board of Directors, Republic of Uzbekistan: Water Resources Management Sector Project / Supplementary Appendix F: Financial and Economic Analysis, ADB, December 2008

Based on the above assumptions, EIRR of the Action Plan is estimated to be 32% (Table 6.4.11, page 6-100). Furthermore, sensitivity analysis with fluctuation in cost and benefit also indicated that the Action Plan is economically viable under considerably negative conditions.

		Benefit Decrease		
		0%	10%	20%
Cost Increase	+0%	32%	29%	26%
	+10%	30%	27%	24%
	+20%	27%	24%	21%
	+30%	25%	22%	19%

6.4.6 Environmental and Social Considerations

(1) Application of State Environmental Examination to Activities of the Action Plan

Under the Law on State Environmental Examination (May 25, 2000) and Resolution of the Cabinet of Ministers of the Republic of Uzbekistan on State Environmental Examination (December 31, 2001), certain development projects are obligated to go through State Environmental Examination (which can be referred to as the process for Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA)).

The Master Plan on Regional Development in Karakalpakstan is regarded as a regional development plan, thus not corresponding to the process for National programs / concepts / schemes of allocation and development of production forces, fields of economy and social sphere, as described in section 2.12.3. However, individual activities to of the Master Plan, particularly those concerning production facilities, may be obliged to go through the process of State Environmental Examination at the time of feasibility study / designing stage.

The activities of the Master Plan that may correspond to such development at this point are as follows. However, it must be noted that application of the above legislation will differ depending on the size and component of the programs/projects, as well as possible revisions of the legislation itself. In this regard, the necessity of State Environmental Examination should be re-examined and procedures should be followed at the time of actual programs/projects implementation.

Table 6.4.12 Components of the Master Plan and Possible Application of State Environmental Examination

Activities	Possible Application of Environmental Examination
Promotion of Renewal of Agricultural Tractors	N.A.
Improvement of accessibility to agricultural inputs for agricultural producers	N.A.
Improvement of Agricultural Extension Service to *fermer*	N.A.
Research and development of melons and apple	Development of new field may fall under Category II or III
Strengthening of Women's Vegetable Production in *Tamarka*	N.A.
Fodder Production	Production of mixed forage may fall under Category III
Artificial Insemination and Veterinary Services	Construction of veterinary clinics may fall under Category IV
Training Program on Animal Husbandry	N.A.
Sustainable Fishery Promotion	N.A.
Aquaculture Development	Development of fish farms may fall under Category III
Improving Internal Canal System	Reconstruction and meliorative improvement of irrigated lands may fall under Category II, III of IV
Strengthening Water Management in the Field	Reconstruction and meliorative improvement of irrigated lands may fall under Category II, III of IV
Promoting Water Saving Technology	N.A.
Improving Drainage Conditions in the Field	Reconstruction and meliorative improvement of irrigated lands may fall under Category II, III of IV
Strengthening WUA and Enhancing Its Activity	Reconstruction and meliorative improvement of irrigated lands may fall under Category II, III of IV

Joint marketing by farmer group (Model Agro-firm establishment)	N.A.
Improvement of Marketing Support Infrastructure	May fall under category III if refrigerator capacity exceeds 50 tons
Small scale slaughterhouse	Meet processing may fall under Category III
Improvement of Small Scale Agro-Processing Technologies	Milk processing may fall under Category II, while vegetable processing may fall under Category III
Improvement of food safety technologies	N.A.
Strengthening of Communication for Local Agricultural Administration	N.A.
Reinforcement of VCC Coordinating Abilities	N.A.

* N.A. : Not expected to be Applied

(2) Environmental and Social Considerations for the Master Plan and Action Plan under the JICA Guidelines

The nature of the Master Plan is oriented towards capacity building of *fermers*, *dehkans* and other relevant organizations. There are few programs / projects involving construction of new facilities, each are also with a limited scale. In this regard, the negative environmental and social impacts that may be induced by the implementation of the Master Plan are expected to be generally small.

1) Expected Negative Impact and Mitigation Measures

Out of the 22 programs / projects incorporated in the Master Plan, 4 were found to have considerable levels of potential negative impact. Besides these, 9 were found to have potential negative impact, but at limited levels. The expected negative impact and possible measures for mitigation are indicated in Tables 6.4.13 and 6.4.14 (pages 6-101 and 103).

2) Alternatives for Implementation

From the viewpoint of environmental and social consideration, the following three alternatives were examined as possible alternatives for the implementation of the Master Plan

- Implementation of all activities of the Master Plan (Full Implementation)
- Implementation of activities expected to have no negative environmental or social impact (Partial Implementation)
- No implementation of the Master Plan

Full Implementation of the Master Plan

Thought in limited scale, implementation of the Master Plan is expected to bare negative environmental and social impacts. Considerable negative impact is expected for Air pollution, Noise and Vibration, Water Pollution, Waste and Offensive Odor. However, the activities causing these activities will be implemented in small scale and the impact is expected to be limited in magnitude and spatial distribution. On the other side, there are uncertainties with the potential of becoming significant environmental / social issues depending on the location and detail design of the programs/projects. Such uncertainties may bare impact on issues such as Air Pollution, Water Pollution, Soil Pollution, Hazards (Risk) Infectious Diseases, Flora, Fauna and Biodiversity, Offensive Odor, and Local Economy such as Employment and Livelihood. Most of these impacts are expected to be avoidable or can be alleviated to a certain level with due attention and necessary mitigation measures. In this regard, full implementation of the Master Plan, in premise that necessary mitigation measures are taken, can be an acceptable option from the viewpoint of environmental and social considerations.

Partial Implementation of the Master Plan

In order to avoid negative impact to the environment and society, one possible option is to exclude activities with potentials for negative impacts. This may be done by excluding activities that are expected to have considerable / moderate negative impact, or by excluding all activities of which potentials for

negative impacts were identified. In either way, the environmental social risks will be alleviated. However, the activities that are expected to bear negative impact occur to be those directly related to enhancement of agricultural production and value adding to such products (e.g. artificial insemination, aquaculture development, slaughter house, improvement of agro-processing technologies, etc.). In regard that enhancement of production and market oriented practices in the Project Area is essential for the regional development of Karakalpakstan, exclusion of such activities are regarded to be irrational.

No Implementation of the Master Plan

From the viewpoint of environmental and social considerations, no implementation of the Master Plan may be one of the possible options. However, in view of the necessity for livelihood improvement in the area and the importance of agriculture in the regional economic and social structure, agricultural development is a critical issue that should be coped with. In this regard, it is unpractical to eliminate the options of implementing the Master Plan. Activities for agricultural development shall be implemented in due consideration of environmental and social aspects.

Taking into regard the above considerations and the necessity to realize sustainable development through market oriented agriculture, Full Implementation of the Master Plan with necessary mitigation measures is regarded to be the optimal alternative for regional development of Karakalpakstan.

(3) Categorization under JICA Guidelines for Environmental and Social Considerations

The result of Environmental and Social Scoping, which has been prepared through the Study, has been examined under by the JICA headquarters under the JICA Guidelines for Environmental and Social Considerations. In conclusion, this Study has been categorized under Category C, which is applied to projects that are expected to have minimal negative impact. The reasons for this categorization were as follows:

- Negative impact to Environmental and Social Aspects are regarded to be Minor.
- Pilot Projects are implemented in considerably small scale.

Based on this decision, the Study does not require further measures for Environmental and Social Considerations.

6.4.7 Overall Evaluation of the Master Plan and Action Plan

Implementation of the Master Plan will directly benefit the 3,000 *fermer* farms and 11,500 *dehkans* households in the Target Area through enhanced market oriented agricultural activities including livestock and fisheries. Marketing of value added products will also be strengthened, and products will be sold in both improved quantity and quality, thus resulting in improved farm household economy of the beneficiaries. With the agriculture sector holding 33% of the labor force and 45% of the GRP, the enhanced economic activities of the farm households is also expected to have a ripple effect on the economy of the whole republic of Karakalpakstan.

The Master Plan will be implemented through the realization of individual components of the Action Plan. These components are regarded to be viable from the viewpoints of relevance, effectiveness, efficiency, impact and sustainability.

The EIRR of the Action Plan as a whole shows 32% and is evaluated to be economically feasible. Moreover, with necessary mitigation measures, negative impact to the environment and society is regarded to be acceptable.

Taking into regard the above, the realization of the Master Plan through the Action Plan is evaluated to be highly effective in order to realize the development of market oriented farm management and good use of tamarka, and to contribute to the improvement of livelihood of the people living in the Target Area.

Table 6.1.1 Development Framework of Regional Development in Karakalpakstan (1/2)

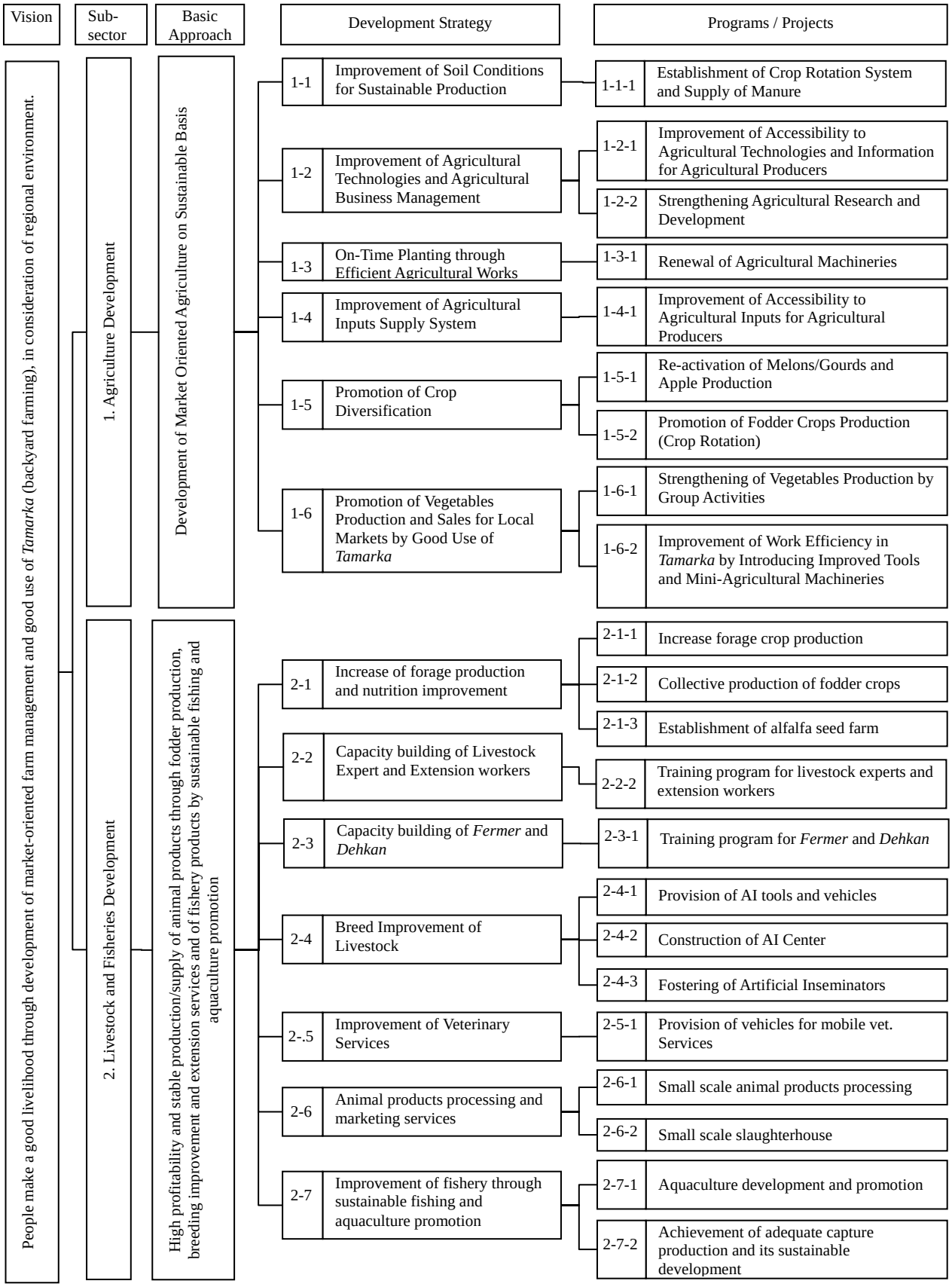


Table 6.1.1 Development Framework of Regional Development in Karakalpakstan (2/2)

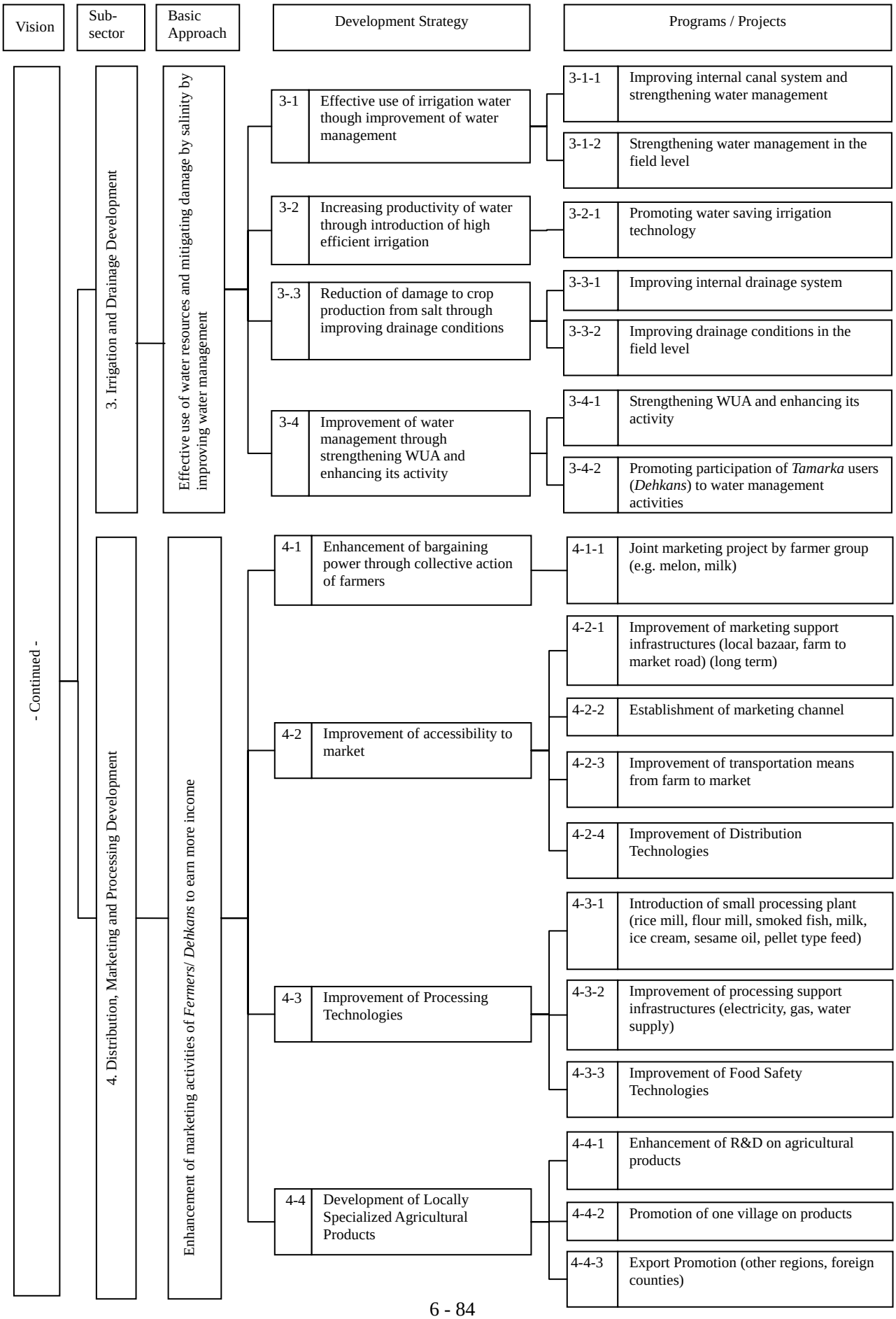
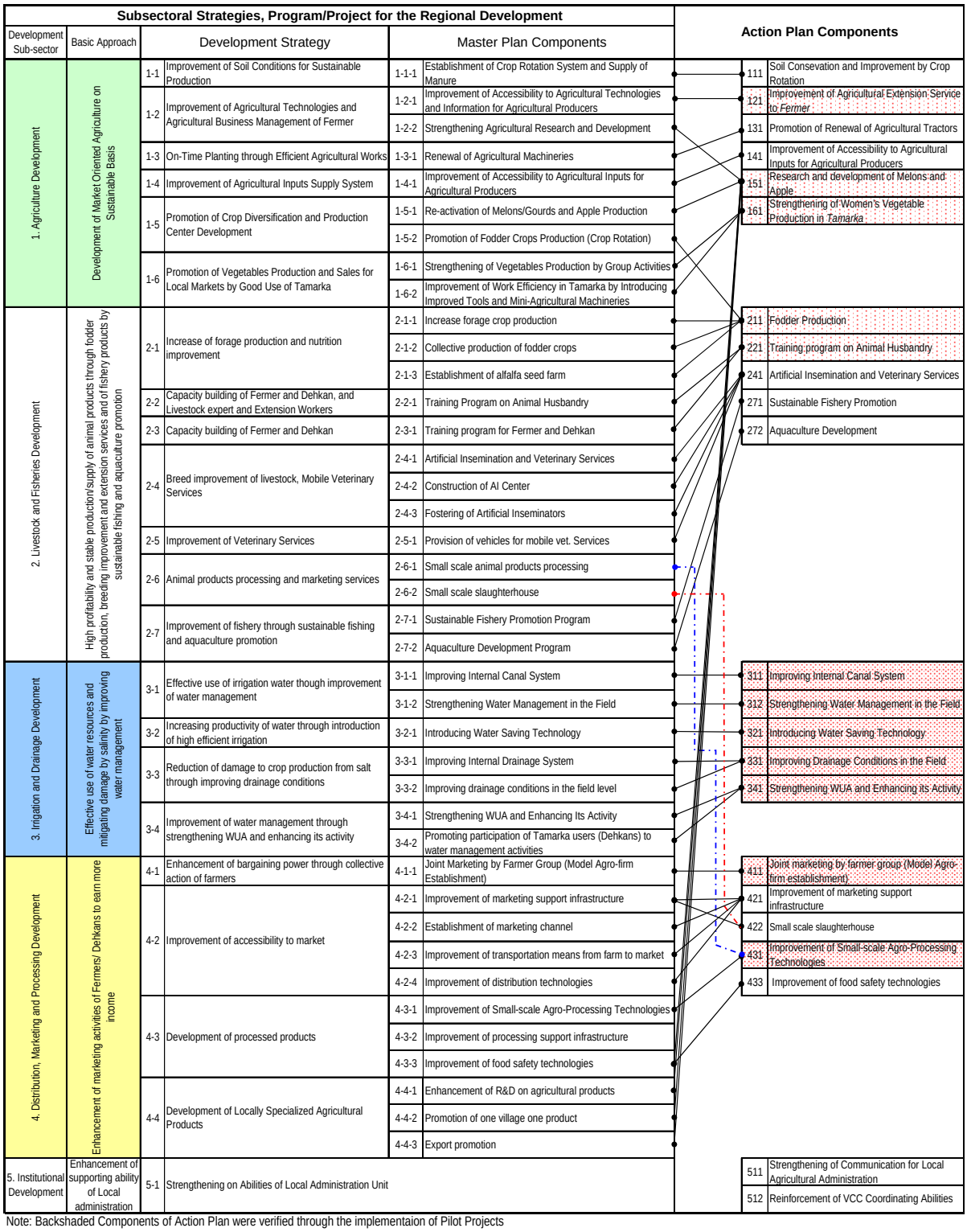


Table 6.2.1 Comparison of Master Plan and Action Plan Components



Note: Backshaded Components of Action Plan were verified through the implementaion of Pilot Projects

Table 6.3.1 Task Allocation for the Implementation of the Action Plan (1/2)

No.	Program/Project	Activities	Government						Public Organizations / Institutions												Private / State Companies / NGOs															
			Council of Ministers of Karakalpakstan	MAWR of Karakalpakstan	Lower Amudarya Basin Management	Other Ministries and agencies (MOE, MOF, MOFECI&T, Department of Vocational - Higher Education, Government	Hakimiyat / District Offices	VCC / Aul / Veterinary Points	Chamber of Commerce	Irrigation System Department	Karakalpakstan MTP Union	Individual MTPs	District WUA	Nukus Branch of Tashkent State University of Agriculture / Agriculture	District Agricultural Colleges	SANIIRI	Karakalpakstan Normative Research	Uzbekistan Scientific Center for Agriculture in Karakalpakstan	Bank/Credit Organizations	Other Research Institutes	District Central Bazar / District Central Bazar Association	Project Institutes	State Enterprise for Meliorative Works	Agricultural Machinery Leasing Company	Uzselhozhimiya (Uzbekistan Agricultural Chemical Co.) Karakalpakstan	Frozen Semen Company in Tashkent	Uz Standard / Milk and Meat Accosiation of Uzbekistan	Karakalpakstan Business Incubator	Karakalpakstan Fermers Association	Fishery Association	WUA	Agro Firm	dehkan	fermer	Private fishery bodies	NGO / Consultants
111	Soil Conservation and Improvement of Crop Rotation	Confirmation of Soil Survey		□			○													○																
		Development of a comprehensive Program	□	■										○				○																		
		Arrangements with the Government of Uzbekistan	□	○																																
		Research on alternative crops		□										■				■																		
		Expansion of farmland under crop rotation	□	○			○																										■	■		
121	Improvement of Agricultural Extension Service to Fermer	To organize and manage a committee to develop agricultural technical manuals	□	■										○			○	○		○									○							
		To edit and print the manuals	○	□										○	○		■	○																		
		To provide the manuals		□			■	○						○			○																			
		To train teachers of district agricultural collages	○	□		■	○	○						■	○		○																			
		To organize technical seminar for fermers	□	○		■	○	○							○		○																			
		To provide agricultural extension services	○	□			○	○							■																					
131	Promotion of Renewal of Agricultural Tractors	Implementation of the tractor lease scheme	○	□							○	○												■					○							
		Planning of MTPs' workshop improvement	○	□							■	○																								
		Facility renovation and equipment procurement	○	○							□	■																								
		Training of MTP mechanical staff	○	○							□	■																								
141	Improvement of Accessibility to Agricultural Inputs for Agricultural Producers	Contracting with producers and/or sales agents of seeds, fertilizers and pesticides/ herbicides	○	○			○											○							■				○							
		Renovation of existing outlet stores to be suitable for the "One-Stop Agro-inputs Shops"		○			○																		■											
		Establishment of "One-Stop Agro-inputs Shops"	○	○			○																		■											
		Consultation services to "One-Stop Agro-inputs Shops"		○			○																		■											
151	Research and Development of Melons and Apple	To establish a trial and demonstration field and facilities		○														□																		
		To study and research recommended varieties and		○														□																		
		To provide production technologies		○														□																		
		To produce and distribute melon seeds		○														□																		
		To cultivate mother plants of apple		○														□																		
		To provide apple scions		○														□																		
161	Strengthening of Women's Vegetable Production in Tamarka	Selection of target VCC		○			□	○																												■
		Set up of model tamarka		○			□	○																												■
		Technical support		○			□	○							○																					■
		Extension and interchange of information		○			□	○							○																					■
211	Fodder Production and Promotion of Livestock	Alfalfa seed production center at SCA in Chimbay		□														■											○							
		Silage production		□			○											○											○					■		
		Collective fodder production		□			○											○											○				■			
		Rotational production of crops and fodder (alfalfa)		□			○											○											○					■		
221	Artificial Insemination and Veterinary Services	Establishement of artificial insemination center		□																		■				○										
		Fostering artificial inseminators		□										○												○										
		Provision of AI tools and vehicles		□																																
		Provision of vehicles with vet. Intrument for mobile		□																																
261	Training Programs on Animal Husbandry	Training program for femermers and dehkans		□			○							○	■					○																
		Training program for livestock		□			○							■	○					○									○							
271	Sustainable Fishery Promotion	Rehabilitation of Association		□																										■						○
		Improvement of financial system		□																										■						○
		Seed production		□																										■						○
		Seed distribution and verification of effectiveness		□		○														○										■						○
		Setting appropriate capture		□		○														○										■						○
		Opening new water area		□		○																								■						○
272	Aquaculture Development	Staff training		□																										■						
		Arrangement of support system for aquaculture promotion		□																										■						
		Extension and publicity		□																										■						
		Implementation of model production		□																○										■					■	○
		Making of manual and promotion		□																○										■						○
311	Improving Internal Canal System	Establishing the special fund and preparation, formulating technical guidance			□	■				■																										
		Preparing the improvement plan, application and approval			□		○			■			○																		■					
		Investigation, survey and design			□																	○									■					
		Cleaning and digging canal, repair and installation of gate and water measurement facilities			□					○												○	○								■					
312	Strengthening Water Management in the Field	Revision of WUA's regulation and public relations, standardizing specification of division box								□																					■					
		Installation of division box at the intake of farm								□																					■					
		Measurement of water amount distributed to farms								□																					■					
		Technical seminar on irrigation planning and water use			○		○			□			○			○															○					

Table 6.3.1 Task Allocation for the Implementation of the Action Plan (2/2)

No.	Program/Project	Activities	Government						Public Organizations / Institutions												Private / State Companies / NGOs															
			Council of Ministers of Karakalpakstan	MAWR of Karakalpakstan	Lower Amudarya Basin Management	Other Ministries and agencies (MOE, MOF, MOFECI&T, Department of Vocational – Higher Education, Government	Hakimiyat / District Offices	VCC / Aul / Veterinary Points	Chamber of Commerce	Irrigation System Department	Karakalpakstan MTP Union	Individual MTPs	District WUA	Nukus Branch of Tashkent State University of Agriculture / Agiculture	District Agricultural Colleges	SANIIRI	Karakalpakstan Normative Research	Uzbekistan Scientific Center for Agriculture in Karakalpakstan	Bank/Credit Organizations	Other Research Institutes	District Central Bazar / District Central Bazar Association	Project Institutes	State Enterprise for Meliorative Works	Agricultural Machinery Leasing Company	Uzselhozhimiya (Uzbekistan Agricultural Chemical Co.) Karakalpakstan	Frozen Semen Company in Tashkent	Uz Standard / Milk and Meat Accosiation of Uzbekistan	Karakalpakstan Business Incubator	Karakalpakstan Fermers Association	Fishery Association	WUA	Agro Firm	dehkan	fermer	Private fishery bodies	NGO / Consultants
321	Introducing Water Saving Technology	Preparation of overall plan		○	□											■																				
		Setting up priority 3 model farms and operation		○	□		○			■			○			■															○			○		
		Setting up remaining 7 model farms		○	□		○			■			○			■															○			○		
		Extension using model farm		○	□		○			■						■															○			○		
		Setting up consultation desk to fermers on technical and materials for water saving technology		○	□		○			■																										
		Research and development of water saving technology and necessary materials			□											■																				
		Preparation of seminar text and materials for extension			□											■																				
331	Improving Drainage Conditions in the Field	Preparation of machinery for drainagae improvement in the field								□													■								■					
		Implementation of land leveling by fermers								□													○								○			■		
		Preparation of credit for drainage improvement in the field					○			□									■																	
		Research and developemnt on effective leaching technology		○						□						■																				
341	Strengthening WUA and Enhancing Its Activity	Appointing necessary field staff of WUA								□																					■					
		Support of ISD to dispatch staffs								□																										
		Equipping Personal Computer to								□			○																							
		Technical and administrative training for WUA staffs								□			○																							
		Equipping transportation for water management activity								□			○																							
		Formulating annual maintenance plan by WUA			□					○																					■					
		Formulating mid/long term maintenance plan by WUA			□					○																					■					
		Arranging inventory and technical information on canal system			□					○																					■					
		Equipping mini-excavator to WUA			□																															
		Providing spare parts and maintenance service to WUA's			□					■		■											■													
		Renting machinery and providing machinery service to WUA			□					○													○								■					
		Preparing supply system of parts and materials for hydraulic structure			□					■																										
		Activating WUA's communication and coordination for collective works of maintenance			□																										■					
		Improving water fee system			□																										■					
		Providing consultation to WUA on accounting, tax management and legal issues			□		○			○																					■					
		Propaganda and enlighten campaign to members			□					○																					■					
		Promoting tamarka user's participation to water management activity through VCC						□																							■					
411	Joint Marketing by Farmer Group (Model Agro-firm Establishment)	Establishment of Working Group	□	○		○	○								○			○										■								
		Focus Group Discussion					□								○													■				■		○		○
		Business Planning					□								○													■				■		○		○
		Products Development					□								○													■				■		○		○
		Marketing					□								○													■				■		○		○
		Establishment of New 3 Agro-firms		○		○	□								○			○										■								
		Establishment of New 3 Agro-firms		○		○	□								○			○										■								
		Establishment of New 4 Agro-firms		○		○	□								○			○										■								
421	Improvement of Marketing Support Infrastructure	Holding stakeholder meeting to formulate market improvement master plan				○	□														○															
		Improvement of Major 4 Defkan Bazaar				○	□														■															
		2nd phase: Improvement of additional 3 Dehkan Bazaar				○	□														■															
		3rd phase: Improvement of additional 3 Dehkan Bazaar				○	□														■															
422	Small-scale Slaughterhouse	Costruction of Small Scale Slaughter House		□			○															■														
423	Improvement on Small-scale Agro-processing Technologies	Confirmation of disincentive factors on initial operation (Pilot project)		□		○			○					○						○							○	■	■							○
		Research and development of small-scale agro-processing		□										■						○							○									
		Trainijg of experts and policy making	○	□			○																					■	■							○
		Credit facilitation and procurement of equipment	○	□															○									■	■							
		Minimum improvement of insrastructure	○	□			■																					○	○							
433	Improvement of Food Safety Technologies	Review of food safety standard		□		○	○														■															○
		Integration of control system of perishable food		□		○	○														■															○
		Capacity Building of VSE		□		○	○														■															○
		Promotion of enlightenment		□		○	○														■															○
511	Enhancement of Communication for Local Agriculture	Implementation	○				□	○	○						○																					■
512	Reinforcement of VCC Coordinating Abilities	Implementation	○				□	○	○						○																					■

□ : Executing Government Avency
■ : Main Actor for Implementation
○ : Supporting Agency / Organization

Table 6.4.1 Action Plan Evaluation by DAC Criteria: Relevance

Criteria for Evaluation

a. Appropriateness of the Project (target, scale, approach)
b. Correspondence of objective and needs
c. Correspondence with development policy

	Program/Project	Item	Relevance
1	Soil conservation and improvement by crop rotation	a	Target is *fermers* who are at the core of agricultural production in Uzbekistan
		b	*Fermers* need a proper soil conservation measure in order to enjoy stable crop production
		c	WISP prioritizes using improved agricultural practices in order to enhance the yield of crop
2	Promotion of renovation of agricultural machineries	a	Number of tractors to be supplied fills a gap between the supply of present leasing system and the potential demand
		b	Many *fermers* complain difficulty of planting crops on time due to shortage of tractors
		c	Since farmland under management of one *fermer* becomes bigger due to the land optimization policy, individual use of tractor is more practical than the collective use
3	Improvement of accessibility to agricultural inputs	a	Productivity of crops other than state controlled crops, cotton and wheat, is expected to improve due to increased use of agricultural inputs (seeds, chemical fertilizers and agricultural chemicals)
		b	Crop growers have difficulty in getting the agricultural inputs for crops other than cotton and wheat
		c	WISP prioritizes gradual introduction of cash crops with higher yields
4	Enhancement of technical extension of agricultural production	a	Target is *fermers* who are at the core of agricultural production in Uzbekistan
		b	*Fermers* need capacity building in order to improve agricultural productivity
		c	The Government focuses on *fermers'* training
5	Re-activation of melons/gourds and apple production	a	Melon/gourd and apple could be popular and their productivity could improve, through increased capability of the agricultural research center
		b	Though the crops are relatively popular, improvement of management technology is necessary for developing a production center
		c	WISP prioritizes gradual introduction of cash crops with higher yields
6	Strengthening of women's vegetable production in tamarka	a	Target is *dehkans* who are social vulnerable in general
		b	*Dehkans* need increased harvest from *tamarka* in order to improve their livelihood
		c	A government policy promotes effective use of *tamarka*
7	Fodder production	a	Target is *fermers* and *dehkans*, and almost of them grows cows or cattle
		b	Stable secure of forage and introduction of improved variety are common need of the growers
		c	The government livestock development policy focuses on strengthening of fodder production and improved variety of cows/cattle
8	Artificial insemination and veterinary services	a	Target is concerned agencies, mainly in Veterinary Department of MAWR of Karakalpakstan, to AI of cows/cattle
		b	Increased number of AI equipment and vehicles, fostering of artificial inseminators and improved veterinary services are needed in order to increase AI %
		c	The government livestock development policy focuses on improved variety of cows/cattle and strengthening of veterinary services
9	Training program on animal husbandry	a	Target is *fermers* and *dehkans*, as well as livestock experts
		b	*Fermers* and *dehkans* have insufficient knowledge on animal husbandry. Even livestock experts need to improve knowledge on animal husbandry, since they work mainly for veterinary services
10	Sustainable Fishery Promotion	a, b	Fish supply in Karakalpakstan has been remaining in low level despite its potential of demand.
		b	Target group of the program is private fishery company including fishery *fermers*, who are rented natural water body in long term contract.
		c	Regarding the capture fishery operated by above target group, sustainable and effective fishery practice under the appropriate resource management is required to be fulfilled.
11	Aquaculture Development	a, b	Fish supply in Karakalpakstan has been remaining in low level despite its potential of demand.
		a, b	Development of extensive fish culture by utilizing available water resource is possible to introduce considering the potential of fish demand.
12	Improving Internal Canal System	a, b,	To fulfill and maintain the adequate function of internal canal system meets the needs of farmers and regional society that requires effective use of water and stable water supply for irrigation.
		b	WUA, who is responsible for internal canal system, does not have adequate financial and technical capacity for implementing rehabilitation of the system by them, and external support is indispensable.
13	Strengthening Water Management in the Field	a, b	To realize effective use of irrigation water meets the needs of farmers and regional society that requires effective use of water and stable water supply for irrigation.
		b	Improvement of water management in the field contributes to realizing effective use of water through fulfilling efficient water use in the field.
14	Introducing Water Saving Technology	a, b	To realize effective use of irrigation water meets the needs of farmers and regional society that requires effective use of water and stable water supply for irrigation.
		b	To introduce water saving technology contributes to stabilize and increase the agricultural production through effective use of water resource which is strictly limited in the region.

15	Improving Drainage Conditions in the Field	a, b	To improve drainage conditions in the field meets the needs of farmers and regional society that is to maintain and/or increase productivity of agricultural land.
		c	It is required to fulfill drainage improvement in the field level in order to bring out full effect of the NDIP, which targets inter-district and internal collectors.
16	Strengthening WUA and Enhancing Its Activity	a, b	To realize effective use of irrigation water meets the needs of farmers and regional society that requires effective use of water and stable water supply for irrigation.
		b	It is essential to strengthening WUA and enchasing its activity, which is responsible for internal canal system, in order to improve water management in the irrigation system as well as to maintain the system fulfilling the function.
17	Joint Marketing by Farmer Group	a	Target are *fermers* producing vegetable and fruits, together with *dehkans* who are interested to participating in the Agro-firm
		b	*Fermers* producing vegetable and fruits have little support from the government, and requires measures that will enhance their income.
		b	*Fermers* producing vegetable and fruits generally practice in small scale, and therefore have weak bargaining power
		c	Establishment of Agro-firms is encouraged by the government as a part of its agriculture reform.
18	Improved Marketing Support Infrastructure	a	Target are the four major markets of Karakalpakstan; Nukus, Kungrad, Khodjeyli and Chimbay.
		b	Social factors such as unemployment and late delivery of salary accelerate the increase of petty dealers in the markets. With this increasing trend, securing hygienic conditions of fresh food is important.
		c	The reforms of district central bazaars are planned based on the Uzbekistan Presidential Decree No 330, enacted in 2007.
19	Small Scale Slaughterhouse	a	Target are the four major markets of Karakalpakstan; Nukus, Kungrad, Khodjeyli and Chimbay.
		b	Most slaughtering is currently being done in individual farms which obstruct appropriate inspection by the Veterinary and Sanitary officers.
		b	The only operating slaughterhouse does not have a cool storage facility, and sanitary conditions must be improved
		c	The activity will be implemented together with “Improved Marketing Support Infrastructure” and “Improvement of Food Safety Technologies”, and will contribute to improving the food safety conditions of Karakalpakstan.
20	Improvement of Small Scale Agro-Processing Technologies	a	Target are *fermers* producing vegetable and fruits, together with *dehkans* who are interested to participating in the Agro-firm
		b	*Fermers* producing vegetable and fruits have little support from the government, and requires measures that will enhance their income.
		b	*Fermers* producing vegetable and fruits generally practice in small scale, and therefore have weak bargaining power
		c	Establishment of Agro-firms is encouraged by the government as a part of its agriculture reform.
21	Improvement of Food Safety Technologies	a.	Target are the four major markets of Karakalpakstan; Nukus, Kungrad, Khodjeyli and Chimbay.
		b.	Sanitary control regarding sales of agricultural products is not necessarily sufficient in Karakalpakstan. Value should be added to agricultural products by securing its food safety conditions
22	Strengthening of Communication for Local Agricultural Administration	a	Target are local officials of *Hakimiyat* and VCCs
		b	Strengthening of Communication for Local Agricultural Administration is required in order to facilitate the implementation of the Action Plan
23	Reinforcement of VCC Coordinating Abilities	a	Target are VCC officials and women participating in VCC “Strengthening of women’s vegetable production in tamarka”
		b	Reinforcement of VCC Coordinating Abilities is required in order to facilitate the implementation of the Action Plan

Table 6.4.2 Action Plan Evaluation by DAC Criteria: Effectiveness

Criteria for Evaluation

a. Expected goal and outcomes

b. Contribution and obstruction towards effectiveness

	Program/Project	Item	Effectiveness
1	Soil conservation and improvement by crop rotation	a.	Crop productivity would improve through realization of sustainable soil improvement
		a.	Number of cows/cattle would increase through increased supply of fodder
		b.	A great influence of the government on farm management of *fermers*
2	Promotion of renovation of agricultural machineries	a.	Shortage of tractors would be settled after increased number of new or good conditioned tractors
		b.	Price of cotton, wheat and other crops hovers over the favorable level on which the growers can expect a reasonable profit to introduce tractors
3	Improvement of accessibility to agricultural inputs	a.	Productivity of crops other than cotton and wheat would improve through increased use of agricultural inputs
		b.	The government policy to liberalize market of agricultural inputs
4	Enhancement of technical extension of agricultural production	a.	Crop productivity would improve through improved crop management technology of each individual *fermer*
		b.	The government's commitment to *fermer* trainings and incentives given to agricultural college teachers
5	Re-activation of melons/gourds and apple production	a.	Outputs of the research would reach to growers in terms of continuous provision of improved crop management technology and improved seeds/seedlings
		b.	Strategic commitment of the government to the strengthening of agricultural research
6	Strengthening of women's vegetable production in tamarka	a.	*Dehkans*' livelihood would improve through the increased productivity of *tamarka*
		b.	A proper Irrigation water supply to *tamarka*
7	Fodder production	a.	Milk production would increase through the stable increase of fodder production
		b.	Provision of enough farmland for fodder production and active participation of *dehkans* to collective fodder production
8	Artificial insemination and veterinary services	a.	Improved variety of cows/cattle would be popular through increased % of AI
		b.	Proper budget allocation of the government to AI programs
9	Training program on animal husbandry	a.	Capability of livestock growers, *fermers* and *dehkans* would increase after the trainings
		b.	The government's commitment to strengthening of trainings on animal husbandry
10	Sustainable Fishery Promotion	a	Sustainable use of fishery resources is realized by appropriate administration and management of fishery activity.
		b	Private fishery bodies are activated their activity owing to the support by enhanced Fishery Association.
11	Aquaculture Development	a	Basic structure for t and promotion in the study area is established by strengthening the system of Fishery Association for aquaculture promotion.
		a	Environment for future aquaculture promotion is developed by realizing experimental production activity to propose a model of adequate aquaculture system.
12	Improving Internal Canal System	a	Improvement of internal canal system enables WUA to operate the system with small human power even in the large coverage and enables to control the water distribution by small block.
		b	Increase of irrigation water use efficiency is expected owing to improving the water delivery operation of WUA.
		b	Through the Verification Study, it was confirmed that WUA and members (water users) were able to operate the improved irrigation system properly so as to improve water management.
13	Strengthening Water Management in the Field	a	By showing the delivered water amount by farms clearly, proper operation of water distribution is enabled.
		b	By showing the delivered water amount by farms clearly, an awareness of WUA members on effective water use, a sense of fairness on the water distribution and a sense of reliance to WUA's activity are raised up.
		a	By intruding land leveling and improving water use in the field, the efficiency of irrigation water use increases. At the same time, the time for one watering is reduced, so that flexible watering can be applied.
14	Introducing Water Saving Technology	a	Introducing water saving technology by farmers in their field contributes to increase the efficiently of irrigation water use.
		a	Demonstration activity in the model farm is effective to extend new technology to farmers.
		a	The increase of water use efficiency is realized through the combination of the improvement of water management in the irrigation system and the one in the field level.
15	Improving Drainage Conditions in the Field	a	By developing the environment which makes farmers positive to invest land leveling, such as providing technical support, supply of material, renting construction machinery, preparing the credit system, it is expected that land leveling is fulfilled by farmers.
		a	Increase of water use efficiency and increase of productivity are expected by improving drainage conditions in the field and enforcement of optimum watering in leaching.
		b	It is expected to raise up farmer's drive to invest for farm land improvement by demonstration and instruction of new technology at model farms.

16	Strengthening WUA and Enhancing Its Activity	b	By implementing the physical improvement of internal canal system and enhancing WUA's activity simultaneously, the improvement of water management is realized in the irrigation system.
		a	Thus, appointing and training of necessary WUA staffs and increasing WUA's capacity for maintaining canal system by equipping machinery shall be implemented with physical improvement of canal system.
		b	Increasing the capacity of WUA to maintain canal system is indispensable for sustainable maintaining the effect of investment to the internal canal improvement.
17	Joint Marketing by Farmer Group	a.	Weakness of bargaining power of *fermers* will be overcome by the establishment of stable marketing routs based on joint marketing
		b.	Intervention of government on production of non-state controlled crops.
18	Improved Marketing Support Infrastructure	a.	Food safety of fresh foodstuff in district central markets will be improved through improved marketing support infrastructure
		b.	Enlightening activities for petit dealers is indispensible to realize appropriate use of the improved infrastructure.
19	Small Scale Slaughterhouse	a.	Safe meet products will be provided to the consumers by slaughtering animals in a hygienic environment.
		b.	Enlightening activities for *fermers* and *dehkans* are indispensible to realize appropriate use of the slaughterhouse.
20	Improvement of Small Scale Agro-Processing Technologies	a.	The income of member *fermers* and *dehkans* will be improved by developing high value added products.
		b.	Unstable supply of electricity, gas and water will obstruct the production of processed goods.
21	Improvement of Food Safety Technologies	a.	Safe agricultural products (particularly fresh foodstuff) will be provided to the consumers by implementing enlightening activities and revision of food safety standards and management plans.
		b.	Food safety standards and management plans may not work efficiently when there is lack of enlightening activities for *fermers*, *dehkans* petit dealers.
22	Strengthening of Communication for Local Agricultural Administration	a.	Communication abilities of local administration staff will be improved and will contribute to the implementation of the Action Plan
23	Reinforcement of VCC Coordinating Abilities	a.	Coordinating abilities of VCC staff will be improved and will contribute to the implementation of the Action Plan.

Table 6.4.3 Action Plan Evaluation by DAC Criteria: Efficiency

Criteria for Evaluation

a. Outcomes corresponding to investment of human (technical) and financial resources
b. Outcomes corresponding to executed activities (timing)

	Program/Project	Item	Efficiency
1	Soil conservation and improvement by crop rotation	a.	The project could achieve the goals with very minimum additional budget, since almost activities are a part of routine administrative works
		b.	Increased profit from farming in combination with livestock and improved soil condition could be achieved through introduction of proper crop rotation
2	Promotion of renovation of agricultural machineries	a.	Productivity of crops could improve after expansion of on-time planting through efficient use of the procured tractors
		b.	Conditions of tractors would improve after provision of new roles of MTP and A-MTP in the maintenance as the central workshop of district or sales agents. This could lead efficient use of the tractors.
3	Improvement of accessibility to agricultural inputs	a.	Efficient implementation of the project could be expected through utilization of the existing outlet shops of the Uzbekistan Fertilizer Company at district level
		b.	A profitable commercial base of the model shops could be established efficiently in combination with consultant services on the shop management
4	Enhancement of technical extension of agricultural production	a.	*Fermer's* capability to manage farming could improve with minimum additional budget, since all activities will be carried out by the existing administrative setups
		b.	Agricultural extension services could be provided efficiently through distribution of technical manuals in Karakalpakstan language, and improved capability and awareness of district agricultural college teachers
5	Re-activation of melons/gourds and apple production	b.	Increase income of the growers could be achieved through strategic establishment of production center of melons/gourds and apple, because the crops are typical popular cash crops in the target area
6	Strengthening of women's vegetable production in tamarka	a.	Participated *dehkans* could increase productivity of *tamarka*, as well as increase their side income by utilization of agricultural inputs provided through the project
		b.	Practical and careful technical instructions could be given efficiently to the participated *dehkans* by allocation of local agronomists to consultation services
7	Fodder production	a.	A high efficiency of investment to milk production business could be achieved through the project, since the efficiency is relatively high even under the present condition
		b.	Milk production efficiency per cow could improve through introduction of improved variety, and stable supply and efficient use of fodder (silage)
8	Artificial insemination and veterinary services	a.	Sufficient return of the investment can be expected, because this project supports the above project of "Fodder production" over the medium and long term
		b.	Milk production efficiency per cow could improve through increased number of improved variety
9	Training program on animal husbandry	a.	Sufficient return of the investment can be expected, because this project supports the above project of "Fodder production" over the medium and long term
		a.b.	Expected goals could be achieved, since technical knowledge improvement of *fermers*, *dehkans* and livestock experts has been verified by the pilot project in the study
10	Sustainable Fishery Promotion	a	Technical support is provided to private fishery company and fishery *fermers* by strengthened activity of Fishery Association.
		a	Technical support by Fishery Association is able to cover private fishery company and fishery *fermers* of whole region by comparatively small input.
		a	Seed distribution system and appropriate resource management increase natural fishery resources, so that the production and income of private fishery company and fishery *fermers* increase.
		b	Effective restock technology through seed distribution is established based on the analysis and feed-back of the results of restock activity and production.
11	Aquaculture Development	a	The system of human resources development, seed supply, technical extension and information publication is established through strengthening the activity of Fishery Association.
		b	Private fishery company and fishery *fermers* are able to apply the technology of appropriate aquaculture established trough the model aquaculture activity.
		a	Profit of private fishery company and *fermers* will increase and be stabilized through aquaculture promotion.
12	Improving Internal Canal System	a	The water delivery to the farm land located even in the lowest reach of the system will be improved by recovery of the water flow of canal.
		a	By installation of gate divisions, the operation of water distribution by WUA becomes easy and convenient.
		b	By implementing the physical improvement of internal canal system and enhancing WUA's activity simultaneously, the improvement of water management is realized in the irrigation system.
		b	WUA obtains technical information on facility necessary for proper operation and management.

13	Strengthening Water Management in the Field	a	The amount of water delivered is able to be monitored by farms by installing division boxes with water measurement and technical instruction to farmers.
		a	Farmer's capability for irrigation planning and water management is improved and an appropriate and effective water use is fulfilled in the field.
		b	Comprehensive technical demonstration and extension regarding water management in the field, water saving technology and drainage improvement in the field will be provided effectively through the model farm activity.
		a	Farmers are able to reduce time and effort for irrigation watering through improved water management in the field.
14	Introducing Water Saving Technology	b	Comprehensive technical demonstration and extension regarding water management in the field, water saving technology and drainage improvement in the field will be provided effectively through the model farm activity.
		b	By developing water saving technology and its technical material as well as carrying out technical demonstration and training in the model farm, farmers are able to apply the results into their own field.
15	Improving Drainage Conditions in the Field	b	Comprehensive technical demonstration and extension regarding water management in the field, water saving technology and drainage improvement in the field will be provided effectively through the model farm activity.
		a	Land leveling is considered as a key technology to improve water management (irrigation practice) and drainage improvement in the field.
		a	By improving the drainage conditions in the field, farmers obtain stable and/or increased productivity, so that their profit increases.
16	Strengthening WUA and Enhancing Its Activity	a	Internal irrigation system is operated and managed properly and water management in the system is improved through appointing necessary staffs and increasing their capability. The function of the system is maintained properly as well.
		a	By possessing machinery, WUA is expected to increase member's sense of reliance and expectation to WUA as well as increase the capacity of canal maintenance.
		b	By showing the capacity of WUA regarding irrigation planning, management of water distribution and management of facility, it is expected to increase member's sense of reliance and expectation to WUA, which will contribute to raise up member's understanding on necessity of water fee payment.
		b	By improving financial system of WUA through increasing water fee collection, WUA is able to appoint necessary staffs and carry out constant activity.
		b	By involving not only *fermers* but also *dehkans* into the activity of water management, it is expected to improve water use and O/M of facilities at the whole of the irrigation block.
17	Joint Marketing by Farmer Group	a.b	The establishment of an attractive business model that can give incentive to the model agro-firm members will further accelerate the establishment of new agro-firms.
18	Improved Marketing Support Infrastructure	a.	Installation of marketing support infrastructures for the distribution of safe foodstuff in the four major markets of Karakalpakstan will stimulate the interest for securing safe products and will influence other small markets.
		b.	An integrated system for management of merchandise will be formulated in the process of revising the role of the market, and will contribute to alleviate the crowdedness of the market.
19	Small Scale Slaughterhouses	a.	Hygienic and safe meet will be distributed at the maximum extent by installing small scale slaughterhouse in the districts with the four major markets of Karakalpakstan.
		b.	The small scale slaughterhouses will start operation subsequent to its construction. However, activities for enlightenment together with necessary legislative measures will be initiated to facilitate the appropriate use of the facilities.
20	Improvement of Small Scale Agro-Processing Technologies	a. b	The establishment of an attractive business model that can give incentive to the model agro-firm members will further accelerate the establishment of new agro-firms.
		b.	Equipment for agro-processing shall be procured in accordance to a concrete business plan, which must be established based on the sense of ownership formulated among the agro-firm members.
21	Improvement of Food Safety Technologies	a.	The consciousness of stakeholders among food safety will be raised through repeated enlightenment activities towards food producers and dealers in the four major markets of Karakalpakstan.
		b.	A new system as well as standards for food security of fresh foodstuff in the market will be established.
22	Strengthening of Communication for Local Agricultural Administration	a. b.	Communication abilities of local administration staff will be improved and will contribute to the implementation of the Action Plan
23	Reinforcement of VCC Coordinating Abilities	a. b.	Coordinating abilities of VCC staff will be improved and will contribute to the implementation of the Action Plan.

Table 6.4.4 Action Plan Evaluation by DAC Criteria: Impact

Criteria for Evaluation

a. Impact towards government policy
b. Impact towards society, implementing agency, beneficiaries, etc.
c. Impact towards technological innovation
d. Impact towards gender, human rights and poverty
e. Impact towards environmental protection
f. Impact towards the achievement of the overall goal

	Program/Project	Item	Impact
1	Soil conservation and improvement by crop rotation	a.	This project can be a national model of soil conservation and improvement, since the issue caused by mono-culture of cotton and wheat is a serious nationwide issue
		b.	A sustainable farming model applicable to the target area will be shown
		c.	This project could make more *fermers* familiar with a profitable farming model in balanced combination of crop farming (cotton, wheat and other crops) and livestock farming
		e.	This project can contribute to improve soil condition of farmland in the target area
		f.	Though production of cotton and wheat in the target area will decrease due to decreased planted area of them, the recovery can be expected due to increased production per ha after several rotations
2	Promotion of renovation of agricultural machineries	a.	Transfer from collective use of tractors to the individual which is more effective to large scaled *fermers*. The average scale of *fermers* is becoming larger under the on-going land optimization policy
		b.	Job opportunities of agricultural machinery mechanics will increase after changing the roles of MTP and A-MTP
		c.	On-time crop planting can be easier with the transition to individual use of tractors
3	Improvement of accessibility to agricultural inputs	a.	This project can show a model for market liberalization of agricultural inputs
		b.	Access of crop growers to agricultural inputs can improve. As well as, job opportunities of the local people will increase with the progress of market liberalization
		c.	Productivity of crops other than cotton and wheat could improve through increased use of agricultural inputs
4	Enhancement of technical extension of agricultural production	a.	This project can show a model of well-organized agricultural extension system, since the system does not exist in Karakalpakstan
		b.	A network will be created by various agents concerned to agricultural research & development and extension
		c.	Technical capacity of *fermers* would increase
5	Re-activation of melons/gourds and apple production	b.	Establishment of production center of melon/gourd and apple can provide an opportunity to increase income of the growers, as well as job opportunities to local people through promotion of agricultural marketing and processing business
		c.	Productivity of the crops could improve through the introduction of new management technologies and improved varieties
6	Strengthening of women's vegetable production in tamarka	b.	This project can show a model to support *dehkans'* livelihood
		c.	Various vegetables would be popular among *dehkans*
		d.	This project could change the way of thinking of *dehkan* women and trigger awareness-raising to take a positive life style
		d.	*Dehkans*, who are the social vulnerable in general, could improve their livelihood
7	Fodder production	b.	Income of the milk producers would increase through increased milk production, as well as job opportunities would be created after development of daily products marketing and processing industry
		b.	This project can show a model to organize *dehkans* in a cooperative work
		c.	This project can promote increased fodder production and efficient use of them, and introduction of new varieties of cows
		d.	*Dehkans* could improve their livelihood, since they depend on their livestock for a substantial part of their income
8	Artificial insemination and veterinary services	b.	AI system can be improved
		c.	Productivity of cows/cattle would improve after introduction of the improved variety
		d.	*Dehkans* could improve their livelihood, since they depend on their livestock for a substantial part of their income
9	Training program on animal husbandry	a.	This project can show a model of well-organized livestock extension system, since the system does not exist in Karakalpakstan
		b.	Livestock extension could be improved through increasing the capacity of livestock experts for animal husbandry
		c.	The growers' capability for animal husbandry could be improved
		d.	*Dehkans* could improve their livelihood, since they depend on their livestock for a substantial part of their income
10	Sustainable Fishery Promotion	c	Technology for sustainable fishery is established as well as appropriate capture production is clarified through introducing adequate fishery resource management.
		e	The expected influence to the natural environment is small due to the scale of the development.
11	Aquaculture Development	c	Technology of aquaculture which can be applied by private fishery company and fishery *fermers* is developed.
		e	The expected influence to the natural environment is small due to the scale of the development.

12	Improving Internal Canal System	b	Effective use of irrigation water contributes to stabilize and increase agricultural production in the region where available water resource is strictly limited.
		b	Through stabilizing and increasing agricultural production, farmer's income increases.
		c	By increasing response of the water delivery in the system, operating water distribution in time and properly, reducing irrigation time required for one watering in the field and strengthening the initiative of WUA, it is possible to minimize the influence of unreliable water supply.
13	Strengthening Water Management in the Field	c	By improving the water management in the field, it is possible to introduce more appropriate water management in the system.
		c	By increasing response of the water delivery in the system, operating water distribution in time and properly through monitoring of delivered water by farm, reducing irrigation time required for one watering in the field and strengthening the initiative of WUA, it is possible to minimize the influence of unreliable water supply.
14	Introducing Water Saving Technology	b, c	Development of water saving technology suitable for the region will contribute to not only *fermers* but also *dehkans*.
		b	By introducing water saving technology, it is expected to obtain more stable agricultural production and income even under the unreliable water supply.
15	Improving Drainage Conditions in the Field	a	Improvement of drainage conditions in the field ensures the results of the NDIP.
		b	Improvement of drainage conditions in the field and development of effect leaching technology reduce salt damage and contribute to stabilize and increase agricultural production in the region.
		c	Developed effective leaching technology is able to apply in the other area.
16	Strengthening WUA and Enhancing Its Activity	c	By increasing response of the water delivery in the system, operating water distribution in time and properly, reducing irrigation time required for one watering in the field and strengthening the initiative of WUA, it is possible to minimize the influence of unreliable water supply
		a	Result of strengthening WUA and enhancing its activity, of which self-reliant activity is realized, can be a model of WUA strengthening in the country.
17	Joint Marketing by Farmer Group	a.	The activity can be a model-case within the policy aiming at the transition to market economy.
		b.	Stable sales of agricultural products will contribute to the improvement of farm economy of the agro-firm members
		b.	Stable sales of agricultural products will stimulate other *fermers* / *dehkans* and will contribute to the vitalization of market economy.
		c.	Technology such as greenhouse culture and seedling production is expected to be introduced.
18	Improved Marketing Support Infrastructure	b.	Safe foodstuff will be provided to consumers by improving the hygienic conditions of merchandise in the four major markets in Nukus, Kungrad, Khodjeyli and Chimbay.
		c.	Use of cold section for fresh foodstuff will be infiltrated in the market, and will raise the awareness of stakeholders on hygienic conditions of food.
		e.	The amount of waste from the market is expected to decrease.
19	Small Scale Slaughterhouse	b.	Safe and hygienic meat will be provided to the consumers by slaughtering animals under hygienic conditions in the districts where the four major markets are located.
		b.	Inspection by veterinary and sanitary officers will be assured by slaughtering animals in certain facilities.
		c.	The accumulation of techniques for slaughtering animals will contribute to the production of meat with higher quality.
		f.	The lack of awareness among livestock farmers on hygiene may result in inappropriate use of the small scale slaughterhouses
20	Improvement of Small Scale Agro-Processing Technologies	a.	The activity can be a model-case within the policy aiming at the transition to market economy.
		b.	Stable sales of agricultural products will contribute to the improvement of farm economy of the agro-firm members
		b.	Stable sales of agricultural products will stimulate other *fermers / dehkans* and will contribute to the vitalization of market economy.
		c.	Simple technology for agro-processing is expected to be introduced.
21	Improvement of Food Safety Technologies	b.	Distribution of hygienic foodstuff will contribute to the improvement of living environment of the consumers.
		b.	The value added to hygienic foodstuff will contribute to the economy of livestock farmers and dealers.
		c.	The ability of veterinary and sanitary officers for inspection and management will be increased through training activities.
		e.	Sanitary conditions of the market will be improved.
		f.	New standards and system may not appropriately function if enlightenment activities for *fermers*/*dehkans* and petty dealers are insufficient.
22	Strengthening of Communication for Local Agricultural Administration	a. b. c. d. e. f.	Communication abilities of local administration staff will be improved and will contribute to the implementation of the Action Plan
23	Reinforcement of VCC Coordinating Abilities	a. b. c. d. e. f.	Coordinating abilities of VCC staff will be improved and will contribute to the implementation of the Action Plan.

Table 6.4.5 Action Plan Evaluation by DAC Criteria: Sustainability

Criteria for Evaluation

a. Sustainability of effect after the project
b. Analysis of political, economical, organizational, institutional aspects contributing to the effect of the project
c. Analysis of technical, socio-cultural, environmental aspects contributing to the effect of the project
d. Negative environmental impact that may defect the continuation of the activities
e. Obstructions that affect sustainability

	Program/Project	Item	Sustainability
1	Soil conservation and improvement by crop rotation	a.	Sustainable soil conservation and improvement can be achieved by developing a crop rotation system
		b.	*Fermers* will continue the crop rotation by themselves after recognition of the positive effects on soil condition
		c.	*Fermers* can continue the crop rotation, since any special new technologies are not necessary
		e.	Very heavy support of the government to cotton and wheat production
2	Enhancement of technical extension of agricultural production	a.	Improved crop productivity can be achieved on a sustainable basis through increased capability of individual *fermers*
		b.	Continuous implementation of proposed agricultural extension can be expected through improved function of district agricultural colleges and the involvement of them
		c.	Any new technical inputs are not necessary for the development of technical manuals, since the manuals can be developed only by local human resources
		e.	Reduction of budget allocation for *fermer* trainings
3	Promotion of renovation of agricultural machineries	a.	On-time planting can be promoted continuously, since operation technology of tractors are already rooted among *fermers*
		b.	Sustainable implementation can be achieved by utilizing a management system to operate the existing tractor leasing schemes
		c.	Sustainable operation of tractors shall be promoted through enhancement of the maintenance system in rural area by reviewing the roles of MTP and A-MTP
4	Improvement of accessibility to agricultural inputs	a.	Sustainable agricultural inputs supply system can be developed through bringing out a power of the private sector
		b.	Sustainability of the model shops shall be guaranteed by utilizing a management system and facilities of the existing outlet shops of Uzbekistan Fertilizer Company
		c.d.	Over-use of agricultural inputs may have negative effects on the environment
		e.	Controls and regulations to impede a self-reliant development of the private sector in agricultural inputs marketing business and undeveloped financial subsystem to support private entrepreneurs
5	Re-activation of melons/gourds and apple production	a.	A base to develop the production center can be maintained on a sustainable basis through continuous provision of new varieties and technologies of melon/gourd and apple
		b.	Increased capacity of the Uzbekistan Scientific Center for Agriculture in Karakalpakstan can contribute to promote the crops through continuous provision of the research outputs
		c.d.	Introduction of technology using the inputs intensively may have negative effects on the environment
		e.	Lack of strategic policy on agricultural research and development
		e.	Inactive supporting measures to agro-firm development
6	Strengthening of women's vegetable production in tamarka	a.	Improved vegetable productivity in *tamarka* can be achieved on a sustainable basis through increased capability of individual *dehkans*
		b.	*Dehkan* supporting system of district office and VCC can be developed through improvement of their capacity
		c.	A base to improve *dehkans'* livelihood can be solid through promoting awareness-raising of *dehkan* women
		e.	Decreased supply of irrigation water to *tamarka*
7	Fodder production	a.	A sustainable increase of milk production can be achieved through enabling the growers to secure sufficient fodder and to introduce the improved variety
		b.c.	A sustainable project implementation system can be set up through the implementation of "AI and veterinary services" and "Training program on animal husbandry" as shown below
		e.	Difficulty to secure farmland to grow fodder crops due to competition with other crops
8	Training program on animal husbandry	a .	Improved livestock productivity can be achieved on a sustainable basis through increasing the capability of individual growers
		b. c.	A livestock extension system can be strengthened on a sustainable basis through increasing the capacity of livestock experts for animal husbandry
		e.	Reduction of budget allocation for animal husbandry trainings
9	Artificial insemination and veterinary services	a.	Improved livestock productivity can be achieved on a sustainable basis through increased number of new variety livestock
		b. c.	A supporting system to livestock growers can be strengthened on a sustainable basis through enhancement of AI and veterinary services
		e.	Reduction of budget allocation for AI and veterinary services
10	Sustainable Fishery Promotion	a	Thorough the established fishery resources management, fishery activity in the region is continued sustainably.
		b	Through improving financial system, Fishery Association carries out its activity sustainably.
		c	Through establishing seed distribution system and fishery resources management, the capturing production in the region is maintained and/or increases continuously.
11	Aquaculture Development	a	Aquaculture fishery enables to maintained and/or increase the sustainable fishery production in the region.

		b	By establishing and demonstrating appropriate aquaculture model, private fishery company and fishery *fermers* are able to manage their aquaculture fishery by themselves.
12	Improving Internal Canal System	b, c	It is essential to increase the capacity and enhance activities of WUA through improving technical and financial condition, in order to bring out and maintain the full function of the improved internal canal system.
		e	Proper operation and maintenance of main canal system by ISD is precondition to bring out and maintain the full function of the improved internal canal system.
13	Strengthening Water Management in the Field	a, b	The effect of improvement of water management in the field will be maintained by farmer's implementation in their field.
		b, c	In order for farmers to invest in improving water management in the field continuously, it is essential that farmers obtain adequate profit through stabilizing and increasing production.
14	Introducing Water Saving Technology	a, b	The effect of introducing water saving technology will be maintained by farmer's implementation in their field.
		b, c	In order for farmers to invest in the introduction of water saving technology continuously, it is essential that farmers obtain adequate profit through stabilizing and increasing production.
15	Improving Drainage Conditions in the Field	a, b	The effect of improving drainage conditions in the field will be maintained by farmer's implementation in their field.
		b, c	In order for farmers to invest in improving drainage conditions in the field continuously, it is essential that farmers obtain adequate profit through stabilizing and increasing production.
16	Strengthening WUA and Enhancing Its Activity	a	When the financial condition of WUA is improved through increasing water fee collection, the activity of WUA will be continued sustainably.
		a	As a result, the internal canals system will be operated and maintained properly and sustainably.
		b	The re-registration of WUAs is proceeding in Uzbekistan at the moment and it is expected that the legal background of WUA and its activity, including water fee collection, will be strengthened through the process of the re-registration.
		c	Increase of WUA's capacity for operation and maintenance of internal canal system contributes to increase farmer's income through stabilization and increase of agricultural production. Thus, it is expected that the increase of income changes the stances of farmers regarding to the payment of water fee and concrete financial background of WUA will be established through the increase of water fee collection ratio.
17	Joint Marketing by Farmer Group	a.	Activities will be continued by agro-firm members which has accumulated know-how through the implementation of the Joint marketing by farmer group.
		b.	Agro-firms can be established under the current legislative system.
		e.	Lack of ownership among the agro-firm members towards its activities.
		e.	Intervention of government on production of non-state controlled crops.
18	Improved Marketing Support Infrastructure	a.	Management of fresh foodstuff and enlightening activities will be continued by the authorities of the markets.
		b.	The *Hakimiyats* of the four districts where the markets are located will coordinate with the stakeholders, such as market authorities, petty dealers, *fermers*/*dehkans*, and veterinary and sanitary office.
		c.	The activity involves selling fresh foodstuff (milk, meet, etc.) in isolated sales spots, and does not require complex technology.
		e.	Insufficient enlightenment activities towards petty dealers may result in inappropriate use of the installed infrastructure.
19	Small Scale Slaughterhouse	a.	The small scale slaughterhouses will continue operation under the management of the *Hakimiyat*.
		b.	The *Hakimiyats* of the four districts where the slaughterhouses are located will coordinate with the stakeholders such as market authorities, petty dealers, *fermers*/*dehkans*, and veterinary and sanitary office.
		c.	Accumulation of techniques for slaughtering animals will be utilized in an appropriate way.
		d.	Waste born in the process of slaughtering should be treated in an appropriate way.
		e.	The lack of awareness of livestock farmers on hygiene may result in inappropriate use of the small scale slaughterhouses.
20	Improvement of Small Scale Agro-Processing Technologies	a.	Activities will be continued by agro-firm members
		b.	The agro-firm members, whom improved their abilities through the implementation of the Improvement of Small Scale Agro-Processing Technologies, will continue the activities in an appropriate way
		b.	The know-how accumulated through the establishment of the model agro-firm will further facilitate the establishment of new agro-firms
		e.	The lack of the sense of ownership among the agro-firm members on its activities.
21	Improvement of Food Safety Technologies	a.	Management and instruction regarding to sales of fresh foodstuff will continue under the supervision of the veterinary and sanitary office.
		b.	Currently, the veterinary and sanitary office, with the sanitary and epidemiology center is already monitoring the hygienic conditions of the market at some extent.
		c.	Enlightenment activities on the background and necessity of food hygiene must be adequately done to all stakeholders.
		e.	New standards and system may not appropriately function if enlightenment activities for *fermers*/*dehkans* and petty dealers are insufficient.
22	Strengthening of Communication for Local Agricultural Administration	a. b. c. d.	Communication abilities of local administration staff will be improved and will contribute to the implementation of the Action Plan
23	Reinforcement of VCC Coordinating Abilities	a. b. c. d.	Coordinating abilities of VCC staff will be improved and will contribute to the implementation of the Action Plan.

Table 6.4.6 Implementation Cost of the Action Plan (1/2)

Program/Project		Activity / Input	Cost (1,000 Sum)	
			Subtotal	Total
111	Soil Conservation and Improvement by Crop Rotation	Setup of coordination office / expansion of farmland under crop rotation	1,603,084	
		Research on alternative crops / experimental cultivation	266,657	
		Coordination Office in the Council of Ministers	Regular*	1,869,741
121	Improvement of Agricultural Extension Services to Fermer	Preparation of manuscript / printing of manual	172,188	
		Training of agricultural college teachers	91,295	
		Seminar for fermers	327,210	590,693
131	Promotion of Renewal of Agricultural Tractors	Tractors with plow (150 units, 10 years)	55,350,000	
		Renovation of workshop facilities	3,690,000	
		Workshop equipment of MTPs	3,690,000	
		Trainig for MTP mechanical staff	36,715	62,766,715
141	Improvement of Accessibility to Agricultural Inputs for Agricultural Producers	Renovation of facilities	43,050	
		Setup of supporting office / consultation services to "One-stop agro-inputs shops"	248,139	291,189
151	Research and Develeopment of Melons ans Apple	Establishment and renovation of research field and facilities	743,221	
		Study and research on technologies of melons and apples (Joint research)	9,246,638	
		Dissemination of seeds / scions and information / technologies	88,088	10,077,947
161	Strengthening of Women's Vegetable Production in Tamarka	Community development expert (15days per month x 6 months)	131,918	
		Kick off workshop (30 participants x 1 day)	20,295	
		Agricultural Inputs (21 pers x 0.05ha x 1,098,000 Sum/ha)	184,685	
		Technical Seminars (21 participants x 5 days)	24,355	
		Vehicle, Fuel (90days), etc.	337,506	698,759
211	Fodder Production and Promotion of Livestock	Alfalfa seed production center at SCA in Chimbay	267,161	
		Silage production	107,857	
		Collective fodder production by dehkans	91,279	
		Rotational production of crops and fodder (alfalfa)	1,317,519	1,783,816
221	Artificial Insemination and Veterinary Services	Establishment of artificial insemination center	810,620	
		Fostering of artificial inseminators	62,843	
		Provision of AI tools and vehicles	934,988	
		Provision of vehicle with vet instrument for mobile vet services	1,086,892	2,895,343
241	Training Programs on Animal Husbandry	Training program for fermers and dehkans	256,221	
		Training for livestock experts	176,753	432,974
271	Sustaiable Fishery Promotion	Strengthening Fishery Association	11,809	
		Establishment of seed distribution system	1,303,800	1,315,609
272	Aquaculture Development	Establishment of system for aquaculture development and promotion	369	
		Establishment of aquaculture model for study area	630,990	631,359
311	Improving Internal Canal System	Establishing special fund for irrigation improvement and publitization of procedures	910	
		Formulating technical guidance for the internal canal system improvement and its publitization	3,560	
		Formulating the improvement plan of the internal canal system, preparing application form	Regular*	
		Conducting survey work and facility design based on the inprovement plan, preparation of inventory and technical information for operation and maintenance work of the intenal canal system	4,427,385	
		Cleaning and diffinf work of intenal canal and repairing canal facilities	17,052,720	
		Repairing, renewal and establishing gate and water measurement facilities	26,949,300	48,433,875
312	Strengthening Water Management in the Field	Installing division box with water measurement tool (Shandur) at the intakes of farms	2,539,261	
		Masureing amount of water distributed to farms	Regular*	
		Holding technical seminars to members on improvement of ittigation planning and water use in the field	324,105	
		Land leveling in the field	AP331**	2,863,366

Note: * Cost included in Regular Activities of the concerned organization

** Cost included in referred Component of the Action Plan

Table 6.4.6 Implementation Cost of the Action Plan (2/2)

Program/Project		Activity / Input	Cost (1,000 Sum)	
			Subtotal	Total
321	Intorducing Water Saving Technology	Setting up model farms and extension through operating model famrs	472,378	
		Setting up consultation desk to fermers on technical and materials for water saving	AP312**	
		Reserach and development of water saving technology and necessary materials	79,950	
		Preparation of seminar text and materials for extension	36,900	589,228
331	Improving Drainage Conditions in the Field	Model farm and extension	AP321**	
		Preparation of technical assistance to fermers	AP321**	
		Preparation of support system of material for improving field water management, water saving technology and improving field drainage	AP321**	
		Preparing construction machiery for drainage improvement in the field	295,200	
		Preparing preference credit system for drainage improvement in the field	Regular*	
		Research and development on effective and efficient leaching technology	830,250	1,125,450
341	Strengthening WUA and Enhancing its Activity	Increasing water management capacity of WUA	2,253,606	
		Increasing canal / collecor maintenance capacity of WUA	19,454,518	
		Improving water fee system and business plan of WUA	88,560	
		Promoting tamarka user's participation in water management activity through WUA	8,856	21,805,540
411	Joint Marketing By Farmer Group (Model Agro-firm Establishment)	Establishment of working group	1,636	
		Focus group discussion and establishment of agro-firm	12,177	
		Business planning	52,161	
		Products development	4,499	
		Marketing	39,589	110,062
421	Improvement of Marketing Support Infrastructure	Holding stakeholder meeting to formulate market improvement master Plan	1,839	
		Integration of control system of perishable food	20,547	
		Separation of perichable food section and other commodities	3,916,935	
		Establish of cold section	658,940	4,598,261
422	Small Scale Slaughter House	Construction of small-scale slaughter house	376,972	376,972
431	Improvement of Small Scale Agro-Processing Technologies	Confirmation of Distinctive Factors on Iitial Operation	294,824	
		Research and Development of Small-Scale Agro Processing	32,398	
		Training of experts and policy making	29,158	
		Credit Facilitation and Procurement of Equipment	1,895,294	
		Minimum Improvement of Infrastructure	1,397,982	3,649,656
433	Improvement of Food Safety Technologies	Review of food safety standard	32,718	
		Improvement of sanitary control plan	11,316	
		Capacity building of VSE	89,689	
		Promotion of enlightenment activities	20,449	154,172
511	Enhancement of Communication for Local Agriculture Administration	Community development expert	43,973	
		Training for Hakimiyat officers	8,795	
		Trainig for VCC officers	6,089	
		Evaluation workshops	27,060	
		Computer and printers, etc.	263,835	
		Vehicle and fuel, etc.	93,358	443,110
512	Reinforcement of VCC Coordinating Abilities	Community development expert	43,973	
		Information workshop	27,060	
		Training for VCC officers and IG	6,765	
		Vehicle and Fuel, etc.	92,681	170,479
Total Cost for AP Components				167,674,316
Physical Contingency (10%)				16,767,432
Total Cost of AP				184,441,748
Equevalent to ***			USD	111,310,651

Note: * Cost included in Regular Activities of the concerned organization

** Cost included in referred Component of the Action Plan

**+ Exchange Rate: 1SUD=1,657UZS (JICA official rate, January 2011)

Table 6.4.7 Annual Disbursement of Investment

		Total	2011	2012	2013	2014	2015	2016	2017	2018	2019
Grand Total (000 000 UZS)		184,442.0	9,927.9	14,859.7	25,855.0	18,762.9	19,546.6	20,194.9	19,371.3	18,643.2	18,956.5
Grand Total (000 USD)		111,310.8	5,991.5	8,967.8	15,603.5	11,323.4	11,796.4	12,187.6	11,690.6	11,251.2	11,440.3
Total Cost of Action Plan (000 000 UZS)		167,674.5	9,025.4	13,508.8	23,504.5	17,057.2	17,769.6	18,359.0	17,610.3	16,948.4	17,233.2
Physical Contingency (10%) (000 000 UZS)		16,767.5	902.5	1,350.9	2,350.5	1,705.7	1,777.0	1,835.9	1,761.0	1,694.8	1,723.3
111	Soil Conservation and Improvement by Crop Rotation	1,869.7	910.9	108.6	106.2	106.2	106.5	106.2	106.2	106.5	106.2
121	Improvement of Agricultural Extension Services to Fermer	590.7	59.1	59.1	59.1	59.1	59.1	59.1	59.1	59.1	59.1
131	Promotion of Renewal of Agricultural Tractors	62,766.7	5,535.0	9,225.0	9,261.7	5,535.0	5,535.0	5,535.0	5,535.0	5,535.0	5,535.0
141	Improvement of Accessibility to Agricultural Inputs for Agricultural Producers	291.2	12.9	121.6	41.7	28.7	28.7	28.7	28.7	0.0	0.0
151	Research and Develeopment of Melons ans Apple	10,077.9	743.2	53.2	53.2	53.2	129.4	1,809.1	1,809.1	1,809.1	1,809.1
161	Strengthening of Women's Vegetable Production in Tamarka	698.8	139.8	139.8	139.8	139.8	139.8	0.0	0.0	0.0	0.0
211	Fodder Production and Promotion of Livestock	1,783.8	151.7	151.7	418.8	151.7	151.7	151.7	151.7	151.7	151.7
221	Artificial Insemination and Veterinary Services	2,895.3	174.5	221.8	184.2	175.6	1,020.5	188.7	173.7	212.0	166.0
241	Training Programs on Animal Husbandry	433.0	43.3	43.3	43.3	43.3	43.3	43.3	43.3	43.3	43.3
271	Sustaiable Fishery Promotion	1,315.6	439.5	438.1	438.1	0.0	0.0	0.0	0.0	0.0	0.0
272	Aquaculture Development	631.4	0.0	0.0	0.0	0.0	197.8	144.5	144.5	144.5	0.0
311	Improving Internal Canal System	48,433.9	4.5	276.7	6,053.7	6,053.7	6,053.7	6,053.7	6,053.7	6,053.7	6,053.7
312	Strengthening Water Management in the Field	2,863.4	0.0	0.0	357.9	357.9	357.9	357.9	357.9	357.9	357.9
321	Intorducing Water Saving Technology	589.2	20.3	104.2	85.6	63.3	63.3	63.3	47.3	47.3	47.3
331	Improving Drainage Conditions in the Field	1,125.5	0.0	166.1	203.0	203.0	203.0	203.0	36.9	36.9	36.9
341	Strengthening WUA and Enhancing its Activity	21,805.5	409.5	1,959.5	2,720.2	2,719.1	2,719.1	2,255.6	2,255.6	2,255.6	2,255.6
411	Joint Marketing By Farmer Group (Model Agro-firm Establishment)	110.1	9.9	0.8	0.8	24.8	2.4	27.2	2.4	35.5	3.2
421	Improvement of Marketing Support Infrastructure	4,598.3	1.9	8.2	2,799.5	484.7	6.1	509.2	76.6	6.1	608.2
422	Small Scale Slaughter House	377.0	0.0	94.2	0.0	0.0	94.2	94.2	0.0	94.2	0.0
431	Improvement of Small Scale Agro-Processing Technologies	3,649.7	214.0	113.2	408.2	728.6	728.6	728.6	728.6	0.0	0.0
433	Improvement of Food Safety Technologies	154.2	32.7	101.0	6.8	6.8	6.8	0.0	0.0	0.0	0.0
511	Enhancement of Communication for Local Agriculture Administration	443.1	88.6	88.6	88.6	88.6	88.6	0.0	0.0	0.0	0.0
512	Reinforcement of VCC Coordinating Abilities	170.5	34.1	34.1	34.1	34.1	34.1	0.0	0.0	0.0	0.0

Table 6.4.11 Summary Cash-flow for Estimation of EIRR

(million sum)

Year	Investment Costs	Incremental Benefit	Cashflow
2011	3,141	0	-3,141
2012	7,177	0	-7,177
2013	16,172	0	-16,172
2014	10,370	3,475	-6,895
2015	11,011	9,786	-1,225
2016	11,542	16,200	4,658
2017	10,868	22,716	11,848
2018	10,272	29,335	19,063
2019	10,528	37,856	27,328
2020	10,011	47,380	37,369
2021	8,430	47,380	38,950
2022	8,430	47,380	38,950
2023	8,771	47,380	38,609
2024	8,771	47,380	38,609
2025	8,771	47,380	38,609
2026	8,771	47,380	38,609
2027	8,771	47,380	38,609
2028	8,430	47,380	38,950
2029	8,430	47,380	38,950
2030	8,430	47,380	38,950
Total	187,097	640,548	453,451
EIRR			32%

Table 6.4.13 Scoping Matrix of Possible Negative Impacts of the Action Plan (1/2)

Program/Project		Contents of Activities		1 Involuntary Resettlement	2 Local economy such as employment and livelihood, etc.	3 Land use and utilization of local resources	4 Social institutions such as social infrastructure and local decision-making institutions	5 Existing social infrastructures and services	6 The poor, indigenous and ethnic people	7 Misdistribution of benefit and damage	8 Cultural heritage	9 Local conflict of interests	10 Water Usage or Water Rights and Rights of Common	11 Sanitation	12 Hazards (Risk) Infectious diseases such as HIV/AIDS	13 Gender	14 Topography and Geographical features	15 Soil Erosion	16 Groundwater	17 Hydrological Situation	18 Coastal Zone	19 Flora, Fauna and Biodiversity	20 Meteorology	21 Landscape	22 Global Warming	23 Air Pollution	24 Water Pollution	25 Soil Contamination	26 Waste	27 Noise and Vibration	28 Ground Subsidence	29 Offensive Odor	30 Bottom sediment	31 Accidents
111	Soil Conservation and Improvement of Crop Rotation	1111	Confirmation of Soil Survey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1112	Development of a comprehensive Program	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1113	Arrangements with the central government	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1114	Research on alternative crops	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1115	Expansion of farmland under crop rotation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
121	Improvement of agricultural extension service to fermer	1211	To establish and manage a committee to develop agricultural technical manuals	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1212	To edit, print and distribute agricultural technical manuals (10,000 copies/year)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1213	To train teachers of agricultural collages	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
131	Promotion of renewal of agricultural tractors	1311	To introduce favorable lease system for fermers to procure agricultural tractors	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1312	To improve function of workshops of MTPs as the central workshop at district level.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
141	Improvement of accessibility to agricultural inputs for agricultural producers	1411	To assist in establishing "One Stop Agro-inputs Shops" (Targets: 10 shops to cover the 11 districts)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	C	-	-	-	-	-	-
		1412	To provide a credit for supporting initial running costs of the "One Stop Agro-inputs Shops"	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	C	-	-	-	-	-	-
		1413	To provide consultation about establishment and management of the "One Stop Agro-inputs Shops"	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
151	Research and development of melons and apple	1511	To establish trial and demonstration field equipped with facilities	-	-	-	-	-	-	-	-	-	-	-	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1512	To study and research production technologies of melons by joint research	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1513	To produce melon seeds of recommended varieties	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1514	To study and research production technologies of apple by joint research	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1515	To maintain mother plants of recommenced varieties of apple	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1516	To provide seeds/scions and agricultural technologies mainly to agro-firms	-	-	-	-	-	-	-	-	-	-	-	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
161	Strengthening of Women's vegetable Production in Tamarka	1611	Select target VCCs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1612	Setup model farms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1613	Technical seminars (seminars and demonstrations)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		1614	Interchange meetings	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
211	Fodder Production	2111	Rotational cropping (including distribution of alfalfa seeds, and AI service for selected 500 fermers)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	-	C	-	-	-
		2112	Strengthening of alfalfa seed production in 50 ha at SRIC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		2113	Collective fodder production by dehkans	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		2114	Silage production in a fermer farm with silo construction	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	-	C	-	-	-
221	Training program on Animal Husbandry	2211	Provision of training for 105 femers/dehkans (35 trainees x 3 times) per year (1,050 fermers/dehkans for	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		2212	Provision of training for 20 livestock experts per year (200 experts for 10 years)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
241	Artificial Insemination and Veterinary Services	2411	Establishment of artificial insemination center in Nukus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	B	-	-	C	B	-	-	-
		2412	Provision of AI tools and vehicles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	B	-	-	-	B	-	-	-
		2413	Fostering of artificial inseminators	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		2414	Provision of vehicles for mobile veterinary services	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
271	Sustainable Fishery Promotion	2711	Rehabilitation of Association	-	-	-	-	-	-	-	-	-	-	-	C	C	-	-	-	-	C	C	-	-	-	-	-	-	-	-	-	-
		2712	Establishment of seed distribution system	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
272	Aquaculture Development ~~Program~~	2721	Establishment of system for aquaculture development and promotion	-	-	-	-	-	-	-	-	-	-	-	C	-	-	-	-	-	-	-	-	-	-	B	-	-	-	-	-	-
		2722	Establishment of aquaculture model for study area	-	-	-	-	-	-	-	-	-	-	-	C	-	-	-	-	-	-	-	-	-	-	B	-	-	-	-	-	-
311	Improving Internal Canal System	3111	Establishing Special Fund for Irrigation Improvement and publication of procedures	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	-	C	-	-	-
		3112	Formulating technical guidance for the internal canal system improvement and its publication	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		3113	Formulating the improvement plan of the internal canal system, preparing application form	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		3114	Conducting survey work and facility design based on the improvement plan, preparation of inventory and technical information for operation and maintenance work of the internal canal system	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		3115	Cleaning and digging work of internal canal and repairing canal facilities	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	-	C	-	-	-
		3116	Repairing, renewal and establishing gate and water measurement facilities	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	-	C	-	-	-
312	Strengthening Water Management in the Field	3121	Installing division box with water measurement tool (Shandur) at the intakes of farm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	-	C	-	-	-
		3122	Measuring amount of water distributed to farms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		3123	Holding technical seminars to members on improvement of irrigation planning and water use in the field	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		3124	Land leveling in the field (Including "Program for Improving Drainage Conditions in the Field")	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 6.4.13 Scoping Matrix of Possible Negative Impacts of the Action Plan (2/2)

Program/Project		Contents of Activities	1 Involuntary Resettlement	2 Local economy such as employment and livelihood, etc.	3 Land use and utilization of local resources	4 Social institutions such as social infrastructure and local decision-making institutions	5 Existing social infrastructures and services	6 The poor, indigenous and ethnic people	7 Misdistribution of benefit and damage	8 Cultural heritage	9 Local conflict of interests	10 Water Usage or Water Rights and Rights of Common	11 Sanitation	12 Hazards (Risk) Infectious diseases such as HIV/AIDS	13 Gender	14 Topography and Geographical features	15 Soil Erosion	16 Groundwater	17 Hydrological Situation	18 Coastal Zone	19 Flora, Fauna and Biodiversity	20 Meteorology	21 Landscape	22 Global Warming	23 Air Pollution	24 Water Pollution	25 Soil Contamination	26 Waste	27 Noise and Vibration	28 Ground Subsidence	29 Offensive Odor	30 Bottom sediment	31 Accidents
331	Improving Drainage Conditions in the Field	3311 Model farm and extension	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		3312 Preparation of technical assistance to Fermers	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		3313 Preparation of support system of material for improving field water management, water saving technology and improving field drainage	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		3314 Preparing construction machinery for drainage improvement in the field	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	-	C	-	-	-	-
		3315 Preparing preference credit system for drainage improvement in the field	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		3316 Research and development on effective and efficient leaching technology	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
341	Strengthening WUA and Enhancing Its Activity																								C				C				
		3411 Appointing necessary staff s of WUA for water management	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		3412 Equipping Personal Computer for irrigation planning and WUA administration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		3413 Training WUA staffs in operation and maintenance of canal system and planning of irrigation and water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		3414 Equipping transportations for water management to	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		3415 Formulating regular and mid/long term plan of maintenance work by WUA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		3416 Preparation of inventory and technical information for operation and maintenance work	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		3417 Equipping construction machinery for canal maintenance work to WUA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	-	C	-	-	-	-
		3418 Providing spare parts and maintenance service to WUA' s machinery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		3419 Renting construction machinery and providing machinery service for canal maintenance work	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		3420 Preparing supply system of parts and materials for hydraulic structure (gate, gauge, concrete flume, etc.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		3421 Activating WUA's communication and coordination for collective works of maintenance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		3422 Improving water fee system and business plan of WUA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		3423 Preparing consultation to WUA on accounting, tax management and legal issues	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		3424 Propaganda and enlighten campaign to members on importance of WUA activity and water fee	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		3425 Promoting tamarka user's (Dehkan) participation to water management activity through VCC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
411	Joint marketing by farmer group (Model Agro-firm establishment)			C																													
		4111 Establishment of task force	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4112 Focus group discussion and establishment of agro-firm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4113 Business planning (needs assessment, marketing strategy, study tour, business seminar, technical training, action planning)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4114 Products development (collection, processing, packing)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4115 Marketing (channel establishment, identifying transport means)	-	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
421	Improvement of marketing support infrastructure																																
		4211 Holding stakeholder meeting to formulate market improvement master plan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4212 Integration of control system for perishable food	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4213 Separation of perishable food section and other commodities	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4214 Establishment of cold section	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
422	Small scale slaughterhouse																									B		B			B		
		4221 Construction of small scale slaughterhouses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	B	-	B	-	-	B	-	-
433	Improvement of food safety technologies			C																													
		4331 Review of Food Safety Standard	-	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4332 Improvement of Sanitary Control Plan	-	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4333 Capacity Building of VSE (including upgrading VSE equipment)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4334 Promotion of Enlightenment Activities	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
431	Improvement of Small-scale Agro-Processing Technologies																								B	C		B	B		C		
		4311 Implementation of test operation of small-scale agro-processing in the selected sites; milk mini-plant, vegetable and fruit processing and oil-extractor/mill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	B	-	-	C	-	-
		4312 Monitoring of pilot projects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4313 Training to personnel of MAWR for small-scale processing to Japan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4314 Training to the selected group leaders	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		4315 Procurement arrangement and operation of agro-processing equipment by the groups of Agro-firm, Fermer and Dehkan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	B	-	-	C	-	-
		4316 Necessary infrastructural improvement and monitoring	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	B	-	-	-	B	-	-	-	-
511	Strengthening of Communication for Local Agricultural Administration	5111 Install information tools (computers etc.) at Hakimyat and VCC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		5112 Train the staff for Hakimiyat and VCCs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		5113 Prepare and submit progress reports by VCCs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		5114 Joint evaluation meetings	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
512	Reinforcement of VCC Coordinating Abilities	5121 Setup IG in VCCs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		5122 Prepare the activity plan by IG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		5123 Support the vegetable program by IG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		5124 Monitor and evaluate the vegetable program by IG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 6.4.14 Possible Negative Environmental and Social Impacts (1/3)

Program/Project	Impacts			Possible Mitigation Measures
	Activity	Environmental / social aspects	Eval*	
Soil Conservation and Improvement by Crop Rotation	-	-	-	-
Improvement of accessibility to agricultural inputs for agricultural producers	To assist in establishing "One Stop Agro-inputs Shops"	Water pollution	C	• Examination of appropriate amount / type / timing of application of agro-chemicals and fertilizers with the activities of "Improvement of Agricultural Extension Service to *Fermer*". • Development / dissemination of guidelines with the activities of "Improvement of Agricultural Extension Service to *Fermer*".
		Soil pollution	C	
Promotion of Renewal of Agricultural Tractors	-	-	-	-
Improvement of Agricultural Extension Service to *Fermer*	-	-	-	-
Research and development of melons and apple	To provide seeds/scions and agricultural technologies mainly to agro-firms	Hazards (Risk) Infectious diseases such as HIV/AIDS	C	• Establish coordination with existing projects on pest control • Provide information to farmers on possible risk of diseases / pest together with adaptable measures for prevention.
Strengthening of Women's Vegetable Production in *Tamarka*	-	-	-	-
Fodder Production	Silage production in a *fermer* farm with silo construction	Air pollution	C	• Construction of silo should be planned distant from neighboring residences in a proper extent. • Machines should be operated with due maintenance work with watering of the operation site to avoid dust in a proper extent. • Operation of machines should be limited to normal working hours and operation during night time and holidays should be restricted.
		Noise and vibration	C	
Training Program on Animal Husbandry	-	-	-	-
Artificial Insemination and Veterinary Services	Establishment of artificial insemination center in Nukus	Air pollution	B	• Construction of AI center should be planned distant from neighboring residences in a proper extent. • Machines should be operated with due maintenance work at the extent possible with watering of the operation site to avoid dust in a proper extent. • Operation of machines should be limited to normal working hours, and operation during night time and holidays should be restricted.
		Noise and vibration	B	
Sustainable Fishery Promotion	Establishment of seed distribution system	Hazards (Risk) Infectious diseases such as HIV/AIDS	C	• Areas suitable for alevin release should be examined from the point of water quality based on monitoring results of the Sate Committee for Nature Protection of Karakalpakstan. • Variety of alevins to be released should be selected from local species under supervision of the Sate Committee for Nature Protection of Karakalpakstan.
		Flora, Fauna and Biodiversity	C	
Aquaculture Development	Establishment of aquaculture model for study area	Hazards (Risk) Infectious diseases such as HIV/AIDS	C	• Information of risk on biological accumulation shall be provided together with educational material incorporated into the manual prepared for aquaculture extension. • Necessary regulations on practice of aquaculture should also be considered during the formulation of the aquaculture model. • Appropriate amount / type / timing of feed and other chemicals shall be examined during the design stage based on calculation of consumption and self-cleaning capacity of the rivers. • Such results should also be incorporated into the manual prepared for aquaculture extension.
		Water Pollution	B	

Table 6.4.14 Possible Negative Environmental and Social Impacts (2/3)

Program/Project	Impacts			Possible Mitigation Measure
	Activity	Environmental / social aspects	Eval*	
Improving Internal Canal System	Cleaning and digging work of internal canal and repairing canal facilities	Air pollution	C	• Operation of machines should be planned distant from neighboring residences in a proper extent. • Machines should be operated with due maintenance work in a proper extent with watering of the operation site to avoid dust in a proper extent. • Operation of machines should be limited to normal working hours, and operation during night time and holidays should be restricted.
		Noise and vibration	C	
	Repairing, renewal and establishing gate and water measurement facilities	Air pollution	C	
		Noise and vibration	C	
Strengthening Water Management in the Field	Installing division box with water measurement tool at the intakes of farm	Air pollution	C	• Operation of machines should be planned distant from neighboring residences in a proper extent. • Machines should be operated with due maintenance work in a proper extent with watering of the operation site to avoid dust in a proper extent • Operation of machines should be limited to normal working hours, and operation during night time and holidays should be restricted.
		Noise and vibration	C	
Promoting Water Saving Technology	-	-	-	-
Improving Drainage Conditions in the Field	Preparing construction machinery for drainage improvement in the field	Air pollution	C	• Operation of machines should be planned distant from neighboring residences in a proper extent. • Machines should be operated with due maintenance work in a proper extent with watering of the operation site to avoid dust in a proper extent. • Operation of machines should be limited to normal working hours, and operation during night time and holidays should be restricted.
		Noise and vibration	C	
Strengthening WUA and Enhancing Its Activity	Equipping construction machinery for canal maintenance work to WUA	Air pollution	C	• Operation of machines should be planned distant from neighboring residences in a proper extent. • Machines should be operated with due maintenance work in a proper extent with watering of the operation site to avoid dust in a proper extent. • Operation of machines should be limited to normal working hours, and operation during night time and holidays should be restricted.
		Noise and vibration	C	
Joint marketing by farmer group (Model Agro-firm establishment)	-	-	-	-
Improvement of Marketing Support Infrastructure	-	-	-	-
Small scale slaughterhouse	Construction of small scale slaughterhouses	Water pollution	B	• Septic tank with appropriate capacity shall be installed in the slaughter house and be well maintained • Design of slaughter house shall be done from the view point of collecting all wastewater into the septic tank • Installation of storage for waste born in the process of slaughtering • Handing over of waste to appropriate agent for incineration or recycling • In case incineration of waste will be done within the facility, furnace with chimney with appropriate height shall be installed to avoid influence to neighboring residences and other facilities • Installation of cold storage for meat and other byproducts • Regular cleaning of the facility shall be planned and executed
		Waste	B	
		Offensive odor	B	

Table 6.4.14 Possible Negative Environmental and Social Impacts (3/3)

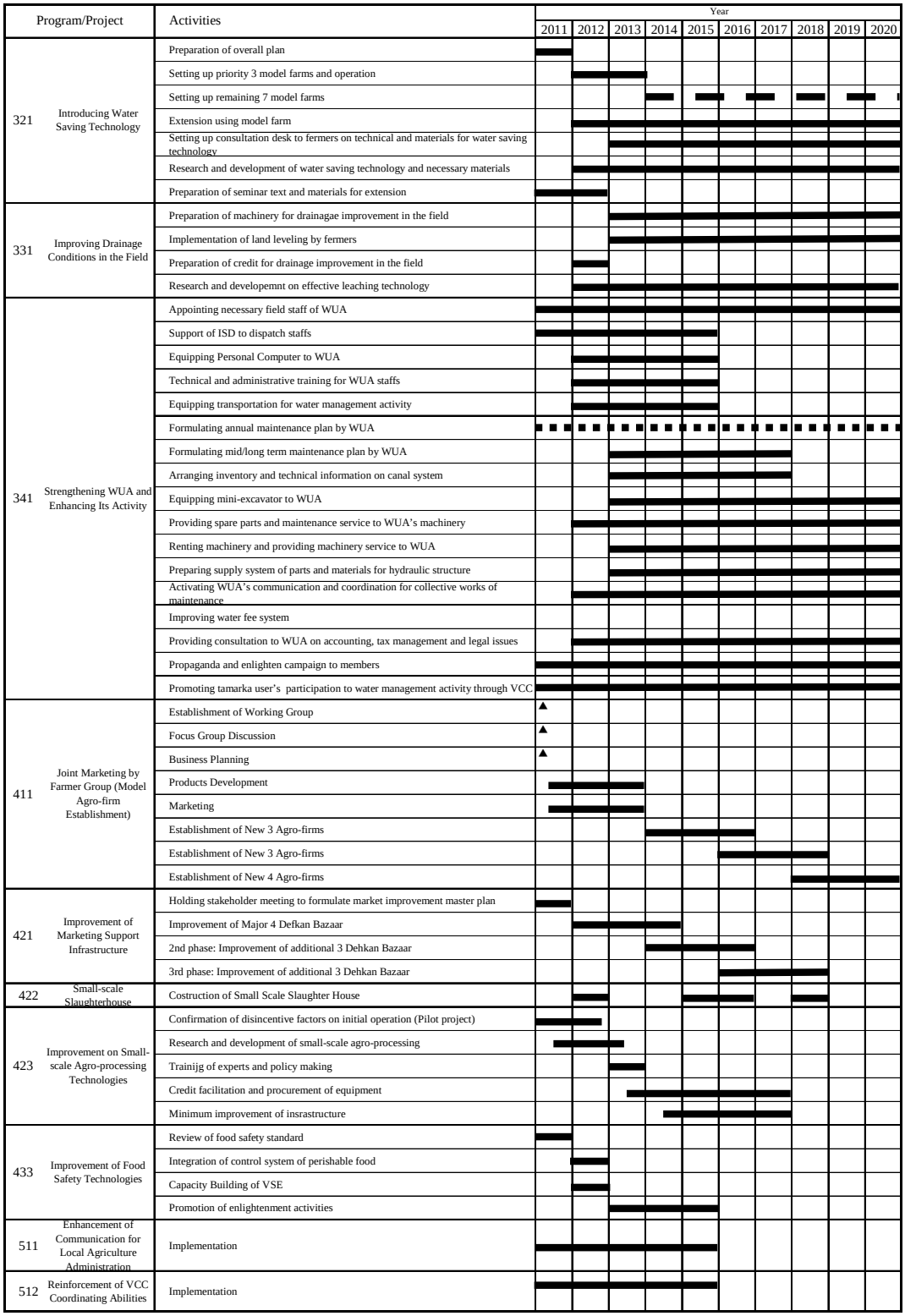
Program/Project	Impacts			Possible Mitigation Measures
	Activity	Environmental / social aspects	Eval*	
Improvement of Small-scale Agro-Processing Technologies	Implementation of test operation of small-scale agro-processing in the selected sites; milk mini-plant, vegetable and fruit processing and oil-extractor/mill	Water pollution	C	• Operation of machines should be planned distant from neighboring residences in a proper extent. • Machines should be operated with due maintenance work in a proper extent, together with watering of the operation site to avoid dust in a proper extent. • Operation of machines should be limited to normal working hours, and operation during night time and holidays should be restricted. • Septic tank with appropriate capacity shall be installed in the facility and be well maintained • Design of facility shall be done from the view point of collecting all wastewater into the septic tank • Installation of storage for waste born from processing • Handing over of waste to appropriate agent for incineration / burying or recycling • In case incineration will be done within the facility, furnace with chimney with appropriate height shall be installed to avoid influence to neighboring residences and other facilities • Regular cleaning of the facility shall be planned and executed
		Waste	B	
		Offensive odor	C	
	Procurement arrangement and operation of agro-processing equipment by the groups of Agro-firm, *fermer* and *dehkan*	Water pollution	C	
		Waste	B	
		Offensive odor	C	
	Necessary infrastructural improvement and monitoring	Air pollution	B	
		Noise and vibration	B	
Improvement of food safety technologies	Review of Food Safety Standard	Local economy such as employment and livelihood, etc.	C	• Provide information and support to small and marginal food producers to match food safety standards and application of control plan. • Prepare transitional measures such as training courses and small-scale credit to support to conventional food producers for them to adapt to new standards and control plan
	Improvement of Sanitary Control Plan	Local economy such as employment and livelihood, etc.	C	
Strengthening of Communication for Local Agricultural Administration	-	-	-	-
Reinforcement of VCC Coordinating Abilities	-	-	-	-

*Eval: A: Significant negative impact expected
B: Moderate / considerable negative impact expected
C: minor / uncertain negative impact expected

Figure 6.3.2 Implementation Schedule of the Action Plan (1/2)

Program/Project		Activities	Year									
			2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
111	Soil Conservation and Improvement of Crop Rotation	Confirmation of Soil Survey										
		Development of a comprehensive Program										
		Arrangements with the central government										
		Research on alternative crops										
		Expansion of farmland under crop rotation										
121	Improvement of Agricultural Extension Service to Fermer	To organize and manage a committee to develop agricultural technical manuals										
		To edit and print the manuals										
		To provide the manuals										
		To train teachers of district agricultural collages										
		To organize technical seminar for fermers										
		To provide agricultural extension services										
131	Promotion of Renewal of Agricultural Tractors	Implementation of the tractor lease scheme										
		Planning of MTPs' workshop improvement										
		Facility renovation and equipment procurement										
		Training of MTP mechanical staff										
141	Improvement of Accessibility to Agricultural Inputs for Agricultural Producers	Contracting with producers and/or sales agents of seeds, fertilizers and pesticides/ herbicides										
		Renovation of existing outlet stores to be suitable for the "One-Stop Agro-inputs Shops"										
		Establishment of "One-Stop Agro-inputs Shops"										
		Consultation services to "One-Stop Agro-inputs Shops"										
151	Research and Development of Melons and Apple	To establish a trial and demonstration field and facilities										
		To study and research recommended varieties and production technologies										
		To provide production technologies										
		To produce and distribute melon seeds										
		To cultivate mother plants of apple										
		To provide apple scions										
161	Strengthening of Women's Vegetable Production in Tamarka	Implementation in Model Tamarka (1 District / Year)										
211	Fodder Production and Promotion of Livestock	Alfalfa seed production center at SCA in Chimbay										
		Silage production										
		Collective fodder production										
		Rotational production of crops and fodder (alfalfa)										
221	Artificial Insemination and Veterinary Services	Establishement of artificial insemination center										
		Fostering artificial inseminators										
		Provision of AI tools and vehicles										
		Provision of vehicles with vet. Intrument for mobile										
261	Training Programs on Animal Husbandry	Training program for femermers and dehkans										
		Training program for livestock experts										
271	Sustainable Fishery Promotion	Rehabilitation of Association										
		Improvement of financial system										
		Seed production										
		Seed distribution and verification of effectiveness										
		Setting appropriate capture production										
		Opening new water area	at any time									
272	Aquaculture Development	Staff training										
		Arrangement of support system for aquaculture promotion										
		Extension and publicity										
		Implementation of model production										
		Making of manual and promotion										
311	Improving Internal Canal System	Establishing the special fund and preparation, formulating technical guidance										
		Preparing the improvement plan, application and approval										
		Investigation, survey and design										
		Cleaning and digging canal, repair and installation of gate and water measurement facilities										
312	Strengthening Water Management in the Field	Revision of WUA's regulation and public relations, standardizing specification of division box										
		Installation of division box at the intake of farm										
		Measurement of water amount distributed to farms										
		Technical seminar on irrigation planning and water use										

Figure 6.3.2 Implementation Schedule of the Action Plan (2/2)



CHAPTER 7 Conclusions and Recommendations

7.1 Conclusions

(1) Master Plan and Action Plan for Regional Development in Karakalpakstan

In response to the request of the GOK through the GOU, the GOJ, through the JICA, conducted the Study on Regional Development in Karakalpakstan in the Republic of Uzbekistan. The objectives of the Study were to 1) formulate the Master Plan on regional development through the development of agriculture for 11 districts of the Republic of Karakalpakstan, and to 2) develop the capacities on planning and implementing the projects, of the Karakalpak government officials and other concerned organizations.

During the Study Period from March 2008 to December 2010, the Study Team, in cooperation with the Counterparts of Uzbekistan and Karakalpakstan, has formulated a Master Plan for Regional Development in Karakalpakstan and an Action Plan for the Realization of the Master Plan. In preparation of the Master Plan and Action Plan, two important factors were taken into account; 1) plan of market oriented agriculture sector development including animal husbandry and fishery, and 2) livelihood improvement plan of small scale farming and animal husbandry to reach the demand of self-consumption and sales of excess to the local market. Taking into consideration such factors, the Master Plan aims to “develop market-oriented farm management and good use of *tamarka* (backyard farming), so that people living in the region can have a good livelihood”.

The Master Plan consists of a series of sub-sectoral strategies and development components, covering the fields of agriculture, livestock, fisheries, irrigation and drainage, marketing, and processing. The individual components under the sub-sectors, with additional activities for institutional development to support farmers, were further re-organized into the Action Plan, in view of the actual implementation. As result, 23 components (Regional Development Projects) with their implementation plans are described in the Action Plan.

The implementation of the Action Plan is expected to contribute not only towards the development of the agriculture sector, but also towards livelihood improvement of individual crop growers (*fermers* and *dehkans*). This will further contribute to the enhancement of regional economy in the Target Area. Taking into consideration the current government policy of agricultural development and market reform in Uzbekistan and Karakalpakstan, the Master Plan and Action Plan for regional development in Karakalpakstan stands as an important key for further development in the region.

The main features of the Master Plan and Action Plan are indicated in the followings.

(2) Relevance to the National Development Policy

Since the independence of the Republic of Uzbekistan in 1991, the Government has gradually introduced a series of economic reform measures to shift the centrally planned economy to a market-oriented economy. Also in the agricultural sector, the Government dissolved the *shirkat* system and promoted the formulation of private farms since 2001. In 2006, the Government added new directions for further promotion of the agricultural reform. This included items such as improvement of accessibility of dehkans to agricultural input and credit, promotion of information dissemination, promotion of export, food security, development of *dehkans*, development of rural infrastructure, and cooperation with donor agencies. Furthermore, the Welfare Improvement Strategy Paper (2005-2010), together with the revised Draft National Development Program of Karakalpakstan (2007-2011), emphasizes the importance to develop rural areas and promoting a shift to market-oriented agriculture.

The Master Plan for Regional Development in Karakalpakstan, together with its Action Plan, indicates a series of measures for the development of rural economy through enhancement of agriculture. The implementation of the Action Plan will not only contribute to large scale *fermers*, but also to promote improvements of small scale farming and animal husbandry to reach the demand of self consumption and sales of excess to local markets.

The Master Plan and Action Plan are in the tracks of the national development policies and its implementation is expected to largely contribute the development of Karakalpakstan.

(3) Needs of Farmers and Villagers

The Master Plan and Action Plan for regional development are formulated based on the needs of the farmers and villagers in the Target Area. Such needs were mainly identified through workshops, questionnaire surveys and direct interviews with farmers and villagers. Also, with the participation of farmers and villagers together with local consultants, contractors, NGOs and organizations, six pilot projects were conducted to verify selected activities of the Action Plan. All activities were verified from the point of acceptability of farmers, possibility of implementation and effectiveness of projects. The contents of the Master Plan and Action Plan not only reflect the vision of the national development policies, but also the reflect the actual needs of the farmers and villagers of the Target Area.

(4) Enhancement of Livelihood

Under harsh natural conditions; climate, water and soil, the Study Area is one of the most depressed and less developed areas in Uzbekistan. Several projects/programs, such as ELI, are being implemented in the Target Area by UNDP and other donors. However, further effective development for the improvement of livelihood of the inhabitants is still required. Crop production and animal raising are the main economic sectors in the Study Area. Therefore, the Master Plan and Action Plan proposed in the Study targets market-oriented agriculture development together with livestock development and value-adding of products. These issues are regarded most important for enhancing the livelihood of the inhabitants in the Target Area.

(5) Estimated Benefits by the Implementation of Action Plan

The Action plan, with the EIRR estimated to be 32%, is regarded to bring both tangible and intangible benefit to the Target Area. The annual incremental benefit produced through the implementation of the Action Plan at the year 2020 is estimated to be around 47 billion sum, and is expected to maintain its level after the completion of the Action Plan.

(6) Killer Assumption

Among the tangible benefits borne from the implementation of the Action Plan, the most significant is the benefit from increased milk production (38 billion sum, accounting for nearly 88% of the total incremental benefit in 2020). However, increased milk production will not be realized by implementation of a single program / project of the Action Plan, but through the comprehensive implementation of a series of activities (soil conservation and improvement by crop rotation, fodder production, training program on animal husbandry, artificial insemination and veterinary services, etc.).

One of the most important assumptions to achieve the expected benefits is the implementation of crop rotation, where the forage produced will be used to raise dairy cattle. Without the implementation of this activity, economic feasibility of the Master Plan will be doubtful. Furthermore, soil conservation is also the basis for other crop production. Due to this reason, implementation of “soil conservation and improvement by crop rotation” should be pointed out as the killer assumption. In other words, the activity that must be implemented in order to achieve the objective of the Master Plan

(7) Early Implementation of the Action Plan

Within the total amount of direct investment, 60.9 billion sum for renewing agricultural tractors (including physical contingency) is expected to be born by "Special Fund for agricultural tractor mechanization for depressed areas in Karakalpakstan" which is to be newly established. This fund will be recovered through the fee collected by the agricultural tractor leasing company. Furthermore, the current "Melioration Improvement Fund" should be extended to devise the 53.2 billion sum for the rehabilitation of internal irrigation and drainage system (including physical contingency).

The remaining amount of 53.6 billion sum (average annual cost at 5.36 billion sum) shall be covered by the budget of the Government of Karakalpakstan (GOK). The annual average expenditure for this cost is equivalent to approximately 6.3 % of the annual budget of the GOK (2004). Basically, these funds shall be arranged by the Government budget. However, taking into consideration limited financial resources of the GOK, it is also possible to search for financial assistance by donor agencies/countries. The GOK and Government of Uzbekistan should start the arrangement of necessary funds for the implementation of the Action Plan as soon as possible.

7.2 Recommendations

(1) Effective Use of Local Human Resources

There are sufficient human resources in the Study Area, such as researchers, consultants, contractors and NGOs. They have enough knowledge with high academic background, but they are currently not strongly involved in economic development. It is recommended to effectively utilize such human resources for the implementation of development projects. Also, the Counterparts of the Study and consultants/NGOs that worked with the Study Team had valuable experiences through the Study. Their know-how can also contribute to the implementation of Regional Development Projects.

(2) Collaboration with External Resources Persons and Organizations for Rural Development Projects

Through the implementation of the Pilot Projects, many governmental organizations concerned to food processing in Uzbekistan and Karakalpakstan, which are working under the laws on food processing, were found. These are namely: Uzstandard, Republican Sanitary and Epidemiology Station, Association for Meat and Milk Products. The Pilot Projects regarding agro-processing were implemented under the collaboration with such relevant organizations. Through the experience, a network among these organizations was developed both on professional and personal basis. Such experiences will be effective for the future implementation of Regional Development Projects.

(3) Improvement of Rural Infrastructure

In Karakalpakstan, 70 % of the population is covered with piped water supply system. However, due to shortage of water, piped water is supplied intermittently and not for the whole day in rural areas. In such areas, electricity is also intermittently supplied. Under such conditions, diesel generators with high diesel consumption are required when small scale agro-processing plants are installed in the rural areas. Their production will not be efficient and production costs will increase. Under poor rural infrastructures, the promotion of rural industries is difficult. The improvement of rural infrastructure, such as electricity, piped water, gas and rural roads, is strongly recommended in parallel with agricultural development.

(4) Promotion of Private Enterprises and Smooth Disbursement in Banking System

According to the Government regulation for financial means of technical assistance, grants and humanitarian assistance of foreign governments and non-government organizations, the bank transfers

to Uzbekistan contractors from donor country or organization shall be monitored by the Grant Committee of the Government (hereinafter referred to as “the SGA system”).

Under the SGA system, a minimum one month period is required before the money can be mobilized after it is transferred to the contractors account. The regular two to three months stand by period has been a considerable setback for the completion of the Pilot Projects under the technical cooperation scheme. With the sub-contractors usually lacking operation fund, the activities of the Pilot Projects were delayed. Under such circumstance, investment of short period projects such as the technical cooperation of JICA will be difficult to implement. In order to facilitate a smooth implementation of projects, a short term credit with easy access should be arranged by concerned banks.

For the procurement of equipment from foreign manufacturers such as milk pasteurizer for the Study, difficulties for the Uzbek suppliers or agents for receiving and payment transfer under the Government foreign currency control were also found. Similar arrangements should be made as well.

(5) Effective Use of 6 Pilot Projects for the Implementation of Action Plan

In the Study, six Pilot Projects were implemented. These pilot projects should be used as demonstration projects for Regional Development Projects. The sites will provide easy understanding for new beneficiaries through visual means and discussion with participants at the Pilot Project sites. For this purpose, the Government of Karakalpakstan is expected to continue its support for these Pilot Projects.

APPENDIX

APPENDIX-1 Scope of Works and Minutes of Meeting of the Study

SCOPE OF WORK

FOR

THE STUDY

ON

REGIONAL DEVELOPMENT IN KARAKALPAKSTAN

IN

THE REPUBLIC OF UZBEKISTAN

AGREED UPON BETWEEN

COUNCIL OF MINISTERS, THE REPUBLIC OF KARAKALPAKSTAN

AND

JAPAN INTERNATIONAL COOPERATION AGENCY

Nukus, April 27, 2007

Mr. Bahadir Yangibaev
Chairman,
Council of Ministers,
The Republic of Karakalpakstan

Mr. Minoru HOMMA
Leader,
Preparatory Study Team,
Japan International Cooperation Agency
(JICA)

Witness:

Mr. Mukhammadkosim Olimov
Deputy Head of the Complex on Economic Issues,
Ministry of Agriculture and Water Resources,
The Republic of Uzbekistan

I. INTRODUCTION

In response to the official request of the Government of the Republic of Uzbekistan (hereinafter referred to as "the Government of Uzbekistan") and the Government of the Republic of Karakalpakstan (hereinafter referred to as "the Government of Karakalpakstan"), the Government of Japan has decided to conduct the Study on Regional Development in Karakalpakstan (hereinafter referred to as "the Study") together with the Government of Uzbekistan and the Government of Karakalpakstan in accordance with the Agreement on technical cooperation between the Government of Uzbekistan and the Government of Japan signed on June 5, 2006 (hereinafter referred to as "the Agreement")

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, will jointly undertake the Study with the authorities concerned of the Government of Uzbekistan and the Government of Karakalpakstan.

The present document sets forth the Scope of Work with regard to the Study and will be valid after the notification of approval by JICA Uzbekistan Office to the Government of Karakalpakstan.

II. OBJECTIVES OF THE STUDY

The objectives of the Study are:

1. To formulate the Master Plan on regional development in the Republic of Karakalpakstan.
2. To develop the capacities on planning and implementing the projects, of the Government of Karakalpakstan and other concerned organizations.

III. STUDY AREA

The Study shall cover eleven (11) Districts of the Republic of the Karakalpakstan (KUNGRAD, MUYNAK, SHUMANAY, KANLIKUL, KEGEILY, CHIMBAY, KHODJEYLI, NUKUS, KARAUZYAK, TAKHTAKUPYR, BERUNI).

IV. SCOPE OF THE STUDY

In order to achieve the objectives mentioned above, the Scope of Work for the Study shall cover the following items.

Phase 1:

(1) Situation analysis
   1) Review of the existing data, information and reports including Program on The Social and Economic Development of the Republic of Karakalpakstan.

   2) Baseline survey for supplementary data collection on the following aspects in the above mentioned study area:
      a. Natural, social and economic conditions
      b. National policy, strategy and plans
      c. Household economy of rural farmers
      d. Agriculture, horticulture, animal husbandry and inland fisheries
      e. Farming system and Post-harvesting

f Processing, marketing and distribution of agricultural products
g Rural infrastructure and facilities including irrigation and drainage system
h Operation and maintenance of existing rural infrastructure and facilities including irrigation and drainage system
i Agricultural extension and credit
j Environmental issues
k Location of districts and population distribution
l Inventory of food processing and marketing related facilities
m Others

3) Review of the relevant projects by the government, donors and NGOs etc.

4) Considerations on environmental and social factors

(2) Identification and clarification of potentials and constraints for attaining regional development of eleven (11) districts of the Republic of Karakalpakstan

(3) Conceptualization of the Master Plan in line with the above potentials and constraints

(4) Drafting the Action Plan

(5) Selection of activities and targeted areas for the verification studies

Phase 2:

(1) Preparation for the verification studies

(2) Implementation of the above planned activities with capacity development of concerned organizations

(3) Considerations on environmental and social factors

(4) Extraction and summarization of lessons and experiences learnt through the verification studies

(5) Finalization of the Action Plans on the basis of findings from the verification studies

(6) Finalization of the Master Plan

V. SCHEDULE OF THE STUDY

The Study will be carried out in accordance with the attached tentative schedule.

VI. REPORTS

JICA shall prepare and submit the following reports in English to the Government of Karakalpakstan. JICA will also prepare the reports in Russian for information purpose. The English version shall remain official.

1. Inception Report:
Fifteen (15) English copies and Thirty (30) Russian copies at the commencement of the first field work period in Karakalpakstan. This report shall contain the schedule and methodology of the

work period in Karakalpakstan. This report shall contain the schedule and methodology of the Study as well.

2. Progress Reports:
Fifteen (15) English copies and Thirty (30) Russian copies at the middle of the Phase1 and Phase2, respectively.

3. Interim Report:
Fifteen (15) English copies and Thirty (30) Russian copies at the end of the Phase1 of the Study.

4. Draft Final Report:
Fifteen (15) English copies and Thirty (30) Russian copies at the end of the verification studies; the Government of Karakalpakstan shall submit its comments within one (1) month after the receipt of the Draft Final Report.

5. Final Report:
Twenty (20) English copies and Forty (40) Russian copies within two (2) months after the receipt of the comments on the Draft Final Report.

VII. ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

The Government of Karakalpakstan shall comply with the relevant regulations and standards in the Government of Uzbekistan as well as the JICA Guidelines for Environmental and Social Considerations in relation to the implementation of the Study.

VIII. UNDERTAKINGS OF THE GOVERNMENT OF UZBEKISTAN AND THE GOVERNMENT OF KARAKALPAKSTAN

1. In accordance with the Agreement, the Government of Uzbekistan and the Government of Karakalpakstan shall take the following necessary measures;
(1) To accord privileges, exemptions and other benefits to the JICA Study team (hereinafter referred to as "the Team")
(2) To bear claims, if any arises, against the members of the Team resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Team.

2. To facilitate smooth implementation of the Study, the Government of Uzbekistan and the Government of Karakalpakstan shall provide necessary facilities to the Team for the remittance as well as utilization of the funds introduced into Uzbekistan from Japan in connection with the implementation of the Study.

3. Council of Ministers, the Republic of Karakalpakstan, shall act as the counterpart agency to the Team and also as the coordinating body in relation with other governmental and non-governmental organizations concerned for the smooth implementation of the Study.

4. Council of Ministers, the Republic of Karakalpakstan, shall at its own expense, provide the Team with the following in cooperation with other agencies concerned:
(1) Security-related information on as well as measures to ensure the safety of the Team;
(2) Information on as well as support in obtaining medical service;
(3) Available data (including maps and photographs) and information related to the Study;
(4) Counterpart personnel;

(5) Suitable office space with telephone lines; and
(6) Support in obtaining credentials or identification cards.

IX. UNDERTAKINGS OF JICA

For the implementation of the Study, JICA shall take the following measures;

1. To dispatch, at its own expense, the Team to the Government of Karakalpakstan; and

2. To transfer relevant skills and technologies to the counterpart personnel in the Government of Karakalpakstan in the course of the Study.

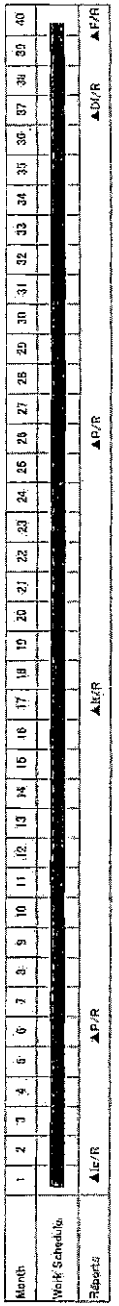
X. CONSULTATION

JICA and Council of Ministers, the Republic of Karakalpakstan, shall consult with each other in respect of any matter that may arise from or in connection with the Study.

A1 - 3

Annex

Tentative Schedule of the Study



Note:
Ic/R: Inception Report
P/R: Progress Report
Ic/R: Interim Report
DF/R: Draft Final Report
F/R: Final Report

MINUTES OF MEETING

ON

THE STUDY ON

REGIONAL DEVELOPMENT IN KARAKALPAKSTAN

IN

THE REPUBLIC OF UZBEKISTAN

AGREED UPON BETWEEN

COUNCIL OF MINISTERS, THE REPUBLIC OF KARAKALPAKSTAN

AND

JAPAN INTERNATIONAL COOPERATION AGENCY

Nukus, April 27, 2007

Mr. Bahadir Yangibaev
Chairman,
Council of Ministers,
The Republic of Karakalpakstan

Mr. Minoru HOMMA
Leader,
Preparatory Study Team,
Japan International Cooperation Agency
(JICA)

Witness:

Mr. Mukhammadkosim Olimov
Deputy Head of the Complex on Economic Issues,
Ministry of Agriculture and Water Resources,
The Republic of Uzbekistan

A1 - 4

1. Introduction

With regards to the Scope of Work for the Study on Regional Development in Karakalpakstan (hereinafter referred to as "the Study") signed by the Government of the Republic of Karakalpakstan (hereinafter referred to as "the Government of Karakalpakstan") and the Japan International Cooperation Agency (hereinafter referred to as "JICA") on 27 April, 2007, the Preparatory Study Team headed by Mr. Minoru HOMMA, dispatched by JICA to Uzbekistan from April 10 to May 1, 2007, and the representatives of the Government of the Karakalpakstan and other relevant organizations had a series of discussions on the detailed matters related to the Study.

The list of the participants in a series of meeting is attached as Appendix.

As a result of discussions, the followings were agreed upon by both Karakalpakstan and Japanese sides in relation to the implementation of the Study.

2. Language

The Uzbekistan side and the Japanese side agreed that the Scope of Work and the Minutes of Meeting be prepared in both English and Russian text, each one being equally authentic. In the case of any divergence of interpretation, the English text shall prevail.

3. Target Year

The both sides agreed that the target year of Master Plan should be ten (10) years from 2011 (2011-2020).

4. Contents of the Study

(1) The both sides agreed that the Master Plan shall focus mainly on agricultural sector in Karakalpakstan in consideration of the importance of agriculture in the Karakalpakstan.

(2) The both sides agreed that the Master Plan shall be utilized in formulation of "Program on Social and Economic Development of the Republic of Karakalpakstan".

(3) The both sides agreed that the Master Plan shall target the *Fermer* and *Defkan* based on the market economy.

(4) The both sides agreed that several verification studies shall be selected from the Draft Action Plan in accordance with the criteria agreed in the course of the Phase 1 of the Study.

5. Counterpart Personnel

Council of Ministers, the Republic of Karakalpakstan, shall assign the necessary number of counterpart personnel from the concerned organizations for the Study and submit the list of counterpart personnel at the beginning of the Study.

6. Steering Committee

For the smooth and effective implementation of the Study, both Karakalpakstan and Japanese sides agreed upon the need for establishment of a steering committee consisting of the following members:

The Chairperson may invite representatives from other relevant organizations, whenever necessary.

(1) Chairman of Council of Ministers of the Republic of Karakalpakstan (chairperson)
(2) Deputy Chairman of Council of Ministers of the Republic of Karakalpakstan
(3) Representatives, Ministry of Economy of the Government of Uzbekistan (As agreed)
(4) Representatives, Minister of Agriculture and Water Resources of the Government of Uzbekistan (As agreed)
(5) Deputy Minister of Foreign Economic Relations, Investments and Trade of Karakalpakstan
(6) Minister of Economy of Karakalpakstan
(7) Minister of Agriculture and Water Resources of Karakalpakstan
(8) Chairman of Farmers' Association of Krakalpakstan
(9) Chairman of Chamber of Commerce and Industry in Karakalpakstan
(10) Representative of JICA Uzbekistan Office
(11) JICA Study Team

7. Counterpart Training in Japan

The Karakalpakstan side requested that the counterpart personnel take advantage of training in Japan or other countries to promote an effective technology transfer related to the Study.

The Japanese side understood the necessity of training and explained that the formal request for the training should be made by the Uzbekistan side through the Embassy of Japan.

8. Office Space

The Government of Karakalpakstan promised to provide the members of the Study with suitable office space with telephone lines and to prepare it before the commencement of the Study.

9. Report

(1) The Government of Karakalpakstan agreed that the Final Report would be open to the public in order to maximum use of the results of the Study.
(2) Both sides agreed that all reports would be principally prepared in English, and Russian as indicated in the Scope of Work. In the case of any divergence of interpretation, the English text shall prevail. Yet, both sides further agreed that the annexed documents such as data sets, maps and drawings in the Draft Final Report and the Final Report would be available only in English.

10. Environmental and Social Considerations

The necessary administrative procedures shall be taken by the Karakalpakstan side as well as bearing the cost for applications and permissions, while JICA Study Team shall bear the cost for the necessary activities for environmental and social considerations, including studies and stakeholder meetings etc.

11. Undertakings of the Government of Uzbekistan and the Government of Karakalpakstan

Regarding the necessary vehicles of the study and furniture for the office-space, the Karakalpakstan side, due to its budgetary constraints, requested the Japanese side to prepare them at JICA's expense.

Japanese side stated that it would convey the request to the JICA Headquarters for consideration.

12. Other Relevant Issues

As explained in the Scope of Work, the notification of its validity will be made officially in writing from JICA Uzbekistan Office to the Government of Karakalpakstan with a copy to the Government of Uzbekistan.

Appendix

List of Attendants

Karakalpakstan side

Council of Ministers of Karakalpakstan

Mr. Yangibaev B.	Chairman
Mr. Abduraklamanov Kh.	Deputy Chairman
Mr. Mukhanov M.	Head of Secretariat on Agricultural and Water

Ministry of Foreign Economy Relations, Investments & Trade of Karakalpakstan

Mr. Sultanuratov A.	Minister
Mr.Ganiev M.	Deputy Minister

Ministry of Economy of Karakalpakstan

Mr. Ernazarov M.	Minister
Ms. Khalmuratova G.	Deputy Minister

Ministry of Agriculture and Water Resources of Karakalpakstan

Mr. Ermanov. F.U.	Minister
Mr. Abdirov M. A.	Head of Management. Lower Amudarya Basin Management of Irrigation System

State Committee on Nature Protection of Karakalpakstan

Mr. Reimov R. P.	Chairman

Chamber of Commerce and Industry of Uzbekistan Karakalpakstan Regional Administration

Mr. Kaypnazarov K.	Head of Administration
Mr. Kosnazarov M.	Deputy Head of the Administration

Fermer's Association of Karakalpakstan

Mr. Tleumuratov A.	President

Fishery Association

Mr. Juzbaev B.	Chairman

Uzbekistan side

Ministry of Economy of Uzbekistan

Mr. Shoabdurahmanov R.	Deputy Minister
Mr. Satterov S.	Head of Department for Accommodation and Complex Development of Regions
Mr. Tuliev A.	Head of section for Development of Agriculture and Water Resources
Mr. Mirzaev A.	Head of section on Cooperation Issues with Eurasian Economic Community & International Financial Institutions
Mr. Umarov O.	Head of Section for Possessing Industry of Food Staff
Mr. Ibragimov F.	Deputy Head of Section for Processing Industry and Food Staff

Ministry of Agriculture and Water Resources of Uzbekistan

Mr. Sherkobilov S.	Head, Department for Development of Production Vegetables, Fruits and Processing of Agricultural Products
Mr. Mamarasulov K.	Deputy Head, Department for Coordination and Development of Market Infrastructure in Rural Areas
Mr. Durmatov D.	Deputy Head, Department for Exploitation of Irrigation Networks
Mr. Mamutov R.	Head, Section for Exploitation and Improvement of Ameliorative System
Mr. Djumaboev B.	Head, Section for Development Planning and Investments
Mr. Ibragimov R. P.	Director, Foreign Investment Department
Mr. Salikhov Z.A.	Deputy Head, Foreign Investment Department

Japanese side

The Preparatory Study Team

Mr. Minoru Honma	Team Leader
Dr. Kazuo Nakabayashi	Development Plan for Agriculture
Mr. Shiro Akamatsu	Rural Society
Mr. Hirohide Kono	Farming System (Livestock)
Ms. Yasuko Ose	Marketing and Distribution of Agricultural Products
Mr. Takayoshi Itoigawa	Processing of Agricultural Products
Mr. Seiichi Yamakawa	Rural Infrastructure / Environmental and Social Considerations
Ms. Fumi Nakamura	Planning Management
Ms. Yurika Kuroda	Interpreter

JICA Uzbekistan Office

Mr. Jun Yamazaki	Assistant Resident Representative

APPENDIX-2 List of Steering Committee Members and Counterparts

APPENDIX 2: List of Steering Committee Members and Counterparts

Steering Committee members

1. Chairman, Council of Ministers of the Republic of Karakalpakstan
2. Deputy Chairman, Council of Ministers of the Republic of Karakalpakstan
3. Representative, Ministry of Economy of the Republic of Uzbekistan
4. Representatives, Ministry of Agriculture and Water Resources of the Republic of Uzbekistan
5. Minister of Foreign Economic Relations, Investment and Trade of the Republic of Karakalpakstan
6. Minister of Economics of the Republic of Karakalpakstan
7. Minister of Agriculture and Water Resources of the Republic of Karakalpakstan
8. Chairman of Farmers' Association of the Republic of Karakalpakstan
9. Chairman of Chamber of Commerce and Industry in the Republic of Karakalpakstan
10. Representative of JICA Uzbekistan Office
11. JICA Study Team

Counterparts

1. Mr. Oralbai Mambetlepesov	Deputy Minister, Ministry of Agriculture and Water Resources, Karakalpakstan
2. Mr. Makhmud Kaipanov	Deputy Minister, Ministry of Agriculture and Water Resources, Karakalpakstan
3. Mr. Azat Tleumuratov	Chairman, Fermer Association, Karakalpakstan
4. Mr. Juzbaev Baxtiyar	Chairman, Water Resources Inspection, Karakalpakstan
5. Mr. Aknazarov Orimbai	Deputy Head, Lower Amudarrya Basin Management Department, Ministry of Agriculture and Water Resources, Karakalpakstan
6. Mr. Kurbaniyazov Murat	Head, Department of Production and Marketing, Ministry of Agriculture and Water Resources, Karakalpakstan
7. Mr. Keulumjai Bekbergenov	Director, Karakalpakstan Normative Research Center of the Uzbekistan Scientific Research Institute of the Study of Market Reform
8. Mr. Ospanov Asemkhan	Head, Department of Animal Husbandry, Ministry of Agriculture and Water Resources, Karakalpakstan
9. Mr. Usnatdinov Omirbai	Head, Department of Horticulture, Ministry of Agriculture and Water Resources, Karakalpakstan

APPENDIX-3 Project Design Matrix of Action Plan

Components of the Action Plan

Category	Action Plan Component	No.
Development of Market Oriented Agriculture	Soil Conservation and Improvement by Crop Rotation	111
	Improvement of Agricultural Extension Service to Fermer	121
	Promotion of Renewal of Agricultural Tractors	131
	Improvement of Accessibility to Agricultural Inputs for Agricultural Producers	141
	Research and Development of Melons and Apple	151
	Strengthening of Women's Vegetable Production in Tamarka	161
Integrated Farm Management by Fodder Production and Animal Breeding	Fodder Production and Promotion of Livestock	211
	Training Programs on Animal Husbandry	221
	Artificial Insemination and Veterinary Services	241
Development of Fisheries and Aquaculture	Sustainable Fisheries and Aquaculture	271
	Aquaculture Development	272
Improvement of Irrigation Water Use Efficiency and Reducing Crop Damage by Salinity	Improving Internal Canal System	311
	Strengthening Water Management in the Field	312
	Introducing Water Saving Technology	321
	Improving Drainage Conditions in the Field	331
	Strengthening WUA and Enhancing Its Activity	341
Distribution and Marketing by Farmers Cooperatives	Joint Marketing by Farmer Group (Model Agro-firm Establishment	411
	Improvement of Marketing Support Infrastructure	421
	Small-scale Slaughterhouse	422
Value-adding of Agricultural and Livestock Products	Improvement of Small-scale Agro-processing Technologies	431
	Improvement of Food Safety Technologies	433
Institutional Development for Supporting Farmers	Enhancement of Communication for Local Agriculture Administration	511
	Reinforcement of VCC Coordinating Abilities	512

A 3.1 Agricultural Development

(1) Soil Conservation and Improvement by Crop Rotation

(1) Project No.	111
(2) Project Title	Soil Conservation and Improvement by Crop Rotation
(3) Prioritized Development Approach	Development of Market Oriented Agriculture on Sustainable Basis
(4) Prioritized Development Strategy	Improvement of Soil Conditions for Sustainable Production
(5) Prioritized Area	11 districts (All districts in the Study Area)
(6) Target Group	*Fermer*
(7) Implementing Agency	Council of Ministers of Karakalpakstan
(8) Supporting Agency	Concerned *Hakimiyat*, MAWR of Karakalpakstan, Uzbekistan Scientific Centre for Agriculture in Karakalpakstan, Nukus Branch of Tashkent State University of Agriculture

(9) Background of the Project

Uzbekistan has been suffering from a general deterioration in land quality and water resources. The deterioration must be a very serious problem. Unless quick measures to prevent the deterioration, agriculture in Uzbekistan will soon reach a point at which crops cannot be grown on sustainable basis. The agriculture will eventually collapse from lack of reasonable yield of crops.

It is quite clear that introduction of crop rotation allowing more room for alternatives to cotton and wheat at the farm (*fermer*) level is the only answer with technical feasibility on sustainable basis. The priority area to pursue a technically sound agriculture with crop rotation shall be the area of low quality soils.

According to the rough calculation of the study team, the *fermer* can expect 1.5times of net profit from the ideal crop rotation farming combining cotton, wheat, alfalfa and sorghum as compared with the present mono-culture farming. Though production of cotton and wheat decreases to 2/3, the number of cows to be reared by fodders from the farmland becomes almost 3 times in the ideal farming. Also, it might be possible to increase per ha yield of cotton and wheat due to the recovery or the improvement of soil fertility after several crop rotations.

(10) Objectives of the Project

To improve soil fertility on sustainable basis by popularizing a crop rotation farming system among *fermers*.

(11) Implementation Period	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

(12) Project Goals

All *fermers* in the 11 districts introduce an ideal crop rotation farming in 10 years, based on soil survey result of their farmland

(13) Expected Outputs

Output 1: Soil fertility of farmland will be improved
Output 2: Net income of *fermers* from farming will be increased

(14) Development Indicators and Monitoring Structure

1) Area of farmland under crop rotation management
2) Sales and profit of *fermers* from farming

(15) Main Activities

Activity 1: To confirm the results of the latest soil survey
Activity 2: To develop a comprehensive program
Activity 3: To make necessary arrangements with the central government
Activity 4: To make research on alternative crops for crop rotation system
Activity 5: To expand farmland under crop rotation

(16) Estimated Project Cost (in thousand sum)

Input 1: Setup of coordination office / expansion of farmland under crop rotation	1,603,084
Input 2: Research on alternative crops / experimental cultivation	266,657
Input 3: Coordination office in the Council of Ministers of Karakalpakstan	Incl. in regular activity
Physical contingency (10% of cost)	186,974
Total	2,056,715

(17) Funding Sources	MAWR of Karakalpakstan, Technical / Financial Assistance from donor countries / organizations

(18) Project Risks

Agricultural policy giving super high priority to cotton and wheat shall be reexamined by paying serious attention to sustainability of land resources and local environment

(2) Improvement of Agricultural Extension Service to *Fermer*

(1) Project No.	121
(2) Project Title	Improvement of Agricultural Extension Service to *Fermer*
(3) Prioritized Development Approach	Development of Market Oriented Agriculture on Sustainable Basis
(4) Prioritized Development Strategy	Improvement of Agricultural Technologies and Agricultural Business Management
(5) Prioritized Area	11 districts (all districts in the study area)
(6) Target Group	*Fermer*
(7) Implementing Agency	Council of Ministers of Karakalpakstan
(8) Supporting Agency	Concerned *Hakimiyat*, MAWR of Karakalpakstan, SCA in Karakalpakstan, Nukus Branch of Tashkent State University of Agriculture

(9) Background of the Project

Productivity of major crops in Karakalpakstan is relatively low as compared with the other regions in Uzbekistan. While this is mainly due to severe condition of weather and irrigation water availability, low technical ability of *fermers* could be another reason. There is substantial number of *fermers* who worked in non-agricultural sector before starting *fermer*. Also, not all *fermers* who used to work in agricultural sector acquire farming technologies and skills systematically.

Uzbekistan government organizes annual 5-days course of *fermer* training seminar in off-agriculture season (Jan – Feb) in order to improve *fermer*s' ability. However, the seminar does not share much time for practical agricultural technologies, since it covers comprehensive topics concerning *fermer* business. Also, abundant information about agricultural technology possessed by researchers in agricultural research institutes and academic institutes does not penetrate to actual producers with understandable form and terms. As a result, many *fermer*s consider that they do not get enough agricultural extension services except for cotton and wheat production. Dissemination of agricultural information and technologies to *fermer* should be improved for further agricultural development in Karakalpakstan. Also, agricultural extension system shall be vitalized, so that *fermers* will be able to have more useful and applicable technology and information to actual daily works in the field through the nearest agricultural college.

(10) Objectives of the Project

To improve *fermers'* ability in agricultural production through improved dissemination system of agricultural technology/information

(11) Implementation Period	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

(12) Project Goals

To develop practical agricultural technical manuals targeted *fermers* (10 kinds of manuals/10 years) and utilize them in the annual *fermer* training seminar

(13) Expected Outputs

Output 1: Development and utilization of agricultural technical manuals
Output 2: Capacity building of teachers of agricultural collages in order to utilize the technical manuals, as well as to provide technical consultation services

(14) Development Indicators and Monitoring Structure

1) Volumes and numbers of agricultural technical manuals developed
2) Evaluation of the agricultural technical manuals by *fermers*
3) Number of trained teachers of district agricultural collages
4) Self-evaluation of the trained teachers about their ability
5) Number of *fermers* to visit district agricultural colleges for technical consultation

(15) Main Activities

Activity 1: To establish and manage a committee to develop agricultural technical manuals
Activity 2: To edit, print and distribute agricultural technical manuals (10,000 copies/year)
Activity 3: To train teachers of agricultural collages
Activity 4: To organize technical seminars for *fermers* (through the existing system)

(16) Estimated Project Cost (in thousand sum)

Input 1: Preparation of manuscript / printing of manual	172,188
Input 2: Training of agricultural college teachers	91,295
Input 3: Seminar for *fermers*	327,210
Physical contingency (10% of cost)	59,069
Total	649,762

(17) Funding Sources	MAWR of Karakalpakstan, Technical / Financial Assistance from donor countries / organizations

(18) Project Risks

Fermer training seminar shall be continuously organized every year at District level, as well as a good incentive for teachers of district agricultural colleges to work for the agricultural extension shall be provided

(3) Promotion of Renewal of Agricultural Tractors

(1) Project No.	131
(2) Project Title	Promotion of Renewal of Agricultural Tractors
(3) Prioritized Development Approach	Development of Market Oriented Agriculture on Sustainable Basis
(4) Prioritized Development Strategy	On-time Planting through Efficient Agriculture Works
(5) Prioritized Area	11 districts (All districts in the Study Area)
(6) Target Group	*Fermer*
(7) Implementing Agency	Council of Ministers of Karakalpakstan, The Agricultural Machinery Leasing Company, Karakalpakstan MTP Union
(8) Supporting Agency	MAWR of Karakalpakstan, Karakalpakstan *Fermer's* Association,

(9) Background of the Project

While tractors are indispensable inputs for *fermers* who manage several 10 has of farmland, many *fermers* have difficulty in using tractors on-time. At present, MTPs which is established at districts level or Alternative-MTPs (A-MTPs), private agro-machinery service companies, provide tractor services to *fermers* on contract basis and also *fermers* use their own tractors. Majority of tractors which are working now in Karakalpakstan were introduced before the independence and have transferred to MTP, A-MTP or *fermers* when *shirkats* were dissolved. Due to high dependence on the overage tractors, operation efficiency of the tractors has been decreasing year by year. Also, number of tractors in operation has been reducing, since less number of scraped tractors is replaced by new one. Such situation causes for the difficulty of *fermers* in using tractors and for unstable managements of MTPs and A-MTPs. However, MTPs and A-MTPs can not afford to renew the tractors due to their unfavorable financial condition. *Fermers* are also under the same financial situation due to severe agricultural circumstances. Though the government has carried out a tractor leasing scheme since 2001, the scheme could not cover all the potential demand in Karakalpakstan. And many *fermers* still can not afford a tractor by using the scheme. To address the situation, the government has newly introduced relaxed lease condition to the scheme.

On the other hand, transition from collective-managed *shirkats* to individual-managed *fermers* is almost completed now. Use of tractors is also needed to shift from collective operation system to individual possession. Average cropping area of *fermers* in target 11 districts is expected to be more than 60 ha as of the end of 2010. The management scale can make full use of 2 – 3 numbers of 80hp tractors which are popular in the target area. Tractors operation would be more efficient by promoting individual possession.

(10) Objectives of the Project

To increase cropped area and increase crop productivity by on-time farming through increased number of tractors and improvement of the working efficiency

(11) Implementation Period	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

(12) Project Goals

1) 1,500 agricultural tractors will be renewed or newly procured by *fermers* in the 11 districts in 10 years
2) Maintenance system of 10 MTPs, covering the11 districts, for agricultural tractors will be improved

(13) Expected Outputs

Output 1: Number of good conditioned tractors will be increased
Output 2: Capacity of MTPs for maintenance of agricultural tractors will be improved

(14) Development Indicators and Monitoring Structure

1) Number of tractors renewed or newly procured by *fermers*
2) Capacity of MTPs for maintenance of agricultural tractors (evaluation of *fermers*)

(15) Main Activities

Activity 1: To introduce favorable lease system for *fermers* to procure agricultural tractors
Activity 2: To improve function of workshops of MTPs as the central workshop at district level.
Activity 2-1: To renovate workshop facilities and equipments of MTPs
Activity 2-2: To train mechanical staff of MTPs

(16) Estimated Project Cost (in thousand sum)

Input 1: Tractor with plow (150 units, 10 years)	55,350,000
Input 2: Renovation of workshop facilities	3,690,000
Input 3: Workshop equipment of MTPs	3,690,000
Input 4: Training for MTP mechanical staff	36,715
Physical contingency (10% of cost)	6,276,672
Total	69,043,387

(17) Funding Sources	Establish of a new fund by the Government of Uzbekistan, Technical / Financial Assistance from donor countries / organizations

(18) Project Risks

Government price of cotton and wheat shall be kept at proper level, so that common *fermers* can afford an agricultural tractor by using the credit system

(4) Improvement of Accessibility to Agricultural Inputs for Agricultural Producers

(1) Project No.	141
(2) Project Title	Improvement of Accessibility to Agricultural Inputs for Agricultural producers
(3) Prioritized Development Approach	Development of Market Oriented Agriculture on Sustainable Basis
(4) Prioritized Development Strategy	Improvement of Agricultural Inputs Supply System
(5) Prioritized Area	11 districts (all districts in the Study Area)
(6) Target Group	*Fermer* and *Dehkan*
(7) Implementing Agency	*Uzselhozhimiya* (Uzbekistan Agricultural Chemical Co.), Karakalpakstan
(8) Supporting Agency	Council of Ministers of Karakalpakstan, MAWR of Karakalpakstan, Concerned *Hakimiyats*, Plant Protection Center in Karakalpakstan, Karakalpakstan *Fermer's* Association

(9) Background of the Project

Present distribution system of fertilizers is substantially monopolized by the state company and it is difficult for many agricultural producers to procure fertilizers except for contract cultivation of cotton and wheat. In case of seeds and pesticides/herbicides, the distribution systems are still underdeveloped in Karakalpakstan. As a result, *fermers* / *dehkans* use very limited amounts of the agricultural inputs for non-cotton/wheat crops and this situation is one of causes of lower crop productivity in Karakalpakstan. It is expected that improved accessibility to agricultural inputs for *fermers* / *dehkans* will contribute to improve the crop productivity. Establishment of "One Stop Agro-inputs Shops" where any customers can buy all necessary agricultural inputs (seeds, fertilizers and pesticides/herbicides) in one place without difficult procedures in rural area would improve the accessibility of *fermers* / *dehkans*.

Fortunately, movement of private sector to enter into agricultural inputs distribution business is increasing, though the movement is still in very beginning stage. Therefore, now is good timing that the government creates favorable condition to promote agricultural inputs distribution system to the end users through private channel. It needs to establish a strategic supporting system so that model "One Stop Agro-inputs Shops" will be established in every area of Karakalpakstan.

(10) Objectives of the Project

To improve productivities of crops, mainly other than cotton and wheat through improved accessibility to agricultural inputs of producers

(11) Implementation Period	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	■	■	■	■	■	■				

(12) Project Goals

1) Established 10 model shops (One Stop Agro-inputs Shops) will trigger a movement to establish similar shops at VCC level by local investors
2) Amount of agricultural inputs (seeds, fertilizers, pesticides and herbicide) used by *fermers* / *dehkans* for crops will be increased up to appropriate level

(13) Expected Outputs

Output 1: 10 Model shops managed by *fermers* (individuals or groups) will be established by improving the functions of outlet stores of *Uzselhozhimiya*
Output 2: Accessibility to agricultural inputs for *fermers* / *dehkans* will be improved

(14) Development Indicators and Monitoring Structure

1) Number of "One Stop Agro-inputs Shops" established
2) Sales achievement of the "One Stop Agro-inputs Shops"
3) Amount of agricultural inputs used by *fermers* / *dehkans* (evaluation of *fermers* / *dehkans*)

(15) Main Activities

Activity 1: To establishing "One Stop Agro-inputs Shops" by renovating the existing outlet stores of *Uzselhozhimiya* (Targets: 10 shops to cover the 11 districts)
Activity 2: To provide consultation services about establishment and management of the "One Stop Agro-inputs Shops"

(16) Estimated Project Cost (in thousand sum)

Input 1: Renovation of facilities	43,050
Input 2: Setup of supporting office / consultation services to "One-stop " agro-inputs shops"	248,139
Physical contingency (10% of cost)	29,119
Total	320,308

(17) Funding Sources	MAWR of Karakalpakstan, *Uzselhozhimiya*, Technical / Financial Assistance from donor countries / organizations

(18) Project Risks

The inputs shall be affordable for producers

(5) Research and Development of Melons and Apple

(1) Project No.	151
(2) Project Title	Research and Development of Melons and Apple
(3) Prioritized Development Approach	Development of Market Oriented Agriculture on Sustainable Basis
(4) Prioritized Development Strategy	Promotion of Crop Diversification
(5) Prioritized Area	Chimbay, Kegeyli, Nukus, Khodjeyli, Beruni
(6) Target Group	*Fermer* / *Dehkan* (Mainly members and/or workers of Agro-firms)
(7) Implementing Agency	SCA in Karakalpakstan
(8) Supporting Agency	Council of Ministers of Karakalpakstan, MAWR of Karakalpakstan

(9) Background of the Project

Melons used to be famous agricultural products in Karakalpakstan. The production is, however, stagnant because of melon flies and loss of traditional markets. Melons are promising crops of Karakalpakstan, since the crops can grow well under dry conditions and can be produced in comparatively large area. Apple is a major fruit which is produced in Karakalpakstan and relatively suitable for local climate conditions.
In order to increase income of the agricultural producers through crop diversification in Karakalpakstan, the both crops must be leading crops. However basic research on the crops and supply system of seeds and seedlings are very limited at present. Conditions to promote the both crops as special products in Karakalpakstan through supplying technical information and seeds/seedlings of promising varieties to agricultural producers is needed by encouraging research and development activities.

(10) Objectives of the Project

To promote melons and apple as special products of the target area through strengthening study and research works on production technologies of melons and apple, and disseminating the technologies

(11) Implementation Period	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

(12) Project Goals

<Melons> Production of melons and gourds in the 11 target districts will increase to 58,500ton by 2020 (28,000ton in 2006)
<Apple> Conditions to provide scions and production technologies will be developed through establishment of mother plants farm of recommended varieties

(13) Expected Outputs

<Melons>
Output 1: Recommended varieties will be selected
Output 2: Technologies (planting season, manuring, water saving irrigation, melon flies control, post-harvesting, marketing, tools & equipments) for recommended varieties will be established.
Output 3: Recommended varieties will be popular among producers.
<Apple>
Output 1: Recommended varieties will be selected.
Output 2: Technologies (graft, pruning, manuring, water saving irrigation, pests & diseases control, post-harvesting, marketing, tools & equipments) for recommended varieties will be established.
Output 3: Mother plants will be maintained

(14) Development Indicators and Monitoring Structure

1) Number of varieties selected (melons & apple)
2) Reduced damages caused by melon flies
3) Amount of melon seeds provided
4) Number of apple mother plants planted

(15) Main Activities

Activity 1 : To establish trial and demonstration field equipped with facilities
Activity 2-1: To study and research production technologies of melons by joint research
Activity 2-2: To produce melon seeds of recommended varieties
Activity 3-1: To study and research production technologies of apple by joint research
Activity 3-2: To maintain mother plants of recommenced varieties of apple
Activity 4 :To provide seeds/scions and agricultural technologies mainly to agro-firms

(16) Estimated Project Cost (in thousand sum)

Input 1: Establishment and renovation of research field and facilities	743,221
Input 2: Study and research on technologies for melons and apple (joint research)	9,246,638
Input 3: Dissemination of seeds / scions and information / technologies	88,088
Physical contingency (10% of cost)	1,007,795
Total	11,085,742

(17) Funding Sources	MAWR of Karakalpakstan, SCA in Karakalpakstan, Technical / Financial Assistance from donor countries / organizations

(18) Project Risks

Market demand for melons and apple does not change

(6) Strengthening of Women's vegetable Production in *Tamarka*

(1) Project No.	161
(2) Project Title	Strengthening of Women's Vegetable Production in *Tamarka*
(3) Prioritized Development Approach	Development of Market Oriented Agriculture on Sustainable Basis
(4) Prioritized Development Strategy	Promotion of Vegetables Production and Sales for Local Market by Good Use of *Tamarka*
(5) Prioritized Area	VCCs (*Auls*) where *dehkans* are participating in water management works.
(6) Target Group	*Dehkans* (Women *Tamarka* Users)
(7) Implementing Agency	Concerned *Hakimiyats*, District Dept. of MAWR of Karakalpakstan
(8) Supporting Agency	District Agricultural Colleges, NGO

(9) Background of the Project

After the dissolution of the *shirkats*, most of their staff and laborers were defined as *dehkans* and have been given permanent rights to maximum 0.35 ha of land each (*tamarka*). While most of the *dehkans* used part of their *tamarka* as residential land, the major part of *tamarka* (approximately 0.25ha on average) is used as fields for growing agricultural produce. Most of the produce from the *tamarka* is consumed by the household, but some *dehkans* sell a portion of their produce for a subsidiary income.

Dehkan women in rural area have a certain role in *tamarka* production, and that role is more important in the production of vegetables than other crops. Nevertheless, there has never been any systematic technical assistance targeting women. Many women are very much in need of agricultural assistance, but the availability of such assistance is limited at present.

In this situation, extension of production skills to female *dehkans* is necessary to improve *dehkan* livelihoods by making effective use of *tamarka*.

(10) Objectives of the Project

The project aims to promote vegetable production in *tamarkas*, from the perspective of assistance to women, to improve living standards for *dehkans*.

(11) Implementation Period	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

(12) Project Goals

1) Promote cultivation of vegetables by female *dehkans* in rural areas.
2) Use model *tamarkas* for extension of vegetable production skills.

(13) Expected Outputs

Output 1: Improved skills among targeted female *dehkans*
Output 2: Extend of improved skills in areas around model *tamarkas* in VCC

(14) Development Indicators and Monitoring Structure

1) Number of model *tamarkas* established
2) Number of *Auls* and *dehkans* involved in extension events
3) Improvement of skills for targeted female *dehkans*

(15) Main Activities

Activity 1-1: Select target VCCs
Activity 1-2: Select participants within VCCs
Activity 1-3: Setup model *tamarka*
Activity 2-1: Technical seminars
Activity 2-2: Implement input support
Activity 3-1: Support the model *tamarka* for extension activities
Activity 3-2: Implement interchange meeting (with surrounding *dehkans*)
Activity 3-3: Implement interchange meetings (with *dehkans* in other *auls*)

(16) Estimated Project Cost (in thousand sum)

Input 1: Community development expert	131,918
Input 2: Kickoff workshop	20,295
Input 3: Agricultural input	184,685
Input 4: Technical seminars	24,355
Input 5: Vehicle, fuel, etc.	337,506
Physical contingency (10% of cost)	69,876
Total	768,635

(17) Funding Sources	*Hakimiyat*, Technical / Financial Assistance from donor countries / organizations

(18) Project Risks

The progress of this project depends on the supply of irrigation water to *tamarkas*, so it should be integrated with "341 Reinforce the Activities of Water Users Associations – Encourage VCC participation in water management work through *dehkans*", with priority implementation for *Auls* which participate in water management work.

A 3.2 Livestock and Fisheries Development

(1) Fodder Production

(1) Project No.	211
(2) Project Title	Fodder Production and Promotion of Livestock
(3) Prioritized Development Approach	High profitability and stable production/supply of animal products through fodder production, breeding improvement and extension services
(4) Prioritized Development Strategy	Increase of forage production and nutritious improvement
(5) Prioritized Area	11 districts in the Study Area, but the Alfalfa Seed Center only in Chimbay
(6) Target Group	*Fermers* and *Dehkans*
(7) Implementing Agency	Animal Husbandry Department of MAWR of Karakalpakstan, Concerned *Hakimiyats*
(8) Supporting Agency	Karakalpakstan *Fermer's* Association, SCA in Karakalpakstan, Veterinary Department of MAWR of Karakalpakstan

(9) Background of the Project

Inadequate feed supply, which has caused lower livestock productivity, is an issue to be solved. Due to concentrated farming of wheat and cotton, soil has been deteriorated, resulting in low crop yield. In winter, dried sorghum and wild reed with less nutrient value are mainly fed to livestock, which also results in low productivity of livestock. Despite their importance in animal husbandry, *dehkans* have been facing shortage of feeds due to limited area. Alfalfa is known for its high nutrient value, but present production is very limited due to inadequate supply of alfalfa seeds.

(10) Objectives of the Project

Stable nutritious feed supply to improve livestock productivity as well as crop productivity through introduction of rotational cropping system, silage production, expansion of alfalfa production. Promotion of collective fodder production by *dehkans* who have only small farming area, which will lead up to increase their income by livestock raising.

(11) Implementation Period	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

(12) Project Goals

1) Fodder area will be increased by 7,500 ha (750ha/year) during 10 years (20,339 at present to about 30,800 ha in 2020 in the Study Area)
2) About 3,500 head of improved calf will be born by artificial insemination
3) About 300kg alfalfa seed will be produced in 50 ha at SCA
4) Increase of silage producer (at present mostly zero)
5) Increase of collective fodder production by *dehkans* at 20ha/year (200 ha for 10 years)

(13) Expected Outputs

Output 1: Increase of alfalfa production
Output 2: Increase of improved calves
Output 3: 300kg alfalfa seed will be distributed per year through SCA
Output:4: Increase of milk yield in winter
Output 5: Increase of income of *dehkans* through increase of milk production

(14) Development Indicators and Monitoring Structure

1) Increase of alfalfa area and its yield (farm survey)
2) No. of improved calves born by artificial insemination (farm survey)
3) Produced alfalfa seeds in the SCA (farm survey)
4) No. of *fermers* who made silage and milk yield in winter (farm survey)
5) No. of *dehkans* who participated in the collective fodder production, and production (farm survey)

(15) Main Activities

Activity 1: Production of Alfalfa seeds at SCA
Activity 2: Production of Silage
Activity 3: Collective fodder production by *dehkans*
Activity 4: Crop rotation using fodder

(16) Estimated Project Cost (in thousand sum)

Input 1: Alfalfa seed production center at SCA in Chimbay (50 ha)	267,161
Input 2: Silage production	107,857
Input 3: Collective fodder production by *dehkans*	91,279
Input 4: Rotational production of crops and fodder	1,317,519
Physical contingency (10% of cost)	178,382
Total	1,962,198

(17) Funding Sources	MAWR of Karakalpakstan, Technical / Financial Assistance from donor countries / organizations

(continued to next page)

(18) Project Risks
Availability of farmland for the project, Willingness of *dehkans* to collective fodder production

(2) Training program on Animal Husbandry

(1) Project No.	221
(2) Project Title	Training Program on Animal Husbandry
(3) Prioritized Development Approach	High profitability and stable production/supply of animal products through fodder production, breeding improvement and extension services
(4) Prioritized Development Strategy	Capacity building of *fermer* and *dehkan*, and livestock experts of Veterinary Department and Animal Husbandry Department
(5) Prioritized Area	11 districts in the Study Area
(6) Target Group	*Fermers* and *Dehkans*, and livestock experts of the departments
(7) Implementing Agency	Animal Husbandry Department of MAWR of Karakalpakstan
(8) Supporting Agency	Veterinary Department of MAWR of Karakalpakstan, Nukus Branch of Tashkent State University of Agriculture, SCA in Karakalpakstan, Karakalpakstan *Fermer's* Association

(9) Background of the Project

One of the issues of low productivity (calving ratio and milk yield etc) is resulted from poor knowledge and technology of *fermer* and *dehkan*. Moreover current service on livestock is focusing on veterinary service such as medical care by veterinarians, who are not "animal husbandry specialist". Therefore capacity building for livestock experts will also be necessary.

(10) Objectives of the Project

To strengthen knowledge and technology of not only *fermers* / *dehkans* but also livestock experts of the concerning departments on animal husbandry involving nutritious feeding, animal care, disease prevention etc

(11) Implementation Period	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

(12) Project Goals

1) Annually 105 persons (1,050 persons for 10 years) consisting of *dehkans* and *fermers* will be trained
2) Annually 20 livestock experts will be trained (200 experts for 10 year)

(13) Expected Outputs

Output 1: Increase of livestock productivity in *dehkan* and *fermer*'s farm
Output 2: Expansion of proper technology on animal husbandry by livestock experts
Output 3: Total increase of livestock production in the whole Karakalpakstan

(14) Development Indicators and Monitoring Structure

1) No. of *dehkans* / *fermers*, and livestock experts trained (data)
2) No. of *dehkans* and *fermers* who were provided proper technical advices (data)
3) Milk and meat production (data)

(15) Main Activities

Activity 1: Provision of training for 105 *fermers* / *dehkans* per year (35 trainees x 3 times) per year (1,050 *fermers* / *dehkans* for 10 years)
Activity 2:Provision of training for 20 livestock experts per year (200 experts for 10 years)

(16) Estimated Project Cost (in thousand sum)

Input 1: Training program for *fermers* and *dehkans*	256,221
Input 2: Training program for livestock experts	176,753
Physical contingency (10% of cost)	43,297
Total	476,271

(17) Funding Sources	MAWR of Karakalpakstan, Technical / Financial Assistance from donor countries / organizations

(18) Project Risks

Stable budget allocation by the government for the project, Livestock experts trained will not transfer

(3) Artificial Insemination and Veterinary Services

(1) Project No.	241
(2) Project Title	Artificial Insemination and Veterinary Services
(3) Prioritized Development Approach	High profitability and stable production/supply of animal products through fodder production, breeding improvement and extension services
(4) Prioritized Development Strategy	Breed improvement of livestock and mobile veterinary services, Improvement of Veterinary Services
(5) Prioritized Area	11 districts in the Study Area. Artificial insemination center only in Nukus district
(6) Target Group	*Fermers* and *dehkans*
(7) Implementing Agency	Veterinary Department of MAWR of Karakalpakstan
(8) Supporting Agency	Animal Husbandry Department of MAWR of Karakalpakstan

(9) Background of the Project

Despite its importance of livestock sector in Karakalpakstan, there is no artificial insemination center that has function of producing frozen semen. Existing equipment for artificial insemination at district veterinary offices is generally poor and degraded, along with lack of vehicles, to carry out adequate services for livestock owners. Moreover, number of veterinarians who can artificial insemination is also insufficient to meet increasing demand for artificial insemination, as seen the present AI ratio of 31%.

(10) Objectives of the Project

Further expansion of artificial insemination to improve cattle breed, and strengthening of veterinary services, especially for rural areas

(11) Implementation Period	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

(12) Project Goals

1) Artificial insemination ratio will be increased 60 to 70 % from current 31 %
2) Number of artificial inseminators will be increased by 110 persons for 10 years
3) Milk productivity will be increased from current 5 to 6 lit to 8 to 9 lit per head per day
4) Mortality rate of livestock will be decreased

(13) Expected Outputs

Output 1: Increase of AI ratio
Output 2: Increase of artificial inseminators
Output 3: Increase of milk yield per head
Output 4: Decrease of mortality rate

(14) Development Indicators and Monitoring Structure

1) AI ratio accomplished (data)
2) No. of artificial inseminators who provided training (data)
3) Milk yield per head (farm survey)
4) No. of livestock diagnosed as infected livestock (data)

(15) Main Activities

Activity 1: Establishment of artificial insemination center in Nukus
Activity 2: Provision of AI tools and vehicles
Activity 3: Fostering of artificial inseminators
Activity 4: Provision of vehicles for mobile veterinary services

(16) Estimated Project Cost (in thousand sum)

Input 1: Establishment of artificial insemination center	810,620
Input 2: Fostering artificial inseminators	934,988
Input 3: Provision of AI tools and vehicles	62,843
Input 4: Provision of vehicle with vet instrument for mobile services	1,086,892
Physical contingency (10% of cost)	289,534
Total	3,184,877

(17) Funding Sources	MAWR of Karakalpakstan, Technical / Financial Assistance from donor countries / organizations

(18) Project Risks

Budget will be secured for artificial and veterinary services by the government

(4) Sustainable Fishery Promotion

(1) Project No.	271
(2) Project Title	Sustainable Fisheries and Aquaculture
(3) Prioritized Development Approach	High profitability and stable production/ supply of fishery products by sustainable fishing and aquaculture promotion
(4) Prioritized Development Strategy	Improvement of fishery through sustainable fishing and aquaculture promotion
(5) Prioritized Area	All districts
(6) Target Group	Fishery Association, Private Fishery Corporation, *Fermers*
(7) Implementing Agency	Fishery Association
(8) Supporting Agency	MAWR of Karakalpakstan, State Nature Protection Committee of Karakalpakstan, Academy of Science

(9) Background of the Project

Fish supply in Karakalpakstan has been remaining in low level despite its potential of demand. Capture fishery in natural water body rented in long-term contract by private fishery body, including fishery *fermers*, has not been practiced with enough sustainability and effectiveness under appropriate resource management. Ineffective management system of Fishery Association and insufficient restocking activity are mentioned as main constraints for this situation. This project is aimed to improve these activities to promote sustainable capture fishery activity in this area.

(10) Objectives of the Project

To achieve adequate fishing activity by fishery body in the study area, Fishery Association, which has mission to support fishery body, is strengthened and its activity is rehabilitated. Through the conducting of Fishery Association, arrangement and distribution of seed is realized to restock to the water bodies of whole region, aiming to increase natural fishery resources. Furthermore, feeding-back the results of restock activity for analyze, further effective method is to be discussed. Implementation of these activities, it is aimed to increase fishery production in the study area with sustainability as overall goal of this project.

(11) Implementation Period	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

(12) Project Goals

Sustainable use of fishery resources is realized by appropriate administration and management of fishery activity

(13) Expected Outputs

Output 1: Fishery Association obtains capability to support its members with sustainable management
Output 2: Restocking system is established and its effectiveness is analyzed and improved

(14) Development Indicators and Monitoring Structure

Activity report of Fishery Association, Record of restocking, Record of fishery production

(15) Main Activities

Activity 1: Strengthening of fishery association
- 1-1: Rehabilitation of association
- 1-2: Improvement of financial system

Activity 2: Establishment of seed distribution system
- 2-1: Seed production
- 2-2: Seed distribution and verification of effectiveness
- 2-3: Setting appropriate capture production
- 2-4: Opening new water area

(16) Estimated Project Cost (in thousand sum)

Input 1: Strengthening of fishery association	11,809
Input 2: Establishment of seed distribution system	1,303,800
Physical contingency (10% of cost)	131,561
Total	1,447,170

(17) Funding Sources	Credit from commercial banks, MAWR of Karakalpakstan, Technical / Financial Assistance from donor countries / organizations

(18) Project Risks

Water supply to water body will not decrease drastically
Seed production of private fish farm will not suspended

(5) Aquaculture Development

(1) Project No.	272
(2) Project Title	Aquaculture Development
(3) Prioritized Development Approach	High profitability and stable production/ supply of fishery products by sustainable fishing and aquaculture promotion
(4) Prioritized Development Strategy	Improvement of fishery through sustainable fishing and aquaculture promotion
(5) Prioritized Area	All districts
(6) Target Group	Fishery Association, Private Fishery Corporation, *Fermers*
(7) Implementing Agency	Fishery Association
(8) Supporting Agency	MAWR of Karakalpakstan, Academy of Science

(9) Background of the Project

Fishery product supply in Karakalpakstan is only relying to capture fishery in natural water body in currently. However, development of extensive fish culture by utilizing available water resource is possible to introduce considering the potential of fish demand. Currently situation has difficulty to extend aquaculture activity because many component for aquaculture is absent, such as human resources, seed supply system, technical and administrative information.

(10) Objectives of the Project

This project is aiming to establish basic structure for future aquaculture development in the study area, by strengthening the system of Fishery Association for aquaculture promotion and by realizing experimental production activity to propose a model of adequate aquaculture system in the study area. Even it supposed to need to have long-term vision, development and promotion of aquaculture with sustainability is set as an overall goal of the project.

(11) Implementation Period	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

(12) Project Goals

Basic system of aquaculture development and promotion in the study area is established

(13) Expected Outputs

Output 1: Fishery Association obtains capability for aquaculture promotion
Output 2: Model of the appropriate aquaculture system is proposed

(14) Development Indicators and Monitoring Structure

Activity report of Fishery Association, Report of model production project, achievement of training

(15) Main Activities

Activity 1: Establishment of system for aquaculture development and promotion
- 1-1: Staff training
- 1-2: Arrangement of support system
- 1-3: Extension and publicity

Activity 2:Establishment of aquaculture model for study area
- 2-1: Implementation of production model
- 2-2: Elaboration of manual and promotion

(16) Estimated Project Cost (in thousand sum)

Input 1: Establishment of system for aquaculture development and promotion	369
Input 2: Establishment of aquaculture model for the Target Area	630,990
Physical contingency (10% of cost)	63,136
Total	694,495

(17) Funding Sources	Fishery Association, Private fisheries, Credit from commercial banks, MAWR of Karakalpakstan, Technical / Financial Assistance from donor countries / organizations

(18) Project Risks

Sustainable Fishery Promotion is not suspended or delayed in schedule
Water supply to water body will not decrease drastically

A 3.3 Improvement of Irrigation Water Use Efficiency and Reducing Crop Damage by Salinity

(1) Program for Improving Internal Canal System

(1) Project No.	311
(2) Project Title	Improving Internal Canal System
(3) Prioritized Development Approach	Effective use of water resources and mitigating damage by salinity by improving water management
(4) Prioritized Development Strategy	Effective use of irrigation water through improvement of water management
(5) Prioritized Area	11 districts, 156,500 ha of targeted farm land
(6) Target Group	WUA
(7) Implementing Agency	WUA , LABM, ISD
(8) Supporting Agency	SEMW, Concerned *Hakimiyats*, District WUA

(9) Background of the Project

WUA can not carry out management of internal irrigation canals sufficiently because of its financial condition and condition of its holding machinery at present. Therefore, WUA can not manage water distribution and its complicate stable agricultural production of farm producer. Farm producer faces severe financial condition because of several reasons and this situation create difficult situation to collect water fee for WUA. As a result, financial condition of WUA is very tight. To put a stop to the negative cycle, improvement of internal irrigation canal shall be carried out by a national program to improve the environment of usage of irrigation water. After the program, operation and management as well as future development of internal irrigation canal can be carried out by WUA and Farmer smoothly.

(10) Objectives of the Project

Flow capacity of canal will be recovered by cleaning and dredging of internal irrigation canal as well as internal irrigation canal system will be recovered or strengthened through improvement or newly installation of gate, water measurement tolls and culvert etc. Then, an environment to be carried out the proper water management by WUA will be developed.

Special fund for improvement of irrigation canal shall be established at the state level and improvement program shall be carried out as national project. LABM and ISD will take charge of program management, even though implementation agency of the improvement project will be each WUA.

(11) Implementation Period	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

(12) Project Goals

Function of internal canal on targeted 90 WUA will be recovered and strengthened until 2020 and the environment to be carried out proper water management by WUA will be developed at 156,500 ha of the targeted farm.

(13) Expected Outputs

Output 1: Flow capacity of internal irrigation canal will be recovered at 156,500 ha of the targeted farm.
Output 2: Gate and water measurement facilities will be established at the targeted farm which area is 156,500 ha and proper water distribution by WUA will be available.
Output 3: WUA will obtain information on topographic survey, facilities and design which are necessary for operation and management of irrigation system.

(14) Development Indicators and Monitoring Structure

1) Area that internal irrigation canals and gate, water measurement facilities are developed.
2) Project cost which was paid out from the special fund.
3) Facility information which is necessary for operation and maintenance activities was arranged and kept in trust by WUA

Monitoring Structure: LABM will consolidate a report of monitoring on the state of implementation of the project from WUA through ISD.

(15) Main Activities

Activity 1: Establishing Special Fund for Irrigation Improvement and publication of procedures
Activity 2: Formulating technical guidance for the internal canal system improvement and its publication
Activity 3: Formulating the improvement plan of the internal canal system, preparing application form
Activity 4: Conducting survey work and facility design based on the improvement plan, preparation of inventory and technical information for operation and maintenance work of the internal canal system
Activity 5: Cleaning and digging work of internal canal and repairing canal facilities
Activity 6: Repairing, renewal and establishing gate and water measurement facilities

(continued to next page)

(16) Estimated Project Cost（in thousand sum)	
Input 1: Establishing special fund for irrigation improvement, announcement of procedures	910
Input 2: Formulating technical guidance for the internal canal system improvement and its announcement	3,560
Input 3: Formulating the improvement plan of the internal canal system, preparing application form	Incl. in regular activity
Input 4: Conducting survey work and facility design based on the improvement plan, preparation of inventory and technical information for operation and maintenance work of the internal canal system	4,427,385
Input 5: Cleaning and digging work of internal canal and repairing canal facilities	17,052,720
Input 6: Repairing, renewal and establishing gate and water measurement facilities	26,949,300
Physical contingency (10% of cost)	4,843,388
Total	53,277,263
(17) Funding Sources	Establishment of a new fund / continuation of existing fund by the Government of Uzbekistan, Technical / Financial Assistance from donor countries / organizations
(18) Project Risks	
Management of main and inter farm irrigation system will be carried out by ISD properly and NDIP will be programmed.	

(2) Strengthening Water Management in the Field

General Description of the Project

(1) Project No.	312									
(2) Project Title	Strengthening of Water Management in the Field									
(3) Prioritized Development Approach	Effective use of water resources and mitigating damage by salinity by improving water management									
(4) Prioritized Development Strategy	Effective use of irrigation water through improvement of water management									
(5) Prioritized Area	11 districts, 393,228 ha of targeted farm land									
(6) Target Group	WUA members									
(7) Implementing Agency	WUA , ISD									
(8) Supporting Agency	SEMW, District WUA, MAWR of Karakalpakstan									
(9) Background of the Project										
It is indispensable that water management of WUA members at field level is improved in order to use the irrigation water effectively. Distribution volumes to each on-farm canal and to farm land are not grasped by most of WUA. Therefore, there is no way to carry out proper water management. On the other hand, uncertainness of actual water usage volume at field level became a cause of low consciousness on improvement of water management and feeling of unfairness on water fee. It is necessary to take measures in order to make WUA members to take part in improvement of water management, even though *fermer* should carry out water management at field by themselves during their farming activities.										
(10) Objectives of the Project										
Proper water distribution and imposition of fair water fee are fulfilled by grasping of water usage volume of each farm land. In addition, it enhances awareness of WUA members on effective water use. Therefore, WUA make it obligatory to install a division box with water measurement tool (*Shandur*) at the intakes of farm by WUA members by modification of the WUA's byelaw. At the same time, WUA and WUA members carry out the monitoring of actual intake volume. On the other hand, knowledge of WUA members on irrigation planning and water use in the field will be stepped up through enlightenment and training.										
(11) Implementation Period	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
(12) Project Goals										
Environment of water management which enables a proper water distribution based on water usage volume by farms will be developed until 2017 at1156,500 ha of targeted farm.										
(13) Expected Outputs										
Output 1: Division box will be installed at the intakes of farm and water distribution volume by farms will be grasped. Output 2: knowledge of WUA members on irrigation planning and water use in the field will be stepped up. Output 3: Land leveling will be carried out and irrigation water will be used effectively. Output 4: Model farm demonstrating the improved irrigation water practice in the field will be set up at 20 districts. (Included in Activity of Project (321) Introducing Water Saving Technology)										

(continued to next page)

(14) Development Indicators and Monitoring Structure
1) Farm area where division box is installed. 2) Operation record (water level and time) of division box by WUA members. 3) Number of times of holding and entry of seminar to WUA members. 4) Land leveling activities will be monitored in "Improving Drainage Conditions in the Field". Monitoring Structure: ISD will consolidate a report of monitoring on the state of implementation of the project from WUA.
(15) Main Activities
Activity 1-1: Installing division box with water measurement tool (*Shandur*) at the intakes of farm Activity 1-2: Measuring amount of water distributed to farms Activity 2 : Holding technical seminars to members on improvement of irrigation planning and water use in the field Activity 3 : Land leveling in the field (Included in " (331) Improving Drainage Conditions in the Field") Activity 4 : Setting up model farms and implement technical demonstration (Included in " (321) Introducing Water Saving Technology")
(16) Estimated Project Cost（in thousand sum）
Input 1: Installing division box with water measurement tool at the intakes of farms 2,539,261 Input 2: Measuring amount of water distributed to farms Incl. in regular activity Input 3: Holding technical seminars to members on improvement of irrigation 324,105 planning and water use in the field Incl. in AP331 Input 4: Land leveling in the field Incl. in AP321 Physical contingency (10% of cost) 286,337 Total 3,149,703

(17) Funding Sources	Individual payment by WUA members (Installation of division box), Budget of WUA financed by water fee (Monitoring activities), Budget of the Government of Uzbekistan through LABM (Holding of seminars etc.), Technical / Financial Assistance from donor countries / organizations

(18) Project Risks
Management of main and inter farm irrigation system will be carried out by ISD properly and NDIP will be programmed.

(3) Introducing Water Saving Technology

General Description of the Project

(1) Project No.	321
(2) Project Title	Introducing Water Saving Technology
(3) Prioritized Development Approach	Effective use of water resources and mitigating damage by salinity by improving water management
(4) Prioritized Development Strategy	Increasing productivity of water through promoting water saving technology
(5) Prioritized Area	11 districts (Model farm at 10 districts)
(6) Target Group	*Fermers* and *Tamarka* users
(7) Implementing Agency	ISD
(8) Supporting Agency	LABM, MAWR of Karakalpakstan, Karakalpakstan SANIIRI, SCA in Karakalpakstan, Concerned *Hakimiyats*, District WUA, WUA

(9) Background of the Project

The targeted area relies agricultural water source on the Amudarya, of which available water volume has been reduced recently. Improvement of water management of irrigation system and promotion of water saving technology at the field level will be indispensable in order to secure and expand agricultural production using limited water resources effectively.

Following water saving technology will be assumed;

- Water saving technology through improvement of water management in the field: Land leveling and modification of canals in the field: Combination of land leveling and improved irrigation practice in the field such as counter furrow irrigation
- Water saving technology through improvement of drainage conditions in the field: Improvement of leaching efficiency by the land leveling
- Water saving through improvement of cultivation technique: Water saving cultivation technique (drip irrigation, mulching, selection of crops which water consumption is low or which will adopt dray condition)
- Water saving technology at *Tamarka*: Simple drip irrigation using PET bottle, irrigation using watering can, mulching etc.

(continued to next page)

(10) Objectives of the Project										
Water saving technology will be promoted through development of water saving technologies which adopt targeted area and extension of technique at Model farm. Effective use of irrigation water and stable agricultural production under the unstable water distribution condition will be aimed for.										
(11) Implementation Period	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

(12) Project Goals
Fermers and *Tamarka* users will get a good grasp of water saving technology and they will start to challenge to water saving cultivation.
(13) Expected Outputs
Output 1: Model farm aimed for water saving cultivation and improvement of irrigation and drainage conditions will be set up at 20 districts. (In combination with Activity of (312) Strengthening Water Management in the Field and Project (331) Improving Drainage Conditions in the Field) Output 2: Materials for extension will be prepared and seminar will be held. Output 3: Technical assistant structure for extension of water saving technology will be developed. Output 4: Water saving technologies which adopt targeted area will be developed.
(14) Development Indicators and Monitoring Structure
1) Number of Model farm which were set up 2) Number of times of holding and entry of technical seminar using Model farms 3) The result of research and development of water saving technology Monitoring Structure: ISD will consolidate activities of Model farm.
(15) Main Activities
Activity 1: Setting up model farms and extension through operating model farms Activity 2: Setting up consultation desk to *fermers* on technical and materials for water saving technology Activity 3: Research and development of water saving technology and necessary materials Activity 4: Preparation of seminar text and materials for extension
(16) Estimated Project Cost（in thousand sum）
Input 1: Setting up model farms and extension through operating model farms 472,378 Input 2: Setting up consultation desk to *fermers* on technology and materials for water saving Incl. In AP312 Input 3: Research and development of water saving technology and necessary materials 79,950 Input 4: Preparation of seminar text and materials for extension 36,900 Physical contingency (10% of cost) 58,923 Total 648,151

(17) Funding Sources	Budget of the Government of Uzbekistan through LABM (Model farm project and technical assistance), Budget of the Government of Uzbekistan through Karakalpakstan SANIIRI (Research and development, Preparation of materials for extension), Technical / Financial Assistance from donor countries / organizations

(18) Project Risks
–

(4) Improving Drainage Conditions in the Field

General Description of the Project

(1) Project No.	331
(2) Project Title	Improving Drainage Conditions in the Field
(3) Prioritized Development Approach	Effective use of water resources and mitigating damage by salinity by improving water management
(4) Prioritized Development Strategy	Reduction of damage to crop production from salt through improving drainage conditions
(5) Prioritized Area	Model farm: Districts located ISD Land leveling: Large scale farm land where is damaged by salinity
(6) Target Group	*Fermers*
(7) Implementing Agency	WUA , ISD
(8) Supporting Agency	Karakalpakstan HME, SANIIRI, MAWR of Karakalpakstan

(9) Background of the Project
It is important that improvement of drainage condition at field level will be combined with in order to maximize the effect of NDIP. It is respected that Suitable hydraulic environment for crop production will be realized by improvement of drainage conditions at field level through development of underground drainage and land leveling as well as result of leaching and water usage efficiency during the leaching will be improved. On the other hand, condition of salt accumulation can be improved by controlling the underground water level properly. In principal, improvement of drainage conditions in the field such as underground drainage and land leveling will be carried out by individual payment of farmer themselves. It is required that necessary measures for promoting improvement of drainage condition at the field by farmers will be carried out as a program.

(continued to next page)

(10) Objectives of the Project

Underground water level will be controlled properly by development of drainage environment at the field level through land leveling and improving water management in the field. In addition, salt damage of crop will be mitigated by increasing the effect of leaching. At the same time, leaching water volume will be economized by effective water use.

Improvement of drainage conditions in the field will be implemented by *fermers* during their farming activities at their field. Technical assistance such as model farm, technical consultation, preparation of support system of material and preparation of construction machinery will be carried out in combination with *fermers* activities in order to promote improvement of drainage conditions in the field.

(11) Implementation Period	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

(12) Project Goals

1) Understandings of *fermers* on improvement of drainage conditions in the field will be deepened through model farm and technical assistance.
2) Land leveling will be carried out by *fermers* and efficiency of leaching will be improved at the field level.
3) An optimum water use for leaching according to the soil and salinity condition of the field will be fulfilled by *fermers* in order to avoid affects of over irrigation.

(13) Expected Outputs

Output 1: Model farm will be set up at each district and technical extension and support system will be developed. (In combination with Activity of Project (312) Strengthening Water Management in the Field and Project (321) Introducing Water Saving Technology)
Output 2: Land leveling will be implemented at 16,000ha of farm land until 2020.
Output 3: Fermers obtain technical information on optimum water use for leaching and widely introduced.
Output 4: Effective leaching technology will be developed.

(14) Development Indicators and Monitoring Structure

1) Past results on installation of underground drainage by *fermers*
2) Implementation area of land leveling

Monitoring Structure: ISD will consolidate a report of monitoring on the land leveling from WUA.

(15) Main Activities

Activity 1: Model farm and extension (Including "321 Promoting Water Saving Technology")
Activity 2: Preparation of technical assistance to *fermers* (Including "321 Promoting Water Saving Technology")
Activity 3: Preparation of support system of material for improving field water management, water saving technology and improving field drainage (Including "321 Promoting Water Saving Technology")
Activity 4: Preparing construction machinery for drainage improvement in the field
Activity 5: Preparing preference credit system for drainage improvement in the field
Activity 6: Research and development on effective and efficient leaching technology

(16) Estimated Project Cost (in thousand sum)

Input 1: Model farm and extension	Incl. in AP321
Input 2: Preparation of technical assistance to *fermers*	Incl. in AP321
Input 3: Preparation of support system of material for improving field water management, water saving technology and improving field drainage	Incl. in AP321
Input 4: Preparing construction machinery for drainage improvement in the field	295,200
Input 5: Preparing preference credit system for drainage improvement in the field	Incl. in regular activity
Input 6: Research and development on effective and efficient leaching technology	830,250
Physical contingency (10% of cost)	112,545
Total	1,237,995

(17) Funding Sources	Individual payment by farmers using credit loan (Project for improvement of drainage conditions in the field), Budget of the Government of Uzbekistan through SANIIRI (Research and development), Technical / Financial Assistance from donor countries / organizations

(18) Project Risks

NDIP will be programmed.

(5) Strengthening of WUA and Enhancing Its Activity

(1) Project No.	341
(2) Project Title	Strengthening WUA and Enhancing Its Activity
(3) Prioritized Development Approach	Effective use of water resources and mitigating damage by salinity by improving water management
(4) Prioritized Development Strategy	Improvement of water management through strengthening WUA and enhancing its activity
(5) Prioritized Area	11 districts, 90 WUA
(6) Target Group	WUA
(7) Implementing Agency	WUA , ISD, District WUA
(8) Supporting Agency	SEMW, MTP, Concerned *Hakimiyats*, Concerned VCCs, MAWR of Karakalpakstan

(9) Background of the Project

WUA has a responsibility to operation and maintenance of after Inter-farm canal. WUA is a direct leader of irrigation water use and improvement of drainage conditions. In addition, WUA can promote improvement of water management in their field to WUA members who are water user through its activity. WUA plays an important role in stabilization and improvement of agricultural product through effective use of irrigation water and improvement of drainage conditions. However, most of WUA lapse into serious financial standing because of difficulty in collection of water fee which is their financial resource. Therefore, the irrigation system is declined in function and proper water management activity can not be performed at present because of paralysis of operation and maintenance activities of canals.

Proper water distribution using irrigation system properly and conservation of function of irrigation and drainage systems by proper operation and maintenance activities are required in combination with Program for Improving Internal Canal System (Component No. 311) for effective use of irrigation water and mitigation of salt damage by improvement of drainage conditions. Therefore, development of ability of water management and operation and maintenance of canals through the strengthening WUA as well as activation of WUA's activity through the improvement of financial standing are required.

(10) Objectives of the Project

1) Water management activity of WUA will be enhanced using irrigation system which will be recovered by Program for Improving Internal Canal System (Component No. 311) and division box at the intakes of field which will be installed by Program for Strengthening Water Management in the Field (Component No. 312) in order to carry out proper water distribution and effective use of irrigation water.
2) Ability of WUA on canal cleaning and dredging and operation and maintenance activity of canal facility will be strengthened in order to carry out operation and management activity of irrigation and drainage systems which are recovered by Program for Improving Internal Canal System (Component No. 311) and NDIP.
3) Improvement of *fermers* will be realized through whole activities in the Master Plan will be tied in with collection of water fee. In addition, financial standing of WUA will be improved through drawing up a realistic business plan.
4) Participation of *tamarka* users (*Dehkans*) to operation and maintenance activities of canal and activity for improvement of water use will be promoted through WUA' activity.

(11) Implementation Period	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

(12) Project Goals

1) Proper water distribution will be carried out through the water management activity of WUA.
2) Irrigation and drainage system will be maintained by WUA properly according to annual as well as medium and long term operation and maintenance plan.
3) Business plan will be able to be carried out.

(13) Expected Outputs

Output 1-1: Canal will be operated properly based on proper water distribution plan and monitoring of water distribution.
Output 1-2: Promotion of WUA to WUA members will be activated and water management at the field level will be improved.
Output 2: Development ability on irrigation and drainage canal of WUA will be strengthened and proper operation and maintenance activities of irrigation and drainage system will be available by WUA.
Output 3: Proper and fair water fee will be set up and financial standing of WUA will be improved.
Output 4: Participation of *dehkans* to water management will be promoted.

(14) Development Indicators and Monitoring Structure

1) Number of WUA staff and number of times of holding and entry of staff training
2) Progress of annual as well as medium and long term operation and maintenance plan of canals
3) Quantity of operation and maintenance works and monitoring of past result on usage of machinery as well as facility condition
4) Monitoring of business plan as well as monitoring on situation of water fee collection
5) Actual result of participation of WUA members and *dehkans* to operation and maintenance activities of canals

Monitoring Structure: ISD will consolidate an annual report from WUA through district WUA.

(continued to next page)

(15) Main Activities	
Activity 1-1: Appointing necessary staff s of WUA for water management	
Activity 1-2: Equipping Personal Computer for irrigation planning and WUA administration	
Activity 1-3: Training WUA staffs in operation and maintenance of canal system and planning of irrigation and water distribution	
Activity 1-4: Equipping transportations for water management to WUA	
Activity 2-1: Formulating regular and mid/long term plan of maintenance work by WUA	
Activity 2-2: Preparation of inventory and technical information for operation and maintenance work	
Activity 2-3: Equipping construction machinery for canal maintenance to WUA	
Activity 2-4: Providing spare parts and maintenance service to WUA's machinery	
Activity 2-5: Renting construction machinery and providing machinery service for canal maintenance work	
Activity 2-6: Preparing supply system of parts and materials for hydraulic structure (gate, gauge, concrete flume, etc.)	
Activity 2-7: Activating WUA's communication and coordination for collective works of maintenance	
Activity 3-1: Improving water fee system and business plan of WUA	
Activity 3-2: Preparing consultation to WUA on accounting, tax management and legal issues	
Activity 3-3: Propaganda and enlighten campaign to members on importance of WUA activity and water fee	
Activity 4-1:Promoting *tamarka* user's (*Dehkan*) participation to water management activity through VCC	
(16) Estimated Project Cost（in thousand sum)	
Input 1: Increasing water management capacity of WUA	2,253,606
Input 2: Increasing canal / collector maintenance capacity of WUA	19,454,518
Input 3: Improving water fee system and business plan of WUA	88,560
Input 4: Promoting *tamarka* user's participation in water management activity through WUA	8,856
Physical contingency (10% of cost)	2,180,554
Total	23,986,094
(17) Funding Sources	Budget of the Government of Uzbekistan through LABM (Strengthening of ability of water management of WUA), Special fund and budget of the Government of Uzbekistan through LABM and budget of WUA which financial resource is water fee (Strengthening of ability of WUA on operation and maintenance of canals), Budget of WUA which financial resource is water fee (Improvement of water fee system and business plan of WUA), Technical / Financial Assistance from donor countries / organizations.
(18) Project Risks	

A 3.4 Distribution, Marketing and Processing Development

(1) Joint Marketing by Farmer Group (Model Agro-firm Establishment)

General Description of the Project

(1) Project No.	411
(2) Project Title	Joint Marketing by Farmer Group (Model Agro-firm Establishment)
(3) Prioritized Development Approach	Enhancement of marketing activities of *Fermers* and *Dehkans* to earn more income
(4) Prioritized Development Strategy	Enhancement of bargaining power through collective action of farmers
(5) Prioritized Area	First, Nukus district (existing Agro-firm), then other districts
(6) Target Group	*Fermers* and *Dehkans*
(7) Implementing Agency	Council of Ministers of Karakalpakstan, Concerned *Hakimiyats*
(8) Supporting Agency	Karakalpakstan Business Incubator, SCA in Karakalpakstan, District Agricultural Colleges, MAWR of Karakalpakstan

(9) Background of the Project

The government of UZ promotes establishment of Agro-firm as a part of agrarian reform policy. Main activities of Agro-firm are processing and marketing of collected vegetables and fruits from *fermers* and *dehkans*. Since 2006, 208 Agro-firms has been established in entire Uzbekistan. One Agro-firm is established in the study area (Nukus District), but their activity is quite limited.

(10) Objectives of the Project

To enhance bargaining power of *fermers* and *dehkans*, model Agro-firm will be established. Since *fermers* and *dehkans*, who produce vegetables and fruits, can't produce enough volume of products due to limitation of land size, their bargaining power tend to be weak, and collective action of marketing is necessary.

(11) Implementation Period	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

(12) Project Goals

A Model Agro-firm is established in each district the Study Area (Total 11)

(continued to next page)

(13) Expected Outputs		
Output 1: Working group for model Agro-firm establishment is organized Output 2: Agro-firms for collective action of vegetable- and fruits-growers are established Output 3: Business plan, which provide incentives to members of participating in the activities, are formulated Output 4: Products of the Agro-firm is developed Output 5: Marketing channel of the Agro-firm is established		
(14) Development Indicators and Monitoring Structure		
1) Number of Agro-firm established (monitoring record at Council of Ministers) 2) Financial condition of Agro-firm (financial record)		
(15) Main Activities		
Activity 1: Establishment of working group Activity 2: Focus group discussion and establishment of agro-firm Activity 3: Business planning (needs assessment, marketing strategy, study tour, business seminar, technical training, action planning) Activity 4: Products development (collection, processing, packing) Activity 5: Marketing (channel establishment, identifying transport means)		
(16) Estimated Project Cost (in thousand sum)		
Input 1: Establishment of working group		1,636
Input 2: Focus group discussion and establishment of agro-firm		12,177
Input 3: Business planning		52,161
Input 4: Products development		4,499
Input 5: Marketing		39,589
Physical contingency (10% of cost)		11,006
Total		121,068
(17) Funding Sources	Credit from commercial banks, private funds (running costs), MAWR of Karakalpakstan, Technical / Financial Assistance from donor countries / organizations	
(18) Project Risks		
Drought and other natural disasters, Unstable Utilities for Processing Activities		

(2) Improvement of Marketing Support Infrastructure

(1) Project No.	421
(2) Project Title	Improvement of Marketing Support Infrastructure
(3) Prioritized Development Approach	Enhancement of marketing activities of *Fermers* and *Dehkans* to earn more income
(4) Prioritized Development Strategy	Improvement of accessibility to market
(5) Prioritized Area	Nukus, Khodjeyli, Kungrad, Chimbay, then other local *Dehkan* bazaars
(6) Target Group	*Fermers* and *Dehkans*
(7) Implementing Agency	Concerned *Hakimiyats*, District Central Bazaar
(8) Supporting Agency	Council of Ministers of Karakalpakstan, Karakalpakstan Government Architecture & Construction, District Central Bazaar Association

(9) Background of the Project

Recent years, trade volume at major *Dehkan* Bazaar is growing. Particularly, number of retailers is increasing, resulting in congestion at retail section. For this background, severe economic situation in Karakalpakstan is underlying, such as lack of employment opportunities and delayed payment of salary. Since retail trade and catering sector are relatively easy to enter, number of retailer will increase from now on.

(10) Objectives of the Project

The purpose of project is to improve accessibility to *Dehkan* bazaar through mitigating congestion in the major *Dehkan* bazaar and creation of better transaction environment in other local bazaar. For this purpose, main activities will be the separation of perishable food section and other section, and the establishment of cold section at *Dehkan* Bazaar. Bazaar is the most important point which located in the center of food supply chain, from farm gate until customers, and the project will enhance sanitary condition of a critical point of perishable food distribution in Karakalpakstan.

(11) Implementation Period	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

(12) Project Goals

Congestion and sanitary condition of the *Dehkan* bazaars are improved

(13) Expected Outputs

Output 1: Market improvement master plan is formulated
Output 2: Management system of perishable food is established
Output 3: Number of retailers selling at walkway and parking lot at major *Dehkan* bazaar is reduced
Output 4: Sanitary condition of perishable food is improved

(continued to next page)

(14) Development Indicators and Monitoring Structure	
1) Reduced number of retailers selling at walkway and parking lot (Bazaar's monitoring record) 2) Willingness to pay for bazaar tax (payment for place to sell) (attitude survey)	
(15) Main Activities	
Activity 1: Holding stakeholder meeting to formulate market improvement master plan Activity 2: Integration of control system for perishable food Activity 3: Separation of perishable food section and other commodities Activity 4: Establishment of cold section	
(16) Estimated Project Cost (in thousand sum)	
Input 1: Holding stakeholder meeting to formulate market improvement master plan	1,839
Input 2: Integration of control system for perishable food	20,547
Input 3: Separation of perishable food section and other commodities	3,916,935
Input 4: Establishment of cold section	658,940
Physical contingency (10% of cost)	459,826
Total	5,058,087
(17) Funding Sources	Council of Ministers of Karakalpakstan, *Hakimiyat*, District Central Bazaar Association, MAWR of Karakalpakstan, Technical / Financial Assistance from donor countries / organizations
(18) Project Risks	
Recession and overflowed jobless into retail sector	

(3) Small Scale Slaughterhouse

(1) Project No.	422
(2) Project Title	Small-scale Slaughterhouse
(3) Prioritized Development Approach	Enhancement of marketing activities of *Fermers* and *Dehkans* to earn more income
(4) Prioritized Development Strategy	Improvement of accessibility to market
(5) Prioritized Area	8 districts in the Study Area, excluding Kegeily, Beruni and Muynak
(6) Target Group	*Fermers* and *Dehkans*
(7) Implementing Agency	Concerned *Hakimiyats*
(8) Supporting Agency	Veterinary Department and Animal Husbandry Department of MAWR of Karakalpakstan, Republican Veterinary Department

(9) Background of the Project

The BSE crisis in 1996 caught worldwide attention on food safety and the traceability of food supply chain. Food safety measures should be taken at critical control point of food supply chain, such as bazaar, processing factory, and farm gate. In this regard, improvement of sanitary condition of slaughterhouse is quite important and urgent. At present, cattle are slaughtered in poor hygienic environment, mostly at farm gate, which makes veterinary and sanitary inspection difficult and inefficient.

(10) Objectives of the Project

Direct objective of the project is to dress cattle in sanitary plant to sell hygienic and safe meats for consumers. The project also aiming at enhancing food safety in supply chain of livestock products (meat) in the Karakalpakstan. Through the project, veterinary and sanitary condition of livestock products in Karakalpakstan will be improved, which will also improve accessibility to international market indirectly.

(11) Implementation Period	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

(12) Project Goals	
1) 4 slaughterhouses will be constructed in main consuming areas	
(13) Expected Outputs	
Output 1: Production of hygienic meats	
(14) Development Indicators and Monitoring Structure	
1) No. of cattle hygienically slaughtered, and total meats hygienically marketed	
(15) Main Activities	
Activity 1:Construction of small-scale slaughterhouses	
(16) Estimated Project Cost (in thousand sum)	
Input 1: Construction of small-scale slaughterhouses	376,972
Physical contingency (10% of cost)	37,697
Total	414,669
(17) Funding Sources	MAWR of Karakalpakstan, Technical / Financial Assistance from donor countries / organizations
(18) Project Risks	

(4) Improvement of Small-scale Agro-Processing Technologies

(1) Project No.	431
(2) Project Title	Improvement of Small-scale Agro-processing Technologies
(3) Prioritized Development Approach	Enhancement of marketing activities of *Fermers*/*Dehkans* to earn more income
(4) Prioritized Development Strategy	Development of processing technologies
(5) Prioritized Area	All districts
(6) Target Group	Agro-firm, *Fermer, Dehkan*
(7) Implementing Agency	MAWR of Karakalpakstan
(8) Supporting Agency *[1]1	Council of Ministers of Karakalpakstan, Nukus Branch of Tashkent State University on Agriculture, Karakalpakstan Business Incubator, Karakalpakstan Fermer's Association

(9) Background of the Project

The raw products of agriculture are sold in low prices, not meet with production costs, therefore Fermer and *dehkan* exploit value-adding of products to increase selling amounts and volume. Generally, they do not have access to purchase suitable equipment in terms of appropriate technology and specifications. The commodity mix of processed products with value-adding is necessary to find buyers. Currently, there are problems in safe/stable production and efficient collection of raw agricultural products in Uzbekistan. Although agro-processing has the aspect of promotion of SMEs, it is required for MAWR and related agencies to coordinate promoting policy for small-scale agro-processing.

(10) Objectives of the Project

In order to obtain more income from agricultural activities of the groups of *fermer* and *dehkan*, the pilot project of small-scale processing will be operated at selected sites using existing resources. As prioritized fields, local production and local consumption of dairy products, and rice and vegetable / fruit processing using current products will be implemented in selected sites. Furthermore, Karakalpakstan side will research and develop new products made from ~~by~~ draught resistant crops and those proposed by local women and farmers. After evaluation of the pilot project, the *Hakimiyat* in consultation with the working group in MAWR will select target groups to expand to other sites through training. This project aims to extend small-scale processing technologies through operation of processing facilities by *fermer* and *dehkan* groups, and transfer economic activities from government to private driven in future. As well, it is required to accumulate technical information and support procurement of equipment including micro-finance.

(11) Implementation Period (including Yr2010)

2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

(12) Project Goals

The target groups of *fermer* and *dehkan* will generate their income by means of appropriate processing technologies and continuous marketing activities.

(13) Expected Outputs

Output 1: Operation of small-scale agro-processing continues in the selected sites (pilot project). The disincentives in initial operation are alleviated.
Output 2: New agro-processing products are developed by the women and farmers.
Output 3: Capacity development of the experts of MARW on promotion of small-scale agro-processing is conducted.
Output 4: Information on processing technologies and equipment are accumulated. Financing for procurement of equipment is executed.
Output 5: Infrastructures for small-scale processing are improved in the target areas.

(14) Development Indicators and Monitoring Structure

Indicator 1: Sales volume and amounts of processing products, cash flow for operation
Indicator 2: Number of processing products newly researched and developed
Indicator 3: Budget amount of MARW for promotion of small-scale agro-processing
Indicator 4: Inquiry numbers about equipment to information providing organization, procurement numbers, amount of credits
Indicator 5: Investing amounts for infrastructural improvement, numbers of improved sites

(15) Main Activities

Activity 1: Implementation of test operation of small-scale agro-processing in the selected sites and alleviation of disincentives on initial operation and sales
Activity 2: Research on small-scale agro-processing technologies for local people including participating women
Activity 3: Formation of promotion programs for small-scale agro-processing
Activity 4: Improvement on accessibility of information and procurement of agro-processing equipment
Activity 5: Improvement of infrastructure of small-scale agro-processing

(continued to next page)

[1] For inspection of quality, contents and calories, 'UZStandard' will be approved to use the logo-mark OZst.

(16) Estimated Project Cost (in thousand Sum)	
Input 1: Confirmation of disincentive factors on initial operation	294,824
Input 2: Research and development of small-scale agro-processing	32,398
Input 3: Training of experts and policy making	29,158
Input 4: Credit facilitation and procurement of equipment	1,895,294
Input 5: Minimum improvement of infrastructure	1,397,982
Physical contingency (10% of cost)	364,966
Total	4,014,622
(17) Funding Sources	MAWR of Karakalpakstan, private funds, Technical / Financial Assistance from donor countries / organizations
(18) Project Risks	
Shortage of water to produce agricultural crops, export ban on agro-processed products especially to Kazakhstan, unstable power , gas and water supply in rural area	

(5) Improvement of Food Safety Technologies

(1) Project No.	433
(2) Project Title	Improvement of Food Safety Technologies
(3) Prioritized Development Approach	Enhancement of marketing activities of *Fermers* and *Dehkans* to earn more income from agricultural production
(4) Prioritized Development Strategy	Improvement of processing technologies
(5) Prioritized Area	11 districts in the Study Area
(6) Target Group	Consumers, *Fermers* and *Dehkans*
(7) Implementing Agency	Republic Veterinary Laboratory, Veterinary and Sanitary Expertise (VSE)
(8) Supporting Agency	Republic Veterinary Laboratory of Nukus City, MAWR of Karakalpakstan

(9) Background of the Project

The BSE crisis in 1996 caught worldwide attention on food safety and the traceability of food supply chain. Since then, the food safety measure is no longer able to ignore in the world of market economy, particularly when farmers want to access international market, including western countries. For export promotion purpose, to meet international standard, such as Hazard Analysis and Critical Control Point (HACCP) and CODEX, is necessary.

(10) Objectives of the Project

The project purpose is to enhance food safety measures to increase value of agricultural products produced in the Karakalpakstan. Through the project, quality of agricultural products in Karakalpakstan will increases, and as a result, accessibility to international market will be improved.

(11) Implementation Period	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

(12) Project Goals

Food safety technology at *Dehkan* bazaar is improved

(13) Expected Outputs

Output 1: Food safety standard which meet international requirement is identified
Output 2: Sanitary control plan which meet international requirement is formulated
Output 3: Equipment at VSEs are improved
Output 4: Veterinary and sanitary knowledge of *dehkans* and *fermers* are improved

(14) Development Indicators and Monitoring Structure

1) Number of trainee of sanitary improvement
2) Number of claim from consumers regarding food safety

(15) Main Activities

Activity 1: Review of Food Safety Standard
Activity 2: Improvement of Sanitary Control Plan
Activity 3: Capacity Building of VSE
Activity 4: Promotion of Enlightenment Activities

(16) Estimated Project Cost (in thousand sum)	
Input 1: Review of food safety standards	32,718
Input 2: Improvement of sanitary control plan	11,316
Input 3: Capacity building of VSE (including upgrading VSE equipment)	89,689
Input 4: Promotion of enlightenment activities	20,449
Physical contingency (10% of cost)	15,417
Total	169,589
(17) Funding Sources	MAWR of Karakalpakstan, Technical / Financial Assistance from donor countries / organizations
(18) Project Risks	
Redeployment of trained VSE staff	

A 3.5 Enhancement of Local Administration Units

(1) Enhancement of Communication for Local Agricultural Administration

(1) Project No.	511
(2) Project Title	Enhancement of Communication for Local Agricultural Administration
(3) Prioritized Development Approach	Enhancement of supporting ability of Local administration unit to coordinate participatory project
(4) Prioritized Development Strategy	Strengthening on abilities of local administration unit
(5) Prioritized Area	11 districts and VCCs where the vegetable program are implemented
(6) Target Group	*Hakimiyat* Officers, District Officers of MAWR, VCC Officers
(7) Implementing Agency	Concerned *Hakimiyats*, MAWR of Karakalpakstan, Concerned VCCs
(8) Supporting Agency	Council of Ministers of Karakalpakstan, District Agricultural College, NGO

(9) Background of the Project

The *Hakimiyat* - VCC line is responsible for local administration, and delivers administrative services for people. Local agricultural administration is run along the *Hakimiyat* - VCC - *Aul* line. VCCs are positioned as the lowest unit of local administration, and have the additional role of a citizen self-governance body. However, they operate as small units, and have little latent capacity. Traditionally, the *sovkhoz*, *kolkhoz* and *shirkats* functioned in intermediate positions, but after these were dissolved, no repository was left for such public functions, so the *Hakimiyat* and VCCs were obliged to take them on. It is practically difficult for *Hakimiyat* staff to identify and grasp people's needs, so that is emerging as another important role for VCCs.
When development programs are implemented in future, channels of communication between the *Hakimiyat*, VCCs and *Auls* will be increasingly important. Implementation of this project will be integrated with the "Project for the reinforcement of coordinating abilities of VCCs" under *Hakimiyat* management, as part of support for local agricultural administration.

(10) Objectives of the Project

To strengthen communication by building the abilities of *Hakimiyat* and VCC staff and by the installation of information tools, in order to contribute to the smooth progress of development programs and projects.

(11) Implementation Period	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	■	■	■	■	■					

(12) Project Goals

This project will provide capacity building of human resources and information infrastructure improvements for the *Hakimiyat* economic department and district department of MAWR and VCCs, which are responsible for coordinating functions in local agricultural administration, and strengthen communication by encouraging liaison with VCCs.

(13) Expected Outputs

Output 1: Enhanced abilities for *Hakimiyat* staff
Output 2: Enhanced abilities for VCC staff.

(14) Development Indicators and Monitoring Structure

1) Reports prepared by VCCs
2) Self-evaluation by training participants
3) Reports of joint evaluation meetings

(15) Main Activities

Activity 1-1: Select target VCCs
Activity 1-2: Install computer equipments in *Hakimiyat* and VCC offices
Activity1- 3: Share information on project with VCCs
Activity 2-1: Train *Hakimiyat* staff
Activity 2-2: *Hakimiyat* staff trains VCC staff
Activity 3-1: Implementation of "Strengthening of Women's Vegetable Production in *Tamarka*" (AP161)
Activity 3-2: VCCs prepare and submit project progress reports
Activity 4-1: Hold joint evaluation meetings

(16) Estimated Project Cost (in million sum)

Input 1: Community development expert	43,973
Input 2: Training for *Hakimiyat* staff	8,795
Input 3: Training for VCC staff	6,089
Input 4: Evaluation workshops	27.060
Input 5: Computers and printers, etc.	263,835
Input 6: Vehicles and fuel, etc.	93,358
Physical contingency (10% of cost)	44,311
Total	487,421

(17) Funding Sources	MAWR of Karakalpakstan, Technical / Financial Assistance from donor countries / organizations

(18) Project Risks

Implementation of this project is integrated with "Reinforcement of VCC Coordinating Abilities".

(2) Reinforcement of VCC Coordinating Abilities

(1) Project No.	512
(2) Project Title	Reinforcement of VCC Coordinating Abilities
(3) Prioritized Development Approach	Enhancement of supporting ability of Local administration unit to coordinate participatory project
(4) Prioritized Development Strategy	Strengthening on abilities of local administration unit
(5) Prioritized Area	VCCs where the vegetable program are implemented in 11 district
(6) Target Group	VCC, Villagers
(7) Implementing Agency	Concerned VCCs, Concerned *Hakimiyats*, MAWR of Karakalpakstan
(8) Supporting Agency	NGO

(9) Background of the Project

VCCs are the smallest units of the local administrative organization, and they have various roles in administrative functions related to sector development in their territory. Community projects go through the VCCs to form consensus with local people. At present, however, most VCCs have no experience of community projects, and they have very few full-time staff, including a chairman. As such, they are not ready to get local people involved from the project formation stage for making consensus.
Running community projects in such circumstances requires a system to strengthen and complement the coordinating abilities of the VCCs.
This project is intended to strengthen the coordinating abilities of VCCs as an element in support for local administration under *Hakimiyat* management.
This project is integrated with "Strengthening of Women's Vegetable Production in *Tamarka*" (AP161), for local people to lead the vegetable project management and produce ripple effects.

(10) Objectives of the Project

To reinforcement the coordinating abilities of VCCs and heighten the sense of ownership among participating local people, in order to realize project effects more fully.

(11) Implementation Period	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

(12) Project Goals

VCCs will be enhanced their coordinating abilities in community operations and projects.

(13) Expected Outputs

Output 1: Initiative groups made by VCCs contribute to consensus formation among people.
Output 2: Initiative groups made by VCCs contribute to project management and evaluation

(14) Development Indicators and Monitoring Structure

1) Activity reports prepared by IG
2) Self-evaluation of IG activities by IG themselves and by people

(15) Main Activities

Activity 1-1: Select target VCCs
Activity 1-2: Share information on project with VCC residents
Activity 1-3: Set up Initiative Groups (IGs) within VCCs
Activity 1-4: Use IGs to confirm community needs
Activity 1-5: Use IGs to prepare the action plan for supporting the implementation of (Component161)
Activity 2-1: Implementation of (Component AP 161)
Activity 2-2: Use IGs to assist demonstration farms
Activity 2-3: Use IGs to organize interchange meetings
Activity 3-1: Monitoring and evaluation by IGs

(16) Estimated Project Cost (in thousand sum)

Input 1: Community development expert	43,973
Input 2: Information workshop	27,060
Input 3: Training for VCC officers and IG	6,765
Input 4: Vehicle and Fuel, etc.	92,681
Physical contingency (10% of cost)	17,048
Total	187,527

(17) Funding Sources	MAWR of Karakalpakstan, *Hakimiyat*, Technical / Financial Assistance from donor countries / organizations

(18) Project Risks

This project aims to strengthen the coordinating abilities of VCCs as a model case for "Strengthening of Women's Vegetable Production in *Tamarka*", so it assumes that water will be supplied.