COUNCIL OF MINISTERS
REPUBLIC OF KARAKALPAKSTAN
REPUBLIC OF UZBEKISTAN

THE STUDY ON REGIONAL DEVELOPMENT IN KARAKALPAKSTAN IN THE REPUBLIC OF UZBEKISTAN

FINAL REPORT

FEBRUARY 2011

JAPAN INTERNATIONAL COOPERATION AGENCY

ORIENTAL CONSULTANTS CO., LTD.
SANYU CONSULTANTS INC.
NTC INTERNATIONAL CO., LTD.

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Exchange Rate (January 2011)		
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Sum 1.00	=	US$ 0.05
US$ 1.00	=	Yen 82.86

PREFACE

In Response to a request from the Government of the Republic of Uzbekistan and Karakalpakstan, the Government of Japan decided to conduct a development study on Regional Development in Karakalpakstan in the Republic of Uzbekistan and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team headed by Mr. Keiji MATSUMOTO of Oriental Consultants Co., Ltd. between March 2008 and December 2010. The study team was composed of members from Oriental Consultants Co., Ltd., Sanyu Consultants Inc. and NTC International Co., Ltd.

The team held discussions with the officials concerned of the Government of the Republic of Uzbekistan and Karakalpakstan, and conducted field surveys in the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relationship between our tow countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of Uzbekistan and Karakalpakstan for their close cooperation extended to the team.

February 2011

Izumi TAKASHIMA
Deputy Vice President,
Japan International Cooperation Agency

February 2011

Mr. Izumi TAKASHIMA
Deputy Vice President,
Japan International Cooperation Agency

Transmittal Letter

We are glad to submit the Final Report of the Study on the Regional Development in Karakalpakstan in the Republic of Uzbekistan.

This report contains the Master Plan and Action Plan on Regional Development in Karakalpakstan mainly focusing on the agricultural sector, of which reflects the suggestions and recommendations made by Japan International Agency (JICA) during the conduct of the Study, as well as the discussions and comments regarding the Draft Final Report made by the concerned institutions of Republic of Karakalpakstan and Uzbekistan.

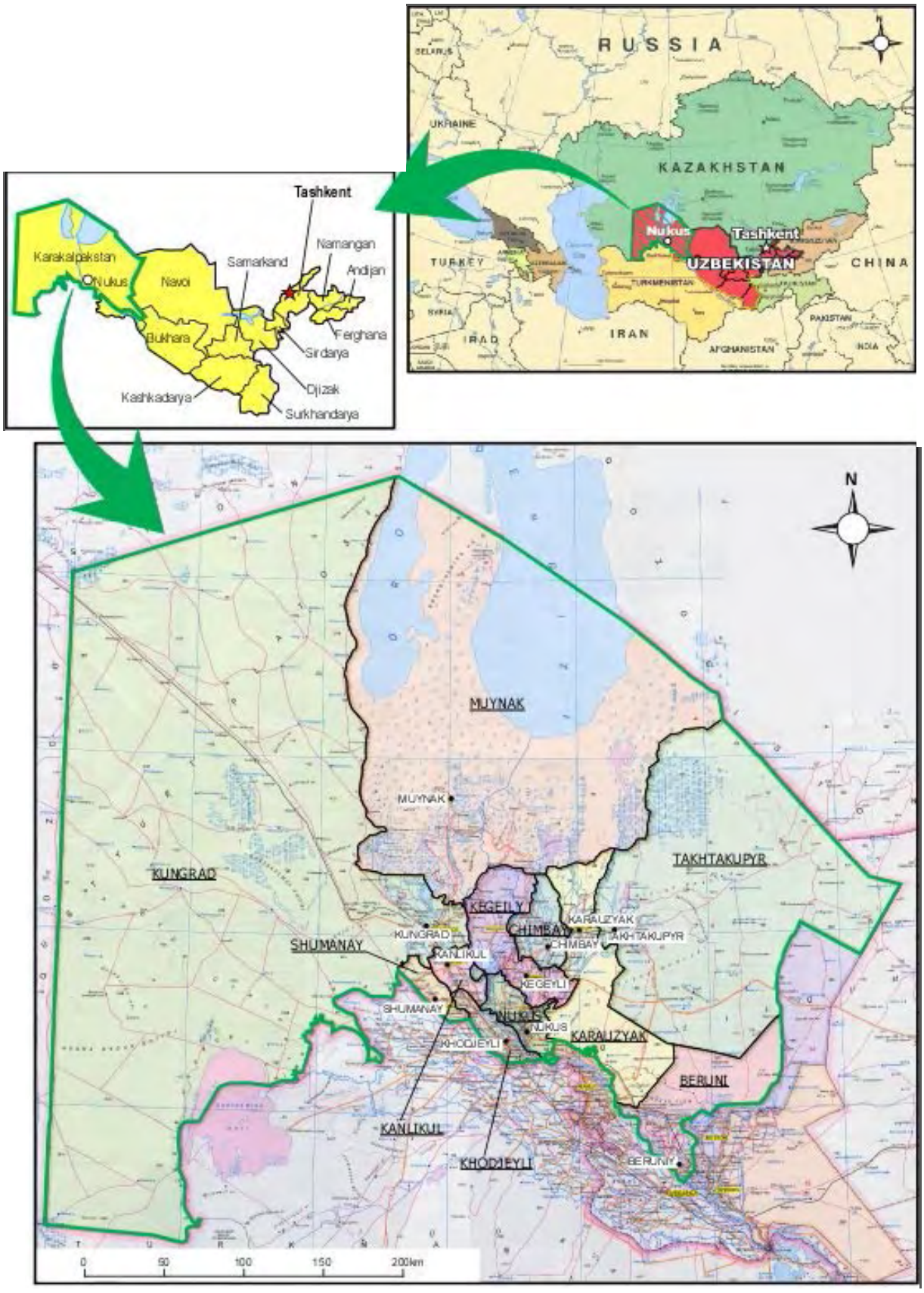
The Study Area, consisting of 11 districts among the 14 districts in the Republic of Karakalpakstan, is located in the Northwestern end of Uzbekistan, and embraces the vast dry lands in the lowest reaches of the Amudarya Basin and also the Aral Sea. Under the severe climate of cold winter and hot summer, the productivity of crop, livestock and fishery in the Study Area are low. Reflecting such conditions, the level of livelihood in the area is also low and the area is considered to be one of the most depressed regions in the Republic of Uzbekistan. Moreover, Uzbekistan is still at its transitional period from planned economy in the Soviet era towards market oriented economy. Agricultural policies of the Government is also under the process of reformation/optimization from state managed crops of cotton and wheat in shirkats, to market oriented food crop production in private farms.

Under these circumstances, the Study formulated a plan for regional development, aiming to activate the regional economy and to improve the livelihood of residents through the development of market oriented agriculture and effective use of tamarka, with due considerations to the environment. The Action Plan for Regional development indicates the activities required to fulfill its goal, for the sub-sectors of crop, livestock, fisheries and marketing and processing. Together with this, concerned stakeholders and procedures for the implementation of the activities are also indicated. It is expected that these outputs of the Study will be effectively applied and contribute to the regional development.

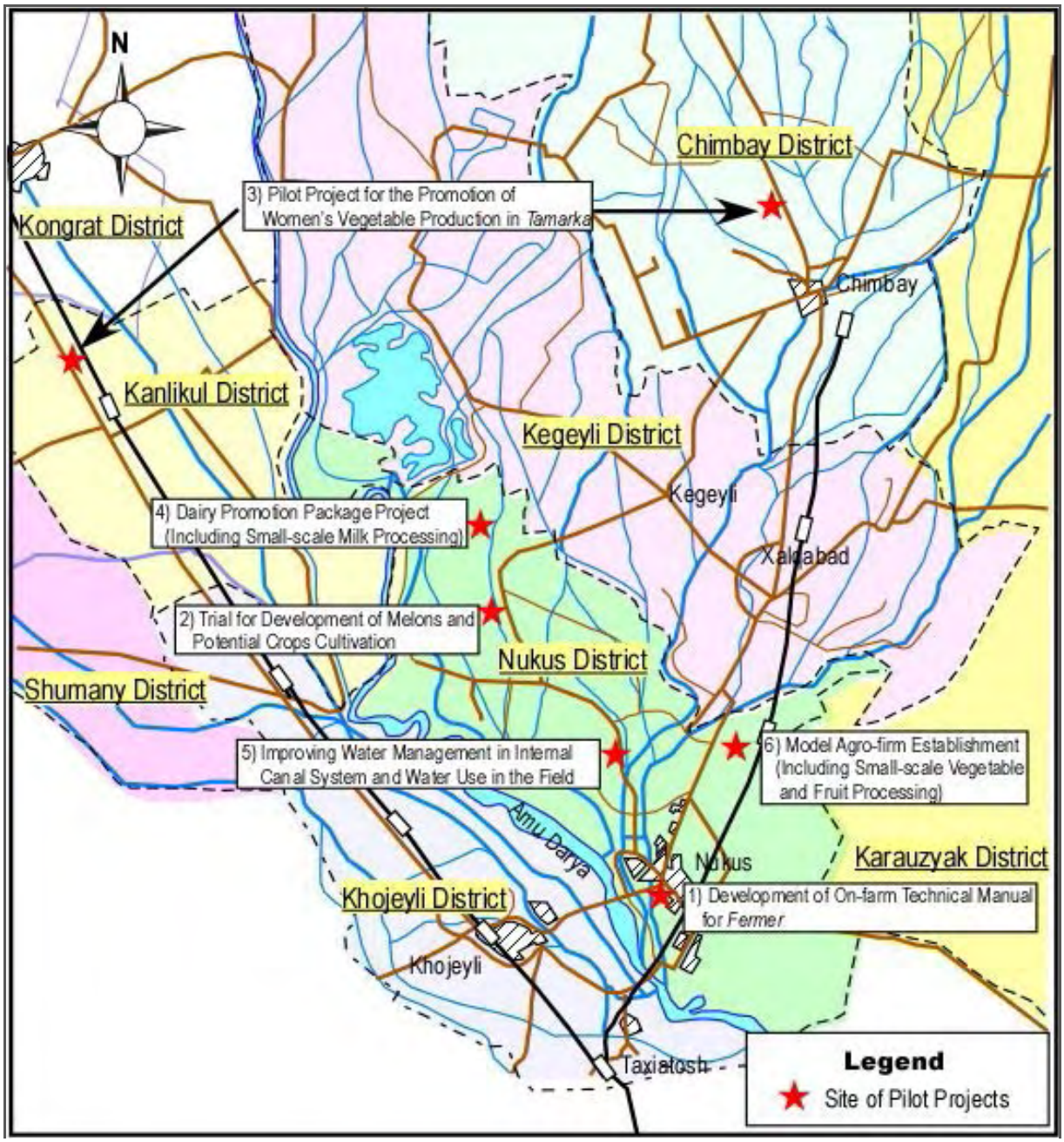
Finally, taking this opportunity, we would like to sincerely express our gratitude to the support and collaboration provided by JICA, to the relevant officials of the Governments of Karakalpakstan and Uzbekistan, especially the Council of Ministries of Karakalpakstan, and to all involved persons who supported our works through the implementation of the Study.

Sincerely yours,

Keiji MATSUMOTO
Team Leader
Study on the Regional Development in
Karakalpakstan in the Republic of Uzbekistan



Location Map of the Study Area



Location Map of Pilot Projects

The Study Area (March 2008 to December 2010)

The Amudarya

Sandstorm in Muynak

Cotton Growing

Tomato harvesting

Pure Karakal Sheep

Irrigation Canal in Summer

Chimbay Hakimiyat in Winter

Tahiatash Barrage (from GIS data)

Field Surveys and Discussions In Karakalpakstan

Discussion on Inception Report

Kickoff Workshop with Government Officials

District Workshops with Fermers

District Workshops with Dehkan

Workshop with WUA

Field Surveys on Crop Production

Wrap-up Seminar on Dec. 7, 2011

Field Surveys on Livestock

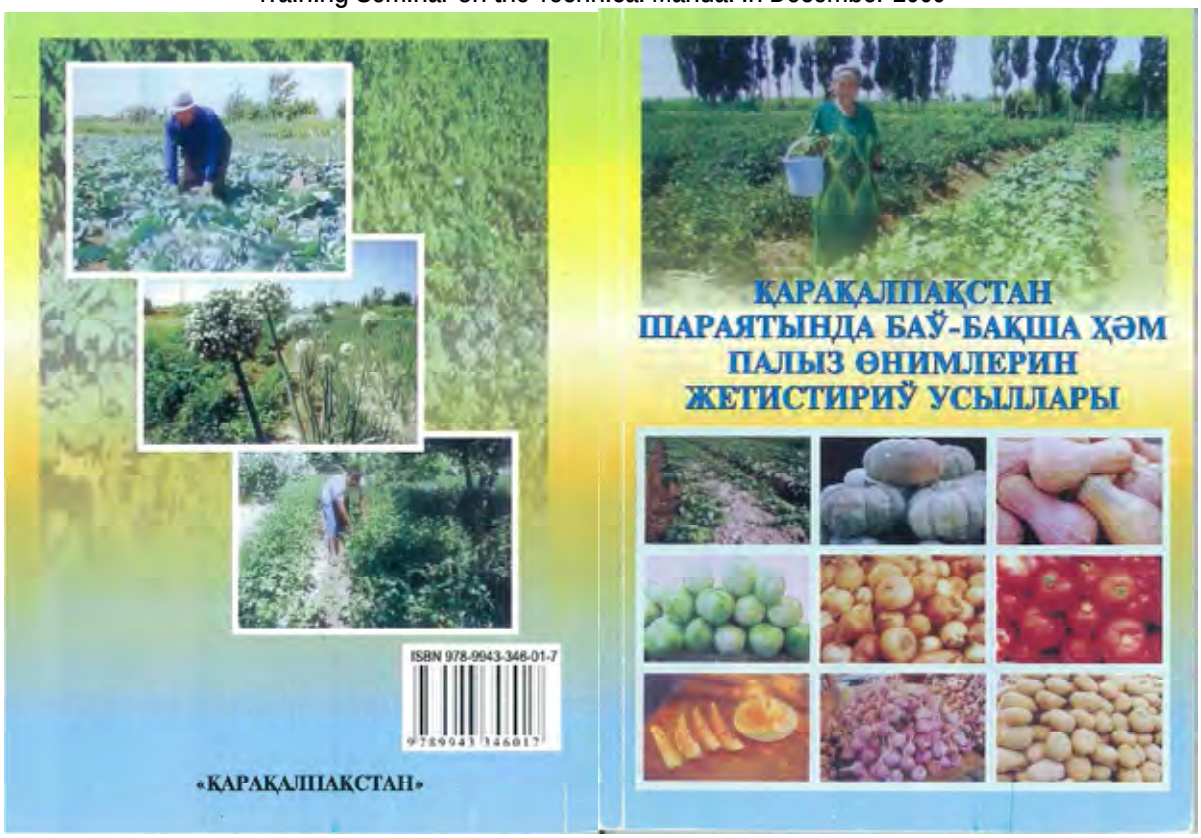
Photograph of the Pilot Project (1/6)

Development of On-farm Technical Manual

Editorial Meeting

Field Survey

Training Seminar on the Technical Manual in December 2009



Published On-farm Technical Manual

Photograph of the Pilot Project (2/6)

Trial for Development of Melons and Potential Crops Cultivation

Field Preparation, April 2009

Field Preparation, April 2010

Raising Seedlings, May 2009

Nursery in Vinyl Tunnel, April 2010

Melon growing, July 2009

Melon growing at Demo. Field, May 2010

Field Day with Farmers on May 30, 2009

Field Day with Farmers on August 14, 2010

Photograph of the Pilot Project (3/6)

Promotion of Women's Vegetable Production in Tamarka

In Chimbay 2009

Kick-off Workshop, April 7, 2009

Distribution of Inputs, April 2009

First Interchange Meeting, June 2009

Evaluation Workshop on October 7, 2009

In Kanlikul 2010

Study Tour to Bernie, March 2010

Demonstration of Seeding, April 2010

Interchange Meeting, August 2010

Evaluation Workshop on September 16, 2010

Photograph of the Pilot Project (4/6)

Dairy Promotion Package

Kick-off Workshop, January 2009

Sorghum Cultivation, July 2009

Silage Seminar, October 2009

Installation of Milk Processing Equipments

Opening Ceremony on August 21, 2010

Technical Seminar, September 2010

Technical Seminar, September 2010

Pasteurized Milk Products, September 2010

Photograph of the Pilot Project (5/6)

Improving of Water Management in Internal Canal System and Water Use in the Field

Kick-off Workshop, April 2009

Canal maintenance by WUA, March 2009

Improvement of Irrigation System at Field Level by local sub-contractor

Land Leveling by Local Sub-contractor

Soil Sampling in the demonstration fields

Technical Seminars for WUA Enhancement

Canal maintenance by excavator of WUA

Photograph of the Pilot Project (6/6)

Establishment of Model Agro-Firm

Preparatory Workshop, September 2008

Kick-off Workshop, April 2009

Installation of Vegetable/Fruits Processing Machines and Rehabilitation of Work Building

Study Tour to Fergana, June 2010

Processing Fruits, June 2010

Charcoal vinegar production, April 2010

Distribution of natural enemy for pest control

1 INTRODUCTION

The Government of Karakalpakstan, through the Government of Uzbekistan, requested the Government of Japan for a Development Study targeting the improvement of livelihood of the population in the region. In response, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched a Preparatory Study Team and signed the Scope of Works (S/W) of the Study on Regional Development in Karakalpakstan in the Republic of Uzbekistan (hereafter referred to as "the Study") on April 27, 2007. Based on the S/W, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched a Study Team from March 2008 to December 2010.

The objective of the Study is to formulate a Master Plan on regional development in Karakalpakstan. The Master Plan shall; 1) focus mainly on agriculture sector in Karakalpakstan, 2) be utilized in formulation of the "Program on Social and Economic Development of Republic of Karakalpakstan", 3) target the *fermer* and *dehkan* based on market economy, and 4) conduct several verification studies selected from the component of Draft Action Plan in accordance with criteria agreed in the course of the Study. Also, considering that the Master Plan will be implemented by the Government of Karakalpakstan, the central government controlled/managed crops, such as cotton and wheat, and primary irrigation and drainage system are excluded.

2 UZBEKISTAN AND KARAKALPAKSTAN

2.1 General

The Republic of Uzbekistan (hereinafter referred to as "Uzbekistan") is located in the center of Central Asia, with Kazakhstan in the north and west, Turkmenistan and Afghanistan in the south, and Tajikistan and Kyrgyzstan in the east. The area of Uzbekistan is 447,400 km^2, of which 425,400 km^2 is land surface. Uzbekistan is divided into; 12 provinces, one autonomous republic (Karakalpakstan), and the city of Tashkent, which has the status of province.

The Republic of Karakalpakstan (hereinafter referred to as "Karakalpakstan") is located in the northwestern part of Uzbekistan with an area of approximately 166,600 km^2. Most of Karakalpakstan consists of low land (from 50 to 200 m above sea level) and its flatness is its most prominent physical feature. Most people lives and works in the irrigated river plain on the delta of the Amudarya.

2.2 Socio-Economic Conditions

(1) Socio-economic Indicators

In 2008, Uzbekistan's population was estimated to be 27.3 million, the largest of the five former Soviet Republics in Central Asia. The annual growth rate was around 1.2 %, and overall population density was 61 people/km^2. The Gross Domestic Product (GDP) in Uzbekistan was 48,097 billion sum in 2009, with a growth rate of 8.1 % comparing to the previous year. GDP per capita was estimated at 1,337 thousand sum (equivalent to US$ 893) in 2009. The main economic sector is the industry (58% of the GDP), followed by the agriculture sector (26%). The total export in 2009 was estimated at US$11,771 million, while the import value was US$9,438 million, resulting in a trade surplus of US$ 2,333 million. The main exporting goods are energy and oil products (34.2 %), cotton fiber (8.6 %), and mineral resources (5.0%), whereas the main imported goods are machines and equipment (56.5 %) and chemical products and articles (11.1%) in 2009.

The population in Karakalpakstan was estimated at 1,612 thousand in 2008, accounting for 5.9% of population in Uzbekistan. The population density of 9.7 people/km^2 is quite low, comparing with the national average. The birth rate and infant mortality rate in Karakalpakstan are relatively higher than those of national average. In 2009, the Gross Regional Production (GRP) of Karakalpakstan was the third smallest among 14 regions in Uzbekistan. Agriculture is the dominant sector, which holds 45% of

GRP and 33% of the total labor force. The main agricultural products in Karakalpakstan are wheat, cotton and vegetables, which account for 34 %, 31 % and 14 % of total output respectively in 2007. Karakalpakstan is one of the most depressed regions in Uzbekistan in view of individual consumption of minimal calorie. According to the World Bank's assessment, poverty rate in Karakalpakstan was 36 %, which was considerably higher than the national average of 26 %.

(2) Welfare Improvement Strategy Paper (WISP)

The Welfare Improvement Strategy Paper (WIS) is a medium-term (2008-2010) national development document of the Government of Uzbekistan for determining the main areas and measures to accelerate the economic growth and enhance the living standards of the population. Under the WIS, the agriculture sector is focused on the following restructuring in medium and long terms:

- gradually improving crop selection in favor of cash crops with higher yields;
- using newly bred varieties of plants and animals, agro-technologies and agricultural practices in order to enhance the yield of crops and productivity of livestock farming;
- substantially increase capital investment in irrigation water supply and implementing water efficient technologies.
- improve economic relations between all actors in the agricultural sector.

(3) Transitional Period to the Market Economy

After 1991, the Government of Uzbekistan has gradually introduced a series of economic reform measures aiming to shift from centrally planned economy to market-oriented economy. The major direction of agricultural reform toward market-oriented economy are; provision of land property right, privatization of agricultural sector including creation of *fermer* and *dehkan*, promotion of small and medium enterprises in rural area, provision of infrastructure necessary to market-oriented economy, improve the taxation and pricing policy related to agricultural development, etc.

In 2006, the Government adds new directions for further promotion of agricultural reform. The new directions include improvement of accessibility of *dehkans* to factor market (machinery, fuel, fertilizers, pesticides, seeds and credits), promotion of information dissemination (via. workshops, textbooks, newspapers and journals), export promotion, insure food security, develop *dehkans*, development of rural infrastructures, and cooperation with donor organizations.

(4) Food Security

After the independence in 1991, the inter-industry relation of the former USSR has collapsed, and food security became an urgent issue for Uzbekistan. Since then, the State has been heavily involved in wheat production. As a result, wheat production has dramatically increased since 1995, and Uzbekistan once attained food self-sufficiency of wheat in 2002 and 2003. However, import of wheat started again since 2004 due to increase in consumption.

(5) Regional Development Plan in Karakalpakstan

The Government of Karakalpakstan has prepared the "Draft Program on Social and Economic Development of the Republic of Karakalpakstan (2007-2011)", which places the emphasis on development of the agricultural sector. However, it only specified production targets for cotton, wheat, rice, livestock, vegetables, fruit, and other products, and does not state specific measures to accomplish these targets. The final Program on Social and Economic Development of the Republic of Karakalpakstan was expected to be issued in 2009 by the Ministry of Economy of Uzbekistan, but the Study Team could not get any information during the Study period.

2.3 Crop Farming

(1) Land Use

Crop production in Uzbekistan is highly dependant on irrigation due to limited precipitation. Only 3,691,200 ha or 8.3% of the total land area was irrigated in 2006. Also, crop land area was almost equal to the irrigated area, 3,637,400 ha or 8.2% of the total land area.

In Karakalpakstan, the actual cultivated land area is quite limited. Irrigated land area is only 459,700 ha or 2.9% of its total land area. Crop land area was only 252,500 ha or 54.9% of the irrigated land area in 2006. This situation implies that Karakalpakstan can not utilize its potential land due to the shortage of irrigation water supply.

(2) Agricultural Actors

1) *Fermer*

Fermer is a legal entity managing several-tens to 100 ha of farmland and is generally operated by family-members. *Fermers* receives a certain piece of farmland in the form of a lease contract with the government with the period of 50 years, but the state owns full property rights.

There were 3,879 *fermers* in Karakalpakstan in January 2010. Cotton & Grain oriented *fermers* occupy 73.0% of the total *fermers*, followed by Vegetables & Gourds oriented (5.5%), Fruits & Viticulture oriented (8.0%), Livestock (10.8%), and others (2.8%).

2) *Dehkan*

During the former Soviet-era, workers of *kolkhoz* and *sovkhoz*, consisting not only of farm-labors but also of workers having various kinds of jobs, received a small plot to grow crops for self-consumption. Every household received official rights of lifelong heritable tenure of a plot for housing and backyard farming (*tamarka*) in 1998. A household basically receives the right of 0.35ha *tamarka*. The households who get the right are categorized as *dehkans*. However, they are not actual farmers or peasants, even though there are many *dehkans* working as farm-labors hired by *fermers*.

There were 225,308 *dehkans* in 2006 in Karakalpakstan according to the statistics. Considering the population, it was estimated that about 95% of the total households in Karakalpakstan were categorized as *dehkan*.

(3) Crop Production

Major crops in Uzbekistan are cotton, wheat, rice, maize, potato, vegetables (tomato, onion, cucumber, carrot, eggplant, cabbage, sweet pepper, melon, water melon, pumpkin) and fruits (apple, grape, apricot, cherry, pear, pomegranate). In addition, alfalfa, barley, sorghum and millet are cultivated for feeding purpose.

The crop land area of Karakalpakstan was 252,800 ha in 2006, which was about 7 % of the utilizable land for agriculture in Uzbekistan. In Karakalpakstan, cotton had the largest planted area which was 106,698 ha (38.3 % of total planted area) in the same year. The second largest planted area was wheat with the planted area of 64,315 ha (23.1 % of total planted area). These two crops covered more than 60 % of the total planted area. Planted area of rice in 2006 was 22,789 ha (8.2 % of the total planted area). Other crops shared only few percentages.

(4) State Controlled Crop Production

The Government still controls procurement prices and trading of cotton and wheat, since those crops are national strategic crops. After liberalization of rice in 2004, “State Order” system for controlling cotton and wheat production was abolished in 2006. After 2006, farmers have been able to choose their own crops, although they still receive suggestions by the Government.

(5) Costs and Benefit of Crops

Official figures of the Government show that rice and potato require higher production costs per ha than other crops, and that tomato, melon and water melon produce higher profits. The profit per ha of cotton and wheat is lower than rice, vegetables, melon and water melon. According to the calculation by the Study Team, it was confirmed that rice, vegetables, melon and watermelon are high profitable crops in the Study Area. The calculation also shows that cotton cultivation would show a loss if the profit is calculated based on the average yield. This calculation implies that not a little number of producers in the Study Area has insufficient profit or even losses from cotton production. As for wheat, the profit would be higher if it is calculated based on the average yield of the study area, instead of the standard yield. However, there is a substantial percentage of wheat producers whose yield is less than average yield. There might be many wheat producers who suffer losses on one hand while a small number of producers enjoy certain profit on the other hand in the Study Area.

(6) Agricultural Inputs

Agricultural inputs distribution system has been established and developed, especially since 1999 in accordance with a Presidential Decree. Since cotton and wheat are strategic crops of the country, the Government constantly pays much attention to cotton and wheat growers based on the developed system. Consequently, the Government still has substantial influence on the distribution. Growers who are tied to the state procurement system rely upon a network of specific suppliers who are monopolized agencies substantially controlled by the state, while other growers rely mainly upon local markets and own resources.

(7) Agricultural Researches

There is one branch office of Uzbekistan Scientific Center for Agriculture (SCA) in the Study Area, which does researches on agriculture sector under the MAWR of Uzbekistan. The branch office of the center is located in Nukus city. Under the branch office, 9 stations and 1 institute are organized in Karakalpakstan.

(8) Extension System

The Government of Uzbekistan organizes an annual 5-days course for *fermer* training seminars in off-agriculture season (Jan – Feb) in order to improve the *fermer's* ability. The training seminars are generally organized in every district at respective district agricultural colleges. However, the seminar in 2009/10 winter was scaled down due to shortage of the Government budget in Karakalpakstan.

Karakalpakstan Fermer's Association also organizes seminars for its members on ad-hoc basis. Many seminars were organized to disseminate Government policies like presidential decrees or donor sponsored events.

(9) Agricultural Credits, Insurance and Leasing Scheme

While there are several agricultural credits schemes at present, all credits are provided through commercial banks. Among these credits, "Cotton & Grain Credit" is the most popular directed among *fermers*. However, inflexibility of the credit scheme, especially the small cash component, is not convenient for *fermers*. In general, the conditions of the above credit schemes are too severe for application by *dehkans*. In order to address this issue, the Government has launched a new credit for growing vegetables, potatoes, fruits, grapes, etc. in private backyards from the cropping season in 2008.

Uz-Agrosugurta, a state joint stock company, is the only insurance company which provides agricultural insurance in Uzbekistan. There are 4 types of mandatory (compulsory) insurance programs and 11 free (voluntary) insurance programs.

The Government has launched a tractor leasing scheme with Qishlog Xoalik Mash Lizing, or in other words, the Agro-machinery Leasing Co., since 2001. According to the Nukus branch office of the company, it has provided only around 200 tractors in 2008 and 2009 due to limitation of allocated fund. According to the company, the actual demand is more than the figure.

2.4 Livestock

Livestock production in Uzbekistan is distinguished by its richness and variety. Each animal type is characteristically distributed in its own agro-ecological zone. For example milk cattle are mainly found in irrigated croplands near industrial centers; beef cattle in mountain zone pasture areas; Karakul sheep production systems are mainly in deserts; meat-wool and ram production systems and horse breeding are concentrated in pre-and mountain zones of the Fergana valley, while pig and poultry production industries are near large cities and industrial centers.

The gross output of agriculture and livestock in Karakalpakstan indicates 53% and 47%. Therefore, the contribution of livestock sector to Karakalpakstan economy seems to be considerably high. On the other hand, the number of livestock in Karakalpakstan has been less than 10% (excluding 11% of cattle) of Uzbekistan.

Climatic conditions in Karakalpakstan are considered severe, especially for cattle/cows. There are limiting factors for rearing livestock, such as intense heat, frore winter, water shortage for forage production, salinized soil and low carrying capacity of grazing lands, which cause insufficient supply of feeds not only in quality but also quantity. Moreover, it is reported that the current concentrated production in Karakalpakstan meets only about 60% of demand. Grazing starts from middle March to end of November in general. After that, animals are kept in housing (barn) to avoid sharp frost, though they are out during daytime even in winter for sunbath. In winter, livestock are fed with dried sorghum, alfalfa hay, reed and cotton meal etc.

The *dehkans* play an important role in the livestock rising in Karakalpakstan, despite their small farm size. There were 225,308 *dehkans* in 2006, comparing to 3,879 of *fermers* (in 2010), who own only few livestock individually, but as a whole the total number of livestock owned by dehkans occupies higher rate for accumulation. As for the cattle/cows and the chicken, *dehkan* owns about 90%, though the share is different according to animal types such as pig and sheep/goats.

As for the livestock supporting system, the Animal Husbandry Department under the MAWR of Karakalpakstan plays general technical assistances for livestock management and feed production in the Study Area, while the Veterinary Department provides mainly veterinary services such as Artificial Insemination (AI) and medical treatment.

2.5 Fisheries

At present, fishery production in Uzbekistan has been practiced by private company and fishery *fermers*. Annual fish consumption per capita has decreased and nowadays it is less than 1kg. Total fishery production in 2006 was 7,200 tons; 3,400 tons of capture production and 3,800 tons of culture production. Aquaculture is practiced exclusively by pond fish culture system, using common carp and Chinese carp. System of culture is extensive, utilizing considerably large ponds (10-50 ha for fingerlings and over 100 ha for grow-out) and the general productivity is 1-2 tons per ha with the total area of 10,200 ha.

In Karakalpakstan, the total area of registered water bodies increased to 79,439 ha and total capture production reached to 802 tons in 2007. Principal fish species are common carp and silver carp (including bighead carp), accounting around 60% of the total production. The Ministry of Agriculture and Water Resources of Karakalpakstan is planning to increase the fishery production thereafter, estimating 1,600 tons of capture production in 2011 and 90,000 ha of total water bodies in the future. In Karakalpakstan, aquaculture is not practiced at present, except few entrepreneur farmers with small

amount of production.

The Department of Animal Husbandry of the MAWR of Karakalpakstan is the prime organization of the fishery administrative structure in the Study Area. Fishery Association was established in 2006 to cooperate in promotion of fishery activities in Karakalpakstan.

2.6 Irrigation and Drainage

Agricultural land of Uzbekistan occupies 22.3 million ha among 44.4 million ha of the country territory, from which 4,042,000 ha is arable land. 97% of agricultural crops are grown in the irrigated area in Uzbekistan. Irrigation is considered vital under the prevailing arid climatic conditions. The development of modern and large scale irrigation network has started in the early 20th century. The area of irrigated land was increased from 2.57 million ha in 1960 to more than 4.2 million ha by the 1980's. The major area of irrigated land in Uzbekistan is distributed in; 1) the north-west part included in Karakalpakstan, and 2) the east to south part which composes of Tashkent, Samarkand, Kashkadarya and Fergana valleys.

The irrigated lands of Karakalpakstan rely their water sources to the river course and dams along the Amudarya. Those irrigation systems cover approximately 500,000 ha with the main and inter-farm canal networks of approximately 3,500 km in length. Among the 500,000 ha of irrigated land, only 252,848 ha was irrigated and cropped in year 2006. This was equivalent to 50.5% of the total irrigation area. The low usage of land is caused by the complicated issues of; lack of agricultural machinery used in the former Soviet Era, aging and malfunctioning of canal systems, reduction of productivity caused by salinization, etc, as well as the limitation of water resources and low efficiency of water use.

The main and inter-farm irrigation canals in the Study Area are operated and managed by the Lower Amudarya Basin Management, while the irrigation and drainage system after the head of the territories of Water Users Associations (WUAs), are managed by WUAs. In general, these territories correspond to those previously managed by the former *shirkats*. Currently, they are the property of WUAs which have responsibility of operation and maintenance by own budget.

2.7 Rural Society

The policy of the Government called "*Mahallization*", aims to reinforce *Mahalla* organizations of residents, and put them on an official footing, as well as filling the gaps in rural social security and community bonds which opened up in the process of rural sector and agrarian reforms.

Mahallas are typical Uzbek communities, and the name "Mahalla" and the system itself did not traditionally exist in Karakalpakstan. Therefore, in Karakalpakstan, they are called "*Makan-kenes*" in urban areas, and "Village Citizen Council" in rural areas. Self-governing bodies called *Bei*, which are similar to *Mahallas*, did traditionally exist in Karakalpakstan. However, as the Kazakhs and Karakalpaks, the main ethnic groups in Karakalpakstan, were traditionally mainly nomadic herders, their traditional organizations emphasize tribe and kin groups, differing somewhat from those of Uzbeks, who have a long history of settled lifestyles.

3. PRESENT CONDITIONS OF THE STUDY AREA

3.1 The Study Area

(1) Natural Conditions

The main cultivation area in the Study Area belongs to the Amudarya river delta and generally has heavy and loamy soils consisting of alluvial sediments. These soils have been irrigated for a considerably long time with water with high salt concentration. Together with high groundwater level this has caused salinity problems in this region. It is said that 54 % of the irrigated land in

Karakalpakstan is categorized in poor land, which is the highest in Uzbekistan.

The climatic condition of the Study Area is characterized by small precipitation from 110 to 130 mm per year, dry and hot summer season and severely cold winter season. The wettest months are March and April, whilst the driest are July and September. The average temperature of the Study Area is 11.4 ºC, varying from 10.4 to 12.3 ºC by location. The hottest months are June to August, while the peak is observed in July.

The only water source of the Study Area is the Amudarya River. The water flows into the Study Area regulated by the Tuyamuyun Dam, which the active capacity is 4,500 million m^3, located at the boundary of Karakalpakstan and Khorezm region.

(2) Socio-economic Conditions

Karakalpakstan is a multi-ethnic society, in which three main ethic groups, the Karakalpaks, Uzbeks and Kazakhs, account more than 90% of the population. In general, the majority of Karakalpak ethnicity lives in the center of the republic, whereas Kazakh lives in northern and western districts. The majority of Uzbek lives in the Southeast districts such as Beruni.

As for the regional economy, Nukus, Beruni and Khodjeyli districts lead the 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 largely, while for service sector Khodjeyli and Kungrad are outstanding in view of trade volume.

3.2 Agriculture

(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**.** Cotton, cereals and fodder crops are major crops in the Study Area. These crops occupy more than 90% of the total planted area of major crops.

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

(2) Cropping Calendar

Generally, 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. As result, most crops are planted around April and harvested in July to September. There is tomato and cucumber produced in green house, however, this type of production system is not popular due to unreliable supply of gas, electricity and water.

(3) Crop Rotation

Crop rotation has been once introduced to Karakalpakstan during the former Soviet era. However, it is not a common practice nowadays in the Study Area due to the following reasons:

1) Dissolution of the collective farming system spoiled the systematic farm management including crop rotation. Many *fermers* who newly entered into the farming business are not familiar with crop rotation and have less knowledge and attention
2) Since actual cropped area is decreasing due to the limited supply of irrigation water and shortage of farm machinery, *fermers* cannot allocate enough farmland to fodder and green manure crops
3) The Government food self-sufficiency policy after the independence has led *fermers* to replace fodder and green manure crops with wheat

(4) Presence of *Fermer* and *Dehkan* in Crop Production

In terms of the planted area, *fermers* occupy 73.6% and *dehkans* occupy 9.5% of the total planted area. This share implies that *fermer* has a prioritized position in the current agricultural policy of the Government.

Fermers tended to concentrate on Government controlled crops (cotton & wheat), cereals and fodder crops. In contrast, *dehkans* tended to diversify into several crops, while also giving high priority to wheat and fodder crops generally for self-consumption and livestock. Crops harvested in *tamarka* are considered to be a subsidiary food source for *dehkan* family in the Study Area, while seasonal surplus are sometimes marketed for getting additional cash income.

(5) Characteristics of the Districts in the Study Area

Based on the agricultural statistics and field observation by the Study Team, the characteristic of the districts are summarized in the table below.

Districts	Characteristics
Kungrad	Wheat and other grains including rice share most part of the cropped area and the cotton share 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 also the cropped area is the smallest in the target districts. The number of livestock is also the lowest in the target districts.
Shumanay	The share of cotton in the 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 the cropped area and the share of cotton is the second.
Kegeily	The share of cotton in the cropped area is the highest in this district and the share of wheat is the second. The numbers of cattle and cow are comparatively high.
Chimbay	The share of cotton in the cropped area is the highest in this district and the share of wheat is the second. The number of cattle and cow are comparatively high.
Khodjeyli	The share of cotton in the cropped area is the highest in this district. However the share of wheat in the 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 the cropped area is low. However the crop production is more diversified into 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 the 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 the 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 the cropped area is lower than average in Karakalpakstan. The share of fruits in cropped area is higher than the other districts. The numbers of cattle, cow and poultry are the highest in the target districts.

(6) Farmer's Organization

The major farmer's organizations existing in the Study Area are shown below:

Organization	General Descriptions
Fermer's Association (FA)	• FA is a NGO covering all area of Uzbekistan and the Karakalpakstan FA is a regional organization of FA. • Karakalpakstan FA was established in 2005. The head office of Karakalpakstan FA is located in Nukus city and it has 14 district offices, which are called Fermer Service Center. • The member of Karakalpakstan FA counts 6,247 *fermers*, which occupies 65% of all *fermers* in Karakalpakstan, as of January 2008. • FA provides legal / management consultation, agricultural technical extension, intermediate service for supplying agricultural input and machinery and other services to the members.
Water Users Association (WUA)	• WUA, which is responsible organization to operate and maintain internal canal systems, was established in 2002 in Karakalpakstan after dissolution of *shirkats*. • 129 WUAs were established in 2007. However, WUAs currently are not able to fulfill their role adequately. The lack of irrigation water is considered as one of the reasons. • Members of WUA conclude contracts for irrigation water with WUA and have an obligation to pay water fee. However, the ratio of water fee collection hangs low. The rate was 36.7 % in 2007. • WUA also coordinates irrigation water supply to *dehkans* who do not have legal status to be member of WUA.
Agro-firm (AF)	• AFs have been established for promoting *fermer's* production in the former vegetable and fruit s*hirkats* after dissolution. There are 208 AFs in Uzbekistan, of which 3 are located in Karakalpakstan. • AFs are private organizations, voluntary formed by *farmers.* • The main activities of AFs are process and marketing of fruits and vegetables. • AFs succeeded assets from the original *shirkat* such as facilities, plants and machineries. However, most of them are superannuated and malfunctioning. • It can be observed that some advanced AFs expand their activity by cooperative shipping, processing and marketing by introducing facilities or plants as well as technical extension.

3.3 Livestock

Livestock population in 11 districts of the Study Area was 254,000 of cattle, 131,000 of cows, 420,000 of sheep/goats in 2006. Cattle/cows, which require a lot of fodder than other livestock, are raised in Beruni district. On the contrary, Beruni is ranked at 4th in the share of sheep/goats, following Kungrad, Karauzyak and Takhtakupyr, which are located at middle and northern part of the Study Area and drier than others. Animal productions in the Study Area were 28,055 LBW ton of meat and 73,997 liters of milk in 2006. Annual meat production of *dehkans* in 2006 was 26,418 ton (94%) and that of *fermers* was only 467 ton (1.7%).

Most of animal products processing observed in the rural areas are dairy products of cow milk. Though milk production is common in Karakalpakstan, bulk of milk is consumed by the producer's households mainly due to the lack of market and processing factory.

34 % of the cattle/cows were inseminated artificially in 2007 in the Study Area. Comparing the accomplishment in 11 districts, Muynak was ranked top, followed by Nukus, Takhtakupyr and Kanlikul. Various paid veterinary services other than AI are available in Karakalpakstan. These veterinary services are provided at a veterinary points located at *auls* under the district veterinary office, though the conditions vary among districts.

3.4 Fisheries

The fishery production in the study area was 795 tons and 99.0% of Karakalpakstan in 2007. The production had a 37.2% increase from the previous year. The main species are common carp and silver carp. The total area of registered water bodies for capture fisheries amounts 75,474 ha and 95.0% of Karakalpakstan in 2007. The number of corporations and *fermers* which registered for lease of water body was 54.

Commercial aquaculture activity in the Study Area is not being practiced at present, yet there are some farmers performing in trial base, using pond and natural fish seed. At present, there is no alevin production unit in study area. Therefore source of alevin supply is limited, only natural alevin collected from irrigation canal in autumn or cultured alevin from other regions in Uzbekistan.

Production of smoked fish is practiced in homestead using any caught fish species and sold in local markets.

3.5 Irrigation and Drainage

Five irrigation systems in the Study Area provide irrigation service to the area of 395,000 ha. Among them, 173,000 ha were irrigated (cropped) in 2006, equivalent to 44% of the total service area. Most main canals show 44% to 71% of the designed discharge capacity. Even though, water distribution in the main and inter-farm canal system does not suffer serious problems, because the irrigated area (cropped area) has declined due to limited available water resource. However, it is expected to become a problem if the re-expansion of irrigated (cropped) area close to the former level is realized.

There are 13,434 km of internal canals in the Study Area. The density of internal canal is considered sufficient or close to sufficient level. However, its condition is generally poor. Due to the lack of machinery and budget, WUA cannot properly maintain canal and other hydraulic structures. Hence, water management in the internal irrigation system is not efficient and water loss in the system is large.

In total, there are 2,148 km of the main and inter-farm collector networks in the Study Area. The conditions of internal collectors are considered poor as well as the internal irrigation canals. In addition, the current internal collectors are insufficient and are necessary to be developed.

After the dissolution of *shirkats*, WUAs had been established in order to succeed the property of the internal canal/collector network. WUAs attain the authority and responsibility to manage the system by their budget, of which financial source is covered by membership fee (water fee) based on the contract with water users. WUAs face difficulties in its operation due to the low collection ratio of water fee, the lack of construction machineries for maintaining canal, the lack of transportation for watermen, insufficient staff for water management, etc.

3.6 Marketing and Processing

Market is the main transaction place for most commodities in Karakalpakstan, and retail shops have been scarcely developed particularly in rural area. Nukus Central Bazaar (so called *Dehkan* Bazaar) is the largest bazaar in Karakalpakstan, and most districts have central and local (satellite) bazaars, in order to give producers and local residents better access. In recent years, the number of retailers at major District Central Bazaars are increasing due to the lack of employment opportunities in rural areas, resulting in congestion of retail sections.

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 in summer, because of many competitors in the market. The price of vegetables, such as cucumber and tomato, in Karakalpakstan skyrocket in winter, because of undersupply, whereas in summer, locally produced vegetables flow into local market at once, which result in a heavy price fall.

In Nukus city, the veterinary and sanitary inspection for livestock and agricultural products are conducted in two points: Nukus Central Bazaar and Nukus railway stations. The veterinary and sanitary laboratory in Nukus Central Bazaar has its own sanitary check plan to check meat, vegetables, fruits, fish and dairy products. However, products are not entirely tested in accordance with the check items due to lack of test equipments.

The system of the vegetable distribution is hardly developed in comparison with the cotton and wheat

in the Study Area. Thus, few cases of commercial vegetable processing are observed. Even though, the demand of dried fruits is observed, most of them are imported from Samarkand and there is no local production.

4. ANALYSIS OF PRESENT CONDITIONS OF THE STUDY AREA

In addition to the literature surveys of the existing documents, statistical data and interviews to obtain information on issues of which the Government and farmers confront, the workshops (workshop with relevant ministries, local officials, *fermers*, *dehkans* and WUAs) and questionnaire surveys were carried out to collect more specific information and comments during May – June, 2008.

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

4.1 Constraints

(1) General

Constraints	Description
Harsh climate conditions	The climate condition of the Study Area is characterized by arid and small precipitation from 110 to 130 mm/year. The temperature varies in 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.
Unstable irrigation water supply	The only water resource of the Study Area is the Amudarya River. The discharge 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 form the River.
Low quality of water	The quality of water of Karakalpakstan is poor because of sewage coming from the provinces located upper Amudarya.
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 over salinity is the main problem to continue the cultivation.
Low population density	The density of population in Karakalpakstan was 9.5 persons/km^2 in 2008, and the figure is extremely low in other provinces of Uzbekistan. This factor significantly increases the cost of investment and social services, as well as result in its underdevelopment.
Low living standards and poverty	The Study Area, especially people in rural area, the living standards are low. The ratio of the poverty people is 11.3 % in total Karakalpakstan, 9.8% in extreme poverty. Karakalpakstan ranks 12^{th} out of 14 provinces in term socioeconomic development in Uzbekistan according to WISP.
Lack of involving community in development	In previous development assistances so far, local communities have hardly ever been involved in planning, decision making, monitoring and evaluation.
Under transition process	Agrarian and rural sector reforms have been carried out since the independent in 1991. In rural society, "*Mahhal* system" and "VCC system" were introduced; on the other hand, the dissolution of *shirkat* brings many private *fermers* and *dehkans* in rural agriculture. Among these processes, local people need more time to well adapt the new system mentioned above.

(2) Agriculture Sector

Constraints	**Description**
Climate	In general, Karakalpakstan is not blessed with good climate condition for crop growing. Its very low annual precipitation, cold winter and hot-dry summer cause low productivity of major crops comparing to other regions in Uzbekistan.
Soil condition	Soil salinity is the most serious problem for growing crops together with irrigation water problem, according to the result of workshops carried out by the JICA 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 on sustainable basis.
Access to technology/ Information	There is no systematic agricultural extension service system in Karakalpakstan. Outputs of agricultural research institutes, which develop applicable technology to local conditions, are not reaching to crop growers due to reduced function of the institutes and lack of integrated coordination system for dissemination. Consequently, many crop growers do not have enough knowledge or technology, especially for growing crops other than cotton and wheat. They can only get yield far less than their potential, as well as low quality harvests. Such low quality standard of farm products is a bottleneck to promote agro-processing and marketing.

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 crops other than cotton and wheat under the present supply system. Moreover, each input or service is provided from each different company or institution on advanced-contract basis in most cases. This situation troubles of crop growers to access to the inputs and services. Together with changeable whether and crop conditions, it makes crop production difficult.
Mechanization	Many crop growers have difficulty to get sufficient agricultural mechanization services when needed, especially in the beginning of planting season. MTP (Machinery and Tractor Park) and Alternative-MTP provide the services to the growers. However, many of the growers are not well satisfied with the services.
Management of *fermer*	Though many *fermers* are struggling to adapt to the present agricultural reforms, substantial numbers of *fermers* still have difficulty in having a sense of ownership and becoming financially independent. Under the present situation, they 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 for market oriented economy.
Dehkan-farming	*Dehkans* have a certain potential, especially in vegetables and fruits production, if motivated by a proper incentive. 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 agricultural inputs and services when they want to grow crops in *tamarka*.

(3) Livestock Sector

Constraints	Description
Low productive capacity of livestock	In general, productivity of livestock in Karakalpakstan is considered to be low. Apart from the productive ability that a breed originally has, one of the reasons for the low productivity can be attributable to the inadequate supply of feeds, not only in quantity but also in quality.
Insufficient and low quality of animal feeds	Major sources of animal feeds prevailingly feeding to animal are sorghum, alfalfa, reed, wild grasses and by-products of cotton seed. However, nutrient values of these feed are generally low, excluding by-product of cotton seed and alfalfa.
Low carrying capacity of grazing lands	Young cattle/cows, sheep/goats are grazing on land until November when dry feeding starts. Grazing areas are composed of post-harvest farms, roadside, desert area and grassland with bushes around residential areas. However, carrying capacities of such areas are low to graze many animals and sufficient feeds are not secured in quantity and quality.
Inaccessibility to veterinary and AI services	District veterinary department and veterinary point at *aul* level are responsible for veterinary services for *fermers* and *dehkans*. Though insufficient, some district veterinary offices have laboratories like Beruni, which is equipped with AI tools such as LN_2 tanks etc. However, district veterinary offices lack vehicles necessary for various veterinary services at rural levels.
Lack of animal products processing facility	Both *fermers* and *dehkans* consider that cattle/cow is most profitable animal from economical point of views probably due to stable income by selling milk. Currently, *fermers* and *dehkans* are facing lack of processing facility along with marketing channel.
Lack of hygienic slaughterhouse	The slaughterhouse in Nukus city has not been operated since 2004. It is reported that the main reason that management could not continue is that users that slaughter animals by themselves. Another private slaughterhouse in Tahiatash, slaughtering 5 to 6 cattle per day, is not hygienic and 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.
Insufficient technology of *fermer* and *dehkan*	One of the reasons for low productive capacity is attributed to currently prevailing poor feeding of animals, in quality and quantity. It will be necessary to train livestock owners, including *fermers* and *dehkans*, to teach balanced feeding system using locally available animal feeds, taking into consideration productive capacity of animals as well as proper animal care, breeding etc.
Necessity for strengthening livestock experts	At present, services on livestock sector at rural levels are focusing on veterinary. Under the condition, it will be necessary to strengthen services for AI, diseases control and medical treatment etc, which are indispensable for sound and productive animal raising in the Study Area. In addition, it will be also necessary strengthen extension services for livestock management, forage production, nutritious feeding technology, market-oriented livestock raising, etc.

(4) Fishery Sector

Constraints	Description
Limited area of water bodies for capture fishery / insufficient investigation	A large proportion of capture fishery production is provided from some principal huge lakes, and verification of its sustainability has not determined. Besides, large increase of capture fishery production seems to be restricted because of its limited availability.
Lack of aquaculture	Historically, fishery activity in the Study Area has progressed only on capture fishing, resulting in a lack of aquaculture as another source of fishery production. Consequently, it is still not recognized popularly and is making fishery development stay behind.

(5) Irrigation and Drainage Sector

Constraints	Description
Inadequate canal condition and water management	Effective water management is difficult in the internal canal network due to inadequate condition of the internal canal network and lack of water management equipment. WUAs do not have financial and technical capability, though they have the responsibility to operate and maintain the internal canal network.
Inefficient water use in the field level	Accurate and careful water management is not operated in the field level. In addition, there is less motivation for users to reduce water consumption in the field because the membership fee is not charged based on actual amount of water delivery, which is not measured.
Soil salinization	The condition of existing collector network, both inter-farm and internal system, is quite inadequate as well as its insufficient density. The lack of control of groundwater table makes leaching in the field ineffective or low efficient, so that the amount of water applied for leaching practice is increased, as well. Excessive water application for irrigation and leaching causes upraising of groundwater table and accelerates secondary salinization in the field.
Less capability of WUAs	The financial capacity of WUAs for ensuring management and maintenance of the internal canal/collector system is weak due to low collection of membership fee. Many WUAs do not have enough staff to manage their system and organization. Especially, the lack of experts makes WUA's technical capacity insufficient and WUAs suffer difficulty in water management and O/M of facilities. Lack of machinery limits WUA's capability on conducting maintenance work of the canal/collector systems. The organizational management capacity of WUAs is insufficient. Currently WUAs cannot act upon the member farmers to improve water management in the field level, due to insufficient technical capacity and lack of close communication with the members, implied by the lack of transportation. Lack of transportation makes difficulty on regular water management activity of WUA, as well.

(6) Distribution / Marketing/ Processing Sector

Constraints	Description
Weak bargaining power	Since farm lot of *dehkans* is quite small, the production volume of individual *dehkans* is limited. In addition, collective actions of small-scale farmers are rarely seen in the Study Area. Accordingly, bargaining power of *dehkans* is weak in general.
Low accessibility to commodity market	As many participants of workshop indicated, accessibility to local bazaar is poor due to (a) lack of transportation means, (b) long distance to market, and (c) difficult to find local buyers. As result, most of the participants of the workshop don't have any experiences on marketing their products.
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. The direct reason of this phenomenon is overproduction in summer and underproduction in winter.
Lack of processing technology	In general, processing activities of agricultural and livestock products are not active in Karakalpakstan. For example, milk at market is directly brought from the farm without any process, and sold in PET bottle stored under the open-air.
Lack of technology on food safety	The existing testing equipments are outdated and too simple. So, veterinary and sanitary inspectors at bazaar cannot meet consumers' requirement on food safety.

4.2 Potentials

Agriculture	Academic and technical human resources	Under SCA－Karakalpakstan, there are 9 stations and one institute, each working on its specific theme on agricultural research. Due to shortage of revenue, they are currently stagnated at a certain extent. However, these stations / institute have well experienced staff with high technical / academic background, and if provided sufficient financial resources, have the potential of developing and introducing agricultural technology suitable for new and current crops / livestock. Also, the Nukus Branch of Tashkent Agriculture University and agricultural colleges in each district can contribute to the training of farmers.
	Promising crops	Karakalpakstan has been well-known as a production center of rice, melon, watermelon and alfalfa seeds. Many farmers still have a mind to produce them since the crops are suitable to local conditions. The production of those crops shall be reactivated with strategic support measures of the Government since there are many local producers who have experience in the production. There is also a big space for local vegetables and fruits for sales in local markets.
	Technical capacity of MTP	There is one MTP in all districts, together with a large number of A-MTPs in Karakalpakstan. Their facilities and workers can maintain agricultural machineries.

	Network for distribution of agricultural inputs	The state company Uzselhoshimiya (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 for distribution of agricultural inputs if a more flexible system is applied
Livestock	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 person, and is remarkably high. These facts indicate that there are potential needs for hygienic local milk.
	Karakul sheep	Karakul sheep is well known in the world market. 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.
Fishery	Market potential of for fishery and introduction of aquaculture	Considering the national economical development and environmental factors, it is reasonable to assume that the demand for fishes can increase in Karakalpakstan. From the fishery viewpoint, land resource is a new area for its production and may provide high potential. Pond aquaculture has large potential of fishery production. It also provides possibility of a new entry to fishery activities, including *fermers* and *dehkans* utilizing their land.
Irrigation and Drainage	Existing institution of WUAs	WUAs are already established. Water users who have been organized into WUAs over the Study Area can be regarded as a potential for improving irrigation and drainage. 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.
	High priority to irrigation subsector of the Government of Uzbekistan	In 2007, a decree for fundamental improvement of collectors in the irrigation area has been issued by the Government, deciding the implementation of NDIP. Also, DIWIP, was implemented in south Karakalpakstan up to 2010. 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.
	Supporting institutions	A number of institutions related to irrigation and drainage, such as ISD, PI and SANIIRI-Karakalpakstan, which have long experience in development and implementation of irrigation and drainage technologies, are present in Karakalpakstan. They are well capable of supporting the WUAs for better water management in the field.
Distribution / Marketing / Processing	High demand on off-season vegetables	Price of off-season vegetables, such as tomato and cucumber which skyrockets in winter season, indicates strong demand on 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 fill the shortfall. This situation indicates that some rooms are remaining to supply local products to market under controlled distribution timing.
	Location in the middle of the Silk Road	Khodjeyli is historically one of transit point of international transaction of the Silk Road. Also the ethnic variety is one of the strengths of Karakalpakstan. This diversity allows Karakalpak people to transact directly with foreign traders using many languages. Being located at the gateway to Kazakhstan, Turkmenistan and to the Russian federation, Karakalpakstan has potential advantage in terms of export.
	Warm climate compared to northern countries	Uzbekistan has warmer climatic conditions comparing with its northern neighbor countries; Kazakhstan and Russia. The demand on fresh vegetables and fruits in the northern neighborhood is still high and Uzbekistan exports these products.
	Established brand name	Some Karakalpak products have an established brand name or reputation. Besides melons and Karakul sheep, the shot grain variety Karakalpak rice is famous in Uzbekistan due to its taste and cheaper price. Rice is one of the staple foods in Uzbekistan and self-sufficiency of rice is still below 100. Therefore, domestic demand on rice is still high and there is space to expand rice production, if irrigation water allows.

5. STUDY ON THE REGIONAL DEVELOPMENT IN KARAKALPAKSTAN

5.1 Draft Master Plan and Action Plan

Based on the analysis of the present conditions, the vision of the regional development, together with the basic approach and development strategies of each sub-sector were studied with the activities required for the regional development. They were compiled in the Draft Master Plan and Action Plan. The Draft Master Plan and Action Plan were further finalized based on findings from Verification Studies (Pilot Projects) as indicated in Chapter 6.

5.2 Verification Study

Before the completion of the Master Plan and Action Plan, several pilot projects were carried out in order to verify adoptability, affordability etc. of selected draft Action Plan components. Finally, the lesson learned through the pilot projects was fed back to the Master Plan and Action Plan. This chapter explains the planning and implementation of the pilot projects in detail and the lesson learned.

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

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

Considering the above, the following 6 Pilot Projects were formulated and implemented to verify the items indicated in the Draft Action Plan.

PP (1): Development of On-farm Technical Manual for *Fermer*

PP (2): Trial for Development of Melon and Potential Crops Cultivation

PP (3): Promotion of Women's Vegetable Production in *Tamarka*

PP (4): Dairy Promotion Package (including small-scale milk processing)

PP (5): Improving Water Management in Internal Canal System and Water Use in the Field

PP (6): Model Agro-firm Establishment (including small-scale vegetable and fruit processing)

During the preparation and implementation of Pilot Projects, it was considered that a structure for coordination of these projects should be established under the Government of Karakalpakstan, besides the implementation structure of the six individual Pilot Projects. The coordination structure was expected to be the foundation for the implementation of the Action Plan after the completion of the Study.

Several topics had been verified through the implementation of the Pilot Projects and the following points were found required to be reconsidered and / or modified.

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 most of the *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 good human resources for activating agricultural extension	(1)
		Considered that agro-colleges should be involved in agricultural extension with research institutions	(1)
151	Research and Development of Melon 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 the 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 made to introduce 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 most participants felt their technical improvement in vegetable production	(3)
		Confirmed that simple and practical technologies were effective to improve *tamarka* production	(3)
		Confirmed that the participants were motivated by competition among them and started to share market information.	(3)
		Confirmed that bargaining power of small-scale growers increased through group production and marketing	(3)
		Confirmed that leaders of women's committee were capable to coordinate members for the project	(3)
		Confirmed that local specialists, e.g. agronomists were valuable human resources to implement 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 will increase by introducing silage	(4)
261	Training Program on Animal Husbandry	Confirmed that most of the *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 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 under water shortage conditions.	(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 it in 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 in 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 in 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 formed 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 to increase 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 the irrigation facilities.	(5)
		Confirmed that establishing supply system of parts and materials for pump, gate structure, tractor (mini-excavator), etc. in order to fulfill an 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 farmer’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 providing 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 to promote agro-firm establishment.	(6)
		Confirmed that Business Incubator, which has experiences and know-how, regarding to 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 a bottleneck for food processing and that it is required to consider collaboration with other factories located in the better operating environment in order to overcome this drawback.	(6)
		Confirmed that as far as the Agro-firm deals 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 500 l/day creates jobs for 11 workers	(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 requires careful preparation to get certifications or approvals from agencies concerned in food processing industry	(6)
		Confirmed that milk producers did not have adequate sense of general hygienic management	(6)

Notes: PP*: Pilot Project in which "Considerations for Formulating the Action Plan" were identified.

6. REGIONAL DEVELOPMENT PLAN

6.1 Master Plan on Regional Development

(1) Vision of the Regional Development

Uzbekistan is in the transitional stage to the market economy after its 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 clear direction of farming. Thus, it is necessary to formulate a Master Plan to indicate a clear integrated direction of market oriented agriculture sector development and livelihood improvement.

Considering the present condition and circumstances of the Study Area, the Regional Development Master Plan shall include the following factors:

- Plan of market oriented agriculture sector development including animal husbandry and fishery
- Livelihood improvement plan for the small scale farming and animal husbandry for self consumption and sales of excess to the local market

Then, Master Plan for regional development 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 and Targets of Master Plan

1) Master Plan Objectives

The Master Plan for the Regional Development in Karakalpakstan aims to realize the development of market-oriented farm management and good use of *tamarka* (backyard farming), so that people living in the region will increase their livelihood condition.

2) Target Year

The target year of the Master Plan is 2020.

3) Target Area

The target area of the Master Plan is 11 districts of Karakalpakstan. These are; Beruni, Nukus, Kegeily, Chimbay, Karauzyak, Takhtakupyr, Khodjeyli, Shumanay, Kanlikul, Kungrad and Muynak.

The area of the target agricultural land is 173,000 ha (including 16,500ha of *Tamarka*), as the same as those cultivated in 2006 in the Study Area.

4) Target Group

The beneficial target by 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 directly benefit through the execution of the Master Plan which focuses the agriculture, livestock and fisheries.

(3) Agriculture Development

Agricultural development of the Study Area should be materialized through the basic approach of ***"Development of Market Oriented Agriculture on Sustainable Basis"***. There are 2 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. Development of production center of certain strategic crops and good use of *tamarka* should also 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 by 130 % in 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 substantial influence on cotton and wheat growers. In line with the above approach, the following development strategies are proposed.

- Improvement of soil conditions for sustainable production
- On-time planting through efficient agricultural works
- Improvement of agricultural inputs supply system
- Improvement of agricultural technologies and agricultural business management
- Promotion of crop diversification
- Promotion of vegetables production and sales for local market by good use of tamarka

(4) Livestock Development

It is considered that it will be difficult to expect fruitful effects for more market oriented economy, if various countermeasures to solve or to improve constraints are to be individually implemented. It will be necessary to implement proposed strategies in a comprehensive way in combination with each strategy to attain the target in livestock sector. There will be things to do 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.

For the livestock development subsector, ***"High productivity and stable production / supply of***

animal product" is set as the basic approach and the following 6 strategies were proposed to achieve the approach:

- Increase of forage production and nutrition improvement
- Breed improvement of livestock
- Improvement of veterinary services
- Improve animal products processing and marketing services
- Capacity building of *Fermer* and *Dehkan*
- Capacity building of Livestock experts and extension workers

(5) Fisheries Development

Development strategy of fishery sector is set as "***Improvement of fishery through sustainable fishing and aquaculture promotion***". This consists of two components: 1) Achievement of adequate capture production and its sustainable development and 2) Aquaculture development and promotion.

(6) Irrigation and Drainage Development

The basic approach from 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 damage by salinity by improving water management."*** In order to achieve this approach, the following development strategies are proposed.

- Effective use of irrigation water though improvement of water management
- Increasing productivity of water through the introduction of high efficient irrigation
- Reduction of damage to crop production from salt through improving drainage conditions
- Improvement of water management through strengthening WUA and enhancing its activity

(7) Distribution, Marketing and Processing Development

The basic approach of marketing sub-sector is; "***enhancement of marketing activities of Fermers and Dehkans to earn more income from agricultural production***". The basic approach will be achieved through the following strategies.

- Enhancement of bargaining power through collective action of farmers
- Improvement of market accessibility
- Improvement of Processing Technologies to add values to raw materials
- Development of Local Specialty of Agricultural Products. Improvement of market accessibility

(6) Consideration for *Dehkans* in the Regional Development

Many *dehkans* are engaged in non-agricultural activities. The products form their own *Tamarka* are mainly for self consumption. Sometimes they sell it if surplus is attained. Most *dehkans* have a mixed farming system: they produce cereals, fodder crops, vegetables and fruits and breed some cattle/sheep/poultry. *Dehkans* have the right to manage *tamarkas* according to their own needs. In general, *dehkans* rely heavily on income from non-agricultural activities. Therefore, *dehkans* are difficult to be recognized as farmers from the legal view point as well as that of household economy.

Based on the field survey and the items 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 means owned by them shall be made good use.

6.2 Action Plan of the Regional Development in Karakalpakstan

(1) Market Oriented Agriculture

1) Soil Conservation and Improvement by Crop Rotation

Objectives	To improve soil fertility on a sustainable basis by popularizing a crop rotation farming system among *fermers*.
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
Expected Outputs	Output 1: Soil fertility of farmland will be improved Output 2: Net income of *fermers* from farming will be increased
Main Activities	Activity 1: To confirm the results of the latest soil survey Activity 2: Develop a comprehensive program Activity 3: Make necessary arrangements with the central Government Activity 4: Make research on alternative crops for crop rotation system Activity 5: Expand farmland under crop rotation

2) Improvement of Agricultural Extension Service to Fermer

Objectives	Improve *fermer's* ability in agricultural production through improved dissemination system of agricultural technology/information
Project Goals	Develop practical agricultural technical manuals targeting *fermers* (10 kinds of manuals/10 years) and utilize them in the annual *fermer* training seminar
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
Main Activities	Activity 1: Establish and manage a committee to develop agricultural technical manuals Activity 2: Edit, print and distribute agricultural technical manuals (10,000 copies/year) Activity 3: Train teachers of agricultural collages Activity 4: Organize technical seminars for *fermers* (through the existing system)

3) Promotion of Renewal of Agricultural Tractors

Objectives	To increase cropped area and increase crop productivity by on-time farming through increased number of tractors and improvement of the working efficiency
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
Expected Outputs	Output 1: Number of tractors in good condition will be increased Output 2: Capacity of MTPs for maintenance of agricultural tractors will be improved
Main Activities	Activity 1: Introduce favorable lease system for *fermers* to procure agricultural tractors Activity 2: Improve function of workshops of MTPs as the central workshop at district level. Activity 2-1: Renovate workshop facilities and equipments of MTPs Activity 2-2: Train mechanical staff of MTPs

4) Improvement of Accessibility to Agricultural Inputs for Agricultural Producers

Objectives	To improve productivities of crops, mainly other than cotton and wheat through improved accessibility to agricultural inputs for producers
Project Goals	1) Establishing 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
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
Main Activities	Activity 1: Establish "One Stop Agro-inputs Shops" by renovating the existing outlet stores of *Uzselhozhimiya* (Targets: 10 shops to cover the 11 districts) Activity 2: Provide consultation services about establishment and management of the "One Stop Agro-inputs Shops"

5) Research and Development of Melons and Apple

Objectives	To promote melon and apple as special products of the target area through strengthening study and research works on production technologies of melon and apple, and disseminating technologies
Project Goals	<Melon> Production of melon and gourd in the 11 target districts will increase to 58,500 ton by 2020 (28,000 ton in 2006) <Apple> Conditions to provide scions and production technologies will be developed through establishment of mother plants farm of recommended varieties
Expected Outputs	**<Melon>** Output 1: Select recommended varieties Output 2: Established technologies (planting season, manuring, water saving irrigation, melon flies control, post-harvesting, marketing, tools & equipments) for recommended varieties. Output 3: Recommended varieties will be popular among producers. **<Apple>** Output 1: Select recommended varieties. Output 2: Establish technologies (graft, pruning, manuring, water saving irrigation, pests & diseases control, post-harvesting, marketing, tools & equipments) for recommended varieties. Output 3: Maintain mother plants
Main Activities	Activity 1 : Establish trial and demonstration field equipped with facilities Activity 2-1: Study and research production technologies of melons by joint research Activity 2-2: Produce melon seeds of recommended varieties Activity 3-1: Study and research production technologies of apple by joint research Activity 3-2: Maintain mother plants of recommenced varieties of apple Activity 4 : Provide seeds/scions and agricultural technologies mainly to agro-firms

6) Strengthening of Women's vegetable Production in Tamarka

Objectives	To promote vegetable production in *tamarkas*, from the perspective of assistance to women, to improve living standards for *dehkans*.
Project Goals	1) Promote cultivation of vegetables by female *dehkans* in rural areas. 2) Use model *tamarkas* for extension of vegetable production skills.
Expected Outputs	Output 1: Improved skills among targeted female *dehkans* Output 2: Extend of improved skills in areas around model *tamarkas* in VCC
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*)

(2) Integrated Farm Management by Fodder Production and Animal Breeding

1) Fodder Production and Promotion of Livestock

Objectives	To establish a model for 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. Collective fodder production by *dehkans* who have only small farming area, which will lead up to increase their income by livestock raising will also be promoted.
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)
Expected Outputs	Output 1: Increase alfalfa production Output 2: Increase improved calves Output 3: 300kg of alfalfa seed will be distributed per year through SCA Output:4: Increase milk yield in winter Output 5: Increase income of *dehkans* through increase of milk production
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

2) Training Program on Animal Husbandry

Objectives	To strengthen knowledge and technology of *fermers / dehkans* and livestock experts of the concerning departments on animal husbandry involving nutritious feeding, animal care, disease prevention etc
Project Goals	1) Train annually 105 *dehkans* and *fermers* (1,050 persons for 10 years) 2) Train annually 20 livestock experts (200 experts for 10 year)
Expected Outputs	Output 1: Increase livestock productivity in *dehkan* and *fermer's* farms Output 2: Expansion of proper technology on animal husbandry by livestock experts Output 3: Total increase of livestock production in the whole Karakalpakstan
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)

3) Artificial Insemination and Veterinary Services

Objectives	To Further expand artificial insemination to improve cattle breed, and strengthen veterinary services, especially for rural areas
Project Goals	1) AI 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 - 6 lit to 8 - 9 lit per head per day 4) Mortality rate of livestock will be decreased
Expected Outputs	Output 1: Increase AI ratio Output 2: Increase artificial inseminators Output 3: Increase milk yield per head Output 4: Decrease mortality rate
Main Activities	Activity 1: Establishment of AI 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

(3) Development of Fisheries and Aquaculture

1) Sustainable Fishery Promotion

Objectives	To increase fishery production in the study area in a sustainable manner by rehabilitating and strengthening the Fishery Association. The association will support private fishery bodies, as well as further realize an appropriate system for arrangement and distribution of alevin for restock of natural water bodies, which will lead to the increase of natural fishery resources.
Project Goals	Sustainable use of fishery resources is realized by appropriate administration and management of fishery activity
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
Main Activities	Activity 1: Strengthening of Fishery Association (Rehabilitation of association/Improvement of financial system) Activity 2: Establishment of seed distribution system (Alevine production/Alevine distribution and verification of effectiveness/Setting appropriate capture production/Opening new water area)

2) Aquaculture Development

Objectives	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 a overall goal of the project.
Project Goals	Basic system of aquaculture development and promotion in the Study Area is established
Expected Outputs	Output 1: Fishery Association obtains capability for aquaculture promotion Output 2: Model of the appropriate aquaculture system is proposed
Main Activities	Activity 1: Establishment of system for aquaculture development and promotion (Staff training/ Arrangement of support system for aquaculture promotion/Extension and publicity) Activity 2: Establishment of aquaculture model for study area(Implementation of a production model/Elaboration of a manual and promotion)

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

1) Improving Internal Canal System

Objectives	Flow capacity of canal will be recovered by cleaning and dredging of internal irrigation canal. Internal irrigation canal system will be recovered or strengthened through improvement or 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.
Project Goals	Function of internal canal on targeted 90 WUAs will be recovered and strengthened until 2020 and the environment to carry out proper water management by WUA will be developed at 156,500 ha of the targeted farm.
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 with the area of 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.
Main Activities	Activity 1: Establish Special Fund for Irrigation Improvement and publication of procedures Activity 2: Formulate technical guidance for the internal canal system improvement and its publication Activity 3: Formulate improvement plan of the internal canal system, preparing application form Activity 4: Conduct 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: Clean and dig work of internal canal and repairing canal facilities Activity 6: Repair, renewal and establish gate and water measurement facilities

2) Strengthening Water Management in the Field

Objectives	To fulfill proper water distribution and imposition of fair water fee by grasping the volume of water usage in each farm land. Also to enhance awareness of WUA members on effective water use. Knowledge of WUA members on irrigation planning and water use in the field will be increased through enlightenment and training.
Project Goals	Environment of water management which enable a proper water distribution based on water usage volume by farms will be developed until 2017 at156,500 ha of targeted farm.
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 increased. 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 "Introducing Water Saving Technology")
Main Activities	Activity 1-1: Install division box with water measurement tool (*Shandur*) at the intakes of farm Activity 1-2: Measure the amount of water distributed to farms Activity 2 : Hold technical seminars to members on improvement of irrigation planning and water use in the field Activity 3 : Land leveling in the field (Including "Improving Drainage Conditions in the Field") Activity 4 : Set up model farms and implement technical demonstration (Included in "Introducing Water Saving Technology")

3) Introducing Water Saving Technology

Objectives	Water saving technology will be promoted through development of water saving technologies in targeted area and extension of technique at Model farm. Effective use of irrigation water and stable agricultural production under unstable water distribution condition will be aimed.
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.
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 "Strengthening Water Management in the Field" and "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.

Main Activities	Activity 1: Set up model farms and extension through operating model farms Activity 2: Set 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: Prepare seminar text and materials for extension

4) Improving Drainage Conditions in the Field

Objectives	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.
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) 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.
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 "Strengthening Water Management in the Field" and "Introducing Water Saving Technology") Output 2: Land leveling will be implemented at 16,000 ha of farm land until 2020. Output 3: *Fermers* obtain technical information and practice optimum water use for leaching. Output 4: Effective leaching technology will be developed.
Main Activities	Activity 1: Model farm and extension (Including "Introducing Water Saving Technology") Activity 2: Prepare technical assistance to *fermers* (Including "Introducing Water Saving Technology") Activity 3: Prepare support system of material for improving field water management, water saving technology and improving field drainage (Including "Introducing Water Saving Technology") Activity 4: Prepare construction machinery for land leveling Activity 5: Prepare preference credit system for drainage improvement in the field Activity 6: Research and development on effective and efficient leaching technology

5) Strengthening of WUA and Enhancing Its Activity

Objectives	Water management activity of WUA will be enhanced in order to carry out proper water distribution and effective use of irrigation water. 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. Improvement of *fermers* 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.
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 mannual as well as medium and long term operation and maintenance plan. 3) Business plan will be able carry out.
Expected Outputs	Output 1-1: Canal will be operated properly based on proper water distribution plan and monitoring. 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 WUA will be able to properly operate and maintain irrigation and drainage system. 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.
Main Activities	Activity 1-1: Appoint necessary staff s of WUA for water management Activity 1-2: Equip Personal Computer for irrigation planning and WUA administration Activity 1-3: Train WUA staffs in operation and maintenance of canal system and planning of irrigation and water distribution Activity 1-4: Equip transportations for water management to WUA Activity 2-1: Formulate regular and mid/long term plan of maintenance work by WUA Activity 2-2: Prepare inventory and technical information for operation and maintenance work Activity 2-3: Equip construction machinery for canal maintenance to WUA Activity 2-4: Provide spare parts and maintenance service to WUA's machinery Activity 2-5: Rent construction machinery and provide machinery service for canal maintenance work

	Activity 2-6: Prepare supply system of parts and materials for hydraulic structure (gate, gauge, concrete flume, etc.) Activity 2-7: Activate WUA's communication and coordination for collective works of maintenance Activity 3-1: Improve water fee system and business plan of WUA Activity 3-2: Prepare consultation to WUA on accounting, tax management and legal issues Activity 3-3: Propaganda and enlightenment campaign to members on importance of WUA activity and water fee Activity 4-1: Promote *tamarka* user's (*dehkan*) participation to water management activity through VCC

(5) Distribution and Marketing by Farmers Cooperatives

1) Joint Marketing by Farmer Group (Model Agro-firm Establishment)

Objectives	To enhance bargaining power of *fermers* and *dehkans*, model Agro-firm will be established. Collective action for marketing will strengthen the bargaining power of *fermers* and *dehkans*, , who cannot produce enough volume of products due to limited of land size.
Project Goals	A Model Agro-firm is established in each district of the Study Area (Total 11)
Expected Outputs	Output 1: Organize working group for model Agro-firm establishment Output 2: Establish Agro-firms for collective action of vegetable and fruits-growers Output 3: Formulate business plan, which provide incentives to participating members Output 4: Develop products of the Agro-firm Output 5: Establish marketing channel of the Agro-firm
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)

2) Improvement of Marketing Support Infrastructure

Objectives	To improve accessibility to Nukus Central Bazaar through mitigating congestion in the major District Central Bazaars 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 District Central Bazaar. Bazaar is the most important point which is located in the center of food supply chain, between farm gate and customers. The project will enhance sanitary condition of a critical point of perishable food distribution in Karakalpakstan.
Project Goals	Improve the congestion and sanitary condition of the District Central Bazaars
Expected Outputs	Output 1: Formulate market improvement master plan Output 2: Establish management system of perishable food Output 3: Reduce the number of retailers selling at walkway and parking lot at major District Central Bazaar Output 4: Improve the sanitary condition of perishable food
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

3) Small Scale Slaughterhouse

Objectives	Direct objective of the project is to dress cattle in sanitary plant, in order to sell hygienic and safe meats for consumers. The project also aims to enhance food safety in the supply chain of livestock products (meat) in Karakalpakstan. Through the project, veterinary and sanitary condition of livestock products will be improved. This will also indirectly improve accessibility to international market.
Project Goals	4 slaughterhouses will be constructed in main consuming areas
Expected Outputs	Production of hygienic meats
Main Activities	Construction of small –scale slaughterhouses

(6) Value-adding of Agricultural and Livestock Products

1) Improvement of Small-scale Agro-Processing Technologies

Objectives	In order to obtain more income from agricultural activities of *fermer* and *dehkan* groups, the pilot project of small-scale processing will be operated at selected sites using existing resources.
Project Goals	The target groups of *fermers* and *dehkans* will generate their income by means of appropriate processing technologies and continuous marketing activities.
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: Conduct capacity development of the experts of MARW on promotion of small-scale agro-processing. Output 4: Accumulate information on processing technologies and equipment. Execute financing for procurement of equipment. Output 5: Infrastructures for small-scale processing are improved in the target areas.
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

2) Improvement of Food Safety Technologies

Objectives	To enhance food safety measures to increase value of agricultural products produced in Karakalpakstan. Through the project, quality of agricultural products in Karakalpakstan will increase and, as result, accessibility to international market will be improved.
Project Goals	Food safety technology at District Central Bazaar is improved
Expected Outputs	Output 1: Identify food safety standard which meet international requirement Output 2: Formulate sanitary control plan which meet international requirement Output 3: Improve equipment at VSEs Output 4: Improve veterinary and sanitary knowledge of *dehkans* and *fermers*
Main Activities	Activity 1: Review of Food Safety Standard Activity 2: Improvement of Sanitary Control Plan Activity 3: Capacity Building of VSE (including upgrading VSE equipment) Activity 4: Promotion of Enlightenment Activities

(7) Institutional Development for Supporting Farmers

1) Enhancement of Communication for Local Agricultural Administration

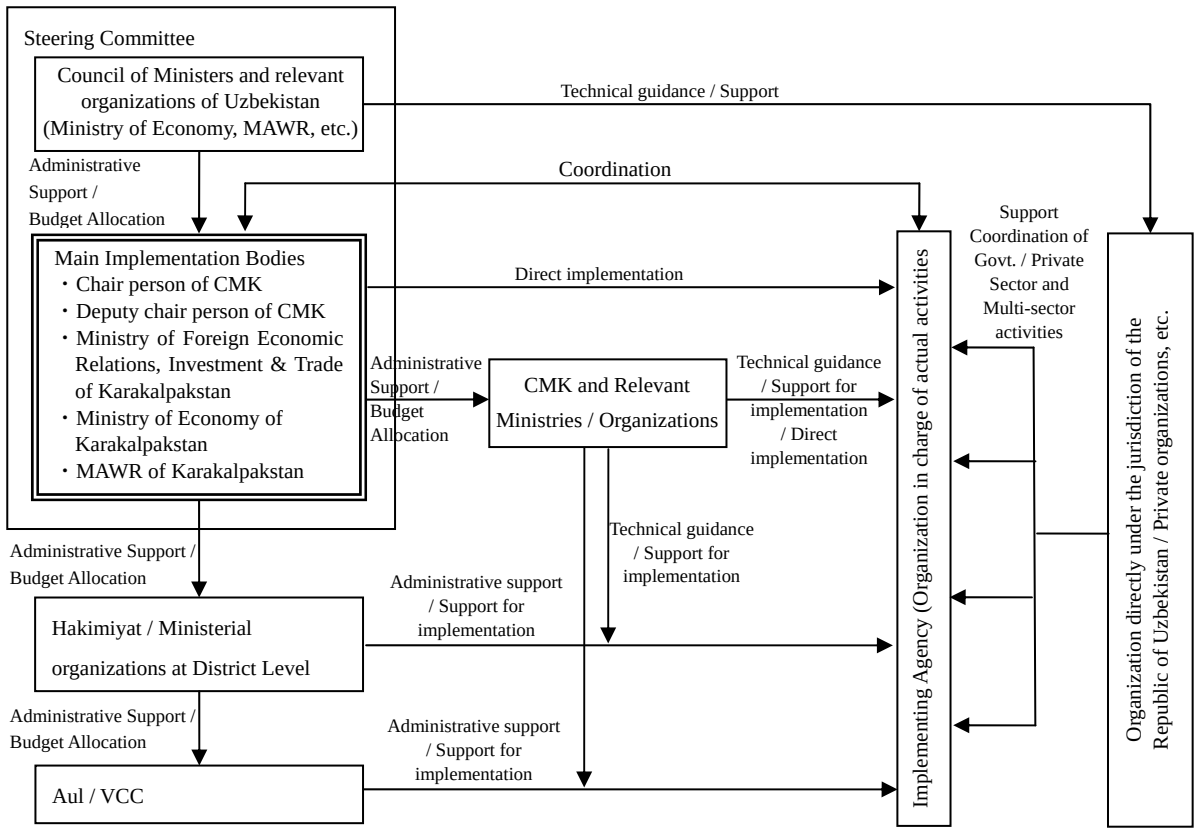
Objectives	To strengthen communication by strengthening the abilities of *Hakimiyat* and VCC staff, and by installing information tools, in order to contribute to the smooth progress of development programs and projects.
Project Goals	This project will provide capacity building and information infrastructure improvements for the *Hakimiyat* economic department, district department of MAWR and VCCs, which are responsible for coordinating functions in local agricultural administration, and strengthen communication by encouraging liaison with VCCs.
Expected Outputs	Output 1: Enhanced abilities for *Hakimiyat* staff Output 2: Enhanced abilities for VCC staff.
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*" Activity 3-2: VCCs prepare and submit project progress reports Activity 4-1: Hold joint evaluation meetings

2) Reinforcement of VCC Coordinating Abilities

Objectives	To reinforce the coordinating abilities of VCCs and increase the sense of ownership among participating local people, in order to realize project effects more fully.
Project Goals	Coordinating abilities of VCCs will be enhanced in community operations and projects.
Expected Outputs	Output 1: Initiative groups (IGs) made by VCCs contribute to consensus formation among people. Output 2: IGs made by VCCs contribute to project management and evaluation
Main Activities	Activity 1-1: Select target VCCs Activity 1-2: Share information on project with VCC residents Activity 1-3: Set up 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 "Strengthening of Women's Vegetable Production in *Tamarka*" Activity 2-1: Implementation of "Strengthening of Women's Vegetable Production in *Tamarka*" 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

6.3 Implementation of Action Plan for regional Development in Karakalpakstan

The Action Plan will be implemented under the overall supervision of the Council of Ministers of the Republic 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 Fermer's Association, Business Incubator and relevant NGOs will also coordinate with the CMK to support the coordination with private organizations as well as cross sector activities.



Implementation Structure of the Action Plan

6.4 Evaluation of Action Plan for Regional development

The Regional Development Action Plan were evaluated by; 1) qualitative evaluation based on DAC evaluation criteria for ODA projects, 2) preliminary economic evaluation with and without projects, and 3) evaluation from the point of environmental and social considerations.

(1) Qualitative Evaluation

23 programs / projects of the Action Plan are mostly impossible to evaluate individually, because they will be implemented as a package of programs to achieve the target. Thus the qualitative evaluation of the programs / projects of Action Plan was conducted based on the DAC's 5 view points of project evaluation on; relevance, effectiveness, efficiency, impacts and sustainability. Each program / project has been evaluated to cohere on all criteria of DAC evaluation.

(2) Project Cost and Benefit

The total investment cost of programs/projects in Action Plan was estimated based on the current unit rates/prices and exchange rates (US$ 1.00=UZS 1,657 = JPY 82.86) at January 2011. Total investment cost was estimated at UZS 184.4 billion (equivalent to US$ 111 million or JPY 9.2 billion), which includes initial investment cost for tractor renewal (covering 33% of total costs) to be arranged a bank credit and to be refunded by lease payment by farmers.

The benefits without implementation of Action Plan set as of agricultural sector products of 2006 at UZS 567.7 billion, and the with implementation of Action Plan set UZS 611.0 billion at the end of Action Plan implementation in 2020 with increase productivity and quality improvement.

In the economic evaluation, investment costs were applied after reduction of private commercial transfer and application of standard conversion rate of 0.9, while incremental benefits were estimated by the balance of benefit with and without implementation of the Action Plan. Based on the project life of 20 years and investment period 10 years, the internal rate of return (EIRR) was estimated at 32%. Also, sensibility analysis shows more than 19% after increased cost and reduced benefit. These results indicate the economic feasibility of the Action Plan.

From the view point of financial arrangement during the Action Plan implementation between 2011 and 2020, the average annual investment amount is UZS 5.65 billion. The costs for tractor renewal and rehabilitation of irrigation and drainage system were excluded from this figure because the former will be under private sector transfer and the latter is to be under the Central Government fund. This amount is equivalent to 6.64% of annual budget of Karakalpakstan Government in 2004.

(3) Environmental and Social Considerations

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 of them 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.

However, individual programs/projects of the Action Plan may be obliged to go through the process of State Environmental Examination process at the time of feasibility study / designing stage. These are namely; 1) Research and development of melons and apples, Fodder production, 2) Artificial insemination and veterinary services, 3) Aquaculture development, Improving internal canal system, 4) Strengthening water management in the field, 5) Improving drainage conditions in the field, 6) Strengthening WUA and enhancing its activity, 7) Improvement of marketing support infrastructure, 8) Small scale slaughter house, and 9) Improvement of small scale agro-processing technologies.

(4) Overall Evaluation

Taking into consideration the results of the above evaluation, the Master Plan and Action Plan is evaluated to be valid and effective for regional development in Karakalpakstan

7 Conclusion and Recommendations

7.1 Conclusions

(1) 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 sell the excess to the local market. The Master Plan consists of a series of sub-sectoral strategies and its development components, covering agriculture, livestock, fisheries, irrigation and drainage, and marketing and processing subsector development. The Action Plan is composed of 23 programs/projects (Regional Development Projects), for the implementation of the Master Plan.

(2) The Regional Development Master Plan and Action Plan in Karakalpakstan are formulated based on the needs of the farmers and villagers in the Study Area. Such needs were identified through workshops, questionnaire surveys and direct interviews with farmers and villagers.

(3) 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 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.

(4) 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

(5) One of the most important assumptions for achieving the expected benefits is the implementation of crop rotation, where the forage produced will be used for raising milk cattle. Without implementation of this activity, economic feasibility of the Master Plan will be doubtful. Furthermore, soil conservation is also the basis for 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

(6) Within the total amount of initial investment, 60.9 billion sum for renewing agricultural tractors will be born by “Special Fund for Agricultural Tractor Mechanization for Depresses Areas in Karakalpakstan” which is to be newly established. This fund will be recovered through the fee collected by the agricultural tractor leasing company. The current “Melioration Improvement Fund” should be extended to devise the 53.2 billion sum for the rehabilitation of internal irrigation and drainage system. The remaining amount of 53.6 billion sum shall be covered by the budget of Karakalpakstan Government. 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) 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) The Pilot Projects were implemented under the collaboration with relevant organizations. A network among these organizations was developed, both on professional and personal basis. Such experiences will be effective for the further implementation of Regional Development Projects.

(3) 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 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) 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.

(5) 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.

THE STUDY ON REGIONAL DEVELOPMENT IN KARAKALPAKSTAN
IN THE REPUBLIC OF UZBEKISTAN

FINAL REPORT

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List of Abbreviations

ADB	Asian Development Bank
AI	Artificial Insemination
A/P	Action Plan
ASBP	Aral Sea Basin Program
BCM	Billion cubic meter (km^3)
BWA	Business Women's Association
CER	Center for European Reform
CIS	Commonwealth of Independent States
CMRK	Council of Ministers of Karakalpakstan
DAC	Development Assistance Committee of OECD
DIWID	Drainage, Irrigation and Wetlands Improvement Project, financial assistance by IBRD
ELS	UNDP Project on "Enhancement of Living Standard in Karakalpakstan"
EU	European Union
EUTACIS	European Union Technical Aid to Commonwealth of Independent State
FA	Fermers' Association
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	Statistic Database run by the FAO
FASID	Foundation for Advanced Studies on International Development of Japan
FDI	Foreign direct investment
GDP	Gross Domestic Products
GEF	Global Environment Facility
GTZ	German Agency on Technical Cooperation
HME	Hydro Melioration Expedition
IBRD	International Bank for Reconstruction and Development (=World Bank)
IDA	International Development Association
IEE	Initial Environmental Examination
ISD	Irrigation System Department
IWISP	Interim Welfare Improvement Strategy Paper
JICA	Japan International Cooperation Agency
JFPR	Japan Fund for Poverty Reduction
LABM	Lower Amudarya Basin Management
LN_2	Liquid nitrogen
MAWR	Ministry of Agriculture and Water Resources of the Republic of Uzbekistan
MAWRK	Ministry of Agriculture and Water Resources of the Republic of Karakalpakstan
MCM	Million cubic meter (10^6m^3)
MIF	Melioration Improvement Fund
M/M	Minutes of Meeting
MAFF	Ministry of Agriculture , Forestry and Fisheries of Japan
M/P	Master Plan
MTP	Machine Tractor Park
NDIP	National Drainage Improvement Program
NGO	Non Governmental Organization
OECD	Organization for Economic Cooperation and Development
O&M	Operation and maintenance
PCM	Project Cycle Management
PDM	Project Design Matrix
RSES	Republican Sanitary and Epidemiology Station
R&D	Research and Development
SANIIRI	Central Asia Scientific Research Institute of Irrigation
SCA	Scientific Center for Agriculture
SCNP	State Committee for Natural Protection
SEMW	State Enterprise for Meliorative and Water Works
S/W	Scope of Works

SWOT	Strengths, Weaknesses, Opportunities and Threats (analysis)
UN	United Nations
UNDP	United Nations Development Program
UNICEF	United Nations International Children's Emergency Fund
UNSES	Department for Energy and Communication
USAID	United States Agency for International Development
USD(US$)	United States Dollars
VCC	Village Community Council
VSE	Veterinary Sanitation Expertise
WHO	World Health Organization
WISP	Welfare Improvement Strategy Paper
WTO	World Trade Organization
WUA	Water Users Association

CHAPTER 1 INTRODUCTION

1.1 Background of the Study

The Government of Karakalpakstan (hereinafter referred to as "the GOK"), through the Government of Uzbekistan (hereinafter referred to as "the GOU"), requested the Government of Japan for a Development Study targeting the improvement of livelihood of the population in the region. In response, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched a Preparatory Study Team and signed the Scope of Works (S/W) of the Study on Regional Development in Karakalpakstan in the Republic of Uzbekistan (hereafter referred to as "the Study") on April 27, 2007.

Based on the S/W, the JICA Study Team (hereinafter referred to as "the Study Team"), headed by Mr. Keiji MATSUMOTO of Oriental Consultants Co.,Ltd., started the Study in Uzbekistan on March 25, 2008. After several field surveys and collection of data/information and their analysis, the draft Master Plan and Action Plan on Regional Development were formulated and summarized in the Interim Report issued in December 2008. In order to verify the plans, the verification study was implemented during the period of March 2009 to September 2010. Based on the findings of the verification study, the Master Plan and Action Plan on Regional Development in Karakalpakstan was finalized.

1.2 The Study

1.2.1 The Scope of Works

(1) Objectives of the Study

Objectives of the Study are as follows:

- To formulate the Master Plan on regional development through the development of agriculture for 11 districts of the Republic of Karakalpakstan.
- To develop the capacities on planning and implementing the projects, of the GOK officials and other concerned organizations.

The Master Plan shall target agriculture, mainly horticulture, vegetables, stockbreeding etc., excluding state controlled crops (e.g. cotton, and wheat), that the *fermer* and *dehkan* are cultivating based on the market economy. Assistance measures and direction of development on the agriculture shall be presented.

(2) The Study Area

The Study Area consists of eleven districts of the Republic of Karakalpakstan, namely; Kungrad, Muynak, Shumanay, Kanlikul, Kegeily, Chimbay, Khodjeyli, Nukus, Karauzyak, Takhtakupyr, and Beruni. They are shown in the Location Map of the Study Area.

(3) Counterpart Agency

The executing agency is Council of Ministers of Karakalpakstan.

(4) Counterparts

Counterpart personnel from the concerned organizations of the Study were appointed during the discussion on the Inception Report in March 2008. After start of the Study several counterparts replaced with new persons in each poison of institutions/organizations.

(5) Relevant Agencies

The relevant organization and institutions are as follows:

Uzbekistan Government (GOU)	Karakalpakstan Government (GOK)	Others
・Ministry of Economy (MOE) ・Ministry of Agriculture and Water Resources (MAWR)	• Council of Ministers • Minister of Foreign Economic Relations, Investments and Trade • Ministry of Economy (MOE Karakalpakstan) • Ministry of Agriculture and Water Resources (MAWR Karakalpakstan)	• Fermers' Association of Karakalpakstan • Chamber of Commerce of Karakalpakstan • JICA Uzbekistan Office

(6) Steering Committee

For the smooth and effective implementation of the Study, a steering committee was established under the chairmanship of Chairman of Council of Ministers of Republic of Karakalpakstan as stated M/M on the Inception Report on March 31, 2008.

1.2.2 Methodology and Stages of the Study

Master Plan and Action Plan of the Regional Development in Karakalpakstan are formulated based on the following steps.

(1) Preparation of draft Master Plan and Action Plan

After collection and analysis of the existing data/information, several workshops among government officials, farmers, member of Water Users Association (WUA), the problems, constraints and potential of the regional development were identified. Based on these results countermeasures, development strategies were studied together with activities required for the regional development. They are compiled as draft Master Plan and Action Plan.

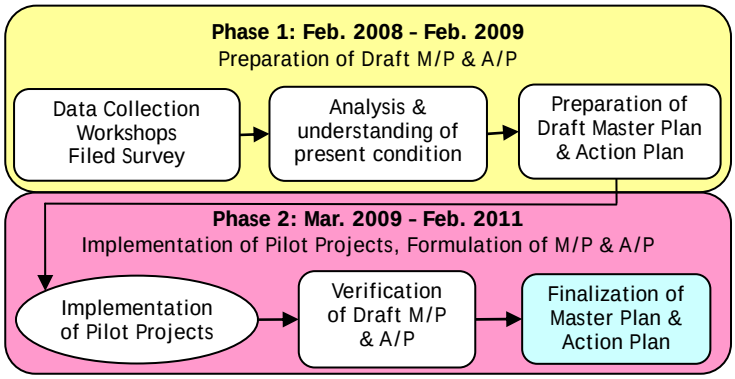


Fig. 1.1.1 Process of the Study

(2) Verification of draft Master Plan and Action Plan through the Pilot Projects

Among the draft Action Plan components, several pilot projects/schemes for the verification of Master Plan and Action Plan on their adaptability, affordability etc. have been selected based on the criteria and agreed between the Steering Committee and the Study Team. They were implemented under guidance of the Study Team and counterparts and the process and results were monitored and evaluated.

(3) Preparation of Master Plan and Action Plan

Based on the monitoring and evaluation of pilot projects, the draft Master Plan and Action Plan has been finalized.

CHAPTER 2 UZBEKISTAN AND KARAKALPAKSTAN

2.1 General

2.1.1 Location and Boundaries

The Republic of Uzbekistan (hereinafter referred to as "Uzbekistan") is located in the center of Central Asia, with Kazakhstan in the north and west, Turkmenistan and Afghanistan in the south, and Tajikistan and Kyrgyzstan in the east. Uzbekistan is a double land locked country and needs to cross more than two countries to reach the ocean. The total area of Uzbekistan is 447,400 km^2, of which 425,400 km^2 is land.

The Republic of Karakalpakstan (hereafter referred to as "Karakalpakstan") is an autonomous Republic in Uzbekistan, located in the far northwest of Uzbekistan. It is bordered by Republic of Kazakhstan in the north and west, and the Republic of Turkmenistan in the south. Karakalpakstan spreads on Kyzyl-Kum desert and delta of the Amudarya River. The total area of Karakalpakstan is 165,600 km^2.

2.1.2 Administration

(1) Republic of Uzbekistan

Uzbekistan declared it's independence from the former Soviet Union on September 1st, 1991 as similar to other Commonwealth of Independent States (CIS). The constitution of 1992 calls for a secular, democratic government system, freedom of expression and religion, and the rule of law.

The central government is composed by the President, the Prime Minister, the Council of Cabinet and ministers.

Uzbekistan is divided into 12 provinces, one autonomous republic (Karakalpakstan), and the city of Tashkent, which has the status of a province. The provinces are divided into a total of 156 districts. Within those districts there are 123 designated municipalities.

Governments at the provincial, district and municipal levels consist of a chief executive, the *hakim*, and a council. The President appoints the *hakims* of the provinces and districts. A vital local political institution is the *mahalla* or Village Citizen Council (VCC) in Karakalpakstan, which now is a formal, government-controlled political entity all over Uzbekistan but formerly, was a powerful, family-based social institution in the cities. There were about 12,000 *mahallas* or VCCs in 2004.

(2) Republic of Karakalpakstan

Karakalpakstan has its own constitution, which is not contrary to the Constitution of Uzbekistan and the Parliament (*Djokargi Kenes*), which governs Karakalpakstan. The Karakalpakstan Government is headed by the chairman of Council of the Ministers of Karakalpakstan. As same as other regional government departments, there is a directly connection to the ministries of Uzbekistan government.

Karakalpakstan is divided into 14 districts and two municipalities, headed by *hakim* (governor of districts) who is appointed by the President of Uzbekistan after the nomination of the Parliament of Karakalpakstan.

2.2 Natural Conditions

2.2.1 Topography

Uzbekistan has various types of topography, such as plateaus, lowland plains, piedmont plains and mountains. The north-western part of the country is occupied by plateaus and lowland plains. There are flat plains known as steppes of Golodnaya, Karnabchulskaya and Karshinskaya adjacent to the vast Kyzyl-Kum desert, which merge gradually into inclined piedmonts, linking the desert plains of the west and the highland places of the east. The main highland areas of the country are the mountain spurs and ridges of the western Tien Shan and Pamir Alay.

Karakalpakstan located at the western part of Uzbekistan has an area of approximately 166,600 km^2, which covers 37.2% of Uzbekistan's. Topographically Karakalpakstan lies towards the western end of the Aral basin, an enormous shallow depression that drains the region. It is almost completely surrounded by desert, and the Amudarya River is the only source of water. The central part of the Khorezm oasis and the Karakum desert situates at the south part. The Kyzyl-Kum desert situates at the east, reaching close to Tashkent, while the huge elevated Ustyurt Plateau situates at the west separating the Aral from the Caspian basin.

Karakalpakstan is a vast low land from 50 to 200 m above sea level. The landscape is characterized by chalk and tertiary rock ridges. The most prominent physical feature of Karakalpakstan is that it is flat. It has one small range of mountains and a few small outcrops of hills. Most of the deserts are flat or imperceptibly gently sloping and one, the Ustyurt, is situated on an elevated plateau. Most people live and work in the irrigated river plain and the delta of the Amudarya.

2.2.2 Climate

The climate of Uzbekistan is characterized by its remarkable continental arid climate with a plenty of light and heat. The coldest month in the country is January, when the average temperature drops to -10ºC in the north and -3ºC in the south. The country's hottest month is July in general, while in the mountainous areas, it is July and August. In plain and piedmont areas, the average temperature in the hottest period is between +25 and +30ºC, while in the southern area (Sherabad) it can reach levels above 42ºC. The annual precipitation in most parts of the country does not exceed 200-300 mm. Lower Amudarya and desert zones are the areas of the lowest precipitation below 10 mm. The precipitation level in mountainous areas rises relatively sharply, reaching up to 1,000 mm. Annual precipitation varies significantly in all zones and in some years it reaches half of the average (Fig.2.2.1, page 2-59).

Precipitation varies significantly across Karakalpakstan from year to year, being much lower in sandy desert regions than in neighboring irrigated lands. Within the delta of the Amudarya, where irrigated land has been developed, the annual precipitation observed in 2001 varied from 77 mm to 121 mm as shown in the table below. The annual precipitation in Karakalpakstan is the lowest in Uzbekistan. The average precipitation days were 71 days and the average wind speed was 3.8 m/s in 2004.

Table 2.2.1 Major Figures of Climatic Condition of Karakalpakstan in 2001

Location	City	Average Temperature (°C)	Annual Precipitation (mm)	Relative Humidity in Summer Season (%)
Center	Nukus	13.6	102	40.5
North	Chimbay	13.1	77	39.5
South	Takhiatash	13.8	121	53.5
Average		13.7	108	56.0

Source: Karakalpakstan Hydro-meteorological Department

2.2.3 Agro-Ecological Zones

(1) Agro-ecological Zones

Uzbekistan is divided into eight agro-ecological zones: Ystyurt, Lower Amudarya, Kizilkum, Sredne-Syrdarya, Fergana, Zeravshan, Lackaday and Surkhandarya.

The territory of Karakalpakstan is located in the agro-ecological zone of the Lower Amudarya, which covers the Khorezm region of Uzbekistan. The soil cover in ancient alluvial valleys is composite. It is represented by Takir soils and residual solonchaks. Hydromorphic soil formation is widespread in the delta of the Amudarya. Silt loads of irrigation water and plant remains as well as introduced fertilizers established a deep cultivated and irrigation horizon.

(2) Vegetation and Soils

Main cultivation area in Karakalpakstan belonging to the Amudarya delta is generally irrigated long time and the soil which has alluvial sediments is heavy and loamy. Content of humus is low (less than 1%) in about 70 % of irrigated land of Karakalpakstan. And also availability of phosphorus and potassium in about 50 % of the irrigated land are also low. Ground water level and the concentration of salt in the groundwater (12 – 30 g/L) are high causing salinity problems in this region.

As the result of the situation mentioned above, it is said that 54 % of irrigated land in Karakalpakstan is categorized as poor land, which is the highest rate in Uzbekistan. Inevitably, productivity of soil is low.

Soil map of Uzbekistan is shown in Fig. 2.2.2 (page 2-59). Main soil in the western part of Karakalpakstan is Yermosols. Main soils in lower Amudarya delta where is the main agricultural production area in Karakalpakstan are Gleysols.

2.2.4 Water Resources

(1) General

The main water resources of Uzbekistan are the surface runoff, formed by the trans-boundary rivers, i.e., the Amudarya and Syrdarya, with their tributaries and also the Kashkadarya and Zarafshan rivers. The main sources of the Amudarya and Syrdarya are located in Tajikistan and Kyrgyzstan, respectively. The total area of the Syrdarya basin is approximately 345,000 km^2. The main Syrdarya is formed by the confluence of the Naryn and Karadarya rivers. The Amudarya is the largest in terms of runoff which accounts for 2/3 of the total water resources of the Aral Sea Basin. The river length of the Amudarya is 2,540 km, including about 1,000 km within the territory of Uzbekistan. The basin covers a vast territory (approximately 1,327,000 km^2). The total mean annual flow of the Amudarya basin (without the Zeravshan) is estimated in about 74.22 km^3 (BCM). Flow probability of annual flow at 5% (high wet year) and 95% (dry year) are 102 BCM and 55.1 BCM, respectively[1].

(2) Flow Regime of the Amudarya and Water Use in Karakalpakstan

The water volume supplied for the irrigation in Karakalpakstan from 1991 to 2009 is shown in the following table. Water supply volume for Karakalpakstan varies from year to year. The distribution volume for each irrigation system is decided by Lower Amudarya Basin Irrigation System Department (LABM) based on the inflow forecast of the Amudarya. LABM used to modify the distribution volume for each irrigation system intermittently depending on the changes of the Tuyamuyun Dam storage volume and the flow regime of the Amudarya during the irrigation period. In case that LABM decides to change the distribution volume for each canal system, the decision will be informed to all water users associations (WUA) through Irrigation System Department (ISD). According to the following table, the average annual distribution volume of demand for the last 19 years were 7,363.9 and 5,761.0 million m^3 (MCM) during the vegetation period from April to September and

[1] http://www.cawater-info.net

non-vegetation period from October to November, respectively. It can be considered that the distribution volume in 2007 is the most approximated to the average in recent year, in consideration with the total water supply and the one in the vegetation period. In the Study, it is assumed that the condition of cultivation in 2007 shall be normal from the aspect of the irrigation water supply based on the result of the examination. An irrigation plan will be examined based on the assumption.

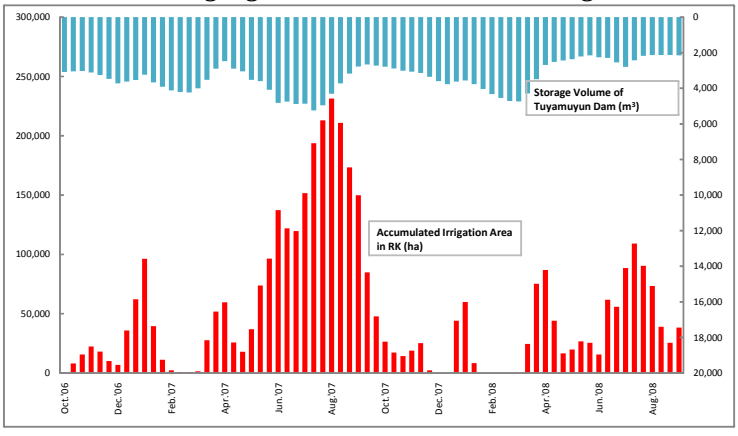
Table 2.2.2 Irrigation Water Supply in Karakalpakstan 1991-2009

year	Total Water Supply Volume (MCM)		Vegetation Period (MCM)		Non-Vegetation Period (MCM)	
	Limit*1	Actual	Limit	Actual	Limit	Actual
1991	9,070.0	9,060.1	7,070.0	7,075.0	2,000.0	1,985.1
1992	8,346.0	8,258.1	6,626.0	6,631.0	1,720.0	1,627.1
1993	8,250.0	9,003.6	6,500.0	7,105.0	1,750.0	1,898.6
1994	8,250.0	7,791.0	6,500.0	6,355.0	1,750.0	1,436.0
1995	7,601.0	7,261.0	6,025.0	5,681.0	1,576.0	1,580.0
1996	7,960.0	8,160.0	6,200.0	6,348.0	1,760.0	1,812.0
1997	8,028.0	7,436.0	6,150.0	5,558.0	1,878.0	1,878.0
1998	8,050.0	8,122.0	6,400.0	6,706.0	1,650.0	1,416.0
1999	9,080.0	9,108.0	6,927.0	6,927.0	2,153.0	2,181.0
2000	8,379.0	4,828.0	6,400.0	2,757.0	1,979.0	2,071.0
2001	5,802.0	2,588.0	4,384.0	1,876.0	1,418.0	712.0
2002	7,388.0	6,280.0	5,842.0	5,770.0	1,546.0	510.0
2003	9,436.0	8,544.0	6,835.0	6,894.0	2,601.0	1,650.0
2004	8,610.0	8,156.0	6,835.0	6,166.0	1,775.0	1,990.0
2005	8,445.0	8,505.0	6,900.0	6,960.0	1,545.0	1,545.0
2006	8,335.0	8,064.0	6,835.0	6,386.0	1,500.0	1,678.0
2007	7,002.0	7,448.0	5,502.0	5,609.0	1,500.0	1,839.0
2008	7,632.4	3,964.5	6,121.3	2,487.6	1,511.1	1,476.9
2009	8,321.2	7,336.6	6,801.3	6,168.1	1,519.9	1,168.4
Average	8,104.5	7,363.9	6,360.7	5,761.0	1,743.8	1,602.8

Source: http://www.cawater-info.net

Note : *1: The "Limit" is the planed amount of water distribution for irrigation purpose, which is set as a limitation of water taking in consideration with the demand of water users and the forecasted available water resources

Situations on a storage volume of the Tuyamuyun Dam (storage capacity 4,500 MCM), as source of irrigation water in Karakalpakstan, are shown in the following figure. As mentioned above, relatively favorable irrigation was carried out in 2007, since a deficit between water distribution plan and actual water distribution was small. It can be seem in following figure that the situation of irrigation in 2007 was normally stable. However, in the case of 2008, the accumulated irrigation area was almost half compared to 2007. The cultivation area of cotton was not reduced significantly in 2008, even though the cultivation area of rice was reduced extremely. Therefore, the data of LABM shows that some part of the cultivation area of the cotton was not irrigated once in Shumanay, Kungrad, Kegeily, Chimbay and Karauzyak. Since the irrigating period was extremely reduced in 2008, it can be imagined how the situation was serious.



Source: LABM

Fig. 2.2.3 Storage Volume of Tuyamuyun Dam and Accumulated Irrigation Area in Karakalpakstan, 2007-2008

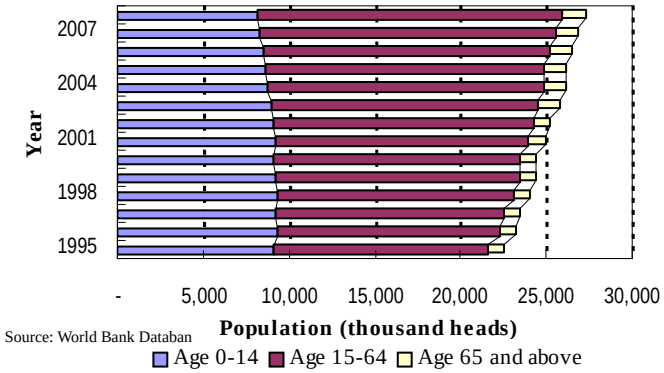
2.3 Socio-Economic Conditions

2.3.1 Demographic Indicators

(1) Population of Uzbekistan

In 2008, Uzbekistan's population was estimated at 27,313 thousand[2], which is the largest among the five former Soviet Republics in Central Asia. The annual growth rate was around 1.2 %, and overall population density was 61 persons/km^2. Population density varies greatly, as the Fergana Valley includes most of Uzbekistan's population centers. In the early 2000s, the greatest population growth was in the rural areas due to the emigration occurred mainly from urban areas. In 2008 some 64 % of the population was classified as rural. In 2006, the net migration rate was –1.5 persons per 1,000 populations.

In 2008, 30.1 % of the population was 14 years old or younger, and 4.6 %t of the population was 65 years old or older. The sex ratio was 0.99 males per female. In 2008 the birthrate was estimated at 21.7 births per 1,000 populations, and the death rate at 5.3 per 1,000 populations. Infant mortality was 33.7 deaths per 1,000 live births. Life expectancy was 64.7 years for males and 71.0 years for females. The fertility rate was 2.56 children per woman.



Source: World Bank Databan

Fig. 2.3.1 Population in Uzbekistan

(2) People in Karakalpakstan

Population in Karakalpakstan was estimated at 1,612,000 in 2008, representing 5.9 % of population in Uzbekistan. Due to its vast territory, the population density of 9.7 persons/km^2 is quite low, comparing with the national average. Birth rate and infant mortality rate in Karakalpakstan are relatively higher than those of national average.

2.3.2 Economic Indicators

(1) Economic Indicators of Uzbekistan

Gross domestic product (GDP) in Uzbekistan was 48,097 billion sum (equivalent to US$ 32,104 million) in 2009, with growth rate of 9.0% to the previous year, according to World Databank of World Bank. The GDP growth has exceeded population growth since 1997, resulting in the increase of GDP per capita , which was estimated at 1,337,000 sum (equivalent to US$ 893) in 2009.

According to statistical information of ADB (Key Indicators of Developing Asia and Pacific Countries), the main economic sector of Uzbekistan is Industry, holding 44% of the GDP. This is followed by services (43 %) and agriculture (24%). The tendency of agriculture and industry was opposite up to 2004, when the agriculture sector held a higher rate than the industry sector.

Key economic indicators of Uzbekistan economy are summarized in the following table:

[2] http://www.statistics.uz

Table 2.3.1 Economic Indicators of Uzbekistan

Item	1995	2000	2002	2003	2004	2005	2006	2007
Population (million)	22.9	24.8	25.4	25.7	26.0	26.4	26.7	27.6
Employed population (thousand persons)	8,449	8,983	9,333	9,589	9,911	10,196	10,467	10,735
Agriculture	41%	34%	33%	32%	31%	29%	29%	-
Industry	13%	13%	13%	13%	13%	13%	11%	-
Services/Others	46%	53%	55%	55%	56%	58%	45%	-
GDP (Current price, billion sum)	303	3,256	7,450	9,838	12,190	15,210	20,759	28,186
Agriculture	32%	34%	35%	33%	31%	28%	27%	24%
Industry	28%	23%	22%	24%	25%	29%	30%	44%
Services	40%	43%	43%	43%	44%	43%	44%	43%
GDP growth of output (annual change, %	-0.9	4.0	4.2	4.4	7.7	7.1	7.4	9.6
GDP percapita (sum)	13,222	131,273	293,316	382,795	468,825	578,342	777,502	######
Exhange rate (US$ 1.0=sum average)	33.0	360.7	885.0	995.5	999.2	1,072.3	1,219.8	1,263.7
Consumer price index		124.9	127.6	110.3	103.7	107.8	106.8	106.8
Produceer price index		160.9	148.0	129.9	129.6	125.6	124.0	110.9
Export (FOB, million US$)	3,719.9	3,264.7	2,988.4	3,725.0	4,853.0	5,408.8	6,389.8	8,991.5
Import (CIF, million US$)	2,892.7	2,947.4	2,712.0	2,964.2	3,816.0	4,091.3	4,781.6	5,235.6
Trade balance (million UD$)	827.0	317.3	276.4	760.8	1,037.0	1,317.5	1,608.2	3,755.9

Source: Key Indicators of Developing Asia and Pacific Countries, ADB

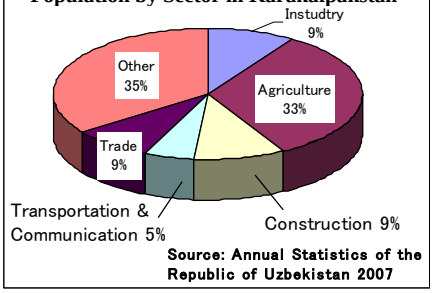
Tashkent city and Tashkent Oblast are the center of the Uzbekistan's economy, which generate one fourth of the total GDP, followed by Kashkadarya, Fergana, Andizhan, Samarkand oblasts. In 2009, the following cities/ oblasts marked a high GDP growth rate: Tashkent city(13%), Namangan(9.9%), Samarkand(9.7%), and Andizhan(9.6%), meaning that these regions are the main engine of economic growth in Uzbekistan.

The total export in 2009 was estimated in US$ 11,771 million, while import value was US$ 9,438 million, resulting in a trade surplus of US$ 2,333 million. The main exporting goods are energy and oil products (34.2%), cotton fiber (8.6%), and mineral resources (5.0%), whereas the main imported goods are machines and equipment (56.5%) and chemical products and articles (11.1%) in 2009 (World Databank).

(2) Regional Economy in Karakalpakstan

According to the Statistical Review of the Uzbekistan, the preliminary figure of gross regional products (GRP) in Karakalpakstan was 1,246 billion sum in 2009, which accounts 2.6 % of Uzbekistan's GDP. The scale of economy in terms of GDP was rather small, and was placed in the second smallest among 14 regions in Uzbekistan.

Fig. 2.3.2 Share of Employed Population by Sector in Karakalpakstan



Source: Annual Statistics of the Republic of Uzbekistan 2007

Agriculture is the dominant sector in Karakalpakstan economy, which holds 45% of GRP and 33% of total labor force. The main agricultural products in Karakalpakstan are wheat, cotton and vegetables, which accounted for 34%, 31% and 14% of total output respectively in 2007.[3] Agricultural outputs are mainly produced by *dehkan* and *fermer*, which hold 55% and 42% of agricultural GRP respectively.

GRP per capita was estimated in 473,000 sum (equivalent to US$364), which was less than half of the national average of 1,050,000 sum (US$807) per capita. Consequently, cash income in 2006 was 280,000 sum per capita, which accounted for only 57% of national average.

Karakalpakstan is one of the most depressed regions in Uzbekistan, in view of minimal individual calorie consumption. According to the World Bank's assessment, poverty rate in Karakalpakstan was

[3] "Statistical Review of the Republic of Uzbekistan", 2008

36%, which was higher than the national average of 26%. Extreme poverty ratio of Karakalpakstan was also higher than the national average, as shown in table below.

In 2007, Karakalpakstan utilized 28 billion sum of foreign investment, which account for 2.2% of national total. Around 80% of the investment was carried out by enterprises and private entities, and foreign investors did only 5%. In the same year, Karakalpakstan contributed only with 0.8% of the total trade turnover in Uzbekistan, including 1.2% of total export and 0.3% of total import. In 2005, 86% of exportation from Karakalpakstan was cotton, according to the explanatory note of the "Draft Program on Social and Economic Development of Karakalpakstan for 2007-2011".

Table 2.3.2 Poverty Indicators (2002)

Region	Poverty[a] %	% of extreme Poverty[b]	Share of Population	Share of Poor Population	Share of Extreme Poor Population
Uzbekistan	27.5	9.7	100	100	100
Rural Area	30.5	11.2	62.6	69.4	72.3
Karakalpakstan	**36.4**	**7.7**	**6.2**	**8.2**	**4.9**
Andijian	31.8	9	8.9	10.3	8.3
Bukhara	13.4	1.9	5.8	2.8	1.3
Djizak	29.7	7.2	4	4.4	3.0
Kashkadarya	62.6	41.6	8.9	20.3	38.2
Navoi	18.7	5.6	3.2	2.2	1.8
Namangan	39.7	12.2	7.8	11.3	9.8
Smarkand	26.4	8.4	10.9	10.5	9.4
Surkhandarya	28.4	9.7	7.2	7.4	7.2
Syrdarya	8.4	2	2.6	0.8	0.5
Tashkent Region	16.9	3.8	9.6	5.9	3.8
Fergana	18.1	4	10.9	7.2	4.5
Khorezm	30.1	8.3	5.4	5.9	4.6
Tashkent City	9.2	2.9	8.7	2.9	2.6

Source: Evaluation of Living Standard of Population, Economic and Social Policies, Directed on Improvement of Living Standards of Population, Volume II: Full Report, May 2003
a/: The poverty line was established based on the value of the minimum food basket which provides 2,100 cal./capita/day
b/: The extreme poverty was established based on the value of minimum food basket of 1,500 cal./pers.day

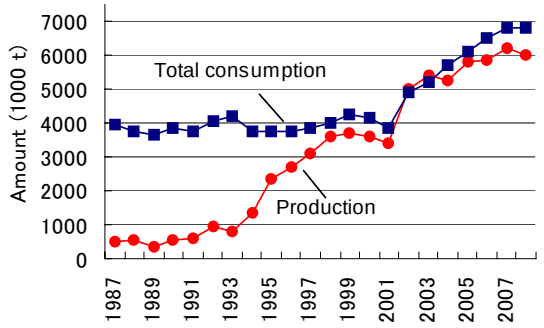
(3) Food Balance and Food Security

Before independence, the Soviet Union forced CIS countries to specialize their industry into a particular sector based on comparative advantage. Uzbekistan had to devote its resources preferentially into cotton production, and import food crops from other countries that are also specialized into food crop production. After the independence in 1991, the inter-industry relation of the USSR has collapsed, and food security became an urgent issue for most CIS countries, including Uzbekistan. Agricultural sector took a vital role to address the problem, through shifting cotton monoculture to food crop production, particularly wheat.

Since then, the state has been heavily involved in wheat production, allocating limited resources, including seed, chemical fertilizer, and labor force, for example. Irrigation water also started to allocate the wheat production, which had been grown mostly under rain fed conditions before the independence.

As result, wheat production has dramatically increased since 1995, and Uzbekistan once attained food self-sufficiency of wheat in 2002 and 2003. However, wheat consumption has also increased particularly since 2002, which turned to a loss of self-sufficiency from 2004.

Fig.2.3.3 Production and Consumption of Wheat in Uzbekistan



Source: World Food Statistics and Graphics, Kyusyu University

According to the FAO Food Balance Sheet (2003), rice is importing good (self sufficiency is 80%), whereas fresh vegetables (potato, tomato, onion) and fresh fruits (apple, grape) are exporting goods for Uzbekistan. Production of meat, milk and fish are also not enough to fill domestic demand, and it is imported from neighboring countries.

For food security reasons, the government of Uzbekistan enacts many laws and regulations to control foreign trade, so as to protect domestic food market. The Presidential Decree UP-1871, issued on October 10, 1997, prohibits exportation of basic foodstuffs, including grains, flour and cereals, cattle and poultry meat and meat products, etc. Also, those high-value crops listed in the Cabinet Decree No.280 are prohibited to be exported and imported in barter.

However, these products can be exported according to the circumstances. In fact, surplus wheat was once exported by the state joint-stock company "Uzprommashimpeks" in 2003, which is specialized in exporting agricultural and industrial products (cotton, wheat, and flour). In case of existence of intergovernmental agreement with other CIS countries, barter trade of specified products is allowed. Also, according to the Cabinet Decree No.168 issued on April 22, 1998, farmers who grow vegetables and fruits can export their products in barter condition. In contrast, the government can stop the trade in emergency cases, including demand-pull inflation of vegetables in winter season. In deed, the amount of vegetables for domestic consumption is not enough. According to an article from MAWR, if we take into account for export and post-harvest losses, the average Uzbekistan can consume only 95-100 kg of vegetables in a year, which is less than the 166 kg that is recommended.[4]

2.4 Transitional Period to the Market Oriented Economy

2.4.1 Uzbek Model of Economic Reform

Five Principles of Uzbek Model

(1) Economy over Ideology
(2) State-lead transition
(3) Supremacy of the law
(4) Step-by-step reform
(5) Social protection to low-income population

After 1991, the Government has gradually introduced a series of economic reform measures aiming to shift the centrally planned economy to a market-oriented economy. The transition, called "Uzbek Model", has been promoted based on five principles, which was proclaimed by the presidential decree. The government adopted a step-by-step approach because the country was in a special circumstance: ethnic diversity, younger population composition, low living conditions than other CIS countries, necessity to maintain social cohesion and stability and deeply rooted public dependency syndrome to the state.[5]

At the beginning of transition period, the Government of Uzbekistan gave high priority on food self-sufficiency. Then, the government reduced the cotton plantation area and increased wheat production, increasing also the production of oil and gas. The result was that official statistics indicates that importation volume of electricity, oil, gas and foodstuff is reducing, while exportation of raw cotton and cotton fiber is decreasing.

Progress of privatization is one of key indicators for the economic transition. Around 80% of GDP was produced by non-government sector, which includes the state joint-stock corporation and the semi-public corporations. According to the official statistics in 2007, privatization of the agriculture and retail trade sectors are advancing, but the transportation sector does not follow this progress. Almost 100% of GDP in the agriculture and retail trade sector are produced by private sector, whereas 53% of output in transport sector is still generated by the state. According to JICA's living condition

[4] Economic and Social Context of the Vegetable System in Uzbekistan, Odil Olimjanov and Khasan Mamarasulov, MAWR, in "Increasing Market-oriented Vegetable Production in Central Asia and the Caucasus through Collective Research and Development", Workshop Proceedings, 25-27 April, 2005, The World Vegetable Center.
[5] "FDI Scenario in Uzbekistan-Glancing at the First Decade after Independence", Abdurakhmonov Mukhsinkhuja, Economic journal of Hokkaido-University, 2003

survey, the privatization of transportation sector resulted in a significant improvement of its service in terms of quantity and quality. Furthermore, it is reported that price of private transportation decreases due to the competition with the newly created service providers.

The gradual approach is also applied to the Agrarian Reform. The major directions of agricultural reform toward market-oriented economy are as follow:

- Provision of land property right
- Privatization of agricultural sector including creation of *fermer* and *dehkan*
- Promotion of SME in rural area
- Provision of infrastructure necessary to the market-oriented economy
- Improvement of taxation and pricing policy related to agricultural development
- Improvement of business environment of agricultural development
- Provision of agricultural service for machinery, inputs, and technologies
- Enhancement of scientific research on agricultural development

In 2006, the Government added new directions for further promotion of the agricultural reform. According to the MAWR, the new directions included improvement of accessibility of *dehkans* to machinery, fuels, fertilizers, pesticides, seeds, and credits, promotion of information dissemination (by workshops, guide books, newspapers and journals), promotion of exportation, insure food security, development of *dehkans*, development of rural infrastructures and cooperation with donor organizations.

2.4.2 Welfare Improvement Strategy

(1) Mid-term Development Strategy of Uzbekistan

The Development of Living Standards Strategy (LSS), covering the period of 2004-2006, was prepared by the Government working groups with technical assistance of ADB and based upon two major studies – Living Standards Assessment (World Bank) and Macroeconomic Policies and Poverty in Uzbekistan (UNDP, CER). The LSS became the foundation to prepare the interim WIS, which was issued in March 2005, covering the period of 2005-2010.

The Welfare Improvement Strategy Paper (WISP) will replace the interim WISP as a medium-term (2008-2010) national development document of the Government of Uzbekistan to determine the main areas and measures to accelerate the economic growth and enhance the living standards of the population.

The WISP emphasizes the fields of; 1) income increase, 2) increase access of the population to quality educational services, 3) expand the access of the population to medical services, 4) social protection of the population, 5) access of the population to communal services and utilities and 6) ecology.

(2) Agriculture in WISP

The agriculture sector, in the economic policies for implementing the goals and priorities of the WIS, focuses the following restructuring in medium and long-terms:

- gradual improvement of selected crops to increase cash crops with higher yields;
- utilize new potential varieties of plants and animals, new agro-technologies and agricultural practices in order to enhance the productivity of crops and livestock;
- substantial increase of capital investment in irrigation water supply and implement efficient water utilization technologies;
- improvement of economic relations between all actors in the agricultural sector

2.4.3 Agricultural Reform

(1) Agricultural System Reform

The farm structure in Uzbekistan has changed with a series of agricultural reforms after the independence, while the government of Uzbekistan has strategically adopted a gradual approach to the market oriented economy. There are mainly three stages in the reforms, and the reform measures are still on going by the Government.

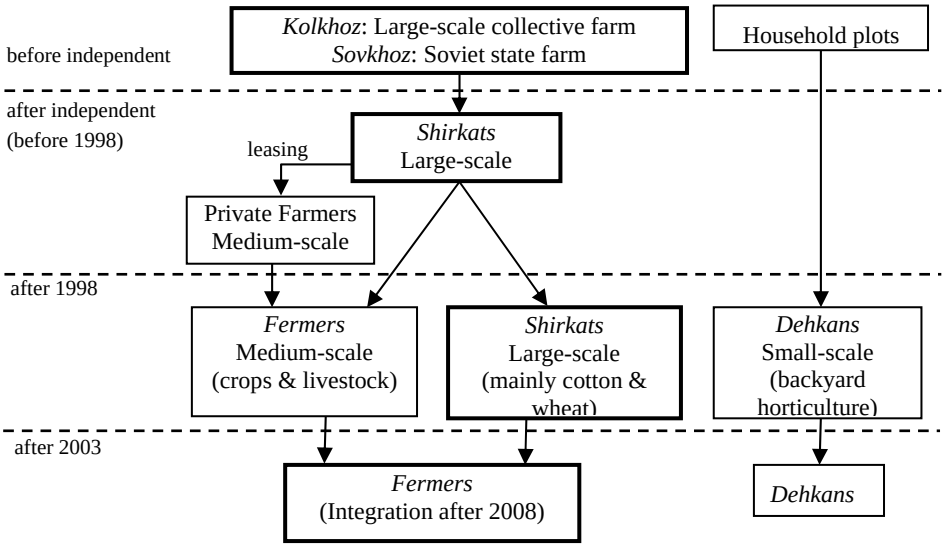


Fig. 2.4.1 Actors Change of Agriculture Sector in Uzbekistan

1) After independence – 1998

Kolkhoz (large-scale collective farm) and *sovkhoz* (soviet state farm) were dissolved after the independence. They were mainly transferred into *shirkats* (agricultural production cooperatives), while small numbers of *fermers* (private farmers) began to emerge by leasing land from *shirkats*. However, the household plots system which was already introduced in Soviet-era stays in the same form. The first law "On *Dehkan* (Private) Farm" was adopted in 1992, which has laid the legal basis for establishment of private farms. Initial measures for reforming agrarian sector were provided by the Resolutions of the Cabinet Ministers (No.87 & 88) in 1994.

2) 1998 – 2003

The 1998 Land Code recognized three types of agricultural producers, i.e. *shirkats*, *fermers* (private farmers) and *dehkan*s (household plots were renamed). Then, three new laws for each agricultural producer were passed simultaneously with the Land Code in April 1998. The government expected that *shirkats* played the major role in agricultural production, mainly for state controlled crops at that time.

3) 2003 – present

In 2003, the government has started new strategy to develop *fermers* as the major agricultural producer to replace the inefficient *shirkats*. The Presidential Decree "On the most important directions for deepening reforms in agriculture" dated on March 24, 2003 and other series of decrees and regulations concerned have been issued during 2003–04. Consequently, most of the *shirkats* has being transformed into *fermers* at present. There are only few *shirkats* to breed Karakal sheep in Karakalpakstan.

Since autumn 2008, the Government has been implementing a new drastic land policy called "land

optimization policy". The policy promotes integration of a large number of weak (small-scaled) *fermers* into a relatively limited number of large-scaled *fermers* in order to address the following problems raised by the agricultural reform started in 2003. From another angle, the Government has intended to restore its strong influence on farming for recovering agricultural sector from a chronic slump.

a. A large number of inefficient *fermers*
   A large number of *fermers* were established within a short period. This rushed measure allowed an incapable and unmotivated person to be a *fermer*. Besides, dividing farmland under management into tiny units has led inefficient farm management.

b. Weakened state control over *fermers*
   State control and guidance mainly on cotton and wheat have not been able to penetrate well to all *fermers* as the number of *fermers* becomes too large. The Government considers that this situation has promoted low productivity of the crops, as well as immorality of *fermers*, e.g. illegal sell of subsidized chemical fertilizers and other inputs.

The land optimization policy will be completed by the end of 2010. It is expected that the number of *fermers* will be 3,000 to 3,500 in Karakalpakstan while the number was 9,556 in the end of 2007 and 3,879 in January 2010, respectively. Table 2.4.1 (page 2-52) shows the number of *fermers* in Karakalpakstan by district as of the end of 2007, and changes in the numbers from the end of 2007 to the beginning of 2010.

The following table shows guidelines on *fermer* size before and after the land optimization policy. It seems that the Government is again seeking a large-scaled corporate farming rather than promoting a relatively small-scaled family operated farming, for revival of agricultural sector. Accordingly the government should modify the present *fermer* supporting measures, i.e. farm mechanization service, water management, inputs supply, etc. to cope with the large-scaled corporate farming.

Table 2.4.2 Guidelines on *Fermer* Size before and after the Land Optimization Policy

Fermer	Before		After	
Cotton & Grain	Karakal	More than 10ha	Karakal	min. 40ha, max. 150ha
	National	―	National	Ditto
Vegetable, Potato & Gourd	Karakal	1 - 3ha	Karakal	Ave. 7.5ha
	National	―	National	Ave. 7.0ha
Fruits & Grapes	Karakal	5 - 10ha	Karakal	Ave. 4.0ha
	National	―	National	Ave. 6.0ha
Livestock	Karakal	More than 30 heads of cattle • fodder crop production farm : 0.5 ha/head • pasture: 2.0 ha/head	Karakal	No change

Source: Collected information through interviews by the Study Team

(2) *Fermer*

In the current agriculture policy, *fermers* are placed as the top priority actor of Uzbekistan's agricultural development. *Fermer* is a legal entity managing several-ten ha of land and is operated by family-members in general. *Fermers* usually hire employees/workers based on a labor contract in accordance with labor regulations. *Fermers* manage certain area of farm-land with 50 years lease period, but the state owns full property rights. The *Fermers* are exempted from relevant taxes and levies for 3 years from the date of establishment (Presidential Decree "The Concept of Development of Leasehold Private Farming" dated on October 27, 2003). The land lease contract is made between the head of *fermer* and *hakim*.

The major rules of *fermers* are as follows:

- Produce cotton and wheat for national needs

- Increase agricultural production, mainly foods for domestic market and exportation
- Create job opportunities to rural people
- Manage land properly to maintain soil fertility & good environment on a sustainable basis

The Government expects *fermers* to have a sense of ownership as an independent legal entity in order to fulfill their responsibilities, and provides several supporting measures to their independence. However, many *fermers* lacks this sense of ownership[6] for the following reasons:

- They have only short experience in farming business since most of *fermers* were established after 2004 in accordance with the Presidential Decree "On the most important directions for deepening reforms in agriculture" dated on March 24, 2003
- Their management still depends on state controlled crops (cotton and wheat)
- Government still provides rigid guidance and a heavy support for cotton and wheat production and marketing

There were 3,879 *fermers* in Karakalpakstan in January 2010. Cotton & Grain oriented *fermer* occupies 73.0% of the total *fermer*, followed by Vegetables & Gourds oriented is 5.5%, Fruits & Viticulture oriented is 8.0%, Livestock oriented is 10.8%, and others is 2.8%.

(3) *Dehkan*

The original meaning of "*dehkan"* is a peasant in the local language, and farm-labors of *Kolkhoz* and *Sovkhoz* were usually called "*dehkan*" in the Soviet-era. However, the original meaning of *dehkan* has nowadays changed in relevant laws and regulations. This is the start of some confusion about status of *dehkans* in Uzbekistan. While someone still mention peasant of farm labor, the other mention legally defined *dehkan* by using the same word.

During the Soviet-era, workers of *kolkhoz* and *sovkhoz* received a tiny plot to grow crops for self-consumption. The workers consisted of various kinds of job, e.g. farm-labors, mechanics, managing staffs, shopkeepers, engineers, teachers, doctors, etc. since *kolkhoz* and *sovkhoz* were not only a farm unit but a rural community unit. Having such background, household (kitchen garden) plots system continued even after the independence.

Table 2.4.3 *Tamarka* Allocation

No	Land Type	Area (ha)
1	Irrigated farm-land	0.35
2	Non-irrigated farm-land	0.50
3	Pasture and steppe	1.00

Source: *Dehkan* Law (No.175-II, Dec15, 2000), Republic of Uzbekistan

Every household received official rights of lifelong heritable tenure of a plot (*tamarka*) for housing and backyard in 1998. In reality, the household plots system in the Soviet-era only has been renamed to the new system and authorized by the government. According to the regulations, a household basically receives the right of 0.35ha *tamarka* based on an application of the household representative and approval of a board of *shirkat* and *hakim*. Then, the households who get the right are categorized as *dehkans*. However, they not receive a legal right to manage farmland even as a tenant farmer, since the right is exclusively given to *fermers* according to the present regulations. So, *dehkans* are not an actual farmers or peasants at all, even though there are many *dehkans* working as farm-labors hired by *fermers*.

There were 225,308 *dehkans* in 2006 in Karakalpakstan according to the statistics of the Ministry of Economy of Karakalpakstan. Considering the population in Karakalpakstan, it was 1,559,700 in 2004[7], and the average family member of household is estimated in

Table 2.4.4 Estimated Number of *Dehkan* Households in Karakalpakstan

1	Total Population in 2004	1,559,700
2	Estimated total households (6.6 family members/household)	236,318
3	*Dehkan* households in 2006	225,308
4	Estimated % of *Dehkan* households	95.3%

Source: Calculation of the Study Team

[6] For an example, many *fermers* still call their sales of cotton and wheat "salary or wages from the government", though they sell the crops to processing companies on contract basis.

[7] Living Conditions in Karakalpakstan 2004, JICA-Uzbekistan

about 95% of the total households in Karakalpakstan that were categorized as *dehkan*. It implies that there must be various types of *dehkans* (*tamarka* holders) with diverse jobs, social status and life-styles, as same as the situation under the household plots system in Soviet-era.

Substantial ex-workers of *shirkats*, especially unskilled farm-labors, have lost their jobs after the farm structure reform in 1998, since *fermers* can not hire surplus workers of the *shirkats.* There were 80,003 *fermer*-workers in 2006 in Karakalpakstan according to the statistics. If all *fermer*-workers were *dehkans*, only 35.5% of *dehkans* got jobs in *fermers*. This data implies that the majority of *dehkans* depended much on non-agriculture sector to survive. *Tamarka* must be one of effective social-welfare measures to mitigate the negative impact of the agricultural reforms, though *tamarka* is too small to generate enough income for a family.

2.4.4 Regional Development Plan in Karakalpakstan

(1) Draft Program on Social and Economic Development of the Republic of Karakalpakstan for 2007-2011

As described in section 2.4.2, the WISP 2005-2010 formulated by the Government of Uzbekistan (GOU) sets the correction of regional disparities as a key challenge to reduce poverty. The plan states the necessity to develop rural areas promoting a shift to a market oriented agriculture, which is the most important sector in regions as Republic of Karakalpakstan, one of the poorest regions in Uzbekistan. The rural sector reforms under the strategy of the WISP emphasize job creation to contribute to the economy in rural area.

In the context of the background mentioned above, the Government of Karakalpakstan (GOK) formulated the "Draft Program on Social and Economic Development of Republic of Karakalpakstan for 2007-2011" that emphasizes the development of the agricultural sector. However, it only specifies the production targets for cotton, wheat, rice, livestock, vegetables, fruit, and other products, without stating specific measures. The program proposal is summarized table 2.4.5 (page 2-53). The final version of the Program was expected to be approved by the Uzbekistan Government in 2009, but the Study Team could not get any information during the Study.

(2) Previous and on-going Development Projects

There have been many donors' assistances and projects in Karakalpakstan. This is because they recognize the low living standards in Karakalpakstan, the Aral Sea problems and the drought of 2000-2001. The UNDP (2008)[8] and FASID (2005)[9] studied the condition of the assistances to Karakalpakstan. Local NGOs have performed countless activities, but few related documentation and reports still remains. In this section, it will be examined the assistances situation in Karakalpakstan based on the preceding two documents and on-site survey.

Table 2.4.6 Projects Conducted in districts of Karakalpakstan (1995-2005)

Districts	Number of Projects
Nukus	19
Muynak	9
Takhtakupyr	6
Khodjeyli	4
Karauzyak	3
Kegeily	3
Kungrad	2
Chimbay	2
Amudarya	2
Shumanay	1
Ellikkala	1
Total	52

Source: UNDP

1) General

The problems of environmental damage, of which the shrinkage of the Aral Sea is the most prominent example, have been recognized since the Soviet Union period, but they began to arouse international concern from the start of the '90s. Karakalpakstan is the most severely affected of the six countries around the Aral Sea, which Muynak, Karauzyak, Takhtakupyr and Kegeily are the four worst-hit districts (aforementioned 1). Therefore, most donor

[8] Review of Donor Assistance in the Aral Sea Region (1995-2005), UNDP 2008
[9] Case Study for Coordination of Donor Assistances – An Experience of Karakalpakstan- 2005 FASID

assistances and other assistances have been directed to those districts. The table on the right shows the number of projects implemented in each Karakalpakstan district. In terms of number of projects, most of them have been implemented in the Nukus district, where is the center of Karakalpakstan administration.

These assistances have been diverse, including short-term ones, such as emergency assistance to people affected by drought, medium-term projects, such as maintenance and rehabilitation of water supply infrastructure, and long-term ones, such as improvement of health problems and assistance for reforms in the agricultural and socio-economic sectors.

According to the UNDP Donor Assistance Review (2008), the breakdown by purpose of the projects to the six countries around the Aral Sea in the ten years (1995-2005) shows that 36.6% of the total monetary value was to improve public health problems and 30.3% to supply irrigation and drinking water. Sustainable agricultural development and sustainable use and management of resources also received more than other sectors.

2) Trends in assistances to date

Assistances and projects to Karakalpakstan increased due to the drought of 2000-2001. It will now be summarized the trends in assistances to Karakalpakstan, based on a review of existing documents.

In response to the Nukus Declaration (1995), which called for restoration and conservation of the Aral Sea environment and improvement of the living condition of the people living around the seashore, the UNDP carried out projects to extend the use of manual pumps, provide education in hygiene, plant trees and projects with rapid results. The UNDP implemented, since 1997, the Aral Seashore Rehabilitation and Capacity Building Program, which delivered aid such as manual pumps, public health education and micro-credit.

Many agencies delivered emergency assistances during the drought of 2000-2001, as described below:

- Japan delivered emergency assistances through its embassy, working through JICA to perform a development study for the whole Republic of Uzbekistan, including Karakalpakstan, to support reforms in the health care sector. It also used grant aid for grass-roots groups to purchase solar panels, financial aid and collaborated with the UNDP to provide training in the installation and operation/maintenance of such equipments.
- The World Bank provided a loan to construct pipelines for potable water supply (the Project for Rural Water Supply and Sanitation Program), and implemented the Project for Rural Enterprises Support Project to nurture industries and create jobs in rural areas.
- The ADB performed its own needs assessment, and provided humanitarian aid supplies against the drought. At the same time, it used the Japan Fund for Poverty Reduction (JFPR) to fund the Innovative Poverty Reduction Project in Karakalpakstan, which used measures such as micro-credit, drinking water supplies and public works projects to reduce poverty. Under this project, a competitive system was employed as the main method to determine the quality of project proposals.
- EU-TACIS began the Project on Enhancement of Living Standards in 2005 as a livelihood improvement program, with the UNDP as the executing agency. The content of the project is described in section 3.1.4.
- The UNDP also provided humanitarian aid supplies, set up units as drought countermeasures to implement public works as drought countermeasures, restore public facilities such as schools and community centers, educate people to save water and provide micro-credit.
- UNICEF provided humanitarian aid supplies, as well as education in infant nutrition, preventive vaccinations and other measures, but ended its operations in Karakalpakstan in 2004.
- The WHO implemented projects for primary health care and drinking water, but ended its

operations in 2004.

- JDA, an international NGO, provided programs for drinking water supply, livestock rearing assistance and agricultural reform. JDA was the first NGO to provide micro-credit in Uzbekistan.
- The international NGO Café received financial support from SIDA of Sweden to implement agricultural assistance, livestock rearing, tree planting, and tuberculosis countermeasures.

3) Recent external assistances

Karakalpakstan received many assistances and projects as drought countermeasures, but many donors and NGOs have withdrawn by now. The following projects are still in operation.

- The Project on Enhancement of Living Standards began with joint funding from the EU and UNDP, but the EU has now withdrawn, while the UNDP is providing follow-up. Proposals are now being prepared for phase two of the project.
- In 2006, the UNDP also began a project entitled "Conservation of Tugai Forests and Strengthening of Protected Areas System in the Amu Darya Delta of Karakalpakstan". Project activities included improving soil to raise yields of cotton and wheat, reducing felling of forests by providing alternatives to wood as an energy source, and developing sustainable methods for using pasture land.
- GTZ begun the "Project for Re-vegetation of dried up Aral Sea", which creates green belts to prevent salt damage caused by salt blowing of the dried Aral Sea bed, and restoring existing forests along the Aral shore. The project targets an area of 80,000ha for vegetation, and had already covered 27,000ha. In 2008, GTZ also started dispatching experts to strengthen Farmers' Associations (FA).
- Perzent is an NGO which was established in 1992 to improve the welfare of women and children. In its home vegetable garden project, Perzent developed teaching materials for a 16 hours training, and has already used them as an outreach tool to provide instruction to 400 households. The training includes a final test in which participants design their own cropping plans.
- The Nukus office of the Business Women's Association (BWA) was established in 1997 as Karakalpakstan branch of the NGO, with its headquarters in Tashkent. The headquarters was established in 1991. The office has branches in four districts (Nukus, Karauzyak, Khodjeyli and Kegeily).
- BWA has been supporting women entrepreneurs, but now also covers men. Its main activities are 1) support for training and consulting, 2) micro-credit, and 3) provision of equipments and materials. Micro-credit borrowers must form groups of 5-7 persons, who are collectively responsible for repayment. The repayment rate is 100%. The most common utilization of borrowed funds is small-scale selling and raising small livestock. Until now, there have been few loans for agriculture production, but BWA intends to include such loans in the future. It is the only NGO licensed to provide credits in Karakalpakstan (it was approved in March 2007).

2.5 Crop Farming

2.5.1 Land-Use

The total land area of Uzbekistan is 44,410,300 ha. The country is relatively blessed with large flat area. Cultivated area concentrates in the river valleys where irrigation is available. Crop production in Uzbekistan depends on irrigation due to the limited annual precipitation.

Table 2.5.1 Land-use of Uzbekistan and Karakalpakstan

Land use in 2006		Uzbekistan		Karakalpakstan	
		(1,000 ha)	(%)	(1,000 ha)	(%)
1	Arable land	4,034.1	9.1	416.0	2.6
	(1) Irrigated land	3,691.2	8.3	459.7	2.9
	(2) Crop land	3,637.4	8.2	252.5	1.6
2	Grazing land	12,850.1	28.9	n.a.	n.a.
3	Other agricultural land (perennial crops, etc.)	5,487.1	12.4	n.a.	n.a.
4	Non-agricultural land	22,039.0	49.6	NA	NA
5	Total land area (1+2+3+4)	44,410.3	100.0	16,100.6	100.0

Note: Irrigated land area in Karakalpakstan is larger than its arable land
Source: Uzbekistan Agricultural Statistics 2006

Only 3,691,200 ha (8.3% of the total area) was irrigated in 2006. The cropping area was almost equal to the irrigated area, 3,637,400 ha (8.2% of the total area).

In Karakalpakstan, the actual cultivated land area is limited. Irrigated land area is only 459,700 ha (2.9% of its total area). Crop land area was only 252,500 ha (54.9% of the irrigated land area) in 2006. This situation implies that Karakalpakstan can not utilize its potential land due to shortage of irrigation water.

2.5.2 Crop Production

(1) Uzbekistan

The production of major crops in Uzbekistan is shown in table 2.5.2 (page 2-53). According to the table, Uzbekistan achieved a sound increased production in major crops since the independence. Though, it is reported that Uzbekistan was affected by severe droughts in 2000 and 2001, the production was not declined much at the national level, except for rice.

Cotton and wheat occupies about 80% of the total crop land area, while the presence of the other crops is relatively modest. All those crops, except rice, increased the production since the independence mainly due to the increase of productivity. Uzbekistan is almost self-sufficient in major food crops, except sugar and oil crops. Remarkable increased production of wheat, which is the staple food, has contributed much for the favorable situation. Besides cotton, substantial amount of vegetables and fruits are exported.

(2) Karakalpakstan

The crop land area of Karakalpakstan was 252,800 ha in 2006, which was about 7 % of the crop land in Uzbekistan. In Karakalpakstan, cotton has the largest planted area which was 106,698 ha (38.3 % of total planted area) in 2006. The second largest planted area is wheat which the planted area was 64,315 ha (23.1 % of total planted area) in 2006. These two crops covered more than 60 % of the total planted area. Planted area of rice in 2006 was 22,789 ha (8.2 % of the total planted area). However other crops share only few percentages.

Table 2.5.3 Crop Production of Karakalpakstan in 2006

Crop	Planted area		Production	Yield
	(ha)	*(%)*	(ton)	(ton/ha)
Cotton (before ginning	106,698	*(38.3)*	193,725	1.82
Wheat	64,315	*(23.1)*	215,193	3.35
Maize (grain)	2,347	*(0.8)*	N/A	N/A
Other grains	30,195	*(10.8)*	N/A	N/A
Rice (Paddy)	22,789	*(8.2)*	55,504	2.44
Fodder crops	32,446	*(11.6)*	N/A	N/A
Potato	2,135	*(0.8)*	15,532	7.27
Vegetables	7,352	*(2.6)*	88,487	12.04
Melons & Gourds	5,310	*(1.9)*	41,527	7.82
Fruits	4,518	*(1.6)*	15,091	3.34
Grape	494	*(0.2)*	2,160	4.37
Total planted area	278,599	*(100.0)*	—	—
Crop land area	252,848	—	—	—
Crop intensity	—	*110.2*	—	—

Source: The Ministry of Economy of the Republic of Karakalpakstan

Though Karakalpakstan share of cotton in Uzbekistan is almost equal to the share of its crop land area, the share of wheat, potato and vegetables are low. On the other hand, the share of rice and melon & gourd are high as Karakalpakstan is traditionally famous in rice and melon production.

Table 2.5.4 Major Crops Production in Uzbekistan and Karakalpakstan in 2006

Crop		Cotton	Wheat	Rice	Potato	Vegetables	Melons & Gourds
Cropped Area (ha)	Uzbekistan	1,447,600	1,446,500	60,400	52,600	154,200	37,000
	Karakalpakstan	106,698	64,315	22,789	2,135	7,352	5,310
	share	7.4%	4.4%	37.7%	4.1%	4.8%	14.4%
Production (ton)	Uzbekistan	3,619,000	6,075,300	211,400	1,020,440	4,286,760	740,000
	Karakalpakstan	193,725	215,193	55,504	15,532	88,487	41,527
	share	5.4%	3.5%	26.3%	1.5%	2.1%	5.6%
Yield (ton/ha)	Uzbekistan	2.5	4.2	3.5	19.4	27.8	20.0
	Karakalpakstan	1.8	3.3	2.4	7.3	12.0	7.8
	share	72.0%	78.6%	68.6%	37.6%	43.2%	39.0%

Source: The Ministry of Economy of the Republic of Karakalpakstan (Cropped area of Karakalpakstan)
State Committee of Republic of Uzbekistan (Cropped area of Uzbekistan)

The total planted area, excluding *tamarka (dehkans' backyard)*, of major crops, i.e. cotton, wheat, rice and vegetables in Karakalpakstan, has been kept nearly 190,000 ha after the drought of 2000-2002, while the area used to be nearly 250,000 ha before the drought. Planted area of cotton and rice has decreased much after the drought among the crops. The area of cotton has decreased from 140,000 – 150,000 ha to around 100,000 ha in recent years, while the area of rice has decreased from around 80,000 ha to around 20,000 ha. To the contrary, the area of wheat has increased from 20,000 – 30,000 ha to about 60,000 ha.

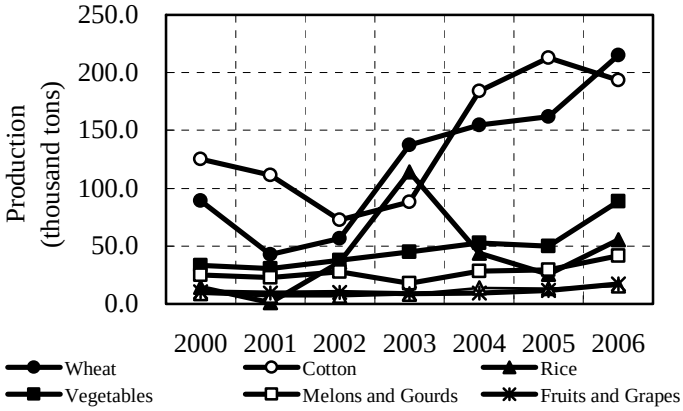
The productivity of the major crops in Karakalpakstan is lower than that of Uzbekistan, but it tends to increase after the drought as shown below.

Table 2.5.5 Yield of Major Crops in Karakalpakstan

Crop	Yield (ton/ha)							
	1999	2000	2001	2002	2003	2004	2005	2006
Cotton	1.35	1.31	1.47	1.11	1.12	1.95	2.06	1.91
Wheat	2.18	2.12	1.49	3.14	2.25	2.25	2.66	3.36
Rice	1.99	1.74	1.75	1.75	1.93	1.97	2.15	2.44

Source: Seminar Material on Aral Sea Problem on July 5th, 08, Toyo University, Japan

Production of the major crops from 2000 to 2006 in Karakalpakstan is shown in the figure below. The production of cotton decreased in 2001 and 2002 and the production of wheat and rice also decreased in 2001. This phenomenon was due to the severe drought from 2000 to 2002 in Karakalpakstan. After 2002, the production of cotton and wheat significantly increased. Productions of cotton and wheat in 2006 were about 1.5 times and 2.4 times of that in 2000, respectively. In case of cotton, decreased planted area after the drought is fully compensated with the productivity increased. However, rice production has not recovered yet due to the sharp decrease of the planted area.



Source: The Study Team made the figure based on data of the Ministry of Economy of the Republic of Karakalpakstan

Fig.2.5.1 Crop Production in Karakalpakstan from 2000 to 2006

2.5.3 State Controlled Crop Production

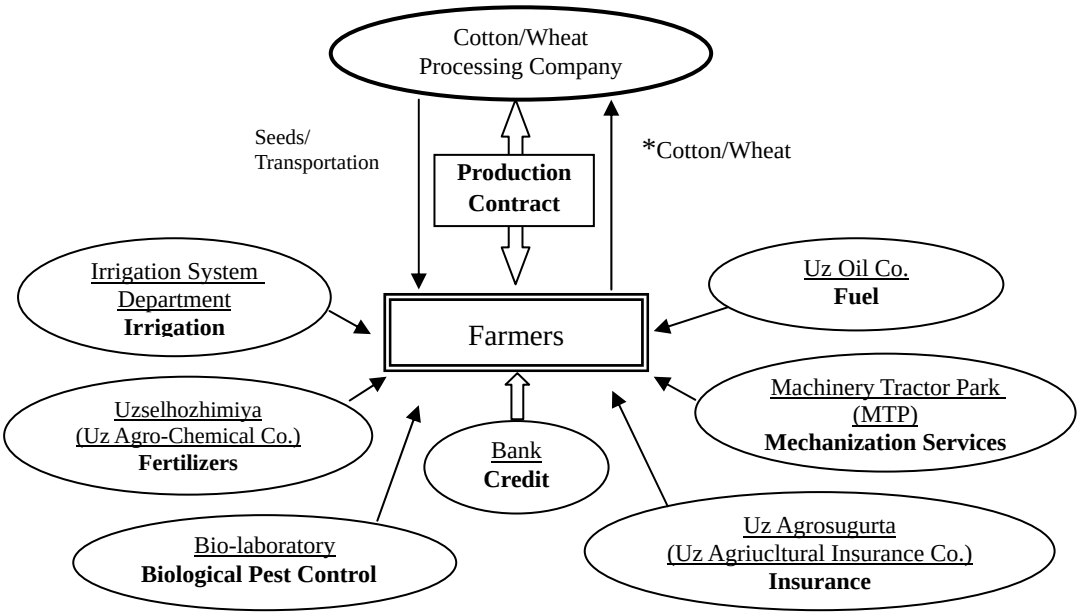
The Government still controls procurement prices and trading of cotton and wheat, since those crops are still national strategic crops. The latest procurement prices of cotton and wheat, which differ according to quality of the products, are shown in Table 2.5.6 (page 2-54).

Cotton, that occupied 40.5% of the cropped area in Uzbekistan in 2006, is the most important crop in the country, though the planted area and the production have slightly declined since the independence.

Wheat, that occupied 39.8% of the cropped area in Uzbekistan in 2006, became a very important crop due to the government promotion policy after the independence. The present production level is more than 6 times against the production in 1992 (the year after the independent). The planted area increased by 231% and the productivity increased by 269% between 1992 and 2006. Such high production increase in such short time can be a historical event in the world history. This is exactly the first green revolution in the 21st century.

The target planted area of both crops was set centrally and broken down by province, district and individual farmer. After liberalization of rice in 2004, "State Order" system for controlling cotton and wheat production was abolished in 2006. After 2006, farmers have been able to choose their own crops. Although they still receive suggestions of the Government in practiced the crop selection.

The following figure shows the current production system of cotton and wheat.



(Note) *If farmers could produce more than the norm amount (2.1 ton/ha for cotton and 1.54 ton/ha for wheat)

Cotton: The farmers have to sell the exceeded product to the contracted company. The selling price of the exceeded product is about 20% higher than the government procurement price

Wheat: The farmers can sell the exceeded product at a free market. The market price is usually more than 2 times of the government procurement price

Fig. 2.5.2 Production System of Cotton and Wheat

In the current system, farmers need to make a production contract with the nearest cotton/wheat processing factory when they want to produce cotton and wheat. The majority of those factories stock is shared by the government. The government standardizes the necessary services and inputs for the crops. The farmers receive them through service providers which are consisted by government institutions, state joint stock companies and autonomous government service units. The farmers need to make a contract for each service to receive them. The contents and volume of services and inputs are calculated according to the government standards and are based on the production contract between farmers and the cotton/wheat processing factory.

2.5.4 Cost and Profit of Crops

(1) Production Costs

The Government standardizes the necessary inputs per hectare (ha) to define the standard productivity of major crops. The production costs are standardized as shown in table 2.5.7 (page 2-55) as of 2008. These official figures, however, have a number of limitations which need clarification, especially for cotton and wheat, due to complicated government interventions in production, inputs supply and other supporting measures. It is widely understood that the official standardized costs tend to underestimate the true cost of production, since some non-target inputs of the government credit are ignored.

Most part of the production costs are salary for workers and mineral fertilizers. These items share from 20 to 40 % of the total production cost. Fuel for machineries also shares large portion of the total cost (around 25 %). Other items as manure, equipment services and miscellaneous share few percent. Repair of equipments, tax, insurance, transportation, canal cleaning, chemicals for plant protection and others are included in the miscellaneous cost.

(2) Profits of Crop Production

Estimated profits of major products are shown in the table below. They were calculated based on the costs and the standard productivity and the selling prices of the products which were estimated based on interviews carried out by the Study Team during the second quarter of 2008. The calculation is also done for major crops in cases of the average yield of the Study Area in 2006. The data shows that rice, vegetables, melon and watermelon are high profitable crops.

Though cotton and wheat are dominant and national strategic crops in Uzbekistan, they may not be favorable crops for growers in terms of profitability. An ADB report on "Republic of Uzbekistan: Implementation and Monitoring of Policy Reforms in Agricultural Sector, 2008" concluded that only farms in the top 20% productivity level in Uzbekistan have made any significant surplus from cotton and wheat based on its study result.

Table 2.5.8 Estimated Profit of Major Crops per Hectare

No	Crop	Costs (sum/ha)	Yield (kg/ha)	Price (sum/kg)	Sales (sum/ha)	Profit (sum/ha)	Remarks
1	Cotton (norm)	831,607	2,100	430	975,240	143,633	Standard yield (Table 2.5.7)
	Cotton (extra)		140	516			
2	Cotton	831,607	1,670	430	718,100	-113,507	Average yield in the Study Area
3	Wheat (norm)	640,863	1,540	169	260,260	83,397	Standard yield (Table 2.5.7)
	Wheat (extra)		1,160	400	464,000		
4	Wheat (norm)	640,863	1,540	169	260,260	359,397	Average yield in the Study Area
	Wheat (extra)		1,850	400	740,000		
5	Rice (paddy)	1,009,902	3,000	700	2,100,000	1,090,098	Standard yield (Table 2.5.7)
6	Rice (paddy)	1,009,902	2,460	700	1,722,000	712,098	Average yield in the Study Area
7	Sorghum (grain)	740,605	2,000	400	800,000	359,395	Standard yield (Table 2.5.7)
	Sorghum (stem)		6,000	50	300,000		
8	Potato	2,470,505	12,000	190	2,280,000	-190,505	Standard yield (Table 2.5.7)
9	Potato	2,470,505	5,840	190	1,109,600	-1,360,905	Average yield in the Study Area
10	Tomato	933,084	20,000	185	3,700,000	2,766,916	Standard yield (Table 2.5.7)
11	Cucumber	573,686	12,000	200	2,400,000	1,826,314	Standard yield (Table 2.5.7)
12	Carrot	723,373	18,000	100	1,800,000	1,076,627	Standard yield (Table 2.5.7)
13	Melon, watermelon	675,404	15,000	200	3,000,000	2,324,596	Standard yield (Table 2.5.7)

Source: The Study Team made based on interview and data from Ministry of Agriculture and Water Resources of Karakalpakstan

1) Cotton

The profit of cotton was 143,633 sum/ha based on the standard yield condition of 2,240 kg/ha. If the profit is calculated based on the average yield in the Study Area (about 1,670 kg/ha) instead of the standard yield, it will be -113,507 sum/ha. This calculation implies that not a little number of producers in the Study Area has not enough profit or has losses from cotton production.

The above mentioned ADB report estimated an official average cotton production cost and profit in 2006. It shows that the cost was almost 295,000 sum/ton, and made a small profit of 11,000 sum/ton before tax and financing charges. Then, once tax and financing charges deducted the profit becomes a small loss of -1,330 sum/ton.

2) Wheat

The profit of wheat was 83,397 sum/ha based on the standard yield condition (2,700 kg/ha). The profit would be higher if it is calculated based on the average yield of the Study Area (3,390 kg/ha) instead of the standard yield. However, there are substantial percentage of wheat producers whose yield is less than 2,000 kg/ha according to the Study Team's field study[10]. Since the break even yield is about 3,490kg, there might be many wheat producers who suffer losses on one hand and the minority producers that enjoy certain profit on the other in the Study Area.

The above mentioned ADB report also estimated an official average wheat production cost and profit in 2006. It shows that the cost was almost 95,000 sum/ton, and made a small profit of 3,500 sum/ton before tax and financing charges. Then, once tax and financing charges deducted the profit becomes zero.

3) Rice

The profit of rice was 1,090,098 sum/ha based on the standard yield condition (3,000 kg/ha). On the other hand, it would be 712,098 sum/ha based on the average yield condition of the Study Area (2,460 kg/ha). The profit must be higher than the estimation during the harvest season of 2008, since its market price has remarkably increased in the first half of 2008.

4) Sorghum

The grain of sorghum is utilized for human and animal consumption, while leaves and stems are used as fodder. The profit was 359,395 sum/ha if the yield of grain reaches 2,000 kg/ha and 6,000 kg/ha for leaves and stems. The profit would not be necessarily inferior to the profit of wheat if all leaves and stems are sold in the market.

5) Vegetables

The estimation shows that the production of vegetables, melon and watermelon could reach higher profit, especially in the case of tomato, melon and watermelon. On the other hand, potato production implies in losses based on the standard yield condition (12,000 kg/ha) and also on the average yield condition of the Study Area (5,840 kg/ha). However, it is expected that producers actually could make a certain profit from potato, since they usually use seeds produced by themselves for many years. A certain profit is expected if the cost of seed potato, which occupies 72.5% of the standard production costs, is not included in the costs, even based on the average yield condition of the Study Area.

2.5.5 Agricultural Inputs

The agricultural inputs distribution system has been established and developed especially since 1999 in accordance with a Presidential Decree. The government always paid more attention to cotton and wheat growers when the system was developed because those are strategic crops for the country. The government still has a substantial influence on the inputs distribution. Consequently, the agricultural inputs supply system has two different delivery mechanisms. Those growers who tied to the state procurement system rely upon a network of specific suppliers who are monopolized agencies substantially controlled by the state, while other growers rely mainly upon local markets and own resources.

[10] The average yield of 22 sample *fermers* in 2007 was only 1.42 ton/ha and the highest yield was 2.50 ton/ha according to the Study Team's Questionnaire Survey.

(1) Chemical Fertilizers

The Government still has a strong influence on production and distribution of chemical fertilizers in Uzbekistan. Uzkimyosanoat (or State Joint Stock Company "Uzbekistan Chemical Producing Co."), former "Uzhimprom", is responsible to supervise and coordinate the production of its affiliated fertilizer factories that are scattered in 8 places in the country.

The Government controls and supervises distribution of ammonium nitrate, which is the most popular chemical fertilizer in Uzbekistan, since the fertilizer can be easily converted to explosive substances. Uzselhozhimiya (or Uzbekistan Agricultural Chemical Co.), is also a state company, exclusively takes responsibility to deliver ammonium nitrate to end users through its own distribution chain. Uzselhozhimiya has 134 Agro-chemistry Centers, which are the end distribution points of the company in Karakalpakstan.

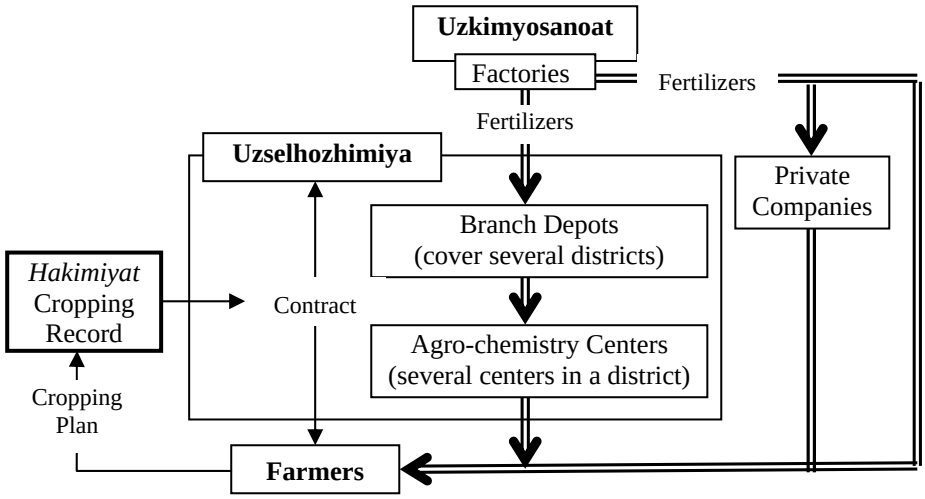


Fig. 2.5.3 Distribution System of Chemical Fertilizers in Uzbekistan

While other companies can distribute fertilizers, except ammonium nitrate that needs license according to the regulations, the distribution is substantially monopolized by Uzselhozhimiya yet. Only one company started fertilizers distribution business since April, 2008 in Karakalpakstan. The company was established by a *fermer* and is supported by Karakalpakstan Fermer's Association. It sells mainly nitrogen fertilizers to any customers without complicated documentation and procedures as requested by Uzselhozhimiya. According to the information, even individual *fermers* can buy fertilizers other than ammonium nitrate directly from the factories, if the requested amount is in large volume.

Though chemical fertilizers are traded at the commodity exchange market, which was established in early 90s and has remarkably enhanced in 2004, the influence to the fertilizer markets must be still negligible under the current market situation that is still substantially monopolized.

Uzselhozhimiya basically sells chemical fertilizers based on the contract between the company and end users (farmers). Then, the contracted amount of chemical fertilizers must be calculated in accordance with a cropping plan listed in the concerned *Hakimiyat* and the normative amount per ha. In other words, farmers have to register their cropping plan to *Hakimiyat* before all planting season to buy chemical fertilizers. Moreover, farmers need to do advanced payment of the full amount through banks according to the Presidential Decree No.6-71, dated on December 27, 2007.

Since cotton and wheat are planted based on the production contract with their processing companies according to a Government's guidance as described in 2.5.3, farmers easily make a cropping plan to

access the necessary chemical fertilizers. However, many farmers have difficulties in making a cropping plan for other crops. As result, few farmers can access chemical fertilizers for other crops. According to estimation of a branch depot of Uzselhozhimiya, only about 20% of vegetable farmers buy chemical fertilizer from Uzselhozhimiya in the Study Area.

Dehkans have many difficulties to access chemical fertilizers since they do not grow cotton and wheat on contract basis. Many *dehkans* do not use chemical fertilizers. But some *dehkans* get them anyhow from somewhere (may be through illegal channels) according to the Study Team's field interviews.

In accordance with a presidential decree to address the chemical fertilizer issue, Uzselhozhimiya has decided to open its outlet stores at strategic points in rural area since the cropping season of 2008. Everyone can buy any chemical fertilizers, except ammonium nitrate, from the outlet shops in cash without any difficulty. It is expected that producers (*fermers* & *dehkans*) access to chemical fertilizers will become better with the increase of outlet stores.

The price list of chemical fertilizers, which are popular among local farmers, is as follows:

Table 2.5.9 Price of Chemical Fertilizers (as of May 2008)

Fertilizers	Chemical Component	Price (sum/ton)
Ammonium Nitrate	N：34.5%	265,322
Urea	N：46.0%	317,085
Ammonium Sulfate	N：21.5%	190,395
Mon-Ammonium Phosphate (MAP)	N&P：11.0＆52.0%	441,987
Single Super Phosphate	P：14.0%	287,247
N/P/K (9.0%)	N, P, K：9.0%	252,148

Source: Uzselhozhimiya

(2) Chemicals for Plant Protection (Fungicide, Insecticide, Herbicide, etc.) and Bio-control Services

Many documents report excessive use and damping of agricultural chemicals especially for cotton in connection with Aral issue. The following reasons, resulted from a series of workshops and field interviews carried out by the Study Team, suggest that chemicals for plant protection are not much used in Karakalpakstan in these days.

1) The Government standards for producing major crops, showing recommendable amounts of inputs, services and man-powers and their expected costs, does not have an independent expenditure item for chemicals for plant protection. Instead, a bio-control system has already popular among *fermers* for controlling plagues of cotton and wheat which are dominant crops in the Study Area
2) Few *fermers* use herbicide for cotton and wheat since weeds are generally controlled manually
3) Defoliant are not much used for cotton since almost cotton is harvested manually
4) Diseases for crops are not serious under dry weather conditions
5) *Fermers & dehkans* are not well aware of damages caused by insects/diseases due to the lack of knowledge and/or compromise with the present level of damages on non-cotton/wheat crops

Novayi Electric Chemical Factory is the only factory that produces chemicals for plant protection in Uzbekistan. Some of the chemicals are imported. Distribution of chemicals for plant protection is not strictly controlled by the government like chemical fertilizers, while the government controls them by environmental regulations. A distribution system of the chemicals in Karakalpakstan can be as follows:

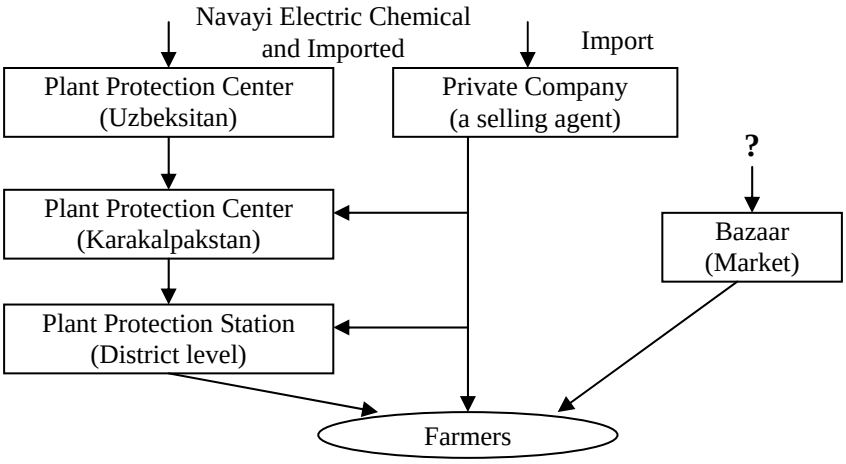


Fig. 2.5.4 Distribution System of Chemicals for Plant Protection in Karakalpakstan

There are two major distribution channels for chemical distribution in Uzbekistan: the government channel and the private channel. The Plant Protection Center is responsible for the distribution in the government channel. The Center distributes chemicals or provides their application services to farmers by contract. The private sector's presence is still limited in Karakalpakstan. A private company, that is a selling agent of foreign manufacturers, has just started their business in Karakalpakstan. Bazaar might be the closest outlet of the chemicals for small scale *fermers* and *dehkans*.

A bio-control system, using 3 kinds of natural enemies (insects), for cotton and wheat has already been developed and accepted by many *fermers*. The technology was introduced in 1990 (before the independence). The system including natural enemies has been provided by government institutions. Plant Protection Stations and Bio-laboratories have become financially autonomous institutions since 1996. The institutions have to manage their all expenses including salaries of staff by their own revenue that comes from their services.

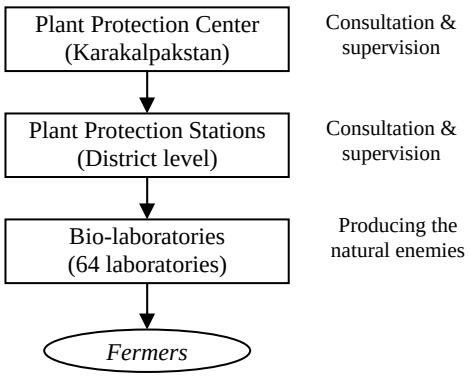


Fig. 2.5.5 Bio-Control Services

The bio-control services cover substantial planted area of cotton and wheat are as follow:

Table 2.5.10 Achievement of Bio-Control in 2007 in Karakalpakstan

Crop	A: Controlled area in 2007 (ha)	B: Planted area in 2006 (ha)	A/B (%)
Cotton	100,000	106,698	93.7
Wheat	35,000	64,315	54.4

Source: Plant Protection Center, Karakalpakstan (controlled area in 2007)
The Ministry of Economy of the Republic of Karakalpakstan (planted area in 2006)

(3) Farm Machinery

Many farmers (*fermers* & *dehkans*) depend on mechanization services, while many individual farmers, mainly *fermers*, have their own tractors. Some of them purchase tractors through tractor leasing company (Qishlog Xoalik Mash Lizing or the Agro-machinery Leasing Co.).

There are four types of farm mechanization service providers in Karakalpakstan as follows:

- MTP (Machinery & Tractor Parks), subdivisions of "Uzagromashservis"
- Alternative-MTPs(Farm Machinery Stations)
- Agro-machinery MMTP
- Individual *fermer* or company

There are 14 MTPs in Karakalpakstan now (basically one MTP/district) and a union has been set up as coordination body in Nukus (Karakalpakstan MTP Union). There is also Uzbekistan MTP Union at national level. MTPs are state joint stock companies and were established after dissolving a state farm mechanization company (Uzselhoztechnika**)** in 1995. They are mainly providing land-preparation services for cotton and wheat with high-powered tractors, and harvesting services manly for wheat/rice on contract basis. A mechanization service contract is made with customers before every cropping season. The type of mechanization services, services schedule, etc. is mentioned in the contract based on the cropping plan of respective customer. There are 586 tractors (384 for plowing, 146 for inter-cultivation and 56 for transportation), 79 combine harvesters (72 for wheat and 7 for cotton) and other miscellaneous machinery and attachments in the 14 MTPs as of August 2008. They cover about 70,000 ha of land- preparation and about 500 ha of wheat/rice harvesting in recent years. The MTPs don't have unified tariff services. Each MTP has each tariff system. A tariff of MTP is shown in the next table.

The operation efficiency of the tractors is decreasing year by year, since major part of the tractors in 14 MTPs was procured before the independence. MTPs can not renew tractors and other machinery at proper intervals due to financial constraint. Decreased of operation efficiency is causing a financial constraint again. According to the information from Karakalpakstan MTP Union, many defaulters among customers due to poor harvests under severe agricultural conditions are another major reason of the unfavorable MTPs' financial condition.

Table 2.5.11 Price of Farm Machinery Services (as of May 2008)

Crop	Machinery Service	Price
Cotton	Plowing	43,900 sum/ha + Fuel
	Leveling	6,632 sum/ha + Fuel
	Inter-cultivation and top-dressing	5,746 sum/ha + Fuel
Wheat	Plowing	43,900 sum/ha + Fuel
	Harvesting	52,200 sum/ha + Fuel

Source: Chimbay MTP

There are 124 alternative-MTPs (A-MTP) in Karakalpakstan actually. Alternative-MTP (A-MTP) is a private entity and most of them were established when *shirkats* were dissolved. *Shirkats* transfer their machinery to A-MTPs without charge in most cases. A-MTPs also provide their services on contract basis. They can provide flexible services to keep the actual situation. Each A-MTP has each tariff system for the services. It is said that many A-MTPs will go into bankruptcy within several years, since their financial situation is same or worse than the situation of MTPs with the similar reasons. Their business circumstances may be getting worse in accordance with the on-going land optimization policy. It seems that more individual *fermers* intend to have own tractors for efficient farm management after expanded their farmland.

There is an Agro-machinery MMTP, which is located at the suburb of Nukus city, in Karakalpakstan. The Agro-machinery MMTP is a mechanization service body under MAWR that only provides harvesting services to wheat/rice growers on contract basis. The service charge in 2008 was 51,200 sum/ha, according to MAWR of Karakalpakstan. The contract system is the same of the MTPs. With 152 combine harvesters, it covers about 53,000 ha of wheat/rice harvesting in recent years.

A questionnaire survey carried out by the Study Team shows that 60% of sample *fermers* have their own tractors. On the other hand, many *fermers* still cannot afford a tractor due to their weak financial condition. Majority of the tractors owned by *fermers* were also transferred from *shirkats* when they were dissolved. The *fermers* got the tractors by bidding according to them. Since relatively smaller powered tractor was transferred to them, many *fermers* still depend on services of MTPs or A-MTPs for preparation of land. Many tractors owned by *fermers* are overage as same condition as the tractors of MTPs and A-MTPs.

The number of tractor in Karakalpakstan showed a remarkable increase of 3,345 units from 2008 to 2010. While there are 10,462 tractors in Karakalpakstan in 2010, the number in itself may be almost sufficient for managing all planted area that was about 250 thousand ha in Karakalpakstan[11]. However, many *fermers* have difficulty in using tractors on time due to mal-coordination of MTPs/A-MTPs and inefficient operation of overage tractors and attachments. There are substantial numbers of inoperative tractors, maybe about 5 - 10 % of the total according to collected information from several sources concerned. The table below shows that the percentage of tractors owned by individual *fermers* is still less than 20%. It is expected that the tractors owned by A-MTP would be replaced by *fermer*-owned tractors gradually in accordance with the progress of land optimization policy.

Table 2.5.12 Number of Tractors in Karakalpakstan in 2008 and 2010

Month/Year	A: Plowing (over 100hp)						B: Inter-cultivation (3 wheel, 60 - 100hp)					
	MTP	Non-MTP				Total	MTP	Non-MTP				Total
		A-MTP	*Fermer*	Company	S-Total			A-MTP	*Fermer*	Company	S-Total	
Aug 2008 (a)	384	-	-	-	1,388	1,772	146	-	-	-	3,050	3,196
(%)	(21.7)	-	-	-	(78.3)	(100.0)	(4.6)	-	-	-	(95.4)	(100.0)
July 2010 (b)	583	494	580	232	1,306	1,889	60	1,801	951	1,347	4,099	4,159
(%)	(30.9)	(26.2)	(30.7)	(12.3)	(69.1)	(100.0)	(1.4)	(43.3)	(22.9)	(32.4)	(98.6)	(100.0)
(b)-(a)	199	-	-	-	-82	117	-86	-	-	-	1,049	963

Month/Year	C: Transportation (60 - 100hp)						All Tractors (A+B+C)					
	MTP	Non-MTP				Total	MTP	Non-MTP				Total
		A-MTP	*Fermer*	Company	S-Total			A-MTP	*Fermer*	Company	S-Total	
Aug 2008 (a)	56	-	-	-	2,057	2,113	586	-	-	-	6,495	7,081
(%)	(2.7)	-	-	-	(97.3)	(100.0)	(8.3)	-	-	-	(91.7)	(100.0)
July 2010 (b)	37	1,165	460	2,716	4,341	4,378	680	3,460	1,991	4,295	9,746	10,426
(%)	(0.8)	(26.6)	(10.5)	(62.0)	(99.2)	(100.0)	(6.5)	(33.2)	(19.1)	(41.2)	(93.5)	(100.0)
(b)-(a)	-19	-	-	-	2,284	2,265	94	-	-	-	3,251	3,345

Source: MAWR of Karakalpakstan and Karakalpakstan MTP Union

Note: Categolization of tractors in the table may not reflect the actual practice at field level, since a tractor is generally used for multipurpose field works.

(4) Fuel

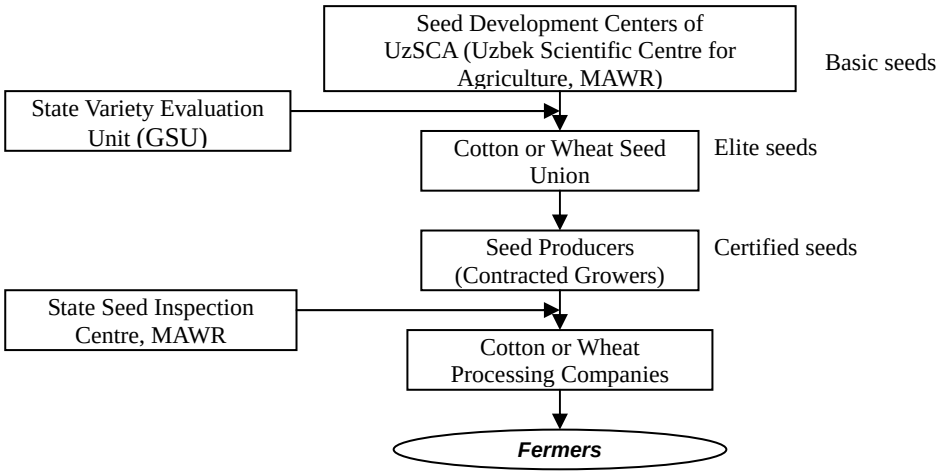
In Uzbekistan, *fermers* & *dehkans* have to procure necessary fuel for farm machinery, even though they hire mechanization services. Therefore, fuel is one of an important agricultural input. Uzbek Oil Co., a state company, is the only company distributing fuel for farm machinery to grow state controlled crops through its outlet stations. *Fermers* and *dehkans* have to buy necessary fuel from the stations on contract basis as same as other necessary inputs to state controlled crops. If growers want to buy more fuel or fuel for other crops, they may do this through private channels. There are 127 fuel stations of Uzbek Oil Co. in Karakalpakstan.

(5) Seeds

There are two major different seed multiplication and distribution systems in Uzbekistan: one for cotton, wheat and some grains and another for other crops, especially vegetables. In the case of cotton and wheat, *fermers* can buy necessary seeds through contracted processing companies, while *fermers* and *dehkans* have to buy seeds for other crops through private marketing channels.

The seed multiplication and distribution systems of cotton and wheat are as follow:

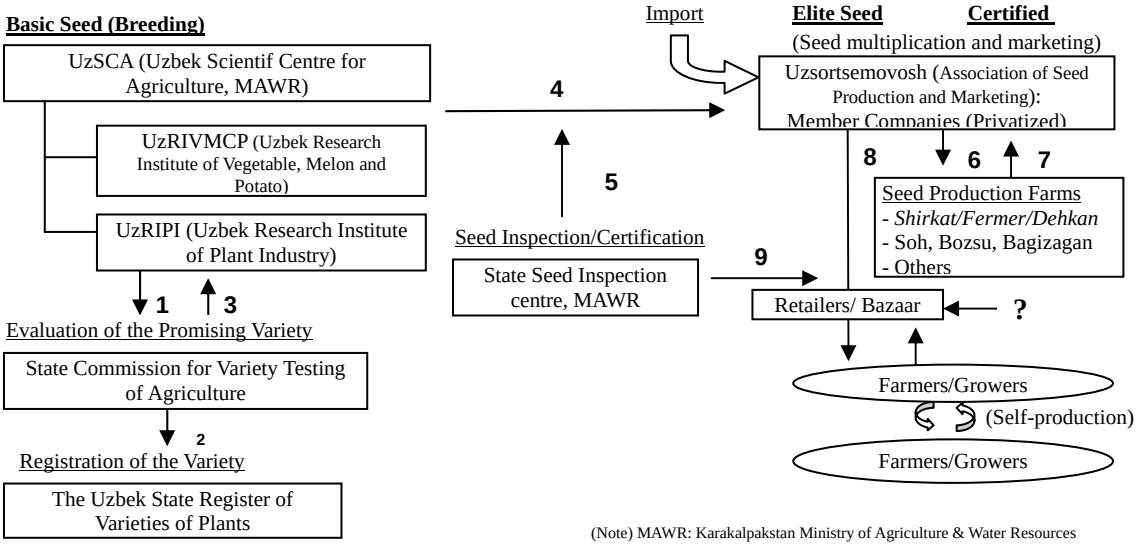
[11] 80 to 100 hp tractors, which are popular among *fermers* in Karakalpakstan, could manage 20 to 25 ha in general. Considering the condition, it is necessary to input 10,000 to 12,500 units of well-conditioned tractors in total to manage 250,000 ha of land.



MAWR: Karakalpakstan Ministry of Agriculture & Water Resources

Fig. 2.5.6 Cotton and Wheat Seeds Multiplication and Distribution in Uzbekistan

The top of seed multiplication and distribution system of vegetables is similar to the system of cotton and wheat as shown in the figure below. However, the system is not functioning as good as the system of cotton and wheat in Karakalpakstan in these days, since responsible institutions for sub-systems e.g. breeding, seed multiplication, etc. lost their ability due to shortage of manpower and budget. Few seeds with quality for vegetables multiplied through the system are distributed to producers now. It seems that common vegetable growers in Karakalpakstan use their own seeds or buy seeds at bazaar, where varied quality of vegetable seeds from various sources (including imported one) are available.



(Note) MAWR: Karakalpakstan Ministry of Agriculture & Water Resources

Fig. 2.5.7 Vegetable Seeds Multiplication and Distribution in Uzbekistan

2.5.6 Supporting System for Crop Production

(1) Agricultural Research

There is one branch office of Scientific Center for Agriculture (SCA) which does researches on agriculture sector under the MAWR of Uzbekistan. The branch office of the center is located in Nukus city. Under the branch office, 9 stations and 1 institute are organized in Karakalpakstan as shown in the following:

Table 2.5.13 Station and Institute under Nukus Branch Office of SCA

Name of Organization	Place (District)	Number of staff	Area of the Field (ha)	Related Products
Crop Station	Chimbay	40	425	Cotton
Grain Crop Station	Nukus District	8	48	Wheat
Sorghum and Maize Station	Khojeyli	7	15	Sorghum, Maize
Potato and Vegetable Station	Khojeyli	1	0	Potato, Vegetables
Horticulture and Grapes Station	Kegeyli	8	38	Vegetables,Fruits & Grapes
Plant Protection Center	Nukus District	3	8	
Animal Breeding Station	Nukus City	7	0	Livestock
Veterinary Station	Nukus City	3	0	Livestock
Market Reforms in Agriculture Station	Nukus City	24	0	
Rice Research Institute	Nukus District	64	264	Rice

Source: Nukus branch office of Scientific Center for Agriculture

The branch office has 7 staff and works on administrative matter to manage the stations and the institute. Each station and institute has researchers and works on research of the respective subjects. For example, the Crop Station in Chimbay has 40 staff and 425 ha of experimental field for cotton production researches.

Potato and vegetable station works on potato and vegetable production research like breeding, seed production and preservation of varieties especially for melon and water melon. It has only one staff and no experimental field at present and the research activities stopped since 2004 because of financial problems. Still yet, the station has elaborated production guidebooks of vegetables, melon and potato in 2008.

Management of all research institutes or centers have been an autonomous body under the government policy. However, they are very close to a crisis of extinction due to shortage of revenue. They are facing difficulty to find out a promising client or patron other than the Government, who is even focusing on limited research themes for spending its budget. The weak private sector in Karakalpakstan cannot be an alternative revenue source at present. Systematic agricultural researches based on policies and plans with assured budget are essential to the development of agricultural production. However, the present situation of research activities is weakening and research organizations might not be functioning well, except cotton and wheat, although the existing research organizations are making efforts within their capacities.

(2) Agricultural Extension

Uzbekistan Government organizes annual 5-days course for *fermer* training seminars in off-agriculture season (Jan – Feb) in order to improve *fermers*' ability. The training seminars are organized in every district at respective district agricultural college in general, and all *fermers* are expected to participate in the training seminars. The figure below shows the implementation system of the seminars in Karakalpakstan.

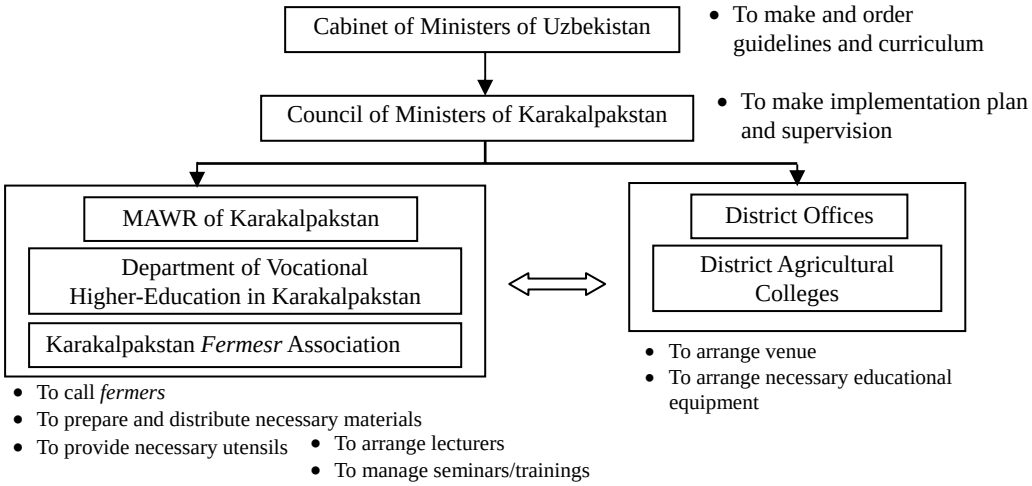


Fig. 2.5.8 Implementation System of the *Fermer* Training Seminars

Three hours/day (16:00 – 19:00) were allotted for the training seminars for 5 days in 2007. The curriculum was very dense and covered not only technical matters on farming but also comprehensive subjects regarding *fermer* business activities, e.g. legal and financial matters. Therefore, government officials, researchers and academic specialists from various fields were invited as lecturers. Teachers of district agricultural collages also played vital role in the training seminars.

Table 2.5.14 Curriculum of the *Fermer* Training Seminars in 2007

Day	No	Subjects
1st	1	National independence idea, activities in cultural/spiritual share
		Establishment of farm and its legal basis
	2	Business plan, insurance, tax and marketing basis of farms
2nd	3	Improvement of contract relations about farming
	4	Cash documents management for farms
	5	Giving credits to support *fermers* who produce state order crops
3rd	6	Improvement of market infrastructure in villages and arrangement of services
	7	Selection of agriculture crops and control insects and diseases
	8	Improvement of farms specialized in fruits, horticulture and vineyard
4th	9	Efficient use of the water and improve the condition of land
	10	Use of machinery
5th	11	Increasing the number of livestock, breeding and veterinary services
	12	Improvement of silkworm breeding in farms

Source: MAWR of Karakalpakstan

The seminar in 2009/10 winter was scaled down due to shortage of the Government budget in Karakalpakstan. A field–day was organized in every district before the main planting season. It is not confirmed whether the scaled down of the *fermer* seminar is a temporary measure only in this year or not.

Karakalpakstan Fermer's Association also organizes seminars for its members on ad-hoc basis. A total of 28 seminars were held and 1,864 participants attended to the seminars from November 2005 to May 2008, according to records of the association. Many seminars were organized to disseminate government policies like presidential decrees or donor sponsored events.

(3) Agricultural Credit and Insurance

1) Credits

Uzbekistan's banking sector is still much dominated by the Government priorities and interventions, especially in the agricultural sector. While there are several agricultural credit systems at present, all credits are provided through commercial banks (all of them are state joint stock companies and the Government shares 51% of the total stocks) as shown in figure below:

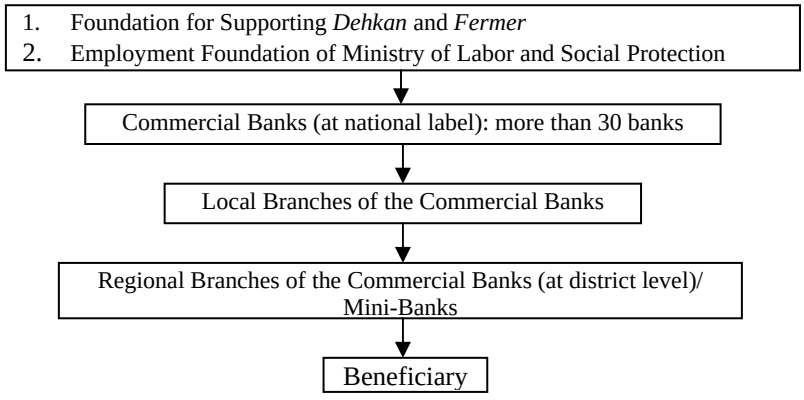


Fig. 2.5.9 Money Flow of Agricultural Credit in Uzbekistan

The Government has taken measures to increase the number of business points of the banks in rural area, which are called "Mini-Bank", in order to improve beneficiaries' convenience. These are actually sub-divisions of the district branch of commercial banks serving farming communities. However, they

are unable to undertake the operations of a bank branch, since they have inadequate equipment and facilities, fewer numbers of qualified staffs, as well as very limited client. There are 104 Mini-Banks in Karakalpakstan as of 2008.

According to “Legal and Financial Aspects of Private Farming, 2005”, Tashkent University, which was published by the USAID as a part of “Water Users Association Support Program”, there are 7 different kinds of agricultural credit schemes at present. Table 2.5.15 (page 2-56) shows a summary of the schemes. In general, the available credit is either directed credit which has only a small cash component and is strictly targeted, or a limited amount of commercial credit which does not meet even a small percentage of their needs. Though the situation is changing slowly as microfinance institutions, credit unions and leasing companies is becoming popular to provide credit options for rural communities, still many growers can not access formal financial sector of credit. A favorable credit option is not accessible to those growers who are not involved in the production of state controlled crops.

“Cotton & Grain Credit” is the most popular directed credit among *fermers* at present, since the interest rate is the lowest and many *fermers* depend on cotton and wheat growing. The program was designed, maybe, for preparing the abolishment of “State Order” system in 2006, since it started in 2005. Necessary money for procuring inputs and services for cotton and wheat production is pipelined through this credit scheme. However, the following inflexible credit system makes *fermers* inconvenient.

After making a supply contract with ginnery or flour mill, in order to access the “Cotton & Grain Credit”, a *fermer* must sign a purchase contract with designated suppliers for inputs, develop a business plan with expected cash flow and balance sheet accepted by the tax authorities, and submit a report of financial condition. The loan amount is automatically calculated based on the necessary amount of inputs per ha suggested by the government technical norms, prices set by the government (MOF) and planted area of the crops under the supply contract. Then, all payments, except for remuneration of wages, have to be made by bank transfer without any cash payment. The credit is split into specific credit items based on the business plan. These items which are fixed before the loan disbursement, regardless of any price changes or unanticipated need, cannot be altered for the other items. It seems that the credit aims at supporting *fermers* growing the state controlled crops, as well as ensuring the inputs suppliers the recovery of sales account from *fermers*.

Fermers expressed several complain about the credit scheme during workshops carried out by the Study Team. Some of them were caused by their misunderstanding or insufficient knowledge about the system. The followings are the focal points of the complaints:

- Unkind services or attitude of pipeline banks
- Complicated procedures and time consuming paper works
- High bank-charges
- System that farmers can not withdraw cash money by their own decision, even though money is in their account (“Next Harvest Credit” and “Cotton & Grain Credit”)

The conditions of the credit scheme are too severe to be applied to *dehkans*. It seems that it is almost impossible for *dehkans* to utilize the credit schemes. In order to address this issue, the government has launched a new credit scheme that mainly targets *dehkans* from the cropping season in 2008, as shown in table 2.5.16 (page 2-57). According to the collected information, the total disbursed amount of the credit in 2008 was 37.6 billion sums.

2) Insurance

Uz-Agrosugurta, a state joint stock company, is the only insurance company which provides agricultural insurance in Uzbekistan. Uz-Agrosugurta has branches in all provinces and provides direct services to farmers. There are 4 types of mandatory (compulsory) insurance programs and 11 free (voluntary) insurance programs as summarized in table 2.5.17 (page 2-57).

3) Tractor Leasing Scheme

The Government has launched a tractor leasing scheme with Qishlog Xoalik Mash Lizing or the Agro-machinery Leasing Co. since 2001. According to the Nukus branch office of the company, it provided 192 and 160 tractors in 2006 and 2007 respectively. Since there is substantial number of defaulters[12], the Government has newly imposed relaxed lease conditions as shown below.

- Initial payment: 15% of the total value
- Lease term: 7 years
- Interest: 7%

The number of tractor provided through the government leasing scheme is still around 200 in 2008 and 2009 due to limitation of allocated fund for the scheme. The actual demand is more than the figure, according to the Nukus branch office of the company. The number of tractors provided by the scheme should be increased to solve tractor issue described in 2.5.5(3).

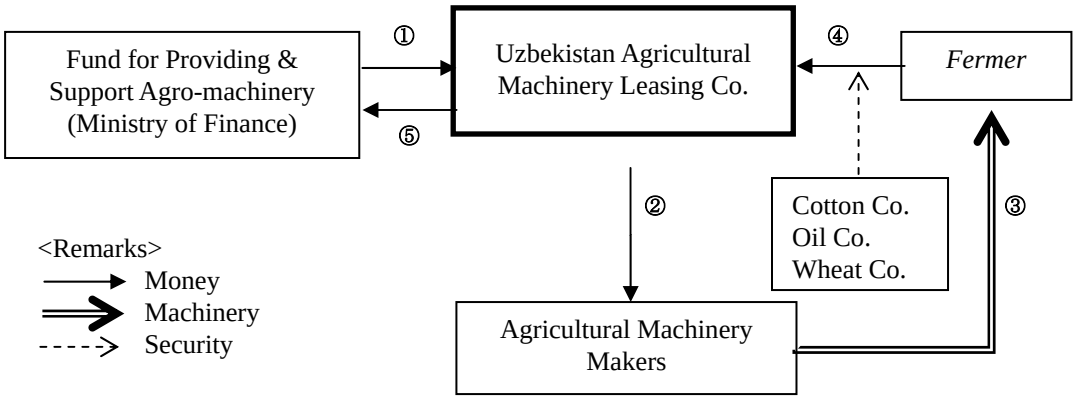


Fig. 2.5.10 Government Agricultural Machinery Leasing Scheme

The Agro-machinery Leasing Co. also has its own leasing scheme by using its own fund. Although the leasing condition, as shown below, is not as favorable as the government scheme, almost same number of tractors with the government scheme were leased through this scheme in recent years.

- Initial down payment: 30% of the total value
- Lease term: 2 - 5 years
- Interest: 16 - 18%

This situation must be a proof that there is a great demand for tractors in Karakalpakstan. It is estimated that the potential demand might be about 500–700 unit/year considering the present number of tractors as well as a life of tractor.

2.6 Livestock

2.6.1 General

Livestock production in Uzbekistan is distinguished by its richness and variety. Each animal type is characteristically distributed in its own agro-ecological zone. For example, milk cattle are mainly found in irrigated croplands near industrial centers; beef cattle in mountain zone pasture areas; Karakul sheep are mainly in deserts; meat-wool and ram production and horse breeding are concentrated in pre-mountain and mountain zones of the Fergana valley, while swine and poultry production industries are near large cities and industrial centers.

[12] About 32% customers have defaulted in payment according to the Nukus branch of the Agro-machinery Leasing Co.

Table 2.6.1 Livestock Dynamics in Uzbekistan for Selected Years in 1990-2005

Species (,000)	Years							
	1990	1995	2000	2001	2002	2003	2004	2005
Total cattle nos.	4,580	5,848	5268	5,344	5478	5879	6243	5400
(Including cows)	1,856	2,336.9	2305.2	2,364	2,293.2	2556.7	2704	2.8
Sheep and goats nos.	9,230	10,049	8886	8,930	9234	9929	10580	10500
Horses nos.	120	144.8	155	150	145	145	145	145
Pig's nos.	716	350.4	80	89	75.4	89.9	86.7	90
Poultry nos.	26,473	18,500	14,787	14,800	15,725	18,053	19,184	18.35

Source: FAOSTAT, 2006

The position of livestock sector in Karakalpakstan is examined comparing to the gross output of the agriculture and livestock production. The crops production occupies 53% of the total in 2006 according to the Ministry of Economy, while 47% by livestock sector. Therefore, the contribution to Karakalpakstan economy by the livestock sector seems to be considerably high. The share of *dehkan* in the livestock products accounts for 90% or more (milk and meat). Despite their small farm size, *dehkan* plays a very important role in livestock production in Karakalpakstan.

The percentage of livestock in Karakalpakstan is less than 10% of the Uzbekistan, excluding 11% of cattle (including cows on statistics in Karakalpakstan). Therefore, it can be inferred that livestock sector of Karakalpakstan does not have strong contribution in the Uzbekistan economy.

Table 2.6.2 Share of Karakalpakstan in Livestock Population in 2004

	Cattle	Pig	Sheep/Goats	Horse	Chicken
Uzbekistan	320.9	19.5	422.2	19.1	767.7
Karakalpakstan	34.2	0.7	11.0	0.9	8.6
Share	11.0	4.7	2.6	8.5	1.1

Source. Fermer's Association Karakalpakstan

The livestock owners in Karakalpakstan are roughly divided into *fermer*, *dehkan* and *shirkat*. Especially, *dehkan* is the main livestock products producer. *Dehkan* owns about 90% of the cattle/cows and chicken, though the share is different according to the animal type. While, difference is seen for pig and sheep/goats (sheep and goat are identify on statistics in Karakalpakstan). *Fermer* and *shirkat* account for about 30% of them. It is reported that *shirkat* raises a lot of pure Karakul sheep as compared with local sheep mainly raised by *fermer* and *dehkan*. There are 225,308 *dehkans* (2006), who own few livestock, but as a whole, the total number of livestock owned by *dehkans* accounts high rates.

2.6.2 Animal Products Consumption

Beef stands at the top of meat consumption in Uzbekistan, which is equivalent to about three times of Japanese consumption. Mutton with a high preference is 3.3kg/capita per year. It seems that the low consumption of mutton than beef is because of the high market price. The consumption of chicken between the two countries is extremely similar. Swine shows low and limited consumption probably due to religious reason. The egg consumption is about 20% of Japan. Calorie taken from animal products of Uzbekistan people reaches 17% of the total calorie per day (2,312 kcal/persona per day), which is higher than 12% of Japan. There is no available data about animal products in Karakalpakstan.

Table 2.6.3 Meat Consumption (kg/capita /year)

	Uzbekistan	Japan
Bovine meat	15.90	5.60
Sheep/goat meat	3.30	-
Pork	0.72	12.10
Poultry meat	0.93	10.50
Other meats	0.12	0.30
Eggs	3.16	16.60
Milk (excl. Butter)	137.63	36.70
Butter	0.32	0.70

Source: FAO, Ministry of Agriculture, Forestry and Fisheries of Japan

In general, the productivity of livestock in Karakalpakstan is low in the case of meat, milk and reproduction. For example, live body weight of cattle/cows is estimated at about 300 to 350 kg/head, excluding beef cattle with 700 to 1,000 kg/head found at a *fermer's* farm in Beruni. Moreover, milk

production per head is only 3 to 5 lit./day with the lactation period of 200 to 250 days/year. Therefore, annual milk production is at most 1,250 kg/head. Productivity of major livestock is shown below:

Table 2.6.4 Indicators of Productive Capacity of Livestock

	Cattle	Sheep	Goat	Pig
Live Body weight ;adult (kg)	300-400	30-35	25-30	60-80
Reproduction rate (%)	80	95-97	97-100	100-110
Milk production (kg/day)	6-8	-	-	-
Wool/hair production (kg/yr)	-	1.5	1.5-2.0	-
Yielding ratio of meat (%)	49-50	47-48	47-48	70-72

Source: Department of Animal Husbandry, MAWR of Karakalpakstan

2.6.3 Feeding Sources

Meteorological conditions in Karakalpakstan are considered severe, especially for cattle/cows. There are restrictions for livestock, such as intense heat, frosty winter, water shortage for forage production, saline soil and low grow capacity of grazing lands. It causes insufficient feed supply, not only in quantity but also in quality. It is reported that current concentrate production in Karakalpakstan meets only about 60% of the demand. These conditions will be very strict especially for *dehkan* who own cattle/cows in a small area. In fact, the Study Team interviewed a *dehkan* who had given up raising goats because of insufficient and unstable supply of feeds.

Grazing starts from middle March to end of November in general. After that the animals are kept in housing (barn) to avoid sharp frost, though they are out during daytime even in winter for sunbath. During spring to summer, when fresh grasses and forage are available, cattle/cows are fed mainly with sorghum, alfalfa, while fresh grasses on grazing land are for sheep/goats. In winter, livestock are fed with dried sorghum, alfalfa hay, reed and cotton meal, etc. Alfalfa hay and dried sorghum are sold in the market for winter feeding.

2.6.4 Livestock Supporting System

(1) Institutional Support

1) Veterinary Department

District Veterinary Station is installed in 11 districts of the Study Area. Out of 11 district of the Study Area, six (6) districts have veterinary laboratories. In addition, Nukus city has a city veterinary station. One station has 17 staff and 35 VSE (veterinarian sanitary expertise) in average. Some of the laboratories are equipped for blood test, parasite test as well as for artificial insemination (AI), as the case of Beruni district. There are 58 veterinary service points under the district veterinary station with about two veterinarians functioning as the end-service organism on farm level. On average, a station covers 12,400 km^2, or 730 km^2 (27 x 27 km) per staff. Since these offices are in lack of transport means for the services, it is inferred that proper services to meet the demand of people is difficult. It is also reported that the number of veterinarians who can make artificial insemination are not enough.

2) Animal Husbandry Department

Animal Husbandry Department under the MAWR of Karakalpakstan is composed of 3 divisions: livestock raise, forage production and poultry division. As compared to the Veterinary Department, which provides mainly veterinary services such as AI and medical treatment, the Animal Husbandry Department plays general technical assistances for livestock management and feed production.

3) Livestock Research

There is no research station specified in livestock raise in Karakalpakstan. In Nukus city, there is the Uzbekistan Scientific Center for Agricultural under the MAWR of Uzbekistan, which is composed of Scientific Research Institute of Agriculture Experimental Farm and Scientific Institute of Animal Husbandry. The research activities, not only covers crop cultivation but also animal husbandry and had

been conducted until 1993 by 58 staff. However, the financial constraints resulted in a gradual decrease of the number of staff. Now only five staffs are working in livestock sector to do researches on meat, milk and camel hair.

In Chimbay, there is the Crop Station of SCA, with an experimental area of 2,500 ha and 80 years history, that conducts researches on breeding improvement and adaptability test of cotton and forage. The existing tractors and attachments in the center have already deteriorated.

(2) Long-Term Plan for Livestock Sector

Long-term plan concerning to livestock development is a part of agricultural plan of Karakalpakstan in the "Draft Social Economic Development of the Republic of Karakalpakstan for 2007-2011". Two strategies are included: the promotion of forage production, and increase of alfalfa seed production targeting the world market. Probably these will be originated in constraints on lack of forage supply and need of expanding alfalfa production. Also "The Program for Stimulation of Livestock Production Increase", especially the case of cattle in private households and small and large scale farm during the period of 2006 -2010 aims to attaining the following tasks:

- Increase allocation of micro credits to private households, small and large scale farmers to purchase cattle;
- Simplify procedures to issue loans by commercial banks to be provided to households, small and large scale farmers for livestock breeding;
- Provide rural families with low income and many children with free cattle and easy access to fodder;
- Widen access of private households, small and large scale farmers to concentrate fodder by provision of warehousing and sales facilities at district centers; and
- Exempt livestock producers from paying customs duties to import pedigree materials and respective equipment up to 2010.

The micro credit with the condition of 6 % interest per year and 3 year-repayment to support purchasing cattle/cows, targeting low income stratum, has been implemented by the Central Bank of Karakalpakstan. In the Study Area, 1,088 million sum have been released to 1,539 beneficiaries till now, which exceeds the target of 794 million sum (equivalent to 750,000 sum per beneficiary). Among the 11 districts of the Study Area, the numbers of beneficiary of the micro credit in Nukus is ranked at the top, followed by Beruni, Khodjeyli, while the lowest is in Muynak with 48 beneficiaries. Moreover, there is as a long-term plan titled "Program on the Development of Karakul Sheep-Breeding in Karakalpakstan in 2008-2012", which is aiming to increase Karakul sheep from current 170,000 head to 210,000 head in the whole Karakalpakstan by 2012. To reach the purpose, the plan notes the necessity to equip AI with tools, increase the forage production, and improve the grazing land as well as reclaim grassland and establish small scale industries for wool and hide/skin processing.

(3) Technical Assistance on Livestock by Foreign Donors

Since April 2008, UNDP didn't implement livestock-specified projects in Karakalpakstan. Since 1998, microfinance project has been implemented in the four districts, which involves the Study Area, in order to improve living standard by raising sheep/goat and cattle. According to UNDP Nukus Office, 30 to 35 % of the credit released to beneficiaries was used to purchase livestock.

2.7 Fisheries

2.7.1 Fisheries in Uzbekistan and Karakalpakstan

Until 1960's, fishery activity in Uzbekistan was performed exclusively as capture fishery in the Aral Sea, producing an average of 15,000 tons annually. Synchronizing to the Aral Sea shrinkage, fishery

productions were drastically decreased and its last fishery production was recorded in 1983 with the amount of 53 tons.

Preceding this alteration in the Aral Sea, Uzbekistan corresponded to find new sources of fishery production. About capture production, alternative water bodies, lakes and reservoirs, were implemented as new fisheries area. Besides, aquaculture was treated as new source of production. Strong effort was invested to enhance aquaculture activity and about 20 aquaculture farms were established during 1960-70's resulting in 18,000 to 23,000 tons of production in annual average during 1970-80s. Moreover, the annual fish consumption in Uzbekistan was marked 10-12 kg per capita with the capture production of 7-8 tons and imported fish from the Soviet Union.

Karakalpakstan played as the most important role in fishery activity in Uzbekistan until 1970's by the Aral Sea presence. Muynak Fish Industrial Association produced over 20,000 tons of fish between 1949 and 1964, producing also processed fish, smoke, freeze and canned fish to export to other Soviet Union states. Then, through the decrease of production in the Aral Sea, capture fishery was shifted to the other lakes and reservoirs around the Aral Sea basin and Amudarya River.

After the agriculture reform operation in 2003, which have applied to fishery activity, government of Karakalpakstan started to lease water bodies to fishing enterprises and *fermers* in term of ten years aiming to practice capture fishing with their permission.

2.7.2 Fisheries Production

After the dissolution of the Soviet Union, fishery activity was spoiled by economical difficulty. Then the fishery production decreased. However slight recovery of production can be observed in recent years, showing 7,200 tons of total production which consisted of 3,400 tons in capture and 3,800 tons in culture in 2006, as shown in the table below. During the period of reduction, decrease of culture production was more remarkable than capture, as being reduced its proportions in the total production of three forth in 1990 to almost half in 2006. Annual fish consumption also has decreased to less than 1kg per capita.

Table 2.7.1 Fishery Production in Uzbekistan (in thousand ton)

	1980	1990	2000	2001	2002	2003	2004	2005	2006
Culture	11.5	20.4	5.3	5.4	5.2	3.3	2.4	3.2	3.8
Capture	5.2	6.1	3.4	3.4	2.6	2.1	1.9	2.9	3.4
Total	**16.7**	**26.5**	**8.7**	**8.8**	**7.8**	**5.4**	**4.3**	**6.1**	**7.2**

Source: Karimov. *et al*., 2008

(1) Capture Fishing

Today, the fishery production in Uzbekistan has been practiced by private company and fishery *fermers*. Main fish species belongs to the family of *Cyprinidae*, such as common carp (*Cyprinus carpio*), crusian carp (*Carassius auratus*) and Roach (*Rutilus rutilus*) in the capture production and common carp, silver carp (*Hypophthalmichthus molitrix*) and crusian carp in the culture production. Fish culture has being practiced exclusively by pond culture system. The culture system is extensive, utilizing quite large size ponds (10-50 ha for fingerlings and over 100 ha for grow-out) and in general the productivity is 1-2 ton/ha in a total area of 10,200 ha.

(2) Aquaculture

At present, 319 aquaculture farms are registered in Uzbekistan. However, 20 biggest farms, almost of which were established in the Soviet Union time, which still contribute for more than 90% of fishery production. These former governmental fish farms are located in favorable condition area of water supply. On the other hand, small fishery bodies, mainly *fermers*, only can use inadequate area where water supply is difficult and where is not also adequate for agriculture. So, they are obliged to practice a limited quantity production. One of the former State fish farms "Baliqchi" is the largest fish farm in Uzbekistan, and it produced approximately 2,000 tons of commercial fish in 2007. It is supposed that

this farm contributes to a quarter of the total fishery production and the half of culture production in Uzbekistan.

There are eight fish farms which possess hatchery to produce alevin by artificial reproduction in Uzbekistan. Basic information of three representative farms, Baliqchi Fish Farm, Khorezm Fish Production co. Ltd. and National State Nursery in Yangiyul is described in table 2.7.2 (page 2-58).

In Karakalpakstan, the total area of registered water bodies increased to 79,439 ha and the total production reached 802 tons in 2007. The main fish species are common carp and silver carp (including bighead carp), accounting around 60% of total production.

The Ministry of Agriculture and Water Resources of Karakalpakstan is planning to increase the fishery production thereafter, estimating 1,600 tons of capture production in 2011 and a total of 90,000 ha water bodies areas in the future.

In Karakalpakstan, aquaculture is not practiced at present, except by a few entrepreneur farmers with non-significant amount of production, resulting in no statistical number of culture productions. As a result, fishery activity is consisted by only capture fishing.

Table 2.7.3 Capture Production in Karakalpakstan 2007

District	Rented Area		Capture Production	
	(ha)	(%)	(t)	%
Kegeily	4,633	(5.8)	241.3	(30.1)
Kanlikul	241	(0.3)	0.0	(0.0)
Beruni	1,000	(1.3)	1.9	(0.2)
Amudarya	50	(0.1)	0.3	(0.0)
Ellikkala	3,697	(4.7)	4.9	(0.6)
Muynak	61,010	(76.8)	346.4	(43.1)
Kungrad	4,661	(5.9)	146.1	(18.2)
Turtkul	217	(0.3)	3.1	(0.4)
Karauzyak	644	(0.8)	21.6	(2.7)
Takhtakupyr	3,160	(4.0)	35.6	(4.4)
Khodjeyli	125	(0.2)	1.7	(0.2)
Total	**79,439**	**(100.0)**	**802.9**	**(100.0)**

Table 2.7.4 Fishery Production in Karakalpakstan in each Fish Species

Year	2003		2004		2005		2006		2007		**Total**	
	(ton)	(%)	(ton)	(%)	(ton)	(%)	(ton)	(%)	(ton)	(%)	(ton)	(%)
Common Carp	29.2	(22.2)	86.6	(26.3)	204.0	(45.9)	237.2	(39.2)	234.2	(29.2)	791.2	(34.2)
Roach	8.4	(6.4)	2.3	(0.7)	14.6	(3.3)	46.8	(7.7)	44.8	(5.6)	116.9	(5.1)
Crusian Carp	3.3	(2.5)	6.8	(2.1)	8.3	(1.9)	33.1	(5.5)	24.5	(3.1)	76.0	(3.3)
Silver Carp	13.3	(10.1)	100.2	(30.4)	115.0	(25.9)	112.7	(18.6)	282.4	(35.2)	623.6	(27.0)
Grass Carp	8.0	(6.0)	16.9	(5.1)	12.3	(2.8)	12.1	(2.0)	11.9	(1.5)	61.0	(2.6)
Sneak head	35.3	(26.8)	105.0	(31.9)	53.2	(12.0)	50.2	(8.3)	34.1	(4.3)	277.8	(12.0)
Catfish	1.7	(1.3)	1.4	(0.4)	0.4	(0.1)	0.4	(0.1)	0.6	(0.1)	4.5	(0.2)
Bream	14.0	(10.6)	1.9	(0.6)	2.4	(0.5)	7.3	(1.2)	64.3	(8.0)	89.9	(3.9)
Pike Parch	18.5	(14.0)	8.1	(2.5)	34.2	(7.7)	105.7	(17.5)	106.1	(13.2)	272.5	(11.8)
Total	**131.6**	**(100.0)**	329.2	(100.0)	444.3	(100.0)	605.4	(100.0)	802.9	(100.0)	2313.4	(100.0)

Source: Department of Animal Husbandry, MAWR of Karakalpakstan

(3) Environmental Issues

Research on dioxins and PCB content in foods produced and consumed in Karakalpakstan (Muntean, *et al.*, 2003)[13] reported high level of PCB contamination in fish on lipid level. However, contribution of fish as origin of dioxin and dioxin-like PCB took by the people in Karakalpakstan is not particularly high compared with other animal products.

Environmental issue, which represents as persistent organic pollutants in Karakalpakstan, should be treated by overall sectors to find out its solution. Pollutants took from foods by human should be well-concerned also in fishery sector considering its safety as food. On the other hand, consideration on the status of fish as origin of dioxins intake and importance of fishery activity in the study area, it is suggested that planning of improvement of fishery activity plenty contributes to regional development in the study area and its reasonableness is not negative, though is needed a careful consideration.

[13] * Muntean, *et.al*. Assessment of dietary exposure to some persistent organic pollutants in the Republic of Karakalpakstan of Uzbekistan. Environmental Health Perspectives, Vol. 111, No10, 2003, pp. 1306-1311.

2.7.3 Fishery Supporting System

Ministry of Agriculture and Water Resources is the prime organization of the fishery administrative structure in Uzbekistan. National State Nursery in Yangiyul is the only one State farm. Therefore besides alevin production and distribution activity, this farm has the task to research and promote the fishery development. In April 2008 a lecture room for training was built in it. However there is no plan for training at the moment due to the lack of economical and human resources.

In Karakalpakstan, regarding to fishery extension, Fishery Association should be in charge of it by dispatching information and offering technical / administrative support. However there is no concrete achievement. For aquaculture, there is no commercial production and no research and extension activity have been realized except in some occasional advice by MAWR staff.

2.8 Irrigation and Drainage

2.8.1 Irrigation in Uzbekistan

Irrigated agriculture is the backbone of the Uzbek economy. Especially in the rural areas, irrigated agriculture and the processing of agricultural products is the main source of employment and income for the population. The most important crops are cotton, wheat, potato, vegetables and fodder crops. Agricultural land of Uzbekistan occupies 22.3 million ha among 44.4 million ha of the country territory, from which 4,042,000 ha is arable. 97% of agricultural crops are grown in irrigated areas. Irrigation is considered vital under the prevailing arid climatic conditions.

The development of modern and large scale irrigation network has started at the early 20th century. The oldest canal was constructed in 1912 from the Surkhandarya River. Large scale construction work for irrigation of the Fergana valley was carried out in the 1940's. At the same time, the Tashsaka and Suwenli canals in the lower Amudarya basin were started. The extensive development of virgin lands had been pressed forward from 1960's to 1985-86. As a result of the efforts, the area of irrigated land was increased from 2.57 million ha in 1960 to more than 4.2 million ha by themed 1980's.

The area of irrigated land in use is 3,699,000 ha in 2007, while irrigated area is in the level of 4.2 million ha, and it remains unchanged or showed small increase in the recent years.

Table 2.8.1 Area of Irrigated Land in Use of Uzbekistan

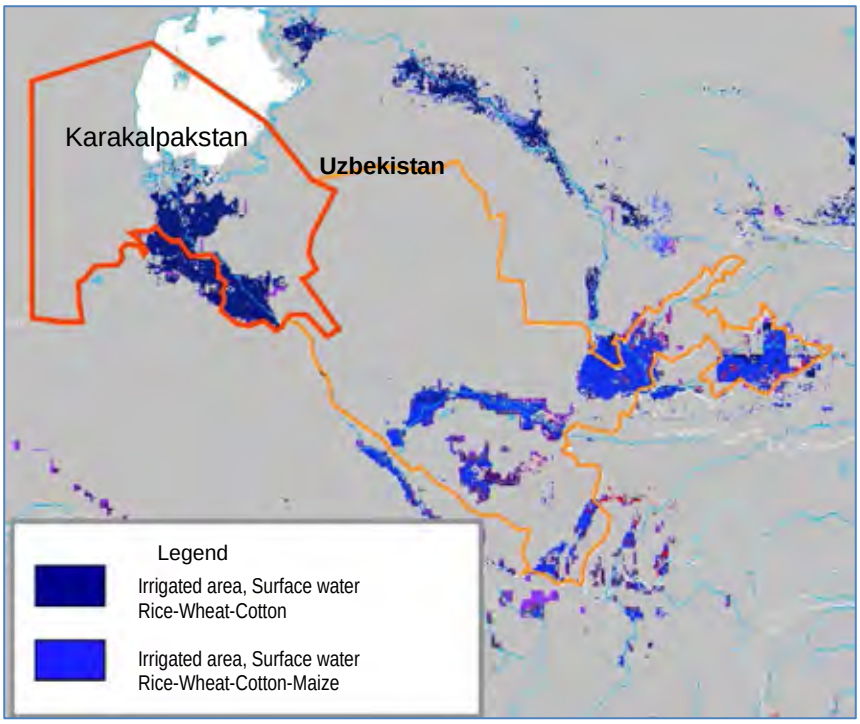
Unit: 1000ha

Year	2004	2005	2006	2007
Irrigated Land in Use	3,689.4	3,687.5	3,691.2	3,698.7

Source: Annual Statistics of Uzbekistan 2007, UZSTAT

The major area of irrigated land on Uzbekistan is distributed in the north-west part included in Karakalpakstan, the east to south part which composes of Tashkent, Samarkand, Kashkadarya and Fergana valleys. According to the Satellite Sensor Based Global Irrigated Area Map of IWMI, the irrigated area of Uzbekistan is distributed as shown in the figure below.

Irrigation is the largest user of water resources, which requires an average 57 km^3 of water annually and accounts 84% of the total utilized volume. The irrational and inefficient use of water is the main factors restricting the development of irrigated agriculture in Uzbekistan. The main reason for the low efficiency is the significant loss through infiltration from the main and inter-farm canals, internal irrigation networks, and directly from irrigation application in the field.



Source: Global Irrigated Area Map (GIAM 10km - 28 Class), IWMI

Fig. 2.8.1 Irrigated Area of Uzbekistan

2.8.2 Irrigation and Drainage in Karakalpakstan

The irrigation area of Karakalpakstan is served by 6 irrigation systems operated by the Government, i.e., the Pakhtaarna-Nayman, the Mangit-Nazarkhan, the Kattagar-Bozataw, the Kizketken-Kegeyli, the Kuwanishjarama and the Suwenli Irrigation Systems. All irrigation systems rely on their water source to the river course and dams along the Amudarya River. The Pakhtaarna-Nayman Irrigation System, which covers Turtkul, Ellikkala, and Beruni District, takes water conveyed by the Right Bank Main Canal from the Tuyamuyun Dam and from the Amudarya River directly by pumps. The Mangit-Nararkhan Irrigation System gives service to Amudarya District through the Gurlen Branch Canal and pump stations along the Amudarya River. The Kattagar-Bozataw, the Kizketken-Kegeyli and the Kuwanishjarama Irrigation Systems serve the districts of the right bank of the Amudarya River, i.e., Nukus, Kegeily, Chimbay, Karauzyak and Takhtakupyr Districts. These systems take water through the Kizketken and Anasai Main Canals which is located upstream of the Takhiatash Dam. The Kuwnishjarma and Kegeily Canals also compose the main canal system in this area. The Suwenli Irrigation System gives services to the left bank area of the Amudarya River, i.e., Khodjeyli, Shumanay, Kanlikul, Kungrad and Muynak Districts through the Suwenli and Parallel Main Canals.

The large scale development of irrigation system in Karakalpakstan started in beginning of 20th century. The construction of the Kizketken Canal started in 1926, which was the first large scale development of irrigation system in Karakalpakstan, and the first part of the Suwenli Canal started its construction in 1940. After the completion of Kegeily and Kuwanishjarma Canals at the beginning of 1960's and after the completion of the Tuyamuyun and the Takhiatash Dams at the middle of 1970's, the irrigation system of Karakalpakstan was being completed as the current system. At present, the irrigation system in Karakalpakstan covers approximately 500,000 ha (even though the actual use of irrigation land dropped significantly due to the lack of water resources) with approximately 3,500 km length of main and inter-farm canal networks. These systems serve 129 Water Users Associations (WUAs) and 8,873 farmers.

Table 2.8.2 Main Figures of Irrigation System of Karakalpakstan

Name of Irrigation System	Irrigation Land. (1000ha)	Design Capacity of Main Canal (m^3/s)	Length of Main & Inter-farm Canals (km)	Number of Main & Inter-farm Canals
Pakhtaarna-Nayman	98.9	350	982	634
Mangit-Nazarkhan	39.6	60	290	298
Kattagar-Bozataw	47.3	342	368	145
Kizketken-Kegeyli	88.1	160	464	227
Kuwanishjarma	73.9	200	339	148
Suwenli	152.2	310	1,056	426
Total of Karakalpakstan:	500.2	-	3,499	1,878

Source: LABM

2.8.3 Irrigation Area of Karakalpakstan

In the statistic data of Karakalpakstan, "irrigation area" is defined as the area where irrigation system has been developed and it does not mean that those areas are cropped and irrigated actually. Among the 500,000 ha of irrigation area of Karakalpakstan, only 252,848 ha was irrigated and cropped in 2006, which is equivalent to 50.5% of total irrigation area. The complicated issues of lack of agricultural machinery which was used in the Soviet-era, aging and malfunctioning of canal systems, reduction of productivity caused by salinization, etc. were pointed as reasons of the low ratio of land usage. However, the limitation of water resources is considered as the major restriction.

Basically, irrigation is indispensable to cultivate any crop in Karakalpakstan, so that irrigated crop and cultivated crop are synonymy there. The major irrigated crop was cotton, which occupied 38% of the irrigated (cropped) area in 2006. Rice was the next, cultivated in approximately 23,000 ha and occupied 8% of the cultivated area in that year.

2.8.4 Management of Irrigation and Drainage System

The Basin Management is the organization responsible for the basin water resources management, including operation of irrigation systems, which is set under the Main Administration of Water Resources of MAWR of Uzbekistan. There are 10 Basin Managements in Uzbekistan and the Lower Amudarya Basin Management (LABM) covers the territory of Karakalpakstan and Khorezm regions, which locates at the lower reaches of the Amudarya River Basin after the Tuyamuyun Reservoir. The number of staffs belonging to LABM is approximately 1,625 through the Republic of Karakalpakstan.

Under the LABM, 6 Irrigation System Departments (ISDs) are set to operate and maintain the irrigation systems among the territory. The Study Area is covered by Kattagar-Bozataw, Kitketken-Kegeili, Kuwanishjarma, Suwenli and a part of Pakhtaarna-Nayman ISD.

Table 2.8.3 Irrigation System Department under the LABM

Territory of Karakalpakstan		Territory of Khorezm Region
Name of ISD	Covered District	
Pakhtaarna – Nayman	**Beruni**, Ellikkala, Turtkul	Shobot – Rulovot ISD
Kattagar – Bozataw	**Nukus**, **Kegeily**	Toshsoka ISD
Mangit – Nazarkhan	Amudarya	Polvon – Gasovat ISD
Kizketken – Kegeily	**Kegeily**, **Chimbay**	Karamazi Kilichbay ISD
Suwenli	**Khodjeyli**, **Shumanay**, **Kanlikul**, **Kungrad**, **Muynak**	
Kuanishjarma	**Karauzyak**, **Takhtakupyr**	

In addition, LABM has another sub department of Aral Region Delta Administration which operates Takhiatash Hydropower. Also, there are organizations strongly related to LABM, i.e., Karakalpakstan Pumping Station Department for Energy and Communication (Karakalpakstan-UNSES), Beruni Pumping Station Department for Energy and Communication (Beruni UNSES) and Karakalpakstan Hydro-melioration Expedition (Karakalpakstan-HME), and Administration of the Tuyamuyun Reservoir as a brother organization.

Under the administration of Basin Management, ISD is responsible to operate and maintain the main and inter-farm irrigation system and to supply irrigation water to WUA. ISD concludes contract with WUAs in its territory to supply irrigation water, while WUAs concludes contract with members. The water distribution plan is set as a limitation of water taking (so called “Limit”) based on the request from WUAs and the forecast of water resources. The Limit is decided on April 1st every year and it is revised on every 10 days based on the condition of water sources.

On the other hand, the irrigation and drainage system after the head of the territory of the Water Users Associations (WUAs), which had been the territory of the former *shirkat* in general, are the property of WUAs which have the responsibility to operate and maintain it by own budget.

2.8.5 On-going Irrigation and Drainage Projects in Karakalpakstan

(1) National Drainage Improvement Program (NDIP)

As the result of lack of an integrated and deliberated measure and realistic budgetary steps on the drainage improvement project as well as passive operation and maintenance activities in Uzbekistan, the underground water level is raised up and salt accumulation was expanded associated with rising up of the underground water level. As the result, more than half of the irrigated farm land is damaged by severe salt damage. Under this situation, the Government of Uzbekistan has instituted Decree No. 3932 with the purpose of fundamental improvement of collectors in the irrigation area on August 29, 2007 and implementation of NDIP has been decided.

NDIP intend to rehabilitate the function of collectors from 2008 to 2009 and Melioration Improvement Fund (MIF) has been established in order to implement the NDIP. Utilization of MIF is confined to the following purposes:

- Repairing, constructing, reconstructing project of Main (Inter Region), Inter District, Inter Farm Collector and Drainage well, Drainage pumping station, observation network as well as overhauling, renovation project of underground drainage network which are mentioned in NDIP
- Training of organizations concerning implementation of projects under NDIP and check drawing and specification and implementation of topographical survey to execute projects mentioned in NDIP
- Repayment mortgage including long term lease in order to renovate and modernize machinery for O&M of collectors which belongs to the State Enterprise for Melioration and Water Works and WUA
- Other projects including in NDIP

Concrete contents of projects mentioned in NDIP has been applied and approved following procedure:

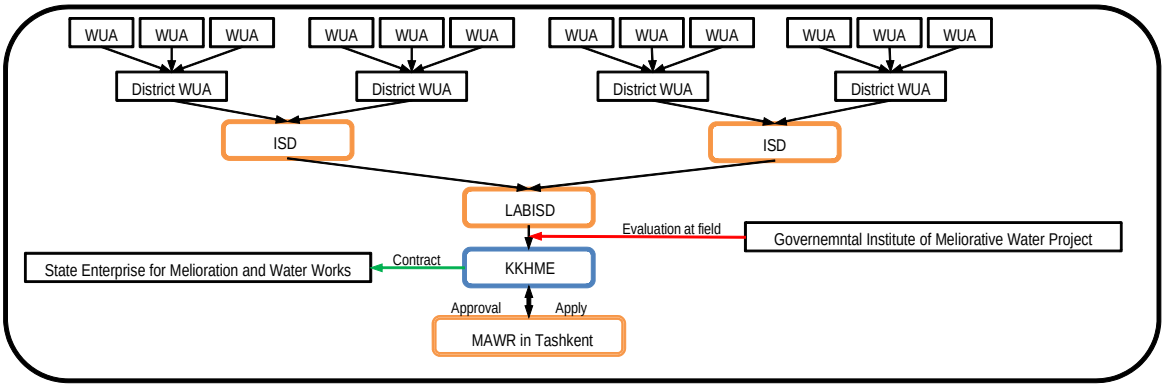


Fig. 2.8.2 Procedure to Decide Concrete Contents of NDIP

Contract and payment of projects under NDIP are managed by HME in Karakalpakstan.

The scale of operation on NDIP in Karakalpakstan are; 1) 498 km Inter District Collector, 2) 13,231 km Inter Farm Collector, 3) 1 km Underground Drainage and a total budget of 42,162 million sum.

Main, Inter District, Inter Farm irrigation canal were maintained by machinery of ISD until last year. In the case of collector, collectors were managed by machinery of HME. However, the Government of Uzbekistan resolved to establish "State Enterprise for Melioration and Water Works (SEMW) with the purpose of smooth implementation of NDIP as Decree No.03/02-1-27 on February 8, 2008 according to Decree No. 3932 which has been instituted with the purpose of fundamental improvement of collectors in the irrigation area on August 29, 2007. SEMWs were established around the nation on April, 2008 according to Decree No.03/02-1-27. Founder of SEMW in Karakalpakstan is LABM and four SEMWs were established (refer to following table).

Table 2.8.4 List of State Enterprise for Melioration and Water Works in Karakalpakstan

No.	Name of Enterprise	Location
1.	Ellikkala State Enterprise for Melioration and Water Works	Ellikkala District
2.	Amudarya State Enterprise for Melioration and Water Works	Amudarya District
3.	Khodjeyli State Enterprise for Melioration and Water Works	Khodjeyli District
4.	Kegeily State Enterprise for Melioration and Water Works	Kegeily District

Activities of SEMWs are set down as follows:

- Implementation of projects mentioned in NDIP
- Repairing, construction, reconstruction projects of major irrigation system managed by ISD as well as major irrigation canals managed by water management organizations including WUA
- Implementation of repairing, construction, reconstruction of water facilities concerning irrigation and collector project including governmental program on a contract base
- Acquisition of machinery and vehicles for canal maintenance by purchase and lease as well as development of own technology

SEMWs will get transfer several machinery for canal maintenance listed in Decree No.03/02-1-27 out of ISD and HME holding machinery. In addition, SEMWs will lent several number of machinery listed in Decree No.03/02-1-27 from Uzmeliomashleasing which is a governmental lease company. SEMWs have already started implementation of projects under NDIP using these machinery on a contract base. Several machinery that was leased or transferred until the end of 2008 are shown in following table, even though all machinery listed in Decree No.03/02-1-27 is not finished to transfer at this moment.

Table 2.8.5 List of Machinery on each Enterprise in Karakalpakstan

Name	Excavator	Bulldozer	Trailer	Plow	Crane	Lorry	Fuel Exporter	Tractor	Dray
Ellikkala	12	3	1	1	1	1	1	1	12
Amudarya	4	1	1	1	1		1	1	4
Khodjeyli	11	4	1	1	1	1	2	1	15
Kegeily	16	4	1	1	1		2	1	15
Total	43	12	4	4	4	2	6	4	46

Territories for four SEMWs established in Karakalpakstan is not limited, basically, SEMWs will carry out their tasks on a contract base. Therefore, they can be candidates of some mutual contract according to an explanation of Kegeily SEMW.

(2) Irrigation and Drainage Studies and Projects

The "Drainage, Irrigation and Wetlands Improvement Project" (DIWIP) in the South Karakalpakstan is being implemented by MAWR funded by World Bank loan and IDA credit. The Work of the DIWIP started in 2004 and was programmed to finish in early 2010. The project budget is about $75 million according to the DIWIP Briefing Note.

The DIWIP was 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 the South Karakalpakstan, which includes Turtkul, Beruni and Ellikkala districts.

The main objectives of the DIWIP are: 1) to increase irrigated agriculture productivity, employment, and incomes in Karakalpakstan, 2) to improve water quality in the Amudarya River through safe disposal of drainage flow and improvement of wetlands quality in the Amudarya delta and 3) to establish organizations for the improvement of water resources management, operation and maintenance of irrigation and drainage systems, as well as to develop a sustainable irrigated agriculture through integrated management.

The technical assistance to re-formulate the Water Users Associations was included within the project components of the DIWIP, as well as infrastructure development of the South Karakalpakstan Main Collector and Akcha Darya Main Drain and improves selected inter-farm collectors. As result of the technical assistance to MAWR, the WUAs in Beruni and Turtkul districts are re-formulated into association based mainly on the major canal from which they receive irrigation water, instead of the former *shirkat* territory which was established by mainly administrative viewpoint.

2.9 Agricultural Products Marketing and Processing

2.9.1 Marketing of Agricultural Products

(1) Market Transaction

Retail shops are the main transaction place for most commodities in Uzbekistan and have been scarcely developed particularly in rural area. According to the Statistical Review of the Republic of Uzbekistan, retail trade in entire Uzbekistan was 9,460 billion sum in 2007, where 67% of them are transacted at retail shops. The trade amount of agricultural and livestock products at farm products market, so called "*Dehkan* bazaar*[14]" are 3,810 billion sum, which accounted 40% of the total retail transaction in that time.

Table 2.9.1 Structure of Retail Trade in 2007

	By Trade Enterprises	Market			Total
			Farm Production (food)	Other Commodities	
Amount of Retail Transaction (unit)	3,108	6,356	3,810	2,546	9,464
Share (%)	32.8	67.2	40.3	26.9	100

Source: Statistical Review of the Republic of Uzbekistan 2008

In Karakalpakstan, most commodities that include food, beverage, daily necessity, electric appliances, and clothes are transacted in local bazaars. Retail shops can be observed even in Nukus city, except in small Kiosks, which sells non-fresh goods such as beverages and dried foods. The total volume of retail trade was estimated at 249 billion sum, and the transaction of food products accounted 53% of the total in 2007.

(2) Exportation of Vegetables and Fruits

Comparing with cotton and wheat, value chain of vegetables are not well developed. Peoples in the Karakalpakstan prefer fresh vegetables for their home consumption. In winter season, demand for pickles, such as tomatoes and cucumber, increases since retail price of fresh vegetables are higher than summer season. However, home made pickles are dominant in the Karakalpakstan, and vegetable

[14] *Dehkan* bazaar refers to public markets handling agricultural products (not a market exclusively for products of *dehkans*) located in major towns, and forming a part of the district central bazaar. Many people call the district central bazaar "*dehkan* bazaar", since they actually occupy major part of the district central bazaars.

processing factory is not well developed. Export of fresh vegetables is not common at present, due to its complicated procedures.

On the other hand, peoples prefer dried fruits in addition to fresh fruits. Most dried fruits are coming from Samarkand where production environment including irrigation water availability and climate condition are better than that of Karakalpakstan. The main target market of the dried fruits is domestic market, but there are some cases to export dried fruits since export of processed food is relatively easier than fresh fruits.

Export of fresh vegetables and fruits are basically not banned in Uzbekistan, but actually, is not easy work for farmers. There are two way to export; 1) export though Karakalpak Agro-Export, and 2) export directly. The Karakalpakstan Agro-Export is a state own company, and is only one company that authorized by Cabinet of Ministers as an export company in Karakalpakstan. This option is relatively easier than the latter, but the exporter must pay commission to the company. As for the latter, the exporter has to obtain export permission.

Since the Government of Uzbekistan put higher priority on filling domestic demand on fresh vegetables and fruits, firms and farmers who want to export must get export permission from the Cabinet of Ministries in Tashkent. The procedure to get the export permission of vegetables and fruits is not simple, and takes more than one month usually. The exporter must follow the following steps:

1) Get a list for the government price to check the minimum price of the products (C.I.P). All trading price must not be less than the control price. The Cabinet of Ministries issues the list monthly, and the list can be obtained at Import and Export Department (MFER) in Karakalpakstan. Also the government issues a price list for processing products that is valid for one year.
2) Identify foreign partners and make contracts with them after price negotiations.
3) Submit the contract document to a committee in the Cabinet of Ministries in Tashkent, to acquire the export permission from the Cabinet of Ministers, through Council of Ministers in Karakalpakstan. The procedures take 10 days usually and the permission is effective for only 30 days.
4) After getting approval, the exporter asks the importer to transmit money to their account, and get a remittance document, which will be submitted to the custom office. Then, the custom office issue a certification of custom clearance with charging 0.2% of commission.
5) In some case, the custom office request the exporter to show a certificate from sanitary or quarantine offices based on the quality of products.
6) Then, the farmer can export to the foreign trade partner.

However, since price fluctuation of vegetables and fruits in Uzbekistan is quite large, it is difficult for farmers to enter into contract with foreign partner with keeping eyes on future trend of the commodity prices. In addition, the followings are the obstacle of export for individual farmers.

- On the assumption, export of fresh vegetables/ fruits is possible only when domestic market is stable. Needless to say, first priority of the national government for agricultural trade is to fill domestic demand and stabilize the food prices. Therefore, it is inevitable risk for traders that they can not export if the domestic market does not maintain stable.
- Barter trade is practicing with neighboring countries. According to the regulation, the exporter must encash 50% of trade income at exchange rate of the central bank, whereas the rest 50% must be used to buy import goods, which are scares in the domestic markets. The regulation must be an additional burden to the exporters, especially to farmers.
- According to the Import ad Export Department of Ministry of Foreign Economic Relation, the Importer must pay 100% of contract amount as advance payment. Otherwise, the custom office issue a certification only for the paid amount, and the exporter can not export the whole amount. If the export can not get 100% of advance payment, the exporter has to submit a guarantee that the importer will pay the remaining after obtaining the products.

- Even though, trade of fresh vegetables and fruits require quick actions to keeping freshness and profit from market price fluctuation, the transaction in Uzbekistan enforcing lots of tasks to the exporters. Also, even though the government requests many tasks, they allow only 10 days to the exporters for shipment after getting the export permission. Individual farmers can not follow these necessary procedures, since they are too complicated and time consuming. As a result, individual farmers have to choice illegal trading with foreign partners. In this regard, the AF is an appropriate and useful body to take the burden for and on behalf of the farmers.

Rather, export of processing food relatively easier, but the farmer must follow the same steps of fresh vegetables and fruits, except 2) for following the control price.

2.9.2 Agro-firm

Agro-firms are composed by marketing private organization in Uzbekistan, that the main activities are collection, processing and marketing of vegetables and fruits that are produced by members of *fermers* and *dehkans*. The Government of Uzbekistan (MAWR) promotes Agro-firms establishment as a part of privatization policy in the agricultural sector. Since 2006, according to MAWR of Uzbekistan, 208 Agro-firms have been established to promote collective actions of vegetable and fruit growers of *fermers* and *dehkans*, which usually don't have enough production due to low bargaining power.

Agro-firms are established based on the presidential decree No.3709, "Deeping Measures on Economic Reform in Fruits, Vegetables and Grapes", dated on January 9, 2006. The standard rules to establish Agro-firms stipulated in the decree are as follows:

- Agro-firms are private organization, voluntary formed by farmers
- The organizational form of the Agro-firms can take any legal forms including joint company with foreign investors
- The relationship between Agro-firms and other factories is based on long-term contracts, that provides the rights and duties to both sides, including advanced payments that is not less than 30% of the delivered products by the farmers
- Newly established Agro-firms from dissolved *shirkat* are exempt from land tax for five years
- Newly established Agro-firms are exempt from income tax, land tax, property tax, value added tax (except value added tax from imported goods) and unified tax payment for three years

According to the law for "the rules on the establishment of Agro-firms in the sector of fruit and vegetable" (an attachment to the decree of the Cabinet Ministry of Uzbekistan dated on 10th March of 2006, No 42), the Agro-firms are considered as a legal entity whose main activities are processing and marketing of mainly fruits and vegetables. The law stipulates that the government organizations have no right to interfere in Agro-firms activities, which are carried out in accordance with the legislative documents. According to the law, the main tasks of the Agro-firms are as follows:

- Prepare, transport, store and process fruits and vegetables, as well as to sell to internal or external markets
- Introduce modern technologies of production and process
- Conduct market researches, as well as determine the preferential production volume of fruits and vegetables
- Creating appropriate technologies and cooperation systems
- Enlarge the export potentials and involving investors
- Provide job opportunities to citizens

There are 3 Agro-firms operating in Karakalpakstan and their activities are summarized in the following Table.

Table 2.9.2 Agro-firms in Karakalpakstan

District	Name of Agro-firm	Main Products	Contract with farmer members (2007)		
			Number	Amount (ton)	Contract Amount (million sum)
Turtkul	Turtkul Mirage	Pickled vegetables, Tomato paste, Fruits jam	7	110	10
Amudarya	Amumevasabzavat	Dry fruits (apple, grapes, and apricot)	8	80	8.5
Nukus	Taqirkol	Fresh vegetables and fruits	1	30	7

Source: Information Analysis Department, Council of Ministers of Karakalpakstan

2.9.3 Small and Micro Enterprises

Small and micro enterprises (SMEs) are the main player in Karakalpakstan economy. The number of enterprises in Karakalpakstan is 20,396 (January 1st, 2008) which around 90% is SMEs. According to the statistical review of the Uzbekistan, SMEs share in GDP was 56% in Karakalpakstan in 2007.

The following table shows the government's forecast for economic growth for the SMEs sector, including the increase of number of SMEs, work force and trade volume. According to the government forecast, the export volume will increase and the import volume will decrease, due to the further implementation of the export-oriented and the import-substitution policy in manufacturing sector.

Table 2.9.3 Numerical Target of Small and Micro Enterprises Development

Item	2005	2011	% Increase
Number of SMEs (number)	15,317	22,000	44%
Number of Employee in SMEs (people)	354,500	472,565	34%
Number of Job Places Newly Created (number)	18,546	21,295	15%
Export Value by SMEs (thousand US$)	7,364	28,214	284%
Import Value by SMEs (thousand US$)	19,444	7,482	-61%
Share of SMEs Output in GDP (%)	38.2	45.5	20%

Source: Explanatory note to the Draft Program on Social and Economic Development of the Republic of Karakalpakstan for 2007-2011.

Main constraints in developing small and micro enterprises are: 1) high interest rates of allotted credit, 2) delay of bank repayments, 3) differences of allocated distribution of credits across regions, 4) high requirements on mortgage guarantee and 5) less competitiveness of products and discrepancy of quality and packing to the world market. The government indicated the necessity to introduce modern technologies to produce competitive products to address those problems, in addition to improvement of financial conditions.

2.9.4 Trade and Service Sector

The trade and catering volume was estimated at around 164 billion sum in 2005, and the government forecasts that the volume will increase by 25% until 2011, according to the draft program on social and economic development for 2007-2011. The growth will be attained by development of modern trade network, which includes construction of 73 small retail structures and 535 customer service structures. The plan was formulated by taking into account of consumers' market condition, which includes increase in transaction volume and diversification of consumer services.

Table 2.9.4 Numerical Target of Trade and Service Sector Development

Item	2005	2011	% Increase
Trade and catering Volume (million sum)	163,947	210,743	29%
Paid Service Volume (million sum)	39,203	76,831/a	96%
Personal Service Volume (million sum)	3,164	8,967	184%
Volume of Export (thousand US$)	58,167	52,737	-9%/b

Source: Explanatory note to the Draft Program on Social and Economic Development of the Republic of Karakalpakstan for 2007-2011.
a/ figure at year 2010.
b/ volume of export will reduce because Karakalpak-Russian JV Gas Company stopped export from 2007 due to gas shortage in Khorezm market.

Cotton is the main export good of Karakalpakstan and held 86% of the total export volume in 2005. The total volume of export was US$ 58,170,000 in the same year. The main constrains on the export promotion were: 1) deterioration of current production facilities, 2) low quality of products and discrepancy to the world market's requirement, 3) high traffic rates of railway transportation, 4) insufficient market research, 5) lack of financial institutions and 6) high cost of raw materials (cotton fiber). To address these issues the following plans are proposed in the Karakalpakstan's development plan: a) utilize foreign direct investment (FDI) to export-oriented and import-substitute products, b) review the tariff rate of railway transportation and c) allocation of necessary amount of cotton fiber.

2.10 Rural Societies

2.10.1 Rural Society

Since the independence in 1991, one of the biggest changes in rural society has been the restoration of citizen's self-government bodies. This restoration has been characterized by a combination of revival of traditional citizen's self-government bodies, which had been suppressed in the Soviet-era, and addition of a new rule as administrative organizations. The policy of the government is called "*Mahallization*".

Mahalla is a form of "neighborhood self-governance" by elders, which traditionally widespread in Central Asia. *Mahallization* aims to reinforce *Mahalla* organizations of the residents, and put them on an official footing, as well as filling in the gaps in rural social security and community bonds which were opened up in the process of agrarian reform. The reform process broke up the kolkhoz system and moved on to the *shirkats* system, and then from *shirkats* to the promotion of *fermers* and *dehkans*.

Today's *Mahallas* are, in legal terms, community-based self-government bodies. Their position in the management of the nation is that of the lowest administration organization. The *Mahallas* form an efficient system to deliver social security to the residents, running small-scale community activities and projects, communicating new laws and decrees to the public and other tasks.

The current legal term for the *Mahalla* committees is called "Citizen Council". *Mahallas* are typical Uzbek communities, and the name "*Mahalla*" and the system itself did not traditionally exist in Karakalpakstan. Therefore, the *Mahalla* is a new form of administrative system in Karakalpakstan and the name differs slightly from other RU provinces. In urban areas they are called "*Makhan-kenes*" and the "village citizen council" in rural areas. (However, the new *Mahalla* system was based on citizen's governance system in the Soviet-era). Self-government bodies called *Bei*, which are similar to *Mahallas*, traditionally existed in Karakalpakstan. However, as the Kazakhs and Karakalpaks, the main ethnic groups in Karakalpakstan that were traditionally mainly nomadic herders, their traditional organizations emphasize tribe and kin groups, differing from those of Uzbeks, which have a long history of settled lifestyles.

Table 2.10.1 Number of Local Communities in the Study Area

City District	Number of *Makhan kenes*	Number of VCCs	Number of Villages
Kungrad	13	11	46
Muynak	5	6	21
Shumanay	4	6	125
Kanlikul	-	6	38
Kegeyli	8	9	151
Chimbay	11	11	138
Hodjeyli	18	9	112
Nukus	1	6	41
Karauzyak	-	6	105
Tahtakupir	1	8	41
Hodjeyli	18	9	112
Beruni	21	13	68
Total in the Study area	109	100	998
Amudarya	9	15	125
Turtkul	20	15	88
Ellikkala	7	13	84
Nukus city	44	-	-
Tahiatash city	10	-	-
Total in Karakalpustan	199	143	1,295

Source: Ministry of Statistic of Karakalpakstan

2.10.2 Ethnic Composition

Karakalpakstan is a multi-ethnic society, in which three main ethic groups, the Karakalpaks, Uzbeks and Kazakhs, account more than 90% of the population. Traditionally, Karakalpaks tend to live in the northern parts of Karakalpakstan and Uzbeks in the south, but intermarriage between ethnicities has been progressing through history. Now multiple ethnic groups coexist in the same community.

As an example that has been reported, 11 ethnicities live in one community[15]. As shown in the table below, the ethnic number varies between communities, but in contrast with other provinces in the RU, it is reasonable to say that Karakalpakstan has been building codependent relationships for a multiethnic society since the independence.

Table 2.10.2 Main Ethnic Group by Several Communities

District(community)	Main ethnic group %
Nukus (Bahtly)	70% Karakalpak
Nukus (Akmangit)	60% Karakapak
Kanlikul (Navruz)	55% Uzbek
Khojeli (4th *Makhan kenes*)	85% Kazak
Shumanai (Dostlil)	40% Turkmen
Beruni (Sabi Kubacv)	54% Uzbek

Source: The Study Team and Assessment of Community Needs and Technical Assistance Program, Karakalpakstan, 2004 Mercy Corp

In the second half of the 1950s, Uzbeks were approximately 65% of Karakalpakstan population, but by 2000, Karakalpaks had become the largest component of the population. On the other way, the Kazakhs and Uzbeks have being declining their shares. The long- running Aral Sea problems and the drought of 2000- 2001 have caused changes in the composition of the three main ethnic groups in the country. In 1999, the national composition was 33.0% Karakalpaks, 25.0% Kazakhs and 34.4% Uzbeks, but in 2003 the composition had shifted to 33.1% Karakalpaks, 23.8% Kazakhs and 31.8% Uzbeks. One factor behind this change is the migration of population to Kazakhstan and elsewhere to search jobs.

2.10.3 Gender Issues

Women accounted approximately 50% of the total population (795,500 persons) in Karakalpakstan in January 2007. Gender average life expectancies are five years longer for women than for men (64.3 for men and 69.3 for women).

According to statistical data, there was 28,000 job seekers in 2004, where 13,000 (46.3%) were women. 4,400 (74.6%) were women of the 6,000 registered unemployed. These figures indicate that it is harder to women find work than men.

Under the mandatory education system, there is no gender disparity in primary and secondary school enrolment. There is also no income-based disparity in educational opportunities. Even in rural areas literacy rates are very high, and there is no gender disparity in educational opportunity.

Women are traditionally active in Karakalpak society. The government gives consideration to women's activities, so officials for women's affairs are posted in district *Hakimiyat* and VCC. For example, the Jan Aba Zap VCC in Kegeily district has 12 members in board, administrative and revision committees, and three of those are women. The chair of the committee on women's issues is held by a woman.

The Business Women's Association (BWA), an NGO, previously only dealt with women activities, but it has extended its activities to cover men, out of concern for gender balance. However, in providing business startup support to men, it sets conditions such as requiring that women must be a majority of the workforce.

[15] Karakalpakstan: Assessment of Community Needs and Technical Assistance Programs, Mercy Corps 2004

2.11 Relevant Governmental Institutions and Organizations in Karakalpakstan

2.11.1 Government of Karakalpakstan

The Karakalpakstan has regional branches (in Karakalpakstan called ministry) of ministries of Uzbekistan Government (GOU) which are under the direction of Council of Minister of Karakalpakstan and Uzbekistan ministers. Among them, Council of Ministers, Ministry of Economy and Ministry of Agriculture and Water Resources are concerned ministries for the Study.

(1) Council of Ministers of Karakalpakstan (CM Karakalpakstan)

The Council of Ministers of Karakalpakstan represents the government of Karakalpakstan. The Council coordinates the ministries to the implement administration of Karakalpakstan headed by a chairman. There are tree deputy chairmen who are in charge of: 1) construction, communication and public utilities, 2) socio-economic affairs and 3) women's committee.

(2) Ministry of Economy (MOE Karakalpakstan)

Ministry of Economy of Karakalpakstan government is directly connected to the Ministry of Economy of the central government. The ministry in charge of economic affairs in Karakalpakstan includes the socio-economic development planning and monitoring of the region.

(3) Ministry of Agriculture and Water Resources (MAWR Karakalpakstan)

The Ministry of Agriculture and Water Resources of Karakalpakstan is in charge of agriculture and water resources administration in Karakalpakstan under the direction of central government ministry and Council of Ministers of Karakalpakstan. Also, the ministry coordinates the relevant departments of central ministry directly connected to the central government such as Lower Amudarya Basin Irrigation System Department, Forestry Department and Karakalpakstan Hydro Melioration Expedition, etc. The deputy minster(s), department of farmer, economy infrastructure, cotton, wheat, vegetable, livestock, mechanization, etc, are deployed under the Minister of MAWR of Karakalpakstan.

(4) Lower Amudarya Basin Management

1) Basin Management Organization

The Basin Management organization is responsible for the basin water resources management, including operation of irrigation systems, which is set under the Main Administration of Water Resources of MAWR of Uzbekistan. There are 10 Basin Management Organizations in Uzbekistan. The Lower Amudarya Basin Management (LABM) covers the territory of Karakalpakstan and Khorezm regions, which are the Amudarya river basin situated at the Tuyamuyun Reservoir downstream. The number of staffs belonging to LABM is approximately 1,600.

Under the LABM, 6 Irrigation System Departments (ISDs) are set to operate and maintain the irrigation systems among the territory. The Study Area is covered by Kattagar-Bozataw, Kitketken-Kegeili, Kuwanishjarma, Suwenli and a part of Pakhtaarna-Nayman ISDs.

In addition, LABM has another sub department for the Aral Region Delta Administration, which operates the Takhiatash Hydropower. Also, there are organizations strongly related to LABM, i.e., Karakalpakstan Pumping Station Department for Energy and Communication (Karakalpakstan - UNSES), Beruni Pumping Station Department for Energy and Communication (Beruni UNSES) and Karakalpakstan Hydro-melioration Expedition (Karakalpakstan-HME) and Administration of the Tuyamuyun Reservoir as a brother organization.

2) Irrigation System Department (ISD)

ISD is responsible to operate / maintain the main and inter-farm irrigation system and to supply irrigation water to WUA. ISD does contracts with WUAs in its territory to supply irrigation water, while WUAs do contract with their members. The water distribution plan is set to limit the water taking

(called “Limit”) based on the request from WUAs and the forecast of water resources. The Limit is decided on April 1st every year and it is revised every 10 days based on the condition of water sources.

2.11.2 Local Government

The local communities are administratively divided into *Hakimiyat* (district offices), VCCs, villages and streets.

(1) District Office (*Hakimiyat*)

The *Hakimiyat*, headed by *hakim*, administrates the district affairs at district level government. They administrate the government directly faced to the people in the district including land registration, cropping guidance / registration, basic education, local tax, etc. As the antenna of district office, village community councils are guided by the district office.

(2) Villagers Citizens Council (VCC)

The structure of local communities can be summarized as follows:

1) Village Citizens Councils (VCCs) 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 *Makhan-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 of support to poor households.

2.11.3 Other Relevant Institutions and Organizations

(1) Fermer’s Association (FA)

Fermer’s Association is a NPO covering all area of Uzbekistan established in 1991. A regional branch of FA, the Karakalpakstan FA, was established after that. FA provides legal / management consultation, agricultural technical extension and other services to the fermer members. Karakalpakstan FA distributes in all districts and municipalities of Karakalpakstan district offices that are called Fermer Service Center.

(2) Fishery Association

Fishery Association was established in 2006, composed by 50 fishery corporations and *fermers*. The Fishery Association cooperates to promote fishery activity in Karakalpakstan such as: 1) Get fishery information from fish farm about catchments 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 delivery of their demands to *Hakimiyats* and 5) Provide assistance in solving conflicts in the court.

2.12 Environmental Protection Systems

2.12.1 Legislative Framework

Environmental laws and legislation in Uzbekistan have shown rapid progress since its independence in 1991. The main pillar for environmental protection in Uzbekistan is the Law No. 754 - XII on Nature Protection, consisting of 11 sections and 53 articles. The law establishes the fundamentals to protect

the natural environment and usage of natural resources. The law has been promulgated in 9th December, 1992 with various amendments to match the current situations.

Other important laws concerning to environment are as follow:

- Law No. 657-XII on sanitary supervision (3 Jul. 1992)
- Law on water and water use (6 Mar. 1993)
- Law No. 353-I on the protection of atmospheric air (27 Dec. 1996)
- Law No.545-I on the protection and usage of the animal habitats (26 Dec. 1997)
- Law No. 543-I on protection and usage of vegetation (26 Dec. 1997)
- Law No. 770-1 on forest (15 Apr. 1999)
- Law on State Environmental Examination (25 May 2000)
- Law No. 269-II on protection and use of the objects of cultural heritage (20 Aug. 2001)
- Law on protection of natural territories (3 Dec. 2004)

Furthermore, the following decrees dictate the procedures to the state authority of environment and environmental examination procedures:

- Ministerial Decree No. 232-I validating the Regulation on the State Committee on Environmental Protection (26 Apr. 1996)
- Ministerial Decree No. 491 validating the Regulation on state environmental examination (31 Dec. 2001)

Basically, the legislative structure for environmental protection of Karakalpakstan resembles that of Uzbekistan.

2.12.2 Relevant Organizations

The State Committee for Nature Protection of Uzbekistan (SCNPU) is the center related to the legislative system for environmental issues in Uzbekistan. Under the supervision and technical support of SCNPU, the State Committee for Nature Protection of Karakalpakstan (SCNPKK) is responsible for the issues in Karakalpakstan.

(1) State Committee for Nature Protection of Uzbekistan

The main responsibilities of the SCNPU are:

- Manage the ecosystem, biological resources, sources of pollution on atmosphere / water resources / soil, flora, biological resources in aquatic ecosystems and protection of wild life.
- Execute environmental legislation and monitoring its implementation.
- Implement projects / programs for environmental protection and sustainable use of natural resources.
- Prepare state cadastre on land / water resources and flora / fauna.
- Analyze the usage of natural resources and state of pollution.
- Manage the water resources in terms of pollution.
- Inspect the land use in compliance with its registered purposes and implement measures for soil protection.
- Restore the land used for mining and excavation of construction material
- Conserve the forests, important natural landscapes and water resources required to preserve forests.
- Designate and conserve protected areas for nature conservation.
- Conserve and control the hunting resources
- Protect considerations for the use of natural resources other than stated above

The SCNPU consists of a Chairman and his deputies / assistants and 10 departments / directorates. These are:

- Department of Environmental Economics and Management with Environment Protection Funds Section
- Department of Scientific and Technological Progress and Popularization
- Directorate-General for State Environmental Review
- Directorate-General for the Atmospheric Air Protection and Waste Utilization
- Directorate-General for the Protection and Rational Use of Water Resources
- Directorate-General for the Protection and Rational Use of Land
- Department of Environmental Norms, Standardization, and Certification;
- Department of Environmental Legislation;
- Department of International Co-operation and Programs;
- Accounts and Economics Department.

(2) State Committee for Nature Protection of Karakalpakstan

The SCNPKK is as a legislative authority for environment protection under the Council of Ministers of Karakalpakstan. At the same time, it has strong juristic and technical ties with the SCNPU. It also functions as a territorial branch of the system for environmental protection in Uzbekistan.

The major responsibilities of SCNPKK are basically to conduct those of SCNPU at the level of Karakalpakstan. The SCNPKK consists of a Management department and 10 regional inspectorates / units, basically resembling that of SCNPU.

(3) Other Government Organizations

Other relevant organizations for environmental protection in Uzbekistan and Karakalpakstan include: Ministry of Public Health, Ministry of Internal Affaires, Ministry of Agriculture and Water Resources, Inspection of Industrial and Mining Safety, State Committee on Land Resources, Geology, Cartography, and State Cadastral Survey.

2.12.3 Environmental Examination

Environmental Examination procedures in Uzbekistan are defined by the Law on State Environmental Examination ("Environmental Examination Law", May 25th, 2000) and the Resolution of the Cabinet of Ministers of Uzbekistan on State Environmental Examination ("Resolution on Environmental Examination", December 31st, 2001). Requirements for Environmental Examination in Karakalpakstan are identical to that of Uzbekistan.

The Law on Environmental Examination states the following:

- Pre-project and project documentation with a special legal regime for the existing enterprises and other subjects, that are negatively impacting the environment and health of people;
- Prepare materials for a 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;
- Prepare documents to develop new types of techniques, technology, materials, substances and products;
- Prepare National programs, concepts, schemes to allocate and develop production forces, fields of economy and social sphere;
- Prepare documents for urban planning (city planning);
- Prepare normative-technical and directive-methodical documents (terms of references, standards, ecological norms, regulations and instructions) regulating economical and other activities related to use of natural resources.

Furthermore, facilities identified under the Law on Environmental Examination, which are relevant to agricultural activities, are categorized into the following:

Table 2.12.1 Categories for State Environmental Examination (items related to agriculture)

Category	Development Activities
Category I: High risk to environment	Reservoirs with capacity more than 200 million m^3. Sewage treatment facilities with capacities more than 280,000 m^3/day. Major water ways with capacity more than 150m^3/s and drainage pipes with the designed capacity more than 50m^3/s. Waste incineration plants, Dams of category I and II, Groundwater seepage facilities. Commercial activities utilizing heap leaching technology. Commercial activities using bio-technology. Tobacco manufacturing. Textile factories
Category II: Moderate risk to environment	Groundwater intakes of inter-regional value. Major canals of inter-regional value. Reservoirs with the capacity up to 200 million m^3. Food and additive factories. Major water ways with the capacity of 100 - 150m^3/s and drainage pipes with the designed capacity of 20 - 50m^3/s. Flour mills. Land development for areas more than 100 ha. Weirs under category III and IV. Enterprises of alcoholic and non-alcoholic beverages. Raw cotton processing industries. Cotton spinning / weaving factories with dying / bleaching facilities. Poultry processing industries. Improvement of farm / irrigation land with areas more than 1,000ha. Cotton processing industries.
Category III: Low risk to environment	Auto-service points and motor parks. Groundwater intakes of regional value. Major canals of regional value. Village gas distribution network. Livestock complex. Cereal storage. Livestock industry. Sewage treatment facilities with capacities under 50,000 m^3/day. Homestead wine production and brewing. Homestead leather processing. Major water ways with capacity less than 100m^3/s and drainage pipes with the designed capacity less than 20m^3/s. Meat industry (slaughtering / processing). Land development for the area up to 100ha. Wool processing industry. Cotton fiber industry. Processing and canning of agricultural production. Restaurants / cafes with 50 seats or more. Mixed forage production. Cotton spinning / weaving factories without dying / bleaching facilities. Poultry farms. Improvement of farm / irrigation land with the area of 100 - 1,000ha. Fisheries and fish processing. Bazaars with 50 tenants or more. Hog farms Greenhouses with boilers. Sweet factories. Cotton distribution centers. Bakeries. Refrigerators with capacity more than 50 m^3. Tea weighing factories.
Category IV: Local risk to environment	Water pipelines of internal importance. Veterinary clinics. Maintenance of vehicles and tire repair. Garages and parking lots of enterprises and organizations, as well as public use. Homestead weaving / sowing factories. Small-scale flour mills. Small-scale fish smoking industries. Land development of internal farmlands. Restaurants / cafes with less than 50 seats. Storage for silkworm cocoons. Bazaars with less than 50 tenants. Improvement of farm / irrigation land with the area less than 100ha. Storage of agricultural products. Construction / repair of internal water facilities. Greenhouses excluding those of private cultivation (without boilers). Bakeries and bread / macaroni production. Sweets factories. Livestock farming (large animals, horses, sheep).

Table 2.4.1 Number of *Fermer*s in Karakalpakstan

No.	District	Cotton & Grain	Vegetables & Gourds	Fruits & Viticulture	Livestock	Others	Total
<December, 2007>							
1	Amudarya	547	33	0	34	20	**634**
2	Beruni	650	250	4	241	39	**1,184**
3	Kanlikul	500	16	0	19	1	**536**
4	Karauzyak	598	24	1	23	1	**647**
5	Kegeily	301	63	51	73	1	**489**
6	Kungrad	537	17	45	36	1	**636**
7	Muynak	29	4	0	3	0	**36**
8	Nukus	366	683	0	26	5	**1,080**
9	Takhtakupyr	364	3	0	8	0	**375**
10	Turtkul	762	173	1	55	19	**1,010**
11	Khodjeyli	529	86	13	98	4	**730**
12	Chimbay	713	58	2	68	3	**844**
13	Shumanay	276	4	7	24	1	**312**
14	Ellikkali	760	194	4	73	18	**1,049**
15	City of Nukus	0	0	0	1	0	**1**
16	City of Takhiatash	0	1	0	2	0	**3**
Total		**6,932**	**1,609**	**128**	**784**	**113**	**9,566**
<November, 2009>							
1	Amudarya	261	5	40	33	20	**359**
2	Beruni	260	0	60	89	53	**462**
3	Kanlikul	160	5	11	17	8	**201**
4	Karauzyak	336	4	7	22	3	**372**
5	Kegeily	172	4	29	45	4	**254**
6	Kungrad	208	3	9	33	1	**254**
7	Muynak	18	1	1	7	0	**27**
8	Nukus	221	330	50	23	11	**635**
9	Takhtakupyr	161	3	1	9	0	**174**
10	Turtkul	295	10	197	78	34	**614**
11	Khodjeyli	267	9	55	60	19	**410**
12	Chimbay	337	25	28	50	5	**445**
13	Shumanay	115	9	2	24	9	**159**
14	Ellikkali	341	15	140	52	56	**604**
15	City of Nukus	0	0	0	0	0	**0**
16	City of Takhiatash	0	0	0	0	0	**0**
Total		**3,152**	**423**	**630**	**542**	**223**	**4,970**
Difference from 2007		-3,780	-1,186	502	-242	110	**-4,596**
<January, 2010>							
1	Amudarya	262	2	19	36	1	**320**
2	Beruni	264	0	33	43	10	**350**
3	Kanlikul	139	3	8	11	5	**166**
4	Karauzyak	293	4	6	23	3	**329**
5	Kegeily	162	3	24	39	3	**231**
6	Kungrad	185	1	5	28	1	**220**
7	Muynak	18	1	1	7	0	**27**
8	Nukus	183	172	64	21	6	**446**
9	Takhtakupyr	106	1	1	4	0	**112**
10	Turtkul	260	1	63	64	8	**396**
11	Khodjeyli	239	8	30	40	12	**329**
12	Chimbay	305	17	19	40	4	**385**
13	Shumanay	103	0	3	15	10	**131**
14	Ellikkali	312	0	33	46	46	**437**
15	City of Nukus	0	0	0	0	0	**0**
16	City of Takhiatash	0	0	0	0	0	**0**
Total		**2,831**	**213**	**309**	**417**	**109**	**3,879**
Difference from 2009		-321	-210	-321	-125	-114	**-1,091**
Difference from 2007		-4,101	-1,396	181	-367	-4	**-5,687**

Source: Fermer Assocition of Karakalpakstan and MAWR

Table 2.4.5 Draft Program on Social and National Economic Development in Karakalpakstan for 2007-2011

Sector	Development Program
Agriculture	Agricultural production is programmed to be increased by solving the challenges below: • Re-establish cropping systems, soil improvement and other farming techniques; • Develop varieties suitable for the region, such as cotton, rice and wheat by the scientific institutions. • Redevelop waste farm land; • Eliminate insects by agricultural, biological and chemical methods; • Rehabilitate the 37km K-3 drainage canal, connecting the Devonkul and Daryalyk drainage canals; • Conclude a cooperative treaty between Uzbekistan and Turkmenistan, concerning the maintenance and management of drainage canals in Turkmenistan; • Reconstruct the irrigation canals and develop sprinklers; • Promote wheat production in regions where irrigation is possible in fall and spring as a means to prevent soil salinization; • Increase the production of melons and watermelons for market selling; • Promote fodder crop cultivation and production of alfalfa seeds for the world market; • Promote planting of mulberry seedlings along the water canals; • Cultivate fruit trees and beans to improve children's nutrition; • Encourage the planting of poplars, birches and other trees by individuals along water canals and around fields, to use as timber.
Consumer's Market	• Project on development of modern trade networks will be implemented in 2005-2010, in which 73 wholesale markets will be constructed and 535 consumer service centers opened; • Matters related to distribution, catering and other service businesses will be considered, to promote the expansion of service-sector markets.
Social Infrastructures	Foreign investment will be used to build new buildings, water supply networks, natural gas networks, in order to achieve the following goals: • Increase per-capita built area from 15.4m^2 to 15.8m^2; • Raise water supply diffusion rate from 71.8% to 72.4%; • Raise natural gas diffusion rate from 92.4% to 93.5%; • Water supply facilities must be refurbished and regional water supply systems improved to enhance access to safe drinking water.
Social System	• Promote small and medium businesses in the private sector to increase employment; • Raise the elementary school education rate from 65.5% to 72.7%; • Raise the elementary education (kindergarten) attendance rate from 16.1% to 19.2%.
Health Care	• Establish systems for primary medical care, public health and emergency treatment systems, with merit payment of medical expenses, and reinforce systems for modern special medical treatment; • Strengthen declarations concerning healthy living and reinforce disease prevention by improving supply of food / deficient minerals and through vaccination; • Improve the public health and disease control situation in all rural areas; • Expand medical treatment networks; • Build medical treatment insurance systems based on payment of medical costs.

Table 2.5.2 Production of Major Crops in Uzbekistan (1993, 1995 and 2000- 06)

Crops	Area	Unit	Year								
			1992	1995	2000	2001	2002	2003	2004	2005	2006
Cotton (lint)	Planted area	ha	1,666,680	1,492,800	1,444,500	1,452,000	1,421,000	1,392,700	1,456,250	1,472,330	1,472,330
	Production	ton	1,274,000	1,265,000	1,000,000	1,015,000	1,008,000	945,456	1,150,000	1,250,000	1,171,000
	Yield	ton/ha	0.76	0.85	0.69	0.70	0.71	0.68	0.79	0.85	0.80
Wheat	Planted area	ha	626,990	1,164,400	1,355,800	1,219,800	1,282,600	1,507,000	1,470,390	1,439,730	1,448,490
	Production	ton	964,000	2,347,000	3,532,000	3,689,800	4,967,400	5,436,800	5,377,510	5,927,800	5,996,305
	Yield	ton/ha	1.54	2.02	2.61	3.02	3.87	3.61	3.66	4.12	4.14
Rice (paddy)	Planted area	ha	182,020	165,900	131,800	39,500	64,400	121,000	66,110	52,480	60,660
	Production	ton	538,900	327,600	154,800	67,800	175,100	333,700	181,230	165,790	220,328
	Yield	ton/ha	2.96	1.97	1.17	1.72	2.72	2.76	2.74	3.16	3.63
Potato	Planted area	ha	42,930	45,900	52,200	50,800	48,900	49,200	52,140	49,810	52,590
	Production	ton	365,300	440,300	731,100	744,400	777,200	834,400	895,730	924,180	1,020,989
	Yield	ton/ha	8.51	9.59	14.01	14.65	15.89	16.96	17.18	18.55	19.41
Vegetables, melons & gourds	Planted area	ha	267,200	194,400	166,800	166,800	164,780	186,400	175,300	178,890	195,080
	Production	ton	4,380,700	3,200,300	3,096,500	3,242,600	3,415,070	3,882,800	3,908,499	4,133,029	5,000,739
	Yield	ton/ha	16.39	16.46	18.56	19.44	20.73	20.83	22.30	23.10	25.63
Fruits	Planted area	ha	144,570	142,350	133,950	138,900	145,970	139,420	136,574	151,982	164,001
	Production	ton	735,550	634,800	820,900	845,300	878,960	919,800	889,220	987,380	1,258,368
	Yield	ton/ha	5.09	4.46	6.13	6.09	6.02	6.60	6.51	6.50	7.67
Grapes	Planted area	ha	94,500	94,500	98,900	99,600	101,300	97,500	96,800	99,200	101,176
	Production	ton	439,100	620,900	624,200	573,100	516,400	401,530	589,110	641,610	803,545
	Yield	ton/ha	4.65	6.57	6.31	5.75	5.10	4.12	6.09	6.47	7.94

Source: FAO Statistics

Table 2.5.6 Government Price of Cotton and Wheat in 2008 (August 2008)

(1) Cotton

(sum/ton)

Industrial sorts of raw cotton	Class of raw cotton	Type/code of cotton staple								
		Long-staple					Medium staple			
		1a	1b	1	2	3	4	**5**		6
		43	42	41	40	39-38	37-36	**35**	34	33
I	1	766,780	700,930	668,000	588,020	531,570	476,860	470,420	464,300	458,660
	2	747,160	682,990	650,900	572,980	517,970	464,660	458,380	452,420	446,920
	3	597,870	546,520	520,840	458,490	414,470	371,820	366,790	362,020	357,620
II	**1**	700,900	640,700	610,600	537,500	458,900	435,890	**430,000**	424,410	419,250
	2	642,730	587,520	559,920	492,890	445,570	399,710	394,310	389,180	384,450
	3	590,860	540,110	514,740	453,110	409,610	367,460	362,490	357,780	353,430
III	1	613,990	561,250	534,890	470,850	425,650	381,840	376,680	371,780	367,260
	2	546,000	499,110	475,660	418,710	378,520	339,560	334,970	330,620	326,600
	3	386,200	353,030	336,440	296,160	267,730	240,180	236,930	233,850	231,010
IV	1	456,990	417,740	398,110	350,450	316,810	284,200	280,360	276,720	273,350
	2	354,660	324,190	308,960	271,980	245,870	220,560	217,580	214,750	212,140
	3	271,250	247,950	236,300	208,010	188,040	168,690	166,410	164,250	162,250
V	1	189,940	173,630	165,470	145,660	131,680	118,130	116,530	115,020	113,620

Source: Ministry of Finance, Uzbekistan

(2) Government Price of Wheat for 2008

Wheat Type	Grade	Gluten Test (%)	Purchase price (sum/ton)
Hard	1st grade	28 and more	277,270
	2nd grade	From 25 to 27	244,540
	3rd rate	From 22 to 24	222,480
	4th rate	From 18 to 21	169,000
Soft	1st grade	32 and more	230,820
	2nd grade	From 28 to 31	196,290
	3rd rate	**From 23 to 27**	**169,000**
	4th rate	From 18 to 22	151,170
Hard and soft	5th grade	Not limited	139,850

Source: Ministry of Finance, Uzbekistan

(3) Government Price of Coarse Grains for 2008

Grain	Grade	Purchase price (sum/ton)
Rye tritikaly variety	1st to 3rd grade	160,560
	4th grade	135,190
Oats	1st grade	236,400
	2nd grade	210,590
	3rd grade	165,590
	4th grade	132,590
Barley	For brewing	210,590
	1st grade	165,590
	2nd grade	132,590

Source: Ministry of Finance, Uzbekistan

Table 2.5.7 Standard Production Costs of Major Crops per Hectare

Crop	Worker Salary (sum)	Fuel (sum)	Seeds (sum)	Mineral Fertilizer (sum)	Manure (sum)	Equipment Services (sum)	Miscellaneous (sum)	Total Cost (sum)	Standard Yield (kg/ha)	Unit Cost (sum/kg)
Cotton	313,024	205,770	30,006	204,014	6,400	34,500	37,893	831,607	2,240	371
Wheat	115,563	131,100	101,200	187,524	3,200	68,000	34,276	640,863	2,700	237
Rice	147,121	329,276	110,000	302,412	3,200	62,500	55,393	1,009,902	3,000	337
Corn for grain	172,795	210,336	10,500	239,734	4,800	60,945	40,764	739,874	3,000	247
Sorghum	150,088	252,278	7,000	242,675	4,800	50,131	33,633	740,605	2,000	370
Millet	109,958	138,346	42,000	146,589	4,800	16,675	28,539	486,907	1,500	325
Sunflower	144,519	236,628	22,450	257,489	4,800	60,945	38,244	765,076	2,000	383
Tomato	385,260	246,644	48,000	192,110	4,800	22,000	34,270	933,084	20,000	47
Cucumber	168,272	196,564	18,000	119,980	4,800	34,000	32,070	573,686	12,000	48
Cabbage	200,416	229,742	4,875	146,589	4,800	16,675	28,539	631,636	18,000	35
Carrot	306,728	184,670	21,000	164,305	4,800	14,000	27,870	723,373	18,000	40
Potato	221,049	222,856	1,792,000	164,305	4,800	34,500	30,995	2,470,505	12,000	206
Beet	245,238	236,628	4,200	146,589	4,800	16,675	26,539	680,669	20,000	34
Melon, Watermelon	243,558	216,596	18,000	119,980	4,800	34,000	38,470	675,404	18,000	38
Gourds	213,589	222,230	18,000	119,980	4,800	34,000	32,070	644,669	20,000	32

Source: MAWR of Karakalpakstan

Table 2.5.15 Summary of Agricultural Credit Programs in Uzbekistan

Terms \ Kind of Credit	*Dehkan* & *Fermer* Fund	Newly Established Farmers Credit	Farming Activity Credit			Next Harvest Mortgage Credit	Cotton & Grain Credit (started from 2005)
			Production	Farm Operating	Investment		
Beneficiaries	Members of *Dehkan* and Fermer's Association	Registered farmers (within 6 months after the registration)	*Dehkans* & Femers			Farmers who produce crops for the government needs	Cotton & grain (wheat) growing farmers
Credit period	3 years	3 years	More than 2 years (can extend up to 30 months)	12 months	5 years	1.5 years	• Grain (wheat): 12 months • Cotton: 18 months
Interest (%/year)	1/3 of the commercial interest, but Max. 8% (6% in 2004)	1/6 of the commercial interest	1/2 of the commercial interest (9% in 2004)			Negotiable between banks and beneficiaries	3%
Limitation of credit amount	(Not mentioned)	300 times of the standardized minimum wage	80 % of the mortgage			(Not mentioned)	50% of the expected production value based on the present price
Target sector/crops	• Animal breeding • Poultry • Crops • Machinery • Chemical fertilizers • Pesticides & other chemicals	• Machinery and equipment • Starting inputs	• Agri-production	• Managing farm Business	• Long-term investment (Project)	• Farm machinery & equipment • Services for farming • Chemical fertilizers • Pesticides & other chemicals	• Farm machinery & equipment • Services for farming • Chemical fertilizers • Pesticides & other chemicals • Salary for employees • Insurance & leasing • Fuel & electricity • Land tax (5% of the credit can be used for others, as much as they are used for cotton & grain growing)
Mortgage	(Not mentioned)	(Not mentioned)	Mainly land (land mortgage system is introduced from 2004) If value of the land is less than the credit, beneficiaries can provide other property, e.g. insurance certificate to make up the balance.			Expected harvest (to be covered by crop insurance)	Expected harvest
Other conditions	Beneficiaries should have bank account	The interest should be paid back within 12 months, then the main debt should be paid back within 18 – 24 months	<Documents> • Application form • Business plan • Financial statements • Mortgage certificate • Guarantee certificate from the third person			<Documents> • Application form • Contract (selling the harvest for the government needs) • Business plan • Financial statements Credit is kept in a special account of beneficiary and it can be deducted only, upon a payment order of the beneficiary (Beneficiaries can not withdraw cash money) If value of the harvest is less than the credit, the banks can forfeit beneficiaries' property "Association of Farm Products for Government Needs" also can provide the credit	<Documents> • Application form • Contract (selling the harvest to the processing company) • Business plan • Financial statements Credit is kept in a special account of beneficiary and it can be deducted only, upon a payment order of the beneficiary (Beneficiaries can not withdraw cash money) The banks are fully responsible for default on beneficiaries' repayment

Source: "Legal and Financial Aspects of Private Farming", Tashkent University, 2005

Table 2.5.16 Summary of New Credit Program Targeting *Dehkans*

Terms	Condition	
Beneficiaries	Individual *Dehkans* and legal entities	
Credit period	• 2 years for buying seeds (for annual crops?) • 5 years for buying seedlings (for perennial crops?)	
Interest (%/year)	Not mentioned (7-14% at present)	
Limitation of credit amount	100 times of the standardized minimum wage	
Target sector/crops	Vegetables, potatoes, fruits, grapes and livestock	
Mortgage	Not mentioned	
Other conditions	<Documents>	• Application form • Business plan • Credit guarantee
	＜Warranty required	• Certificate of the property or securities • Warranty of bank or insurance company • Warranty of the third party
	Only 50% of the credit amount can be withdrawn in terms of cash. Remained 50% shall be transferred to the shops/companies who sold chemical fertilizers, agro-chemicals and veterinary medicines directly from the credit account	

Source: Regulation for Providing Credit Funds to *Dehkans* for Growing Vegetables, Potatoes, Fruits and Grapes in Private Backyards (Tamarka), January 30, 2008, Cotton Bank

Table 2.5.17 Summary of Agricultural Insurance

<Mandatory Insurance>

No	Mandatory (compulsory) Insurance	Insurance charge (% of the Secured value)
1	Insurance of advanced payment in agricultural production and repayment by future contracts	1.0
2	No description	?
3	Insurance of responsibility of transport owners	0.5 – 2.0
4	Insurance of mortgage (compulsory when get credit from banks)	0.25

<Free Insurance>

No	Free (voluntary) Insurance	Insurance charge (% of the Secured Value)
1	Insurance of crop harvest of agricultural enterprises in the result of natural disasters and pests & diseases	2.5 – 8.5
2	Insurance of unexpected expenses occurred in the result of replanting the result of natural disasters	8.0 – 10.0
3	Insurance of debt of agricultural animals in the result of natural disasters and infectious diseases	4.0 – 8.0
4	Insurance of the harvest of orchard and vine yard from natural disasters	8.0 – 12.0
5	Insurance of pastures and marvel trees of agricultural enterprises	2.0 – 3.0
6	Insurance of silk harvest	1.0 – 2.0
7	Insurance of leased machinery & tools of agricultural enterprises	0.5
8	Insurance of property of agricultural enterprises	0.5 – 4.0
9	Insurance of the business risk related to the preferential credit provided by the commercial banks to farmers for planting and production of cotton & wheat	0.75
10	Insurance of transportation of agricultural products	0.4 – 4.0
11	No description	?

Source: “Legal and Financial Aspects of Private Farming”, Tashkent University, 2005

Table 2.7.2 Basic Information of Fish Farms in Other Province of Uzbekistan

	Khorezm Fish Production co. Ltd.	National State Nursery in Yangiyul	Baliqchi Fish Farm
Establish	1974	1975	1969
Total Area		250 ha	3,000 ha
Number of Staff	93	30	420-450
Pond Area	1,500 ha 25 ponds for blood stock @12.5ha 220 ponds for fingerling @2-156ha 1,255 ponds for commercial @30-113ha	240 ha 100 ponds for blood stock @10ha 90 ponds for fingerling @6ha 50 ponds for commercial @2ha	2,500 ha
Number of Female Bloodstock	common carp 849 silver carp 792 bighead carp 34 grass carp 118	common carp 200 silver carp 300 grass carp 100	
Production of Larvae 2008	20.6 million common carp 7 million silver carp 11.6 million bighead carp 0.5 million grass carp 1.5 million	35 million common carp 20% silver carp 70% grass carp 10%	100 million common carp 30% silver carp 50% grass carp 20%
Distribution of Larvae 2008	None	15 million To 11 small farm (*fermers*) 450,000 sum/ 1 million.	50 million To 5 big farm (80%) and 15 small farm (20%)
Production of fingerling	4.6 ton @ 5-25g common carp 1.8 ton silver and bighead carp 2.4 ton grass carp 0.4 ton 5,000 sum/kg		(distribution) <u>To big farm</u> 330,000 common carp 350,000 silver carp 10,000 grass carp <u>To small farm</u> 140,000 common carp 160,000 silver carp
Production of Commercial fish 2007 (t)	561 ton common carp 140 ton silver carp 388 ton bighead carp 12 ton grass carp 21 ton		2,000 70% alive 30% frozen, dressed (sold mainly for governmental use, such as military food)
Commercial size and/or age Price	common carp 400g, 4,000 sum /kg silver carp 500g 1,200 sum /kg bighead carp 750g 1,800 sum /kg grass carp 700g 4,000 sum /kg	2 years 2,000 sum/kg	Approx. 600g, 2 years Alive fish 3,500 sum/kg Frozen fish 4-5,000 sum/kg
Remarks	200km far from Nukus	The only governmental fish farm in Uzbekistan	Largest fish farm in Uzbekistan

Source: Study Team

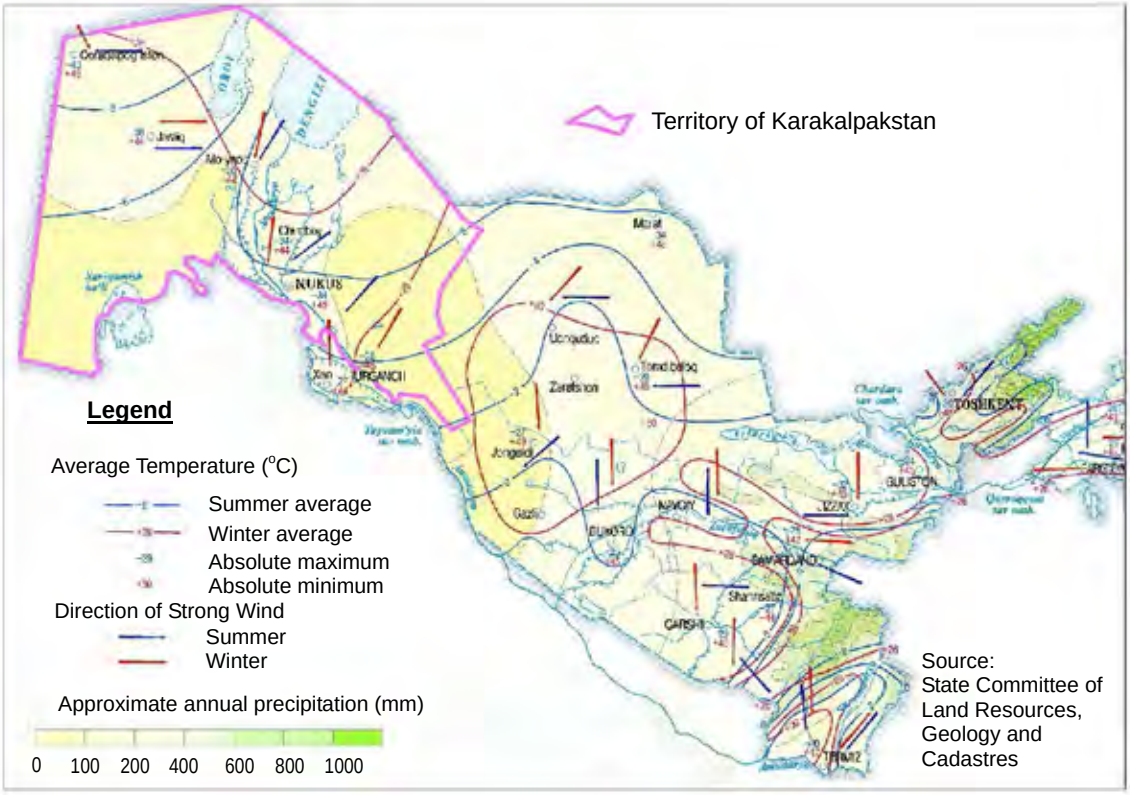


Fig. 2.2.1 Climatic Map of Uzbekistan

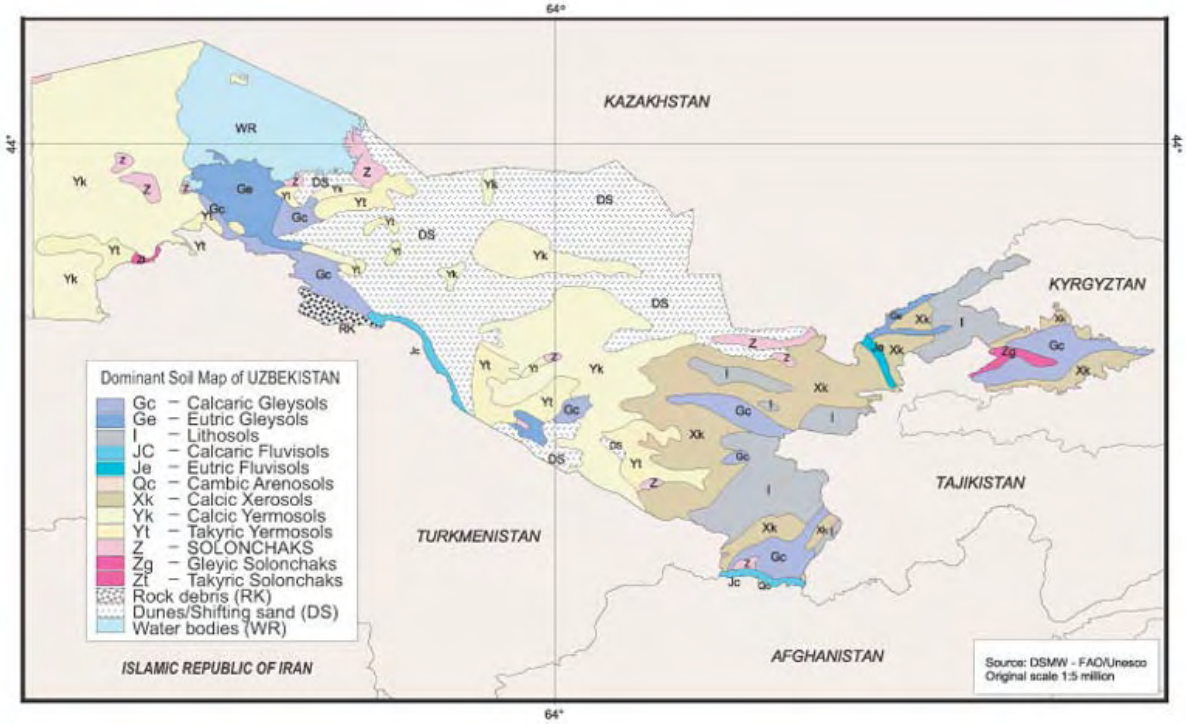


Fig. 2.2.2 Soil Map of Uzbekistan