Annex 5	Agriculture, Animal Husbandry and Marketing

ANNEX 5

AGRICULTURE, ANIMAL HUSBANDRY AND MARKETING

A5.1 Agriculture

The agricultural conditions of the four districts related to the Study Area are discussed in this section. Based on the agricultural conditions, the Study Area is divided into three regions as mentioned below:

1) Southern region of Gharasu River has good conditions for agriculture. Rainfall is about 700mm per year, and the agriculture is mainly irrigated. There is also rain-fed farming in this region, but farmers do not worry about irrigation, due to the rainfall that occurs at the base of the Elbourz Mountains. The soil is almost medium texture, except the priority site No.4, in Mehtar Kalate village, Kordkuy district, where it is heavy. The damage of salinity is less and therefore there are two to three harvests in a year. On the other hand, the farm scale in this area is very small, especially in Chahardhe and Yasagi villages where the scale is less than 1.0 ha. In this region, the main crops are paddy rice with vegetables during the summer, such as cabbage, squash, cotton, soybeans and fruit trees.
2) The zones of both banks of the Gorgan River have very good conditions for agriculture and high yield area, because the soil texture is silty loam and the groundwater level is low. The rainfall is about 400mm per year. The main crops are wheat, barley, cotton, etc.
3) The areas, which are away from the Gorgan River have the worse agricultural conditions and lower productivity. Especially, the northern region of the study area is not suitable for agriculture. The soil has high salinity and alkalization problem. The rainfall is low, about 250mm per year, and evaporation and temperature become very high during the summer. The farming scale is larger than that of other regions. The main crops are barley and rapeseed in rain-fed fields, and wheat, cotton, paddy rice and maize in irrigated fields. The water sources for irrigation are from the reservoirs, rivers and wells. The problems of farming are related to the poor drainage from January to April, salt damage and drying up of the Gorgan River from June to the end of September.

A5.1.1 Farm Households

In the Study Area, 90% of the population are Torkman, who has settled down from ancient time. Balchi and Sistani also live in this region, who moved to Golestan as laborer of harvesting cotton from Baluchistan and Sistan about 40 years ago. Besides, Mazandarani of Persian has been settled in Mehtar Kalate of Kordkuy district.

Most of the Balchi and Sistani became land owners after the land reforms of white revolution

and the Islamic revolution in 1979. Their farm scales are very small, 2 or 3 ha per farm, due to the high number of the laborers. The next table shows the number of farms of land owners, tenant farmers and laborers by district.

Number of farm Households in Each district in Golestan Province (2000-2001)

District	Number of Farms		
	Owner-farming	Tenant farming/Laborer	Sum
Aq Qala	12,938	1,518	14,456
Bandar-e-Torkaman	7,496	0	7,496
Kordkuy	7,104	3,838	10,942
Gorgan	14,648	7,410	22,058
Azad Shahr	4,817	15	4,832
Bandar Gaz	4,119	1,497	5,616
Ramyan	4,505	7,261	11,766
Ali Abad	7,345	10,166	17,511
Kalaleh	10,225	1,995	12,220
Gonbad	13,323	453	13,776
Minoodasht	9,092	3,030	12,122
Total	95,612	37,183	132,795

There are many farmers in the Study Area engaged in the agriculture sector with no lands. These farmers are divided into two types: the tenant farmer and the employer (laborer). In the case of tenant farmers, the whole farming activities are charged on the tenant farmer, and the tenant farmer gets one third of the products.

In the case of the laborer, the farmer is a daily laborer. Over 80% of the laborers are women, whose working hour is short (commonly six-hour per day) than that of the men (with eight-hours per day). In general, the farm works of women are light works, such as weeding, transplanting of paddy rice seedlings. However, in the cotton harvesting, women and men work together. In this case, there is no difference of wage between women and men. The wage of women is US$2.0 /day for light work, and that of men is US$6.0 to 7.0 /day for heavy work, such as harvesting of paddy rice.

It seems that the high rate of rural population in Golestan province, 46% in both of women and men, is caused by the existence of many small farms created by the land reforms after the revolution. In addition, the equalized inheritance of land by the Iranian law increases the number of small lands.

A5.1.2 Farm scale

(1) Golestan Province

The number of farms and cultivated area by class of farm scale are shown in the following table. The average of farm scale in the whole Golestan province is 6.7 ha.

Farm Scale in Golestan Province (1996, Census)

Classification of farm scale	Farmers		Cultivated Land	
	Number	%	ha	%
< 1 ha	4,408	5.2	2,438	0.4
1 ~ 2 ha	13,844	16.3	18,966	3.1
2 ~ 3 ha	13,686	16.1	31,791	5.3
3 ~ 5 ha	17,374	20.4	63,498	10.5
5 ~ 7 ha	11,297	13.3	65,671	10.9
7 ~ 10 ha	7,435	8.7	57,978	9.6
10 ~ 15 ha	8,188	9.6	96,268	16.0
15 ~ 20 ha	2,947	3.5	50,060	8.3
20 ~ 25 ha	1,962	2.3	43,434	7.2
25 ~ 30 ha	1,163	1.4	31,941	5.3
30 ~ 35 ha	845	1.0	27,218	4.5
35 ~ 50 ha	1,034	1.2	41,730	6.9
50 ~ 70 ha	498	0.6	29,069	4.8
70 ~ 100 ha	262	0.3	22,341	3.7
.> 100 ha	116	0.1	21,103	3.5
Total	85,059	100.0	603,505	100.0

Note: 1) Land of Dashly Boroon and border areas are not included.
2) Source: Golestan Jihad-Agriculture Organization

In Golestan province, the small scale farms (less than 10 ha) account for 80% of the whole number of farms, and the sum of the area of the small scale farms accounts for about 40% of the total area. The farm scale class with the largest number is between 3 to 5 ha, and that of the largest area of cultivated land is 10~15 ha. In the class of over 100 ha, there are 116 farms with 21,103 ha, including a farmer owning 1,000 ha. The average of the farm scale is 3.5 ha in Kordkuy, 5.9 ha in Gorgan, 6.5 ha in Minoodasht, 7.2 ha in Ali Abad, 7.4 ha in Gonbad and 11.9 ha in Bandar-e-Torkaman.

(2) Tazeh Abad Project Area

According to the cadastre of the project area, the gross cultivable area is 3,210 ha, and the irrigated area in winter and summer are 2,000 ha in 2001 and only 1,200 ha in 2002 because of water shortage for irrigation and construction of canals and drains of about 1,500 ha the unfinished part of construction in the project are.

The number of farm households by farming scale in the project area is shown in the following Table. The number of households is 102 (28% of total households) in 0 to 3 ha of farming scale class, 86 (24%) in 3 to 5 ha class, 122 (33%) in 5 to 10 ha class, 36 (10%) in 10 to 20 ha class, 16 (4%) in 20 to 50 ha class and 5 (1%) in over 50 ha class, respectively.

Number of Farm Households by Farm Scale Class
In Peivand RCO (Tazeh-abad, 2002)

Farm scale	Number of farm households
0 ~ 3 ha	102
3 ~ 5 ha	86
5 ~ 10 ha	122
10 ~ 20 ha	36
20 ~ 50 ha	16
> 50 ha	5
Sum	367

With regard to dispersion of a farmer's owned fields, the number of farmers by number of dispersing fields is 2 farmers, who each has fields of average 25.4 ha in 6 locations, 3 farmers of average 23.6 ha in each in 4 locations, 12 farmers of average 21 ha in 3 locations, 34 farmers of average 8.3 ha in 2 locations, respectively. There is no dispersion of owned land in the rest of 316 farmers, which are 86% of total number of farmers in the project area, as shown in the following Table. As the dispersion of farmer's owned field is found in the farmers of relatively larger farming scale, it is seemed that the influence on mechanization is low.

Number of Farm Households by Dispersion of
Farmers' owned Fields in Peivand RCO (Tazeh Abad, 2002)

Number of dispersing fields	Number of farm households	Average of owned land
6 locations	2	25.4
4 locations	3	23.6
3 locations	12	21.0
2 locations	34	8.3
1 location	316	7.1
Sum	367	6.9

The number of field plots by plot size class in Tazeh-abad is shown in the following Table. The percentage of farm plot size is 29% in 1 to 3 ha of farm size class, 36% in 3to 6 ha class, 22% in 6 to 10 ha class, 87% in total of these 3 classes, respectively.

Number of Field Plots by Plot Size in Tazeh Abad Scheme

Farm plot size	Number of field plot		Area of each plot scale	
	Number	%	ha	%
< 1.0 ha	13	3	6.1	0.1
1 ~ 3 ha	134	29	320.7	10
3 ~ 6 ha	166	36	690.0	21
6 ~ 10 ha	102	22	826.2	26
10 ~ 15 ha	20	4	236.8	7
15 ~ 20 ha	7	2	120.6	4
20 ~ 30 ha	8	2	199.9	6
30 ~ 50 ha	9	2	322.5	10
> 50 ha	6	1	487.2	15
Total	465	100	3,210.1	100

The area and yield per ha of cultivated crops in 2001 were 1,200 ha and 1.5 to 4.5 tons in wheat, 800 ha and 1 to 4 tons in barley, 70 to 80 ha in rape, 60 to 70 ha and 0.5 to 2 tons in cotton, about 100 ha and 3 to 4.5 tons paddy rice by irrigation with well water, 10 ha of cumin, 40 ha of maize as fodder whole crop, 60 ha of sunflower, 20 ha of sorghum, etc., respectively.

(3) Cheldin Project Area

1) General

In the Kordkuy District, annual precipitation is about 700mm in the normal years, and 600mm in the drought year, 2001. The area is rich in irrigation water, such as more rainfall, rich groundwater from the Elbourz Mountains, compared to Tazeh-abad. However, the area has also suffered the damage of drought since 1993. That is, the yield of soybean decreased from 2.2 tons/ha to 1.6 tons/ha, and that of cotton also decreased to 65% of the yield in the normal years. There is no damage of drought in wheat. The reasons of these yield decrease were considered that it did not rain at time of need and it rained at time of needless, which caused diseases of crops, such as fusarium.

Soil of the area is low salinity, except of the northern part of the area, but has problem of heavy textured soil, which is difficult to till. To solve the problem, the organization of extension and research carries out to transfer the techniques of tillage to cover every soil conditions.

The area is divided into three agricultural zones as follows;

1. The northern zone between the Ghalas River and the national main road; There are many

low land and crops cannot cultivate in autumn due to inundation. Therefore, seeding of winter crops is delayed. Cotton, wheat and rice are cultivated. Vegetables cannot cultivate in this zone. Rice is cultivated if irrigation water is enough. Soybean cannot cultivate due to high salinity in some parts of the zone.

2. Middle zone between two main roads: This zone has suitable soil and high productivity. Besides of cotton, wheat and rice, vegetables, especially leafy vegetables, are cultivated in autumn, and water melon, tomato, radish and cucumber are cultivated in spring.
3. The foot of the Elbourz Mountains; it is more rain than other zones. Cotton, wheat and rice are cultivated.

The Mahtar Kalateh locates in the northern zone of Kordkuy District, and the case study area locates in the lowest land. The land height above sea level of the case study area is from – 22 to – 20 m. On the other hand, soil texture is classified as heavy soil texture, which has 46 to 64% of clay at soil layer of 0 to 30cm in depth. Therefore, the low land area, including the case study area, suffers from flooding by heavy rainfall, especially in the beginning of autumn and the end of winter to spring. As a result, farmers cannot often sow seeds of wheat.

Agricultural condition of the lowland area surrounded with the Gharasu River, the west and east branches of the Shast Khola River, which includes the case study are, is as shown in the following Table.

Agricultural Conditions of the Low Land Area Surrounded with the Gharasu River, west and east branches of the Shast Khola River

Items		Conditions
1	Number of farm households in the area	76 households
2	Area of land in the area	219 ha
3	Number of field plots in the area	124 plots
4	Number of irrigation wells in the area	43 wells
5	Number of irrigation wells by the years passed since construction	
	1) Over 20 years	12
	2) 10 ~ 20 years	16
	3) 5 ~ 10 years	5
	4) Less 5 years	10
	Sum	43
6	Number of tractors in the area	31
7	Number of tractors by the years passed since purchase	
	1) Over 20 years	27
	2) 10 ~ 20 years	3
	3) 5 ~ 10 years	0
	4) Less 5 years	2
	Sum	31
8	Area submerged during over 10 days by flood in the area	25 ha
9	Number of the cases of farmers' cooperation in the area	
	1) The cases of group farm works	2
	2) The cases of common wells	9

Items			Conditions
3)	The cases of common use of tractors		6
4)	The cases of cooperative use of fields to expand a field plot and to increase efficiency of mechanization.		5
10	Cultivated crops		
	Crops	Area (ha)	Average yield (ton/ha)
	Wheat	189	3.0
	Rice	165	5.5 ~ 6.0
	Cotton	30	1.5
	Soybean	10	1.5

From this Table, the agricultural conditions of the low land, included the case study area, are characterized as follows;

1. The farming scale is 2.9 ha in average, and a field size is 1.8 ha in average.
2. There is one well per 3 plots.
3. Old irrigation wells, which passed over 10 years since construction, are 65% of total wells (43 wells). On the other hand, new wells, which passed less 5 years since construction, reach 23% of total.
4. There is one tractor per 2.5 farm households, and old tractors, which passed 20 years since new one, reach 87% of total (31 tractors) and new tractors, which passed less 5 years from purchase, are 6% of total.
5. Number of cases of farmers' cooperation in the low land is 2 cases in farm works, 9 cases in common use of wells, 6 cases in common use of tractor, 5 cases in cooperative use of fields to expand a field plot and to increase efficiency of mechanization, respectively.
6. Area and yields of cultivated crops are 189 ha and 3 tons/ha in wheat, 165 ha and 5.5 ~ 6 tons in rice, 30 ha and 1.5 tons in cotton, 10 ha and 1.5 tons in soybean, respectively. Yields of most of crops, except rice, are low. Therefore, paddy rice is most suitable in the low land area.

2) Case study Area

The case study area has 4 plots of fields, of which each area is 8.2 ha of the first plot, 12.9 ha of the second plot, 4.6 ha of the third plot and 1.1 ha of the fourth plot. All lands belong to the relatives and their families, and the joint farming is carried out in each plot by 3 families in the 1st plot, 8 families in the 2nd plot, 3 families in the 3rd and the 4th plot.

Land conditions of the case study area are the worst in the lowland area, such as lowest in altitude, heavy textured soil, several ponding in winter every year, etc. Therefore, the cropping pattern in the area is generally "paddy rice – wheat". Irrigation water source is well. When well's water is not enough for paddy rice cultivation, soybean is cultivated in a part of the plot instead of paddy rice. At present, paddy rice are cultivated in all plots, except 2 ha of

the 2nd plot, which is cultivated soybean instead of rice due to shortage of well's water.

In each plot, the cooperative field use, common use of irrigation water by well and cooperative farm works are carried out. The products are allotted to each family.

It is considered that the present cropping pattern "paddy rice – wheat" is the best, unless land conditions are improved by any ways, such as forcible drainage by pump, soil dressing by light textured soil, etc. Yields of crops under irrigation by well in the case study area are 6 to 7 tons/ha of rice, 2 to 4 tons/ha of wheat, and 2 to 2.5 tons/ha of soybean, respectively.

With regard to mechanization, tractor cannot work in field in winter (December to March) due to wet land. And also, combine cannot work in field for harvest of paddy rice. Therefore, paddy rice is harvested by hand and transported to combine, and then is threshed by combine.

The farmers' surveys by questionnaire were carried out in 3 farm households. The data are under analysis now.

A5.1.3 Land Use Conditions

The average area of annual crop cultivation and horticulture in each village of four districts in the Study Area is shown in the following table. The names of villages (*Dehestan*) in the table are the name of divisions (*Dehestan level*) for the agricultural extension of the Golestan Jihad-Agriculture Organization.

Average Area under Cultivation in Each Village of Study Area (2000-2001)

Village (Dehestan)	Annual Crop Cultivation				Horticulture			
	Irrigation		Rain-fed	Sum	Irrigation		Rain-fed	Sum
	ha	%	ha	ha	ha	%	ha	ha
Kordkuy District	**9,252**	**38.9**	**14,546**	**23,797**	**336**	**51.6**	**315**	**651**
Garji Mahaleh	4,668	51.3	4,429	9,097	73	61.9	45	118
Central	4,584	31.2	10,117	14,700	263	49.3	270	533
Gorgan District	**37,758**	**69.5**	**16,575**	**54,330**	**251**	**17.6**	**281**	**1,423**
Jelin	20,498	76.7	6,233	26,730	175	87.9	25	199
Varsan	9,934	68.1	4,654	14,587	76	22.9	256	332
Central	7,326	56.3	5,688	13,013				892
Bandar-e-Torkaman District	**10,154**	**11.8**	**75,547**	**85,701**	**12**	**50.0**	**12**	**24**
Gomishan	855	2.2	38,675	39,530	0		0	0
Banavar	5,474	21.1	20,439	25,913	12	50.0	12	24
Central	3,825	18.9	16,433	20,258	0		0	0
Aq Qala District	**44,914**	**38.9**	**32,248**	**86,414**	**185**	**84.3**	**35**	**219**
Grey	5,550	38.9	4,452	19,254	2	8.0	23	25
Anbar Olum	20,731	77.2	6,321	26,849	183	93.8	12	195
Central	18,633	46.5	21,475	40,108	0		0	0
Total (Golestan)	231,172	35.6	418,366	649,538	12,698	64.4	7,005	19,703

Source: Golestan Jihad-e-Agriculture Organization

Note 1) Total area of orchard includes sapling fields.

The table shows that the rates of irrigated land of annual crops to the total cultivated land with annual crops are 2.2%~21.1% in Bandar-e-Torkaman district, and about 30~77% in other districts. Especially, the rates are high in Gorgan district.

The average area under cultivation of annual crops is about 86,000 ha in Aq Qala district, 54,000 ha in Gorgan, 86,000 ha in Bandar-e-Torkaman, and 24,000 ha in Kordkuy, respectively. And the average area of irrigated land of annual crop cultivation are 44,000 ha in Aq Qala, 38,000 ha in Gorgan, 10,000 ha in Bandar-e-Torkaman and 9,000 ha in Kordkuy, respectively.

In relation to the horticulture, the average area of fruit cultivation are larger in Gorgan and Kordkuy districts than in other districts. The land use map of the Study Area is shown in Fig. A5.1.1. I1 and I2 represent the areas which have no or low and some limitation for irrigation such as slope, salinity, texture, topography etc.

A5.1.4 Agricultural Production

The cultivated area and yields of main annual crops in four districts are shown in the following table.

Agricultural Production in 4 Districts Related to Study area

Main annual crops (1999-2000)

District	Crop	Cultivated land			Yield	
		Irrigated land	Rain-fed land	Sum	Irrigated land	Rain-fed land
		ha	ha	ha	tons/ha	tons/ha
Gorgan	Wheat	33,605.0	17,486.0	51,091.0	3,450.4	1,512.4
	Barley	2,999.0	16,866.0	19,865.0	2,590.0	1,000.0
	Soybean	8,464.0	795.0	9,259.0	1,550.2	727.0
	Cotton	19,576.0	1,451.0	21,027.0	1,500.0	1,107.0
Total of District		85,950.0	42,109.0	128,059.0		
Bandar-e-Torkaman	Wheat	3,147.0	14,250.0	17,397.0	3,320.9	2,308.0
	Barley		32,610.0	32,610.0		1,340.0
	Soybean	14.0		14.0	1,071.4	
	Cotton	4,157.0	3,735.0	7,892.0	1,983.0	880.1
Total of District		8,232.0	55,237.0	63,469.0		
Kordkuy	Wheat	5,045.0	1,126.0	6,171.0	3,841.0	2,948.5
	Barley	11.0	85.0	96.0	1,730.0	1,690.0
	Soybean	2,291.0	2,748.0	5,039.0	1,748.6	1,384.3
	Cotton	7,346.0	3,086.0	10,432.0	1,926.0	1,520.1
Total of District		21,410.0	10,518.0	31,928.0		

Source: Golestan Jihad-e-Agriculture Organization

Note: Data of Aq Qala district are pigeonholing in the Golestan Jihad-e-Agriculture Organization.

The cultivation of wheat and cotton takes priority in irrigated lands of all districts, and the yields are between 3.3~3.8 tons/ha for wheat and 1.5~1.9 tons/ha for the cotton. On the other hand, in rain-fed land, the cultivation of wheat and barley takes priority, except for Kordkuy.

In Kordkuy, there is less difference between the irrigated crops and rain-fed crops due to the relatively rich supply of water.

The yields of rain-fed lands are clearly different from the irrigated lands, except that of Kordkuy district. In Kordkuy, there is no big difference between the irrigated crops and rain-fed crops. According to the central extension service center of Aq Qala, the Agricultural conditions in the jurisdiction of the center are as follows:

1. The cultivated area under the center control is about 40,000 ha. The area of grains, such as wheat and barley, is about 37,000 ha. The main crops are wheat, barley in rain-fed land, cotton, and vegetables.
2. The irrigation of wheat has two kinds of sources: one is well and another is river. The wells, which are 100~150 in the controlled area, can irrigate and supply water to 5,000 ha of wheat. On the other hand, the irrigation by pumping up from river is insecure, and the river's water supplies is up to about 3,000 ha of wheat.
3. At the present, agriculture in this area is changing from traditional farming to mechanized farming.
4. The improved varieties of wheat and barley are spreading to farmers. Especially, the improved barley is for rain-fed farming and the yield of variety is about 4 tons/ha.
5. The tendency of yields of crops during 10 years has been decreasing in cotton, increasing in wheat, barley, melon, water melon, pea, rape, soybean, etc.
6. There have been low precipitation and hot temperature during the summer during last several years.

The cultivated area and yields of main fruit trees are shown in the following table.

Agricultural Production in 4 Districts Related to Study area (1999-2000)

District	Fruit Trees	Cultivated land			Yield
		Sapling	Fertile trees	Sum	
		ha	ha	ha	kg/ha
Aq Qala	Peach	0.1	6.5	6.6	11,969.2
	Egg-plum (Yellow plum)	0.4	12.3	12.7	11,959.3
	Orange	2.2	35.0	37.2	13,000.0
	Olive	1,160.0	8.0	1,168.0	600.0
	Walnut		0.1	0.1	5,000.0
Total of District		1,172.3	136.1	1,308.4	-
Gorgan	Peach		168.0	168.0	4,154.4
	Egg-plum (Yellow plum)		638.0	638.0	8,650.0
	Orange	23.7	226.0	249.7	10,340.7
	Olive	713.0	11.0	724.0	650.0
	Walnut	69.3	12.8	82.1	2,514.8
Total of District		810.5	1,233.9	2,044.4	-
Bandar-e-Torkaman	Peach				
	Egg-plum (Yellow plum)				
	Orange				

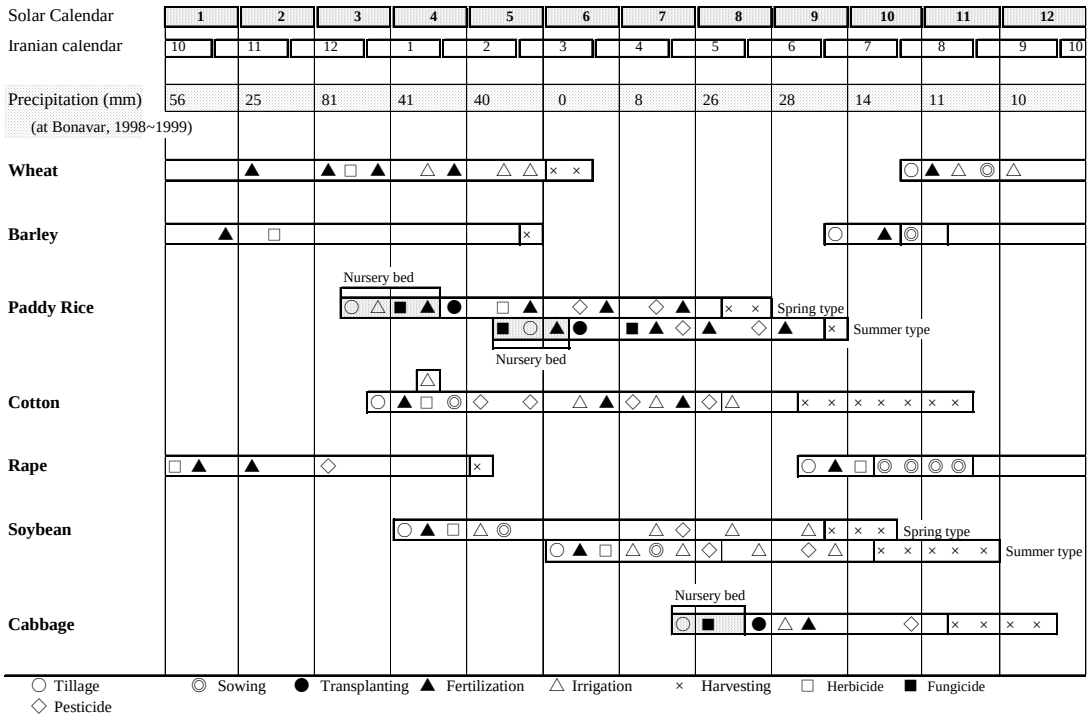
	Olive	11.0		11.0	
	Walnut				
Total of District		11.0		11.0	-
Kordkuy	Peach				
	Egg-plum (Yellow plum)		44.0	44.0	8,918.2
	Orange	29.0	642.0	671.0	8,002.5
	Olive	260.0	40.0	300.0	675.0
	Walnut		182.2	182.2	5,500.0
Total of District		335.5	1,797.1	2,132.6	-

Source: Golestan Jihad-e-Agriculture Organization

The table shows the cultivated area of the main crops as the sum of irrigated and rain-fed land, and the yields are also shown as the total horticulture land. Since Kordkuy and Gorgan districts have good farming conditions, there are few differences between rain-fed and irrigated land. On the other hand, Aq Qala and Bandar-e-Torkaman districts are under relatively bad farming conditions, and most of the horticultural lands are irrigated, because fruit trees can not grow without irrigation. Especially, there are few fruit trees in Bandar-e-Torkaman.

A5.1.5 Crop Cultivation

The farm work calendar of the main crops in irrigated field, recommended by the Government officers is shown in the figure.



In the figure, time of tillage, sowing, transplanting, fertilization, spraying of herbicides, fungicides and pesticides, irrigation and harvesting are shown for the main crops (wheat,

barley, paddy rice, cotton, rape, soybean and cabbage). Besides, monthly precipitations at Banavar, Bandar-e-Torkaman district, in relation to irrigation are shown in the figure.

The average farm materials and farm works per ha used in wheat cultivation for irrigated field in Golestan province is shown in the following Table. The unit price and cost per ha of materials and farm work operations are also shown in this table. The same kind of data for wheat under rain-fed condition, potatoes, cotton are shown in tables A5.1.1, A5.1.2, and A5.1.3.

Cultivation method and Production Cost
(wheat under irrigation, average in Golestan province, 2000-2001)

Farm Materials					
Items	Unit	Quantity per ha	Unit price Rls	Cost Rls/ha	Remarks
Sterilizing seeds	kg	180	11,300	203,400	
Fertilizer (phosphate)	kg	100	450	45,000	
Fertilizer (Urea)	kg	100	315	31,500	
Irrigation water charge	hours	12	25,000	300,000	6 inch well
Pesticide	kg	2	14,000	28,000	Sevine
Herbicide	litter & kg	1 lit. + 15 g	79,400	79,400	Topic, grand Star
Insurance due				8,000	
Field rent				1,300,000	
Interest of debts				123,430	8 months, 8% of rate
Farm Works					
Items	Unit	Number of times	Unit price Rls	Cost Rls/ha	Remarks
Plowing		1	60,000	60,000	
Disc harrow		3	30,000	90,000	
Sowing (drill)		1	40,000	40,000	
Making drain		1	15,000	15,000	
Transporting seeds and fertilizer			10,000	10,000	
Fertilization		2	15,000	30,000	
Irrigation water charge		2	30,000	60,000	
Spraying pesticide		2	25,000	50,000	
Harvesting (with combine)		1	200,000	200,000	
Transporting products to market				35,000	
Total cost				2,708,730	
Income by sale of straw				360,000	200packs, each 1,800 Rls
Net production cost				2,348,730	

Source: Golestan Jihad-e-Agriculture Organization

The above figure and table indicate the following:

1. In the southern region of the study area, the recommendable cropping pattern is Wheat (November ~ July)—Soybean (July ~ the end of October)—Fallow (green manure crops, e.g. leguminous crops, November ~ April)—Cotton or Soybean (May ~ October).

In this region, Government guided the farmers to limit the paddy rice cultivation in less than 10,000 ha due to the shortage of irrigation water of last years. But farmers disregarded the guidance and cultivated 40,000 ha of paddy due to its high market price.

2. In the northern region of the Study Area, the recommendable (by Government) cropping pattern is wheat (November ~ June)—paddy rice (June ~ September)—barley (October ~ May)—cotton (May ~ October) in irrigated farming. In rain-fed farming, the cropping pattern is wheat (October ~ June)—beans (June ~September)—rape (September ~ May)—Fallow—barley (October ~ May). In this region, soybean is not cultivated.

   However, in the actual situation, most of the farmers have been carrying out the successive cropping of wheat, barley, rape seed etc., in disregard of the Government guidance. Therefore, many pests and diseases are increasing.

   Government guided farmers to discontinue the paddy rice cultivation, but farmers disregarded the guidance due to the high market price as same as in the northern region.

3. In Golestan province, the annual crop cultivation is almost mechanized in every crop, as to be mentioned later. The composition rates for total cost by items in wheat cultivation is about 3% of fertilizer, 4% of chemicals, 13.3% of irrigation water charge and related work charge, 19.6% of the charge of mechanized farm works, etc. It is concluded that the highest rate in the total cost is about 20% of the mechanization cost, except field rent.

4. When yield is 3,083 kg/ha (average yield in 2000/2001), and the producer's price of wheat is Rls 875 /kg, the gross income per ha is Rls 2,697,625. Therefore, the net income is 348,895 Rls/ha. The gross income, production cost and the net income per kg of wheat are Rls 875 /kg, Rls 762 /kg and Rls 113 /kg, respectively. The net income is about 13% of the gross income, and about 15% of the production cost.

   The Governmental guideline on the net income of agricultural production is 20% of the production cost, which is the same percentage in industrial production.

A5.1.6 Agricultural Mechanization

1) Increase of the Agricultural Mechanization

The numbers of tractors, combines and tillers in Golestan province are shown in the following Table. There are about 16,600 tractors, 1,700 combines and 1,900 tillers in Golestan province. In Golestan province, most of the farmers' fields are mechanized by contract with the

machinery owners. The number of machinery in the province is enough to mechanize all the area under cultivation in the province. However, these machines are old types and have many problems in accuracy of farm work operation. The farm works with tractors are the most active in September to October in the year.

Number of Farm Machinery in Golestan Province (2000-2001)

District	Farm machinery		
	Tractor	Combine	Tiller
	nos	nos	nos
Aq Qala	1,164	55	12
Bandar-e-Torkaman	1,100	558	0
Kordkuy	1,655	0	56
Gorgan	3,169	121	907
Azad Shahr	560	30	155
Bandar Gaz	815	92	35
Ramyan	725	32	223
Ali Abad	1,657	264	119
Kalaleh	1,938	105	0
Gonbad	2,287	260	1
Minoodasht	1,517	169	377
Total	16,587	1,686	1,885

Source: Golestan Jihad-e-Agriculture Organization

The introduction rate of mechanization for the main crops cultivation in Golestan province is shown in the following Table. The rates of area using tractors for the total cultivated area are 50 ~ 100% in tillage, 100% in harrowing, 50 ~ 95% in fertilization, respectively. In regard to combines, the rates of the mechanized area are 100% in wheat and barley. In harvesting of paddy rice, combine is used as thresher. Cotton is reaped with manual labors.

Mechanization of the Main Crops Cultivation in Golestan (2000-2001)

Farm Work		Wheat		Barley		Rice	Cotton
		Irrigation	Rain-fed	Irrigation	Rain-fed		
		%	%	%	%	%	%
Land Preparation							
	Tillage	100	100	100	65	50	100
	Harrowing	100	100	100	100	100	100
	Leveling	60	0	50	0	60	60
Seeding							
	Fertilization	90	60	70	50	67	95
	Combined drill	0	65	6	50	0	0
	Broadcasting of seeds	51	32	55	0	0	1
	Seeding	47	0	39	0	0	99
	Row planting	0	0	0	0	0	0
Growth Management							
	Pumping for irrigation	13	0	0	0	0	8
	Supplemental irrigation	0	65	0	0	0	0
	Spray of pesticide (tractor)	66	60	55	20	5	50
	Spray of pesticide (knapsack power sprayer)	24	25	45	10	95	45
	Aerial spraying	10	5	0	0	1	5
	Intertillage & weeding (with cultivator)	0	0	0	0	0	27

Farm Work		Wheat		Barley		Rice	Cotton
		Irrigation	Rain-fed	Irrigation	Rain-fed		
		%	%	%	%	%	%
Harvest							
	Harvesting (with combine)	100	99	100	100	(94)	0
	Chopping of stem and straw	0	0	0	0	0	1
	Harvesting of radish	0	0	0	0	0	0
	Harvesting of potatoes	0	0	0	0	0	0
	Chopper	0	0	0	0	0	0
	Reaping (with reaper)	0	65	0	0	0	0
	Reaping (with manual labor)	0	15	0	0	100	100

Source: Golestan Jihad-e-Agriculture Organization

Note: In harvesting of paddy rice, combine is used as thresher.

95% of the trustees of mechanized work operation are private. These trustees consist of small-scale farmers, who make their living by charges of farm working by own machinery, non-farmers, etc. The rests of 5% are some cooperatives and the mechanized service companies (private companies), which are 10 ~ 15 companies in Golestan province, and they have 2 ~ 5 tractors and 1 ~ 2 combines in average.

2) Price of Machinery

Prices of farm machinery in Iran is shown in the following Table.

Prices of farm machinery (2002)

Farm machinery	Price (Rls)	Price (US$)
Combine (100 ~ 110 HP, John Deer)	170,000,000	21,250
Tractor (75HP, Massey Ferguson 285)	52,000,000	6,500
Tractor (110HP, Massey Ferguson 399)	67,000,000	8,375
Seeder (for rain-fed farming)	27,000,000	3,375
Seeder (for irrigation farming)	20,000,000	2,500
Row planter (for cotton and oilseeds)	9,000,000	1,125
Reversible plow (triple)	3,000,000	375
Reversible plow (quaternary)	4,000,000	500
Disk harrow (28 blades)	15,000,000	1,875
Disk harrow (36 blades)	20,000,000	2,500
Sprayer	4,000,000	500
Broadcaster	4,500,000	563
Sub-soiler	4,000,000	500
Plow	2,000,000	250
Baler	40,000,000	5,000
Knapsack power sprayer	2,000,000	250

Source: Golestan Jihad-e-Agriculture Organization

3) Mechanization System

The operation charge of farm machinery is basically decided by the contract between the owner of machinery and client according to the market price of each farm work. In general, the charge of plowing is Rls 60,000 /ha in ordinary upland field, Rls 120,000 /ha in paddy

field, and Rls 400,000 /ha in paddy field in case of including plowing, puddling and leveling.

As the improved plowing in the heavy textured soil, subsoiler is introduced since four years ago. The chisels of subsoiler works with 60cm depth and 1 m interval in field with tractor of 100 ~ 150 HP to improve the physical conditions of the soil.

4) Problems of Mechanization

The problems of the mechanization are as follows:

Technological problems

- Operation condition of plowing is very bad by rainfall and wet field in both sowing time in spring and autumn.
- There are heavy textured soils in Golestan province. Therefore, farm work by machines requires more fuel and is easy to create a hard pan at upper soil layer.
- The researches on mechanization are not active, especially in improving the operation methods of the machines.
- Shortage of functional machinery.

Economical problems

- High speed of machinery price rising, making an unbalance with the low speed of that of agricultural products.
- Lack of will to services by the machinery owners, due to the high cost of machinery maintenance and low insurance benefits.

Social problems

- There is enough labour in Golestan province. Farmers do not have interest in the mechanization.
- The farm scale is small and the farmer’s field are scattered.
- There is no service center and maintenance center for machinery in the province.

A5.2 Livestock

A5.2.1 Conditions of the Livestock

(1) Study Area

1) General

In the study area, sheep, cattle and poultry are common for meat, milk and egg production. The number of livestock in the study is as follows:

	Gorgan	Aq Qala	Torkman	Kordkuy	Total
Sheep	165,741	248,612	235,294	52,941	702,588
Goat	16,470	24,706	4,118	2,353	47,647
Cattle	35,027	35,026	24,166	31,195	125,414
Pure Milk Cow	10,352	4,437	5,380	1,507	21,676
Hybrid Cow	23,044	28,957	12,887	28,957	93,845
Native Cow	1,631	1,632	5,899	731	9,893
Buffalo	22	64	97	627	810
Poultry	1,148,440	382,000	267,860	770,600	2,568,900

Source: Jihad-e- Agriculture Organization, 2001; Note: Pure milk cow means Holstein species

As shown above, there are largest numbers of sheep; poultry and cattle are raised in the Study Area (about 30 per cent of the total numbers in Golestan Province.

2) Sheep Farming

Most of sheep are raised in the farmers in the village for meat production with the traditional method. Few farmer raise sheep under extensive method in the area. A farmer purchases a lamb with 15-20kg/head and raises for 3.5months. After the certain period sheep gains 45kg/head for sale. Male lambs are fattened for meat production purpose. Most of these lambs are exported to other cities especially to Tehran. Female lambs are sold in markets or slaughters.

The species of sheep in the area is native or endemic as mostly Zeland and Dalagh. The feed for sheep is natural pasture, straw of wheat, rice and barley. Red meat production and consumption of each district are shown in following table.

	Production (ton)	Consumption in District	Surplus or Deficiency
Gorgan	2,171	4,162	1,991
Aq Qala	2,678	1,287	1,393
Torkman	3,132	2,132	1,433
Kordkuy	672	839	167

Source: Jihad-e-agriculture Organization, 2002

3) Cattle Farming

Most of Cattle in this area is for milk production and raised in the farmers as a sideline for self-consumption and sale. 1 to 5 heads of cow are raised in a farmer. There are a few intensive dairy farmers in the area. Farming management system of intensive dairy farmers is quite different from that of the small scale farmers, as most of intensive dairy farmers, have improved variety of pasture as well as machinery equipment. They also perform

self-production of replacement heifers, AI, and silage production.

There is no beef breeder in the area. Male calves are dealt to the beef breeders in Mazandaran and Tehran. In recent years, due to the low milk productivity of nation cows, Holstein species has been imported from Denmark, Holland, Germany and Canada. After introduction of Holstein, Hybrid cow is bred by crossing Holstein and native cow. The native cow has resistance for diseases and adapted to climatic conditions of the area, however, the raised number are decreasing due to low milk productivity. The hybrid cows are raised in the farmers in the village.

Preservation and breeding of cattle are performed either in intensive dairy or traditional way. In intensive dairy, Holstein cows are kept in well sanitary condition with proper feeding with purpose of getting high quality products. There are 50 technicians working on artificial insemination (AI) in animal husbandry in Golestan province.

Annual milk productions of Holstein, Hybrid and Native cows are 2,500 to 5,500 kg, 1,800kg and 800kg, respectively. Average milk production in different livestock and its consumption in Golestan Province are summarized in the following table.

Unit: kg

Kind of livestock	Yearly Product	Lamb & Calves Consumption	To Market
Pure cow (Holstein)	5,650.00	400.00	5,250.00
Hybrid cow	1,816.00	300.00	1,516.00
Native cow	605.00	200.00	405.00
Buffalo	1,122.00	300.00	822.00
Small cow	30.00	10.00	20.00
Goat	40.00	10.00	30.00

Source: Jihad-e-Agriculture Organization

Milk production and its consumption of each district are shown in the following table.

Unit: ton

	Total Production	Self Consumption	Dairy Product	To Other cities
Gorgan	44,749	2,493	4,548	42,256
Aq Qala	35,599	8,884	226	26,715
Torkman	26,129	9,474	575	16,555
Kordkuy	10,819	5,649	295	5,170

Source: Jihad-e-Agriculture Organization, 2001

There are 11 milk plants in Gorgan district having 50 ton/day processing capacity. In Aq Qala, 4 units are processing milk with 33ton daily capacity, and in Bandar-e-Torkman, there are 6

plants having daily processing capacity of 27ton. In Kordkuy, 3 milk plants are producing 16ton/day.

4) Buffaloes Farming

Only few farms of buffaloes are seen in the area for milk production. Buffaloes have recently attracted attention since their meat contains low cholesterol and calories and also high contents of fat in buffalo milk.

Buffaloes are known as; it is possible to raise them in natural pastureland that a cattle does not eat well. It is especially advantages in the study area, where utilization of farmland is limited.

In average, milk yields is 1,100kg to 1,500kg per year. River type dominant species crossed with swamp type are seen in the area.

5) Poultry Farming

Productions of poultry meat and eggs are made in traditional and systematical industrial ways. In industrial chicken meat breeding, day-old chick is raised for 45 to 50 days gaining 2.3 kg weight, and then delivered to slaughterhouse. After slaughtering the meat are sent straight to market. There are 3 kinds of industrial poultry in the area.

- Roof covered poultry house with controlled windows and ventilation system on both sides.
- Roof covered poultry house without window, height of wall is 1.5 m.
- Tunnel system without windows on sides, from one end air comes through and at the other end ventilation system is installed.

Since the tunnel system has more efficiency than another systems, most of the chicken are employed with this system. The species of the industrial chicken meat is mostly Arian and for eggs is Hiline. In the village farmers raise chicken, duck, goose and turkey in traditional way, and they are fed with left over foods or dry bread or grazing in the fields. The production of eggs and chickens are made surrounding their houses.

The production cost of 1 kg chicken meat in the industrial units is Rls.5,842 when the shipping weight is 2.2 kg. There is a probability of lower cost of production by doing a better management. The production cost for 1 kg eggs in industrial unit is Rls.4,932 while one-day chick is Rls.4,200.

Due to lack of a well-equipped slaughterhouse to produce frozen chicken with the world standard level, and to trace non-permitted chemical materials in chicken’s meat, and some diseases, there is no possibility of exporting poultry meat and eggs under the present conditions. It is required to introduce the modern and progressed facilities.

About 60 % of poultries in Golestan have identification card which their period have been expired, and their facilities and instruments are not proper for producing chicken meat and egg, and they are location close to urban areas and don't regard proper quarantine rules and sanitary matters. Due to low knowledge of poultries owners, do not utilize technician's advises, improper production are prevailed.

In some cities of province, because of proper climatic condition some poultries produce more chicks. It is sometimes 2 times more than the market need for poultry meat and eggs. Sometimes the productions of poultry meat and eggs are very low as the improper climatic condition, buying power of people increases to resist such climatic condition so that meat and eggs consumption increases also. At present, slaughterhouses of province do not have freezing facilities and facilities for packing and instruments to clean up inside chickens.

(2) Tazeh Abad Project Area

The accurate number of livestock in the project area, such as cattle, sheep, camel, etc., can not be clarified. According to the leader of the RCP, 50% of the farmers in the project area raise 2 to 10 heads of cows, and 10% of the farmers raise 20 to several hundred heads of sheep.

According to the surveyed dairy farmer in Tazeh-abad Deh, who have milking cows of 4 heads, one bull and calves of 2 heads and fattening cattle of 3 heads, and cultivate wheat of 5 ha and barley of 3 ha, stock-farming is carried out as follows;

1) Breed of cow; Local breed. Hybrid with Holstein is higher in milk yield than local breed, but is required cow shed to manage more hygienically, and medical examination by veterinarians several times a year.

2) Cow is mated in late spring, farrows in March, and milks during 5 to 6 months.

3) Quantity of milking is 5 to 7kg/head/day in spring, and 3 to 4 kg in the end of milking (September), that is, is estimated 0.8 tons/head/year in milking period of 165 day a year.

4) There is no stall, and cattle are turned out in the daytime and are tied in night.

5) Milking and feeding are carried out by hands 2 times of morning and evening a day.

6) Roughage is straw of wheat (straw hay), which is produced in the owned field and purchased with 500 Rls. /kg from the neighboring farmers in the time of harvest. These hay is stored in shed.

7) Concentrate supplies to only cows. 95% of wheat as concentrate is purchased. All cultivated barley is used as concentrate.

8) Milk is sold to brokers with 1,000 Rls. /kg. Calves and fattening cattle are also sold to brokers. The price of three-years fattening cattle is 2.5 million Rls. in black one and 4

million Rls. in white one.

9) Each percentage by income sources in total annual gross incomes is 50% by crop production, 40% by livestock raising and 10% by farm works with owned farm machines.

As above mentioned, the livestock farming in the project area is ordinarily carried out with traditional methods.

A5.2.2 Price of Livestock Products

Consumer retail price of each livestock products in the Study Area is as follows:

Retail price of Livestock products

Items	Price (Rls./kg)
Sheep meat	26,000
Beef (boneless)	22,000
Chicken meat (broiler, frozen)	11,500
Egg (1 kg)	4,000
Long Life milk (1 liter)	1,500

Source: Data from the field survey by JICA Study Team, June 2002.

The present price of day-old chick is Rls.4,200/unit and the live chicken in free market is Rls.7,500 to 9,000 per kg. It means dealers buy Rls.7,500 to 9,000 per kg and treat for meat with 30% benefit; they sell it to consumer for Rls.11,500/kg. The poultry liver is sold Rls.3,500/kg while the 1 kg poultry meat is Rls.11,500 at the market to consumers. The price of 1 kg poultry meat depends on price of day-old chick, management, cost of feed and medicine.

In some critical conditions, dealer sells poultry meat and eggs to consumers. And in some cases price is controlled by inspection office. And some time price of production keep changing up and down, it is because of climate, especially in hot season and celebrations and holidays.

Produced milk in the intensive dairy farms are carried with the especial tankers and sold to factories for Rls.0000 per litter which price is determined by the government. In villages, dealers purchase produced milk from farmers in cheap price and then carried it to the factories. Factories pay Rls.82 to 100 per kg, and if the distance of buying factories is far from the produced dealer will buy it for Rls.95 to 1,100 per kg.

A5.2.3 Forage for Livestock

(1) Forage Production

Hays of wheat, barley and rice, wetland pastures and dry land pasture is common livestock forage in the study area. Forage production in each district is as follows:

Unit : ton

Kind of forage	Gorgan		Aq Qala		Kord Kuy		Torkman	
	Product	TDN	Product	TDN	Product	TDN	Product	TDN
Hay wheat	68,775	27,509	81,464	323,585	35,712	14,285	34,472	13,789
Hay Barley	931	372	27,492	10,997	199	80	26,593	10,637
Rice hay	9,680	2,872	7,056	2,822	15,974	6,390	1,085	434
Corn seed			274	219	6,112	2,445		
Sun flower concentration			318	223	48,889	3,422		
Cereal hay	169	67	273	111				
Soybean hay	12,455	4,982	254	102			7	3
Soybean hay concentration	9,964	6,975					6	4
Cotton seed concentration	3,657	2,560	4,456	3,119	3,630	2,541	1,973	1,381
Kolsa hay	285	114	430	172	252	101	378	1,508
Kolsa concentration	228	160	344	241	151	106	3,017	2,112
Clover					12,625	7,575		
Corn forage concentration	24,012	11,526						
Alfa alfa			212	127				
Corn forage			3,283	1,576	1,029	494	159	76
other plant			306	184				
Barley seed	730	555	18,328	13,929	156	119	20,858	1,508
Green Barley					10,270	5,135	1,290	6,045
Cereal Hay					374	149	36	1,434
Wet land pasture	139,528	6,279	64,838	29,177	34,921	15,715	11,826	5,322
Dry land Pasture	10,588	4,235	24,037	962	57,977	23,191	61,321	24,528
Wheat bran	9,170	5,960	10,862	7,060	4,762	3,095	4,596	2,988
Rice bran	1,935	1,258	1,411	917	3,195	2,077	217	141
Soy bean concentration			203	142				
Total	292,106	75,424	245,841	113,318	192,228	86,918	182,027	71,911

(2) Forage Requirement

The forage requirement in TDN (Total Digestive Nutrients) based on livestock unit for each district is shown in the following tables. It is clear that all districts except Kordkuy in the study area are not sufficient in the forage production.

Gorgan

Kind of Forage	Unit	Population	Con version Rate	Livestock Unit	TDN Production (ton)	TDN Consumption (ton)	Difference
Sheep	Head	165,741	1.00	165,741		38,120	
Goat	Head	16,470	0.76	12,517		2,879	
Native Cow	Head	1,631	4.83	7,877		1,812	
Hybrid Cow	Head	23,044	7.84	169,142		38,903	
Pure Cow	Head	10,352	10.32	106,832		24,571	
Buffalo	Head	22	7.23	160		37	
Total		15		399,879	75,424	106,322	-30,897

Note: 1 livestock unit=One sheep with 40kg weight and required 230kg TDN/year

Aq Qala

Kind of Forage	Unit	Population	Con-version Rate	Livestock Unit	TDN Production (ton)	TDN Consumption (ton)	Difference
Sheep	Head	248,612	1.00	248,612		57,181	
Goat	Head	24,706	0.76	18,776		4,318	
Native Cow	Head	1,632	4.83	7,882		1,813	
Hybrid Cow	Head	28,957	7.84	212,544		48,885	
Pure Cow	Head	4,437	10.32	45,789		10,531	
Buffalo	Head	64	7.23	465		107	
Total					113,318	122,836	-9,518

Bandar-e-Torkman

Kind of Forage	Unit	Population	Con-version Rate	Livestock Unit	TDN Production (ton)	TDN Consumption (ton)	Difference
Sheep	Head	235,294	1.00	235,294		54,118	
Goat	Head	4,118	0.76	3,129		720	
Native Cow	Head	5,899	4.83	28,492		6,553	
Hybrid Cow	Head	12,887	7.84	94,590		21,756	
Pure Cow	Head	5,380	10.32	55,521		12,770	
Buffalo	Head	97	7.23	706		162	
Total					86,256	96,078	-9,822

Kordkuy

Kind of Forage	Unit	Population	Con-version Rate	Livestock Unit	TDN Production (ton)	TDN Consumption (ton)	Difference
Sheep	Head	52,941	1.00	52,941		12,176	
Goat	Head	2,353	0.76	1,788		411	
Native Cow	Head	731	4.83	3,530		812	
Hybrid Cow	Head	8,122	7.84	59,615		13,711	
Pure Cow	Head	1,507	10.32	15,552		3,577	
Buffalo	Head	627	7.23	4,564		1,050	
Total					71,911	31,737	40,174

(3) Price of Forage

Prices of the forage per kilogram are wheat hay; Rls.410, sugar beat waste; Rls.850, wheat bran sold by Government; Rls.485, cottonseed concentration; Rls.1,410, wheat bran in free market;Rls.808 and dry Alfalfa;Rls.1,240.

1kg of sugar beet waste in the free Market is Rls.100, barley; Rls.905, maize for silage; Rls.250 and Molasses; Rls.550. The prices of barley and bran are distributed by Government

they have constant price, but other forages are depending on the market flows.

A5.2.4 Animal Health

(1) Diseases

Common diseases of livestock and poultry in Golestan are as follows;

a) Livestock

- Foot and Mouth Disease (cow & sheep)
- Antro toxemia (sheep)
- Rabies (cow)
- MCF (Malignant Catarrh Fever) (cow)
- IBR (Infectious Bovine Rhinotraceitias) (cow)
- Theileriosis (cow)
- Diphtheria (calf)

b) Poultry

- Gamboro in birds (Infectious Bursa disease, IBD)
- Salmonellas
- Coccidiose
- Colibacillose

(2) Vaccines

Vaccines used for medium and large livestock are as follows:

- For Charbon : Sign Charbon
- For Small pox: Antro toxemia
- For Foot and Mouth Disease: Agalaxy-Revi – S19.

Vaccines used for poultry:

- For Newcastle: Gamboro
- Bronchitis: small pox.

(3) Technical Assistance

Development institutes and classes have been establishment to train farmer and people who work in husbandry fields. Giving seminars and showing videos to inform people of the newest methods inside country do it.

(4) Livestock Waste

Waste matters are usually gathered in one place and after a period of time they are transported to agriculture fields and used as animal fertilizer.

A unit of 10,000 units of poultry produce 120 ton dropping in each year and sold to farmers and gardeners Rls.50/kg. In Gorgan, Aq Qala, Bandar-e-Torkman and Kordkuy, 252 units are active and yearly fertilizer production is estimated 30,240 tons. Therefore, 30,240 ton x Rs50/kg = 1,512 million Rials will be earned by poultry dropping.

(5) Slaughter Condition

There is one slaughterhouse in each city and it is done in traditional way and it is controlled by Mayer's office and do not have good sanitary condition. In village, every butcher kills 2 or more per day and sale it at shops in the villages. Weak livestock are sent to factories, which produce ham, sausage and salami. Real statistics data is not available for this regard.

A5.3 Farm Management

A5.3.1 Farming Conditions based on the Results of Farm Households Survey

(1) Purpose of Farm Households' Survey

The farm households' survey is conducted for understanding actual situation (production, farm economy, livelihood, and awareness and desire of farmers) of farm households in the Study Area. The result of this survey becomes the data for concreting the objective of agricultural development.

(2) Methods of Farm Households' Survey

2) In the Study Area, there are about 160 Dehs. In Iran, culture, customs, and the way of thinking are different depending on Dehs. Therefore, it is desirable that Dehs should be selected at first and then the farm households for the survey are selected to clarify the actual situation of farmers in the Study Area (800 km^2).
3) Then, 15% or 24 out of 160 Dehs are selected. It is not cared whether the Deh is in Pilot Areas determined by the Provincial Government or not.
4) Selection of farm households depends on the type of farmers: farmers with irrigated land, farmers with dry land, and farmers with both irrigated and dry lands. The number of selected farm households is determined in portion as the number of farm households by farm scale in the prefectures as much as possible.
5) The members of RPCs (Rural Production Cooperatives) are included in the selected farm households in taking account to the share of them in total number of the farm households.
6) It should be avoided that the selected farm households are concentrated in one area in

a prefecture. The selected farm households should hold their farmland in the representative place in the prefecture.

7) The farm households should be selected through random sampling.

Considering all items mentioned above, the questionnaire survey (farm households' survey) through interview including about 100 questions were conducted for 18 households in Kordkuy Prefecture, 54 households in Aq Qala Prefecture, 38 households in Bandar-e-Torkman Prefecture, and 18 households in Gorgan Prefecture under cooperation with provincial extension department. Following paragraphs report the results of the survey in four prefectures: Gorgan, Kordkuy, Aq Qala and Bandar-e-Torkman.

A5.3.2 Farming of Individual Farm Households

(1) Study Area

1) Problems on farming by prefecture in the Study Area

The problems on farming in the selected Dehs are summarized in the Table A5.3.1. The problems on farming are classified into three: natural and social conditions and problems on the farming of farm households. Gorgan and Kordkuy Prefecture has plenty of rainfall and groundwater compared with the other 2 prefectures. The location is also good because it is close to Gorgan City. So, the problems are relatively less compared with the other 2 prefectures. Common problems of four prefectures are shortage of irrigation water as natural condition, and small benefit due to unbalance between unstable and low producer's price and steep rise of agricultural inputs as social condition. Farmers are lacked with the financing for production. As the problems of farming, because agricultural inputs are not provided timely (it is not clear whether there are not agricultural inputs or they cannot afford it), farmers miss appropriate time for irrigation, machine operation, fertilizing, weeding, and protection of pests. These cause low production.

Adding to these problems, Aq Qala and Bandar-e-Torkman Prefectures have operation problems due to salinity, and alkalinity as natural condition, and not well maintained roads for conveying the products and hindrance of agricultural investment and decreasing of productivity because of segmentation of farmland owing to equal inheritance of property system. And they also have the problems of farming such as shortage of machinery, lack of irrigation and drainage facilities, and low technical level (there are not varieties which are appropriate for climate and soil texture, machinery is not improved, and organic matters in soil are small).

The problems mentioned above can be seen in the intention of farmers. Table A5.3.2 and Table A5.3.3 shows the most serious problems of farmers in order of the numbers by prefecture and faming scale. Many of farmers' farm scale is small but in Gorgan and Kordkuy

Prefecture which has relative advantage in natural and social conditions have the problem of introducing technique besides those of finance and production cost. In addition to these problems, the other two prefectures have the problems of salinity and supply of irrigation water.

Considering these results mentioned above comprehensively,

1. It is necessary to phase in (short, middle and long terms) construction of irrigation and drainage facilities for solving shortage of irrigation water as natural condition.
2. As social condition, it is necessary to phase in planning and execution of following projects: improvement of infrastructure such as roads and processing factories, establishment of the system for timely providing of agricultural inputs and machinery, solving the problem of farmland segmentation through legislative approach, and improvement of financial supply system for production.
3. As for improvement of farming, first of all, reformation of farmers' awareness is required. Although Agricultural Extension Service Centers extend technique and market information, farmers do not follow them. The farmers intend to gambling agriculture. Sustainable farming contrasts with gambling agriculture. The crop rotation for increasing organic matters in soil should be established soon. After this, technical modernization is introduced. High level of technique means operating each technique timely and securely. Mere use of agricultural chemicals and pesticide costs much. Production can be stable and improved through making each farm work the most effective. Justification of the considerations above is referred to in the following paragraphs.

2) Level of cultivation technique and production of main crops

In the farm households' survey, operation of 8 items: organic manure, chemical fertilizer, lime, inspected or certified seed, irrigation, herbicide, insecticide and fungicide was examined in order to know the level of farmers' technique. Here, the farmers who apply these items much are defined as the farmers whose level of technique is high. The results are described in Table A5.3.4. These are arranged in order of level (a number of applying the items) on wheat, cotton, and barley by prefecture and put down with production.

Commonly, the production of wheat and barley is small and rare respectively in Gorgan and Kordkuy Prefecture. Nevertheless, the production of wheat and cotton is relatively high even though the level is low. In the other two prefectures, it is required to apply 4 technique on wheat, 5 technique on cotton, and 3 technique on barley in order to produce at least more than 2t/ha.

Moreover, there are some farmers whose production is relatively high although their level of technique is low. The reason of low production although high level of technique can be

assumed that technical operation was not done timely. In addition, this is the data in the year severely suffered from drought. Therefore, one of the other reasons can be that the technique of irrigation did not make effect. The damages of drought are caused by the interval between rainfalls besides absolute shortage of precipitation. The data is not summarized yet, but it can be seen in *Veranico* phenomenon (the drought caused by a long interval of rainfalls in rainy season) feared in Brazil. The interval of rainfalls suffered the damage by drought has subtle locality. This should be also considered as one of the reasons.

3) Irrigation and yields of main crops

Tables A5.3.5, A5.3.6, and A5.3.7 indicate the summary of the times of irrigation and the production of wheat, barley, and cotton (t/ha) concerning all farm households together. Because rainfall in Gorgan and Kordkuy Prefecture is larger than the other two prefectures, it is excluded. Even in dry land, the production of wheat is 2-3t/ha in Aq Qala and Bandar-e-Torkman Prefecture. Furthermore, this is exception but production of wheat can be 2.5-3t/ha with 1-2 times of irrigation. This is also the data in the year severely suffered from drought.

In case of barley, production is large rather in dry land. In conclusion, as the first stage of improvement, it can be estimated that winter wheat needs total 2 times of irrigation: once for leaching in fall and once in spring, and barley needs once of irrigation for leaching in fall to produce more than 2t/ha stably. As for summer cotton, it is hard to increase production in dry land even in Kordkuy Prefecture whose condition is relatively better. In the other two prefectures, it requires at least three times of irrigation to produce more than 1.5t/ha.

(2) Tazeh Abad Project Area

In general, wheat is seeded in December and harvested in May, and irrigated with water of Gorgan River in 2 times of February and the end of March. Barley is irrigated one time in February. After fallow in winter, cotton is irrigated in the middle of March as pre-irrigation to leach salt, and seeded in April, harvested in the end of November, and irrigated 3 times of June, July and August.

According to the farm households' survey of 7 farmers in project area in July of 2002, the degrees of cultivation technology of the surveyed farmers showed within 2 to 5 degrees. In the farm households' survey, farm works of 8 items, that is fertilization of organic manure, chemical fertilization and lime, use of certified seed, irrigation, use of herbicide, insecticide, and fungicide, was examined in order to know the level of farmers' cultivation technology (Table A5.3.8). These farmers were seemed irrigation and fertilization of chemical fertilizer at least. The yields of wheat of these farmers were ranged from 1 to 3 tons per ha. Irrigation was carried out in February to May. From these facts, the farmers did not carried out pre-irrigation, fertilization of sulfur to prevent alkalization of soil, fertilization of micro-elements, which are

required in soil of Tazeh-abad to attain high yield of every crop.

A5.3.3 Farm Management in the Dehestan Extension Service Centers

Most part of the Study Area is covered by following Extension Service Centers in regard to the area of jurisdiction of Dehestan Extension Service Center: from the north, Anbar Olum and Central Extension Service Centers in Aq Qala Prefecture, Banavar and Central Extension Service Centers in Bandar-e-Torkman Prefecture, and Garji Mahaneh Extension Service Center in Kordkuy Prefecture. Table A5.3.9 shows the summary of the farming belonging to the areas of jurisdiction of 5 Dehestan Extension Service Centers in the Study Area together.

The characteristics of each area of jurisdiction of Dehestan Extension Service Center in the actual situation of agriculture are as follows:

(1) Area of jurisdiction of the Anbar Olum Extension Service Center

The area is located in the north-easternmost and nearest to the Gorgan Dam in the Survey Area. The area borders on the Gorgan River on the south. The army farm and the Peivand RPC (rural production cooperative, site 1) are in the area.

Annual precipitation in this area is the least in the Survey Area. Therefore, the main crops' yields in the last several years, which were drought years, were less 30% of the yields in the normal years.

The rate of supply of irrigation water in the area is 70% from the Gorgan Dam, 10% from the Gorgan River, 20% from wells, respectively. Recently, 80% of the total irrigated area suffered damage from the shortage of irrigation water because of sedimentation of the Gorgan dam and shortage of flow of the Gorgan River. The wells in the area concentrate in Chin Civili, which is the big Deh and has 95% of the total wells in the area, 75 of deep wells, 3 of half deep wells and 6 of shallow wells.

The farm scale class with the largest number is 3 to 5 ha in the irrigated farming and 5 to 10 ha in the dry-land farming, respectively. In every farm scale class, wheat, barley, cotton and vegetables as succeeding crop of wheat and barley are cultivated.

With regard to the change in the yields of main crops during the last ten years, the yield of irrigated wheat has increased compared with 10 years before, because of modernization of farming. The modernization of farming in the area has reached the highest standard in the Golestan province due to extension activities of the Extension Service Center, such as use of improved seeds, seed disinfection, sub-soiling, application of chemicals and chemical fertilizer with optimal methods, irrigation in time for growth, soil analysis and fertilization of micro-elements of 500 ha every year, which were mainly applied Zn and S of 250 tons in 2001. On the other hand, the irrigated cotton is not change in yield during the last 10 years,

because the seeds of the variety “sahel”, which was introduced 15 years ago, have been self reproduced. Therefore, the new variety “ Saiukura” is introducing now.

The yield of barley under dry farming has increased compared with 10 years before, because of extension of new varieties tolerant to salinity of soil. However, the barley of dry farming suffered severe damages of drought during the last several years.

The rate of insured farmers for the total farmers with the accident insurance of the Agricultural Bank in the area is also the highest in the Golestan Province. 70% of cultivated wheat and 95% of cultivated cotton in the area are insured by the accident insurance.

(2) Area of jurisdiction of the Aq Qala Central Extension Service Center

The area borders on the Gorgan River on the north and Ghalas River on the south. Aq Qala city and the Hermat RPC (site 2) are in the area.

Annual precipitation in this area is the least in the Survey Area as same as Anbar Olum. Therefore, the main crops’ yields in the last several years, which were drought years, were 30 to 50% in the northern part and more 50% of the yields in the normal years.

In the zone between the Gorgan River and the Ghalas River, there are many deep wells, about 200 wells, and about 900 ha is irrigated by wells. In Aq Qala city and northward, there is no well, therefore, the northern part of the area is dry-land farm. Both banks of the Gorgan River and the Ghalas River are also irrigated by pumping up of rivers’ water. The damages of drought during the last several years arose severely in the irrigated farms by pumping up of the Gorgan River’s water and the dry farms.

The farm scale class with the largest number is more 20 ha in the irrigated farming and 10 ha in the dry-land farming, respectively. In every farm scale class, wheat, barley, cotton and vegetables as succeeding crop of wheat and barley are cultivated.

With regard to the change in the yields of main crops during the last ten years, the yield of wheat and cotton have decreased during the last 4 years due to drought, especially in dry land and in irrigated land by pumping up of rivers’ water. Extension rate to farmers of improved seeds and chemical fertilizer are nearly 100%, but almost farmers do not still fertilize the micro-nutrients. Awareness of farmers on modernization of farming is not high and the meeting of technical transfer by the Extension Service Center has been poorly attended.

(3) Area of jurisdiction of the Banavar Extension Service Center

The area is divided into two parts by the Gorgan River. Banavar city, the Shadi Mehr RPC and Partove Banavar RPC (site 3) are in the area.

Annual precipitation in this area is about 450mm in the normal year, but 230mm in the drought year, 2001. Therefore, the main crops’ yields in the last several years, which were drought years, were 30 to 50% of the yields in the normal years.

The irrigated land is about 21% of the total cultivated land. About 1,700 ha are irrigated by 117 wells, which are mainly located in the southern part of the area. In the northern part of the Gorgan River, the numbers of wells are only 9. Main irrigated crops are wheat, barley and rape as winter crops, and cotton, rice and vegetables as summer crops.

Both banks of the Gorgan River are also irrigated by pumping up of river's water. That is, 1,450 ha of the Partove Banavar RPC, 1,500 ha of Shadi Mehr RPC and 1,500 ha of Arekhe Bozorg RPC (in the planning) are irrigated by use of the Gorgan River's water. However, in the last several years, crops suffered severe damage due to shortage of river's water and difficult taking of the river's water at the lower reaches of the stream. Therefore, in the Partove Banavar RPC and the Shadi Mehr RPC, the reservoirs are under construction or in the planning stage. The farm scale class with the largest number is 10 to 20 ha.

With regard to the change in the yields of main crops during the last ten years, the yield of irrigated wheat has increased compared with 10 years before, because of modernization of farming due to extension activities of the Extension Service Center, and subsidies for well construction and pumps for taking of river's water.

The yield of cotton has been unstable during the last 10 years. Diseases and the lower international marketing price of cotton cause the decrease of the cotton production. The new variety " Saiukura" is introducing now.

(4) Area of jurisdiction of the Torkman Central Extension Service Center

The area borders on the Gorgan River on the north, Ghalas River on the south and the Caspian Sea on the west. Bandar-e-Torkman city is in the area.

Annual precipitation in this area is about 430mm in the normal year, but 290mm in the drought year, 2001. Therefore, the main crops' yields in the last several years, which were drought years, were more 50% of the yields in the normal years in the northern part of the area. On the other hand, in the southern part of the area, crops did not nearly suffer the drought damages.

The area is divided into three agricultural zones, that is, the low productivity belt along the seaside of the Caspian Sea, the high productivity belt along the Ghalas River and the medium productivity zone of central part.

The irrigated land is about 19% (3,825 ha) of the total cultivated land. About 3,632 ha are irrigated by 283 wells, which are mainly located in the southern part of the area, and consist of 154 of deep wells, 127 of shallow wells and others. The quantity of water and the depth of wells are less and deeper in proportion to distance from the Ghalas River, and the water levels of wells are lower in the drought years, especially in summer use of irrigation water. There are reservoirs of 20 to 60 ha in total, in which fish culture is carried out.

Cereals of 1,787 ha are cultivated with sprinkler irrigation by use of wells' water, and cotton of 1,847 ha is cultivated with furrow irrigation by use of wells' water. The irrigated farms by pumping up of river's water are only 5% of the total irrigated farms. River's water is high salinity and cannot be commonly used as irrigation water. Only in seasons of low salinity, river's water is used as irrigation water for cereals cultivation with sprinkler.

Main crops cultivated in the area are wheat, cotton, rice, rape, which introduced several years ago, and vegetables, such as "harvoze", water melon, melon, etc. The farm scale class with the largest number is 5 to 20 ha.

With regard to the change in the yields of main crops during the last ten years, the yield of irrigated wheat has not changed during 10 years. The yield of barley in dry land has decreased during 10 years, because of increase of salinity in soil. The local varieties tolerant to salinity have to cultivate. The yield of cotton has been unstable during the last 10 years, because of increase of salinity in soil.

(5) Area of jurisdiction of the Kordkuy Garji Mahaneh Extension Service Center

The area borders on the Ghalas River on the north, the foot of the Elbourz Mountains on the south and near the Caspian Sea on the west. The Rooyesh-e-Mehtar Kalateh RPC (site 4) is in the area.

Annual precipitation is about 700mm in the normal years, and 600mm in the drought year, 2001. The area is rich in irrigation water, such as more rainfall, rich groundwater from the Elbourz Mountains, compared to other four areas. However, the area has also suffered the damage of drought since 1993. That is, the yield of soybean decreased from 2.2 tons/ha to 1.6 tons/ha, and that of cotton also decreased to 65% of the yield in the normal years. There is no damage of drought in wheat. The reasons of these yield decrease were considered that it did not rain at time of need and it rained at time of needless, which caused diseases of crops, such as fusarium.

Soil of the area is low salinity, except of the northern part of the area, but has problem of heavy textured soil, which is difficult to till. To solve the problem, the organization of extension and research carries out to transfer the techniques of tillage to cover every soil condition.

The area is divided into three agricultural zones as follows;

1. The northern zone between the Ghalas River and the national main road; There are many low land and crops cannot cultivate in autumn due to inundation. Therefore, seeding of winter crops is delayed. Cotton, wheat and rice are cultivated. Vegetables cannot cultivate in this zone. Rice is cultivated if irrigation water is enough. Soybean cannot cultivate due to high salinity in some parts of the zone.

2. Middle zone between two main roads: This zone has suitable soil and high productivity. Besides of cotton, wheat and rice, vegetables, especially leafy vegetables, are cultivated in autumn, and water melon, tomato, radish and cucumber are cultivated in spring.
3. The foot of the Elbourz Mountains; it is more rain than other zones. Cotton, wheat and rice are cultivated.

Main crops in this area are soybean, cotton and rice, and wheat cultivation is few. Soybean is cultivated in two cropping seasons, spring cropping, which soybean is sowed in May and period of vegetation is about 110 to 130 days, and summer cropping which soybean is sowed in mid-June. Soybeans of both cropping season can rotate with wheat.

Rotation of crops in the area is considered as follows; wheat - soybean of summer cropping - green peas (November to April) - cotton (May to December) – wheat, barley or rape. However, in the area, farmers have not stable crop rotation. This is the most important problem in the Survey Area. Farmers turn a deaf ear to advice of the organization of extension or the Golestan Government and produce the profitable crops under themselves discretion, and then fail in farm economy. For example, the price of cotton fell sharply due to overproduction by cotton production in more 200 ha in the area. Besides, farmers produce sugar beat of 1,000 ha in spite of advice of the Government and also fail in farm economy. And although the Government advises to stop rice cultivation by wells' water, farmers reject it. That is, farmers carry out the gambling farming.

A5.3.4 Farm Management in Dry Land Farming

According to the Dry Land Agricultural Research Institute (Maragheh), the dry land farming can be recognized as follows:

There are 4 million ha of dry lands in Iran. The average yield of wheat is 84o kg/ha, and Golestan Province has the highest yield in Iran, 2.2 tons/ha, in 10 years average. Golestan Province is considered as the rich fields in dry land farming of Iran.

Water availability is the main criteria rather than any other parameters including soil, mechanization etc. Besides, the timing of rainfall is more important the total amount of rainfall. Wheat is also cultivated in Western Azerbayjan Province, which has only 197mm of annual precipitation.

The main characteristics of the surrounding areas of the Institute and the dry land farming are as follows:

1) The area is bout 1,200m of altitude and sloppy mountainous areas with a wide distribution of limestone.
2) Soil has less organic matters, and is in shortage of micro-nutrients, light soil which allow

easier percolation, and low salinity (< 1 mS/cm).

3) The groundwater table is low, about 20 to 30m from surface of soil.
4) Rainfall is very low (average 350mm) and is mostly concentrated in winter.
5) Farm scale of each farm household is 8 to 10 ha in average. The yields of crops are 0.5 to 1.5 tons/ha for bread wheat, 0.5 to 1 ton/ha for durum wheat, and 1.5 to 3 tons/ha for barley, respectively. As most of farmers cannot make a livelihood by agriculture, they have various side jobs, such as honey production, carpet, handicrafts and animal husbandry, etc.
6) Mostly traditional cultivation is followed in dry land areas than the modernized cultivation, except for the introduction of new improved varieties, fertilization of chemical fertilizer and mechanization. In this area, the cold-tolerant varieties are introduced, and chemical fertilizer of N and P_2O_5 are used with 60kg/ha and 25kg /ha, respectively.
7) From a viewpoint of the sustainable farming, it is important to increase the organic matter in soil. In Miyane, Eastern Azerbayjan Province, dry feeding is carried out. The feces of cattle are applied to the cultivated dry land as compost, therefore, the yield of wheat is keeping high.
8) The principle of dry land farming is to keep the soil moisture as possible. As the surrounding areas of the Institute is a plateau area and the secluded places in the mountains, the keeping of soil moisture is carried out with following methods;

   ① Semi-irrigation
   ② The ridges in crop cultivation should make at right angle to slop.
   ③ Minimum tillage
   ④ Increase of soil fertility by crop rotation: common rotation is “wheat – chick pea – fallow” in the area.

On the other hand, Golestan Province is completely different from this area in natural conditions, except the low rainfall, such as high salinity of soil, high groundwater table, poor drainage due to low land, etc. Referring to the opinion of the Institute, the dry land farming and natural conditions of the surrounding areas of the Institute, the measures of development of the sustainable dry land agriculture in the Survey Area are as follows;

1) Construction of reservoirs, which store the irrigation water in winter for the minimum irrigation at time of intolerable drought.
2) Minimum tillage: Minimum tillage using chisel plough is needed to preserve soil moisture in dry land. Weeds are removed with sweeper plough.
3) Increase of soil fertility by crop rotation: Common rotation is “wheat or barley – rape or safflower” in the Survey Area. Besides, it is desirable to rotate with pasture plants, which have a lot of roots, to increase the organic matter in soil.
4) In order to carry out the desalinization of soil by rainfall in the dry land, drainage system,

including from drains in field to main drain, is established in the Survey Area.

A5.3.5 Farming of RPCs (Rural Production Cooperatives)

Most part of the Study Area is covered by following Extension Service Centers in the meaning of area of jurisdiction of Dehestan Extension Service Center: from the north, Anbar Olum and Central Extension Service Centers in Aq Qala Prefecture, Banavar and Central Extension Service Centers in Bandar-e-Torkman Prefecture, and Garji Mahaneh Extension Service Center in Kordkuy Prefecture. So, the following paragraphs report the zonings and characteristics of agriculture, actual situation of agriculture, and climatic disaster by the Extension Service Center mentioned above.

There are 6 RPCs (Rural Production Cooperatives) which supported by provincial government on irrigation facilities and management (principally, 5 years) in the Study Area. Table A5.3.10 shows faming of 6 RPCs.

These RPCs are divided into two groups; one is the group, which aims to carry out the irrigation farming by water use of the Gorgan River, and another group carries out the irrigation farming by use of existing water sources, such as wells, reservoir, etc.

(1) Existing farming in group of RPCs aimed irrigation farming by use of the Gorgan River's water

Peivand RPC, Hermmat RPC, Shadi Mehr RPC, Partove Bonavar RPC and Gomishan Kesht RPC are aimed to carry out the irrigation farming by use of the Gorgan River's water. These RPCs were founded in 1995 to 2000, and have supported by provincial government on irrigation facilities and management. The irrigation farming in these RPCs is not functionally carried out yet, because of short space of time since foundation of cooperatives, incompletion of construction of irrigation canals and drains, drought during the last four years, less function of water storage of the Gorgan Dam by sedimentation, extreme decrease of discharge of the Gorgan River, etc. Therefore, each RPC suffers the restriction on irrigation water, and carries out farming under water-saving cultivation. Besides, every RPC cannot plan the next year's farming plan.

The characteristics of each group of RPCs in the actual situation of agriculture are as follows;

1) Peivand RPC

The total cultivated area of RPC is 3,500 ha, and the completed area of the construction of irrigation canals and drains is about 2,000ha. The rest of 1,500 ha is planned the construction until 2004. The RPC is located at the bank of upper reaches of the Gorgan River, which is more advantageous to taking river's water.

Cultivated crops are irrigated wheat of 1,200 ha, irrigated barley of 800 ha, which is

cultivated in fields of high salinity of soil and irrigated rape of 80 ha in winter, and irrigated cotton of 80 ha in summer. These crops are cultivated with continuous cropping. Irrigation is carried out mainly in winter, that is, two times in February and the end of March for wheat and one time in February for barley.

As the measures for shortage of irrigation water, the reservoir is constructed and used at present. The yield of each irrigated crop was not different between the yield in the drought year and that in the normal years.

2) Hermmat RPC

The total cultivated area of RPC is 1,962 ha, and the completed area of the construction of irrigation canals and drains is about 1,025 ha. The reservoir of 25 ha is constructed and used at present. As it is difficult to take the irrigation water from the Gorgan River due to shortage of flow, the damage of drought in the last 4 years becomes more acute as shown in the Table A5.3.9. Therefore, farmers cannot the debt to banks. The cultivated crops and the method of irrigation are as same as these of Peivand RPC.

3) Shadi Mehr RPC

The total cultivated area of RPC is 1,000 ha, and 400 ha of the total area are under construction of irrigation canals to complete until 2003. Beside, the reservoir of 90 ha is planned. The drains of whole area were already constructed, as the fields of the area were originally wet land and high salinity of soil.

At present, barley, which is local variety and tolerant to high salinity of soil, is cultivated in the dry land, but the yield of barley remains in low, 800kg/ha.

4) Partove Bonavar RPC

The total cultivated area of RPC is 1,780 ha, and the completed area of the construction of irrigation canals and drains is about 600 ha. However, only 80 ha of wheat in winter and 80 ha of cotton in summer were irrigated due to shortage of irrigation water in 2001. The rest land became the dry land in reality and cultivated wheat, barley and rape, but the damage of drought in the last 4 years becomes more acute as shown in the Table A5.3.9. As the measures of shortage of irrigation water, the reservoir of 20 ha is planned.

5) Gomishan Kesht RPC

The total cultivated area of RPC is 4,800 ha, and the completed area of the construction of irrigation canals is about 800 ha. The construction of canals were completed two years ago, but the canals and pumps have never used during 2 years because of trouble of pumps. The

drains completed the construction of 70% of the area to leach the salts of soil by rain.

The RPC is aimed to carry out the irrigation farming by use of the Gorgan River's water. However, it is difficult to take the river's water at the lower reaches of the stream, and river's water is high salinity and cannot be commonly used as irrigation water. Only in seasons of low salinity, river's water will be used as irrigation water.

At present, the area is the dry land in reality and cultivated wheat, barley and rape, but the damage of drought in the last 4 years becomes more acute as shown in the Table A5.3.9. Cotton is cultivated in irrigated land of 150 ha with one or two times of irrigation by the private pumps, but the yield remains in low, 0.8~1.0 tons/ha.

(2) Rooyesh-e-Mehtar Kalateh (Cheldin) RPC (irrigation farming group by use of existing water sources)

The characteristics of the RPC in the actual situation of agriculture are as follows;

1) The RPC consists of two Dehes, 750 households of mazandadani and 20 households of sistani.
2) The cultivated area is 1,580 ha, and the cultivated area per household is 2 ha in average, 35 ha in maximum.
3) The irrigated area is about 1,200 ha and the dry land area is 380 ha. In dry land, wheat and barley are cultivated. The yield of wheat is 4 tons/ha in the normal years, and 2tons/ha in the drought years. Cropping pattern of wheat is the continuous cropping of "wheat – fallow". In general, barley is only cultivated in 1 ha.
4) The irrigated area is divided into the following categories by irrigation water sources;

- Wells: There are about 400 wells in the RPC including the illegal wells, of which 80% are owned by privates, and the irrigated area by wells is 1,130 ha. The depths of wells are 60m to 130m. In 250 ha of the irrigated land by use of wells' water, recently, the crop rotation "soybeans (spring cropping type: sowing in April, summer cropping type: sowing in June to July) – rape or wheat is carried out with sprinkler irrigation. In some area, the rotation of three cropping a year "wheat – rice – vegetables (spinach, radish or leek)" is also carried out with sprinkler irrigation.
- Reservoir: The water is irrigated about 100 ha of rice in summer and wheat in winter by inundation method due to lack of irrigation canals. Capacity of irrigation of the reservoir is 300 to 400 ha of rice and wheat cultivation, if the irrigation canals are constructed.
- Shaskola River: The River's water is irrigated only to winter crops.

5) The yields of crops in the normal years are 2 to 5 tons/ha of irrigated wheat, 1.5 to 3

tons/ha of cotton, 3 to 7 tons/ha of rice, 0.7 to3.5 tons/ha of rape, respectively.

6) The RPC has 2 tractors, a combine, a trans-planter (4 rows) of rice, and a baler. The total number of tractors in the RPC, including private tractors, is 168. Such many private tractors are used to draw water from a well.

Problems in farming are as follows;

1) There is no machinery, especially for tillage, to be suitable for the heavy textured soil in the area. At present, farmers till the field under slightly moist condition, and fertilize some ammonium phosphate and micro-nutrients, such as S, Mn, Fe, Mg, etc.
2) The average cultivated area per household is 2 ha, therefore, most of farmers cannot make a livelihood by only agriculture and follow a side job besides keeping a farm. Kinds of side job are various, such as drivers, teachers, traders, operators of machinery in RPC, etc. It is considered that the living expenditure per year is required about US$ 3,000 for stable livelihood, which can be accomplished by agriculture of irrigated 5 ha in the area.

A5.3.6 Farm Economy

(1) Farm Economy Based on the Results of the Farm Households' Survey

Table A5.3.11 shows the results of the survey on the farm economy of 128 farm households in the Study Area. Concerning on the figures of money such as benefit and production cost, the farmers' annual registration is the most reliable. This survey is extremely inaccurate on the numbers due to short hearing survey. Benefit and living expenses are very reliable but production cost is not. Too much production cost in the year of 2001/2002 was reported. This can be known by observation that the production cost in the year of 2000/2001 is higher than the estimation of the production cost in the year of 2001/2002 (the right most column of the Table).

Basically, the benefit should cover the production cost for the next year besides production cost and living expenses in this year. If not, farmers could not reproduce. The results of this survey show that the farmers of any farm scales and in any prefectures do not have the surplus for reproduction in the next year. It should be considered that the survey examines the data in the year of drought. The results of the farm households' survey are described below.

1) As comparing annual gross income of the farmers belonging to the same farm scale in three prefectures, those of Gorgan and Kordkuy Prefecture is the largest. Specially, the farmers whose faming scale is 3-10 ha highly depend on agriculture and also gain much gross income from agriculture, compared with the other two prefectures.
2) Gross income becomes higher as the faming scale becomes larger.
3) As for composition of farmers' gross income, the portion except of agriculture and animal husbandry becomes larger as the farm scale becomes smaller, except 1-3 ha of

farm scale of Gorgan Prefecture.

4) Animal husbandry is introduced and composes a certain part of gross income without the relation to farm scale in Aq Qala and Bandar-e-Torkman Prefectures.

5) All farm scales' farmers are in black if only concerning on the production of agriculture and animal husbandry. Nevertheless, the farmers whose farm scale is more than 5ha in Gorgan and Kordkuy Prefecture and is more than 10ha in Bandar-e-Torkman Prefecture are in black even after reduction of living expenses. The others are in red.

6) In comparison with Bandar-e-Torkman and Aq Qala Prefectures, the surplus of farm economy as a whole including living expenses of the farmers whose farm scale is more than 10ha is small, and they are in red in Aq Qala Prefecture. The reasons are that the production cost of two farmers whose farm scale is more than 20ha in Aq Qala Prefecture increased owing to something and the living expenses are higher than those in Bandar-e-Torkman Prefecture. This is not because of big difference of the production.

7) Living expenses are not related to prefecture and farm scale and are around Rls. 15 million to Rls.20 million (US$ 1,900-2,500/year, US$ 160-208/month).

(2) Debt

Table A5.3.12 shows the results of the survey on the farm economy of 128 farm households in the Study Area. The results of the farm households' survey are described below.

1) Generally, there are many farmers who have debts in four prefectures. The portions of them are 100% in Gorgan and Kordkuy Prefecture, 23-50% in Bandar-e-Torkman Prefecture depending on farm scale, and 34-45% in Aq Qala Prefecture depending on farm scale, respectively.

2) Creditors are banks, cooperatives, wholesalers, consignment loan lenders, relatives, and money lenders.

3) Each prefecture has characteristics. Main creditors are banks, cooperatives, and money lenders in Gorgan and Kordkuy Prefecture. It is remarkable that the debt from banks is very large. In case of the farmers whose farm scale is small, they borrow supplemental money from relatives and money lenders in all of the prefectures.

4) In both of Bandar-e-Torkman and Aq Qala Prefectures, the farmers have the debt from consignment loan lenders besides from cooperatives, relatives, and money lenders as well as Kordkuy Prefecture. The farmers whose farm scale is less than 10ha has debt except from banks.

5) Repayment situation of debt is summarized later, but if the repayment situation is classified into 4 stages: normal, reschedule, overdue and requiring of legal instance, the repayment situations of all farmers to banks are overdue or requiring of legal

instance. This means the debt is not paid off and they are in severe condition. The repayment situations of overwhelming majority of farmers to cooperatives, consignment loan lenders, and money lenders are also overdue and requiring of legal instance.

(3) Farm Economy of Tazeh Abad Project Area

According to the farm households' survey of 7 farmers in project area in July of 2002, the farm scale of the surveyed farmers were ranged 4 to 65 ha, and 4 farmers raised livestock. The compositions of animal husbandry in total annual gross income in the households were ranged from 10 to 25%. Besides, the compositions of non-agricultural incomes were ranged from 12 to 51%. In production of agriculture and animal husbandry, all farm economies of farmers were in black. However, the annual farm household expenditures were ranged from about 10 to 24 million Rls., therefore, 4 households were in red in farm household economy (Table A5.3.13).

At present, the project area is suffered by serious shortage of irrigation water and by drought. As farmers cannot count on crop production, it seems to expect on animal husbandry. Almost of farmers intends to introduction of milk cows of 2 to 20 heads.

With regard to debt conditions of the surveyed farmers in Tazeh-abad, 5 households in 7 households have debt from banks and RCO. Amount of debts are ranged from 1 to 13 million Rls. Repayment conditions of bank's credits are in normal in all farm households, however, repayment conditions of RCO loan are in legal instance in 2 farmers (Table A5.3.14).

A5.4 Agricultural Extension

A5.4.1 Provincial Level

There is an extension section in the Golestan Agriculture Organization, as a lower branch of the extension section of the Ministry of Agriculture. The extension section of the province is the headquarter of rural extension and has three persons in charge of management of the extension service centers, and seven persons in charge of technical practice, which consist of experts of agronomy, animal husbandry, soil, farming, extension, training, environmental pollution, etc. The section has the coordination council to resolve the agricultural problems, which consists of staff of every section of the Organization and the meeting is held usually every three months. Each district also has the extension section and the coordination council.

The system of extension management is shown in Fig. A5.4.1.

There are 28 provincial extension service centers in Golestan province. Besides, there are 56 of the extension service centers established in villages (*Dehestan*) and large communities (*Dehe*). In villages or communities without the extension service center, one extension worker

alone carries out the extension activities. The total number of extension workers is 264 persons.

The extension workers are divided into three categories, namely, public officials, military servicemen, and volunteer persons. In province, district, and village (*Dehestan*), all extension workers are the public officials. On the other hand, in communities (*Dehe*), the extension workers of all categories are mobilized to carry out extension activities.

According to the extension official, the most important problem on the extension activity is the present extension system, which is the American system and is not fit in the present socio-economic conditions of Golestan province. The efficiency of extension activities for farmers is now very low. That is to say, training for farmers becomes stereotyped and is not fresh. The range of trainees is not spread out and the effects of training are slow. It is necessary to reconsider the extension and training activities under the new concept of extension, on which young men and women have interest. To introduce the new concept and extension system, the officer hopes to improve the Japanese extension concept and system to the original system of Iran by the cooperation of JICA.

A5.4.2 Extension in the Study Area

Organizational structures, activities and problems of 5 Dehestan Extension Service Centers are described by Center.

(1) Anbar Olum Extension Service Center in Aq Qala Prefecture

1) Organizational structure and activities

The Center consists of totally 11 technical staffs: 4 of them are graduated from university and 7 of them are technicians. Adding to them, there are three more staffs. So, grand total is 14. One extension worker is in charge of 6,500ha/4 persons (1,625ha/ person) as for cotton and 13,000 ha/3 persons (4,300ha/ person) as for wheat.

2) Problems

The number of extension workers is enough, but human resources are not sufficient. The Center has three cars but one of them is out of order. Budget is not enough.

(2) Central Extension Service Center in Aq Qala Prefecture

1) Organizational structure and activities

According to the standard of Ministry, appropriate area of farmland which is covered by one extension worker is 1,500ha but that is 10 times of the standard, 15,000 ha in the Center.

The Center consists of totally 11 technical staffs including Head of the Center (4 of them are

graduated from university, the other 4 of them are graduated from high school and took 2-year training, and the rest, 3 of them are technicians graduated from high school) and one office clerk. Sections are extension, cotton, plant protection (agricultural chemicals, damage of pest, and weed), farming and fruits trees, statistics, mechanization and clerical work. Technical staffs also do office work, so they do not have time to extend.

2) Problems

The Center has three cars and one motor bike (out of order). The staffs are busy due to approving farmers' purchasing of subsidized agricultural chemicals. The Center recommend farmers to use agricultural chemicals and farmers can buy them at cooperatives and shops at low price. So, the farmers rush to the Center and the staffs are very busy with this. In the near future, this work is transferred to private sector. Moreover, extension is inefficient (many farmers do not come). And a number of extension workers and experts is not enough although the area in charge is large.

(3) Banavar Extension Service Center in Bandar-e-Torkman Prefecture

1) Organizational structure and activities

The Center consists of totally 4 technical staffs: 2 of them are graduated from university and 2 of them are technicians. Adding to them, there are four office clerks. So, grand total is 8.

2) Problems

One of the staffs from Jihad and a regular staff but the others are contracted workers on a one-year contract and unstable. The Center does not have opportunities to train the staff. Budget is not enough. A number of staff is small. The Center has three cars but old.

(4) Central Extension Service Center in Bandar-e-Torkman Prefecture

1) Organizational structure and activities

Because of merger of Ministries of Jihad and Agriculture, the organization structure is not fixed yet. The Center consists of totally 6 technical staffs: 3 of them are graduated from university, 1 of them is graduated from high school and took 2-year training, and the other 1 of them is cotton technician. Adding to them, there are three office clerks and two drivers. So, the grand total is 11.

2) Problems

Head of the Center from Jihad and a regular staff but two experts are contracted workers on a one-year contract and unstable. The Center has two cars but old. They have opportunities to train staff (10-20 weeks). A number of staff is enough. Because there are many illiterate farmers, there is a problem of extension. It is not effective if a number of extension workers

increases.

(5) Garji Mahaneh Dehestan Extension Service Center in Kordkuy Prefecture

1) Organizational structure and activities

The Center consists of totally 51 technical staffs including Head of the Center. Sections are extension, cotton cultivation, plant protection (agricultural chemicals, damage of pest, and weed), crop cultivation except cotton, statistics, mechanization and clerical work. Technical staffs also do office work, so they do not have time to extend.

2) Problems

A number of cars is not enough. And a number of extension workers and experts are not enough although the area in charge is large. Office is small. They do not have a copy and fax machines and even telephone.

A5.4.2 Extension in the Tazeh Abad Project Area

At present, agricultural extension for farmers in the Peivand RCP is mainly carried out by the Anbar Olum Extension Service Center through the management of the Peivand RCP. To manage the extension activities, there is two staff of the RPC, of which one is the leader (agronomist, Province Government employee) of RPC and another is agronomist. The two agronomists of RCP carry out to communicate the training courses planned by the Extension Service Center, to make schedules of training courses of each Deh, to invite farmers to participate, and to arrange the place of training.

The actual extension activities in the RCP are as follows;

1) The plan of training courses is presented by the Extension Service Center every 3 months. RCP communicates to the Extension Service Center on a schedule and participants and arranges to open the training courses. Trainers are the specialists of the Extension Service Center. In 2001, 56 training courses were carried out in the Peivand RCP, and participants of the training courses were 1,417 man-hour in total.

2) The RCP has the trial fields and the exhibition fields of 5 to 6 ha to transfer the cultivation techniques to farmers. In 2001, selection trial of wheat varieties carried out in the trial field of 1 ha, and exhibition of cultivation techniques on 4 crops, such as wheat, barley, cotton, rape, is intended in the next year.

A5.5 Distribution of Agricultural Products and Marketing

A5.5.1 Control System of Prices for Agricultural Products

The Ministry of Agriculture makes a draft of prices of various agricultural products every year in consideration of some profits of producers in each crop production under many factors related to production. The draft is submitted to the Economy Council of Government, and the Council decides the guaranteed price of each crop this year. The relationship among the guaranteed price, the producer's price and production cost are shown in Table A5.5.1.

The products prices are decided by the wholesale market, except that of wheat, soybean, sunflower, tobacco and rape seed. The products of these five crops are directly purchased by the Government. In regard to the other crops, farmers cultivate only under consideration of the expected marketing prices. Therefore, the production of some crops increase often beyond government's expectation in some year, and the producers' prices of these crops drop sharply in this year. In this case, the Government purchases and stores the surplus products and controls the marketing quantity of these products. In such method, the Government controls the producers' price to be near the guaranteed prices. Besides, the Government does not pay the difference to farmers, even though the producers' price is less than the guaranteed price. In such price control methods, the Government carried out the market price control in the past for paddy rice, cotton, potatoes, onion, etc.

The following table shows the producers' price, wholesale price and consumers' price of main crops. In this table, the differences between wholesale prices and consumers' prices are small, but the differences between producers' prices and wholesale prices are variable due to market operation.

Prices of Products in Golestan Province (2000-2001)

Crops	Producers' price	Wholesale price	Consumers' price	Crops	Producers' price	Wholesale price	Consumers' price
	Rls/kg	Rls/kg	Rls/kg		Rls/kg	Rls/kg	Rls/kg
Wheat	539	990	1,099	Cabbage	900	883	1,151
Barley	720	970	1,057	Melon	619	1,129	1,506
Rice	4,825	5,898	6,825	Meize	600	1,095	1,205
Potatoes	1,217	1,276	1,575	Sunflower	1,800	2,685	2,120
Onion	700	1,212	1,591	Soybean	1,657	1,670	1,868
Tomato	330	1,144	1,508	Orange	1,500	1,628	2,115
Cucumber	555	1,565	2,000	Watermelon	375	800	1,028
Green peas	233	1,668	2,058				

Source: Golestan Jihad-e-Agriculture Organization

Table A5.5.2 shows the profit sharing between producers and wholesalers in 2000/2001. In this table, the profits of wholesalers are divided into three groups as follows:

1) Crop group in which the profits of wholesalers are small or fall: cotton, and leguminous crops, such as beans, pea, lentil, etc.
2) Crop group in which the profits of wholesalers are large: barley, paddy rice, maize, potatoes, onion, eggplant, cucumber, water melon, melon, etc.
3) Crops group in which wholesalers beat down the prices of products: barley, maize, green pea, etc.

To keep the stable and reasonable producers' price, it is necessary to sell products jointly by the cooperatives.

A5.5.2 Mechanism of Shipping of Agricultural Products and Purchasing of Farm Materials

Table A5.5.3 shows shipping routes of agricultural products and purchasing routes of farm materials based on the farm households' survey's results of 128 farm households.

(1) Shipping routes of agricultural products

Shipping of agricultural products and purchasing routes of farm materials are divided into 5 routes: wholesalers, traders/ private shops, cooperatives, public organizations/ public factories, and others. As for wheat, soybeans, rice, cotton, rape seed, and barley, the farmers use all of five shipping routes. Main shipping routes by crop are as follows:

1) Wheat: 85% of farmers ship to cooperatives or public organizations/ public factories.
2) Soybeans: 80% of farmers ship to cooperatives or public organizations/ public factories as well as wheat.
3) Rice: 80% of farmers ship to wholesalers and traders/ private shops.
4) Cotton: 41% of farmers ship to public organizations/ public factories. But the farmers also conduct a deal with all of the shipping routes.
5) Rape seeds: 78% of farmers ship to cooperatives. 22% of them ship to public organizations/ public factories.
6) Barley: 94% of farmers ship to wholesalers and trader/ private shops.

(2) Purchasing routes of farm materials

Purchasing routes of farm material by crop as follows:

1) Wheat: 91% of farmers purchase from cooperatives and public organizations/ public factories.
2) Soybeans: 93% of farmers purchase from cooperatives or public organizations/ public factories.
3) Rice: 40% of farmers purchase from wholesalers, and 50% of them purchase from cooperatives and public organizations/ public factories.
4) Cotton: 79% of farmers purchase from cooperatives and public organizations/ public factories.
5) Rape seeds: 100% of farmers purchase from cooperatives and public organizations/ public factories.

6) Barley: 52% of farmers purchase from trader/ private shops and 37% of them purchase from cooperatives.

It is not clear in this survey whether cooperatives refer to RPCs or RCO among the shipping routes mentioned above. RPCs conduct administrative management on shipping and purchasing farm materials comprehensively but do not have transportation means in many cases. Therefore, it is not clear whether the farmers assume RPCs as cooperatives or they assume RCO as cooperatives because RCO is a final shipping route and purchasing route of farm materials when the farmers answer the question.

(3) Problems on the Marketing of Agricultural Products from the Viewpoint of Farmers

There are many problems on shipping and purchasing of farm materials. Specially, there is a strong possibility that lack of social condition, in other words, lack of the marketing systems of agricultural products and farm material hinder the increase of productivity in the Study Area.

A5.5.3 Products from Dehs and Outer Markets

This section examines the distribution of agricultural products and marketing through the situation of wholesalers, middlemen, and retailers in 4 Prefectures in the Study Area: Gorgan, Aq Qala, Bandar-e-Torkman, and Kordkuy.

(1) Products in Deh

1) Crop Production

According to the agricultural statistics in the year of 2000/ 2001, total cultivation area in 4 Prefectures was 211,878 ha, which shared 34% of total cultivation area in Golestan Province. The total agricultural production in the same year was 656,149 ton, which shared 39% of total production in the Province. Among the cultivated land, orchards occupied 4,567 ha, consisting of 25% in the Province, and they produced 37,200 ton, 39% of total orchards' production of the Province.

From the viewpoint of production variety, Kordkuy produces the most varied agricultural products. On the other hand, that of Bandar-e-Torkman is not much verified. The products of these prefectures are differed because the climatic condition and soil quality are quite different from the northern to the middle parts of the Province. Aq Qala and Bandar-e-Torkman Prefectures are located in the northern part of the Province and produce small varieties of products compared to Korkuy and Gorgan Prefectures located in the middle part of the Province. Kordkuy and Gorgan Prefectures mainly produce vegetables, summer patch products (water melon and melon), and orchard products.

The main products of Aq Qala and Bandar-e-Torkman Prefectures are wheat, barely, cotton and sometimes patch products. In case of cotton production, contract cultivation is popular. The contract is made between farmers and cotton factories or the middlemen who are entrusted by the factories. There are two types of the contract cultivation: 1) The middlemen estimate the harvest and its sales' value and pay the farmers 50-60% of the estimated sales before harvesting. After harvesting, the farmers can gain the rest of the sales calculated based on the real price in the market at that time, or 2) Farmers can gain the full sales estimated before harvesting (usually at the beginning of growing). The contract cultivation is also seen in barely production sometimes.

(2) Stock Farm Products

Major stock farm products in the Study Area are sheep, cattle, poultry, and dairy products. The number of livestock has been raising and it shares about 30% of total number of livestock in Golestan Province. In Aq Qala and Bandar-e-Torkman, sheep is in the majority of the livestock. Red meat, dairy products, and white meat (chicken) occupy about 29%, 36% and 50% respectively of the total in Golestan Province.

1) Rural Supporting Industries

a) Agricultural processing products

According to the result of the statistical survey for agricultural processing industry, the number of factories and workers for agricultural processing industry is relatively small, compared to the other provinces in Iran. Its share remains around 1% of national total at present.

Agricultural Processing Industry in Golestan Province

No.	Type/ Name of Processing Industry	Number	Product	Annual Production (t)
1	Flour milling factory	30	Flour Wheat bran	743,850 74,370
2	Cotton factory	26	Cotton Linter Hydro filtered cotton Ginned cotton	106,915 7,044 11,312 336
3	Oil processing factory	3	Cotton seed oil	27,100
4	Macaroni factory	15	Macaroni	36,870
5	Rice miller	92	Milled rice	63,120
6	Gorgan processing factory	1	Canned food, jam, canned fruits	11,600
7	Golcheshmeh processing factory	1	Apple juice, canned fruits, jam, salted cucumber	5,280
8	Goldasht processing factory	1	Lemon juice (for cooking)	300

			Canned food (except meat)	1,000
			Pickles	150
			Syrups of fruits	500
			Jam	300
9	Shelgun	1	Nuts Corn paste	950 250
10	Taro-pood Co.	1	Soy bean oil Oil cake	286 1,782
11	Paste Factory	7	Tomato paste	29,096
12	Gorgan Soya (Soy bean) Co.	1	Processed soy bean	1,350
13	Tobacco factory	1	Tobacco	3,000
14	Bread factory	7	Bread	1,205
		187		1,133,966

Source: Industrial Organization Golestan

According to the table above, there are 187 agricultural processing factories and total amount of production is 1,133,966t/ year. Main productions are flour, cotton and milled rice. Among the agricultural processing factories in Golestan Province, the shares of flour factories, cotton factories, and rice millers in number are 16%, 14%, and 49% (totally 79%) relatively. Likewise, among total processing production amount, the shares of flour, cotton, and milled rice are 65%, 9.4%, and 5.5% relatively. Considering the capacity of agriculture in Golestan Province, it can be a center of agricultural processing industry in Iran in the future. The production of oil seeds and cotton takes the first and of wheat and rice takes the fourth and the fifth places respectively in Iran. Nevertheless, it is difficult to be realized due to the problem on the credit for agricultural processing industry. Moreover, the capacity of 4 Prefectures in the Study Area is now under the study conducted by government.

b) Stock farm processing products

Stock farm processing industries are described in the table below.

Processing Industries Related to Stock Farm Products in Golestan Province (2000-2001)

Items	No.	Capacity unit	Nominal capacity	Remarks
1. Feed processing plant	5	tons /year	271,500	4 units in operation
2. Dairy factories	13	N.A.	6,900	3 units under construction
3. Leather and fur	3	pieces /year	657,336	-
4. Wool spinning factories	1	tons /year	160	-
5. Meat processing factories	4	tons /year	9,350	3 units under construction
6. Complementary nutrients factories	4	tons /year	19,000	1 units under construction
7. Industrial slaughterhouse for poultry	3	tons /year	N.A.	-
8. Honey packing	1	N.A.	N.A.	Under construction
Total	72	-	-	-

Source: Jihad-e-Agriculture Organization, 2002

A5.5.4 Mechanism from Deh to Markets

(1) Agricultural Products

1) General

With regard to market condition of agricultural products, there is one big wholesale market in the easily accessible part of Gorgan City. There are about 150 wholesalers dealing in distribution of agricultural products. This market plays a role of the central market for 4 prefectures and takes part in trading a great portion of their products.

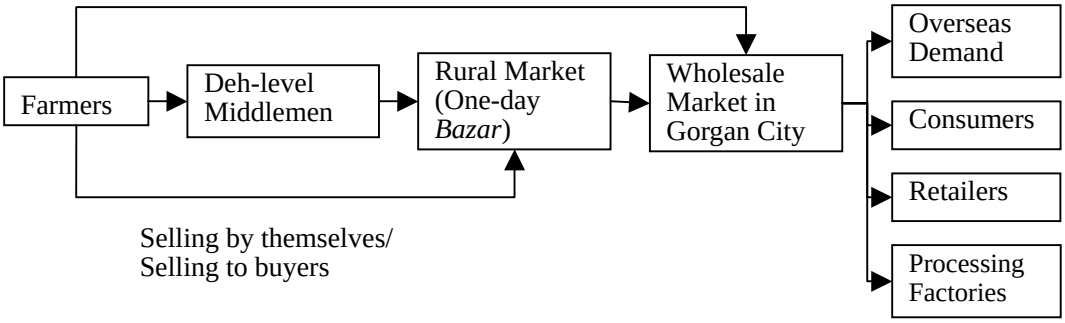
2) Market Mechanism and Marketing Channels

The mechanisms of trading agricultural products in 4 Prefectures are similar. But marketing channels are different by product. The price of the products is commonly determined by market mechanism, demand and supply, except wheat, soybeans, sunflower, rapeseeds, and sometimes cotton and rice. In the wholesale market in Gorgan City, the prices of the products are determined by wholesalers. They decide the prices through seeing the volume of arrived products (the number of trucks) every morning. There is not auction and sorting systems for setting the prices. Moreover, it is not enough but information of the market price can be taken through radio and TV. General market mechanism of each product in 4 Prefectures is as follows

a) Fruits and vegetables

Farmers transport and sell their products directly to/in rural and the central wholesale market in Gorgan City by their own or rent vehicles. Middlemen also buy their products and sell them to markets. This is popular in the prefectures located in the northern part of Golestan Province: Aq Qala and Bandar-e-Torkaman because most of the farmers do not have transportation means. In case of tomatoes, the contract cultivation with processors (processing factories) is not so rare, especially in case of large farmers. Classification or screening of the fruits such as apples and oranges is implemented just for export. Moreover, it should be mentioned that most of the fruits and vegetables dealing in the central whole market in Gorgan City are shipped to big cities' markets outside of Golestan Province such as Tehran, Esfahan, and Tabriz and etc.

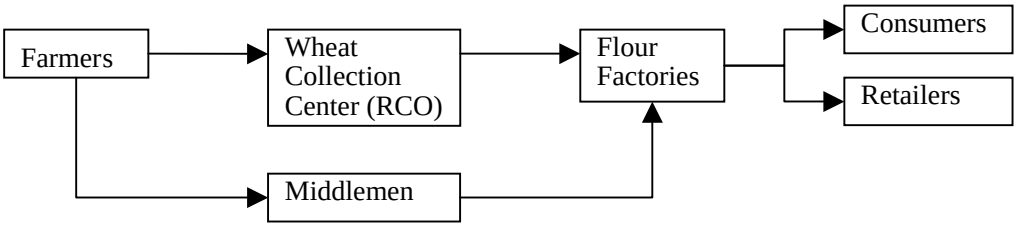
Marketing Channel of Fruits and Vegetables



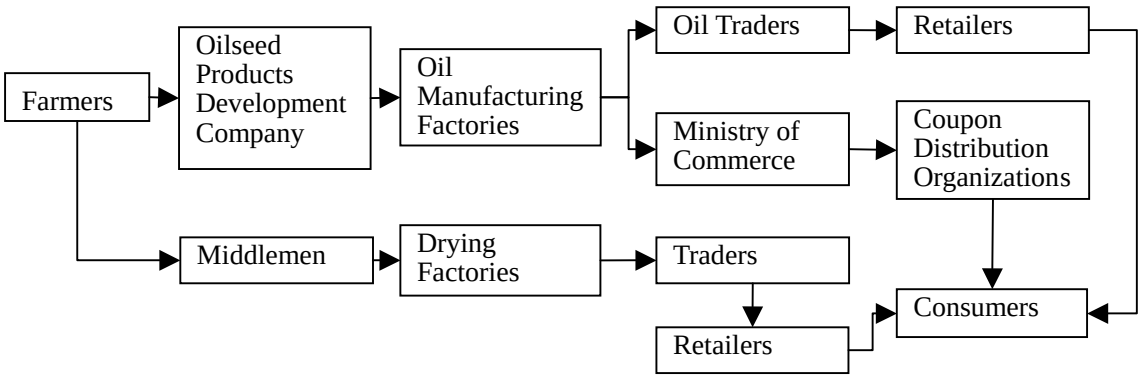
b) Wheat, sunflower, soybeans and rapeseeds

Wheat, soybeans, sunflower, and rapeseeds are under full governmental support including the gurranteed purchasing system because these crops are staples for Iranians. In case of wheat, farmers need to bring their products to the designated place, a wheat collection center of RCO (Rural Cooperative Organization) after their harvest. In the center, the quality of wheat (humidity, amount of admixture and etc.) is carefully examined. Then, the farmers get the quality-based price. Meanwhile, some farmers try to sell their products to local middlemen due to lack of cash. These middlemen established their offices in rural or sometimes urban areas for dealing with agricultural products. As for rapeseeds and soybeans, a semi-governmental corporation, named Oilseed Production Development Company buys them at gurranteed prices determined by Economic Council. The Company sells them to oil manufacturing factories which operated by governmental funds such as The Oppressed Fund. Around 80-85% of sunflower goes as well as rapeseeds and soybeans, but the rest, 15-20% of that is purchased by middlemen for eating as snacks. It is noted that around 95% of oilseed products are exported.

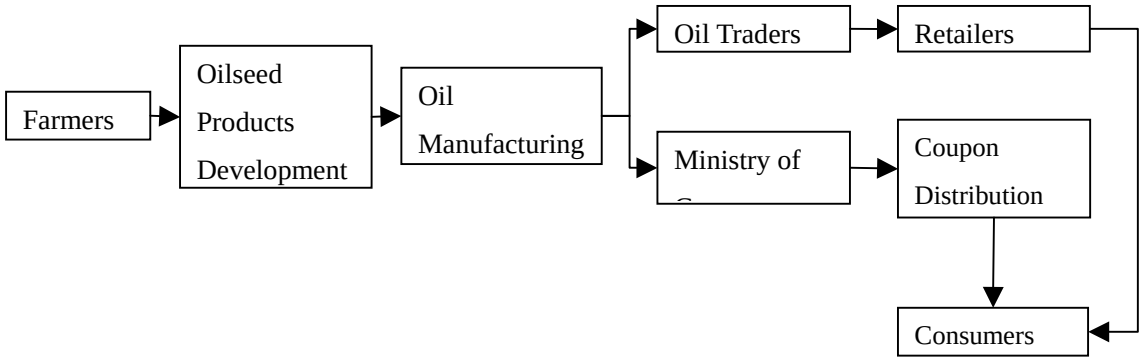
Marketing Channel of Wheat



Marketing Channels of Sunflower



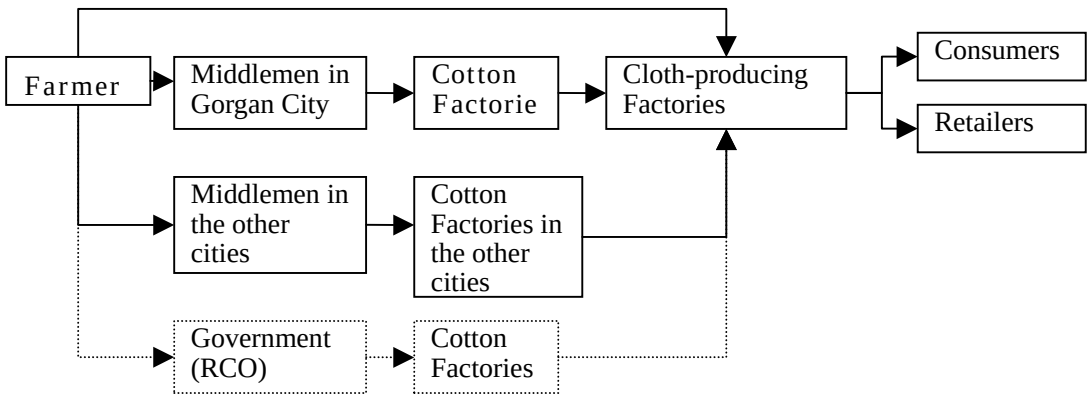
Marketing Channels of Soybean and Rapeseed



c) Cotton

Cotton also has a special protection from government. Government intervenes in buying when the market price sharply goes down.

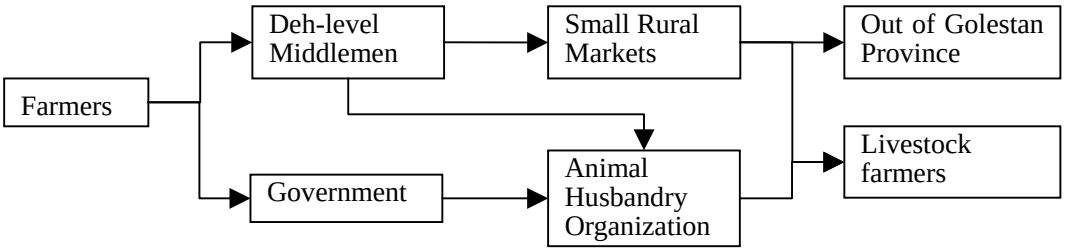
Marketing Channel of Cotton



d) Barely

Barely is mainly cultivated as fodder for domestic animals. Most of barely producing farmers engage in animal husbandry and so they sell the surplus of their production. Sometimes, irrigated barely are sold to Islamic beer factories.

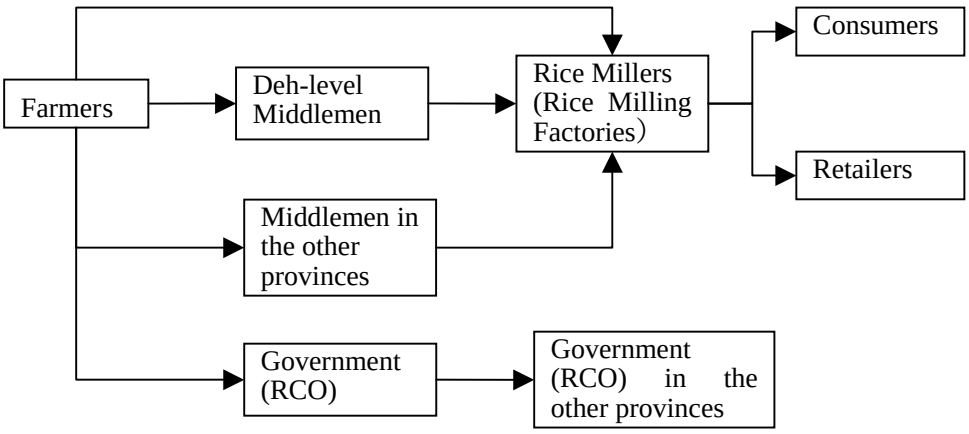
Marketing Channel of Barley



e) Rice

Rice production has been increasing recently. It is one of the most important products in the Province. Many rice milling factories have been established to ease the cleaning process and get it ready for consumers. The trading of rice is mainly dealt by farmers but middlemen also buy and sell rice to rice milling factories. And then, middlemen sell polished rice to retailers and consumers in the Province. Recently, some middlemen have come from Mazandaran Province and bought the rice in this Province. In addition, RCO (Rural Cooperative Organization) also buys three varieties of rice whose production is large: Neda, Haraz, and Hazel. The other varieties do not have guaranteed prices.

Marketing Channel of Rice



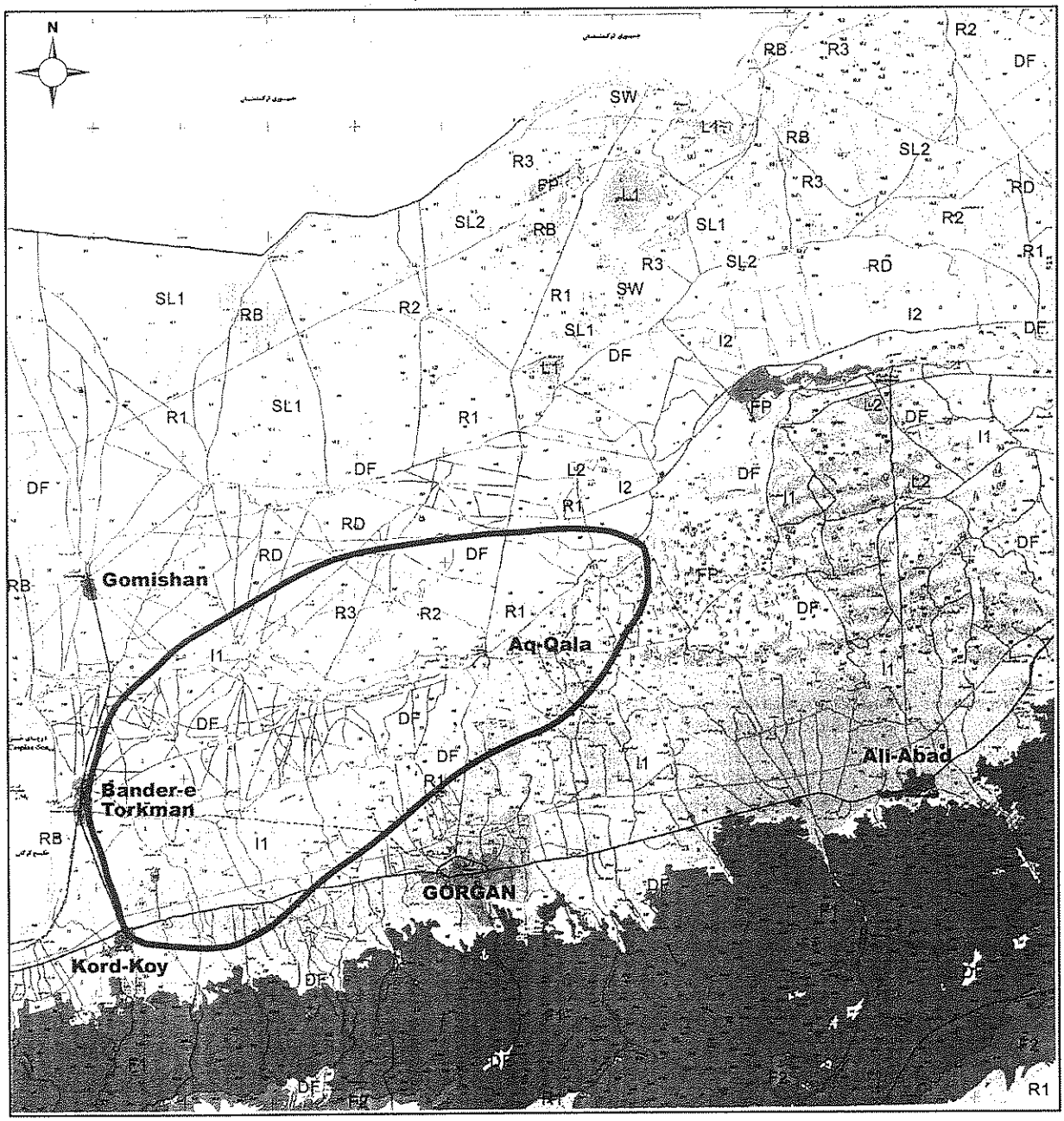
2) Stock farm products

All of the stock farm products are dealt at free market prices. However, RCO buys milk at the guaranteed price when it is oversupplied.

A5.5.5 Problems and Constraints on Marketing

The problems and constraints on agricultural marketing are listed as follows:

a) Most of the middlemen who deal with agricultural products are illiterate or remain at low educational level,
b) The middlemen's knowledge on their business is low and so their activities are limited,
c) Transportation means are too short to transport the products due to large production in the Province,
d) Shipping cost is high,
e) Storage facilities are not enough, especially for selling the products at the highest price,
f) Pricing is difficult due to the lack of the standards for agricultural products,
g) The number of cooperatives which deal in agricultural marketing is not enough for creating job opportunities for unemployed persons,
h) There is not training on modern management and sales for wholesalers,
i) There is not insurance for damages and robbery of the agricultural products dealt by wholesalers,
j) The budget of those who deal in agricultural distribution business is low and it causes the limitation of their activities,
k) Domestic and international market information is not sufficient,
l) The number of a large market is too small to support farmers in the meaning of obtaining markets, and
m) Quality of some products is low due to not setting proper price because of lack of classification process.
n) Problems in distributing poultry meat and eggs;
   - No proper managements in distribution chicken meat
   - Big difference of price at farm gate and market
   - Fluctuation in price has an economical reason.
   - Fluctuation in price of egg depends on market need



LEGEND

AGRICULTURAL AREA
- I1 Without limitation/Low limitation
- I2 With limitation
- DF Dry farming

RANGE LAND
- R1 High density
- R2 Medium density
- R3 Low density
- RD Mixed range/Dry farming

WET LAND
- RB Reed bed
- SW Swamp

FOREST/WOOD LAND
- F1 High density forest
- F2 Medium density forest

SURFACE WATER BODIES
- L1 Dam lake
- L2 Reservoir
- FP Fish pond

BARREN LAND
- SL1 Salty land without vegetation

Fig.A5.1.1 Land use map of the Study Area

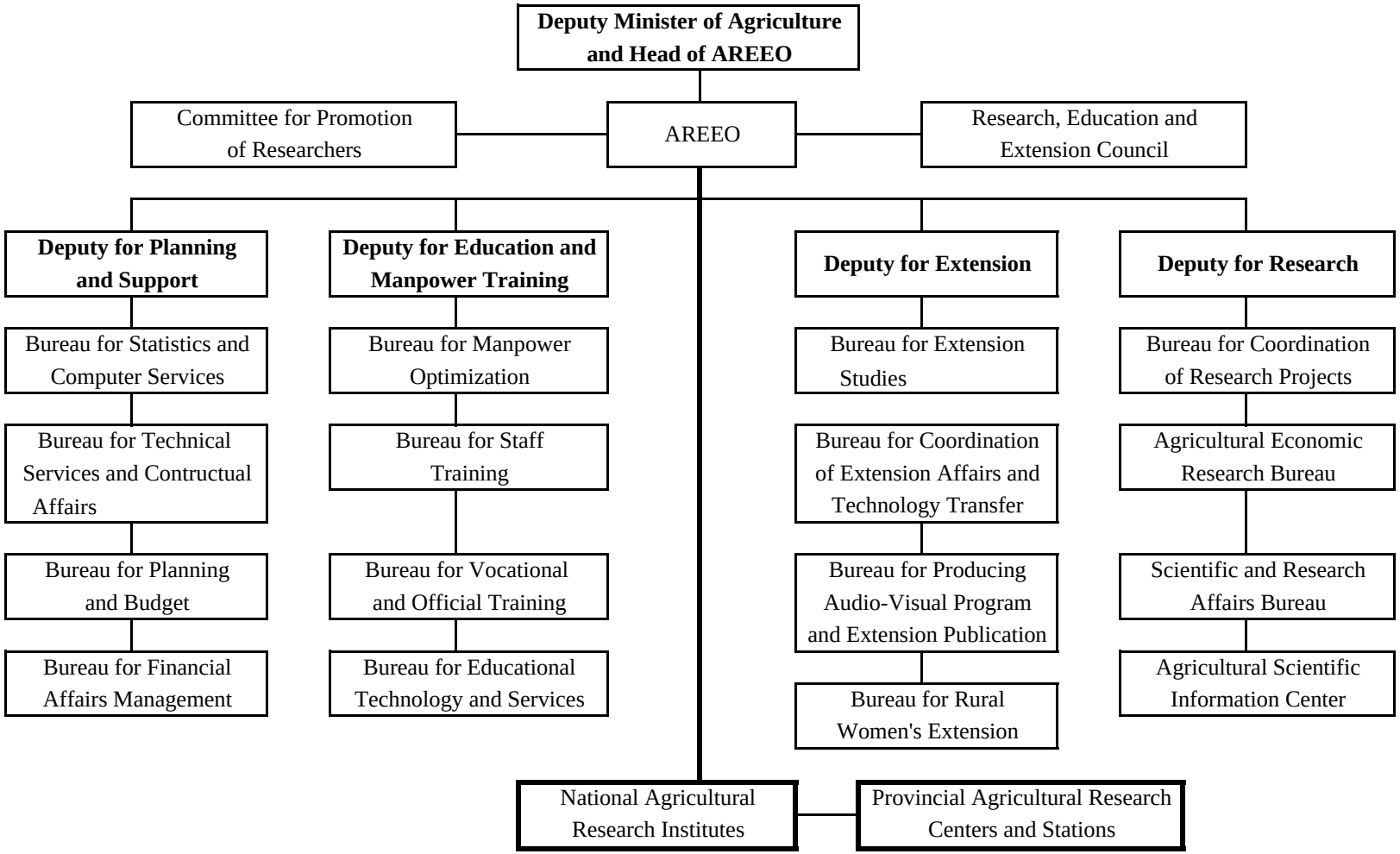


Fig.A-5.1.1 Agricultural Research, Education and Extension Organization

Table A-5.1.1 Cultivation Method and Production Cost (wheat under rain-fed condition, average in Golestan Province, 2000~2001)

Farm Materials					
Items	Unit	Quantity per ha	Unit price Rls	Cost Rls/ha	Remarks
Sterilizing seeds	g	180	11,300	203,400	
Fertilizer (phosfate)	kg	100	450	45,000	
Fertilizer (Urea)	kg	75	315	23,625	
Pesticide	kg	2	14,000	28,000	Sevine
Herbicide	litter & kg	1 lit. + 15 g	79,400	79,400	Topic, grand Star
Insurance due				8,000	
Field rent				900,000	
Interest of debts				81,196	8 months, 8% of rate
Farm Works					
Items	Unit	Number of times	Unit price Rls	Cost Rls/ha	Remarks
Plowing		1	50,000	50,000	
Disc harrow		2	25,000	50,000	
Sowing (drill)		1	40,000	40,000	
Transporting seeds and fertilizer			15,000	15,000	
Fertilization		2	15,000	30,000	
Spraying pesticide		2	25,000	50,000	
Harvesting (with combine)		1	10,000	10,000	
Transporting products to market				13,000	
Total cost				1,626,621	
Income by sale of straw				234,000	130packs, each 1,800 Rls.
Net production cost				1,392,621	

When yield is 1,405 kg/ha, and producer's price is 875 Rls/kg, the gross income poer ha is 1,229,375 Rls. Therefore, the net income is -163,246 Rls/ha.

The gross income, production cost and the net income per kg are 875 Rls/kg, 991 Rls/kg and -116 Rls/kg, respectively. The net income is about -13% of the gross income, and about -12% of the production cost.

Table A-5.1.2 Cultivation Method and Production Cost (Cotton under irrigation, average in Golestan Province, 2000~2001)

Farm Materials					
Items	Unit	Quantity per ha	Unit price Rls	Cost Rls/ha	Remarks
Seed	kg	40	2050	82000	
Fertilizer (phosfate)	kg	100	450	45,000	
Fertilizer (Urea)	kg	150	315	4,725	
Fertilizer (Potasium)	kg	75	380	28,500	
Irrigation water charge	hours	28	30,000	840,000	6 inch well, 7 hrs x 4 times
Pesticide	kg	12	20,000	240,000	
Herbicide	litter	2.5		28,500	Sonalan
Insurance due				14,000	
Field rent				220,000	
Interest of debts				123,430	8 months, 8% of rate
Farm Works					
Items	Unit	Number of times	Unit price Rls	Cost Rls/ha	Remarks
Plowing	ha	1.5	75,000	112,500	
Disc harrow	ha	4	37,500	150,000	
Sowing (drill)	ha	1	40,000	40,000	
Making drain	ha	1	30,000	30,000	
Pesticide	ha	1	30,000	30,000	
Transporting seeds and fertilizer	ha	1	12,000	12,000	
Fertilization	ha	2	15,000	30,000	
Weeding	ha		-	559,000	Manual (33 personsx13,000
Cultivator	ha			25,000	| Rls), car(8,000Rls)
Spraying pesticide	ha	4	30,000	120,000	| and oversee worker (50,000 Rls)
Irrigation		4	30,000	240,000	Manual (4 times x 2 persons)
Harvesting (with combine)	ha			945,000	Manual (labor 57 x 15,000Rls,
Transporting products to market	kg	2,200	40	88,000	| oversee worker 3 x 25,000Rls, car
Other cost				295,400	| 8,000Rls
Profit of fund				271,380	
profit of management				647,353	
Other cost				295,400	
Total cost				5,517,188	

When yield is 2,200 kg/ha, and producer's price is 3,127 Rls/kg, the gross income poer ha is 6,879,400 Rls. Therefore, the net income is 1,362,212Rls/ha.

The gross income, production cost and the net income per kg are 3,127 Rls/kg, 2,508 Rls/kg and 619 Rls/kg, respectively.

The net income is about 20% of the gross income, and about 25% of the production cost.

Table A-5.1.3 Cultivation Method and Production Cost (Potatoes under irrigation, average in Golestan Province, 2000~2001)

Farm Materials					
Items	Unit	Quantity per ha	Unit price Rls	Cost Rls/ha	Remarks
Seed	kg	350	10,000	3,500,000	
Fertilizer (phosfate)	kg	400	450	180,000	
Fertilizer (Urea)	kg	250	315	78,750	
Fertilizer (Potasium)	kg	300	380	114,000	
Irrigation water charge	times	3	200,000	600,000	
Pesticide	liter	2	30,000	60,000	
Herbicide	liter	3.0	8,640	25,920	
Fungicide	liter	2.0	7,500	15,000	
Bagging and packing materials	nos	500.0	120	60,000	
Field rent				1,500,000	
Interest of debts				363,750	7 months, 9% of rate
Farm Works					
Items	Unit	Number of times	Unit price Rls	Cost Rls/ha	Remarks
Plowing	ha	1	100,000	100,000	
Disk harrow	ha	3	37,500	150,000	
Cutting of seeds	ha	1	60,000	60,000	Manual, 5 persons
Sowing (drill)	ha	1	150,000	150,000	
Transporting seeds and fertilizer	ha	1	80,000	80,000	Qn. 3,850kg
Fertilization	ha	2	30,000	60,000	
Weeding	ha		-	120,000	Manual (8 personsx15,000)
Molding	ha	1	60,000	60,000	
Irrigation		3	25,000	75,000	
Cutting tops	ha	1	70,000	70,000	
Harvesting (with tractor)	ha			130,000	
Assistants of harvesting	ha	1		370,000	20 persons
Transporting products to market	kg	15,000		500,000	
Total cost				8,422,420	

When yield is 15,000kg/ha, and producer's price is 730 Rls/kg, the gross income poer ha is 10,950,000 Rls. Therefore, the net income is 2,527,580 Rls/ha.

The gross income, production cost and the net income per kg are 730 Rls/kg, 561 Rls/kg and 169 Rls/kg, respectively. The net income is about 23% of the gross income, and about 30% of the production cost.

Table A-5.1.4 Prices of Farm Machinery and Farm Materials (1992-2001)

Year	Farm Machinery (1,000 Rls.)				Chemicals (Rls.)						Fertilizer	
	Tractor Fergusson 285	Sower	Combine	Pump 4 cylinders	Sevin Rls./kg	Andusulfa Rls./liter	Novacron Rls./liter	Treflan Rls./liter	Tofordy Rls./liter	Granstar Rls./50 g	Urea Rls./kg	Phosfate Rls./kg
1992	5,050	1,200	12,000	1,791	523	482	517	469	400	55,798	19	22
1993	9,638	2,700	29,075	2,200	2,615	2,410	2,585	2,345	2,000	278,990	95	110
1994	21,630	2,700	87,660	3,600	4,840	4,660	4,780	2,930	2,500	348,738	95	110
1995	26,826	4,714	88,515	7,673	8,000	7,360	7,890	4,400	3,120	436,500	150	190
1996	26,826	7,960	95,461	7,673	8,000	7,360	7,890	4,400	3,120	436,500	210	270
1997	34,190	7,960	116,390	9,700	8,000	7,360	7,890	4,400	3,120	436,500	224	292
1998	34,190	7,960	116,390	9,700	8,000	7,360	7,890	4,400	3,120	436,500	258	336
1999	46,460	7,960	131,300	18,000	10,400	9,600	10,250	6,200	3,900	545,650	315	450
2000	46,460	8,548	153,621	18,000	13,000	12,000	12,810	7,750	4,880	645,000	315	450
2001	51,106	9,403	153,621	19,800	13,000	12,000	12,810	7,750	4,880	645,000	345	495
Average annual increase rate during 10 years (%)	29	26	33	31	43	43	43	37	32	32	38	42

Source: Report of agricultural economy in Golestan Province, 2000-2001

TABLE A-5.3.1 Severe Conditions of the Survey Area (by interviewers of the hearing survey, 2002)

District	Natural condition	Social condition	Agricultural condition
Kordkuy	shortage of water		machine not available when needed
and		not receiving inputs on time	correct method of planting under climatically condition,
Gorgan		far distance to soil analysis laboratory/no soil analysis	no checked by Government Organization,
		labor cost	no fertilizing recommend
		unstable prices of products	no planning by farmers
		lack of budget and investment during plantation	lack of rotational cultivation
		lack of budget at beginning cultivation	renting machinery cost & shipping cost
		not enough budget for buying facilities	
Torkman	shortage of water	bad conditions of roads	lack of seeding machine
	salinity/alkalinity	fuel problem for pump any time	irrigation for all farm land
	barley is only cultivated because of salinity of soil.	expensive input	low level of mechanization
	drought	chemicals are too expensive to supply	machinery unavailable
		illiterate of farmers	weed in farm
		increase of conversation with farmers	lack of canal of irrigation and drainage
		low producer's price, and high input prices	change from traditional farming
		willing participate to RPC	poor technology
		not available input supply because of loan problem	heavy tractor pulled subsoiler
		shortage of machinery and fuel	old equipment
		not available input supply because of loan problem	disease and pests are increasing year by year, especially the Locust, so that cotton is impossible to cultivate now.
Aq Qala	shortage of water	shortage of budget	occurrence of disease(Patogene)) on harvesting time
	monsoon hot wind (blasting)	shortage of machinery	lack of canal of irrigation and drainage
	lack of irrigation water at sowing time	shortage of chemicals (pesticides)	no suitable varieties for the soil and water
	hardness of soil due to heavy soil texture	unbalance between producers' price and cost	wind problem (blasting phenomenon by monsoon wind)
	salinity	bad road between farms and main roads	gamble cultivation
	lack of irrigation water at required time	bad condition for commercialization	poor efficiency of weed control chemicals
		shortage of inputs	no organic matter in soil
		non sufficient investment because of small-scale farming	just only one time in irrigation, even though need of 3 times
		financial problem: banks refuse to lend for irrigation	no effect of herbicides
		facilities and repairs of wells.	shortage of agricultural equipment
		shortage of facilities	low level of land surface
		small scale farming (inheritance law)	security in the well
		security in the well	moter pump facility

TABLE A-5.3.2 Farmers' Evaluation on production Factors (average, 2002)

District Kordkuy						District Gorgan					
Farm scale	1.5		4.3		7.1		2.3		4.7		8.0
Access to technology	1.0	Producer price	1.0	Access to technology	1.0	Access to technology	1.0	Input price	1.0	Access to rural credit	1.3
Transportation cost	1.0	Input price	1.0	Access to rural credit	1.0	Interest rate	1.0	Access to rural credit	1.0	Interest rate	1.3
Mechanization cost	1.0	Access to rural credit	1.0	Interest rate	1.0	Access to rural credit	2.0	Interest rate	1.0	Mechanization cost	1.3
Technology of dry farming	1.1	Interest rate	1.0	Technology of dry farming	1.0	Appropriate technology	2.0	Mechanization cost	1.3	Producer price	1.7
Producer price	1.3	Technology of dry farming	1.0	Producer price	1.3	Technology of dry farming	2.0	Appropriate technology	1.5	Input price	1.7
Input price	1.3	Access to technology	1.2	Input price	1.3	Mechanization cost	2.0	Technology of dry farming	1.5	Appropriate technology	1.7

District Torkman									
Farm scale	2.0		4.8		9.2	Farm scale	15.7		27.9
Getting of irrigation water	1	Access to technology	1.4	Salinity and alkalinity of so	1.3	Access to rural credit	1.2	Interest rate	1.0
Access to rural credit	1	Getting of irrigation water	1.4	Interest rate	1.6	Getting of irrigation water	1.4	Producer price	1.2
Producer price	1.5	Access to rural credit	1.5	Access to rural credit	1.6	Interest rate	1.5	Access to technology	1.2
Input price	1.5	Interest rate	1.6	Technology of dry farming	1.7	Access to technology	1.5	Salinity and alkalinity of soil	1.3
Access to technology	1.5	Producer price	1.6	Access to technology	1.8	Appropriate technology	1.5	Getting of irrigation water	1.3
Appropriate technology	1.5	Salinity and alkalinity of soil	1.8	Appropriate technology	1.8	Mechanization cost	1.6	Access to rural credit	1.4
District Aq Qala									
Farm scale	2.4		4.7		7.9		15.8		40.3
Access to rural credit	1.0	Access to rural credit	1.1	Access to rural credit	1.2	Getting of irrigation water	1.4	Input price	1.0
Interest rate	1.3	Mechanization cost	1.5	Mechanization cost	1.2	Producer price	1.6	Getting of irrigation water	1.0
Getting of irrigation water	1.4	Appropriate technology	1.6	Interest rate	1.2	Interest rate	1.6	Appropriate technology	1.0
Appropriate technology	1.4	Getting of irrigation water	1.6	Technology of dry farming	1.3	Appropriate technology	1.7	Access to rural credit	1.0
Producer price	1.5	Interest rate	1.6	Access to technology	1.4	Technology of dry farming	1.7	Interest rate	1.0
Access to technology	1.5	Producer price	1.6	Appropriate technology	1.4	Access to technology	1.8	Technology of dry farming	1.0

Note: The figures show the average of 103 farmers' evaluation, which each farmer evaluates 1 to very problem, 2 to medium problem, and 3 to no problem on the each item.

TABLE A-5.3.3 Farmers' Evaluation on the Organizations Involved in Farming (average, 2002)

District Kordkuy						District Gorgan					
Farm scale	1.5		4.3		7.1		2.3		4.7		8.0
Bank	2.6	Market (public and private)	3.0	Bank	2.8	Market (public and private)	2.3	Market (public and private)	2.7	Bank	2.7
Rural Office (Province, district.)	2.5	Bank	2.8	Rural Office (Province, district.)	2.5	Rural Office (Province, district.)	2.0	Government	2.0	Rural Office (Province, district.	2.5
Market (public and private)	2.3	Rural Office (Province, district.	2.6	Market (public and private)	2.5	Association/Cooperative	2.0	Bank	2.0	Government	2.3
Government	2.1	Government	2.5	Association/Cooperative	2.3	Government	1.7	Association/Cooperative	1.7	Market (public and private)	2.3
Association/Cooperative	2.1	Association/Cooperative	2.0	Government	2.0	Bank	1.7	Extension activities	1.0	Association/Cooperative	1.7
Extension activities	1.9	Extension activities	1.5	Extension activities	1.5	Extension activities	1.3	Rural Office (Province, district.	1.0	Extension activities	1.0

District Torkman											
Farm scale	2.0		4.8		9.2	Farm scale	15.7		27.9		
Government	3	Rural Office (Province, district.	2.5	Bank	2.5	Rural Office (Province, district.)	2.3	Bank	3.0		
Bank	3	Bank	2.3	Market (public and private)	2.3	Market (public and private)	2.3	Rural Office (Province, district.	2.3		
Market (public and private)	2.5	Market (public and private)	2.0	Government	1.8	Government	1.9	Association/Cooperative	2.3		
Rural Office (Province, district.)	2	Association/Cooperative	1.8	Association/Cooperative	1.7	Extension activities	1.4	Market (public and private)	2.2		
Extension activities	1.5	Government	1.7	Rural Office (Province, district.)	1.4	Bank	2.3	Government	2.0		
Association/Cooperative	1	Extension activities	1.4	Extension activities	1.3	Association/Cooperative	2.0	Extension activities	2.0		
District Aq Qala											
Farm scale	2.4		4.7		2.9		15.8		40.3		
Bank	3.0	Market (public and private)	2.6	Market (public and private)	2.8	Market (public and private)	2.2	Bank	3.0		
Rural Office (Province, district.)	2.3	Rural Office (Province, district.	2.4	Bank	2.7	Bank	2.0	Market (public and private)	3.0		
Association/Cooperative	2.3	Bank	2.4	Government	2.5	Government	1.6	Association/Cooperative	2.7		
Market (public and private)	2.2	Government	2.2	Rural Office (Province, district.)	2.1	Rural Office (Province, district.)	1.3	Rural Office (Province, district.	2.5		
Government	2.0	Extension activities	1.9	Association/Cooperative	1.6	Association/Cooperative	1.2	Government	2.0		
Extension activities	2.0	Association/Cooperative	1.9	Extension activities	1.5	Extension activities	1.0	Extension activities	1.7		

Note: The figures show the average of 103 farmers' evaluation, which each farmer evaluates 1 to satisfactory, 2 to medium, and 3 to unsatisfactory on the each organization related to agriculture and animal husbandry.

TABLE A-5.3.4 Yield of Main Crops and Level of Technology in Cultivation (2001)

No. of Farmer	District	Deh	Wheat		No. of Farmer	District	Deh	Cotton		No. of Farmer	District	Deh	Barley	
			Yield (ton/ha)	Degree of technology				Yield (ton/ha)	Degree of technology				Yield (ton/ha)	Degree of technology
94	Aq Qala	attabad	3.50	8	94	Aq Qala	attabad	2.00	7	60	Aq Qala	Aghdagash	1.00	5
89	Aq Qala	yampi	3.00	8	95	Aq Qala	attabad	2.00	7	62	Aq Qala	Aghdagash	1.50	4
95	Aq Qala	attabad	3.00	7	5	Kordkuy	Yesaghi	1.05	7	43	Torkman	Banavar	2.40	3
16	Kordkuy	Mahtar Kalateh	2.75	7	75	Aq Qala	pirvash sofla	1.00	7	55	Torkman	Khaje nafas	2.00	3
90	Aq Qala	yampi	2.00	7	8	Kordkuy	Chahar	3.00	6	82	Aq Qala	sahnah sofla	2.00	3
75	Aq Qala	pirvash sofla	4.00	5	74	Aq Qala	pirvash sofla	3.00	6	31	Torkman	khojeh Khan	1.89	3
8	Kordkuy	Chahar	3.50	5	24	Torkman	Ghaleh	1.50	6	83	Aq Qala	sahnah sofla	1.50	3
30	Torkman	Ghaleh	3.50	5	76	Aq Qala	Gary	1.50	6	32	Torkman	khojeh Khan	1.20	3
45	Torkman	Banavar	3.50	5	97	Aq Qala	enghelad	0.37	6	66	Aq Qala	Chen sebly	1.00	3
59	Aq Qala	Tazeaba	3.00	5	17	Kordkuy	Mahtar Kalateh	2.50	5	84	Aq Qala	sahnah sofla	0.52	3
73	Aq Qala	pirvash sofla	2.60	5	22	Torkman	Ghaleh	2.40	5	41	Torkman	Banavar	4.00	2
64	Aq Qala	Aghdagash	2.00	5	7	Kordkuy	Alang	1.60	5	25	Torkman	Ghaleh	1.75	2
67	Aq Qala	Chen sebly	1.33	5	11	Kordkuy	Badil Abad	0.77	5	27	Torkman	Ghaleh	1.50	2
60	Aq Qala	Aghdagash	1.00	5	2	Kordkuy	Yesaghi	5.00	4	85	Aq Qala	sahnah sofla	1.43	2
98	Aq Qala	enghelad	0.87	5	10	Kordkuy	Badil Abad	2.17	4	33	Torkman	khojeh Khan	0.80	2
78	Aq Qala	Gary	0.80	5	88	Aq Qala	yampi	1.80	4	21	Torkman	Ghaleh	0.70	2
71	Aq Qala	Charanjic povlamar	0.50	5	13	Kordkuy	Gholam Abad	1.30	4	86	Aq Qala	sahnah sofla	0.50	2
43	Torkman	Banavar	0.36	5	96	Aq Qala	enghelad	1.10	4	34	Torkman	khojeh Khan	0.43	2
7	Kordkuy	Alang	4.00	4	52	Torkman	Gomishan	0.90	4	102	Aq Qala	mohammad abad pai	0.00	2
10	Kordkuy	Badil Abad	3.50	4	18	Kordkuy	Mahtar Kalateh	0.80	4	26	Torkman	Ghaleh	2.00	1
18	Kordkuy	Mahtar Kalateh	3.00	4	99	Aq Qala	amin abad	0.80	4	47	Torkman	Gomishan	1.85	1
22	Torkman	Ghaleh	3.00	4	20	Torkman	Ghaleh	0.20	4	52	Torkman	Gomishan	1.50	1
57	Aq Qala	Tazeaba	3.00	4	103	Aq Qala	mohammad abad pair	0.15	4	49	Torkman	Gomishan	1.18	1
53	Torkman	Khaje nafas	2.90	4	102	Aq Qala	mohammad abad pair	0.13	4	28	Torkman	Ghaleh	1.00	1
15	Kordkuy	Mahtar Kalateh	2.89	4	100	Aq Qala	amin abad	0.03	4	51	Torkman	Gomishan	0.87	1
72	Aq Qala	pirvash sofla	2.67	4	43	Torkman	Banavar	1.70	3	46	Torkman	Gomishan	0.80	1
23	Torkman	Ghaleh	2.62	4	34	Torkman	khojeh Khan	1.60	3	44	Torkman	Banavar	0.67	1
24	Torkman	Ghaleh	2.50	4	53	Torkman	Khaje nafas	1.50	3	29	Torkman	Ghaleh	0.50	1
40	Torkman	Banavar	2.50	4	50	Torkman	Gomishan	1.33	3	48	Torkman	Gomishan	0.07	1
41	Torkman	Banavar	2.44	4	3	Kordkuy	Yesaghi	1.00	3	36	Torkman	Banavar	2.75	0
80	Aq Qala	saghar yalghi	2.30	4	87	Aq Qala	yampi	0.25	3	71	Aq Qala	Charanjic povlaman	1.00	0
62	Aq Qala	Aghdagash	2.22	4	4	Kordkuy	Yesaghi	1.60	2					
9	Kordkuy	Chahar	2.00	4	93	Aq Qala	attabad	2.00	0					
12	Kordkuy	Gholam Abad	2.00	4										
27	Torkman	Ghaleh	2.00	4										
101	Aq Qala	amin abad	1.60	4										
1	Kordkuy	Yesaghi	1.50	4										
69	Aq Qala	Charanjic povlamar	1.00	4										
70	Aq Qala	Charanjic povlamar	1.00	4										
76	Aq Qala	Gary	0.95	4										
77	Aq Qala	Gary	0.83	4										
97	Aq Qala	enghelad	0.67	4										
88	Aq Qala	yampi	0.40	4										
100	Aq Qala	amin abad	0.03	4										
6	Kordkuy	Alang	0.00	4										
4	Kordkuy	Yesaghi	3.40	3										
5	Kordkuy	Yesaghi	3.33	3										
11	Kordkuy	Badil Abad	3.33	3										
51	Torkman	Gomishan	3.00	3										
52	Torkman	Gomishan	3.00	3										
13	Kordkuy	Gholam Abad	2.72	3										
66	Aq Qala	Chen sebly	2.67	3										
3	Kordkuy	Yesaghi	2.50	3										
50	Torkman	Gomishan	2.00	3										
61	Aq Qala	Aghdagash	2.00	3										
79	Aq Qala	Gary	2.00	3										
54	Torkman	Khaje nafas	1.80	3										
56	Torkman	Khaje nafas	1.80	3										
42	Torkman	Banavar	1.71	3										
25	Torkman	Ghaleh	1.70	3										
29	Torkman	Ghaleh	1.67	3										
37	Torkman	Banavar	1.16	3										
68	Aq Qala	Chen sebly	1.00	3										
48	Torkman	Gomishan	0.18	3										
49	Torkman	Gomishan	2.89	2										
39	Torkman	Banavar	2.50	2										
82	Aq Qala	sahnah sofla	2.50	2										
38	Torkman	Banavar	2.40	2										
58	Aq Qala	Tazeaba	2.25	2										
36	Torkman	Banavar	2.20	2										
87	Aq Qala	yampi	2.00	2										
63	Aq Qala	Aghdagash	1.95	2										
85	Aq Qala	sahnah sofla	1.00	2										
81	Aq Qala	saghar yalghi	0.60	2										
2	Kordkuy	Yesaghi	4.67	1										
28	Torkman	Ghaleh	0.25	1										

TABLE A-5.3.5 Yield of Wheat and Times of Irrigation (2001)

No. of Farmer	District	Deh	Wheat Irrigated land			No. of Farmer	District	Deh	Wheat Dryland	
			Irrigated times	ha	Yield				ha	Yield
57	Aq Qala	Tazeaba	3	6.0	3.0	8	Kordkuy	Chahar	2.0	4.0
66	Aq Qala	Chen sebly	3	3.0	2.7	104	Gorgan	Chaleh mahmoud	2.0	3.0
67	Aq Qala	Chen sebly	3	9.0	1.3	109	Gorgan	Hashem Abad	2.0	3.0
75	Aq Qala	pirvash sofla	2	1.0	4.0	110	Gorgan	Hashem Abad	1.0	3.0
43	Torkman	Banavar	2	10.0	3.6	51	Torkman	Gomishan	10.0	3.0
22	Torkman	Ghaleh	2	5.0	3.0	52	Torkman	Gomishan	3.5	3.0
23	Torkman	Ghaleh	2	3.0	3.0	49	Torkman	Gomishan	5.0	2.9
82	Aq Qala	sahnah sofla	2	2.0	2.5	13	Kordkuy	Gholam Abad	1.3	2.7
85	Aq Qala	sahnah sofla	2	3.0	1.0	3	Kordkuy	Yesaghi	4.0	2.5
2	Kordkuy	Yesaghi	1	1.5	4.7	23	Torkman	Ghaleh	10.0	2.5
106	Gorgan	Chaleh mahmoud	1	5.0	4.0	39	Torkman	Banavar	5.0	2.5
108	Gorgan	Hashem Abad	1	1.5	4.0	40	Torkman	Banavar	10.0	2.5
112	Gorgan	Hashem Abad	1	0.5	4.0	6	Kordkuy	Alang	2.0	2.4
7	Kordkuy	Alang	1	1.0	4.0	38	Torkman	Banavar	5.0	2.4
110	Gorgan	Hashem Abad	1	4.0	3.8	36	Torkman	Banavar	1.0	2.2
11	kordkuy	Badil Abad	1	0.8	3.7	9	Kordkuy	Chahar	1.0	2.0
10	kordkuy	Badil Abad	1	2.0	3.5	12	Kordkuy	Gholam Abad	1.3	2.0
107	Gorgan	Lemesk	1	4.0	3.5	27	Torkman	Ghaleh	5.0	2.0
30	Torkman	Ghaleh	1	4.0	3.5	50	Torkman	Gomishan	10.0	2.0
45	Torkman	Banavar	1	4.0	3.5	79	Aq Qala	Gary	6.0	2.0
93	Aq Qala	attabad	1	4.0	3.5	87	Aq Qala	yampi	2.0	2.0
94	Aq Qala	attabad	1	8.0	3.5	90	Aq Qala	yampi	2.0	2.0
4	Kordkuy	Yesaghi	1	2.5	3.4	54	Torkman	Khaje nafas	5.0	1.8
5	Kordkuy	Yesaghi	1	3.0	3.3	56	Torkman	Khaje nafas	11.0	1.8
8	Kordkuy	Chahar	1	2.0	3.0	88	Aq Qala	yampi	5.0	1.8
18	Kordkuy	Mahtar Kalateh	1	2.0	3.0	42	Torkman	Banavar	10.5	1.7
59	Aq Qala	Tazeaba	1	10.0	3.0	25	Torkman	Ghaleh	4.0	1.7
53	Torkman	Khaje nafas	1	4.0	3.0	29	Torkman	Ghaleh	3.0	1.7
95	Aq Qala	attabad	1	3.0	3.0	35	Torkman	khojeh Khan	5.0	1.4
15	Kordkuy	Mahtar Kalateh	1	0.8	2.9	16	Kordkuy	Mahtar Kalateh	2.0	1.3
16	Kordkuy	Mahtar Kalateh	1	4.5	2.7	24	Torkman	Ghaleh	10.0	1.2
72	Aq Qala	pirvash sofla	1	1.5	2.7	37	Torkman	Banavar	2.5	1.2
73	Aq Qala	pirvash sofla	1	2.0	2.6	76	Aq Qala	Gary	19.0	0.9
24	Torkman	Ghaleh	1	10.0	2.5	48	Torkman	Gomishan	5.0	0.8
41	Torkman	Banavar	1	4.5	2.4	78	Aq Qala	Gary	5.0	0.8
80	Aq Qala	saghar yalghi	1	10.0	2.3	28	Torkman	Ghaleh	2.0	0.3
58	Aq Qala	Tazeaba	1	4.0	2.3					
62	Aq Qala	Aghdagash	1	4.5	2.2					
61	Aq Qala	Aghdagash	1	10.0	2.0					
64	Aq Qala	Aghdagash	1	8.0	2.0					
63	Aq Qala	Aghdagash	1	8.7	2.0					
101	Aq Qala	amin abad	1	5.0	1.6					
1	Kordkuy	Yesaghi	1	5.0	1.5					
96	Aq Qala	enghelad	1	3.0	1.1					
60	Aq Qala	Aghdagash	1	25.0	1.0					
68	Aq Qala	Chen sebly	1	3.0	1.0					
70	Aq Qala	Charanjic povlamar	1	3.0	1.0					
69	Aq Qala	Charanjic povlamar	1	12.0	1.0					
98	Aq Qala	enghelad	1	3.0	0.9					
97	Aq Qala	enghelad	1	6.0	0.7					
81	Aq Qala	saghar yalghi	1	5.0	0.6					
71	Aq Qala	Charanjic povlamar	1	20.0	0.5					

TABLE A-5.3.6 Yield of Barley and Times of Irrigation (2001)

No. of Farmer	District	Deh	Barley Irrigated land Irrigated times	ha	Yield	No. of Farmer	District	Deh	Barley Dryland ha	Yield
33	Torkman	khojeh Khan	3	10.00	0.80	41	Torkman	Banavar	5.50	4.00
32	Torkman	khojeh Khan	2	10.00	1.20	89	Aq Qala	yampi	0.50	3.00
34	Torkman	khojeh Khan	2	7.00	0.43	36	Torkman	Banavar	4.00	2.75
82	Aq Qala	sahnah sofla	2	7.00	0.00	26	Torkman	Ghaleh	20.00	2.00
83	Aq Qala	sahnah sofla	2	5.00	0.00	43	Torkman	Banavar	5.00	2.00
84	Aq Qala	sahnah sofla	2	5.00	0.00	55	Torkman	Khaje nafas	3.00	2.00
85	Aq Qala	sahnah sofla	2	14.00	0.00	31	Torkman	khojeh Khan	9.50	1.89
31	Torkman	khojeh Khan	1	0.00	0.00	47	Torkman	Gomishan	10.00	1.85
35	Torkman	khojeh Khan	1	5.00	0.60	25	Torkman	Ghaleh	4.00	1.75
86	Aq Qala	sahnah sofla	1	8.00	0.00	27	Torkman	Ghaleh	2.00	1.50
						52	Torkman	Gomishan	15.00	1.50
						49	Torkman	Gomishan	10.00	1.18
						28	Torkman	Ghaleh	3.00	1.00
						24	Torkman	Ghaleh	20.00	0.90
						51	Torkman	Gomishan	17.50	0.87
						46	Torkman	Gomishan	2.00	0.80
						21	Torkman	Ghaleh	18.00	0.70
						48	Torkman	Gomishan	10.00	0.70
						44	Torkman	Banavar	21.00	0.67
						29	Torkman	Ghaleh	16.00	0.50

TABLE A-5.3.7 Yield of Cotton and Times of Irrigation (2001)

No. of Farmer	District	Deh	Cotton Irrigated land			No. of Farmer	District	Deh	Cotton Dryland	
			Irrigated times	ha	Yield				ha	Yield
24	Torkman	Ghaleh	4	20.00	1.50	1	Kordkuy	Gholam Abad	1.00	1.30
43	Torkman	Banavar	4	5.00	1.70	2	Kordkuy	Yesaghi	1.00	1.00
75	Aq Qala	pirvash sofla	4	1.00	1.00	3	Torkman	Gomishan	3.00	0.90
2	Kordkuy	Yesaghi	3	1.00	5.00	4	Aq Qala	yampi	5.00	0.90
22	Torkman	Ghaleh	3	5.00	2.40	5	Kordkuy	Mahtar Kalateh	1.25	0.80
74	Aq Qala	pirvash sofla	3	2.00	3.00	6	Aq Qala	yampi	2.00	0.25
4	Kordkuy	Yesaghi	2	2.50	1.60	7	Aq Qala	mohammad abad pai	13.00	0.13
5	Kordkuy	Yesaghi	2	4.00	1.05					
34	Torkman	khojeh Khan	2	3.00	1.60					
45	Torkman	Banavar	2	6.00	1.00					
97	Aq Qala	enghelad	2	27.00	0.37					
7	Kordkuy	Alang	1	1.00	1.60					
8	Kordkuy	Chahar	1	1.50	3.00					
10	kordkuy	Badil Abad	1	6.00	2.17					
11	kordkuy	Badil Abad	1	3.00	0.77					
17	Kordkuy	Mahtar Kalateh	1	6.00	2.20					
50	Torkman	Gomishan	1	9.00	1.33					
87	Aq Qala	yampi	1	0.00	0.00					
96	Aq Qala	enghelad	1	0.00	0.00					
99	Aq Qala	amin abad	1	2.00	0.80					
100	Aq Qala	amin abad	1	2.00	0.03					
103	Aq Qala	mohammad abad pai	1	2.00	0.15					

Table A-5.3.9(a) Farming by Jurisdiction Area of Dehestan Service Center in Survey Area (2002)

Item	Area of jurisdiction of Anbar Olum extension service center	Area of jurisdiction of Central extension service center	Area of jurisdiction of Banavar extension service center
District	Aq Qala	Aq Qala	Banavar-e-Torkman
Dehestan	Anbar Olum	Aq Qala city	Banavar
Social background	Deh: 22, Torkmani 505, Sistani 50%	Deh; 32, Torkmani 95%, Sistani 4%	Deh; 19, Torkmani 100%
Farm household:	3,026	3,200	4,300
Cooperatives	RPC 1, livestock cooperative 1 Livestock cooperative 1; having milk	RPC 3, Branch of RCO	RPC 2
Processing factory	processing factory	Macaroni/noodle factory, public slaughter house	Oil manufacturing factory (cotton, soybean, and rape)
Natural conditions			
Soil texture	Clay loam or sandy clay loam	Various soil textures	In northern side of Banavar is clay loam, and in southern side is loam.
Salinity	S2 (moderate)	S2(moderate) ~ S4 (very severe)	northern side: S2 ~ S3 southern side: S4 (very severe)
Precipitation	(drought year) 223mm/year in 2001 (normal year) 360mm/year in 1996	(drought year) 241mm/year in 2001 (normal year) 318mm/year in 1996	(drought year) 233.1mm/year in 2001 (normal year) 456.7mm/year in 1996
Land use			
Total cultivated area:	27,000 ha	39,000 ha	25,913 ha
Irrigated area:	22,000 ha	18,633 ha	5,474 ha (21%)
Irrigation water source:	Gorgan dam: 70%, well; 20% Gorgan river: 10%	Well (200): 900 ha (5%) Gorgan river: 17,733 ha (95%)	Well (117): 1,700 ha, only 9 wells are in northern side of Gorgan river. Gorgan river: 3,000 ha
Cultivated crops:	Dryland: wheat, barley and rape Irrigated land with well: cotton, wheat, barley, maize, rice and vegetables Irrigated land with dam: cotton, wheat	Dryland: wheat, barley and rape Irrigated land with well: cotton, wheat, barley, maize, rice and vegetables	Dryland: wheat, barley and rape Irrigated land with well: wheat, barley, rape, cotton, rice, and vegetables.
Farm scale and farming	Number of farm household / Area of cultivated land	Number of farm household / Area of cultivated land	Number of farm household / Area of cultivated land
< 3 ha	381 / 677	940 / -	91 / 1,792
3 ~ 5 ha	511 / 1,852	1,337 / -	148 / 538
5 ~ 10 ha	557 / 3,690	2,135 / -	513 / 3,176
10 ~ 20 ha	329 / 4,128	2,196 / -	961 / 11,231
> 20 ha	253 / 5,172	5,667 / -	329 / 10,283
Total	2,031 / 15,519	12,275 / -	2,042 / 27,020
Damage by drought	Normal (1996) / Drought(2001)	Normal (1996) / Drought(2001)	Normal (1996) / Drought(2001)
Wheat Dryland	1.8 ~ 2.0 t/ha / 0.4 ~ 0.5 t/ha	3.5 t/ha / 0.5 ~ 0 .7 t/ha	4.0 ~4.5 t/ha / 1.8 ~ 2 t/ha
Irrigated land	4 ~ 6 / 4 ~ 6	4.5 t/ha / 2.2 ~ 4.3 t/ha	4.0 ~ 6.0 t/ha / 2.2 ~ 2.5 t/ha
Change of yield of wheat during the last 10 tears	Wheat under irrigation; increase by extension. Cotton under irrigation; no change Barley in dryland: increase by variety tolerant to salinity of soil.	Wheat under irrigation by river; severe damage during the last 4 years Wheat in dryland: ditto. Cotton under irrigation by ri ditto.	Wheat under irrigation; increase by extension. Cotton under irrigation; unstable
Animal husbandry	95% of stock farming is the complex farming with agricultural farming. Specialized stock farmers raise over 100 heads of sheep and about 10 heads of cows.		There are four pasture lands, which are managed by the Administrative Bureau of Natural Conservation.
Problems in farming	70% of total irrigation water is unstable by sedimentation of dam. Therefore, 70% of irrigated area may change to dryland.	Irrigated land used river water will change to dryland in drought year.	1) Shortage of irrigation water from river due to lower reaches: need of reservoir 2) Soil salinity: need of drains 3) Mechanization: need of renewal of super-annuated machinery. 4) Traditional raising of livestock: need of keeping of feeds.

Table A-5.3.9(b) Farming by Jurisdiction Area of Dehestan Service Center in Survey Area (2002)

Item	Area of jurisdiction of Central extension service center		Area of jurisdiction of Garji Mahaneh extension service center	
District	Banavar-e-Torkman		Kordkuy	
Dehestan	Banavar-e-Torkman		Garji Mahaneh	
Social background	Deh; 25, Torkmani 95%, Sistani 7%		Deh: 17, Mazandarani	
Farm household:	2,311		2,628	
Cooperatives	RPC 0		RPC 1	
Processing factory			few	
Natural conditions				
Soil texture	Area along the coast of the Sea: sandy loam The middle area: loam Area along the Gorgan river: clay		Very good texture, except Mahtar Kalateh, a part of which is low land and clay texture.	
Salinity	Area along the coast of the Sea: S 4 Other area: S 3 (severe)		S2, except Mahtar Kalatrh, a part of which shows high salinity of soil since old times.	
Precipitation	(drought year) 289.2mm/year in 2001 (normal year) 425.3mm/year in 1996		(drought year) 573mm/year in 2001 (normal year) 474mm/year in 1996	
Land use				
Total cultivated area:	20,258 ha		9,204 ha	
Irrigated area:	3,825 ha (18.9%)		6,900 ha (75%)	
Irrigation water source:	Well (283): 3,634 ha (95% of total irrigated land/1,787 ha with sprinkler and 1,847 ha with furrow irrigation) Gorgan river: 191 ha (5%)		Irrigation water source is rich.	
Cultivated crops:	Dryland: wheat, barley and rape Irrigated land : wheat, cotton, rice, rape and vegetables.		1) Northern zone lain within Ghalas river and main road: rice if water is available. 2) Middle zone: vegetable (leafy vegetables, tomato, radish, cucumber,etc.) 3) Foot of mountain zone: Cotton, wheat, and rice are commonly cultivated throughout the three zones.	
Farm scale and farming	Number of	Area of	Number of	Area of
Land type	farm household	cultivated land	farm household	cultivated land
< 3 ha	459	1,034	1,427	2,128
3 ~ 5 ha	387	1,408	726	2,605
5 ~ 10 ha	623	4,864	354	2,209
10 ~ 20 ha	536	6,325	100	1,254
> 20 ha	217	7,364	28	814
Total	2,329	21,004	2,635	9,010
Damage by drought	Normal (1996)	Drought(2001)	Normal (1996)	Drought(2001)
Wheat Dryland	1.8 ~ 2.2 t/ha	1.5 ~ 1.8 t/ha	Wheat: no damage	
Irrigated land	2.8 ~ 3.0 t/ha	2.4 t/ha		
Change of yield of wheat during the last 10 tears	Wheat under irrigation; no change Barley in dryland; decrease by salinity of soil. Cotton under irrigation; decrease and unstable by salinity of soil.		All crops ; no change	
Animal husbandry			There are 2,854 heads of cows in the Dehestan, which are raised by 525 stock farmers. 30% of total farms is complex farming with stock farming.	
Problems in farming	1) Increase of soil problems of salinity and alkalization		1) Lack of basic cropping pattern (gamble farming): need of propaganda by extension activities. 2) Lack of farmers' intention on soil fertility with organic matter. 3) In northern part of the area is low land, which causes inundation in autumn.	

TABLE A-5.3.10 (1) Present Farming of Rural Production Cooperatives in the Survey Area

Item	Peivand RPC	Hermmat RPC	Shadi Mehr RPC
District	Aq Qala	Aq Qala	Banavar-e-Torkman
Dehestan	Tazeh-abad	Sahneh	Delije Kaslakheh
Present condition	Deh: 8	Deh: 3	Deh; 3
Farm household:	451	194	380
Cultivated land	3,500 ha av. 8 ha/farm household	1,962 ha	1,000
Irrigated land	2,000 ha Reservoir: 25 ha	1,025 ha Reservoir: 25 ha	0 (prearrangement of 400 ha)
Dryland	1,500 ha	937 ha	1,000
Cultivated crops	wheat 1,200 ha barley 800 ha rape 80 ha cotton 70 ha rice ha by 2 deep wells	wheat barley	barley only
Cultivation methods Irrigated land	wheat: irrigated 2 times(Feb. and Mar.) barley: irrigated 1 time (Feb.) cottton: irrigated 4 times(Mar., Jun., Jul., Aug.)		
yield	wheat: 1.5~4.5 t/ha no effects of barley: 1.0~4.0 t/ha drought cotton: 0.5~2.0 t/ha	wheat: 2~4 t/ha in 2001, 4~6.5 t/ha in normal barley: 2~3 t/ha in 2001, 2~3.5 t/ha in normal cotton: 0.6~1.2 t/ha in 2001, 2~3.5 t/ha in normal	
Dryland	wheat: 600 ha, 1.5~2.5 t/ in normal year 0~1.0t/ha in 2001 barley: 800 ha, 1.0~2.0 t/ha in normal year 0~0.8 t/ha in 2001	wheat: 0.8~3 t/ha in 2001, 2.5~4 t/ha in normal barley: 1~2 t/ha I 2001, 2~3.5 t/ha in normal	barley: 0.17 t/ha im 2001, 2~2.5 t/ha in normal. At present, traditional farming due to high salinity of soil.
Animal husbandry	Almost farmers raise 4 to 5 heads cows.		
Activities of RPC and problems	2 tractors (more 6 tractors in 2002) providing loan for farm materials	guidance of cultivation no machinery. In future, purchase of machinery. purchase of inputs and distribution management of account of products	high salinity of soil finished construction of drains start construction of irrigation canals and reservoir this year.

TABLE A-5.3.10 (2) Present Farming of Rural Production Cooperatives in the Survey Area

Item	Partove Bonavar RPC	Gomishan Kesht RPC	Rooyesh-e-Mehtar Kalateh RPC
District	Banavar-e-Torkman	Banavar-e-Torkman	Kordkuy
Dehestan	Banavar	Gomishan	Mehtar Kalateh
Present condition			Deh: 2, (mazandarani Deh and sistani Deh)
Farm household:	158	266	750
Cultivated land	1,500 ha	4,800 ha (95% of farmers: av. 5 ha, max. farm scale: 29 ha)	1,580ha
Irrigated land	600 ha (irrigated 120ha in 1999~2000, 80ha in 2001	600~800 ha (plan, finished 200 ha, but pumps broken)	1,200ha
Dryland	900 ha	4,800 ha at present, but 4,600 ha since this summer	380ha
Cultivated crops	wheat: 400~500ha (irrigated for 80 ha in 2001) barley: 600~700 ha rape: 60 ha cotton: 80ha 300~ 400 ha in normal year 80 ha in 2001	wheat: 700 ha of dryland barley: 2,000 ha of dryland rape: 190 ha cotton: 150ha	wheat: 1,200ha barley: 0 soybean: 250ha rape: 25ha cotton: 400ha rice: 1,000ha vegetables
Cultivation methods			
Irrigated land	cotton:irrigated 3 times(Mar., Jun., Aug.) in normal year. 1 time only in 2001.	Pumps have been broken just after construction during 2 years. Therefore, there is no production under irrigation until now. Construction of drains is finished about 70% of all fields.	well (about 400): 1,130 ha; soybean and rape reservoir:for 300~400 ha; rice and wheat river: used only in winter
yield	wheat: 3~4 t/ha in 2001 cotton: 3~ 3.5 t/ha in 2001.	Rape: 2~3 t/ha, irrigated by individual pump Cotton: 0.8~1 t/ha, irrigated one or 2 times by individual pump.	wheat: 2~5 t/ha in normal year cotton: 1.5~3 t/ha in normal year rice: 3~7 t/ha in normal year rape: 0.7~3.5 t/ha in normal year
Dryland	wheat: 1~2.8t/ha in 2001 barley: 2~4 t/ha in 2001 rape: 2.2 t/ha in 2001 cotton: less 1 t/ha in 2001	Production: only area along the Gorgan river. Wheat: 1.5~2 t/ha in 2001 Barley: 1.5~2.2 t/ha in 2001 Rape: 600 ha sowed, but only 190 ha harvested, 1~2 t/ha in 2001	
Animal husbandry	50% of farmers raise 1~10 heads of cows. 10% of farmers raise 20~several hundred heads of sheep.	80% of farmers raise several heads of cows. 20% of farmers raise 200~1,000 heads of sheep. There are two available pasture lands of common (32,000 ha) and public (700 ha).	
Activities of RPC and problems	purchase of inputs and distribution distribution of irrigation water, if river's water is available. 2 tractors, 1 combine leveling and maintenance of canals. training 3 times a year. shortage of water	at first, it's important to leach salt by rain and drains because of severe salinity. subsoiling 200~300 ha a year; 40cm in depth, 1.2m in space; high effect. purchase of inputs and distribution training 2 times a year, participating with about 100 farmers every meeting	2 tractors, 1 combine, 1 rice transplanter (4 rows), 1 baler, and 1 grader. no machinery for heavy textured soil number of tractors of cooperative and farmers is 168. Farmer having 5 ha can live on only farming.

TABLE A-5.3.11 Farmers' Economy in the Survey Area

District	Farm scale	Item	Annual Gross Income				Total farm area inclu. Rental	Total farming gross income (million Reals)	Production cost (million Reals)	Surplus in production (million Reals)	Household expenditure (mil. Rls./year)	Total expenditure (mil. Rls./year)	Surplus	Financing production cost 01/02
			Total	% of composition										
				Agriculture	Animal Hus.	others								
			(million Reals)	(%)	(%)	(%)								
Gorgan	1 ~ 3 ha	Average	18.75	100	0	0	2.3	18.75	15.12	3.64	18.93	34.05	-15.30	13.75
		Max.	27.00	100	0	0	3.0	27.00	19.83	7.17	22.10	35.59	-8.59	15.00
		Min.	10.50	100	0	0	1.5	10.50	10.40	0.10	15.76	32.50	-22.00	12.50
	3 ~ 5 ha	Average	23.85	74	1	21	4.5	18.45	10.35	8.10	23.35	33.70	-9.85	16.00
		Max.	27.20	99	1	41	4.5	26.90	12.30	14.60	29.60	41.90	-5.00	20.00
		Min.	20.50	49	0	0	4.5	10.00	8.40	1.60	17.10	25.50	-14.70	12.00
	5 ~ 10 ha	Average	64.85	85	0	16	8.0	54.80	39.83	14.98	23.95	63.78	1.08	20.50
		Max.	66.00	85	0	16	8.0	56.10	58.50	32.35	28.50	87.00	23.15	26.00
		Min.	63.70	84	0	15	8.0	53.50	21.15	(2.40)	19.40	40.55	-21.00	15.00
Kordkuy	1 ~ 3 ha	Average	11.90	55	0	45	1.4	6.50	4.55	1.95	16.29	20.85	-8.94	2.60
		Max.	28.50	100	0	100	2.0	15.40	7.09	11.22	30.56	37.65	-4.85	3.50
		Min.	3.00	0	0	41	1.0	0.00	3.00	-4.50	6.10	10.60	-11.85	1.00
	3 ~ 5 ha	Average	25.45	99	1	0	4.3	25.45	16.49	8.96	18.52	35.01	-9.56	13.50
		Max.	41.08	100	9	0	5.0	41.08	49.23	20.45	35.22	84.45	4.82	25.00
		Min.	12.00	91	0	0	3.5	12.00	4.20	-8.15	9.15	13.35	-43.37	6.00
	5 ~ 10 ha	Average	55.89	89	0	11	6.8	49.80	26.23	23.57	16.31	42.54	13.35	18.10
		Max.	82.17	100	0	22	8.0	63.92	42.54	37.20	23.15	58.88	27.78	30.00
		Min.	34.05	78	0	22	6.0	34.05	14.24	12.13	9.42	23.66	-11.03	9.30
Bandar-e-Torkman	1 ~ 3 ha	Average	10.19	43	0	58	2.0	5.89	0.67	5.22	8.75	9.42	0.78	1.14
		Max.	12.08	74	0	89	2.0	10.50	0.87	9.63	10.61	11.08	1.00	1.20
		Min.	8.30	11	0	26	2.0	1.28	0.47	0.81	6.88	7.75	0.55	1.07
	3 ~ 5 ha	Average	30.82	58	23	19	4.8	24.34	21.82	2.52	14.91	36.73	-5.91	18.06
		Max.	98.90	100	49	58	5.0	98.90	108.80	15.65	38.10	146.90	8.27	75.00
		Min.	2.96	13	1	0	4.0	2.96	1.22	-9.90	6.10	7.32	-48.00	3.50
	5 ~ 10 ha	Average	19.18	66	5	29	9.2	14.25	6.59	7.66	15.58	22.17	-2.99	17.74
		Max.	44.38	100	25	75	10.0	31.18	15.84	18.17	22.85	38.69	13.16	102.45
		Min.	5.05	25	0	12	6.0	5.05	2.02	-0.99	10.85	14.15	-19.82	2.60
	10 ~ 20 ha	Average	32.47	92	3	5	15.7	27.60	12.78	14.83	13.09	25.87	6.61	11.49
		Max.	62.29	100	56	58	20.0	62.29	31.75	52.16	24.20	44.02	47.31	34.00
		Min.	10.13	42	22	10	10.5	10.13	5.41	-7.34	4.85	14.98	-19.61	3.50
	> 20 ha	Average	95.27	72	5	23	27.9	73.34	37.29	36.04	18.25	55.54	39.73	47.08
		Max.	163.31	94	18	48	40.0	147.00	91.23	70.36	24.50	109.28	116.09	101.00
		Min.	19.76	52	6	0	21.0	11.76	8.46	3.30	11.22	25.86	-6.10	10.00
Aq Qala	1 ~ 3 ha	Average	14.50	71	3	27	2.5	10.63	4.36	6.27	9.04	13.40	1.10	6.31
		Max.	33.50	100	84	94	3.0	33.50	10.70	29.50	13.90	20.19	19.75	20.00
		Min.	3.15	0	4	26	2.0	0.37	0.67	-3.42	1.28	4.38	-11.19	1.50
	3 ~ 5 ha	Average	15.20	68	13	19	4.7	12.36	6.37	5.99	11.43	17.80	-2.60	4.16
		Max.	39.65	100	61	88	5.0	39.65	20.60	35.65	16.80	34.60	30.05	5.00
		Min.	7.30	6	0	27	4.0	1.81	0.30	-12.39	3.70	4.50	-23.36	1.00
	5 ~ 10 ha	Average	22.05	72	10	18	7.9	18.12	8.46	9.65	15.93	24.39	-2.34	5.29
		Max.	43.35	100	38	50	10.0	38.15	13.60	24.55	25.40	35.15	12.75	10.00
		Min.	10.20	50	10	12	6.0	10.20	1.66	-3.31	9.35	17.33	-18.21	0.35
	10 ~ 20 ha	Average	27.95	80	5	15	17.0	23.76	12.04	11.72	21.18	33.22	-5.28	15.50
		Max.	59.60	100	19	56	23.0	59.60	29.05	36.60	51.32	74.32	5.12	20.00
		Min.	14.26	33	9	23	13.0	6.27	0.00	-22.78	5.82	16.18	-20.61	6.00
	> 20 ha	Average	59.50	71	26	4	49.0	57.61	56.75	0.86	15.25	72.00	-12.50	41.50
		Max.	65.00	85	37	7	65.0	65.00	57.80	9.30	17.00	72.70	-7.70	58.00
		Min.	54.00	56	15	7	33.0	50.22	55.70	-7.58	13.50	71.30	-17.30	25.00

TABLE A-5.3.12 Debt Conditions of the Survey Farmers (2001)

District	Farm scale	Number of surveyed farmers	Number of farmers in debt	Bank		Cooperatives		Wholesaler		Consignment loan		Relatives		Money-lender		Others	
				Debtor	Amount Million Rls.	Debtor	Amount Million Rls.	Debtor	Amount Million Rls.	Debtor	Amount Million Rls.	Debtor	Amount Million Rls.	Debtor	Amount Million Rls.	Debtor	Amount Million Rls.
Gorgan	1 ~ 3 ha	2	2	2	96	0	0	0	0	0	0	0	0	0	0	0	0
	3 ~ 5 ha	1	1	1	23	1	0.75	0	0	0	0	0	0	0	0	0	0
	5 ~ 10 ha	3	3	3	135	1	1.5	0	0	0	0	0	0	1	3	0	0
	10 ~ 20 ha	1	1	1	30	0	0	0	0	0	0	0	0	0	0	0	0
Kordkuy	1 ~ 3 ha	8	8	5	340.3	3	3.6	0	0	0	0	2	2.5	2	2.1	0	0
	3 ~ 5 ha	6	6	5	72.84	2	8	0	0	0	0	1	5	1	6	0	0
	5 ~ 10 ha	4	4	2	128	2	12.6	0	0	0	0	1	8	1	4	0	0
Bandar-e	1 ~ 3 ha	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Torkman	3 ~ 5 ha	7	4	1	50	0	0	0	0	0	0	3	5	0	0	0	0
	5 ~ 10 ha	10	3	0	0	0	0	0	0	2	8	1	2.5	0	0	0	0
	10 ~ 20 ha	13	8	2	20	0	0	0	0	2	22	1		3		0	0
	> 20 ha	6	4	2	42	1	15	0	0	0	0	0	0	0	0	0	0
Aq Qala	1 ~ 3 ha	15	8	3	8.1	0	0	0	0	1	2	2	2	3	3	0	0
	3 ~ 5 ha	11	8	4	28.6	3	3	0	0	1	1.3	2	6.3	1	2.5	1	2
	5 ~ 10 ha	11	9	2	19.5	3	3	1	1	0	0	1	1	0	0	0	0
	10 ~ 20 ha	5	3	3	10.5	1	1	0	0	0	0	0	0	1	10	0	0
	> 20 ha	4	3	1	5	1	12	0	0	1	1	0	0	1	1	0	0

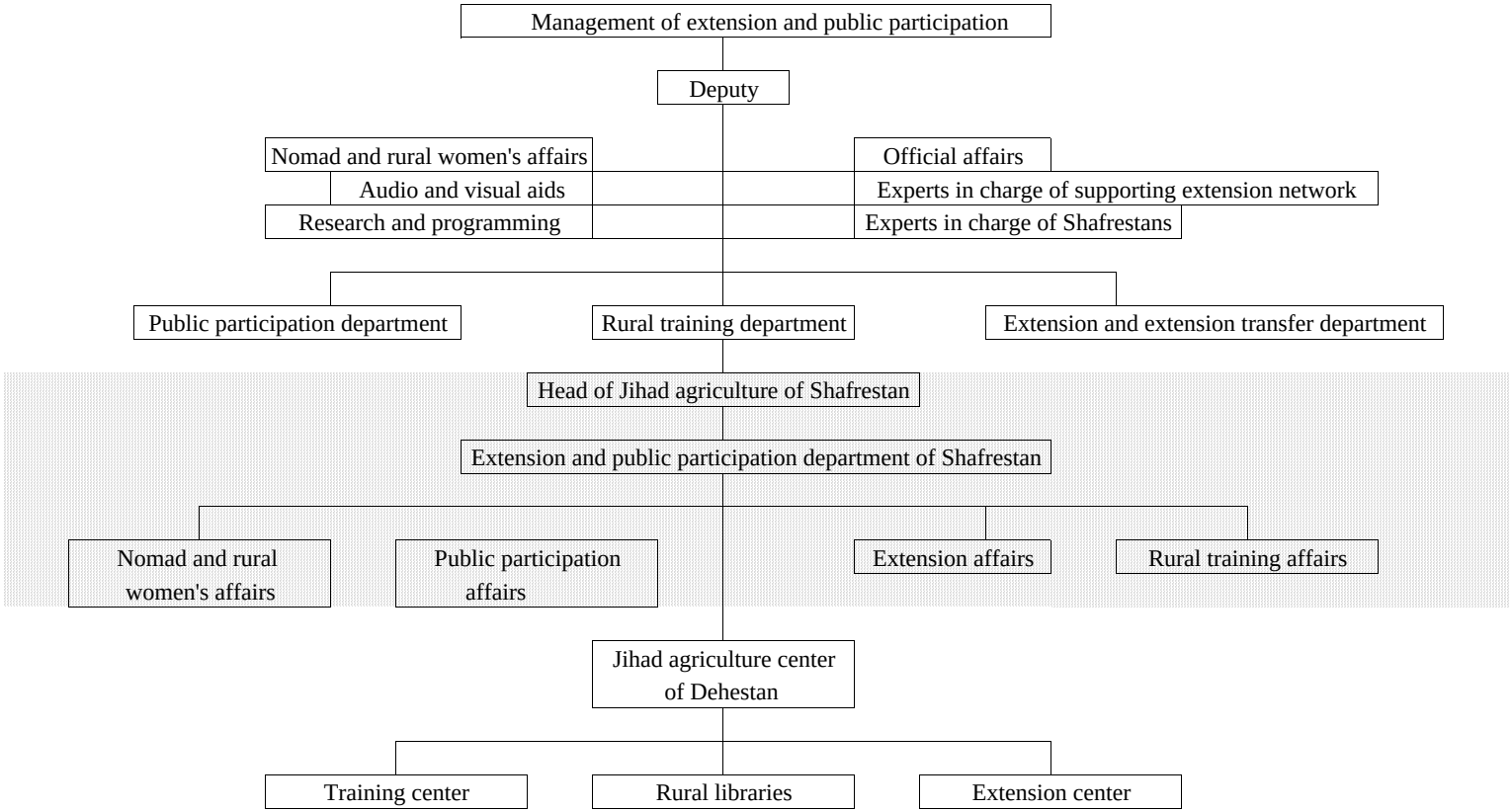


Fig. A-5.4.1 System of Extension Management and Public Participation in Golestan Province

Table A-5.5.1 Costs, Garantteed and Producers' Prices of Products (Golestan province, 1992-2001)

Year	Cotton			Wheat			Barley			Potatoes		
	Cost	Guaranteed Price	Producer's Price	Cost	Guaranteed Price	Producer's Price	Cost	Guaranteed Price	Producer's Price	Cost	Guaranteed Price	Producer's Price
	Rls/kg	Rls/kg	Rls/kg	Rls/kg	Rls/kg	Rls/kg	Rls/kg	Rls/kg	Rls/kg	Rls/kg	Rls/kg	Rls/kg
1992	238	401	399	84	150	150	94	115	125	73	78	128
1993	350	520	607	142	225	225	123	173	173	64	117	100
1994	496	650	1,193	170	260	260	189	210	218	118	135	144
1995	855	-	1,404	479	330	330	191	255	244	174	140	512
1996	1,050	-	1,448	312	410	410	-	317	296	250	174	360
1997	1,453	1,600	1,704	323	480	480	386	387	386	216	210	253
1998	1,320	1,750	1,923	330	600	600	397	478	413	275	262	-
1999	1,577	1,990	2,622	424	672	672	688	535	539	263	292	531
2000	2,100	2,428	3,127	643	875	875	845	694	720	530	380	730
2001	2,753	2,820	2,758	685	1,050	1,050	1,391	800	818	584	437	338
Average annual increasing rate during 10 years (%)	32	24	24	26	24	24	35	24	24	26	22	13

Source: Golestan Jihad-e-Agriculture Organization

Table A-5.5.2 Agricultural Production and Profit Sharing in 2000/2001 (Golestan Province)

Crops	Cultivation land	Yield	Production	Profit sharing of unit product					Profit sharing of whole products in Golestan Province				
				Production cost	Producers' unit price	Wholesale unit price	Profit of farmers	Profit of wholesalers	Total production cost	Producers' gross income	Wholesalers' gross income	Total producers' profits	Total wholesalers' profits
	ha	kg/ha	tons	Rls/kg	Rls/kg	Rls/kg	Rls/kg	Rls/kg	Million Rls.	Million Rls.	Million Rls.	Million Rls.	Million Rls.
Wheat*	309,815	2,680	830,304	643	875	-	232	-	534,000	614,000	-	80,000	-
Barley	80,955	1,030	83,384	840	720	1,057	-120	337	70,546	60,000	89,000	-10,546	29,000
Paddy rice	42,582	3,160	134,559	1,827	2,400	3,200	573	800	247,000	324,000	432,000	77,000	108,000
Maize (for popcorn)	981	3,950	3,875	652	600	1,305	-52	705	2,527	2,326	5,058	-201	2,732
Soybeans*	25,164	1,510	37,998	1,540	1,868	-	328	-	58,788	71,309	-	12,521	-
Cotton	79,822	1,710	136,496	2,100	3,127	3,118	1,027	-9	288,170	429,100	427,864	140,930	-1,236
Potatoes	7,035	12,890	90,681	530	730	1,575	200	845	48,090	66,237	142,909	18,147	76,672
Sunflower*	16,339	470	7,679	3,795	2,100	-	-1,695	-	29,149	16,130	-	-13,019	-
Tobacco*	4,098	1,040	4,262	8,400	6,730	-	-1,670	-	36,070	28,899	-	-7,171	-
Tomato	8,276	18,590	153,851	238	330	1,508	92	1,178	36,625	50,783	232,063	14,158	-
Green peas	1,219	4,460	5,437	508	433	2,058	-75	1,625	2,890	2,464	11,710	-426	9,246
Cumin caraway	6,730	190	1,279	4,930	6,750	17,037	1,820	10,287	6,301	8,627	21,773	2,326	13,146
Rape*	4,195	1,160	4,866	900	1,800	-	900	-	4,416	8,833	8,833	4,417	-
Onion	717	10,150	7,278	488	700	1,591	212	891	3,552	5,095	11,581	1,543	6,486
Eggplant	139	11,890	1,653	390	633	1,466	243	833	645	1,046	2,423	401	1,377
Green beans	43	2,390	103	395	900	1,953	505	1,053	41	93	201	52	108
Beans	178	360	64	1,460	4,559	5,272	3,099	713	95	296	325	201	29
Pea	36	1,750	63	3,680	5,825	6,890	2,145	1,065	232	367	434	135	67
Lentil	169	2,800	473	3,790	5,515	6,820	1,725	1,305	1,797	2,624	3,233	827	609
Cotyledon	137	540	74	2,500	6,883	7,527	4,383	644	188	516	565	328	49
Vetch	5,305	270	1,432	1,780	3,762	4,404	1,982	642	2,643	5,587	6,540	2,944	953
Dry garlic	1	4,000	4	235	2,321	3,756	2,086	1,435	1	9	15	8	6
Cucumber	1,078	26,150	28,190	310	555	2,000	245	1,445	8,740	15,647	56,384	6,907	40,737
Water melon	6,839	10,360	70,852	264	375	1,038	111	663	18,716	26,585	73,586	7,869	47,001
Melon	2,481	7,790	19,327	320	619	1,504	299	885	6,190	11,975	29,095	5,785	17,120
Total	604,334		1,624,182						1,407,412	1,752,548	1,555,592	345,136	352,102

Note: *Wheat, soybean, sunflower, tobacco and rape are not put on the wholesale market. The wholesalers don't deal in these crops.

TABLE A-5.5.3 Commercialization at Farm Gate

Name of crops	Rout of selling of farmers' products (%)					
	Wholesaler	Trader/private shop	Cooperative	Public organization/ Public factory	Others	Sum
Wheat	9	5	43	41	1	100
Soybean	13	0	40	40	7	100
Rice	50	30	10	0	10	100
Cotton	19	14	5	41	22	100
Rape	0	0	78	22	0	100
Barley	41	53	0	3	3	100
Tomato	50	50				100
Melon	100					100
Water melon		100				100

	Rout of purchase of farm materials (%)					
	Wholesaler	Trader/private shop	Cooperative	Public organization/ Public factory	Others	Sum
Wheat	6	0	76	15	3	100
Soybean	0	0	50	43	7	100
Rice	40	10	30	20	0	100
Cotton	0	0	50	29	21	100
Rape	0	0	90	10	0	100
Barley	7	52	37	4	0	100
Tomato	50	0	0	50	0	100
Melon	0	0	0	100	0	100
Water melon	100	0	0	0	0	100

Annex 6	Socioeconomical Conditions of the Study Area

ANNEX 6

SOCIOECONOMICAL CONDITIONS OF THE STUDY AREA

A6.1 Socioeconomic Conditions of the Study Area

A6.1.1 General

(1) Administration

The Study Area includes 4 Districts (*Shahrestan*) and 6 Sub-Districts (*Bakhsh)* in the Golestan Province. The names of Districts and Sub-Districts are shown in the following table.

Districts (*Shahrestan*)	Sub-Districts (*Bakhsh)*
Kordkuy	Central Kordkuy
Bandar-e-Torkman	Central Bandar-e-Torkman
Aq Qala*	Central Aq Qala, Anbor Olman
Gorgan	Central Gorgan

*Aq Qala District use to be Aq Qala Sub-District in Gombat District until 2 years ago.

Among 221 Dehs in 4 Prefectures, 6 Dehs were selected according to the race in order to understand the present social and economic condition of Dehs and their settlers, mostly farmers, in the Study Area. General information of each Deh is shown in the tables below. Difficulties and shortages/ strengthens and potentials of the selected Dehs are presented Table 6.1.1.

General Information of the Selected Dehs

Deh	Prefecture	Population (Persons)	Race	Religion	Remarks
Aqdakesh	Aq Qala	1,200 (180 H/H)	Turkmen (100%)	Islam (Sunni)	With RPC
Anbar Olum*	Aq Qala	7,000 (1,100 H/H)	Turkmen (50%)/ Baluchi (50%)	Islam (Sunni) /Islam (Shiite)	1% of landless farmers / Without RPC
Tazeh Abad	Aq Qala	About 500 (About 70 H/H)	Baluchi (95%) Turkmen (5%)	Islam (Sunni)	25 landless H/Hs / With RPC
Mehtar Kalateh	Kordkuy	About 3,500 (About 750 H/H)	Mazandarani (80-85%) Sistani + Persian from Khorasan Province (15-20%)	Islam (Shiite)	Less than 1% of landless farmers / With RPC
Gorji Mahalleh	Kordkuy	700 (150 H/H)	Mazandarani (85%) Sistani (15%)	Islam (Shiite)	30% of landless farmers / Without RPC
Gholamabad	Kordkuy	278 (54 H/H)	Sistani (100%)	Islam (Shiite)	95% of landless farmers / With RPC

*Anbar Olum is now a city but it was a Deh until recently.
Source: Hearing from the members of Rural Council in the Dehs mentioned above (June, 2002)

(2) Population

The population of 4 Districts occupies 40% of that of Golestan Province. The ratio of the rural population is about 70%, except Gorgan.

Table 6.1.1 Difficulties and Shortages/ Strengthens and Potentials of the Selected Dehs

Deh	Prefecture	Difficulties and Shortages	Strengthens and Potentials
Aqdakesh	Aq Qala	**On Farming:** 1) Drought: the most of the Deh settlers have debt in Agricultural Bank but it would be defaulted, 2) Problems of mechanization and drainage,3) Low interest in new agricultural technology of the Deh settlers: low effect of extension service by Agricultural Organization due to insisting to traditional way of agriculture, **General**: 4) It takes a lot of time to give the knowledge of hygiene to the villagers such as disposal of garbage and taking bath hygienically, 5) There is no sport facility, 6) There is no home phone. (One public phone for a long distance call), 7) There is no pipeline for gas, 8) The price of carpet is cheap	1) High hygiene level, 2) No religious problems: everybody keeps Islamic rules well, 3) No crime because of faith in religion
Anbar-olum*	Aq Qala	**On Farming:** 1) Drought from 3 years ago, 2) Earthquake, 3) The dam is filled with the segments and water is wasted, 4) The infrastructure for drainage is required because there is a lot of high saline farmland, 5) Low level of mechanization,	1) The most advantageous area in Golestan Province from the point of agriculture and animal husbandry (located between the Gorgan River and the Atrack River.), 2) The most qualified cotton can be harvested in Golestan Province, 3) There is enough water and the climate is good, 4) There is a pond can be used for a reservoir and distribute water from it
Tazabad	Aq Qala	**General:** 1) The water of the well dug before was bad. The water has to be purchased from the other villages costing Rls. 50,000 – 600,000/tank, 2) There is no health center, 3) The roads are not paved and well maintained (difficulty in walking in the winter), 4) The villagers have to walk 6-7km to take a mini bus bound to Aq Qala City, 5) Population is small and the Deh cannot share the cost of public works.	1) None
Mehtar Kalate	Kordkuy	**On farming:** 1) Low level of mechanization, 2) Not well-maintained farm road, 3) Sediments of drainage canal (cleaning of drainage canals) – difficult to pay the share (70%) of cleaning cost to Ministry of Energy/ Drainage canals are cleaned up every 15-year, 4) There are too many wells. Too many wells cause shortage of water. We need to construct a reservoir, 5) Water is not effectively used because water of two rivers (The Shaskorate, The Danbran) go directly into Caspian Sea and the	1) The Deh is covered by RPC, 2) Villagers' race is same and there is a unity, 3) It is possible to harvest 2-3 varieties of crops a pear. (Spring: cotton and paddy, Summer: summer vegetables, Winter: Wheat)

		present reservoir is old-fashioned, **General:** 6) The condition of paved roads is bad, 7) There is no library, 8) There is not an Upper Secondary School for boys, 9) There is no park, 10) There is no sports club.	
Gorji Mahalleh	Kordkuy	**On Farming:** 1) Farming is influenced by the trend of modernization but farmers' idea cannot follow it and insist on their own way, 2) Agriculture is mainly rainfed. The number of wells is also small, 3) Agricultural machinery costs high and farmers cannot afford it, 4) Irrigation costs high and farmers cannot afford it, 5) The price of agricultural inputs is high and it is impossible for farmers to be purchased them timely, 6) There is no subsidized/ secured price of harvested crops, 7) The market channels for the products are not ensured, 8) The area of farmland is small and scattered. (1-2ha: 70%, 3-5ha: 30%), 9) Farmers do not agree with agricultural land grouping due to consideration of their landownership, **General:** 10) Low income level of the Deh settlers, 11) High unemployment rate of the youth, 12) There is no entertainment (a theater, a sports club)	1) All of the villagers are kind and they do not forget sympathy with the poor, 2) Human recourse is abundant.
Gholamabad	Kordkuy	**General:** 1) There is not a lower secondary school in the Deh, 2) Tapped water is not hygienic, 3) The roads are not paved and so it is hard to pass in winter, 4) The mosque of the Deh is old and narrow, 5) There is not a coupon distribution organization. **Note:** The interviewee said, "There are not the problems on agriculture because most of us do not hold farmland. Our life belongs to agriculture. All of us want to engage in agriculture on own farmland even though there are some problems such as drought."	1) None

Note: This table is made based on the opinions of the interviewee

Trend of Population Change

Name of District		1986	1996	2000	2001
Aq Qala	Total	84,950	98,664	104,589	106,118
	Rural	69,944	76,464	78,763	79,354
	Urban	15,006	22,200	25,826	26,764
Bandar-e-Torkman	Total	82,715	117,287	134,491	139,129
	Rural	51,542	75,890	88,095	91,403
	Urban	31,173	41,397	46,366	47,726
Gorgan	Total	260,498	323,106	351,436	358,877
	Rural	121,048	134,396	139,360	140,715
	Urban	139,430	188,710	212,076	218,162
Kordkuy	Total	61,003	67,051	69,563	70,203
	Rural	39,989	40,559	40,629	40,671
	Urban	21,014	26,492	25,934	29,532
Area Total	Total	489,166	606,108	660,079	674,327
	Rural	282,523	327,309	346,847	352,143
	Urban	206,623	278,799	310,202	322,184
Province	Total	1,145,033	1,426,288	1,557,266	1,591,849
	Rural	722,840	837,303	887,590	902,490
	Urban	422,193	588,985	669,676	689,359

Note：figures of 1986 and 1996 are National Census, others are estimated by MPO
Source: MPO of Golestan Province、Statistics of Golestan 2001

Among economically active population, agriculture sector dominates the share of employment by industrial origin, except Gorgan. Service sector and industry sector follow the agriculture sector. Thus, it can be concluded agriculture is the important sector of the area from the viewpoint of the employment.

In the Study Area, mainly 4 different races are living: Turkmen, Mazandarani, Baluchi and Sistani (Zaboli).

(3) Social Infrastructure

1) Road

Almost all of the roads connecting the major cities in the study area are asphalt paved; dual lane type roads with 8.0m ROW, while feeder roads from those inter-city connecting roads are earth graded 6.0m ROW. All of the farm roads are 6.0m ROW or 3.0m ROW and easily turned into muddy and slippery conditions by rainfall.

2) Electricity, Water Supply, and Communication (Telephone Line)

Alternating current electricity with 220 voltages is supplied to areas along the inter-city connecting roads and to important rural facilities such as pump stations. But the electricity is not supplied to most of the farm area. Potable water supply is available only in major cities. Almost all of the people in rural areas obtain drinking water from rainwater of storage tanks, individual, or community wells. Rural administrations are delivering drinking water by

truck-amount tanker in dry seasons. Telephone facilities are available only in cities such as Gorgan, Aq Qala, and Bandar-e-Torkman. Only some of the government officers and people use mobile phones for their communication. Majority of the people in the villages use "*telephone hane*" (telephone office) for their telecommunication.

3) Education

The number of schools and students of each District are shown in following table.

Number of School and Students as of 1999

	Aq Qala	Torkman	Gorgan	Kordkuy
Primary school				
Number of schools	N.A.	211	323	63
Number of classes	N.A.	656	2,230	353
Number of students	N.A.	17,057	59,276	8,439
Junior high school				
Number of schools	N.A.	60	203	36
Number of classes	N.A.	327	1,213	209
Number of students	N.A.	9,424	37,631	6,416
High school				
Number of schools	N.A.	36	153	35
Number of classes	N.A.	212	1,183	205
Number of students	N.A.	6,648	34,266	5,395

Source: Provincial Educational Organization, MPO of Golestan Province, 2000

Among 6 Dehs, all of them have a public primary school (co-ed, boys', or girls'). Boys' and girls' lower secondary school are located in relatively large Deh or city such as Anbar Olum City, Dehs Adakesh and Mehtar Kalateh. Deh Gorji Hahalle has only girls' lower secondary school. Both types of upper secondary school are located in only Anbar Olum City but a girls' upper secondary school exists in Deh Mehtar Kalateh. School attendance ratio decreases as the level goes up but many students go to lower and upper secondary school in cities or Dehs within a 15km radius from their Dehs. Besides these public schools, there is a private religious school for being mullah in Deh Adakesh.

4) Health

The medical personnel and facilities are centralized in Gorgan City. The medical facilities in the Study Area are listed below.

Medical Facilities in the Study Area as of 1999

Type of Medical Facilities	Aq Qala	Torkman	Gorgan	Kordkuy
Hospital	N.A.	12	40	7
Bed	N.A.	97	675	23
Clinic	N.A.	1	6	1
Radiography	N.A.	1	14	1
Medical Doctors	N.A.	52	411	47
Dentists	N.A.	8	74	6

Source: Provincial University of Medicine and Hygiene Care, MPO of Golestan Province, 2000

Four out of six Dehs surveyed have a public health center for vaccinating children, taking care of pregnant women and expanding a family planning. A public clinic exists in relatively large Deh and city such as Mehtar Kalateh and Anbar Olum. But both of them are not located in relatively small Dehs such as Tazeh Abad and Gholamabad.

A6.1.2 Rural Social Structure/ Deh

Among 221 Dehs in 4 Prefectures, 6 Dehs were selected according to the race in order to understand the present social and economic condition of Dehs and their settlers, mostly farmers, in the Study Area. General information of each Deh is shown in the tables below.

General Information of the Selected Dehs

Deh	Prefecture	Population (Persons)	Race	Religion	Remarks
Aqdakesh	Aq Qala	1,200 (180 H/H)	Turkmen (100%)	Islam (Sunni)	With RPC
Anbar Olum*	Aq Qala	7,000 (1,100 H/H)	Turkmen (50%)/ Baluchi (50%)	Islam (Sunni) /Islam (Shiite)	1% of landless farmers / Without RPC
Tazeh Abad	Aq Qala	About 500 (About 70 H/H)	Baluchi (95%) Turkmen (5%)	Islam (Sunni)	25 landless H/Hs / With RPC
Mehtar Kalateh	Kordkuy	About 3,500 (About 750 H/H)	Mazandarani (80-85%) Sistani + Persian from Khorasan Province (15-20%)	Islam (Shiite)	Less than 1% of landless farmers / With RPC
Gorji Mahalleh	Kordkuy	700 (150 H/H)	Mazandarani (85%) Sistani (15%)	Islam (Shiite)	30% of landless farmers / Without RPC
Gholamabad	Kordkuy	278 (54 H/H)	Sistani (100%)	Islam (Shiite)	95% of landless farmers / With RPC

*Anbar Olum is now a city but it was a Deh until recently.
Source: Hearing from the members of Rural Council in the Dehs mentioned above (June, 2002)

The difference of the administrative structure of Deh is not so noticeable according to race in the Study Area although that is remarkably appeared in their customs and activities, especially of rural women. The representatives of Dehs are the members of Rural Council, elders, and mullahs. The society consists of landed farmers, tenant farmers, agricultural labors, animal breeders and sometimes, public servants, small storekeepers, *ab-ban mirab* (a traditional water manager), *dasht-ban* (a traditional farmland watcher), and *hammam-ban* (a traditional public bath caretaker). In other words, main income sources of Deh settlers are agriculture and animal husbandry. Among the representatives, Rural Council plays a big role in the recent Deh society. In case of Deh Aqdakesh, the mullahs act as intermediary between RPCs (Rural Production Cooperatives) and the members. They are respected as successful farmers besides mullahs. *Ab-ban mirab*, *dasht-ban* and *hammam-ban* exist in Anbar Olum City and Deh Mehtar Kalateh, Deh Tazeh Abad, and Deh Gorji Mahalleh respectively.

1) *Ab-ban mirab* (a traditional water manager)

Ab-ban mirab is in charge of water distribution in paddy fields. The method of water distribution is determined by 1) the farmland and well owner or *Ab-ban mirab* in trust with the owner, in case of well or 2) RPCs, in case of dams and reservoirs. Take an example of *Ab-ban mirab* in Deh Mehtar Kalateh. There exist two types of *Ab-ban mirab* according to water

sources: a) Well and b) Dam/ Reservoir (reserving water from a dam).

a) Well

The farmland and well owner hire *Ab-ban mirab* to manage distribution of water. *Ab-ban mirab* decides the rotation and the schedule of irrigation and the owner supervises his work. Some large farmers who have wells do not hire him and decide them by themselves. *Ab-ban mirab* is a traditional specialist of water distribution. In Deh Mehtar Kalateh, there are 350 wells. The owners hire one *Ab-ban mirab* per well usually. So, there are 350 *Ab-ban mirab*. *Ab-ban mirab* deals with not only water distribution itself but also maintenance of pumps. Salary is paid by farmland owners or tenant farmers. If the farmland is the tenant, the tenant farmers pay his salary before the landowner takes his share. The salary paid by paddy and it is 100kg/ha.

b) Dam/ Reservoir (reserving water from dam)

RPC Mehtar Kalateh hires 2-3 *Ab-ban mirab* every year. The RPC has a contract with Ministry of Energy on water distribution. The salary is 100kg/ha paddy paid by farmland owners.

Ab-ban mirab used to exist in the other Dehs, too. In case of Deh Gorji Mahalleh, they used to exist when farmers used *qanat* as their water source, but now most of farmers dug wells by themselves and the job of *Ab-ban mirab* was abolished.

2) *Dasht-ban* (a traditional farmland watcher)

Dasht-ban is a traditional farmland watcher and is usually landless. His job is to watch farmland for preventing the invasion of animals. He gains 300-400kg of wheat from his employers. His work period is 6 months a year from seeding to harvesting of wheat. This job is related only to wheat production but not to barely.

In case of Deh Gholamabad, *Ab-ban mirab* and *Dasht-ban* do not exist because there are a few landed farmers and also their farmland is very small ranged between 0.5 and 2ha.

3) *Hammam-ban* (a traditional public bath caretaker)

H*ammam-ban* (a traditional public bath caretaker) exists in Deh where there is a *Hammarm* (public bath). In case of Deh Gorji Mahalleh, 30% of the households have bathrooms, the rest of them don't. So, 70% of the Deh settlers still use *Hammarm*. But those who have bathrooms but like *Hammarm* still go there to exchange information.

A 6.1.3 Rural Associations

In the 6 Dehs, there are some public and private associations and groups: (Public) Rural Council, RPCs (Rural Production Cooperatives), RCO (Rural Cooperative Organization), *Basiji*, Coupon Distribution Organization, Islamic Assembly, :(Private) mosque management groups, women religious groups, milk collecting and transport organization, and *Qalz-al-Hassanah* (Lending gently). More details about Rural Council, RPCs (Rural Production Cooperatives), RCO (Rural Cooperative Organization), and *Qalz-al-Hassanah* are described later and those of the other associations, organization, and groups are mentioned in the table below.

Organization, Associations, and Groups in Deh

Name of Association/ Organization	Purpose	Membership
1) *Basiji* (Public)	Established by the command of Khomeini 24 years ago. - The draft in the time of Iran-Iraq War - At present, promotion of culture and sports	Only men but women also can enter in if she wants (Members of *Basiji* can be powerful in the Deh)
2) Islamic Assembly (Public)*	Promotion of culture	Only men
3) Mosque management group (Private)	Management of mosque	Only men
4) Religious group (Private)	Management of religious events	Only men
5) Women's religious group (Private)	Execution of religious activities	Only women
5) Coupon distribution organization (Public)	Distribution of coupon of sugar cooking oil, and petroleum	Only men
6) Hygiene Group (Public)	Extension of hygiene knowledge	Only men
7) Milk collecting and transport organization (Private)	Gaining more profits from milk producing	Only men

***** Islamic Assembly has a union in *Shafrestan* (District) and the budget is provided from it.

(1) Rural Council

Rural Council, the smallest unit of the administrative organization, is relatively new. There are always Rural Councils in Dehs where more than 20 households live. Rural Councils were established first through Rural Council election in February 1999. Although they were selected by the election, the status of the members is volunteer and they can get no reward. Even in this status, the reasons willing to be a member of the Council are mainly to cooperate to solve the problems in Dehs, promote mutual help among Deh settlers, and to be the bridge between government and Deh settlers. The number of Rural Council's members depends on the population of Deh as mentioned below.

Deh population	Number of Rural Council's member
More than 1,500 persons	5 persons
Less than 1,500 persons	3 persons

Rural Council does not include *Dehdar* (Head of Deh). *Dehdar* is a governmental officer and supervises about 5-6 Dehs together. Rural Council consists of President, Vice President, and Secretary if they are 3, and adding Accountant and one more Secretary, if they are 5. The term of their service is 4 years. So as to be a member of the Council, candidates need to register their names at the department under Ministry of Interior in *Bakhsh* (Sub-District) government, and be screened whether he/she is eligible for the members of Rural Council. The candidates should be older than 21 year-old Iranian men and women (after serving in the army, if men), and are required of finishing a lower secondary school, and not committing crimes in the past. After the screening, the eligible persons are announced and then the election is implemented.

A part of the governmental budget is allocated to Rural Council. The Council covers the all fields and activities concerning improvement of the living standard of the Dehs such as installation of rural and agricultural infrastructure. The actual examples of installed or established infrastructure are shown in the table below.

Type of Infrastructure	Items
Rural (Social) infrastructure	Water supply and sewerage system (including digging wells), electricity, gas pipeline, telephone line, paved roads (including expansion and renovation), streetlights, primary and secondary schools, health center, a house for a clergy, and a mosque
Agricultural infrastructure	Farm roads (cooperating with RPCs), and reservoir, wells and pumps for agricultural use, and drainage canal

All of the members are very active and enthusiastic about solving the problems and improving the living standard of their Dehs. But in case of that population of the Deh is small such as Deh Tazeh Abad (mainly consisting of Baluchi), the members of the Rural Council have to face a serious budget problem. This is because people have to share the cost of all public works such as construction of a school and a health center and it is hard for a small Deh to collect the huge amount of share from the settlers.

(2) Rural Production Cooperatives (RPCs)

1) General

RPCs (Rural Production Cooperatives) is a public organization established for effective agricultural water use through well-managed irrigation facilities such as pumping stations and irrigation and drainage canals. There are 27 RPCs in Golestan Province as a whole and there are 8 RPCs in the Study Area. 6 out of 8 RPCs are located in 4 Priority Areas. General information of each RPC in the Priority Areas is shown in the following table.

General Information of RPCs

Name (No. of Priority Area)	Prefecture	Year	No. of Covered Deh	Covered land area (ha) (With irrigation)	Membership (persons) (Men:Women)	Main Race	Average holding area (ha) (Maximum/ Minimum)
Pavand (Priority Area 1)	Aq Qala	1997	7	3,500 (2,000)	430 (425:5)	Turkmen, Baluchi	8 (2/ 100)
Hemat (Priority Area 2)	Aq Qala	1998	3	1,962 (1,025)	185 (175:10)	Turkmen	10 (1/ 60)
Shadi Mehr (Priority Area 2)	Aq Qala	1996	3	1,172 (0)	379 (368:11)	Turkmen	2-4 (Plan)
Partov-e-Bonavar (Priority Area 3)	Torkman*	1995	3	1,500 (600)	158 (157:1)	Turkmen	6 (1/ 40)
Gomishan Kesht (Priority Area 3)	Torkman	1997	6	4,800 (0)	291 (287:4)	Turkmen	5 (2/ 130)
Rooyesh-e-Mehtar Kalateh (Priority Area 4)	Kordkuy	1997	2	1,558 (1,200)	450 (440:10)	Mazandarani, Sistani	1-3 (0.25/ 15)

*Torkman = Bandar-e-Torkman
Source: Hearing from the RPCs mentioned above (June, 2002)

The eligible persons to be a member of RPCs are those who hold farmland in the covered area (Dehs) by RPCs. The entrance fee or the share is a little different from one by one and described in the table below.

Entrance Fee/ Share of RPCs

Name (No. of Priority Area)	Prefecture	Entrance fee/share	
		Rainfed	Irrigation
Pavand (Priority Area 1)	Aq Qala	Rls.50,000/ha	Rls.50,000/ha
Hemat (Priority Area 2)	Aq Qala	Rls.50,000/ha (Rls.1,000/share)	Rls.100,000/ha (Rls.1,000/share)
Shadi Mehr (Priority Area 2)	Aq Qala	Rls.100,000/ha	Rls.100,000/ha
Partov-e-Bonavar (Priority Area 3)	Torkman*	Rls.50,000/ha (At establishment: Rls.10,000)	Rls.100,000/ha
Gomishan Kesht (Priority Area 3)	Torkman	Rls.50,000/ha**	-
Rooyesh-e-Mehtar Kalateh (Priority Area 4)	Kordkuy	Rls.50,000/ha (Rls.50,000/share)	Rls.50,000/ha (Rls.50,000/share)

*Torkman = Bandar-e-Torkman

**After completion of an irrigation network, the members will pay additional Rls.50,000/ha.

Source: Hearing from the RPCs mentioned above (June, 2002)

Farmers do not need to borrow money to be members because they can pay their entrance fee/ share by installments. The payment term varies from each RPC ranged between 1 year and 5 years. RPC Mehtar Kalateh does not even set the term. Actually some of the members did not pay in full within the payment term.

It is noted that RPC Shadi Mehr is unique among the RPCs mentioned above. At present, whole farmland covered by the RPC is belonging to Jihad –e– Agricultural Organization Golestan. After the RPC prepares 1) pumping station, 2) reservoir, 3) drainage and irrigation canals, and 4) agricultural machines, and then enough amounts of crops are produced, the farmland will be distributed to the members by Jihad-e-Agricultural Organization. This is a part of Five-year plan of Ministry of Jihad-e-Agriculture: "Converting not-arable land into arable land." The farmland is put in the landless villagers' charge whose income source is animal husbandry, freelance professions, and handicrafts. 90% of them are young people. Agricultural technique is transferred from the RPC or his father who is landed farmer. Moreover, the members cannot get any rewards from the RPC. The sales of harvested products go to the RPC and it is used for repayment of the loan from government.

2) Organizational Structure

The RPCs comprises of a RPC President, an accountant, agricultural technicians usually dispatched from Jihad-e-Agricultural Organization and an executive board selected among the members. The executive board comprises of 5 persons: President, Vice President, Secretary, and two non-positioned persons. They cannot get any rewards from RPCs and are farmers, the members of RPCs. The election among all the members is conducted every 3-year. And 2 inspectors, who supervise the management of RPCs 3-4 times a year, are also selected at that time. Their term of service is 1 year. RPCs is a government-led organization. Commonly, at the initial stage of setting up RPCs, an official of Jihad -e- Agricultural Organization goes to Deh and explains about RPCs. Then, farmers organize the promoters' group although it is ideal that RPCs are established based on farmers' spontaneous intention. In addition, Jihad -e- Agricultural Organization has the annual plan on RPCs establishment. In the plan, the locations

of RPCs are already decided. So, if the location of the applicants' farmland consists with that in the Organization's plan, it is easy to get approval from the Organization to set up RPCs. But if it is not, it will take time and is difficult to be approved.

3) Activities of RPCs

The activities of the RPCs are mainly about 1) construction of agricultural infrastructure, 2) water distribution, 3) selling agricultural inputs, 4) lending or selling agricultural machinery, 5) collecting and shipping of agricultural products and 6) giving technical instruction and advice through supervision (technical extension). For example, as a part of technical extension, RPC Mehtar Kalateh sets a member's plot as a demonstration plot and an experimental plot for new cultivation method of wheat. Besides these activities, RPC Pavand donates to school in the covered Dehs and RPC Hemat support the members on ceremonial occasions.

4) Available Finance for RPCs

When RPCs carry out their activities such as installation of agricultural infrastructure, they can obtain the credit from Agricultural Bank in the different conditions from individual farmers. The differences are described in the table below.

Type of Debtor	Condition
Individual farmer	- Required of the reserving fixed time deposit at the bank which he/she wants to borrow money determined by types of activities
RPCs/ the member of RPCs	- Not required of the reserving - The interest rate is discounted at 50% except "*Qalz-al-Hassanah*"

Ministry of Jihad-e-Agriculture decides the budget allotment and its uses of Jihad-e-Agricultural Organization in each province. The budget is disbursed through Agricultural Bank. According to the Ministry, the Organization discusses with the representatives of RPCs and decides the details of the budget allotment. There are three types of finance related to or through RPCs: 1) RPCs borrows money from the Bank for purchasing agricultural machinery and inputs, then RPCs pays back money to the Bank, 2) RPCs borrows money from the Bank for implementing projects related to soil and water such as leveling for the individual land of the members, and then the landowners pay back money to the Bank through RPCs, and 3) RPCs members can obtain the credit for the individual use in the same conditions with the RPCs among the allotment of each RPCs with the inquiry letter from the Organization. The conditions for each activity are shown in the table below.

Conditions of the Credit (2002)

Purpose of the credit	Interest rate (commission) /year	Among the total	Repayment term
Purchasing of agricultural input	4% (*Qalz-al-Hassana**) 14% (other facilities)	25% 75%	1 year
Purchasing of agricultural machinery	16%	100%	5 year
Implementation of the projects related to water and soil	12-14% (depending on activities)	100%	5 year

Source: Hearing from the counterpart (June, 2002)

* *Qalz-al-Hassanah* is a name of Islamic contract type's facilities without interest (actually low commission)

It is noted that RPC Gomishan Kesht obtains the loan from Agricultural Bank, purchases the

machinery, and then sells it to members, considering Islamic (Sunni) doctrines. Turkmen are Sunni and they hate borrowing money with interest. They cannot regard interest as commission like the Shiite faithful.

5) Benefit and Debt

The benefit and debt of each RPC in the year of 2001 are shown in the table below.

Benefit and Debt of each RPCs (2001)

Name (No. of Priority Area)	Benefit (Rls.)	Debt (Rls.)	Repayment /year (Rls.)	Interest rate/year	Purpose of Debt
Pavand (Priority Area 1)	N.A. (in black)	1.7 billion	130 million	8 %	Install of irrigation and drainage canals, purchasing agricultural machinery
Hemat (Priority Area 2)	N.A. (in black)	650 million	N.A.	4 %	Installation of drainage canals, leveling land, construction of farm roads
Shadi Mehr (Priority Area 2)	40 million (in red)	226 million (canals) / 37 million (tractor)	67 million (canals) / 11 million (tractor)	15 % (canals) /17 % (tractor)	Installation of drainage canals/ purchasing a tractor
Partov-e-Bonavar (Priority Area 3)	14 million (in black)	140 million (machinery)/ 640 million (canals, leveling)	70 million (machinery) / 180 million (canals, leveling)	16 % (machinery)/ 6% (canals, leveling)	Purchasing agricultural machinery/ installation of irrigation and drainage canals + leveling
Gomishan Kesht (Priority Area 3)	N.A. (almost equal)	60 million (machinery)/ 20 million (inputs)	N.A. (not overdue)	16 % (machinery) /4% (13 million), 16% (7 million) (inputs*)	Purchasing agricultural machinery/ purchasing agricultural inputs
Rooyesh-e-Mehtar Kalateh (Priority Area 4)	12 million (in black)	400 million	7.5 million	16 %/year	N.A.

Source: Hearing from the RPCs mentioned above (June, 2002)
*In case of purchasing agricultural inputs, Agricultural Bank determines the interest rates: 35% of total cost at 4%/year and 65% at 16%/year when the RPCs borrowed money.

6) Strengths/ Opportunities and Weakness/ Threats (problems)

The strengths/ opportunities and weakness/ threats (problems) of each RPC seeing from RPC's side are described in the tables below.

Strengths/ Opportunities of RPCs

Name	Strengths/ Opportunities
Pavand (Priority Area 1)	l) RPC can expand irrigation area (if affordable) 2) RPC puts the first priority on farmers and agricultural development.
Hemat (Priority Area 2)	None
Shadi Mehr (Priority Area 2)	l) RPC can obtain the loans from Agricultural Bank at low interest rate. 2) RPC can get subsidy from the government. 3) The person in charge of RPC in Agricultural Bank understands the condition of RPC well and then, provides credit.

Partov-e-Bonavar (Priority Area 3)	None
Gomishan Kesht (Priority Area 3)	l) The staffs are qualified. 2) RPC implements a soil improvement project (subsoil/ hard pan breaking) in the area of 80ha 3) RPC contributes to increasing production.
Rooyesh-e-Mehtar Kalateh (Priority Area 4)	l) RPC can purchase agricultural machineries and contribute to increases of production. 2) RPC contributes to decreasing cost through extension of appropriate amount of seed, fertilizer, and agricultural chemicals. 3) The members can buy agricultural inputs very timely and increase their production. 4) RPC can extend new cultivation techniques.

Weakness/ Threats (problems) of RPCs

Name (No. of Priority Area)	Weakness/Threats (Problems)
Pavand (Priority Area 1)	l) Shortage of water 2) RPC has to borrow money from Agricultural Bank because of not having machinery and equipment for installing canals and leveling lands.
Hemat (Priority Area 2)	l) Lack of cars and motor bikes (= transportation means) 2) Lack of storehouses
Shadi Mehr (Priority Area 2)	l) The members have low interest in participating in the projects that the RPC planned due to low awareness of mutual work.
Partov-e-Bonavar (Priority Area 3)	l) Lack of cooperation with the members 2) High salinity of soil 3) Low production 4) Shortage of water
Gomishan Kesht (Priority Area 3)	l) The members' cooperation is not enough because of lack of understanding on the RPC 2) Shortage of the loan for purchasing agricultural inputs 3) It is supposed that the RPC cannot obtain the loan necessary for constructing infrastructure due to the Islamic Doctrines (Sunni).
Rooyesh-e-Mehtar Kalateh (Priority Area 4)	l) Shortage of budget 2) Decrease of governmental subsidy 3) The mechanization plan (purchasing agricultural machinery) of Jihad-e-Agriculture Organization was not appropriate, and some RPCs had to sell the machines. 4) Farmland is detached. (It is hard to meet together although discussion is required to implement the project) 5) The guaranteed prices of some agricultural products are not set.

(3) Rural Cooperative Organization (RCO)

1) Organizational Structure

Rural Cooperative Organization (RCO) is a public organization established for improving rural settlers' living standard through providing living necessaries, agricultural inputs, and collecting and shipping of agricultural products. The Head Quarter of RCO is located in Tehran. Central Organization for Rural Cooperative of Iran is a competent authority of RCO. RCO Union Golestan Province was established in 1999 under the supervision of Organization for Rural Cooperative of Iran Golestan Province. Nevertheless, the history of RCO in Golestan Province is long and the first RCO at Prefecture level was established in Gorgan Prefecture in 1963. Under RCO Union, there are 9 prefecture level's RCOs and each of them has *Dehestan* or large Deh level RCOs. Moreover, these levels' RCOs have some RCO shops in Dehs which sell living necessaries including sugar (with coupons) and agricultural inputs. In case of RCO Gorgan Prefecture, it has 15 *Dehestan* or large Deh level RCOs and 80 RCO shops

subsequently. The Organization for Rural Cooperative of Iran Golestan Province supervises the other 40 producers' organizations in Golsetan Province such as Organizations of Poultry (9), Animal Husbandry (13), Apiculture (2), Sericulture (1), Combines' Owners (4), Orchard (2), Horticulture (1), Rural Women (5), Wheat Production (1), and Cotton Production which holds a cotton mill (1). There is Carpet Organization but not supervised by Department of RCO.

RCOs at *Dehestan*, a large Deh, and Prefecture levels have an executive board comprising of 5 members: President, Vice President, Secretary and two non-positioned persons. They are volunteers selected through the election among the members. The executive board at prefecture level comprises the representatives of RCOs at *Dehestan* and a large Deh levels. Besides the executive boards, the RCOs employs RCO President selected through the election among the members. Accountants and storehouse keepers are also hired by the RCOs. Most of the RCOs' management goes well and about 98% of them are in black.

2) Eligibility and Privileges of the Members

The members of RCO are 85,000 households in Golestan Province as a whole. The eligible persons to be a member of RCO is those who engage in agricultural-related works such as farming, animal husbandry, rent-a-tractor, and agricultural industries. They also have to live in *Dehestans* covered by RCOs. At least about 60% of Deh settlers are the members of RCO. The members buy at least one share at Rls.1,000. Those who are not members of RCO can use RCO shops but the members have two privileges: 1) obtaining credits for agricultural production and 2) gaining dividends if the RCO has benefit. The Organization for Rural Cooperative of Iran Golestan Province introduces the *Dehestan* or large Deh level RCO to Agricultural Bank. The Bank decides the value of disbursed credit based on the number of members, and then the RCO distribute it to the members. In order to borrow money, the members are not required of collateral but two co-signers. The members have to pay back money to the RCO after a harvest (in a year) at the interest rate of 4% or 16% per year. The RCO takes the commission of 1% per year.

3) Activities of RCO

Main activities of RCO are four: 1) selling living necessaries, 2) selling agricultural inputs (seeds, agricultural chemicals, and etc.), 3) distributing the products such as petroleum and sugar in exchange for coupons, and 4) collecting (at guaranteed prices) and shipping of agricultural products especially which have some problems on marketing. The guaranteed price of each product and its problems are shown in the table below.

Guaranteed Price, Buying Volume and Problems of the Agricultural Products

Product	Guaranteed price	Buying volume (t/year)	Problems
Potato	Rls.600/kg (2002)	50,000 (est.)	Huge production may cause drastic fall in price.
Wheat	Rls.1,300/kg (2002)	600,000 (est.)	Under governmental control*
Rice	Rls.3,500/kg(2001)	4,500	Huge production may cause drastic fall in price.
Cotton	Rls.8,500/kg (2^{nd} grade) (2001)	2,800	Sometimes cotton market price falls steeply.
Milk	Rls.1,450/kg (2002)	45,000 (150t/ day)	Transportation of milk to a factory is hard for individual producers.

Source: Organization for Rural Cooperative of Iran Golestan Province
*There are 100 wheat collection centers under RCOs in Golestan Province.

4) Strengths, Problems, and Future Plans of RCOs

Organization for Rural Cooperative of Iran Golestan Province believes that it provides necessary services for farmers and rural people and contributes to improving of their lives. On the other hand, one of the problems is that too much milk production brings about huge buying cost. Organization for Rural Cooperative of Iran Golestan Province knows the requirement of a milk-processing factory but it is not affordable for now. Moreover, the members of RCOs do not consider that RCO is their organization and do not make much effort to improve them. A future plan of the Department is to construct a slaughterhouse.

(4) *Qalz-al-Hassanah* (Lending gently)

Qalz-al-Hassanah (Lending gently) is an informal money lending organization mainly for those who cannot borrow money from banks. It is not related to the same name service of Agricultural Bank. This organization lends money without interest (commission) and collateral. *Qalz-al-Hassanah* is popular mainly among Mazandarani Dehs. In case of Deh Mehtar Kalateh, it was established in 2001. The system is the organization collects money from the members as deposit and save it at a bank. Both of men and women can be a member. The entrance and monthly deposits are Rls.50,000 – 100,000 and Rls.10,000, respectively. There are two types of credit and the members can borrow under conditions mentioned in the table below.

Type of Credits and Conditions

Type of Credit	Timing	Maximum	Term of Repayment
Normal	After 3 months of being a member, Once a year	Rls. 500,000	Within 15 months
Special	Traffic accidents, death, disease	Rls. 500,000	Within 3 months

A6.1.4 Rural Women

(1) General

As a part of the Deh survey, the condition of rural women was examined through group interview with women being between the late 20s and 50s by race. The difference among races was remarkably revealed from the life style of women.

(2) Turkmen Women in Anbar Olum City and Deh Aqdakesh in Aq Qala Prefecture

The Turkmen women usually wear a flower printed one-piece dress with a long sleeve and a long length and a flower printed scarf. Their appearances are obviously different from the other 3 races of women and they are recognized as Turkmen at a glance. The average marital age is 17~20 years old and most of them are married until 30 years old. Usually, they are married among the same race. And they deliver average 3~5 children during their lives.

1) Main Activities of Women

The main activities of the Turkmen women are weaving carpets, making short-napped coarse carpets, housekeeping, taking care of domestic animals (feeding and milking), and making dairy products. Surplus of milk is bought by milk processing factory. Usually, Turkmen women do not engage in farming. They just help with weeding and harvesting of cottons in their husbands' fields.

2) Main Income Source of Women

The main income source of the Turkmen women is weaving carpets but recently the price of carpets has been decreasing, and some of them quit weaving the carpets for selling. In such Dehs, women engage in sewing instead of weaving carpets.

a) Weaving Carpets

Weaving carpets as an income source is daily work for young women starting from their ages of 14-17 years old and continuing until their marriage. In case of weaving a $12m^2$ (3m X 4m) carpet, 4 women for weaving and 1 woman for taking care of them (serving meals and etc.) organize a group. They engage in this activity from 6:00 AM to 9:00 PM except breaks for meals and it takes about 30 days. 8 years ago, $1m^2$ carpet was Rls.30,000 but now the same size of carpet is Rls.25,000 even under high inflation. The carpet will be a part of their dowry, or purchased by the merchants.

b) Sewing

Some of the Turkmen women who quit weaving carpets engage in sewing. They sew Turkmen traditional trousers for women and Turkmen traditional hats for men to order. The sewing is sold at One-day *Bazar* by the women or sold to the clothes retailers. The price of the hats is Rls.200,000 and it takes from 3 weeks to 1 month to be completed.

3) Sphere of Women

The Turkmen women can go everywhere in a country if they have permission from their husbands. But main destinations of them are the cities near their Deh such as Aq Qala and Gombat using by mini-buses or owner-driven car.

4) Social Discrimination Against Women

a) Division of Work Between Men and Women

The Turkmen women can engage in income generating works such as weaving carpets and sewing, but generally they do not work outside and have to concentrate on domestic works.

Division of work between men and women (Turkmen)

Work	Men	Women
Farming	- Watering - Cultivating	- Weeding - Harvesting
Animal husbandry	- Raising sheep - Feed preparation - Cleaning of a stable - Taking animals to pasture	- Milking - Feeding

b) Education

In the past, many women could not go to school because the culture/ custom did not let them. But at present, almost all women go to school by the level of a lower secondary school. Moreover, there are very few women who go to university.

c) Voting Right

Both men and women have voting right from 16 years old by law. And women also have an interest in going to vote.

d) Voice of Women

The Turkmen women do not hesitate to speak up in front of men and can consult with men when something important is decided. But men are decision makers in Deh as well as home.

e) Access/ Control on Resources

	Water	Land	Farm land	Domestic animals
Access (use)	○	○	○	○
Control (hold)	○	○	○	○

The Turkmen women have the right to access and control on the resources above as well as men. They have the right to inherit and purchase both land and farmland.

There is no discrimination against the Turkmen women on work, education, voting right, and access/ control on resources legally and religiously. But their freedom is somehow limited, for example, the Turkmen women cannot go out without her husbands' permission and men's room and women's room for eating and receiving guests are separated in a house.

5) Problems

Compared with the past, weaving carpets is less profitable. So, some of the women gave up weaving carpets and engage in sewing unwillingly in stead. Moreover, due to Turkmen culture, men and women have to work separately in divided places. Therefore, the working places for women are limited. Division of men and women is a deep-seated tradition. What the Turkmen women can do is now only domestic works and many of them are bored.

6) Future Desire

Corresponding to the problems above, one of their future desires is increasing the price of the carpet and continuing/ restarting weaving carpets. From the aspect of infrastructure, they want to install telephone and gas lines and improve water supply system (Deh Aqdakesh).

(3) Mazandarani Women in Deh Mehtar Kalateh and Deh Gorji Mahalleh in Kordkuy Prefecture

The Mazandarani women wear a black Islamic cloak (*chador*) and a scarf but wear very colorful dress under the cloak. The average marital age is 15-20 years old. And they deliver average 2~5 children during their lives.

1) Main Activities of Women

The main activities of Mazandarani women are farming (in kitchen gardens, husbands' farmland and the others' farmland), raising chickens and ducks for self-consumption, making dairy products from the milk of their own cows, sewing, handicrafts as a hobby and housekeeping. Men also help with a part of housekeeping such as receiving guests, cleaning, washing clothes and dishes but rarely cooking.

2) Main Income Source of Women

The main income sources of the Mazandarani women are farming as agricultural labor and sewing.

a) Farming

The wages are different from crops and farming activity. The wages in the last year are mentioned in the table below.

Wages of Women's Farming Activities

Crop	Working hours	Farming activities	Wage/ day
Paddy	4 hours -7:00AM–11:00/11:30AM or 12:00/12:30AM–4:00/4:30PM	Rice planting	Rls.7,000
	4 hours 7:00AM –3:00 PM	Harvesting (70% of women engage in rice harvesting)	Rls.13,000 (Incase of men, Rls.17,000)
Cotton	7:00 AM –6:00 PM	Harvesting	Rls.20,000 – 25,000 (6kg/basket = 1 put = Rls.5,000, Average 4 – 5 puts/day)
Broad beans and green peas	7:00 AM –6:00 PM	Harvesting	Rls.30,000 (Rls.3,000/box, Average 10 boxes/day)

Source: Hearing from the interviewees (June, 2002)

b) Sewing

The Mazandarani women sew clothes for women and children to order. The prices of shirt, and skirt and cloak, which depend on design and cloth, are Rls.20,000 – 25,000 and Rls.50,000 respectively. Usually, men ordered to male tailors.

3) Sphere of Women

The Mazandarani women can go everywhere in a country but they must get permission from their husbands before or after. Main destinations of them are near their Dehs such as Bandar–e–Torkman and Kordkuy but sometimes they also go to Gorgan and Tehran for visiting their friends and seeing a doctor and Gombat for shopping and visiting banks.

4) Social Discrimination Against Women

a) Division of Work between Men and Women

The Mazandarani women can engage in income generating works such as agriculture and sewing. Moreover, men and women cooperate with each other and there is not a clear division of works but the details of the division of works are as follows.

Division of work between men and women (Mazandarani)

Work	Men	Women
Farming	- Cultivating - Watering (irrigation)	- Rice planting* - Weeding -Spraying agricultural chemicals - Harvesting
Animal husbandry	- Preparation of feeds - Cleaning of a stable - Taking animals to pasture	- Feeding - Milking

*Note: Basically, rice planting has been a women's work in Mazandarani Dehs but recently rice planting machines are gradually introduced and this is becoming men's work.

b) Education

Most of the Mazandarani women go to school by the level of upper secondary school. Some women who go to university have appeared recently. Compared with men, women have stronger will to let their children go to school.

c) Voting right

Both men and women have voting right from 16 years old by law. And women also have an interest in going to vote. Iranian women are also eligible for election. In fact, some Mazandarani women are the members of Rural Islamic Council and *Basiji*. Furthermore, some interviewees also want to try to be a member of the Council.

d) A Voice of Women

It is not big and all matters are decided by men, but women also can give their opinions to Rural Council.

e) Access/ Control on Resources

	Water	Land	Farm land	Domestic animals
Access	○	○	○	○
Control	○	○	○	○

The Mazandarani women have the right to access and control on the resources above. In fact, some of them have already accessed and controlled the all resources above. They have the right to inherit from their husbands and fathers and purchase both land and farmland. They can open their own bank accounts and obtain loans from the bank if the conditions are fulfilled, for example, the woman who has a license of sewing can obtain a special loan. The Mazandarani women also can borrow money from *Qalz-al-Hassanah*. Most of the Mazandarani women do not feel any sexual discrimination and are satisfied with the present condition. But the interview was conducted in the different room from men's one and women ate lunch after men and guests finished eating.

5) Problems

The biggest problem is unemployment of both men and women especially graduating from an upper secondary school. Moreover, some of the Mazandarani women think that the girls have to engage in only housekeeping after they get married because they do not have special classes for achieving technique such as sewing. Adding to this, it is hard for girls' students to go to upper secondary school if it is not located in their Dehs. From the religious point, a mosque does not care women much and they cannot learn how to read Koran if there is not a mausoleum in the Deh.

6) Future Desire

The Mazandarani women want other income sources besides farming. They need to establish the places for work for women.

(4) Baluchi women in Deh Gorji Mahalleh, Aq Qala Prefecture

The Baluchi women wear a black Islamic cloak (*chador*) and a scarf as well as Mazandarani women. The average marital age is 15years old. Usually, they are married among the same race.

And they deliver average 2~5 children during their lives.

1) Main Activities of Women

The main activities of the Baluchi women are farming with their husbands, animal husbandry (cows and sheep), weaving carpets as their hobby and for a dowry, housekeeping, needlework, and making yogurt.

2) Main Income Source of Women

a) Farming as an Agricultural Labor (in the past)

Since the Deh settlers stopped cotton production and then, the women lost their job as an agricultural labor 3-4 years ago. Their past tasks in cotton farming were weeding and harvesting. The reward was Rls.200/kg, working hour was from 5:00AM to 5:00 PM. The women could harvest average 80kg/day. So, they earned Rls.16,000/day. The Deh settlers quit cotton production because of drought, increasing of agricultural inputs, and decreasing of cotton price.

b) Weaving Carpets (in the past)

The Baluchi women stopped selling the carpets because they could not be sold and became unprofitable. In the past, the price of the materials was Rls.50,000/carpet (1.1m X 1.5m) and it could have been sold at Rls.150,000. Thus, the net profit was Rls.100,000. Now, the price of materials is Rls.200,000 due to inflation but that of the carpet is not changed.

c) Animal Husbandry (7 women engage in)

The Baluchi women are in charge of all necessary activities for animal husbandry such as feeding, watering, cleaning stables, milking, and taking animals to pasture. Most of the milk is sold to middlemen from Deh Chen Sbri. The price is Rls.1,000/kg.

d) Making Pillows/ Cushions at Home

A retailer from Aq Qala City provides them materials and he pays Rls.20,000/piece. It takes 10 days to complete a pillow/ cushion and is not profitable.

3) Sphere of Women

Main destinations of the Baluchi women are Kordkuy City and Gorgan City for shopping and seeing doctor. If she has a husband, usually he accompanies with her. But she does not need to get permission from him when she wants to go out.

4) Social Discrimination Against Women

a) Division of Work Between Men and Women

The Baluchi women can engage in income generating works such as agriculture but unfortunately they had to give up the idea due to the cancel of cotton production in their Deh. There is not definite distinction but the division of works between men and women is shown in the table below.

Division of works between men and women (Baluchi)

Sex	Activities
Men	Production of barely and wheat
Women	Weaving carpets, sewing, animal husbandry

b) Education

Normally, the Baluchi women can go to school by the level of primary school. Only if affordable, not only men but also woman can receive higher education.

c) Voting Right

Both men and women have voting right from 16 years old by law. And women also have an interest in going to vote.

d) A Voice of Women

Women can consult with men but decision makers are men.

e) Access/ Control of Resources

	Water	Land	Farm land	Domestic animals
Access	○	○	○	○
Control	○	○	○	○

The Baluchi women have the right to access and control on the resources above. In fact, some of them have already accessed and controlled the all resources above. They have the right to inherit from their husbands and fathers and purchase both land and farmland. They also have the right to borrow money. In fact, some of them borrow money from Agricultural Bank but in this case, she is a widow. The Baluchi women do not feel any sexual discrimination and can consult with men about all issues.

5) Problems

Because the Baluchi women had to quit working as agricultural labor and selling carpets due to external reasons, most of them lost income sources and have nothing to do. And it is difficult for girls to continue studying. They cannot go to city for studying because their families do not permit it.

6) Future Desire

The Baluchi women want to earn money through using present ability. If there is a possibility of sales of carpets and needle works, they want to sell them. In addition, they hope the Baluchi girls could receive higher education.

(5) Sitani (Zaboli) women in Deh Gholamabad, Kordkuy Prefecture

The Sistani (Zaboli) women in Deh Gholamabad wear a black Islamic cloak (*chador*) and a scarf as well as Mazandarani and Baluchi women. The average marital age is 15-20 years old. Once men got married at 15 years old, but now they do not get married before 20 years old. The Sistani women deliver average 3 children during their lives.

1) Main Activities of Women

The main activities of the Sistani women are farming, taking care of domestic animals (cows and chickens: milking, feeding, and cleaning stables), making dairy products from the milk of their own cows, and housekeeping. After taking the share for self-consumption, the milk is sold to the middlemen who come everyday or to a shop in Bandar-e-Torkman. The price is Rls.1,100/kg and a cow produces average 8kg milk/day. So, average daily earning from milk is Rls.8,800.

2) Main Income Source of Women

a) Farming as an Agricultural Labor

The wages are different from each crops and farming activity. The wages in the last year were mentioned in the table below.

Wages of Women's Farming Activities

Crop	Working hours	Farming activities	Wage/ day
Paddy	10 hours 6:00AM–4:00PM	Rice planting	Rls.15,000
The other crops (cotton, wheat, peas, beans, potatoes)	10 hours: 6:00AM –4:00PM	Weeding	Rls.15,000
		Harvesting (except wheat)	Rls.15,000

Source: Hearing from the interviewees (June, 2002)

3) Sphere of Women

Main destinations of the Sistani women are Gorgan City, Bandar –e- Torkman City, and the places of One Day *Bazar* for shopping or seeing doctor. Usually, men accompany with the women, but they also go by themselves. The women need to inform men about their going out before or after.

4) Social Discrimination Against Women

a) Division of Work Between Men and Women

The Sistani women can engage in income generating works such as agriculture. Commonly, men and women cooperate with each other. There is not definite distinction but the division of works on farming activities between men and women is shown in the table below.

Division of works between men and women (Sistani)

Sex	Farming activities
Men	Irrigation, spraying of agricultural chemicals, preparation of nursery
Women	Rice planting (90%), cotton harvesting (mainly), weeding (mainly)

b) Education

Usually, the Sitani women can finish school by the level of primary school. Only if affordable, woman can graduate from an upper secondary school.

c) Voting Right

Both men and women have voting right from 16 years old by law. And women also have an interest in going to vote. The interviewee is interested in being a member of Rural Council but

she cannot be because she does not have time due to housekeeping and taking care of children. She is also afraid of lacking in her educational level.

d) A Voice of Women

Women can consult with men but decision makers are men in the Deh as well as at home.

e) Access/ Control on Resources

	Water	Land	Farm land	Domestic animals
Access	○	○	○	○
Control	○	○	○	○

The Sistani women have the right to access and control on the resources above. In fact, some of them have already accessed and controlled the all resources above. They have the right to inherit from their husbands and fathers and purchase both land and farmland but it is not affordable for them. They can borrow money mainly from Agricultural Bank. If she can open the account, she can borrow money from the other banks, too. There is no money lending organization in the Deh but they can borrow money from relatives.

In addition, the interview was conducted in the different room from men's place but the interviewees feel there has been no discrimination since she was born.

5) Problems

The Sistani women do not have farmland as well as men. Furthermore, there are not enough income generating works.

6) Future Desire

The Sistani women have a hope to start working through learning technique such as weaving carpets and sewing.

A 6.2 Assistance from the Government and Finance for Farmers

A 6.2.1 Present Assistance from the Government

(1) General

Governmental assistance programs for farmers and rural areas are now provided by Ministry of Jihad-e-Agriculture, Ministry of Industries and Mining, Ministry of Housing and Urbanization, Ministry of Education, Ministry of Health and Medical Treatment, and Islamic Revolution Housing Foundation. Besides these programs provided through Ministries, Agricultural Products Insurance Fund contributes much to securing agriculture and farmers' lives.

(2) Details of Assistance Programs for Farmers and Rural Areas (Dehs)

Details of assistance programs are provided in the Tables A6.2.1 and A6.2.2.

Table A6.2.1 Assistant Programs for Farmers by Government (Agricultural Development)

No.	Name of Program	Ministry/ Authority in Charge	Contents of Program	Requirements of Recipients	Activities of Program
1	Development of Soil and Water Resources	Ministry of Jihad-e-Agriculture	1 Reclamation and integration of farmland 2 Installation of modern irrigation system 3 Installation of farm roads	1,2,3 Farmer	1,2,3 Subsidization of construction cost (Government: 70%, Farmer: 30%)
			4 Restoration and renovation of qanats 5 Construction and renovation of irrigation canals	4 Qanat owner 5 Farmer	4,5 Subsidization of construction cost (Government: 70%, Farmer: 30%)
			6 Study on soil and water 7 Construction of water and soil facilities 8 Improvement of traditional canals	6,7,8 Farmer	6, 7, 8 Preparation of an execution plan and introducing farmers to Agricultural Bank based on farmers' request
2	Forest and Pasture	Ministry of Jihad-e-Agriculture	1 Biological experiments to fix sand 2 Optimal management of feeding on the pasture 3 Reforestation	1,2,3 Stockbreeders around forestry	1,3 Plant seedlings 2 Production of fodder seeds
3	Watershed Management	Ministry of Jihad-e-Agriculture	1 Flood control on watershed	1 Farmer who holds farmland near watershed	1 Preparation of execution map and plan
4	Agronomy	Ministry of Jihad-e-Agriculture	1 Pest and disease control 2 Promotion of mechanization 3 Supervision of seed production 4 Cultivation of agricultural products (wheat, cotton, barley)	1 Farmer	1,2,3 Technical supervision
5	Horticulture	Ministry of Jihad-e-Agriculture	1 Pest and disease control 2 Promotion of mechanization 3 Production of seedlings (olives) 4 Promotion of fruit trees' growing	1 Farmer	1,2,3,4 Technical supervision 3 Observation of production and distribution of seedlings

No.	Name of Program	Ministry/ Authority in Charge	Contents of Program	Requirements of Recipients	Activities of Program
6	Livestock, poultry, and aquaculture	Ministry of Jihad-e-Agriculture	1 Improvement of livestock management and modernization of stables 2 Improvement of animal husbandry services 3 Improvement of animal husbandry production 4 Improvement of fish and shrimp culture 5 Improvement of red meat production 6 Improvement of chicken production 7 Improvement of egg production 8 Improvement of honey production 9 Production of animal fiber (ex. wool) 10 Improvement of converting efficiency (forage-meat) 11 Improvement of converting efficiency (forage-milk) 12 Improvement of converting efficiency (forage-chicken) 13 Improvement of forage seeds production	1,2, 3 Stockbreeders 4 Aqua farm owner 5 Stockbreeder 6,7 Poultry farmer 8 Apiarists 9-13 Stockbreeder	1-13 Technical supervision
7	Training and extension	Ministry of Jihad-e-Agriculture	1 Extension	1 Farmer	1 Provision of training courses 2 Distribution of extension magazine
8	Development of Veterinary Services	Ministry of Jihad-e-Agriculture	1 Control of animal contagious disease 2 Establishment of laboratories, clinics, quarantines between provinces and provision of equipment for them 3 Control of raw animal products (inspection) 4 Control of animal parasite disease	1 Stockbreeder 2 Laboratories, clinics, quarantines	1 Technical supervision 2 Technical supervision, provision of equipment 3,4 Technical supervision

Source: The Third Five Year Development Plan for Golestan Province (2001)

Table A6.2.2 Assistant Programs for Farmers by Government (Rural Development)

No	Name of Program	Ministry/ Authority in Charge	Contents of Program	Requirements of Recipients	Activities of Program
1	Study of Rural Sewage Network	Ministry of Jihad-e-Agriculture	1 Establishment of implementation plans	Dehs with more than 500 households	1 Study and establishment of the plans
2	Pure Water Supply	Ministry of Jihad-e-Agriculture	1 Provision of pure water supply system	Dehs with more than 20 households	1 Construction of pure water supply system
3	Construction of rural water supply system	Ministry of Jihad-e-Agriculture	1 Provision of rural water supply system	Dehs with more than 20 households	1 Construction of Water supply from one water source to some Dehs
4	Preparation of Rural Supervising Plan	Islamic Revolution Housing Foundation	1 Preparation of rural supervision and development Plan	Dehs with more than 500 households	1 Preparation of execution maps and plans
5	Installation and Improvement of Rural Roads	Ministry of Jihad-e-Agriculture	1 Installation and Improvement of Rural Roads	Dehs with more than 20 households	1 Preparation of execution maps and plans based on Deh settlers' request
6	Paving Rural Roads	Ministry of Jihad-e-Agriculture	1 Substructure and paving of rural roads	All roads in Golestan Province	1 Preparation of execution maps and plans based on Deh settlers' request
7	Maintenance of Roads	Ministry of Jihad-e-Agriculture	1 Maintenance of roads	Paved roads in Golestan Province	1 Setting traffic signs 2 Maintenance of roads

No	Name of Program	Ministry/ Authority in Charge	Contents of Program	Requirements of Recipients	Activities of Program
8	Development of Rural Handicraft Industry	Ministry of Industry and Mining	1 Establishment of a handicraft center 2 Training 3 Exportation of handicrafts	Rural craftsmen	1 Establishment of a handicraft center 2 Training 3 Exportation of handicrafts 1,2,3 based on Deh settlers' request
9	Change of Deh Location in the Area Damaged by natural Disaster	Ministry of Housing and Urbanization	1 Identification of the corresponded Dehs 2 Establishment of an implementation plan	Corresponded Dehs	Change of Deh Location in the area damaged by natural Disaster
10	General Education	Ministry of Education	1 Extension	Deh settlers	1 Provision of training courses 2 Distribution of extension magazine
11	Health and Medical Treatment	Ministry of Health and Medical Treatment	1 Provision of health services 2 Improvement pf public health	Dehs in Golestan Province	

Source: The Third Five Year Development Plan for Golestan Province (2001)

(3) Agricultural Products Insurance Fund

1) Organization Structure

The Agricultural Products Insurance Fund is established, according to the Agricultural Products Insurance Law of 1983, within the framework of the Agricultural Bank, which in turn, is responsible for the implementation of the insurance program. The Fund is financially independent and legal entity allowing management under provisions pertaining to public companies. The Fund is administered through a Head Office in Tehran, 29 provincial Directorates and a total more than 1,750 Agricultural Bank branches throughout the country. Total annual users are 14,954 persons in Golestan Province (2001).

2) Insurance Provision

Given a higher priority to the introduction and execution of insurance programs, particularly in the sensitive matter of extension to the rural community, the Agricultural Bank's branch managers as well as the experts and field surveyors take charge of these jobs. It has enabled some of the most experienced people living in the rural areas to actively participate in the introduction of new ideas of crop insurance. The successful liaison with farmers is the result of positive experience gained from both mutual trust and cooperation with the Bank staff.

3) Insured Crops and Perils

The main objective of the Fund is to eventually insure all the major strategic crops of the country. The strategic crops under coverage now and in the end of the Third Five Year Development Plan (2000-2004) are shown in the table below.

Insured Crops (at present and in the end of the Third Five Year Development Plan)

At present	<Strategic crops> Cotton, sugar-beet, soybean, rice, wheat (irrigated and dry), potato, onion, corn, sunflower, and rape seed <Orchard crops> Grape, date palm, citrus fruits, apple, tea, pomegranate, almond, and pistachio
The end of the Third Five Year Development Plan	Sugarcane, grains, and cereals (irrigated and dry), vegetables, summer crops, maize (fodder), alfalfa, fleawort, sesame, peanut, tobacco, flax and hemp, green house products (summer crops and vegetables), ornamental and in-door flowers and plants

Moreover, by the end of the Third Five Year Development Plan, agricultural production factors will also be brought under insurance coverage in all the main fields. Currently, studies are undertaken to assess the insurance feasibility of such factors as agricultural and livestock machinery, rural buildings and constructions, rural workshops, in-door fish breeding units, irrigation installations, water-pump engines, life and accident insurance of the staff, and transport and road insurance (beehives, livestock, etc.).

Due to various climatic conditions in Iran the risk factors facing farmers are different. But the main perils covered by the insurance are: flood, hail, storm, windstorm, heavy rainfall, frost, frostbite, and earthquake. Drought is so far included only in those insurance programs which are launched by the Fund for the protection of wheat (irrigation and dry), barley, tea, rice, cotton as well as, forestry and pastures.

4) Livestock, Poultry, and Aquaculture Insurance and Insured Perils

The livestock and aquaculture under the coverage of the insurance are dairy cattle, farmed

aquatics (cold-water fish and warm-water fish), rural herd (sheep and goat), pure bred Iranian horses, honeybees, camel, shrimp, registered bull, native and hybrid cow, cattle raising units, and breeding centers. In the field of poultry insurance, the Fund covers all industrial units, in which such brands as ancestor parent, layers, and broilers are respectively bred.

Regarding the perils in these fields, the Fund covers any unpredictable accident or disease except for the diseases against which precautionary vaccination is available. Another exception is chemical water pollution in case of aquaculture insurance.

5) Action Fields

Action fields include mainly three stages: 1) farmer enrollment and premium payment, 2) damage occurrence and loss assessment and 3) compensation payment. It should be noted that the government subsidizes premium payment. This has been a key incentive for farmers, livestock breeders, and the others concerned to take up insurance. The premium rate is based on losses over specified number of years. Most of the insurable several alternatives for premium payment have been formulated on the basis of their average yield and, therefore, the producer has more than one option according to his/her production rate. This multiple rate system provides the producer to participate in the insurance program. Compensation covers part of the profit in addition to production costs base on farmers with an average yield. For livestock insurance, it is based on the current average price of the livestock.

6) Problems with the Present Assistances from the Government for Farmers

The problems of the present assistances from the government for farmers are summarized as follows:

a) The programs cannot cover all farmers who need the assistance (about only 1/3 of the farmers under the coverage of the programs),
b) The subsidy is not enough, especially for infrastructure,
c) The approval of the development plan and its subsidy is not timely enough (the second half of the year),
d) The private sector is not interested in investing in the study and the project implementation for farmers,
e) The budget of the assistance for farmers is scattered in too many small projects, and
f) Land (Use) Bank* is not active in Golestan Province.

*Land (Use) Bank is a subordinate bank of Agricultural Bank. It lends the land after land preparation and installation of irrigation and drainage networks to farmers and horticultural companies, and food-processing industries.

A 6.2.2 Available Finance

(1) General

Agricultural Bank or Bank Keshavarzi distributes about 65% of the total credit facilities extended to the agricultural sector as well as 10% of the total credit in Iran. The rest 35% is provided by the other national banks such as Bank Melli, Saderat, Mellat, and Tejarat, and Sepah. Besides them, RPCs (Rural Production Cooperatives) and RCO (Rural Cooperation Organization) have a credit scheme for their members. Moreover, *Qalz-al Hassanah*, an informal money lending organization in this case, is popular among Mazandarani Dehs. Following paragraphs explain Agricultural Bank (Bank Keshavarzi), the main credit distributor

in agricultural sector.

(2) Agricultural Bank (Bank Keshavarzi)

1) Organization Structure

Agricultural Bank or Bank Keshavarzi is a national bank and established in 1933. Like the other banks, Agricultural Bank is under the supervision of the Bank General Assembly, the highest decision making body and subsequently the Supreme Council of Banks. There are 11,656 employees making up the personnel at the Bank, working in 23 divisions at the Head Office, 29 provincial directorates and 1,750 branches throughout the country. In Golestan Province, there are 40 branches.

2) Credit Operation

The credits are distributed to wide range of agricultural activities related to production as well as services in the agricultural sector. The share of different activities in the total credit facilities extended by the Bank is: 42% of crop farming horticulture, 32% of animal husbandry, 11% of agri-related industries and agricultural services, 3% of fish and shrimp farming, 2% of carpet weaving and handicrafts, and 10% of other activities. The credit operations of the Bank is wide with regard to the establishment of farms, orchards, drilling of deep wells, renovation and integration of farms, construction of dams and irrigation networks, establishment of agro-industrial units, establishment of food processing plants as well as poultry, livestock and fishery units. It is noted that 19% of the credits granted in 1998/1999 is rescheduled owing to the drought. But the Bank collects 79.8% of the receivables, 1.7% better than the previous year (Bank Keshavarzi, “Annual Report 1999-2000”).

3) Services

Agricultural Bank Golestan provides 13 programs for the persons, factories, and companies concerned with agriculture. For more details, see Table 6.4.3 on the back. Commission (Interest rate) of Credit Scheme is also summarized in Table 6.4.4. Annual users of the Bank in Golestan Province in 2001 were 5.4 million persons (including the users of facilities).

Table 6.2.3 Agricultural/ Rural Credit provided by Agricultural Bank

No.	Name of Program	Purpose of Credit	Credit Eligibility	Interest rate	Terms	Method of Credit Application	Remarks
1	*Tooba* Scheme	Assistance for establishment of an orchard (olive, walnut, almond, fruit trees and non-fruits trees)	Those who can be introduced from the Organization* and hold farmland	7%/year	10 years	After introduced by the Organization, submitting the required documents and application forms to the Bank	RPCs also can use this.
2	Increasing production of rape seeds, canola and sunflower	Supplying the money for covering the cultivation of oil seeds including purchasing of machinery	Those who can be introduced from the Organization* and hold farmland	14%/year	1-10 years	After introduced by the Organization, submitting the required documents and application forms to the Bank	
3	Electrification of wells	Electrification of wells for agricultural use	Those who can be introduced from the Organization* or an oil company	14%/year	6years	After introduced by the Organization or the oil company, submitting the required documents and application forms to the Bank	
4	Renovation and repairing stables for animals and poultry	Assistance for more effective usage of invested fund and making better condition for production	Those who have required documents	14%/year	Up to 10 years	Submitting legal permissions concerned and application forms to the Bank	
5	Establishment of green houses	Assistance for establishment of horticulture, banana and vegetables in the northern part of Iran	Those who have required documents, land and specialty	14%/year	Up to 10 years	Submitting legal permissions concerned and application forms to the Bank	

No.	Name of Program	Purpose of Credit	Credit Eligibility	Interest rate	Terms	Method of Credit Application	Remarks
6	Mechanization	Promotion of mechanization	Presenting the permission from the Organization	14%/year	Up to 10 years	Depending on the type of facilities' source (Internal/ Note) Submitting required permission and application forms to the Bank, and introduction from the Organization	This facility mainly goes to RPCs.
7	Current facilities	Supplying the fund or the circulating capital for agricultural field	The persons, factories, and companies concerned with agriculture who have required permission and are active and continuous producers	15%/year	Up to 4 years	Depending on the type of facilities' source (Internal/ Note) Submitting required permission and application forms to the Bank, and introduction from the Organization	RPCs and RCO use this facility to provide credits to their members
8	Islamic Development Bank (IDB) Credit	Establishing and developing agricultural processing factories/ Technology transfer	The persons, factories, and companies concerned with agriculture who produce the products for export	6.8%/year	Up to 10 years	Submitting required permission and application forms to the Bank, and introduction from the Organization	All organization under RCO and RPCs also can use this facility
9	Foreign exchange reserving account	Establishing or developing agricultural industries	The persons, factories, and companies concerned with agriculture who can export their products to other countries and supply them within a country	Libor rate** +2%/year	Up to 10 years	Submitting required permission and application forms to the Bank, and introduction from the Organization	All organization under RCO and RPCs also can use this facility
10	Iran Scheme	Supplying female living necessaries and helping with creation of job opportunities	Those who hold an account at the Bank and use it for transaction (Maxmum loan value: Rls.3-5 million)	4%/year	3 years	Submitting required documents and application forms to the Bank that he/she holds the account	

No.	Name of Program	Purpose of Credit	Credit Eligibility	Interest rate	Terms	Method of Credit Application	Remarks
11	Harzat Zeinab Scheme	Creation of job opportunities for umemployed female headed-households in rural areas	Umemployed female head of family (Maxmum loan value: Rls.5 million)	4%/year	5 years	Submitting required documents and application forms to the Bank	
12	Fund for Creation of Rural Occupation	Creation of job opportunities in Dehs	Those who can be introduced by the Fund located in the Dehs	4%/year	5 years	Submitting a letter of inquiry from the Fund and required documents to the Bank	
13	Scheme for Creation of Job Opportunities for University Graduated Students in Agricultural Fields	Creation of job opportunities for university graduated students in agricultural fields	Those who have at least BS diploma in one of the agricultural fields		5 years	Submitting pemissions concerned, required documents, and application forms to the Bank	

Note: * the Organization = Jihad-e-Agricultural Organization

** Libor rate = London inter-bank borrowing rate

Source: Hearing from Agricultural Bank Golestan (2002)

Table 6.2.4 Commission (Interest rate) of Credit Scheme per year

Agricultural sub-division	Agriculture Services Sub-division	Industry Sub-division	Agriculture Supporting Industries Sub-division	Service Industries
Investment: 14% Circulating capital: 15%	Investment: 15% Circulating capital: 15%	Investment: 15% Circulating capital: 15%	Investment: 18% Circulating capital: 18%	Investment: 23% Circulating capital: 25% (at present)
Soil and water infrastructure	Agricultural mechanization	Production of compote and conserve	Grain and pulses winnowing unit	Refrigerator
Agronomy	Veterinary clinics	Production of tomato paste (with aseptic packing)	Sorting and packing of agricultural products	Cold stores
Animal husbandry	Soil and water laboratories	Production of fruits concentrate and syrup	Agricultural products drying units	Digging well
Poultry	Plants pest and disease laboratories	Production of meat and fish powder	Rice cleaning mill	Agricultural products transportation means (with and without refrigerator)
Orchards	Electrification of wells	Flour factory	Cotton ginning factory	Gas station
Forest, pasture, and watershed	Place for shipping milk	Sausage and ham	Packing raisins and dry fruits	
Apiculture	Repairing agricultural machinery	Milk/Dairy products factory	Dairy products packing	
Sericulture		Livestock and poultry		
Fishery and aquatics		Production of agricultural machinery		
Horse raising		Powder, granule, and fries of potato factory		
Medical plants		(Mechanical) Bakery		
Mushroom cultivation		Tea processing factory		
Ornamental plants		Handicrafts (carpet, kelim)		
Fur and leather animal raising		Production of agricultural chemicals		
Breeding insects for pest control		Oil extraction and filtration factory		
Green house products		Shipbuilding (fishing boat)		
Proliferation of plants by tissue culture		Carton and box factory		
Artificial insemination		Production of starch, glucose, hemp sack and net weaving factory		
		Macaroni production		
		Industrial slaughter houses for livestock and poultry		

4) Problems with Agricultural Finance and Countermeasures

Iranian government and farmers have not been invested enough in the agricultural field so far. The main reason for farmers cannot invest in agricultural infrastructure and agricultural inputs is lack of own capital due to recent drought, shortage of water, and subdivision of farmland. Moreover, it is very hard for them to borrow money from Agricultural Bank due to lack of collateral and so on. Therefore, farmers, if they are the members of RPCs, expect to borrow money through RPCs. However, RPCs also face many difficulties when they intend to obtain loans from Agricultural Bank. First, the Bank imposes the hard conditionalities to be fulfilled. Putting them concretely, 1) RPCs need a co-signer, 2) The members of the executive board and the ordinal members did not overdue once they borrowed money from Agricultural Bank, and 3) Landownership of the members should be very clear. In other words, all of the RPCs members cannot always fulfill the conditionalities mentioned above, for example, there are some members who have overdue repayment. Additionally, some of the farmers who hold the farmland that were distributed after the Islamic Revolution or inherited do not have a land register. Second, even if the RPCs found a co-signer and obtain credit from Agricultural Bank, some new difficulties come up. The co-signer cannot obtain credit from the bank individually and cannot leave Iran until the RPCs pays off its debt. Under this situation, some traders make benefit through lending money with high commission (interest), instead of banks. Moreover, the existing banks are all national and there are no private banks that can be a competitor of national banks. (Note: Private banks have been established recently, but they do not competitive power against national banks yet.)

Finally, the ways out of this situation are as follows:

a) To promote the private banks that have competitive power against national banks,
b) To establish “Association Bank” which can provide loans with more simple conditionalities,
c) To simplify the conditionalities, and
d) To put more stress on agriculture (banks).

A 6.3 Socioeconomic Conditions of the Project Area

A 6.3.1 Population

Tazeh Abad Project Area has one RPC (Rural Production Cooperatives) named RPC Pavand. The members of RPC Pavand, 451 persons, mainly consist of Turkmen and Baluchi, live in 7 Dehs (Chen Sbli, Tazeh Abad, Adakesh, Aq Zebir, Granjik, Seydlar, and Salagh Yolghi) in the near future, 8 Dehs (adding Saghar Yolghi) in or near the project area. More precisely, the project area includes 4 (Chen Sbli, Tazeh Abad, Adakesh, and Garanjik) out of the 8 Dehs but all of them should be covered when the socioeconomic conditions of the project area discusses. Moreover, the members are divided into 8 groups based on the irrigation and drainage network and the location of their farmland. The groups are named by their Dehs of residence. This group is good for leveling, convey of water, and the procedure of the lending money from Agricultural Bank. Number of RPC members, households, and population by Deh are summarized in the table below.

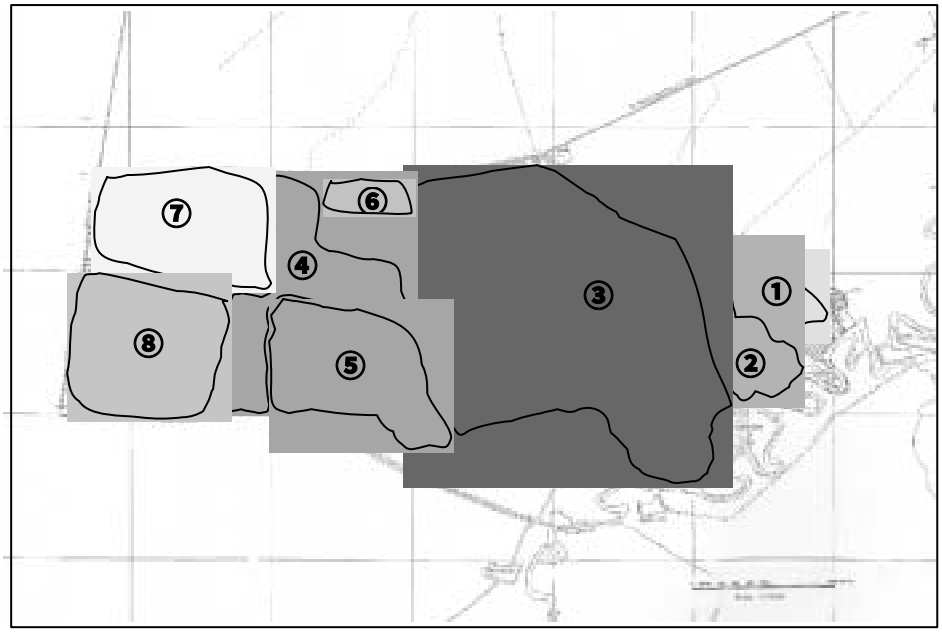
Number of RPC Members, Households, and Population by Deh

No.	Name of Deh/ Group	Covered area by RPC Pavand (ha)	Number of Members (person)	Household	Population (person)
	Chen Sbli	250	45	658	3,325
	Tazeh Abad	320	51	63	332
	Adakesh	1,100	107	186	1,020
	Aq Zebir	350	60	145	871
	Garanjik	440	64	161	1,039
	Seydlar	40*	61**	51	321
	Salagh Yolghi	550	63 (+ 14, expected)	218	1,304
	Saghar Yolghi	(450)	(56, expected)	165	1,004

Source: Hearing from RPC Pavand President (Oct. 2002)
Note:*The area for the construction of the reservoir
**They pay Rls. 50,000/ha as a members' fee but RPC borrows their land for the reservoir and pays 220kg/ha x the wheat price guaranteed by the government.

The location of each group's farmland is shown below

Location of Farmland by Group



<Legend

①	Chen Sbli
②	Tazeh-Abad
③	Adakesh
④	Aq Zebir
⑤	Garanjik
⑥	Seydlar
⑦	Salagh Yolghi
⑧	Saghar Yolghi

A6.3.2 Economic Activities

Economic activities or main income sources of the members of RPC Pavand are agriculture and animal husbandry. They have at least a couple of milk cows, sheep or camels besides hold farmland. As well agriculture and animal husbandry, all of the members have a side job. They work as a public servant (18 persons), a small storekeeper (33 persons), a sales person of carpets and cushions, which is popular among Turkmen members, and so on.

A6.3.3 Marketing

(1) Marketing Channel of Agricultural Products from Tazeh Abad Project Area

The marketing channel of agricultural products from Tazeh Abad Project Area is differentiated by product so as from the other areas. Cultivation area and main buyers by product are described in the table below.

Cultivated Area and Main Buyers of Agricultural Products in Tazeh Abad Project Area

Agricultural Product	Cultivated Area (ha)	Main buyer
Wheat	1,200	- RCO (Rural Cooperative Organization) - Cereal Organization (Public enterprise) - Flour milling factories (State-owned/ Private) - Middlemen
Barley	1,365	- Animal Husbandry Organization - Cereal Organization
Rape seed	150	- Oilseed Product Development Company (semi-governmental) - 2 private companies in Aq Qala City (for selling to oil processing factories)
Cotton	53	- Cotton factories (Private) - Middlemen
Rice	40	- RCO (specific varieties) - Middlemen - Consumers
Cumin	2	- Middlemen - RCO
Maize	40	- Animal Husbandry Organization - Animal Husbandry Association
Sun flower	60	- For oil: Oil Seed Production Development Company - For snacks: middlemen
Broad beans	4	- Middlemen - Wholesale market - Selling by themselves
Sorghum	20	- Animal Husbandry Organization
Milk	- (415 heads)	- Milk processing factories through middlemen in the Dehs - Peddling in the Dehs

Source: Hearing from RPC President (Oct., 2002)

Tazeh Abad Project Area is located 25km from the place in Aq Qala City for One Day *Bazar* (Market) opened every Thursday and 45km from Gorgan City vegetable and fruits wholesale market. The nearest Cereal Organization is located in Anbar Olum City 5-6km from the project area. Branches of Animal Husbandry Organization, which is a subordinate organization to Ministry of Jihad-e-Agriculture, are located in Gorgan, Aq Qala, Bandar-e-Torkman, and Kordkuy Cities and the members can choose where they deliver their forage products.

(2) Marketing Problems of Agricultural Products in Tazeh Abad Project Area

1) Price of the products

A main problem of the price exists in barley. The price presented by the middlemen is lower than the governmental gurranteed price. But farmers have to sell barley to middlemen when they face shortage of money because middlemen pay just after they sell but it takes a couple of months in case of Animal Husbandry Organization.

2) Relationship with the buyers

The price of barley proposed by the middlemen is relatively low compared with the gurranteed price as mentioned above. The members can negotiate with the middlemen but the middlemen are more powerful than them. In case of wheat, a main buyer is Wheat Collection Center of RCO. The members point out that sampling and examination of wheat is not severe and fair.

They feel that RCO tries to set the low price as much as possible. Delayed payment for rapeseed, rice and cotton are also recognized as a problem.

3) Market information

Information on market such as governmental gurranteed prices is broadcasted through radio and TV programs, and also expanded through the RPC. But some of the members do not care much about the condition of market and they produce based on their capacity. It is very risky.

4) Transportation means and cost

Usually, farmers transport their products by themselves through borrowing trucks from a truck syndicate. Rental changes by demand and it is ranged between Rls.20/kg and Rls.40/kg although it is officially fixed. RCO, Cereal Organization, flour milling factories, Animal Husbandry Organization, and cotton factories pay for transportation cost based on the sales' volume. For example, Wheat Collection Center of RCO pays Rls.30/kg (2002). Deh level RCO does not pay for transportation cost because it is usually located very close to farmland. The transportation cost becomes higher than that they are provided when the production is smaller than 10t and the members have to wait in a line for all day long or more because they have to pay additional rental, Rls.10/kg, to the truck syndicate. Therefore, they want RCO to open 24 hours during the harvest season.

(3) Agro-processing industry

Right now, there is no agro-processing factory in and around Tazeh Abad Project Area. Nevertheless, there are potentials to introduce agro-processing industry around this area. This is because a) The members of the RPC have a keen interest in providing materials to agro-processing factories, and b) there is no problem to gather workers because the area is troubled with unemployment of youth and women.

A 6.3.4 Agrarian Society and Gender

(1) Social Structure of Deh

The difference of the administrative structure of Deh is not so noticeable according to race although that is remarkably appeared in their customs and activities, especially of rural women. The representatives of Dehs are the members of Rural Council, elders, and mullahs. The society consists of landed farmers, tenant farmers, agricultural labors, animal breeders and public servants, small storekeeper and *ab-ban mirab* (a traditional water manager).

(2) Gender

Population of the 8 Dehs mainly consists of Turkmen and Baluchi. Turkmen and Baluchi should be discussed separately when gender issues discuss as follows.

1) Turkmen women

Turkmen women usually wear a flower printed one-piece dress with a long sleeve and a long length and a flower printed scarf. Their appearances are obviously different from the other race's women and they are recognized as Turkmen at a glance. The average marital age is 17-20 years old and most of them are married until 30 years old. Usually, they are married among the

same race. And they deliver average 3~5 children during their lives. The main activities of them are weaving carpets, making short-napped coarse carpets, housekeeping, taking care of domestic animals (feeding and milking), and making dairy products. Usually, they do not engage in farming. They just help with weeding and harvesting of cottons in their husbands' fields. Division of work between men and women is indicated in the table below.

Division of work between men and women (Turkmen)

	Men	Women
Farming	- Watering - Cultivating	- Weeding - Harvesting
Animal husbandry	- Raising sheep - Feed preparation - Cleaning of a stable - Taking animals to pasture	- Milking - Feeding

There is no discrimination against the Turkmen women on work, education, voting right, and access/ control on resources such as water, land, farmland, and domestic animals, legally and religiously. But their right is somehow limited, for example, the Turkmen women cannot go out without her husbands' permission and men's room and women's room for eating and receiving guests are separated in a house. Their main problem is weaving carpets is less profitable compared with the past. Moreover, due to Turkmen culture, men and women have to work separately in divided places. Therefore, the working places for women are limited.

2) Baluchi women

Baluchi women usually wear a black Islamic cloak (*chador*) and a scarf as well as the majority of Iranian women. The average marital age is 15years old. Usually, they are married among the same race. And they deliver average 2~5 children during their lives. The main activities of them are farming with their husbands and for the others as an agricultural labor, especially in the cotton field, animal husbandry (cows and sheep), weaving carpets, making pillows/ cushions, needlework, housekeeping, and making dairy products. There is not definite distinction on works between men and women but the main role by sex is shown in the table below.

Division of works between men and women (Baluchi)

	Activities
Men	Production of barely and wheat
Women	Weaving carpets, sewing, animal husbandry

The Baluchi women have the right to access and control on the resources such as water, land, farmland, and domestic animals. They have the right to inherit from their husbands and fathers and to purchase both land and farmland. They also have the right to borrow money. In fact, some of them borrow money from Agricultural Bank but in this case, she is a widow. They do not feel any sexual discrimination and can consult with men about all issues. Main problem of the Baluchi women is that most of them lost income sources due to that weaving carpet become less profitable and so on, and have nothing to do. And it is difficult for girls to continue studying. They cannot go to city for studying because their families do not permit or cannot afford it.

A 6.3.5 Rural Production Cooperatives (RPC Pavand)

(1) General

RPCs (Rural Production Cooperatives) is a public organization established for effective agricultural water use through well-managed irrigation facilities such as pumping stations and irrigation and drainage canals. There is 1 RPC, named RPC Pavand, in the Tazeh Abad Project Area as already mentioned above. General information of RPC Pavand is shown in the following table.

General Information of RPC Pavand

Prefecture	Year	No. of Covered Deh	Covered land area (ha) (irrigation)	Membership (persons) (M:F)	Main Race	Average holding area (ha) (Mini/ Max)
Aq Qala	1997	7 (8)	3,500 (2,000)	451 (446:5)	Turkmen , Baluchi	8 (2/ 100)

Source: Hearing from the RPC Pavand (Oct, 2002)

The eligible persons to be a member of RPCs are those who hold farmland in the covered area (Dehs) by RPCs. The entrance fee is Rls.50,000/ha in case of both rain-fed and irrigated farmland in case of RPC Pavand. Additionally, the members have to pay annual member's fee and water charge if they receive water from the irrigation network.

(2) Organizational structure

RPC Pavand comprises of a RPC President and an accountant dispatched from Jihad-e-Agricultural Organization, and an agronomist, a tractor operator, a guardsman hired by the RPC and an executive board selected among the members. The executive board comprises of 5 persons: President, Vice President, Secretary and two non-positioned persons. They are the representatives of the members selected by the election among all of the members every 3-year. Moreover, there are 2 inspectors, who supervise the management of RPC 3-4 times a year. They are also selected at that time. Their term of service is 1 year.

(3) Activities and decided matters of the RPC

The activities of the RPC Pavand are 1) construction of agricultural infrastructure, 2) water distribution, 3) leveling, 4) selling agricultural inputs (seeds and agricultural chemicals subsidized by government), 5) lending and selling agricultural machinery, 6) collecting and shipping of agricultural products and 6) providing agricultural extension service. Besides these activities, the RPC donates to school in the covered Dehs.

The decided matters are 1) the rules that the members must comply with, 2) buyers of 4 tractors that the RPC bought with low interest rate, 3) water distribution (*ab-ban mirab* distributes water following the RPC decision), and 4) value and time of donations to school and so on following the basic policy of Jihad-e-Agricultural Organization, Golestan.

(4) Available finance for the RPC and the RPC's members

Available finance for the RPC is as same as the other RPCs. When RPCs carry out their activities such as installation of agricultural infrastructure, it can obtain the credit from

Agricultural Bank in the different conditions from individual farmers. The differences are described in the table below.

Type of Debtor	Condition
Individual farmer	- Required of the reserving fixed time deposit at the bank which he/she wants to borrow money determined by types of activities
RPCs/ the member of RPCs	- Not required of the reserving - The interest rate is discounted at 50% except "*Qalz-al-Hassanah*"

There are three types of finance related to or through RPCs: 1) RPCs borrow money from the Bank for purchasing agricultural machinery and inputs, then RPCs pay back money to the Bank, 2) RPCs borrow money from the Bank for implementing projects related to soil and water such as leveling for the individual land of the members, and then the landowners pay back money to the Bank through RPCs, and 3) RPCs members can obtain the credit for the individual use in the same conditions with the RPCs among the allotment of each RPC with the inquiry letter from the Organization. The conditions for each activity are shown in the table below.

Conditions of the Credit (2002)

Purpose of the credit	Interest rate (commission) /year	Among the total	Repayment term
Purchasing of agricultural input	4% (*Qalz-al-Hassana**) 14% (other facilities)	25% 75%	1 year
Purchasing of agricultural machinery	16%	100%	5 year
Implementation of the projects related to water and soil	12-14% (depending on activities)	100%	5 year

Source: Hearing from the counterpart (June, 2002)
* *Qalz-al-Hassanah* is a name of Islamic contract type's facilities without interest (actually low commission)

(5) Benefit and debt

The benefit and debt of RPC Pavand in the year of 2001 are shown in the table below.

Benefit and Debt of RPC Pavand (2001)

Benefit (Rls.)	Debt (Rls.)	Repayment/year (Rls.)	Purpose of Debt
400 million	2.1 billion	110 million	- Install of irrigation and drainage canals - Purchasing agricultural machinery - Purchasing agricultural inputs

Source: Hearing from the RPC Pavand (Oct., 2002)

Current balance of RPC Pavand has been surplus so far. Therefore, the RPC can afford to employ RPC President and other staff by itself, after RPC President, who dispatched from Jihad-e-Agricultural Organization, finishes his duty

(6) Strengths/ opportunities and weakness/ threats (problems)

Strengths/ opportunities and weakness/ threats (problems) of RPC Pavand, which the RPC points out are described in the table blow.

Strengths/ Opportunities and Weakness/ Threats (problems) of RPC Pavand

Strengths/ Opportunities	Weakness/Threats (Problems)
l) RPC can expand irrigation area (if affordable) 2) RPC can contribute to increasing farmers' production through extension service. 3) RPC can provide agricultural inputs surely at the fixed price. 4) RPC contributes to increase of mechanization. 5) RPC puts the first priority on farmers and agricultural development. 6) RPC can protect the members' landholding right.	l) Shortage of water 2) RPC has to borrow money from Agricultural Bank because of not having machinery and equipment for installing canals and leveling lands. 3) It is hard to achieve farmers' trust. 4) Some of the elder members hesitate to introduce new crops. 5) It takes time to expand new crop cultivation because of many elder and low educated members. 6) Turkmen has some religious restriction such as not mixing the soil of his own land with the others.

Source: Hearing from the RPC Pavand (June and Oct., 2002)

(7) The problems of the RPC's members

The problems of the RPC's members are summarized by following categories.

1) Agricultural inputs (fertilizer, seeds and agricultural chemicals)

a) Fertilizer is so expensive although the price is decided and fixed by the government that they cannot use necessary volume, and then the yield is low.

b) Pesticide and insecticide are too short to meet necessity. They are always worried about shortage of the pesticide and insecticide in the middle of cultivation because they are absolutely not sure when they can get them. Moreover, current pesticide and insecticide are not effective at all.

c) They produce seeds by themselves basically, but if the seeds they produced are not good or short, they have to buy the seeds from the RPC. If it is not still enough, they buy the seeds from a market. Nevertheless, every agricultural input can be purchased whenever they want.

2) Rental of agricultural machinery

Rental fee of the RPC is almost same as the other lenders. RPC Pavand has one tractor and so sometimes the members cannot borrow when they need. Nevertheless, it is good for farmers that they can pay for the rent after harvest.

3) Technical instruction (extension)

There is disparity in receiving extension service among the location of their farmland. The members who hold their farmland in the upstream area receive enough extension service but those who in the downstream do not. More precisely, the members from Dehs Garanjik, Salagh Yolgi, and Aq Zebir feel so sorry about that they cannot receive individual technical instruction from either the RPC or Agricultural Service Center such as a recommended cropping pattern. They have intentions to follow the advice on agricultural technique based on the soil analysis of their field. They expect the RPC to solve a salinity problem of soil trough its extension service.

4) Water distribution

All of the members pointed out the shortage of water. But those who hold their farmland in the downstream area have more serious problem than those who in the upstream area. They can irrigate only very small part of their land, for example, 0.5ha out of 5ha in this year and the

number of irrigation is one third compared to those who in the upstream area. They also said that there was enough water before construction of Golestan dam. They expect the reservoir under construction will solve a part of the problem. The members also mentioned a lot of water loss because all of the irrigation canals are not covered by concrete lining. Moreover, the members who obtain irrigation water have to pay member's fee every year because irrigation network is not completed yet. It is ranged between Rls.80,000/ha and Rls.120,000/ha a year. Water distribution in the field is managed by a small group and there is no problem so far.

5) Others

Farm economy of many members shows a loss because agriculture costs much more than their benefit. They envy Army Farm and think the difference is caused by available volume of water and technical advice from the experts.

(8) Request to RPC Pavand from the members

Much complaint on RPC Pavand was not heard from the members. They think the RPC is trying its best in its limitation and the members are satisfied. They clearly said, "If there is water, everything will go well." They requested following matters to the RPC,

a) Supplying of sufficient water and individual technical extension,
b) Decrease of water charge and additional member's fee,
c) Completion of concrete lining of the irrigation canals,
d) Purchasing tracks for transporting their product, and
e) Selling of wheat seeds as the other years.

Among these requests above, "selling seeds" is the most crucial at present. They heard RPC would not able to sell seeds to the members in this year. If the RPC doesn't, they will have to buy the seeds from middlemen and it will be costly (RPC: Rls. 1,500/kg, Middlemen: Rls. 2,000/kg). They said they would be in a severe trouble unless the RPC sells seeds in the condition of deferred payment.

A 6.3.6 Agricultural Assistance and Finance

(1) Agricultural Assistance

Governmental assistance programs for farmers and rural areas are now provided by Ministry of Jihad-e-Agriculture, Ministry of Industries and Mining, Ministry of Housing and Urbanization, Ministry of Education, Ministry of Health and Medical Treatment, and Islamic Revolution Housing Foundation. Besides these programs provided through Ministries, Agricultural Products Insurance Fund contributes much to securing agriculture and farmers' lives.

Among the members of RPC Pavand, 50-60% of them get Agricultural Product Insurance through the RPC. More precisely, all of the members who cultivate rapeseed and cotton get it because of high risk of their cultivation. Cotton is spring crop and there is high risk of inundation. Rapeseed is usually cultivated on a contract with Oilseed Production Development Company. So as to make contract with it, the farmers have an obligation to get this insurance. The ratio of those who get the insurance in the members who cultivate wheat is about 30-40%. Furthermore, in case of the loan from Agricultural Bank, the members can exempt from the payment of the loan interest and the loan is rescheduled when they are damaged from natural

disaster.

(2) Agricultural Finance

Generally, as the source of finance, farmers can use Agricultural Bank (Bank Keshavarzi) and other national banks such as Bank Melli Iran, Saderat, Mellat, Tejarat, and Sepah. Besides them, RPCs (Rural Production Cooperatives) and RCO (Rural Cooperation Organization) have a credit scheme for their members (intermediation between Agricultural Bank and their members).

Preparation of production cost for the next year is a very critical matter for all of the farmers. In case of the members of RPC Pavand, they mainly use Agricultural Bank through the intermediation of the RPC or by themselves. The members can borrow money within the limit of Rls.1 million through the intermediation of the RPC between Agricultural Bank and them but it is not enough. The production costs are at least: Rls.500,000/ha, Rls.150,000/ha, and Rls.300,000/ha in case of wheat, rape seed and barley respectively. Nevertheless, the RPC provides the loan not based on the area of landholding but evenly. Moreover, sometimes the members cannot borrow money when it is needed for the limit of allocated budget. In this case, the person who has more necessity and is more reliable can get priority to obtain the loan. Obtaining loans from banks (including Agricultural Bank) not through the RPC is difficult if he has no connection with the bank. Asking the loan from their friends is a rare case.

A 6.3.7 Social Infrastructure

(1) Roads and Transportation

1) Access Road to the Project Area

Tazeh Abad Project Area is located about 17-25km northeast of Aq Qala City and 40-50km northeast of Goragan City via Aq Qala City. There are 4 access roads to Tazeh Abad Project Area to Aq Qala City. There is an access road from Aq Qla City to Goragn City and its length is 15-20km. This road is wide, well paved and maintained. The length and condition of each access road from the project area to Aq Qala City is shown in the table below.

Length and Condition of Access Roads to Aq Qala City

	Length	Condition	Note
1	25km	5km- earth 20km- paved (asphalt)	When it rains, the part of the earth road (5km) becomes mud and it is hard to pass.
2	20km	10km- graveled 10km- paved (asphalt)	There is no problem to pass.
3	17km	5km- graveled 12km- paved (asphalt)	There is no problem to pass.
4	17km	8km- graveled 9km- paved (asphalt)	There is no problem to pass.

2) Rural Road

Total length of rural road is 100-150km in Tazeh Abad Project Area. The road is earth and so it is hard to pass during rain.

3) Public Transportation

Mini bus is the main public transportation mean from the Dehs in and around Tazeh Abad Project Area to Aq Qala City. People change mini bus at Aq Qala City to go to other

neighboring cities such as Gorgan. The charge of mini bus to main destination is shown in the table below.

Charge of Mini Bus to Main Destination from Aq Qala City

Destination	Charge (Rls.)
Gombat (via Aliabad)	1,900
Gorgan	600
Bandar-e-Torkman	900
Kordkuy	900
Anbar Olum	700
Incheborn (border with Turkmenistan)	6,000
Deh → Aq Qala	Average 500

(2) Electricity, Water Supply, Gas and Communication (Telephone Line)

A power transmission line is installed in Tazeh Abad Project Area and so 100% of the members can use electricity for agricultural production and domestic life. Water supply facilities are not installed only in Deh Tazeh Abad among the other 8 Dehs in the project area. Formerly, a water network used to be there and its source of water was well in Deh Tazeh Abad but they stopped using it for salinity problem. Gas pipeline is not installed yet in this area. It is expanded until Aq Qala City and the settlers living within 5km radius from the city have to pay for gas. As for communication tool, telephone line is not installed in Dehs Tazeh Abad, Adakesh, and Aq Zebir. But it is now under installing in Deh Aq Zebir and can be used soon. In the center of the Dehs mentioned above, there is a telephone office (*telephone hane*) in each Deh.

(3) Education

There are 11 public primary schools, and all of the Dehs, where the members of RPC Pavand live, have at least 1 primary school. There are also 8 public lower secondary schools and 2 public upper secondary schools in the area. Details of educational institutions are shown in the table below.

Details of Educational Institution

Level of the educational institution	No.	Style	Location (Deh)
Primary	11	Co-ed: 5	Adakesh, Taseh-Abad, Aq Zebir, Granjik, Seybrar
		Boys: 3	Chen Sbli, Salagh Yolghi, Saghar Yolgi
		Girls: 3	Chen Sbli, Salagh Yolghi, Saghar Yolgi
Lower Secondary	8	Co-ed: 0	
		Boys: 4	Chen Sbli, Salagh Yolghi, Saghar Yolgi, Garanjik
		Girls: 4	Adakesh, Chen Sbli, Salagh Yolghi, Saghar Yolgi
Upper Secondary	2	Boys: 1	Saghar Yolgi
		Girls: 1	Saghar Yolgi

School attendance ratio decreases as the level goes up but many students go to lower and upper secondary school in cities or Dehs within a 15km radius from their Dehs. Besides these public

schools, there is a private religious school for being mullah in Deh Adakesh. Moreover, a few people go to universities across the nation.

(4) Health and Medical Care

Four out of eight Dehs, Adakesh, Chen Sbli, Salagh Yolghi, and Saghar Yolghi, have a public health center for expanding a family planning, vaccinating children, taking care of pregnant women, giving instruction on purification of drinking water, and garbage collection. There is no public clinic but a doctor visits these health centers one a week from Aq Qala City.

A6.4 Socioeconomic Condition of the Project Area

A6.4.1 Population and Economic Activities

The area of Case Study is belonging to Deh Mehtar Kalateh and covered by RPC (Rural Production Cooperative) Rooyesh-e-Mehtar Kalateh (hereinafter, RPC Mehtar Kalateh). Number of households, population, main race, and religion in Deh Mehtar Kalateh are described in the table below.

Number of Households, Population, Race, and Religion

Name of Deh	Household	Population (person)	Main race	Religion
Mehtar Kalateh	About 750	About 3,500	Mazandarani (80%), Sistani + Persian from Khorasan Province(20%)	Islam Shiite

Source: Hearing from Rural Council of Deh Mehtar Kalateh (June, 2002)

Main economic activities, in other words, main income sources of the settlers in Deh Mehtar Kalateh are agriculture, animal husbandry and public servants. About 30% of farmers deal with animal husbandry besides agriculture. *Ab-ban mirab* (a traditional water manager) exists in this Deh to manage water in the paddy field.

The area of the Case Study is divided into 4 plots. Number of families who hold and farm in each plot, and the area and the products of each plot are summarized in the table below.

Number of Families, Area, and Products in 4 Plots

No.	No. of Families	Area of Plot (ha)	Products
1	5	11	- Wheat - Rice - Soybeans
2	3	8	- Wheat - Rice
3	3	4	- Wheat - Rice
4	1	1	- Wheat - Rice

Source: Hearing from the representatives of 4 plots (Oct. 2002)

All of the persons who hold the farmland in the area of Case Study are belonging to the majority of Deh Mehtar Kalateh. In other words, they are Mazandarani and Islam Shiite. Their economic activities or main income sources are agriculture, or agriculture and animal husbandry. Moreover, all of them are the members of RPC Mehtar Kalateh.

A6.4.2 Marketing

(1) Marketing Channel of Agricultural Products

In the area of Case Study, they produce wheat, rice and soybeans. Total cultivated area, yield and main buyers of each product are described in the table below.

Cultivated Area, Yield and Main Buyers of Agricultural Products

Agricultural Product	Cultivated Area (ha)	Yield (t/ha)	Main buyer
Wheat (Dec.-June)	21	2-4 (rain-fed)	- RCO (Wheat Collection Center) at Yazri and Siejavar
Rice (After wheat)	21	6.5-7 (irrigation)	- Middlemen (at gate) - RCO at Kordkuy and Aq Qala (at gate)
Soybeans	2	1.5-2 (irrigation)	- Oilseed Product Development Company on the way to Gorgan (transported by farmers)

Source: Hearing from the representatives of 4 plots (Oct. 2002)

Yazri, Siejevar, Kordkuy City, and Aq Qala City are 6km, 8km, 15km, and 30-35km away from the area of Case Study respectively. Oilseed Product Development Company is located 15-20km from there. The condition of the road from farmland to main road is not good but the main road is well-paved.

(2) Marketing Problems of Agricultural Products

1) Price of the products

The prices of the products mentioned above are satisfied. But the farmers in the area of Case Study (hereinafter "the farmers") are a little unhappy with the price of wheat because that of the imported one from foreign countries is much more expensive than that of local one. And the price of rice fluctuates much more than that of wheat although that of both of them is gurranteed by government. Soybeans production is not profitable compared to rice. They think farmers will willingly produce more wheat and rice, if the price of wheat and rice increases. In that case, Iran will not need to import rice from Pakistan and Thailand.

2) Relationship with middlemen and other buyers

In case of rice, RCO buys 30% of total harvest. The sales are paid just after selling. It is a large benefit for the farmers. Therefore, RCO is the most reliable buyer for them at present. On the contrary, middlemen are unreliable because they pay by check and late. But the farmers can negotiate with the middlemen and, sometimes they can sell the products at more than the gurranteed price.

3) Market information

Market information can get from TV and newspaper and it is enough.

4) Transportation means and cost

The ratio of truck owners is less than 10% in Deh Mehtar Kalateh. All of the farmers do not have a truck, either. In case of wheat and rice transportation, they borrow a truck from a truck syndicate in Kordkuy and Bandar-e-Torkman. Soybeans are transported by a small tractor and

it is dangerous. Sometimes, they cannot borrow a truck for shipping rice on time and it gets wet although rice should be sold just after harvesting. Rental fee of a truck is Rls.3,500/t for any products and it is reasonable enough. In addition, RCO pays half of the rental fee but Oilseed Product Development Company does not at all.

A 6.4.3 Agrarian Society and Gender

(1) Social structure of Deh

The representatives of Deh Mehtar Kalateh are the members of Rural Council, elders, and mullahs. The society consists of landed farmers, tenant farmers, agricultural labors, animal breeders, public servants, and small storekeepers, *ab-ban mirab* (a traditional water manager). Among the representatives, Rural Council plays a big role. In Deh Mehtar Kalateh, *Ab-ban mirab* is in charge of water distribution in paddy fields. The method of water distribution is determined by 1) the farmland and well owner or *Ab-ban mirab* in trust with the owner in case of well or 2) the RPC in case of dams and reservoirs.

(2) Gender

The Mazandarani women wear a black Islamic cloak (*chador*) and a scarf but wear very colorful dress under the cloak. The average marital age is 15~20 years old. And they deliver average 2~5 children during their lives. The main activities of Mazandarani women are farming (in kitchen gardens, husbands' farmland and the others' farmland), raising chickens and ducks for self-consumption, making dairy products from the milk of their own cows, sewing, handicrafts as a hobby and housekeeping. Men also help with a part of housekeeping such as receiving guests, cleaning, washing clothes and dishes but rarely cooking. There is not a clear division of works but the details of the division of works are as follows.

Division of work between men and women (Mazandarani)

	Men	Women
Farming	- Cultivating - Watering (irrigation)	- Rice planting* - Weeding -Spraying agricultural chemicals - Harvesting
Animal husbandry	- Preparation of feeds - Cleaning of a stable - Taking animals to pasture	- Feeding - Milking

*Note: Basically, rice planting has been a women's work in Mazandarani Dehs but recently trans-planters are gradually introduced and this is becoming men's work.

There is no discrimination against the Mazandarani women on work, education, voting right, and access/ control on resources legally and religiously. Moreover, they can open their own bank accounts and obtain loans from the bank if the conditions are fulfilled, for example, the woman who has a license of sewing can obtain a special loan. The Mazandarani women also can borrow money from *Qalz-al-Hassanah*, which is a popular informal money lending organization mainly for those who cannot borrow money from banks among Mazandarani. The largest problem for them is unemployment of both men and women especially graduating from an upper secondary school.

A 6.4.4 Rural Production Cooperatives (RPC Mehtar Kalateh)

(1) General

The area of Case Study is covered by RPC (Rural Production Cooperative) Mehtar Kalateh as mentioned first. General information of RPC Mehtar Kalateh is shown in the following table.

General Information of RPC Mehtar Kalateh

Prefecture	Year	No. of Covered Deh	Covered land area (ha) (irrigation)	Membership (persons) (M:F)	Main Race	Average holding area (ha) (Mini/ Max)
Kordkuy	1997	2	1,558 (1,200)	450 (440:10)	Mazandaran i, Sistani	1-3 (0.25/ 15)

Source: Hearing from the RPC Mehtar Kalateh (Oct, 2002)

The eligible persons to be a member of RPCs are those who hold farmland in the covered area (Dehs) by RPCs. The entrance fee or the share of RPC Mehtar Kalateh is Rls.100,000/ha for both rain-fed and irrigated farmland. Now, 10% of the members has not finished the payment and it shows low cooperation of some members.

(2) Organizational structure

The RPC Mehtar Kalateh comprises of a RPC President employed by RPC itself, and an accountant, an agricultural technician dispatched from Jihad-e-Agricultural Organization, a person in charge of mechanization, 4 agricultural machinery operators (tractor, combine, and trans-planter), and an executive board selected among the members.

(3) Activities and decided matters of the RPC

Activities of RPC Mehtar Kalateh are 1) Training of the members through technical extension (ex. appropriate crops), 2) Setting a member's plot as a demonstration plot, 3) Setting an experimental plot in the RPCs' farmland (new cultivation method of wheat, named "Smitch"), 4) Purchasing a rice trans-planter and lending it to the members at Rls.300 thousand/ha (2001), 5) Purchasing wheat combines (for 400ha) and lending it to the members at Rls.40 thousand/ha (2002), 6) Selling agricultural inputs, 7) Analyzing soil, 8) Extending the method for prevention of weed and insects, 9) Buying cotton at the better price than middlemen, and 10) Preparing a pickles factory.

Decided matters are 1) Getting grant from Agriculture Bank for Drought Damage Prevention Plan established by the RPC, 2) Installing farm roads (8km), 3) Land grouping (it is decided but not proceeded due to two farmers' objection), 4) Making cadastre and topographical maps for identifying the area of farmland, the location of farm roads, and wells, and 5) Water distribution (by the executive board).

(4) Available finance for the RPC

Available finance is as same as the other RPCs. For more details, see A 6.3.3 Rural Association (2) 4).

(5) Benefit and debt

The benefit and debt of RPC Mehtar Kalateh in the year of 2001 are shown in the table on the next page.

Benefit and Debt of RPC Mehtar Kalateh (2001)

Benefit (Rls.)	Debt (Rls.)	Repayment/year (Rls.)	Purpose of Debt
12 million (in black)	400 million	7.5 million	N.A.

Source: Hearing from the RPC Mehtar Kalateh (June, 2002)

(6) Strengths/ opportunities and weakness/ threats (problems)

Strengths/ opportunities and weakness/ threats (problems) of RPC Mehtar Kalateh, which the RPC points out, are described in the table blow.

Strengths/ Opportunities and Weakness/ Threats (problems) of RPC Mehtar Kalateh

Strengths/ Opportunities	Weakness/Threats (Problems)
l) RPC can purchase agricultural machineries and contribute to increases of production. 2) RPC contributes to decreasing cost through extension of appropriate amount of seed, fertilizer, and agricultural chemicals. 3) The members can buy agricultural inputs very timely and increase their production. 4) RPC can extend new cultivation techniques.	l) Shortage of budget 2) Decrease of governmental subsidy 3) The mechanization plan (purchasing agricultural machinery) of Jihad-e-Agriculture Organization was not appropriate, and some RPC had to sell the machines. 4) Farmland is detached. (It is hard to meet together although discussion is required to implement the project) 5) The guaranteed prices of some agricultural products are not set.

Source: Hearing from the RPC Mehtar Kalateh (June, 2002)

(7) Problems with the RPC members in the Case Study Area

a) Agricultural inputs

The prices are reasonable enough. But there is shortage of fertilizer for wheat. Therefore, they have to buy it at the market and it is more expensive than the fertilizer supplied from the RPC. Moreover, Iranian agricultural chemicals are not effective and quality of seed is not good (mixed with insects and barley's seed, and broken). The support for the inputs of rice production is not sufficient. There is no subsidy for seeds and fertilizer from government. Agricultural chemicals for rice cultivation are subsidized but their quality is bad.

b) Agricultural machinery

Rental is not expensive, but the farmers cannot use the machinery when those who want to use it concentrate in one period.

c) Technical instruction (extension)

Training course conducted by technicians belonging to the RPC. Individual instruction is also given. The farmers are satisfied with contents and frequency of the extension service. But they request distribution of manuals or brochure and putting up of posters on recommendable cultivation and for attention on disease and insects.

d) Water distribution

There is no irrigation and drainage network in the covered area of the RPC. The farmers joined in the RPC for receiving technical instruction and easier access for agricultural inputs. At present, they use groundwater from their individual wells for irrigation. It costs much because of maintenance, sperm oil or gasoline, and engine oil. They expect to receive cheaper water from a reservoir or a dam.

e) Request to RPC Mehtar Kalateh from the members in the area of Case Study

They are satisfied with the RPC because they think the RPC tries its best actively within a present limitations such as shortage of tractors and attachment, and agricultural inputs. But they request that the RPC will clear the segment from the river located next to their fields with a lot of segment and is easily inundated once it rains.

A6.4.5 Agricultural Assistance and Finance

(1) Agricultural Assistance

Jihad-e-Agriculture Organization in Golestan provides the loan for purchasing domestic animals. Khomeini Foundation and Ministry of Labor and Social Problems also provide this kind of loan. The persons who graduated from a university but do not have any occupation have a priority to get the loan.

(2) Agricultural Finance

The farmers borrow money from a bank, mainly Bank Saderat because it is close and has a long history around this area. In case of borrowing from Bank Saderat, they need a letter of introduction from Rural Council. Interest rate for agricultural production is 16%/year. That for well construction loaned from Agricultural Bank is 20%/year. Agricultural Bank (branch) started its operation recently around this area. In case of borrowing from Agricultural Bank, they can obtain loan through the RPC.

A6.4.6 Social Infrastructure

(1) Access Road to the area of Case Study

The area of Case Study is located around Deh Mehtar Kalateh. It is 15 km from Kordkuy City, and 7-8km from Gorgan City. The condition of the road is good and it is well-paved.

(2) Electricity, Water Supply, Gas and Communication (Telephone Line)

A power transmission line is installed in Deh Mehtar Kalateh but not in the field. Water supply facilities and sewers are also installed in the Deh. Gas pipeline is not installed yet but it is planned by Rural Council of Deh Mehtar Kalateh. Moreover, telephone line is already installed.

(3) Education

There are 2 public primary schools (boys and girls), 2 public lower secondary schools (boys and girls) and 1 public upper secondary school (girls) in Deh Mehtar Kalateh. Most of the students go to until the level of upper secondary school.

(4) Health and Medical Care

The medical care system is well arranged. There are a small public clinic and a large health center in Deh Mehtar Kalateh.

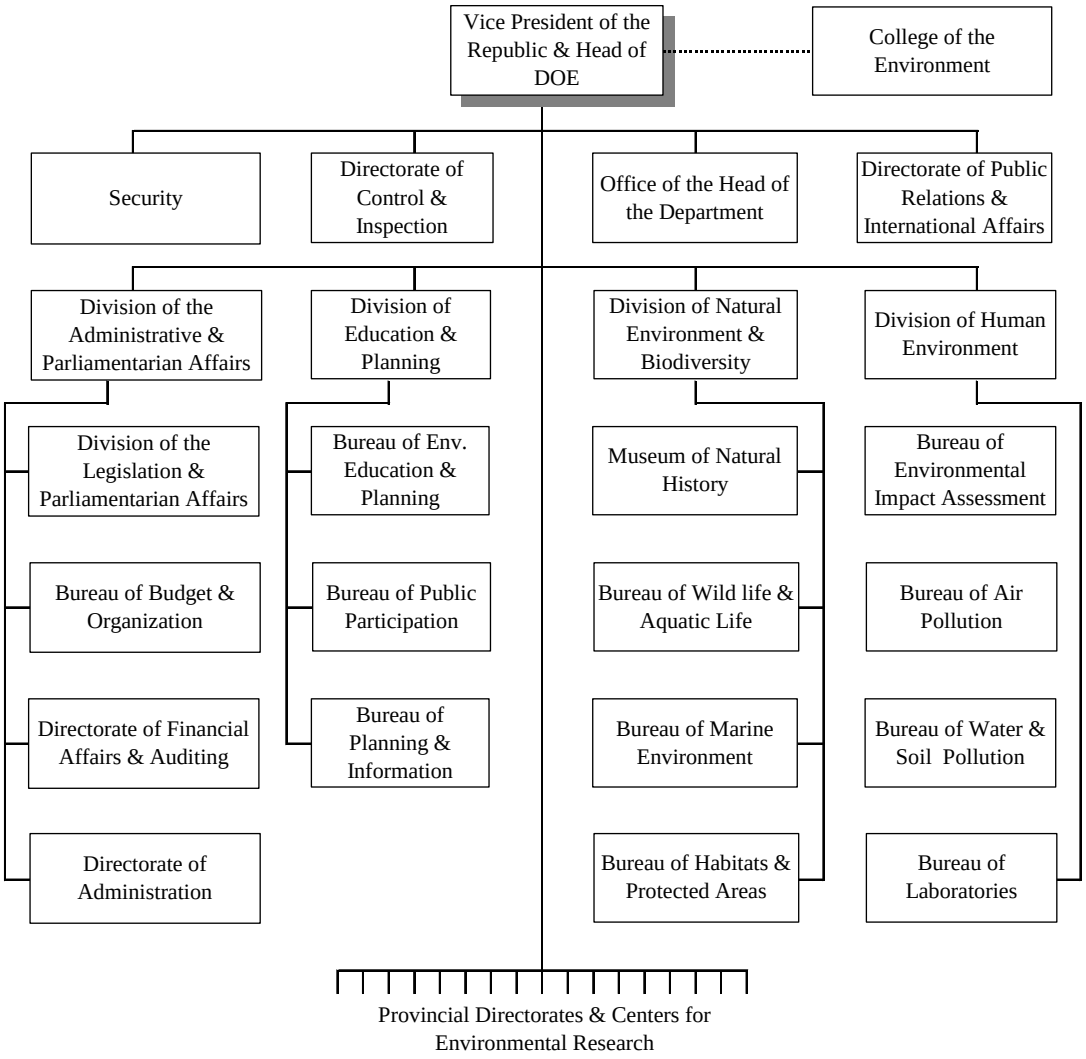
Annex 7	Environment

ANNEX 7

ENVIRONMENT

A7.1 Environmental Organization and Its Responsibilities

In Iran, the Department of Environment (DOE) is responsible for the protection and enhancement of the environment, the prevention and control of any form of pollution or degradation leading to the disturbance of environmental balance, and for conducting all matters related to wildlife and the aquatic biota of the territorial waters. The Vice President of the Islamic Republic of Iran, who directs the daily operations of DOE heads the department with 4 deputies as shown in the following organizational chart of the DOE.



Organizational Chart of the Department of Environment

DOE is responsible for 10 national parks with a total area of 1,277,560 hectares, five national monuments covering 1,798 hectares, 25 wild life refuge measuring 1,921,504 hectares, 47 protected areas spread over 4,813,086 hectares and 17 wetlands. The sum of these area equals to 8,013,948 hectares or 5% of the entire land area[1].

Each province of Iran has a DOE provincial directorate, which monitors all the aspects of environmental protection and the implementation of the department's programs. DOE is in-charge for defining the national regulations and standards for preserving and enhancing the quality of environment. A major part of this responsibility includes the provision of expert studies in human and industrial pollution, desertification, deforestation, soil erosion, rangeland degradation, improved water resource management and protection of biodiversity. Considering the rapid development of the country, DOE is responsible for monitoring the quality of air and water.

The legal division of DOE prepares the comprehensive draft guidelines that detail regulations in accordance with the international environmental laws, standards and conventions. This series of legislative measures are introduced to the parliament for ratification and once they are approved, these mandates provide the necessary legal powers towards the implementation of these measures.

DOE introduced the National Environmental Plan of Action (NEPA) in 1997 and was presented as a report to the cabinet, chaired by the President. This initiative outlines the outstanding threats to the national environment and proposes concise measures needed for environmental protection. NEPA deals with danger zones including climate control, noise pollution, water resource preservation, protection and management, soil stabilization and anti-erosion measures. Protection of forests and grasslands, desertification, safeguarding of biodiversity and monitoring the anti-pollution measures are undertaken for the national waterways. Environmental education and public participation have been emphasized in these areas.

A7.2 Environmental Laws, Planning and Management

The Environmental Protection Act (1974) is the major law for environmental conservation in Iran. The Supreme Council of the Environment is a legislative body that enacts relevant regulations for the environmental protection. It is chaired by the President of the Islamic Republic and the other members of the council are the Ministers of Agriculture, Foreign Affairs, Industry, Interior, Health and Medical Education, the Heads of the Department of

[1] A Glance at the Department of the Environment of the Islamic Republic of Iran

Administration and Planning and the Institute of Standard and Industrial Research. The laws enacted to protect the environment are as follows:

- Regulations for forested areas in 1920
- Municipality law concerning air pollution, solid waste disposal and reduction of industrial pollution in 1955
- The Environmental Protection and Enactment Act (EPEA) in 1974
- The executive rule of EPEA in 1975
- The clean air act in 1975
- Article 50 of the Constitution of the IRI approved in December 1979
- The Water Pollution Prevention Guideline in 1984
- The wastewater effluent standard in 1991
- The Amendment of Water Pollution Prevention Guideline in1994
- The Amendment of wastewater effluent standard in 1994
- Air Pollution Control Law in 1995
- Industrial Siting Guidelines
- Environmental Impact Assessment Guidelines and Framework in 1995
- Air Pollution Emissions Standards in 1998

According to Article 50 of the Constitution of IRI, "the protection of environment, in which the present and future generations must lead an ever-improving community life, is a public obligation. Therefore, economic or other activities which cause pollution or other irreversible damage to environment are prohibited".

The major development projects require an Environmental Impact Assessment (EIA) to evaluate the degree of damage on the environment, and the ways to reduce, eliminate or remedy these impacts. Projects needing an EIA and the methods of assessment will be reviewed and updated at intervals, to ensure that progress is made in keeping up with the technical know-how of international environmental bodies.

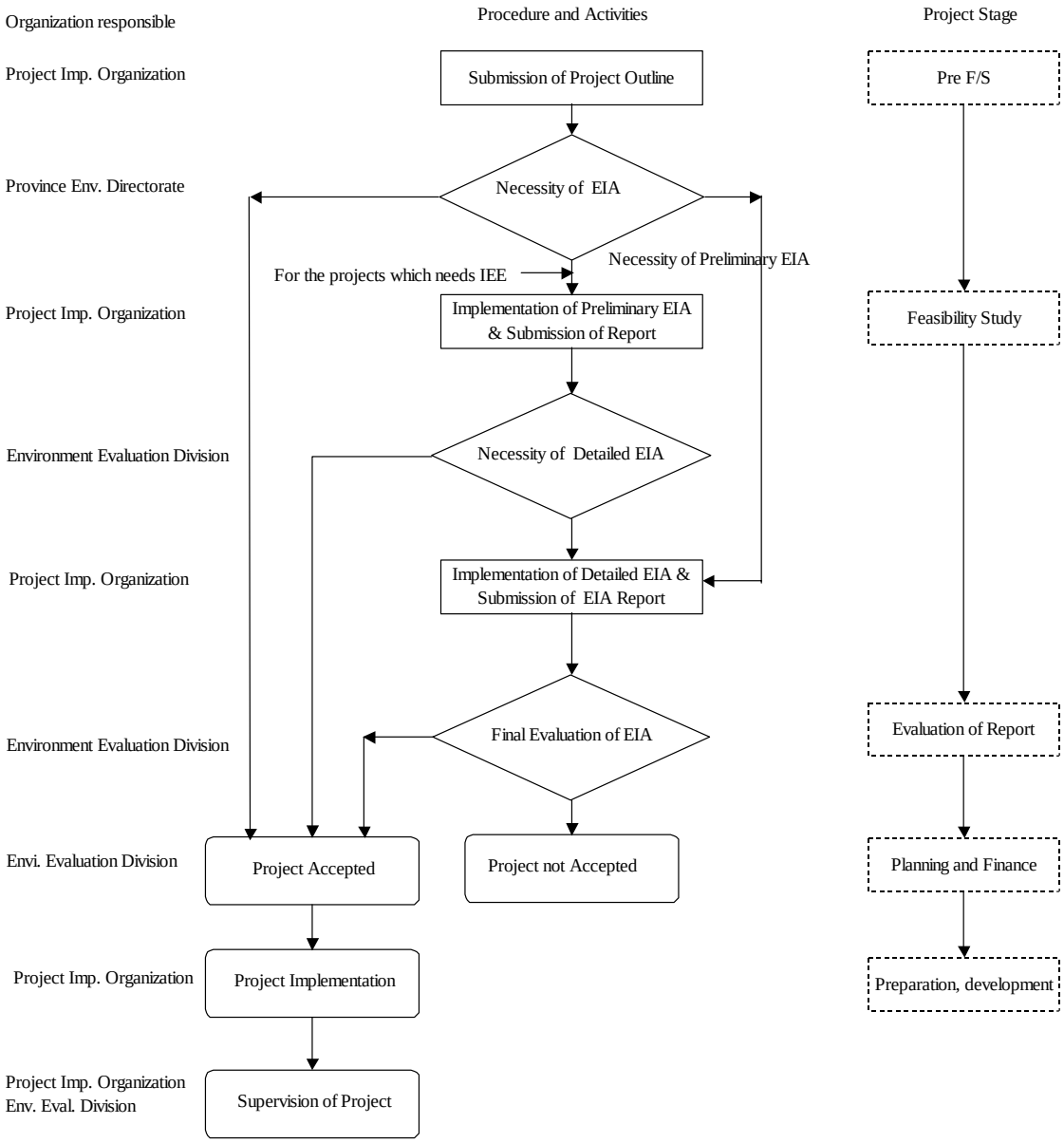
EIA needs to be carried out for the following projects:

- Petroleum industries of any kind
- Refineries
- Power stations with capacity of more than 100 MW
- Steel industries
    a) Units of melted materials with a capacity of 300,000 ton/year
    b) Units of forming with a capacity of 100,000 tons/year
- Dams of more than 15m high with area more than 400 ha area

Dams which keep pollutant materials in any measure should be evaluated by the environmental office.

- Man-made lakes with area more than 400 ha area
  The size of the lakes that breed fish with an area of less than 400 ha should be supervised by the department of agriculture.
- Irrigation and drainage projects with an area of more than 5,000 ha
- Airports with a landing area of more than 2,000m
- Forestry projects
- Projects of oil or gas pipeline transportation

EIA procedure followed in Iran is shown below:



Evaluation Procedure of Environmental Impact Assessment in Iran

A7.3 International Environmental Role of Iran

A7.3.1 International Conventions

Iran has accepted international legal responsibilities, which in part reflects its moral, ethical and scientific obligations to protect the biodiversity assets. The international conventions of which Iran is a member are as follows:

- Convention on Biological Diversity (CBD)
- Convention of Wetlands (Ramsar)
- Convention of Control of Transboundary Movement of Hazardous Waste
- Convention to Combat Desertification
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- United Nations Framework Convention on Climate Change (UNFCCC)
- World Heritage Convention (WHC)
- Montreal Protocol on Ozone-layer Depletion Substances
- Bio-safety Protocol

A7.3.2 UNDP-Iran Environmental Activities

In 1993, Iran became the first developing country to utilize the UNDP-supported Agenda 21 programme, later seen as an environmental charter for the 21st century, through the formulation of a National Strategy for Environment and Sustainable Development.

The programme pays particular attention to the inner working of the Department of Environment and aims at introducing a new policy framework for environment protection, organizational adjustments and new policy instruments such as environment impact assessment for large public and private investments. Iran has a number of ongoing projects in the areas of environment impact assessment, biodiversity, climatic change, ozone layer protection, carbon sequestration, protection of the Caspian Sea, prevention of desertification, and management of land and water resources, and UNDP is assisting the Government of Iran to achieve a safe environment for its citizens in line with its commitment to Agenda 21 and other global environmental conventions and treaties.

Some of the major environmental activities carried out by this joint UNDP-Iran program are as follows:

1) Environmental Impact Assessment - To define principles of EIA and proposes to build and strengthen national capacity to carry out EIA effectively and efficiently.
2) Biodiversity - UNDP-assisted National Biodiversity Strategy and Action Plan for protection and preservation of the country's distinct biodiversity.
3) Climatic Changes - Compile an inventory of green house gases (GHGs) and to assess the vulnerability and adaptation of Iran to the global climate change patterns.
4) Caspian Environment Programme (CEP) - Environmentally sustainable development and management of the Caspian Sea. The project brings together five littoral countries (Azerbaijan, Iran, Kazakhstan, Russia and Turkmenistan) of the Caspian to develop a regional coordination mechanism, complete a transboundary diagnostic analysis of related environmental issues, formulate, and endorse an overall Strategic Action Plan and respective national Caspian Strategic Action Plans.
5) Montreal Protocol - Iran is committed under the Montreal Protocol (MP) to phasing out the use of Ozone Depleting Substances (ODS) by 2010. The National Ozone Committee (NACODS) and its secretariat (Ozone Office) formed under the project is the highest policy making body for the MP programme in the country.
6) Land and Water Resources Management - Formulate a National Action Programme for Sustainable Management of Land and Water Resources under three interrelated pilot projects of desertification control, watershed management and irrigation improvement.

A7.4 Golestan Provincial Directorate of Environment

The Golestan provincial directorate of environment is responsible for the protection of national environmental sites in the Golestan province and to carry out the environmental activities including environmental monitoring, and environmental training to its staff and the local population. One of the important natural environment sites in the province is Golestan National Park, which covers an area of about 92,000 ha with a length of 52 km in the east of Albourz mountains. The national park is the largest protected forest in the country, and covers different climatic zones between the Caspian Sea and arid areas.

The Golestan provincial directorate of environment has 8 branch offices at the following locations:

1. Gorgan,
2. Ali-Abad,
3. Bandar-e-Turkman,
4. Kordkuy,
5. Bandar-e-Gaz,
6. Gonbat Kavoos,

7. National Park of Golestan and
8. Minoodasht

In the future, it is planned to open offices in Aghala, Azad Shar, Kalaleh and Ramian. There is also an environmental laboratory in Gorgan.

The provincial directorate is responsible for making the evaluation and approval of Preliminary Environmental Impact Assessment (pre EIA) and detailed EIA. When any industry or factory is set up in the province, permission needs to be obtained from the department of environment based on the regulations of DOE. For eg., when a big industry/factory is to be established, it should be set up in the industrial or commercial areas which are included in the development plans of the city and should be at a considerable distance away from the city as defined by the regulations of the DOE.

Before starting any major factory or industry, an application should be first submitted to the respective branch office of the Golestan provincial directorate of environment. After the first visit by the staff of the branch office, the expert from the provincial directorate will visit the area based on the necessity and the final approval will be given after it is confirmed that all the necessary criteria are satisfied. Besides, the environmental officials will recheck whether all the norms are followed during the construction. When necessary, they also take samples such as drainage water sample and check them at the laboratory in Gorgan.

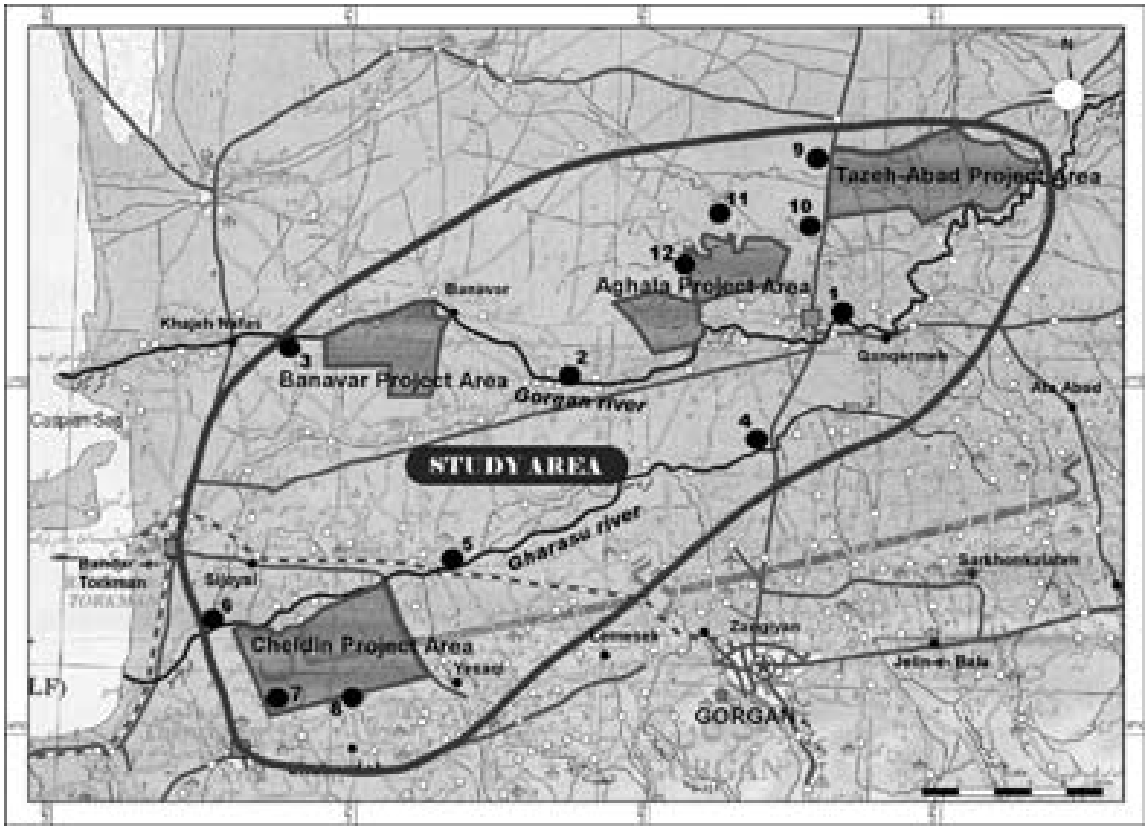
A7.5 Existing Environmental Problems of the Study Area and the Region

A7.5.1 Water Pollution in Gorgan and Gharasu Rivers

The water pollution in Gorgan and Gharasu rivers is considered to be the major environmental problem in the Study Area. Water pollution is caused by three ways:

i) By farming practices: All the agricultural pollutants including pesticides, fertilizers and salts are drained into the river through the drainage water causing pollution.
ii) Some industrial wasters from Aq Qala and other nearby towns are also discharged into the Gorgan river causing pollution. During the field survey, it was reported that the house waste garbage in Bandar-e-Torkman and the surrounding are thrown directly into the canals, which are finally discharged into Caspian sea.
iii) There are 100 villages located near the rivers and the wastes from houses living closer to the river are also thrown into the rivers causing pollution. Although the water pollution by the industries are controlled through environmental regulations, it is still impossible to control them fully.

In order to analyze the water quality of Gorgan and Gharasu rivers, well water and drainage water, water samples were taken during the 1st field survey in January 2002 in 12 locations as shown in the following figure.



Water Sampling Locations in the Study Area

The results of the water quality analysis are presented in Table A7.5.1. During the 2nd field survey in June 2002, water quality samples were collected in 12 locations and the results of the water quality analysis are shown in Table A7.5.2. In order to compare the similar data for previous years, the results of water quality analysis conducted in 1998 is shown in Table A7.5.3.

The Environmental research center of Golestan Provincial Directorate of Environment also conducted water quality analysis of Gorgan and Gharasu rivers and the results are shown in Table A7.5.4 and A7.5.5 respectively.

Iran Water Quality Standard for Discharge Water is shown in Table A7.5.6; Guideline for Interpretations of Water Quality for Irrigation is shown in Table A7.5.7 and Recommended Maximum Concentrations of Trace Elements in Irrigation Water is shown in Table A7.5.8.

Table A7.5.1 Results of Water Quality Survey in the Study Area (1st Field Survey, January 2002)

Sample No.	Source	pH	EC	SAR	SSP	Classification	Cations and Anions, milliequivalents per liter								Nutrients/Elements, Parts Per Million (P.P.M)						Sol. K	TDS	TSS
			mS/cm			(**)	Na^{+}	Mg^{++}	Ca^{++}	Sum Cations	Cl^{-}	$SO4^{--}$	$HCO3^{-}$	Sum Anions	$NO3^{-}$ - N	$NH4^{+}$-N	Cu	Zn	Mn	Fe	meq/l	mg/l	mg/l
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
1	Upstream of Gorgan River	7.8	2.000	3.9	39.0%	C3S1	12.0	11.4	7.4	30.8	12.0	15.2	3.8	31.0	1.75	0.07	0.01	0.00	0.02	0.12	0.22	1,200	1,110
2	Middlestream of Gorgan River	7.8	1.990	4.0	40.3%	C3S1	12.0	10.8	7.0	29.8	12.4	13.4	4.2	30.0	1.47	0.14	0.02	0.00	0.02	0.76	0.19	1,190	780
3	Downstream of Gorgan River	7.8	2.340	4.8	43.9%	C4S2	15.0	11.0	8.2	34.2	14.0	15.7	4.3	34.0	1.75	0.14	0.03	0.00	0.01	0.70	0.23	1,500	40
4	Upstream of Gharasu River	7.9	1.430	3.0	36.2%	C3S1	7.7	3.8	9.8	21.3	5.2	9.6	6.2	21.0	0.00	0.00	0.01	0.00	0.02	0.09	0.37	1,000	10
5	Middlestream of Gharasu River	7.9	1.550	3.9	44.2%	C3S1	9.5	4.6	7.4	21.5	10.0	5.6	5.9	21.5	0.00	0.00	0.00	0.00	0.01	0.07	0.24	1,200	10
6	Downstream of Gharasu River	7.5	1.570	3.3	38.5%	C3S1	8.5	5.2	8.4	22.1	6.8	9.1	6.2	22.1	0.00	0.35	0.00	0.00	0.01	0.10	0.30	1,230	10
7	Well Sample 1	7.5	0.982	1.5	25.0%	C3S1	3.2	3.6	6.0	12.8	5.2	0.4	7.2	12.8	0.00	0.00	0.00	0.00	0.01	0.04	0.04	550	10
8	Well Sample 2	7.7	1.457	5.4	57.2%	C3S2	10.7	4.0	4.0	18.7	11.2	2.1	7.4	20.7	0.35	0.07	0.01	0.01	0.01	0.09	0.10	1,000	0
9	Drainage Sample 1	8.1	47.600	62.5	76.8%	C4S4	590.0	131.0	47.0	768.0	570.0	196.5	3.5	770.0	0.07	0.00	0.05	0.00	0.09	0.28	0.41	50,500	190
10	Drainage Sample 2	8.1	16.110	16.5	51.2%	C4S4	130.0	96.0	28.0	254.0	176.0	76.0	2.0	254.0	0.00	0.00	0.03	0.00	0.05	0.09	0.41	14,000	60
11	Drainage Sample 3	8.1	8.380	16.4	64.1%	C4S4	75.0	33.0	9.0	117.0	84.0	27.3	5.7	117.0	0.00	0.07	0.02	0.00	0.03	0.07	0.37	5,500	20
12	Profile Water table Sample	7.1	38.800	48.8	72.6%	C4S4	450.0	100.0	70.0	620.0	444.0	171.9	4.1	620.0	0.70	0.07	0.04	0.00	0.08	0.36	0.15	38,500	8,980

Note : The Sampling was carried out in January, 2002

(**) USDA Classification of Irrigation water salinity

C1 - Low Salinity Water (EC<0.25 mS/cm)
C2 - Medium Salinity Water (EC = 0.25-0.75 mS/cm)
C3 - High Salinity Water (EC = 0.75 - 2.25 mS/cm)
C4 - Very High Salinity Water (EC>2.25 mS/cm)

S1 - Low Sodium Water (SAR<10)
S2 - Medium Sodium Water (SAR10-18)
S3 - High Sodium Water (SAR18-26)
S4 - Very High Sodium Water (SAR>26)

Table A7.5.2 Results of Water Quality Survey in the Study Area (2nd Field Survey, June 2002)

Sample No.	Source	pH	EC	SAR	SSP	Classification (**)	Cations and Anions, milliequivalents per liter								Nutrients/Elements, Parts Per Million (P.P.M)						Sol. K	TDS	TSS
			mS/cm				Na^{+}	Mg^{++}	Ca^{++}	Sum Cations	Cl^{-}	$SO4^{--}$	$HCO3^{-}$	Sum Anions	$NO3^{-}$ - N	$NH4^{+}$-N	Cu	Zn	Mn	Fe	meq/l	mg/l	mg/l
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
1	Mehtar Kalate well (about 100m deep)	7.4	0.685	1.1	22.7%	C2S1	2.0	3.6	3.2	8.8	1.2	3.8	3.8	8.8	1.50	0.00	0.00	0.00	0.05	0.41	0.06	432	0
2	Mehtar Kalate pond	7.0	0.347	0.5	16.5%	C2S1	0.8	1.8	2.0	4.6	0.8	0.7	3.0	4.5	2.40	0.14	0.00	0.00	0.00	0.04	0.10	220	0
3	Drainge at Cheldin area (near agri.	8.2	2.016	4.1	39.4%	C3S1	13.0	8.0	12.0	33.0	12.0	15.4	4.4	31.8	0.00	0.40	0.00	0.00	0.00	0.02	0.12	1,200	200
4	Gharasu river (downstream)	8.0	1.984	5.0	46.7%	C3S1	14.0	2.0	14.0	30.0	11.0	15.2	3.0	29.2	0.40	0.00	0.00	0.00	0.02	0.08	0.14	850	0
5	Gorgan river at Khajeh Nafas	8.1	3.427	5.4	40.2%	C4S2	21.5	18.0	14.0	53.5	18.0	32.1	3.4	53.5	0.40	0.00	0.00	0.00	0.00	0.10	0.19	2,100	200
6	Gorgan river at Banavar project area	8.3	7.539	11.9	55.3%	C4S3	57.0	30.0	16.0	103.0	60.0	38.2	3.6	101.8	0.40	0.14	0.00	0.00	0.00	0.09	0.20	4,800	700
7	Gorgan river at Aq qala Hemmat project	8.5	10.483	15.1	56.9%	C4S4	87.0	44.0	22.0	153.0	62.0	84.6	4.8	151.4	0.40	0.00	0.00	0.00	0.00	0.13	0.26	7,300	400
8	Aq qala Hemmat project Pond	8.4	2.984	5.8	45.5%	C4S2	20.0	18.0	6.0	44.0	32.0	6.0	4.6	42.6	1.30	0.00	0.00	0.00	0.00	0.30	0.15	2,565	200
9	Gorgan river at Tazah Abad project	8.4	9.677	13.0	51.3%	C4S4	80.0	58.0	18.0	156.0	60.0	89.8	4.8	154.6	0.00	0.00	0.00	0.00	0.00	0.08	0.25	6,950	600
10	Desilting pond at Tazah Abad project	8.4	5.967	9.7	52.8%	C4S3	42.5	22.0	16.0	80.5	36.0	38.3	4.8	79.1	0.00	0.00	0.00	0.00	0.00	0.10	0.19	4,218	400
11	Canal water at Army farm area	8.0	0.887	2.1	36.6%	C3S1	3.7	2.0	4.4	10.1	4.4	3.3	2.4	10.1	0.30	0.00	0.00	0.00	0.00	0.07	0.13	850	100
12	Vosmigr Dam	8.1	0.855	2.0	34.6%	C3S1	3.6	0.8	6.0	10.4	4.0	2.6	3.8	10.4	0.14	0.00	0.00	0.00	0.00	0.08	0.13	780	100

Note : The Sampling was carried out in January, 2002

(**) USDA Classification of Irrigation water salinity

C1 - Low Salinity Water (EC<0.25 mS/cm)
C2 - Medium Salinity Water (EC = 0.25-0.75 mS/cm)
C3 - High Salinity Water (EC = 0.75 - 2.25 mS/cm)
C4 - Very High Salinity Water (EC>2.25 mS/cm)

S1 - Low Sodium Water (SAR<10)
S2 - Medium Sodium Water (SAR10-18)
S3 - High Sodium Water (SAR18-26)
S4 - Very High Sodium Water (SAR>26)

Table A7.5.3 Results of Water Quality Survey Carried out in July, August 1998

location	pH	EC mS/cm	SAR	SSP	TDS (mg/l)	Milliequivaleents per liter									$NO3^-$-N	$NH4^+$-N
						Na^+	Mg^{++}	Ca^{++}	S.cations	$SO4^{--}$	Cl^-	$HCO3^-$	CO3--	S.Anions		
Ali Abad Well	7.6	0.910	1.8	34.1	582.4	3.0	3.7	2.1	8.8	0.8	3.3	4.7	0.0	8.8	1.60	1.12
Ali Abad Well	7.6	1.340	2.2	34.6	857.6	4.5	6.0	2.5	13.0	1.7	5.2	6.1	0.0	13	1.67	0.59
Ali Abad Well	7.7	0.900	1.9	36.4	576.0	3.2	3.2	2.4	8.8	0.8	2.9	5.1	0.0	8.89	1.61	0.25
Ali Abad Well	7.8	0.800	0.5	11.2	512.0	1.0	5.3	2.6	8.9	3.7	0.6	4.6	0.0	8.9	1.47	0.22
Ali Abad Well	7.8	1.300	2.0	30.5	832.0	4.3	7.5	2.3	14.1	4.7	3.0	6.4	0.0	14.1	3.60	0.64
Ali Abad Well	7.9	0.840	1.8	34.1	537.6	3.0	3.7	2.0	8.7	1.7	2.7	4.3	0.0	8.7	2.42	0.64
Anbar Olum Canal	7.6	0.760	2.5			3.8	2.2	2.5	8.4	1.8	3.1	3.4	0.0	8.35		
Anbar Olum Canal	7.7	9.800	15.0			78.0	34.2	18.6	130.8	63.0	62.0	5.8	0.0	130.8		
Anbar Olum Canal	8.0	0.740	2.2	42.5		3.4	2.2	2.4	8.0	1.8	3.0	3.2	0.0	8		
Anbar Olum Canal	8.2	5.300	10.0			37.5	17.0	9.4	63.9	29.4	30.0	3.7	0.4	63.9		
Anbar Olum Canal	8.5	10.200	17.0	70.6		85.0	35.2	18.0	138.2	64.0	70.0	4.2	0.4	138.2		
Azad shahr well	8.3	1.300	3.8			6.6	4.1	2.1	12.8	3.1	7.5	2.4	0.0	13		
Basir Abad	7.5	43.700	41.0	68.1		400.0	150.2	37.6	587.8	97.1	486.0	4.7	0.0	587.8		
Basir Abad	7.5	43.700	43.0	69.0		415.0	151.6	36.4	603.0	108.7	490.0	4.3	0.0	603		
Dahane	8.3	20.000	25.0	66.0		160.0	67.4	15.6	243.0	53.9	184.0	3.7	1.4	243		
Dahane	8.4	20.000	24.0	65.0		156.0	66.6	16.0	238.8	55.6	178.0	2.6	2.6	238.8		
Eraghi Mahale well	8.6	0.600	1.4			2.0	3.2	0.8	6.0	2.5	1.3	2.7	0.0	6.5		
Eraghi Mahalle wel	7.8	0.650	1.3	30.0		2.1	2.9	2.0	7.0	3.1	1.5	2.4	0.0	7		
Fazel Abad Well	7.8	0.800	0.6			1.1	3.8	3.3	8.1	5.9	0.8	1.8	0.0	8.5		
Fazel Abad Well	7.9	0.720	0.4	9.1	46.8	0.7	4.1	2.9	7.7	3.2	0.7	3.8	0.0	7.7	5.42	1.54
Fazel Abad Well	7.9	0.790	0.5	10.6	505.6	0.9	5.2	2.4	8.5	3.2	0.7	4.6	0.0	8.5	3.21	1.26
Fazel Abad Well	7.9	0.790	6.2	8.4	505.6	0.7	5.3	2.3	8.3	2.7	0.7	4.9	0.0	8.3	0.40	
Fazel Abad Well	7.9	0.810	2.3	10.1	518.4	0.9	5.0	3.0	8.9	3.7	0.6	4.6	0.0	8.9	2.30	0.50
Gonbad Qanat	6.7	2.760	7.0			15.0	6.0	3.0	24.0	4.0	11.0	9.2	0.0	24.2		
Ilvar Well	8.1	1.280	2.6													
Ilvar Well	8.2	2.200	6.2			13.7	7.2	2.7	23.6	1.4	15.6	6.8	0.3	24.1		
Ilvar Well	8.6	0.960														
Islam Tape	7.5	6.500	4.5			26.0	49.8	16.5	92.3	72.6	15.5	4.2	0.0	92.3		
Islam Tape	8.0	1.200	4.8													
Khaje Lar	7.9	0.800														
Khaje Lar	8.3	1.200	3.4													
Khaje Nafas	8.3	20.700	23.0	63.6		150.0	68.4	17.4	235.8	41.1	190.0	3.7	1.0	235.9		
Khaje Nafas	8.3	20.700	27.0	67.6		180.0	68.8	17.4	266.2	75.9	184.0	4.7	1.6	266.2		
Kordkuy Well	7.6	0.960														
Kordkuy Well	8.2	1.400	5.4													
Kordkuy Well	8.4	1.120	5.1													
Kordkuy Well	8.9	2.400	15.1			20.5	1.7	2.0	23.7	0.3	18.0	5.5	0.8	24.5		

Table A7.5.4 Results of Water Quality of Gorgan River Made by Environmental Research Center

Sample No. (1)	Source (2)	pH (3)	EC mS/cm (4)	Turbidity ntu (5)	DO mg/l (6)	BOD mg/l (7)	COD mg/l	TSS mg/l	$NH4^{+}$-N mg/l (16)	NO3 - N mg/l (17)	$HCO3^{-}$ mg/l(*) (18)	Hardness mg/l(*) (19)
	Gorgan River (Date : 2000.06.12)											
1	Temer Ghara Ghouzi	8.26	1.955	380	4.7	4.9	318	-	1.90	7.61	224	66
2	Koroukiy Gonbad	7.80	2.210	10	4.2	1.6	109	-	1.16	0.00	206	72
3	Exit of Woshmigr Dam	8.90	3.315	10	8.0	4.3	53.6	-	1.50	0.47	245	66
4	Exit of Aq Qala	7.91	4.564	10	8.1	4.4	71.4	-	1.70	3.83	192	124
5	Kajeh Nafas	7.99	15.300	10	7.9	4.8	384	-	1.66	0.00	373	380
	Gorgan River (Date : 2000.09.08)											
1	Temer Ghara Ghouzi	7.56	1.190	1	1.5	0.3	7.1	119	-	5.50	105	280
2	Koroukiy Gonbad	7.90	2.630	0	5.9	0.9	21.4	413	-	0.00	161	720
3	Exit of Woshmigr Dam	8.18	8.410	0	3.7	1.2	78.3	105	-	0.49	145	2,420
4	Exit of Aq Qala	8.42	11.050	0	1.7	0.7	185.1	405	-	3.00	140	3,340
5	Kajeh Nafas	8.67	11.900	7	1.6	1.2	170.8	134	-	0.00	99	4,140
	Gorgan River (Date : 2000.10.26)											
1	Temer Ghara Ghouzi	8.32	0.935	8	10.5	0.3	7.1	119	-	6.49	132	2,180
2	Koroukiy Gonbad	8.23	1.275	6	8.8	0.9	21.4	413	-	2.55	124	800
3	Exit of Woshmigr Dam	8.00	1.900	-	3.3	1.2	78.3	105	-	2.26	132	2,640
4	Exit of Aq Qala	8.01	1.610	-	6.2	0.7	185.1	405	-	3.59	125	1,920
5	Kajeh Nafas	8.33	2.550	-	5.2	1.2	170.8	134	-	4.03	139	1,800
	Gorgan River (Date : 2001.02.11)											
1	Temer Ghara Ghouzi	8.01	0.930	-	6.0	1.0	34	190	0.091	8.52	328	760
2	Koroukiy Gonbad	8.18	6.630	-	5.6	0.4	47	350	0.002	4.26	233	580
3	Exit of Woshmigr Dam	8.35	2.312	-	5.5	5.6	119	10,600	0	5.49	167	840
4	Exit of Aq Qala	8.11	2.380	-	6.1	0.1	64	8,000	0	8.74	255	1,080
5	Kajeh Nafas	7.96	1.573	-	7.3	0.5	44	7,500	0	6.38	223	860
	Gorgan River (Date : 2001.02.11)											
1	Temer Ghara Ghouzi	8.01	0.930	-	6.0	1.0	34	190	0.091	8.52	328	760
2	Koroukiy Gonbad	8.18	6.630	-	5.6	0.4	47	350	0.002	4.26	233	580
3	Exit of Woshmigr Dam	8.35	2.312	-	5.5	5.6	119	10,600	0	5.49	167	840
4	Exit of Aq Qala	8.11	2.380	-	6.1	0.1	64	8,000	0	8.74	255	1,080
5	Kajeh Nafas	7.96	1.573	-	7.3	0.5	44	7,500	0	6.38	223	860

* : Alkalinity and Hardness are given as equivalent of CaCO3

(**) USDA Classification of Irrigation water salinity
C1 - Low Salinity Water (EC<0.25 mS/cm)
C2 - Medium Salinity Water (EC = 0.25-0.75 mS/cm)
C3 - High Salinity Water (EC = 0.75 - 2.25 mS/cm)
C4 - Very High Salinity Water (EC>2.25 mS/cm)

Table A7.5.5 Results of Water Quality of Gharasu River Made by Environmental Research Cente

Sample No. (1)	Source (2)	pH (3)	EC mS/cm (4)	Turbidity ntu (5)	DO mg/l (6)	BOD mg/l (7)	COD mg/l	TSS mg/l	Nitrate ppm (16)	Phospate ppm (17)
	Gharasu River (Date : 1994.09.09)									
1	Mouth	7.50	1.500	120	11.4	21.0	65	68	3.0	0.1
2	Above the bridge	7.90	0.870	120	10.6	15.0	15	183	0.0	0.2
3	Junction of Ghaz mahaleh	8.15	1.080	180	14.3	5.0	15	136	0.0	0.3
4	Ghaz Mahaleh	7.96	0.450	11	12.7	9.0	10	14	3.6	0.6
5	Ghaz Mahaleh Bala Dast	8.23	0.320	8	9.0	5.0	5	47	4.0	0.0
6	Bala judeh river	8.47	0.310	30	10.3	8.0	15	68	3.9	0.0
7	Bala judeh river water tank	8.04	0.330	10	12.6	0.0	5	81	3.8	0.1
8	Shast Kold river	8.35	0.300	25	12.0	0.0	10	54	2.6	0.1
9	Aq Qala	7.99	3.280	73	6.6	0.0	80	312	0.0	0.1
10	Pol Dikcheh	7.69	2.770	10	5.2	0.0	70	10	0.0	0.1
	Gharasu River (Date : 1994.10.14)									
1	Mouth	6.34	0.640	339	7.2	6.9	25	270	7.50	0.10
2	Junction of Ghaz mahaleh	7.26	0.670	892	7.1	5.7	6	380	8.50	0.20
3	Ghaz Mahaleh	7.66	0.366	71	6.7	1.2	10	40	7.10	0.30
4	Noaz Abad Bridge	7.66	0.950	780	7.4	3.5	20	362	9.20	0.20
5	Junction of Kafsh Giri	7.70	1.070	361	7.5	5.5	5	50	10.90	0.20
6	Kafsh Giri	8.09	0.446	97	9.5	2.4	65	220	6.80	0.20
7	Nahar Khoran river	8.28	0.769	36	9.6	1.3	50	46	6.20	0.40
8	Aq Qala Bridge	7.99	1.270	167	8.6	1.7	35	156	12.00	0.10
9	Ghaleh Jigh	7.92	1.350	278	9.0	1.4	70	414	12.40	0.10
10	Touskastan	8.21	0.591	26	10.2	1.3	10	70	3.70	0.04
	Gharasu River (Date : 1994.11.10)									
1	Mouth	7.75	1.150	64	12.7	2.3	27.1	74	2.30	0.50
2	Ghaz mahaleh	7.72	0.520	10	9.0	2.2	11.6	60	2.20	1.40
3	Junction of Ghaz mahaleh	7.86	1.080	119	9.3	3.0	15.5	82	3.00	0.40
4	Junction of Kafsh Giri	7.87	1.350	40	11.1	2.8	23.3	24	2.80	0.40
5	Kafsh Giri	7.94	0.450	9	10.8	1.7	11.5	14	1.70	0.20
6	Bala dast Kafsh Giri	7.97	0.370	18	10.3	1.1	3.8	16	1.05	0.01
7	Exit Kosar Dam	7.57	0.550	1	5.4	0.5	0	2	0.50	0.10
8	West of Aq Qala bridge	7.97	1.190	121	9.6	1.7	19.8	92	1.70	0.40
9	Ghaleh Jigh	8.06	1.190	82	11.3	1.2	7.6	44	1.15	0.03

Table A7.5.5 Results of Water Quality of Gharasu River Made by Environmental Research Cente

	Gharasu River (Date : 1994.12.09)									
1	Mouth	7.40	1.250	335	10.9	3.8	51.8	90	2.04	0.60
2	Junction of Ghaz mahaleh	7.90	1.260	270	10.0	6.7	18.5	78	2.10	2.70
3	Ghaz Mahaleh	7.91	1.980	30	7.1	8.4	44.4	150	2.10	0.00
4	Noaz Abad Bridge	7.93	1.330	105	10.6	2.7	33.3	12	2.10	0.50
5	Junction of Kafsh Giri	7.91	1.460	100	10.7	2.0	63	28	2.00	0.50
6	Kafsh Giri	8.00	0.420	27	9.1	1.2	44.6	18	2.10	0.00
8	West of Aq Qala bridge	7.95	1.180	145	11.2	2.8	14.9	20	2.10	0.40
9	Ghaleh Jigh	7.90	1.000	245	10.7	3.5	3.7	144	2.00	0.30
10	Touskastan	8.11	0.510	5	12.2	2.7	3.7	40	2.00	0.10
	Gharasu River (Date : 1995.01.09)									
1	Mouth	7.73	1.430	11	9.6	5.7	12	62	8.40	0.50
2	Junction of Ghaz mahaleh	7.90	1.340	11	7.9	5.7	80	42	10.20	0.50
3	Ghaz Mahaleh	8.24	2.020	5	5.2	7.6	100	64	2.30	2.10
4	Noaz Abad Bridge	7.90	1.330	11	4.2	3.7	8	60	8.60	0.50
5	Junction of Kafsh Giri	7.90	1.520	10	10.4	5.5	12	64	11.00	0.60
6	Kafsh Giri	8.21	0.460	2	13.5	3.4	11.5	86	6.60	0.02
7	Ziarat	7.96	0.830	30	4.1	2.2	15.3	34	6.50	0.40
8	Aq Qala Bridge	7.77	1.460	31	7.2	2.8	23	136	15.20	0.40
9	Ghaleh Jigh	7.80	1.440	4	9.1	0.9	19.1	12	3.60	0.10
10	Touskastan	8.04	0.640	5	10.1	1.7	3.8	6	3.60	0.10
	Gharasu River (Date : 1995.02.05)									
1	Mouth	7.59	1.520	7	9.9	6.7	26.2	80	8.40	0.40
2	Junction of Ghaz mahaleh	7.72	1.510	12	9.7	3.2	15	10	8.10	0.50
3	Ghaz Mahaleh	7.62	2.110	6	7.0	8.9	36.1	92	0.00	3.80
4	Noaz Abad Bridge	7.80	1.500	10	10.2	4.6	22.5	44	7.70	0.30
5	Junction of Kafsh Giri	7.74	1.730	5	10.8	2.1	22.5	42	7.40	0.40
6	Kafsh Giri	7.98	0.500	7	13.6	2.2	3.7	10	6.30	0.30
7	Ziarat	7.98	0.770	14	10.7	3.2	3.7	20	5.30	0.40
8	Aq Qala Bridge	7.77	1.450	50	10.6	2.1	25.9	36	5.30	0.10
9	Ghaleh Jigh	7.85	1.220	1	11.4	1.2	11.1	20	2.90	0.03
10	Touskastan	8.00	0.600	17	14.1	1.8	7.4	26	2.97	0.00

* : Alkalinity and Hardness are given as equivalent of CaCO3

(**) USDA Classification of Irrigation water salinity
C1 - Low Salinity Water (EC<0.25 mS/cm)
C2 - Medium Salinity Water (EC = 0.25-0.75 mS/cm)
C3 - High Salinity Water (EC = 0.75 - 2.25 mS/cm)
C4 - Very High Salinity Water (EC>2.25 mS/cm)

Table A7.5.6 Iran Water Quality Standard for Discharge Water

Item	Pollutants	Discharged to surface water , mg/l	Dicharged to wells, mg/l	Used in Agriculture and Irrigation, mg/l
1	Silver (Ag)	1	0.1	0.1
2	Aluminium (Al)	5	5	5
3	Arsenic (As)	0.1	0.1	0.1
4	Boron (B)	2	1	1
5	Barium (Br)	5	1	1
6	Beryllium (Be)	0.1	1	0.5
7	Calcium (Ca)	75	-	-
8	Cadmium (Cd)	0.1	0.1	0.05
9	Cloride (free)	1	1	0.2
10	Chloride (Cl-)	600 (note 1)	600 (note 2)	600
11	Cyanide (Cn)	0.5	0.1	0.1
12	Cobalt (Co)	1	1	0.05
13	Chromium (Cr+6)	0.5	1	1
14	Cr+3	2	2	2
15	Copper (Cu)	1	1	0.2
16	Flouride (F)	2.5	2	2
17	Iron (Fe)	3	3	3
18	Mercury (Hg)	very low	very low	very low
19	Magnesium (Mg)	100	100	100
20	Manganese (Mn)	1	1	1
21	Molybdenum (Mo)	0.01	0.01	0.01
22	Nickel (Ni)	2	2	2
23	Ammon. Nitrogen (NH4-N)	2.5	1	-
24	Nitrite Nitrogen (NO2-N)	10	10	-
25	Nitrate Nitrogen (NO3-N)	50	10	-
26	Phosphate (based on Phosphur)	1	1	
27	Lead (Pb)	1	1	1
28	Selenium (Se)	1	0.1	0.1
29	Sulphide (SO3-)	1	1	1
30	Sulphate (SO4-)	400	400(note2)	500

Table A7.5.6 Iran Water Quality Standard for Discharge Water

Item	Pollutants	Discharged to surface water , mg/l	Dicharged to wells, mg/l	Used in Agriculture and Irrigation, mg/l
31	Vanadium (V)	0.1	0.1	0.1
32	Zinc (Zn)	2	2	2
33	Greasy and oily matters	10	10	10
34	Detergent (ABS)	1.5	0.5	0.5
35	Biological Oxygen Demand (BOD5)	50	50	100
36	Chemical Oxygen Demand (COD)	100	100	200
37	Dissolved Oxygen (DO)	2	-	2
38	Total Dissoloved Solids (TDS)	note 1	note 2	-
39	Total Suspended Solids (TSS)	40	-	100
40	pH	6.5-8.5	5 to 9	6-8.5
41	Turbidity (GTU)	50	-	50
42	Colour (PTC)	75 clour units	75 clour units	75 clour units
43	E-Coli (Nos. in 100 ml)	400	400	400
44	MPN (Nos. in 100 ml)	1000	1000	100
45	Parasitic worm eggs (nematode)	1/ 1000 ml	1	1/ 1000 ml

Note 1: Discharge with concentration level in excess of the level specified in the table shall be permissible, if the discharge does not increase the chloride sulfate and dissoloved substances of the receiving body at a 200m diameter, in excess of 10%.
Note 2: Discharge with concentration level in excess of the level specified in the table shall be permissible, if the increase induced by dishcharge of the choloride sulphate and dissolved substances in the consumed water does not exceed 10%.
Ref : The Executive Bylaws for Paragraph (C) of Article 104 and Article 134, DOE (2001)

Table A7.5.7 Guideline for Interpretations of Water Quality for Irrigation

Potential Irrigation Problem	Degree of Restriction on Use		
	None	Slight to Moderate	Severe
Salinity			
EC, mS/cm	<0.7	0.7 – 3.0	>3
Total Dissolved Solids, TDS, mg/l	<450	450-2000	>2000
Specific Ion Toxicity (affects sensitive crops)			
Sodium (Na+) (adj. SAR)			
Surface irrigation	<3	3-9	>9
Sprinkler Irrigation	<3	>3	>9
Chloride (Cl-), meq./lit			
Surface irrigation	<4	4-10	>10
Sprinkler Irrigation	<3	>3	>10
Miscelaneous Effect (Affects susceptible crops)			
Nitrate – N (NO3-N), mg/l	<5	5-30	>30
Bicarbonate (HCO3), me/l (Overhead sprinkling)	<1.5	1.5-8.5	>8.5
pH	Normal range 6.5 – 8.4		

(Source : Water Quality for Agriculture, FAO Irrigation and Drainage Paper No.29)

Table A7.5.8 Recommended Maximum Concentrations of Trace Elements in Irrigation Water

Element	Recommended Max. Con. (mg/l)	Remarks
Copper (Cu)	0.20	Toxic to a number of plants at 0.1 to 1.0 mg/l in nutrient solutions
Zinc (Zn)	2.0	Toxic to many plants at widely varying concentrations
Manganese (Mn)	5.0	Toxic to a number of crops at a few-tenths to a few mg/l, but usually only in acid soils
Iron (Fe)	5.0	Not toxic to plants in aerated soils, but can contribute to soil acidification and loss of availability of essential phosporus and molybdenum. Overhead sprinkling may results in deposits on plants and equipment.

(Source : Water Quality for Agriculture, FAO Irrigation and Drainage Paper No.29)

According to USDA classification, the water of Gorgan and Gharasu rivers is in the range of C3S1 to C4S2, and the salinity of water is in the high level. This condition was noted both during the first and the second field surveys. Therefore, the irrigation water may cause serious salinity problems, if the soils are not properly drained. For salinity control, excess water application for leaching is necessary. However, the sodium is at a slight (S1) to medium level (S2). As shown in Table A7.5.2, the wells in the Mehtar Kalate (Cheldin project area) have relatively good quality water with a low salinity. Since the irrigation in this project area is carried out with this water, the salinity, alkalinity problem in this Cheldin project area is low.

As shown in Table A7.5.3, the water quality samples taken in July 1998, in Basir Abad close to the Banavar project site, shows extremely high values of 43.7 mS/cm, which is almost close to the salinity level of sea water. The analysis made by environmental research center (Table A7.5.4) also shows higher values in spring and summer. During this period, the water in the Gorgan river and Gharasu river is mostly drainage water from the fields and therefore the salinity of water is very high, since the soils also have high salinity and alkalinity.

As shown in Tables A7.5.1, the water quality in the winter season does not vary significantly at different locations, whereas the water quality during the spring and summer season (dry period) varies significantly based on the location. As shown in Table A7.5.2, the water quality at the Vosmigr dam and the nearby Army farm canal are much better than the down stream sides and the salinity level of Gorgan river water increases by almost 10 times at the Aq Qala and Banavar project areas. As shown in Table A7.5.4 and A7.5.5, Dissolved Oxygen (DO) values of the rivers are higher than 5 mg/l for most cases, except for a few cases when DO is less than the critical level of 2 mg/l. Although the BOD values are lower, the higher COD values imply that the pollutant strength of chemicals is higher in the Gorgan river.

According to the FAO guidelines for water quality, the chloride is at a higher level for surface and sprinkler irrigation. Therefore, salt tolerant crops should be used. However, nitrate nitrogen is at a lower level and bicarbonate is at a moderate level. The other elements such as Cu, Zn, Mn and Fe are at a much lower level.

As shown in Table A7.5.1, the drainage water has a very high EC ranging from 8 mS/cm to 47 mS/cm, which has very severe salinity and alkalinity problems. This extremely saline-sodium drainage water is drained into Gorgan river and the Caspian Sea. Although the water of the Caspian sea is less saline (EC = 18 mS/cm or TDS = 12 mg/l) when comparing with the sea water, which is about 3 times than the Caspian sea, the higher amount of salty water and chemicals draining into Caspian sea also has a potential impact on the fishes in the downstream side of the study area.

A7.5.2 Other Environmental Problems in the Region

(1) Atmospheric Pollution

Field Burning in Cheldin Area after Harvest (June 2002)

It is a common practice in the areas such as Cheldin project area to burn the fields immediately after harvesting of wheat so that the fields will be ready sooner for the next spring crop such as rice or soybean. Heavy smoke causing air pollution were observed during the field survey in the Cheldin project area.

In stead of burning of the fields, it might be better if the wheat straw are ploughed into the soil so as to increase the organic matter of the soil. However, the farmers choose to burn the fields, since it is much easier and faster. Research and extension of proper tillage methods are necessary so that the farmers will avoid burning of fields. Regular monitoring of atmospheric pollution and adoption of proper farm management practices are necessary.

(2) Health and Sanitation

During the field survey, it was reported that the house wastes and garbages are mostly thrown into the nearby canals or river.

Garbage in Bandar-e-Torkman Canal

One of the most important problems existing in the study area is the location of many villages at both sides of the Gorgan river. In this case, the human sewage and also the agricultural drainage including agro chemicals cause the pollution of Gorgan river and cause diseases on fishes. As a result, the people who consume those fishes may be infected with the water borne diseases such as skin diseases or stomach ailments etc. Also, the children are infected with some diseases because of swimming in Gorgan river. Monitoring of regulations of waste disposals and provision of waste disposal measures are necessary.

(3) Social problems in project execution

In general, people of Turkmen Origin live in and around the Study Area, except for a small area in the western part of the Study Area, where people of Mazandaran and Sistan province live. The irrigation and drainage projects are executed based on the request from the farmers and the cooperatives and therefore, there is very little disagreement among people. However, when a storage reservoir or a desilting pond needs to be constructed, the cooperative needs to make arrangement for purchasing the lands from the concerned farmers. Some times, when new irrigation and drainage projects are executed by the government, it might be difficult to get the agreement of the farmers, if the proposed irrigation and drainage system disturbs the land allocation of the farmers. It was reported that the introducing of drainage system in the Cheldin project area has been postponed mainly because of the disagreement of the farmers.

A7.5.3 Environmental Problems of Tazheh Abad Project Area

(1) Existing Environmental Conditions and Problems of Tazeh Abad Project Area

There are Voshmigr dam, wetlands and fish breeding farms near and around the Tazeh Abad Project Area and these conditions make the locations a proper place for migratory birds to spend winter. *Incheh* lake with saline water is located at 12 km north of Tazeh Abad and living *Artemia solina* is a food source for some birds such as flamingo.

The major environmental problems in the project area are as follows:

- High salinity and alkalinity of the soils of the Project Area
- High level of underground water
- Water quality of Gorgan River

The salinity, alkalinity of the soils varies from S1A1 to S3A3 and S4A4 in some small areas. Except for a small area in the southeastern part of the Project Area, most of the soils have a higher salinity and alkalinity level. The combination of low amount and poor quality of irrigation water for leaching, and insufficient drainage system increase the salinization and alkalinization of the soil.

According to the soil survey and land classification study carried out by the Soil and Water Research Institute, the groundwater is mostly at a depth of 1-2m in most part of the Project area. Because of the higher level of the groundwater table, the salts in the drained water moves down to the groundwater and again rise back to the top of the soil by capillary rise. It is necessary to reduce the groundwater table in the Project Area with sufficient drainage system.

As discussed in the previous section A7.5.1, the water quality of Gorgan river which supplies irrigation water for the project area is the major environmental concern of the project area. According to USDA classification, the water of Gorgan river is in the range of C3S1 to C4S2, and the salinity of water is in the higher level. Therefore, the irrigation water may cause serious salinity problems, if the soils are not properly drained. For salinity control, excess water application for leaching is necessary. The water quality in the winter season is much better than that of the summer season. During summer season, there is high amount of drainage water flow into the Gorgan river and the river water is mostly the drainage water from the fields and therefore the salinity of water is very high, since the soils also have high salinity and alkalinity. Regular monitoring of water quality in the Gorgan river and regular removal of sediments in the desilting pond of the Project Area are necessary.

A7.5.4 Environmental Problems of Mehtar Kalateh Case Study Area

The major environmental problems of the Mehtar Kalateh Case Study Area are as follows:

- Heavy clay content of the soil
- High groundwater table
- Water quality, especially the heavy sediment load of Gharasu River

The texture of the soil in the Case Study Area is mostly clay with high clay content, which is mostly above 50%. In most of the cases, the clay content of the bottom layers are still higher than the top layers. Because of the clayey texture and the low infiltration rate, flooding occurs in the area, whenever there is heavy and sudden rain in and around the project area. Excessive ploughing of the soil because of poor drainage has resulted in soil structural problems, which are increasing the poor drainage and water logging problems.

The groundwater level in the upper aquifer is higher in most of the area. This problem is further increased by the ponding method of irrigation during rice cultivation, which raises the groundwater table and causes excessive flooding during heavy rain.

The water quality especially the heavy sediment load of Gharasu river is another significant envivornmental problem of the area. The Gharasu river, which acts as the main drainage canal for all of the excess drainage water from a greater catchment area, is partially blocked with sediments from the foothills area. The Gharasu river reaches its full capacity once or twice in a year and cause flooding. Although some of the sediments are received from the farms and urban lands on the flat areas, it appears that much of sediments come due to erosion from the highly erodible foothill soils and from the more steeply sloping parts of the Piedmont plain.

As discussed in the previous section A7.5.1, water quality is a major concern in the Project Area. According to USDA classification, the salinity and alkalinity level of water of Gharasu river is C3S1, and the salinity of water is in the high level. This condition was noted both during the first and the second field surveys. Total Suspended Solids (TSS) is also higher in many cases. Resolving environmental concerns of Gharasu river is important, especially avoiding the discharge of sediments and nutrients into the Caspian sea and further destruction of the fish species.

The awareness of the farmers in regard to erosion, soil loss, soil fertility and productivity needs to be increased. Farmers need to alter the management and tillage practices, contour cultivation etc. The farmers should be encouraged to more profitable and sustainable tree crops in the hilly areas.

A7.6 Initial Environmental Examination (IEE)

Initial Environmental Examination (IEE) is undertaken at the outset of the development project planning stage to determine the environmental impacts that may be created by the particular project based on existing data and information related to the particular project, and the comments and judgments of specialists who are familiar with the environmental impacts of past similar projects. IEE is the preliminary environmental review to assess whether Environmental Impact Assessment (EIA) is necessary or not for the development plan.

Major study components of IEE include identification of project outline, and site environmental conditions (Project Description and Site Description), preliminary assessment on negative environmental impacts of a proposed project and evaluation of whether EIA is required for the development plan. IEE supports an important premise of environmental consideration that sustainable development is achieved most efficiently when negative environmental impacts are identified and addressed at an earliest possible study stage. Along with these lines, IEE is considered as one of the important methods of environmental consideration.

In general, IEE is carried out in a short term with the use of existing data and experience of similar projects. IEE for this Study is carried out together with the counterparts of Golestan Provincial Directorate of Environment and Golestan Agriculture Organization. According to the Environmental Consideration in Iran, Preliminary EIA is considered as the equivalent of IEE and the detailed EIA is considered as the equivalent of EIA mentioned in this report.

As per the regulations of Iran, EIA needs to be executed only if a new irrigation/drainage project exceeds the size of 5000 ha or more. However, in the present Study, only rehabilitation or improvement of existing projects are included and therefore, basically, there is no need to carry out EIA at this stage.

A7.6.1 Joint Screening and Scoping

Screening is undertaken to determine whether the development study requires environmental consideration, i.e., IEE or EIA. Scoping is the process to identify the significant impacts to be assessed in IEE or EIA. Although screening and scoping were conducted during the preparatory Study, the screening and scoping were revised further based on the information collected and discussion with the Golestan Provincial Directorate of Environment. Joint screening and scoping were undertaken together with the counterparts of the Environment and Agriculture and the checklists were prepared as shown in Tables A7.6.1 to A7.6.3.

Table A7.6.1 Joint Screening Checklist (1)

1) The Study Title : The Study on Improvement of Irrigation, Drainage and Agricultural Development for Gorgan Plain, Golestan Province

2) Name of the Country : The Islamic Republic of Iran

3) Criteria on IEE and EIA in the Recipient Country

Project Component	Development Type	Development Scale which requires	
		IEE	EIA
Irrigation	New Project	Discuss the necessity with Environment department	Above 5000 ha
	Rehabilitation		
Drainage	New Project	Discuss the necessity with Environment department	Above 5000 ha
	Rehabilitation		
Land Clearing & Leveling	New Project	Discuss the necessity with Environment department	Discuss the necessity with Environment department
	Rehabilitation		
Sea/Swamp reclamation	New Project	Discuss the necessity with Environment department	Discuss the necessity with Environment department
	Rehabilitation		
Land Consolidation	New Project	Discuss the necessity with Environment department	Discuss the necessity with Environment department
	Rehabilitation		
Settlement	New Project	Discuss the necessity with Environment department	Discuss the necessity with Environment department
	Rehabilitation		
Dam and reservoir	New Project	Discuss the necessity with Environment department	Area of above 400 ha
	Rehabilitation		Dams of more than 15m high
Substantial Changes in Farming System	New Project	Discuss the necessity with Environment department	Discuss the necessity with Environment department
	Rehabilitation		
Others	New Project	Discuss the necessity with Environment department	Discuss the necessity with Environment department
	Rehabilitation		

4) Area under specific designation

Environmentally Sensitive Area	Applicable or Not	
	In the prject Area	Vicinity of Project Area
a. Habitat of fauna and flora listed in CITES	not applicable	applicable
b. Wetland designated in Ramsar Convention	not applicable	applicable
c. National Park, natural reserve, etc.	not applicable	applicable
d. Others	not applicable	not applicable

Table A7.6.2 Joint Screening Checklist (2)

Environmental Issues	Potential SEI	Evaluation	Evaluation Bases
I Social Environment			
1. Socioeconomic Issues			
Will the Project significantly	1. Planned agricultural settlement	Yes	Positive Impact
affect socioeconomic activities in	2. Involuntary resettlement	No	
and around the Project site, such	3. Substantial changes in way of life	Yes	Positive Impact
as daily human life, economic	4. Conflict among communities or people	No	
activities, transportation, community,	5. Impact on ethnic minorities, nomads	No	
institution, customary practices?	6. Population increase	No	
	7. Drastic changes in population composition	No	
	8. Relocation of bases of economic activities	Yes	Positive Impact
	9. Occupational change, loss of labor opportunity	Yes	Positive Impact
	10. Increase in income disparities	Yes	
	11. Adjustment and regulation of water or riparian rights	Yes	
	12. Changes in social and institutional structures	Yes	Positive Impact
	13. Changes in existing institutions and customs	No	
2. Health and Sanitary Issues			
Will the Project significantly	1. Increased use of agrochemicals	Yes	Due to fertilizer and agrochemicals use
affect hygiene in and around the	2. Outbreak of endemic diseases	No	
Project area or induce water related	3. Prevalence of epidemic diseases	No	
diseases?	4. Residual toxicity of agrochemicals	Yes	Due to fertilizer and agrochemicals use
	5. Increase in domestic and other human wastes	No	
3. Cultural Issues			
Are any historically, culturally,	1. Impairment of historic remains and cultural assets	No	
aesthetically or scientifically	2. Damage to aesthetic sites	No	
important areas situated in the Project	3. Impediment of mineral resources exploitation	No	
site?			

II Natural Environment			
4. Biological and Ecological Issues			
Are any habitats for rare species	1. Deterioration or degradation of vegetation	No	
or ecologically sensitive areas	2. Negative impacts on important fauna and flora	No	
locaed in the Project or surrounding	3. Degradation of ecosystem with biological diversity	No	
areas?	4. Proliferation of exotic and hasardous species	No	
	5. Encroachment on wetland and peat swamp	No	
	6. Encroachment on tropical forests	No	
	7. Destruction or degradation of mangrove forests	No	
	8. Degradation of coral reef	No	
5. Soil and Land Resources			
Will the Project significantly	1. Soil erosion	No	
induce land devastation, soil	2. Soil salinization	Yes	
erosion, soil contamination, etc.?	3. Deterioration of soil fertility	No	
	4. Soil contamination by agrochemicals	Yes	Due to fertilizer and agrochemicals use
	5. Devastation or desertification of land	No	
	6. Devastation of hinterland	No	
	7. Ground subsisdence	No	
6. Hydrology and Air and Water Quality Issues			
Will the Project siginificantly	1. Changes in surface water hydrology	Yes	
affect hydrological regime of	2. Changes in groundwater hydrology	Yes	
river, lake and swamp, and	3. Inundation and flood	Yes	Postive Impact
groundwater hydrology or the	4. Soil sedimentation	Yes	
atmosphere?	5. Riverbed degradation	No	
	6. Impediment of inland navigation	No	
	7. Water contamination and deterioration of water quality	Yes	Due to fertilizer and agrochemicals use
	8. Water eutrophication	Yes	Due to fertilizer and agrochemicals use
	9. Sea water intrusion	Yes	
	10. Low irrigation water temperature	No	
	11. Atmospheric pollution	Yes	Due to fertilizer use
Overall evaluation			

Table A7.6.3 Joint Scoping Check List (1/2)

1) Applicable development activities : Irrigation, drainage,

2) Applicable development type : ~~New project,~~ Rehabilitation

1) Applicable environmentally sensitive areas : Arid and semi-arid lands

I Social Environment

Category of Environmental Impact		Evaluation of SEI 1*				Evaluation Base 2*
		A	B	C	D	
1. Socioeconomic Issues						
(1) Social Aspects						
1.	Planned Agricultural Settlement		X			Positive impact
2.	Involuntary resettlement			X		
3.	Substantial changes in way of life	X				Positive impact
4.	Conflict among communities and people			X		
5.	Impacts on ethnic minorities and nomads			X		
6.	Others			X		
(2) Demographic Issues						
1.	Population Increase			X		
2.	Drastic changes in population composition			X		
3.	Others			X		
(3) Economic Activities						
1.	Relocation of bases of economic activities		X			Positive impact
2.	Occupational change, loss of labor opportunity		X			Positive impact
3.	Increase in income disparities		X			
4.	Others			X		
(4) Institutional and Customs related issues						
1.	Adjustment and regulation of water or fishing rights	X				
2.	Changes in social and institutional structures		X			
3.	Changes in existing institutions and customs			X		
4.	Others			X		
2. Health and Sanitary Issues						
1.	Increased use of agrochemicals	X				Due to fertilizer and agrochemicals use
2.	Outbreak of endemic diseases			X		
3.	Prevalence of epidemic diseases			X		
4.	Residual toxicity of agrochemicals	X				Due to fertilizer and agrochemicals use
5.	Increase in domestic and other human wastes		X			
6.	Others			X		
3. Cultural Issues						
1.	Impairment of historic remains and cultural assets			X		
2.	Damage to aesthetic sites			X		
3.	Impediment of mineral resources exploitation			X		
4.	Others			X		

1* Applicable columns with the following impact degree are marked with 'x'

A: The subject SEI is unquestionably induced by the Project

B: The subject SEI is likely to be induced by the Project

C: There is no possibility of the subject SEI being induced by the Project

D: The SEI is unknown

2* Potential Impacts are stated referring to 'Significant Environmental Impacts and Issues

Table A7.6.3 Scoping Check List (2/2)

1) Applicable development activities : Irrigation, drainage,

2) Applicable development type : ~~New project,~~ Rehabilitation

1) Applicable environmentally sensitive areas : Arid and semi-arid lands

II Natural Environment

Category of Environmental Impact		Evaluation of SEI 1*				Evaluation Base 2*
		A	B	C	D	
4. Biological and Ecological Issues						
1.	Deterioration or degradation of vegetation			X		
2.	Negative impacts on important or ind. fauna and flora			X		
3.	Degradation of ecosystem with biological diversity			X		
4.	Proliferation of exotic and/or hazardous species			X		
5.	Encroachment of wetland and peat swamp			X		
6.	Encroachment on tropical forests			X		
7.	Destruction or degradation of mangrove forests			X		
8.	Degradation of coral reef			X		
9.	Others			X		
5. Soil and Land Resources						
(1) Soil Resources						
1.	Soil erosion			X		
2.	Soil salinization	X				
3.	Deterioration of soil fertility			X		
4.	Soil contamination by agrochemicals	X				Due to fertilizer and agrochemicals use
5.	Others			X		
(2) Land Resources						
1.	Devastation or desertification of land			X		
2.	Devastation of hinterland			X		
3.	Ground subsidence			X		
4.	Others			X		
6. Hydrology and Air and Water Quality Issues						
(1) Hydrology						
1.	Changes in surface water hydrology	X				
2.	Changes in groundwater hydrology	X				
3.	Inundation and flood	X				Positive impact
4.	Soil sedimentation	X				
5.	Riverbed degradation			X		
6.	Impediment of Inland navigation			X		
7.	Others			X		
(2) Water quality and temperature						
1.	Water contamination and deterioration of water quality	X				Due to fertilizer and agrochemicals use
2.	Water eutrophication	X				Due to fertilizer and agrochemicals use
3.	Sea water intrusion		X			
4.	Low irrigation water temperature			X		
5.	Others			X		
(3) Atmosphere						
1.	Atmospheric pollution		X			Due to fertilizer and agrochemicals use
2.	Others			X		

1* Applicable columns with the following impact degree are marked with 'x'

A: The subject SEI is unquestionably induced by the Project

B: The subject SEI is likely to be induced by the Project

C: There is no possibility of the subject SEI being induced by the Project

D: The SEI is unknown

2* Potential Impacts are stated referring to 'Significant Environmental Impacts and Issues

As shown in the Tables, most of the environmental issues have positive environmental impacts because of the agricultural development of the area through the improvement of irrigation and drainage system. However, agricultural development also results in increased use of agricultural fertilizers and chemicals, which induce pollution in the Gorgan river. Water quality is one of the most important environmental aspects, for which regular monitoring is necessary. The activities related to agriculture development such as agro-industries might also result in atmospheric pollution.

A7.6.2 Project Description

In the project description, the outline and components of the proposed project including 1) the project background, 2) general information such as objectives, executing agencies, beneficiaries and area of proposed project, 3) project components and scale are described. The major environmental aspects and impacts to be reviewed or assessed in the environmental consideration process can be preliminarily selected after clearly identifying the project components. The Project description is shown in the standard format in Table A7.6.4. At the present stage, no new works of irrigation and drainage is planned and only the rehabilitation of the existing areas is proposed.

A7.6.3 Site Description

The environmental conditions with particular significance in the Study Area are described in the site description. The site description is shown in the standard formats in Table A7.6.5 and A7.6.6. As it can be seen from the Table, there is no environmentally sensitive area in the Project area, except for the arid and semi-arid lands and a very small part of wetlands in the Cheldin Project Area in the southern part of the Project Area.

However, there are some sensitive areas in the vicinity of the Project area as mentioned below:

1. The Miankaleh reserve is located in the western part of the Study area in Gorgan Bay.
2. There is an international swamp of Gomishan lagoon designated in Ramsar convention (Site no. 1109), which is one of the best habitats for immigrant birds in winter.
3. In the northern part of the Study area, there is a lake called Incheh lake which is a good habitat for immigrant birds such as Flamingo (*Phoenicopterus rubber*). A bit further at the border line of Turkmenistan, there are 3 international swamps for immigrant birds called Alagol, Almagol and Ajigol, which are good ecotourism areas.

Table A7.6.4 Project Description

1. Study Title (Project Name)

   The Study on Improvement of Irrigation, Drainage and Agricultural Development for Gorgan Plain, Golestan Province

2. Background information and objectives of the Project

   In order to improve the agricultural production in the Gorgan plain of Golestan province, the Study is carried out to prepare an Irrigation and Drainage Plan, considering efficient water use and the salinization control in 800 km2 area.

3. Brief Description of the Project

Outline of Study Area	800 km^2 in the districts of Bandar-e- Torkman, Kordkuy, Aq Qala District and Gorgan in the Golestan Province.
Beneficiaries and Benefited Area	800 km2 area with the 4 districts popuplation of 674,000 (2001, estimated by MPO)
Relvant project components	Irrigation and drainage and agricultural development
Executing Agencies	Golestan Province Agriculture Organization
Environmental Agencies	Golestan Provincial Directorate of Environment, Department of Environment

4. Major Components and Development Scale of Project

Main Components of the Project		Type of Project		Scale of Project		Remarks
		New	Rehabilitation	Area	Major Facilities	
a.	Irrigation	No	X	7,750	Not yet decided	
b.	Drainage	Not yet decided	X	14,089	Not yet decided	
c.	Land clearing & leveling	Not yet decided	Not yet decided	Not yet decided	Not yet decided	
d.	Sea/swamp reclamation	No	No	Nil	Nil	
e.	Land consolidation	Not yet decided	Not yet decided	Not yet decided	Not yet decided	
f.	New land settlement	No	No	Nil	Nil	
g.	Dam & reservoir	Desilting ponds	No	Nil	Nil	
h.	Substantial changes in farming	X	X	Not yet decided	Not yet decided	
i	Others	No	No	Nil	Nil	

Table A7.6.5 Site Description (SD) - 1/2

1.	Study Title (Project Name) : The Study on Improvement of Irrigation, Drainage and Agricultural Development for Gorgan Plain, Golestan Province		
2.	Present Socioeconomic Status of the Study Area		
	(1)	Land ownership, land use etc.	In the Study Area, mostly the lands are owned by individual land owners. However, in the Aq Qala Project, an area of about 1,000 ha is owned by the Shadimer Cooperative.
	(2)	Economic activities in and around the Study	Agriculture and animal husbandry are the primary economic activities in and around the Study Area. Although there are also activities of trade and services, there are no major industries in the Study Area. Carpet making is a popular household activity in and around the Study Area.
	(3)	Customs (riparian rights, water rights etc.)	In regard to water rights, Golestan Province Water Organization is responsible for regulating water. When water is needed for the Project, the cooperatives need to make the request to this organization. The water rights within the project area is managed by the cooperatives.
	(4)	Community or Host people	Mostly the people of Turkmen origin live in and around the Study Area. However, there are people from Mazandaran, Sistan and other provinces living at the western part of the Study Area.
	(5)	Public Hygiene and Health	Well water is used as drinking water. There are no proper drainage facilities and the house garbage are thrown into canals which pollute the river water and finally discharged to Caspian sea.
	(6)	Population	The popuplation of 4 districts of the Study Area is 674,000 (2001, estimated by MPO)
3.	Natural Conditions of the Study Area		
	(1)	Climate	Average rainfall varies from 300 mm to 700 mm and the average annual temperature is 17 deg. C. Average monthly temperature varies from 7 deg. C in Dec-Jan to 28 deg. C in June-July.
	(2)	Topography	The Study Area is located at Gorgan plain with an altitude of 10 to 150m.
	(3)	Hydrology and Drainage condition	The Gorgan plain is situated in the watersheds of Gorgan river and Gharasu river. Besides, groundwater is also used for both irrigation and drinking purposes. Drainage is a major problem in the Study Area with a high salinity and alkalinity levels in many parts of the Study Area.
	(4)	Soils	The soils are deep soils with medium to heavy texture. Most of the soils are silty loam and some soils in the western part (Cheldin area) are clay or silty clay. Salinity and alkalinity levels are high in the northern part of the Study Area.
	(5)	Vegetation	Agriculture is mostly practiced in the Study Area with the main crops of wheat, barley, cotton etc.
	(6)	Rare species or fragile ecology	There is no environmentally sensitive area in the Study Area. However, there is a Gorgan Gulf natural reserve at the western part and Gomishan lagoon at the northern part of the Study Area.

Table A7.6.6 Site Description (SD) - 2/2

Environmentally Sensitive Areas in the Project Site or Vicinity

Environmentally Sensitive Area		Applicable or Not					
		In the Project Area			Vicinity of Project Area		
		Appl.	Not App.	Unknown	Appl.	Not App.	Unknown
Area under specific designation							
S1.	Habitat of fauna and flora listed in CITES		X		X		
S2.	Wetland designated under the Ramsar Convention		X		X		
S3.	Heritage sites listed in the World Heritage Convention		X			X	
S4.	National park, natural reserve, etc.		X		X		
S5.	Others		X			X	
Socioeconomically sensitive area							
S6.	Areas inhabitated by indigenous people, ethnic minorities, nomads etc.		X			X	
S7.	Historical remains, cultural assets, aesthetic sites		X			X	
S8.	Area likely to suffer from significant negative economic impact		X			X	
S9.	Others		X			X	
Environmentally sensitive natural land							
S10.	Arid and semi-arid lands (incl. savanna, rangeland,etc.)	X			X		
S11.	Tropical forests and wildlands		X			X	
S12.	Wetlands or peat lands						
	Wetlands	X			X		
	Peat lands		X			X	
S13.	Coastal zones						
	Mangrove forests		X			X	
	Coral reefs		X			X	
S14.	Mountainous, steep sloped, erodible or devasted lands		X			X	
S15.	Closed water bodies such as lakes, swamps or reservoirs		X		X		
S16.	Others		X			X	

4. There valuable birds such as otter (*Lutra lutra*), Barbary Falcon (*Falco Pelegrinoides*), Peregrine Falcon (*Falco Peregrinus*) and Imperial Eagle (*Aguila heliaca*) living around Gorgan and Gharasu rivers and have been listed in Cites 1. The birds migrate from Afghanistan and China during the period of August to October and then move on to the Southern part of Iran.
5. Arid and semi-arid lands are located in and around the Study Area
6. Reservoirs including Voshmigr dam and Golestan dam are located at the north-eastern part of the Study Area.
7. The Gorgan river passes through the center of the study area through Aq Qala and Khajeh Nafas and then joins with Caspian sea. Gorgan river is a place for breeding fishes such as white fish, anchovy and sturgeon fishes.
8. Gharasu river is also a breeding place for fishes such as white fish and anchovy.
9. The two rivers mentioned above act as drainage system and the fertilizers and pesticides discharged from the farms are drained into these rivers causing water pollution.
10. Industrial complex of Aq qala with an area of 100 ha is located in the south of Aq qala city and the complex includes food and electronic industries. Industrial complex of Banavar with an area of 10 ha is located in the south of Banavar. Besides, there are some flour, oil, soap and cotton industries located in the Study Area. There are some traditional and industrial animal husbandry and poultry inside and outside of the Study Area.

A7.6.4 Preliminary Assessment of Environmental Impacts

In general, the environmental impact means significant adverse impact to be caused by the project on the existing overall conditions of air, water, soil and the living things, assets, social information and circulation of goods, which are related to human life or their combined structures.

The negative impacts to be caused by a project can be divided into two parts. One is a negative impact in the short term, which is perceived at the moment of execution of the project. In this case, it is important to consider the environment in such a way as to harmonize the development activities and the conservation of the environment. Another is irreversible negative impact in the long run, which is perceived after finishing the project and this negative impact may exert a significant influence on the environment.

At the present stage of the Study, it is mostly a rehabilitation project and therefore the present environmental problems due to the irrigation and drainage and agricultural development projects in the Study Area are addressed as the significant environmental impacts. The mitigation measures to be undertaken are also discussed along with the environmental impacts.

Based on the joint screening and scoping and in consideration of site description and project description and the project activities to be undertaken, the major environmental impacts to be assessed are as follows:

1. Water contamination and deterioration of water quality including eutrophication
2. Sedimentation
3. Soil contamination by agrochemicals
4. Soil salinization and alkalinization
5. Influence on surface water hydrology
6. Influence of groundwater hydrology
7. Atmospheric Pollution
8. Health and sanitation

(1) Water Contamination and Deterioration of Water Quality including Eutrophication

Water contamination and deterioration of water quality in the Gorgan and Gharasu rivers is the most important environmental impact in the Study Area. Through the agriculture development, all the agricultural pollutants including pesticides, fertilizers and salts are drained into the river through the drainage water causing pollution. As discussed in the section A7.5, the Gorgan and Gharasu rivers are highly saline and the drainage waters, which are drained to these two rivers are also highly saline. During the 2nd field survey, greenish water was observed because of drainage of agriculture fertilizers and eutrophication.

Regular monitoring of water quality in Gorgan and Gharasu rivers and appropriate use of fertilizers and agriculture chemicals are necessary.

(2) Sedimentation

In the irrigation projects using the Gorgan river, sedimentation is another major problem. Since there are few tree covers in the upstream side hilly areas, the water drained this area brings along a heavy volume of sediments, which are flown into Gorgan river.

During the first field survey in Jan 2002, sedimentation problem is noted in Gorgan river and it can be seen that the total suspended solids (TDS) at the upstream and middle stream is about 1110 and 780 mg/l. Normally, a TDS level of less than 100 mg/l is suitable for irrigation and at a higher level, they normally block the canals, disturb pumps and irrigation systems and cause sedimentation problem at the dams. Annual sedimentation at Vosmgir dam is estimated as 1.3 MCM/year and at the Golestan dam it is estimated as 0.6 MCM/year.

During the second field survey in May 2002, the sedimentation in the Gorgan river is comparatively at a lower level in the range of 200 to 700 mg/l. Since the sedimentation is mainly caused by erosion of the top layer, little sedimentation is noted due to low rainfall during the observation.

Regular monitoring of water quality in Gorgan and Gharasu rivers and inclusion of desilting ponds in the project areas are necessary.

(3) Soil contamination by agrochemicals

The soils will be contaminated with high residual toxicity because of the agricultural development using of agriculture fertilizers and chemicals. It causes agrochemical contamination of farm products and causes harmful impact to human and animals through progressive biological concentration of toxic substances in the food chain.

Regular monitoring of soil properties and proper recommendation of fertilizers and chemicals are necessary. Use of fertilizers and agrochemicals having no or limited residual toxicity and extension of appropriate application methods of chemicals are necessary.

(4) Soil salinization and alkalinization

Soil salinization and alkalinization is a major problem in the problem in the Study Area. The salinity and alkalinity levels of the soils have increased in many areas after agricultural development in the past 30 years. Although the salinity levels of some areas have been lowered because of drainage systems, the salinity level, in general, has increased because of irrigating with saline water of Gorgan and Gharasu rivers. The combination of poor drainage system, low amount of irrigation water for leaching and poor quality saline water increase the salinization and alkalinization of the soil.

If these limiting factors are overcome, both economically and technically by inclusion of proper drainage system and adaptation of salinity resistant varieties, then these areas can become productive. There is no forest coverage inside the study area and therefore the trees which are compatible to these areas such as Tamarix, Eucalyptus, and Olive shall be planted.

(5) Influence on surface water hydrology

Gorgan river, Gharasu river and their tributaries are the major sources of irrigation in the Study Area. Through construction of reservoirs or new irrigation and drainage projects at the

upstream part of the Study Area, the farms at the downstream sides are receiving low amount of irrigation water resulting in poor yields. Some farms located closer to the Gorgan river pumps the water from the rivers when ever it is available.

Improper use of surface water in the study area should be controlled through regular monitoring of surface water. Proper distribution and usage of surface water and use of water saving methods are necessary.

(6) Influence of groundwater hydrology

Agriculture development project in the Study Area also has a significant influence on groundwater hydrology. In the Study Area, groundwater is available in different layers both at a shallow depth of 2 to 3 m and at a deeper depth of 100 m or more. Groundwater is depleted by pumping through wells and used for agriculture cultivation. Besides, groundwater table at a shallow depth of 2 to 3m causes salinization and ponding problem.

Improper depletion of groundwater in the study area should be controlled through regular monitoring of groundwater. Proper drainage system is needed in order to avoid the ponding and salinization problems. Research and extension of water saving irrigation methods are necessary.

(7) Atmospheric Pollution

Agricultural development activities might cause atmospheric pollution because of the use of chemical spraying and also due to the practice of burning the fields as discussed above in section 7.5. Besides, setting up of new agro-product industries might also result in atmospheric pollution. Research and extension of proper tillage methods are necessary so that the farmers will avoid burning of fields. Regular monitoring of atmospheric pollution and adoption of proper farm management practices are necessary.

(8) Health and Sanitation

One of the most important problems existing in the Study Area is the location of many villages at both sides of the Gorgan river. In this case, the human sewage and also the agricultural drainage including agro chemicals cause the pollution of Gorgan river and cause diseases on fishes. As a result, the people who consume those fishes may be infected with the water borne diseases such as skin diseases or stomach ailments etc. Also, the children are infected with some diseases because of swimming in Gorgan river. Monitoring of regulations of waste disposals and provision of waste disposal measures are necessary.

A7.6.5 Environmental Monitoring and Management System (EMMS)

An environmental monitoring and management system shall be established to monitor the project's environmental impacts on the project area and the surrounding areas, aiming at adequately protecting the environment both during and after the project implementation. EMMS should include suitable environmental monitoring and management measures to avoid or mitigate potential adverse impacts. The monitoring and management measures corresponding to potential adverse impacts mentioned above are listed below.

1. Regular monitoring of water quality in Gorgan and Gharasu rivers and appropriate use of fertilizers and agriculture chemicals
2. Regular monitoring of water quality in Gorgan and Gharasu rivers and inclusion of desilting ponds in the project areas
3. Regular monitoring of soil properties and proper recommendation of fertilizers and chemicals
4. Inclusion of proper drainage system and adaptation of salinity resistant varieties
5. Proper distribution and usage of surface water and use of water saving methods
6. Regular monitoring of groundwater and use of water saving methods
7. Regular monitoring of atmospheric pollution and adoption of proper farm management practices
8. Monitoring of regulations of waste disposals and provision of waste disposal measures.

Golestan Provincial Directorate of Environment and Golestan Province Agriculture Organization shall coordinate together in establishing EMMS for the province.

A7.6.6 Positive Impacts of the Project

The agriculture development through irrigation and drainage projects will have the following the significant positive effects in the Study Area and the region:

- Increased food production through the effective utilization of the wide area of the plain
- Settlement of the people who have a strong nomadic culture
- New economic activities through marketing and agriculture processing
- Expansion of employment opportunities of the local population
- Substantial improvement in way of life
- Reduction of inundation and flood by drainage projects

In line with the Government policy of agriculture development of the region, the positive impacts due to the projects weigh much higher than the negative impacts to be caused by the project. However, suitable monitoring and management system of environment is necessary for the sustainable development of the region.

A7.6.7 Necessity of Environmental Impact Assessment (EIA)

As per the regulations of Iran, EIA needs to be executed for the following projects related to irrigation and drainage and agriculture development.

- New irrigation/drainage project, which exceeds the size of 5000 ha or more.
- Dam of more than 15m high with area more than 400 ha area
- Man-made lake with area more than 400 ha area

At present stage of the Study, only rehabilitation or improvement of existing projects are included. Tazeh Abad project area has a desilting pond and a storage pond under construction. However, the storage pond under construction is smaller than the size of 400 ha. Therefore EIA is not necessary for constructing this pond.

The Aq qala project managed by Hemat cooperative and Cheldin project also have storage ponds. Among the pilot projects, only Banavar project and Aq qala project managed by Shadimer cooperative don't have storage ponds. For the effective use of water, it is planned to construct storage ponds in the above two projects. Besides, it shall be also planned to construct desilting ponds in all the projects except Tazeh Abad Project. However, the storage ponds and the desilting ponds which are planned to be constructed are much smaller than the size of 400 ha. Therefore EIA is not necessary for constructing these ponds.

In regard to irrigation and drainage works, construction of irrigation and drainage canals are not fully completed and are planned to be completed in the near future based on the budget availability. It is also hoped to improve the drainage system in the project areas based on the necessity and the budget availability. Since these works are only a part of on-going works, there is no need to carry out EIA.

After completion of the Study, during the next phase of the Gorgan Plain Agriculture Development, it might become necessary to construct new irrigation and drainage projects in the Gorgan plain. If the new irrigation and drainage project to be implemented will exceed the size of 5000 ha, or if any new dam will be constructed, then EIA should be carried out before the implementation of the project.