

## **Chapter 6   Past Concepts for Development Schemes and Trend of Other Donors**

## **Chapter 6 Past Concepts for Development Schemes and Trend of Other Donors**

### **6.1 Past Concepts for Development Schemes**

There are a number of planned schemes for development of water resources in the Northern and the Northeastern Afghanistan which were suspended. It is assumed that implementation of these plans would improve water supply to 146,000 ha of existing irrigated land and 162,000 ha of new land under irrigation. Outlines of major planned schemes are described as follows;

#### **6.1.1 Planned Schemes concerning the Kokcha River**

##### **(1) The Kokcha River Irrigation System Development Scheme**

During the 1970s, a dam on the Kokcha River with the function of hydro-power generation was planned with the assistance from the Soviet Union. The Dam was located in on the Kokcha River between Kunduz and Takhar provinces. The objectives of the project were:

- Irrigate 12,120 ha of new lands on the right bank of the Kokcha River
- Improve water supply to 7,740 ha of already irrigated lands located in the command area of Nawabad (Zulm) canal
- Secure water intake throughout the growing period to the left bank of Nar-e-Archi canal and improved water supply to 25,400 ha of already irrigated lands within the command zone of this canal
- Increase potential for future irrigation of 5,300 ha of new lands in the Nowabad massif and about 12,000 ha of fallow lands that have irrigation systems, but now inactive due to the lack of water in the Kari-Archi canal
- Generate 10 - 20kWh of electricity

A preliminary estimated cost of the proposed scheme, excluding the installation cost of the hydro-power station, was US\$ 33.43 million plus 2,181.2 million Afghanis as in the early 1970s. Work begun in 1980, and about 60 percent of the actual dam was completed, but the project was suspended with the collapse of the Soviet Union.

##### **(2) Sheermai Steppe Irrigation System Development Scheme**

The proposed plan was to irrigate the Sheermai steppe from Shahrawan canal after increasing the canal's capacity to 80 m<sup>3</sup>/s with a lift irrigation system, of which the water lift height was to be up to 100 m. Despite the very large energy that would be consumed by such a design, this opinion was preferred over gravity water supply to Sheermai steppe from Kokcha water works. The flow at the head of the canal would be 100 m<sup>3</sup>/s and the canal's length about 90 km including a 7 km tunnel. The canal would irrigate the Nowabad massif (5,000 ha) and the Sheermai steppe (40 – 50 thousand ha). In addition, the Nar-e-Archi system (with an area

of 25,400 ha) and possibly the Shahrawan system (with an area of more than 40 – 50 thousand ha) would be connected to the canal

### **(3) Nar-e-Archi Irrigation System Development Scheme**

Nar-e-Archi irrigation system is located in the Takhar province. The Nar-e-Archi canal carries water diverted from the Kokcha River near the Pul-e-Ishim bridge to irrigate the massif. Water is diverted to the canal through an intake dam. The head site has been regularly washed out by flood waters and repaired by local population. Bank protection measures were to be implemented in the zone of the water intake, with the head of the canal reconstructed and several structures built at the sites where the canal crosses river channels. At present, the capacity at the head of the canal is no more than 15 – 17 m<sup>3</sup>/s and the irrigated area is smaller than 12,500 – 13,000 ha. The cost of construction was estimated in the 1970s at US\$ 7 million plus 3.8 million Afghanis. It was anticipated that construction would take 13 – 15 years.

## **6.1.2 Planned Schemes concerning the Balkh River**

### **(1) Chashma-e-Shefah Reservoir Development Scheme**

A detailed design for the Chashma-e-Shefah reservoir on the Balkh River was elaborated in the 1970s with the purpose of improving water supply to about 7,000 ha of existing irrigated lands. Although the scheme was in the government books for a long time, in 1974, the scheme was finally reassessed with the technical assistance from India, under the Daoud Administration's Seven Year Plan and the following works were included;

- A dam with a height of 62 m and crest length of 230 – 250 m, made of local materials
- Water intake structures
- Off-take regulator
- Reservoir with the capacity of 440 million m<sup>3</sup>
- Secondary structures and a village for operating personnel

It was also anticipated that the possibility of constructing a small hydro-power station would be assessed. A preliminary estimate of the cost of the construction (estimate is as of 1975) was US\$ 18 million plus 777 million Afghanis, not including the cost of resettlement of people from the flood zone or the cost of partial reconstruction of the existing irrigation system. The detailed design of Chashma-e-Shefah reservoir was to be finished in November 1979, but was never completed.

## **6.1.3 Planned Schemes concerning the Kunduz River**

### **(1) Gawhargan-Chardara Irrigation System Construction Scheme**

There was a plan to implement projects to reconstruct existing irrigation systems, including the Gawhargan system in Baghlan province and Chardara in Kunduz province with the support of the Asian Development

Bank. These projects anticipated construction of a head intake structure on the Kunduz River, reconstruction of existing canals of the Gawharagan system, construction of pumping station and a new Larkhabi canal for lift irrigation, construction of a head intake structure for the Chadara canal on the Kunduz River, and reconstruction of major canals in this region. Implementation of these projects would have provided guaranteed water intake for irrigation needs during the whole growing season, introduced 3,450 ha of new irrigated lands, and improved the water supply to 24,860 ha of land with irrigation infrastructure already installed – of which approximately 30 percent was not actively irrigated due to lack of water. The total cost of these works was estimated in 1970s at US\$ 7.49 million plus 12.46 million Afghanis.

## **(2) Ali-Abad Massif Lift Irrigation Scheme**

The Ali-Abad massif is located between Kunduz city and Ali-Abad village, on the right bank of the Kunduz River. The massif lies along the Kunduz River, with three to four terraces. The total area of land suitable for irrigation is 4,365 ha. The maximum altitude of these lands above the river's water level is 30 to 65 m. Water would be supplied from the Kunduz River to irrigate the massif through a pumping station.

The Ali-Abad massif is topographically divided into two zones, the first lift zone and the second. The pumping station for the first lift would be located on the bank of the Kunduz River. Water would be transported at 4 m<sup>3</sup>/s through a steel pipeline with a diameter of 1,020 mm, to a height of 30 to 32 m. The length of each pipe run would be 787m. The pumping station for the second lift would be located 4 km from the first pumping station and would be able to pump 2.3 m<sup>3</sup>/s. The height of water lift would be 31 to 32 m. Water would be transported through a steel pipeline with a length of 250 m.

Land would be irrigated from the lift irrigation canals AMK-1 and AMK-2. The length of AMK-1 would be 17 km, and its command area would be 1,149 ha. The length of AMK-2 would be 17.54 km and its command area 2,112 ha. Water inlets, check structures, falls, siphons, bridges, amounting to 410 small and large structures, were planned within the area of the massif. The capital which was required to implement this project was estimated at 301 million Afghanis in 1970s, of which 235 million Afghanis was the estimated cost of construction and 66 million Afghanis the cost of agricultural development.

## **(3) Kelagai Reservoir and Hydro-power Station on the Kunduz River Construction Scheme**

To improve water supply for 56,000 ha of existing irrigated land that were not receiving sufficient water during years of drought, and to develop an additional 25,000 ha of newly irrigated land along the Kunduz River, the Kelagai reservoir was planned about 11 km down stream of Pul-e-Kumri. The scheme included the following works;

- A dam with a height of 80 m and crest length of 665 m
- Spillways and a hydro-power station, with a capacity of up to 50,000 kWh
- Reservoir with active capacity of 800 million m<sup>3</sup>

- Off-take regulator
- Secondary structures and other subsidiary objects

The total cost of construction was estimated in the 1970s at US\$ 45.4 million plus 2,069.8 million Afghanis excluding the costs related to resettlement of people from the reservoir zone or for design and construction of irrigation systems for the 81,000 ha that would receive new or increased supply of irrigation water.

#### **6.1.4 Planned Schemes concerning the Panj River and Amu Darya**

##### **(1) Bank Protection Measures Scheme on the Panj River and Amu Darya**

An authority that would be responsible for measures to protect the bank of the Panj River and Amu Darya was established in 1975, with an office in a village in the Imam-Saheb district. This authority aimed to take responsibility over implementation of the following measures;

- Bank protection within the territories of the Yangi-Kala, Nar-e-Turkmen, and Darkod settlements
- Protection for the head intakes of major canals diverting water from the Panj River: Shahrawan (irrigation area: 34,000 ha); the Nar-e-Turkmen (irrigation area: 6,000 ha); and Yatim-Tapa (irrigation area: 1,500 ha)

By 1978, the authority had carried out the following works;

- Construction of more than 150 km of motor roads with gravel-sand surface, including 40 small bridges
- Bank protecting roads on Shahrawan water works (2.5 km) and on Nar-e-Turkmen water works (1.6 km)
- Construction of groins at Shahrawan water works (330 m) and Yangi-Kala (200m)
- Working of quarry in Kuturbulak and Boyawa
- Construction of a village to accommodate authority staff, including organization of power and water supplies

##### **(2) Khush Tapa Irrigation Development Scheme**

Khush Tapa is located between Kunduz and Samangan provinces on the bank of the Amu Darya with about one million ha of land suitable for agriculture. A survey conducted by Afghanistan in the 1950s foresaw development of these lands through left irrigation. But funds for development of such a large scheme have not been found. Khush Tapa represents the largest land development in the Northern Afghanistan.

#### **6.2 Other Assistance for Agriculture and Irrigation by Donor Organizations**

From the establishment of the Afghanistan Transitional Government in December 2001, reconstruction activities have been carried out in conjunction with international society in accordance with peacemaking

process decided by “Bonn Agreement”. Prior to the assistance for reconstruction, a conference for the reconstruction and rehabilitation of Afghanistan was held at Tokyo in January 2002. In the conference, donor countries and agencies agreed to provide assistance with the total amount of US\$ 4,500 million during a 5 year period, of which US\$ 1,800 million will be assisted within year 2002. The Government of Japan clearly stated their intension to assist US\$ 500 million within two years. In the conference, improvement of administrative capacity of the Government, education (especially education of women), enhancement of health service facilities, development and reconstruction of infrastructures and agricultural development were pointed out as priority sectors. Effectiveness of existing system of financial assistance was confirmed in the conference, and also establishment of a single trust fund was agreed. UNDP, WB and ADB were to be responsible for the financing of this fund. As mentioned above, international agencies led by United Nation, donor countries and international NGOs have been carrying out reconstruction and rehabilitation activities in the country.

Table 6.2.1 summarizes the situation of assistance, particularly for the rural area such as agriculture, irrigation and rural development in the Northern and the Northeastern Afghanistan out of the activities of international agencies led by United Nation, donor countries and international NGOs.

**Table 6.2.1 Trend of Other Donors concerning Agriculture and Irrigation Sector in the Northern and the Northeastern Regions**

| Name of Project                                                                                      | Period    | Budget            | Targeted Area                                                                 | Name of Donor | Sector                                             | Activities                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------|-----------|-------------------|-------------------------------------------------------------------------------|---------------|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rural Agribusiness Support Project                                                                   | ~2010     | 12 million US\$   | No information                                                                | ADB           | No information                                     | No information                                                                                                                                                                      |
| Agriculture Market Infrastructure Program (AMIP)                                                     | ~2013     | 31 million US\$   | Herat, Jalalabad, Kabul, Kandahar, Kunduz, Gardez and Mazar                   | ADB           | Distribution, economy, environment, private sector | Improvement of infrastructure and development of ability for distribution                                                                                                           |
| Emergency Infrastructure Rehabilitation and Reconstruction Project: Traditional Irrigation Component | 2004~2009 | 15 million US\$   | 11 Irrigation systems along the Balkh River, Samangan, Balkh, Juzjan          | ADB           | Irrigation                                         | Emergency rehabilitation of 11 irrigation systems located in down stream of the Balkh River, construction and rehabilitation of irrigation department offices at targeted provinces |
| Balkh River Integrated Water Resources Management Project                                            | 2005~2008 | 10 million US\$   | The Balkh River Basin                                                         | ADB           | Irrigation, water resource                         | Establishment of management system and development of ability of water users association concerning irrigation systems along the Balkh River                                        |
| Rural Recovery Through Community Based Irrigation Rehabilitation                                     | 2007~2009 | 5 million US\$    | Faryab, Juzjan, Sar-i-Pul                                                     | ADB           | Irrigation                                         | Income improvement through irrigated agriculture, capacity building of effective water use                                                                                          |
| Rural Business Support Project                                                                       | 2007~2010 | 19.3 million US\$ | Balkh                                                                         | ADB (JFPR)    | Local industry                                     | Assistance for poultry farming and/or establishment of marketing cooperative for carpet in Balkh province                                                                           |
| Multi Tranche Financing Facility (MTFF) for Water Resource Development and Investment Program        | 2009~2018 | 300 million US\$  | Amu Darya flood basin, Balkh River basin, Nanger valley Development Authority | ADB           | Flood prevention, irrigation                       | Flood prevention of Amu Darya, Yangi Qali, Yrtin Tapa, rehabilitation of irrigation facilities in the Balkh River basin and Nanger valley, other emergency schemes                  |
| Enhancing Licit Livelihoods in Northern Afghanistan                                                  | 2008~2011 | 19.8 million C\$  | Takhar, Badaghshan, Kandahar                                                  | CIDA          | Rural development                                  | Integrated rural development in Northern Afghanistan                                                                                                                                |

| Name of Project                                                      | Period         | Budget             | Targeted Area                                                                                                                                                                | Name of Donor | Sector                                                          | Activities                                                                                                                                                                                                                                           |
|----------------------------------------------------------------------|----------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Livestock Health, Production and Marketing Program                   | No information | No information     | Balkh                                                                                                                                                                        | DCA           | Animal husbandry                                                | A part of RAMP and ASAP components, assistance for development of cashmere extraction technology for veterinary                                                                                                                                      |
| Pilot Project of Comprehensive Agricultural Rural Development (CARD) | 2009~          | 3.06 million US\$  | Nangerhar, Badakhshan, Balkh                                                                                                                                                 | DFID          | Rural development                                               | Pilot project                                                                                                                                                                                                                                        |
| Perennial Horticulture Development Project (PHDP)                    | 2006~2010      | 12.5 million Euro  | Kabul, Heart, Balkh, Kunduz, Nangerhar, Kandahar                                                                                                                             | EU            | Horticulture                                                    | Establishment of horticulture training center, implementation of demonstration and training                                                                                                                                                          |
| Animal Health Support Program                                        | 2006~2012      | 14.35 million Euro | Heart, Badghis, Farah, Ghor, Kandahar, Helmand, Urozgan, Daikondi, Nangerhar, Laghman, Kunarha, Nooristan, Balkh, Kunduz, Takhar, Badakhshan, Baghlan, Kabul, Parwan, Wardak | EU            | Animal husbandry                                                | Establishment of animal hygiene center, improvement of ability for animal diagnostic and for production of vaccine for animal                                                                                                                        |
| Strategy for the Early Rehabilitation of Agriculture                 | 2002~2006      | No information     | No information                                                                                                                                                               | FAO           | Agriculture, animal husbandry, environment, employment creation | Establishment of sustainable agriculture and animal husbandry, management of natural resources and environment, rural development, employment creation, nonagricultural income, enhancement of implementation ability for governmental organizations |
| Integrated Daily Development Project                                 | 2005~2009      | 3.93 million US\$  | Kabul, Balkh, Kunduz, Wardak, Logar                                                                                                                                          | FAO           | Animal husbandry                                                | Integrated assistance for milk production from breed improvement by artificial insemination to collection of milk and marketing                                                                                                                      |
| Regional Initiative for Sustainable Economy (RISE)                   | 2006~2007      | 3.1 million US\$   | Balkh                                                                                                                                                                        | FAO           | Poverty reduction                                               | Provision of basic package or selected package in Balkh province                                                                                                                                                                                     |

| Name of Project                                                                                   | Period     | Budget            | Targeted Area                                                                            | Name of Donor      | Sector                 | Activities                                                                                                                                                                                                                             |
|---------------------------------------------------------------------------------------------------|------------|-------------------|------------------------------------------------------------------------------------------|--------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Afghanistan Variety and Seed Industry Development Project                                         | 2007~2011  | 10 million Euro   | Kabul, Nangerhar, Kandahar, Helmand, Herat, Balkh, Kunduz, Badakhshan, Bamyan            | FAO, EC            | Agriculture            | Strengthening of seed center, effective regulation for seed industry, rehabilitation of MAIL office, improvement of ability of MAIL                                                                                                    |
| Cooperative and Horticulture (CHP)                                                                | 2003~      | 8.87 million US\$ | Kunduz                                                                                   | French Cooperation | Cooperative, orchards  | Development of cooperative through implementation of strategy and business plan, establishment of provision system of finance and facilities to improve allocation of products, improvement of quality standard on fruit and vegetable |
| Development of Agriculture Research                                                               | 2008~2014  | 5.2 million Euro  | Baghlan                                                                                  | French Cooperation | Agriculture            | Development of agricultural research, production of improved seed, assistance for cooperative, assistance for agricultural economy                                                                                                     |
| German Trust Fund to Afghanistan for Improved Food Security, Nutrition and Sustainable Livelihood | 2005~2011  | 11.1 million Euro | Heart, Bamyan, Badakhshan, Baghlan, Kunduz, Balkh                                        | Germany            | Livelihood improvement | Biotic diversification for food security and improvement of nutrition, improvement of livelihood                                                                                                                                       |
| Mass Mobilization into Entrepreneurship                                                           | 2008.02~08 | No Info           | Balkh                                                                                    | Hand In Hand       | Local industry         | Assistance for establishment of microfinance by inhabitant group                                                                                                                                                                       |
| Rural Microfinance and Livestock Support Program (RMLSP)                                          | ~2013      | 26 million US\$   | No information                                                                           | IFAD               | No information         | No information                                                                                                                                                                                                                         |
| NABDP Economic Regeneration Unit                                                                  | 2007       | 1.9 million US\$  | Balkh                                                                                    | UNDP               | Local industry         | Assistance of activities for commercialization of carpet, almond, melon etc.                                                                                                                                                           |
| Agribusiness Global Development Alliance                                                          | 2001~      | 254 million US\$  | Kabul, Kunduz, Takhar, Baghlan, Nangerhar, Kunarha, Kandahar, Urozgan, Daikondi, Helmand | USAID              | Agricultural finance   | Agriculture/ agro-industry, small scale facilities, resource management, improvement of ability, small scale finance                                                                                                                   |

| Name of Project                                                               | Period        | Budget              | Targeted Area                                                                                                        | Name of Donor | Sector                                                   | Activities                                                                                                                                                                                   |
|-------------------------------------------------------------------------------|---------------|---------------------|----------------------------------------------------------------------------------------------------------------------|---------------|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rebuilding Agricultural Markets in Afghanistan Program (RAMP)                 | 2003~2006     | 150 million US\$    | Helmand, Kunduz, Parwan, Nangerhar, Ghazni, Balkh                                                                    | USAID         | Distribution, rural infrastructure, agricultural finance | Development of agricultural technology and market, reconstruction of rural infrastructure, agricultural finance service                                                                      |
| Daily Industry Revitalization                                                 | 2003~2008     | 7.2 million US\$    | Balkh                                                                                                                | USAID         | Agro-processing                                          | Assistance for construction of milk processing factory                                                                                                                                       |
| Alternative Development Program - North                                       | 2005~2009     | No Info             | Badkhsan economic corridor                                                                                           | USAID         | Rural development                                        | Promotion of training on agricultural production, employment creation, promotion of domestic cottage industry for women in poverty, rehabilitation and establishment of economic base        |
| Agriculture Rural Investment and Enterprise Strengthening                     | 2006~2009     | 22.4 million US\$   | Badkhsan economic corridor                                                                                           | USAID         | Finance                                                  | Expansion of access to financing service, sustainable financing service                                                                                                                      |
| Afghanistan Water, Agriculture and Technology Transfer Project                | 2008~On-going | No Info             | Kabul, Nangerhar, Balkh, Kapisa                                                                                      | USAID         | Rural development                                        | Water resource management, improvement of ability, technology transfer, agricultural production, value chain, women in development, water policy, interrelation, market creation, employment |
| Afghan Vouchers for Increased Production in Agriculture                       | 2008~2010     | 60 million US\$     | Farah, Heart, Badghis, Ghor, Faryab, Juzjan, Sar-i-Pul, Balkh, Bamyan, Samangan, Kunduz, Baghlan, Takhar, Badakhshan | USAID         | Agriculture                                              | Food security, humanitarian response, distribution of agricultural input, Training for agricultural production                                                                               |
| Rapid Action Wheat Seed Production & Distribution & Review of the Seed Sector | No info       | 32.435 million US\$ |                                                                                                                      | USAID, CIDA   | Agriculture                                              | Production of wheat seed, establishment of distribution system                                                                                                                               |

| Name of Project                                          | Period           | Budget                           | Targeted Area               | Name of Donor                                                                               | Sector                         | Activities                                                                                                                                                                           |
|----------------------------------------------------------|------------------|----------------------------------|-----------------------------|---------------------------------------------------------------------------------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Accelerating Sustainable Agriculture Project (ASAP)      | 2006~2010        | 102 million US\$                 | Kabul, Heart, Balkh, Kunduz | USAID, DCA, Overseas Private Enterprise Corporation                                         | Agriculture, animal husbandry  | Successional projects of RAMP, exhibition of agriculture, value chain, agricultural information system, poor harvest early warning system, agricultural yard, veterinary service     |
| Emergency Irrigation Rehabilitation Project (EIRP)       | 2004~2011        | 101 million US\$                 |                             | WB                                                                                          | Irrigation                     | Rehabilitation of irrigation facilities, improvement of ability, reassembly of hydrological observation network                                                                      |
| Green Afghanistan Initiative (GAIN)                      | 2005~2008        | 0.16 million US\$                | Balkh                       | WFP                                                                                         | Assistance for women           | Provision of seedlings of fruit trees and nuts, assistance for livelihood improvement through production of seedlings                                                                |
| Balkh Livestock and Rural Enterprise Development Project | 2006.11~12 years | Belgium government: 700,000 Euro | Balkh                       | Mae Fa Luang Group, Financing Belgium government, Thailand International Cooperation Agency | Animal husbandry               | Sheep bank in Balkh province including the long term view of sheep wool and leather processing                                                                                       |
| Horticulture and Livestock Project (HLP)                 | 2006~2009        | 51 million US\$                  |                             | WB, CIDA, DFID                                                                              | Horticulture, animal husbandry | Rehabilitation and development of horticulture, extension service, establishment of regulation for disease and pest prevention, veterinary service, poultry farming, milk production |

## **Chapter 7   Regional Agricultural Characteristics and Direction for Agricultural Development Support**

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### **7.1    Regional Agricultural Characteristics**

#### **7.1.1    Northern Region**

Most of the area is flat vast arable land, while a low-mountain area exists which connects Hindu Kush Mountains ranges in the southern part of this region. Except for a certain northern part of the region, rain-fed cropping is commonly practiced since a certain precipitation is expected in the winter season. However sharp fluctuations in annual precipitation amount and pattern makes it difficult to manage stable cropping in the rain-fed area. Therefore irrigation is highly needed, while the irrigated area is limited and has been dropping every year. While the number of large-scale farm households is relatively large, they have a certain amount of fallow land caused by water shortage and routine crop rotation every year. As a result, the actual cropped acreage is not as large as their management scale. Since this region is located in a remote area, development of industries other than agriculture is limited.

Wheat cropping is abundantly dominant. The region has a surplus of wheat in a year with average precipitation, though it cannot accomplish self-sufficiency in a drought year. Other than wheat, pulses and oil seeds are relatively popular among farmers. Since vegetables are not so popular, there are no conspicuous crops other than melons and watermelons. On the other hand, fruit and nut cropping is traditionally common. Grapes, plums, pistachios, almonds and walnuts are popular.

Vast pastureland appears in the southern part of the region from spring to summer. Livestock, particularly sheep farming, in this land is common. The region is famous for its Karakul sheep production. In addition, handicrafts production such as carpet production is relatively common. Drought since 1999 caused a significant decrease in the number of sheep. The number has not been recovered enough. Desolation of pastureland is considered to be a reason for the difficulty to recover the number. Shifting from pastureland to cropping land is also mentioned as an issue.

Agricultural characteristics in the western part and in the eastern part of this region are slightly different. Balkh, one of the target provinces, located at the eastern end, shares numerous similarities with the flat land of the Northeastern region described below.

#### **7.1.2    Northeastern Region**

This region is divided into flat land in the northeastern part and mountain area from the south to the eastern part. Agricultural characteristics differ distinctly.

The characteristics in the flat land basically follow those of the Northern region. However the percentage of irrigated area is higher than that of the Northern region. Hence agriculture in this region is more stable than that in the Northern region. The favored condition makes the region to be a breadbasket for the country. Agricultural income in this region is maintained at a high level in relationship to the rest of the country. The number of middle-class landlords is relatively large. Large-scale farmers who accumulate property also exist among the landlords. However, as in the Northern region, some factors including degradation of irrigation facilities make the basic structure of agricultural production in this region unstable. Wheat, the main crop in this region, can produce a surplus constantly in the flatland. Even in a drought year, the amount of wheat exceeds the regional self-sufficiency level. Also, diversity of crops in this region has progressed more than that in the Northern region. Since this region has a large production area of rice, production of rice counts for approximately 50% of the whole production in the country. Also, feed crops, pulses and oil seeds are relatively largely cultivated. Though cotton used to be as important a summer crop as rice, its recent production has hovered at a low level. Production of other crops like vegetables, fruits, nuts and livestock share numerous similarities with the Northern region.

On the other hand, the mountain area has little crop cultivated acreage. The cold climate can be one characteristic of this region, while the annual precipitation is relatively large. Therefore there are no conspicuous crops other than fruits and nuts, mainly apples and plums in this area. Instead, the dependency on livestock is high. Unlike in the Northern region, cattle breeding is popular in this region. A considerable number of nomads (they mainly breed sheep) moves to pastureland which occurs from spring to summer in the area. Small-scale land-owner farmers are the majority.

### **7.1.3 Eastern Region**

Relatively warm climate and a long frost-free season as compared with the other regions make diverse crops to be able to grow in this region. At the same time, cropping without irrigation is almost impossible in this region since the annual precipitation is small. Cultivated land is seen only in areas along short rivers and irrigation canals. Also, farm size per one farm household is very small due to the thick population density. Therefore agricultural income in this region is maintained at a low level in comparison to the rest of the country, though intensive agriculture is managed and the diversity of crops is progressing. Since this region is located along the main route which connects Kabul and Pakistan (Peshawar), industries other than agriculture have been developed. The Agriculture sector is getting to be marginalized in the local economy.

Among crops, the growing area of wheat is still the largest, though the percentage of wheat cultivated area is not higher than in other regions. Since most wheat is cropped in irrigated land, yield per ha is higher than in other regions. Also, the annual production is relatively stable

every year. However the production does not meet the local demand yet. To mention about other crops, rice is also popular. The rice production is the second largest after the flat land in the Northeastern region in Afghanistan. However, its amount of production is almost equal to the local demand. Furthermore, maize is popular. It is used not only for feed but also for farmers' self consumption. Clover is also relatively popular as a feed crop.

On the other hand, vegetable production is becoming to be popular among farmers. Various vegetables are cropped mainly in Nangarhar province. In particular, this region has an advantage as a vegetable supply source in the winter season, the lean-season of vegetables in other regions. Also, citrus is popular and considered to be an important cash crop.

Although livestock farming is not very popular due to limited land area, intensive cattle breeding is relatively popular for farmers. The number of chickens is also large.

## **7.2 Local Potential and Agricultural Development Strategy**

### **7.2.1 Principle of Agricultural Development Strategy**

Based on the principle below, the agricultural development strategy for each target region is discussed below.

#### **(1) Consistency with ANDS (ANDS: Afghanistan National Development Strategy)**

ANDS states the five basic strategies below in the agriculture and rural development sector. Consistency between these strategies and the agricultural development strategy is needed.

- ① Strengthen formal and informal institutions in sub-national administration to make good decisions regarding their constituents lives and livelihoods
- ② Increase household income through semi-intensive and semi-specialized production with a well defined market and market-based commercial agriculture
- ③ Provision of basic infrastructure focusing on irrigation, roads, water, sanitation, electrification and service and value chain infrastructure
- ④ Facilitate an enabling environment and provide the necessary business support services to enable private sector led development of the rural economy. Financial services will be enhanced to support development
- ⑤ Strengthen early warning systems, disaster response coordination, disaster mitigation and relief

#### **(2) Consistency with NAP (NAP: National Agricultural Program)**

The Ministry of agriculture, irrigation and livestock states the seven strategies below in the NPA for development of legitimate agriculture, food security and poverty reduction.

- ① Food security

- ② Promotion of export-oriented horticulture
- ③ Promotion of import-substituting livestock
- ④ Enhancement of natural resource management
- ⑤ Upgrading of infrastructure and irrigation
- ⑥ Enhancement of research and development
- ⑦ Capacity building (government)

### **(3) Development of Local Potential**

This agricultural development strategy puts a priority on development of potential in each target region to the maximum extent.

### **(4) Priority on Reconstruction Support**

In view of the current situation in Afghanistan, this agricultural development strategy gives priority to the support for reconstruction of the local community and livelihoods. Although ANDS strategy above ambitiously intends to invest for rapid development, this strategy gives grater importance to activities that can connect the state of “reconstruction” to “future development” with continuity.

## **7.2.2 Strategy for Northern Region**

### **(1) Local Potential**

- ① Large arable land and pastureland
- ② Wheat production
- ③ Fruits and nuts production
- ④ Sheep-based livestock (especially Karakul sheep)
- ⑤ Handicrafts (carpets and so on)

### **(2) Strategy for Agricultural Development**

#### **① Enhancement of stable production of wheat**

Comprehensive measures should be taken for wheat production in order to achieve a stable local surplus. Irrigation facilities need rehabilitation as the first step, while stabilization of rain-fed cropping is also needed in this region where the percentage of irrigated land is small. In particular, soil fertility shall be maintained in good condition by a crop rotation system which combines fodder crops and fallow periods. At the same time, it is necessary to build up the crop farming system which is organically combined with livestock farming. Also, in the marginal areas where it shifts from pastureland to cropping land, wheat production will be controlled.

**② Improvement of traditional fruits and nuts production, rehabilitation of the related processing industry and enhancement of exports**

A countermeasure which focuses on traditional local crops more than newly-introduced crops is needed. Enlargement of cropped area of traditional crops, increasing their production and quality improvement are the first goals. Rehabilitation of the processing industry and export must be medium-to long-term targets. As for processing and marketing, promoting support for the local private sector has top priority.

**③ Promotion of sheep breeding (especially Karakul sheep), rehabilitation of leather and wool products and enhancement of export**

The biggest issue in livestock breeding is securing fodder. As described in ①, maintenance of pastureland and increase of fodder crops should be carried out actively. Local agricultural production should be maximized through combining crops and livestock. In addition, indigenous technology for the primary products (i.e. leather and wool) and handicrafts (i.e. carpets), which is still kept in a certain level, should be applied at a maximum. It is reported that Pakistan merchants control the market of processed products. The strategy should aim at growing local producers' bargaining power gradually by sharing the roles in marketing between the producers and the merchants for the mutual conveniences, instead of competition.

### **7.2.3 Strategy for Northeastern Region**

#### **【Flat Land】**

#### **(1) Local Potential**

- ① Large area of arable land and relatively high irrigation rate
- ② Wheat production
- ③ Rice production
- ④ Fruits and nuts production
- ⑤ Sheep-based livestock (especially Karakul sheep)

#### **(2) Strategy for Agricultural Development**

**① Establishment of stable production and supply of wheat as Afghanistan's breadbasket**

Basic strategy overlaps with the strategy for the Northern region. However rehabilitation of irrigated facilities which aims to the increase wheat production has higher priority, since the percentage of irrigated land is higher than that in the Northern region. Additionally, this region has constant annual local surplus and is a main route (for both domestic and imported goods) connected to Kabul, the large consuming area. Therefore wheat storage and milling facilities will be developed in certain hubs in order to improve a stable supply for the domestic market.

## **② Establishment of stable production and supply of local rice**

Rice production should be increased for promoting a major cash crop in the region. However, expansion of cultivated area will be restrained in order to promote balanced agricultural development in the region, since the region has been struggling with limited water resources. Then, simple increased production is not an appropriate rice policy form the viewpoint of macro-economy. Rice production costs should be reduced since retail price of local rice has been higher than the international FOB price. On the other hand, imported rice is more expensive than local rice in the local market even though the transportation costs are considered, due to maybe superior quality of imported rice. Therefore, comprehensive measures should be taken to improve the quality, so that the local rice can compete on the local market first, as well as, to reduce the production costs of the local rice. The measures are not only improvement of the productivity per unit area, but also introduction of favorable varieties for the local people and improvement of postharvest and milling technologies.

## **③ Increase the production of traditional fruits and nuts, rehabilitation of the processing industry and enhancement of the exports**

The strategy for the Northern region is also pursued in this area.

## **④ Promotion of sheep breeding (especially Karakul sheep), rehabilitation of leather and wool products and enhancement of exports**

The strategy for the Northern region is also pursued in this area.

### **【Mountain Area】**

#### **(1) Local Potential**

- ① Cool climate and rich pastureland
- ② Production of fruits and nuts
- ③ Cattle-based livestock

#### **(2) Strategy for Agricultural Development**

### **① Increase the production of traditional fruits and nuts, rehabilitation of the processing industry and enhancement of the exports**

The strategy for the Northern region is also pursued in this area.

### **② Promotion of cow breeding and development of dairy farming including processing**

It is predicted that draft cattle are gradually going to be replaced by tractors in Afghanistan. Hence conversion from draft cattle to milk cows should be promoted in cattle breeding and the

dairy industry should be developed by active investment from the local private sector. Since a number of traditional dairy products can be seen in this area, development of processed products utilizing the traditional techniques shall be promoted. However, accessibility to urban area determines whether to sell milk as fresh-milk or as other dairy products. Also, measures to preserve pastureland and to increase production of fodder crops will be taken, since securing fodder is the critical issue related to cattle breeding.

#### **7.2.4 Strategy for Eastern Region**

##### **(1) Local Potential**

- ① Warm climate and diversity of crops
- ② Rice production
- ③ Fruits and nuts production
- ④ Chicken breeding

##### **(2) Strategy for Agricultural Development**

###### **① Establishment of stable production and supply of local rice**

The strategy for flat land in the Northeastern region is also pursued in this region.

###### **② Encouragement of vegetable and citrus production taking advantage of the warm climate**

Development of production centers which have already been achieved to a certain extent should be promoted more. A strategy in crop promotion to look for a way different from the other regions taking advantage of the unique climate conditions is necessary. Through controlling harvesting season by protected cultivation, etc and introduction of new crops and varieties based on the market trends, high-value vegetables and citrus will be supplied to the market.

###### **③ Development of poultry (chicken and egg) production centre**

Although cattle breeding is popular in this region, cultivated land to produce enough fodder is limited. Therefore poultry farming which can expect high productivity even in a small area should be encouraged. Introduction of high quality breeds, as well as promotion of breeding stock farms that supply healthy chicks to growers will be encouraged. Also, production of blended feed for chickens made from local procurable materials such as maize and rice bran will be promoted.

#### **7.3 Possible Cooperation Program for Agricultural Development in the Target Provinces and Nangarhar**

Target provinces are Balkh, Kunduz and Takhar. Balkh is located in the Northern region,

while Kunduz and Takhar are located in the flat land of the Northeastern region. However the characteristics of the agricultural situation in Balkh share more similarities with the flat land of the Northeastern region, since Balkh is located in the east-end of the Northern region. Hence the cooperation program for these three target provinces is discussed based on the strategy described in chapter “7.2.3 Flat Land” Additionally, the program for Nangarhar is discussed based on the strategy described in chapter 7.2.4, since this region is located in the Eastern region. See Table 7.3.1 for details of the discussion.

In order to promote agricultural development in the 3 target provinces and Nangarhar, which is located in the northern and northeastern regions of Afghanistan, where development of basic infrastructure for agricultural production and other social infrastructure is stagnated, development of basic infrastructure / environment for agricultural production based on the relative advantages of the area (as examined in 7.2) alone is not sufficient. As indicated in Table 7.3.1, strengthening of the capacity of agricultural administration, as a common issue must also be coped at the same time.

In regard of development of basic infrastructure / environment for agricultural production, improvement of various factors are required, as described in the “Possible Cooperation to Overcome the Impediments” indicated in Table 7.3.1. These are namely; Stable supply of irrigation water, Establishment of farming / stock raising technology, Establishment of post harvest treatment technology, Establishment of processing / storage technology and facilities, Development of market distribution system, and other items such as Establishment of agricultural credit system and Development of basic infrastructure,

Furthermore, many issues must be solved in order to strengthen the capacity of agricultural administration such as; Institutional reforms to establish efficient organizational structures, Securing necessary manpower, Strengthening the capacity of individual staff, Installation of facilities / equipment, Elaboration of practical action plans based on national / regional development plans and implementation of projects in accordance to these plans.

Though some of these items can be implemented alone, the basic idea, which can bring out the results in the most efficient way, are to implement the stepwise in relation to the improvement of awareness and technologies of farmers and administrative staff. Table 7.3.2 summarizes the “Possible Cooperation to Overcome the Impediments” indicated in Table 7.3.1, by target regions and evaluation indexes. Furthermore, the implementation schedule in each province, which takes into regard the priorities of the individual cooperation programs are indicated in Fig. 7.3.1 to 7.3.3.

**Table 7.3.2 Priority of Development Programs regarding the Development of Foundation for Agricultural Production**

| Target regions         | Priority development issues                                                                                                    | Evaluation index                             |                                                  |                                                    |                                          |                              |                                               | Total score |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|--------------------------------------------------|----------------------------------------------------|------------------------------------------|------------------------------|-----------------------------------------------|-------------|
|                        |                                                                                                                                | Possibility of areal expansion of the Effect | Ripple effect to the vulnerable (poor and women) | Diversity of related industries (future expansion) | Possibility of effect seen in short term | Macro – economic rationality | Advantage of Japanese experience / technology |             |
| Three target provinces | Establishment of stable production and supply of wheat                                                                         | A                                            | A                                                | B                                                  | A                                        | A                            | B                                             | 16          |
|                        | Establishment of stable production and supply of local rice                                                                    | B                                            | C                                                | B                                                  | A                                        | C                            | A                                             | 12          |
|                        | Increase the production of traditional fruits and nuts, rehabilitation of processing industry and enhancement of the exports   | B                                            | C                                                | B                                                  | B                                        | A                            | B                                             | 12          |
|                        | Promotion of sheep breeding (especially Karakul sheep), rehabilitation of leather and wool products and enhancement of exports | A                                            | A                                                | A                                                  | C                                        | A                            | C                                             | 14          |
| Nangarhar province     | Establishment of stable production and supply of local rice                                                                    | A                                            | C                                                | B                                                  | A                                        | C                            | A                                             | 13          |
|                        | Encouragement of vegetable and citrus production taking advantage of the warm climate                                          | A                                            | A                                                | C                                                  | A                                        | B                            | A                                             | 15          |
|                        | Development of poultry (chicken and egg) production center                                                                     | A                                            | A                                                | C                                                  | B                                        | C                            | A                                             | 13          |

Note: Total score is calculated with A=3, B=2, C=1

However, it is also a fact that urgent economic reconstruction is demanded in Afghanistan, and that reconstruction of Agriculture / Livestock sector is regarded to be one of the most important issues. The donor countries and agencies have already started many cooperation programs in the field of agriculture and livestock, and its effects are already starting to show. JICA has also started the Improvement of Rice-based Agriculture in Nangarhar Province (RIP), with a planned period of three and a half years from September 2007, and is currently implementing the activities indicated in Table 7.3.3. Improved cropping technology that has been introduced by this project has largely increased the yield in this area. Currently, in the eastern region, RIP is working to disseminate the developed technology to other areas in the province and further improving the quality of cropping, as well as searching for measures to promote improvement of post-harvest treatment, processing and market distribution. Furthermore, there is an idea to utilize RIP as a research centre, to disseminate technologies to other paddy cultivated areas of the country.

When searching for possible cooperation programs that can bring direct impact to the agriculture / livestock sector, based on the input and results of the above mentioned project,

items such as 1) rehabilitation of irrigation facilities and introduction / dissemination of advanced varieties, 2) transportation of agricultural inputs and guidance for crop / stock raising in relation to the introduced varieties, 3) development of rural roads connecting the villages with major road systems, which will be the key to market distribution of products, and 4) development of farm roads necessary for operation and maintenance of the irrigation facilities can be can be raised.

Located in the northern and northeastern regions, the water source of three target provinces and Nangarhar province is the melted snow coming from the Hindu Kush Mountains. Construction of a dam may be the most efficient way to utilize this water for agriculture, but with the current lack of hydrological / geological data, securing stable water supply by dam construction is unrealistic. Under such conditions, together with aging, deterioration and lack of proper operation and maintenance, the efficiency of irrigation facilities of Afghanistan is said to be only 25%. Simple calculations show that if the facilities are rehabilitated with concrete linings where necessary, and if for example, the irrigation efficiency would reach 40% (which is equivalent the average in the neighboring nation of Iran), the irrigation system can cover up to 1.6 times more than the currently irrigated area, even without improving water management.

Furthermore, as result of FAO and other donor countries producing / distributing quality seeds of wheat, which is the major grain of the country, the introduction / dissemination rate of advanced varieties has reached 53%. Though cultivated area has not recovered to that of the 1970's, which is before the Soviet invasion, the amount of production is exceeds that of this time. Moreover, the yield of paddy is also reported to have largely increased as result of guidance for cropping technology by RIP, which is implemented in Nangahar.

Though maintenance rate of rural road and farm roads cannot be grasped from collected material, development of roads are advantageous in terms of less time required for local coordination. This is because road development will widely benefit the local population, and it does not involve personal concessions.

Anyhow, it must be clearly noted that this study is conducted based on collection and analysis of existing information. With such information, the outline of the target regions are well understood, but much of the details are not clear. Therefore, when activities such as rehabilitation of irrigation facilities and introduction / dissemination of quality seeds or other activities including guidance of crop / stock raising technology are to be implemented as cooperation programs, detailed information must be collected through preparatory studies, in order to clarify the framework of the project as well as continuous discussion on actual measures for its implementation taking into consideration the situation of security in the area.

**Table 7.3.1 Possible Cooperation Program for Agricultural Development in the Target Provinces and Nangarhar**

| Province           | Priority Issues                                                                         | Impediments                                                                                                                                                                                                                                                                                                                                                                                                                                 | Possible Cooperation to Overcome the Impediments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3 Target Provinces | (1) Establishment of stable production and supply of wheat as Afghanistan's breadbasket | <ul style="list-style-type: none"> <li>• Unstable rainfall and insufficient supply of irrigation water</li> <li>• Unskilled post harvest technology</li> <li>• Shortage of storage facilities</li> <li>• Decline of commercial milling industry including aging facilities</li> <li>• Unstable supply of electricity, water, etc</li> <li>• Poor condition of local roads</li> </ul>                                                        | <ul style="list-style-type: none"> <li>• To rehabilitate irrigation systems and improve water management systems</li> <li>• To establish and disseminate practical soil conservation systems (crop rotation, fallow, etc)</li> <li>• To introduce and spread drought-resistant and early ripening varieties (including quality seed production and distribution)</li> <li>• To research and spread water-saving cultivation and improved post harvest technology</li> <li>• To promote wheat millers and develop their milling/storage facilities</li> <li>• To establish quality standards system</li> <li>• To develop basic infrastructure such as electricity, water supply and roads</li> </ul>                  |
|                    | (2) Establishment of stable production and supply of local rice                         | <ul style="list-style-type: none"> <li>• Unstable rainfall and insufficient supply of irrigation water</li> <li>• Lack of high-quality varieties of rice favorable for local people</li> <li>• Unskilled cultivation technology</li> <li>• Unskilled post harvest and rice milling technology</li> <li>• Aging milling facilities</li> <li>• Unstable supply of electricity, water, etc</li> <li>• Poor condition of local roads</li> </ul> | <ul style="list-style-type: none"> <li>• To rehabilitate irrigation systems and improve water management systems</li> <li>• To introduce and spread varieties which have high-yielding capacity and fit local people's taste (including quality seed production and distribution)</li> <li>• To introduce and spread appropriate paddy field management technology and cropping system</li> <li>• To research and spread high-quality rice production and post harvest technology</li> <li>• To promote rice millers and develop their milling/storage facilities</li> <li>• To establish quality standards system</li> <li>• To develop basic infrastructure such as electricity, water supply and roads.</li> </ul> |

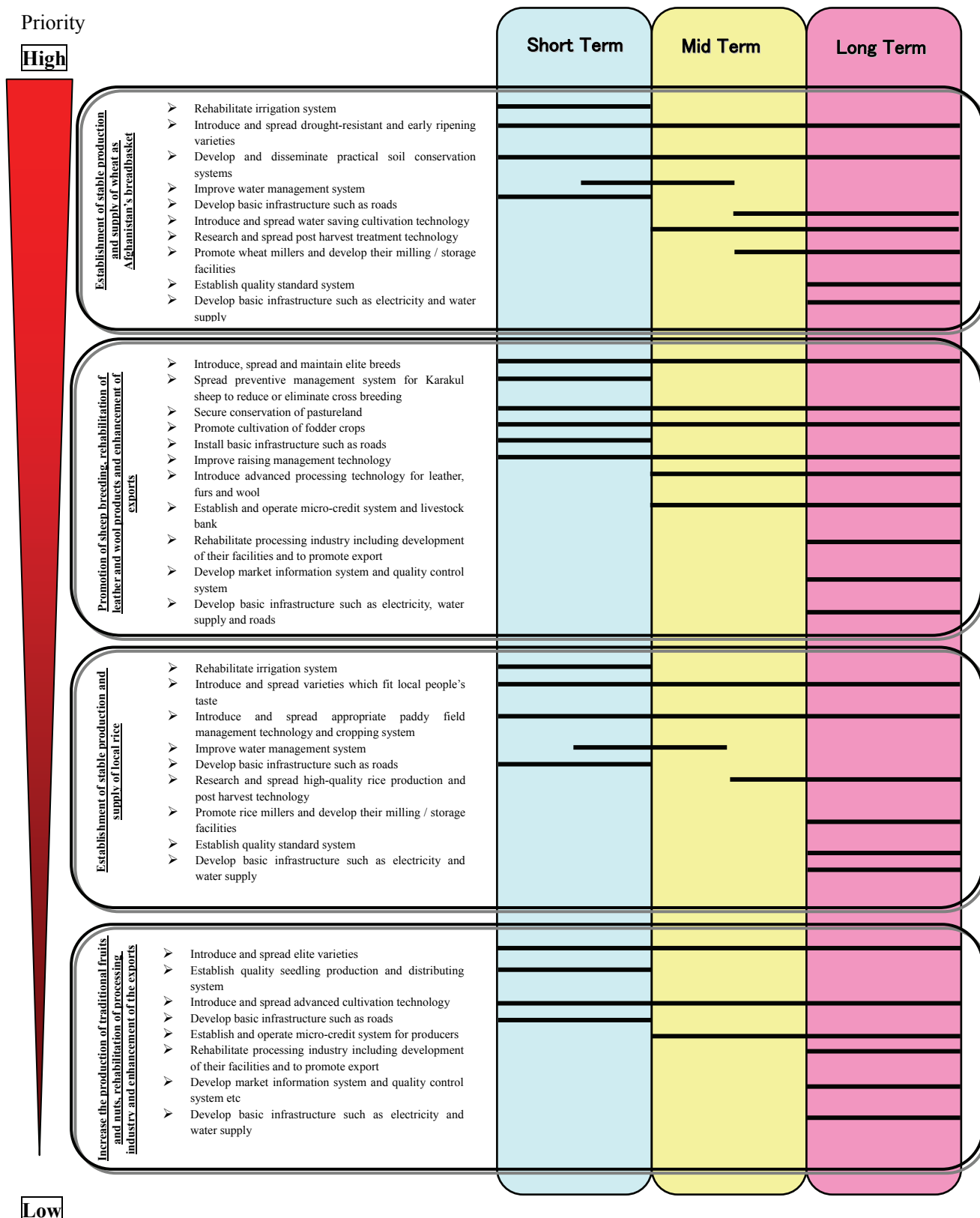
| Province | Priority Issues                                                                                                                    | Impediments                                                                                                                                                                                                                                                                                                                                                                                                                                      | Possible Cooperation to Overcome the Impediments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------|------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          | (3) Increase the production of traditional fruits and nuts, rehabilitation of processing industry and enhancement of the exports   | <ul style="list-style-type: none"> <li>• Lack of elite (high-yielding and high-quality) varieties</li> <li>• Unskilled cultivation technology</li> <li>• Unsophisticated processing, packaging and quality control technology</li> <li>• Insufficient market information</li> <li>• Decline of local processing industry and exporters</li> <li>• Unstable supply of electricity, water, etc</li> <li>• Poor condition of local roads</li> </ul> | <ul style="list-style-type: none"> <li>• To introduce and spread elite varieties</li> <li>• To establish quality seedling production and distributing system</li> <li>• To introduce and spread advanced cultivation technology (pruning, fruit thinning, grafting, layering etc)</li> <li>• To establish and operate micro-credit system for producers</li> <li>• To rehabilitate processing industry including development of their facilities and to promote exporters</li> <li>• To develop market information system and quality control system etc</li> <li>• To develop basic infrastructure such as electricity, water supply and roads</li> </ul>                                                                                                                                                                                                                                                     |
|          | (4) Promotion of sheep breeding (especially Karakul sheep), rehabilitation of leather and wool products and enhancement of exports | <ul style="list-style-type: none"> <li>• Shortage of fodder</li> <li>• Lack of elite breeds and degradation (crossing) of breeds</li> <li>• Unskilled raising and disease control technology</li> <li>• Insufficient quality control</li> <li>• Insufficient market information regarding processed products (design, quality standards, etc)</li> <li>• Weak market control power of local people</li> </ul>                                    | <ul style="list-style-type: none"> <li>• To introduce and spread elite breeds</li> <li>• To spread preventive management system for Karakul sheep to reduce or eliminate cross breeding</li> <li>• To secure conservation of pastureland</li> <li>• To promote cultivation of fodder crops (collaborating with soil conservation measures)</li> <li>• To improve raising management technology (including disease control such as vaccination)</li> <li>• To introduce advanced processing technology for leather, furs and wool</li> <li>• To rehabilitate the processing industry including development of their facilities and to promote exporters</li> <li>• To establish and operate micro-credit system and livestock bank</li> <li>• To develop market information system and quality control system</li> <li>• To develop basic infrastructure such as electricity, water supply and roads</li> </ul> |

| Province           | Priority Issues                                                                           | Impediments                                                                                                                                                                                                                                                                                                                                 | Possible Cooperation to Overcome the Impediments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nangarhar Province | (1) Establishment of stable production and supply of local rice                           | <ul style="list-style-type: none"> <li>Follow above (1) of 3 Target Provinces</li> </ul>                                                                                                                                                                                                                                                    | <ul style="list-style-type: none"> <li>Follow above (2) of 3 Target Provinces</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                    | (2) Encouragement of vegetable and citrus production taking advantage of the warm climate | <ul style="list-style-type: none"> <li>Lack of elite (high-yielding and high-quality) varieties</li> <li>Difficulty to procure necessary inputs</li> <li>Unskilled cultivation technology</li> <li>Unskilled post harvest and packing technology</li> <li>Insufficient market information</li> <li>Poor condition of local roads</li> </ul> | <ul style="list-style-type: none"> <li>To introduce and spread elite varieties</li> <li>To establish quality seed and seedling production and distributing systems</li> <li>To research and spread advanced cultivation technology and cropping system including protected cultivation (harvest control for vegetables and pruning, fruit thinning, grafting, layering etc for citrus)</li> <li>To establish and operate micro-credit system for producers</li> <li>To promote distributors of farm inputs</li> <li>To develop market information system and quality control system</li> <li>To rehabilitate irrigation systems and improve water management systems</li> <li>To develop basic infrastructure such as electricity, water supply and roads</li> </ul> |
|                    | (3) Development of poultry (chicken and egg) production centre                            | <ul style="list-style-type: none"> <li>Lack of elite breeds</li> <li>Difficulty to procure enriched feeds and inputs</li> <li>Unskilled raising and disease control technology</li> <li>Poor condition of local roads</li> </ul>                                                                                                            | <ul style="list-style-type: none"> <li>To introduce and spread elite breeds</li> <li>To promote breeding stock farms (farmers) including development of the facilities</li> <li>To improve raising management technology (including disease control such as vaccination)</li> <li>To establish and operate micro-credit system and chicken bank for producers</li> <li>To promote distributors of necessary inputs</li> <li>To promote local producers (farmers) of blended feed</li> <li>To develop basic infrastructure such as electricity, water supply and roads</li> </ul>                                                                                                                                                                                     |

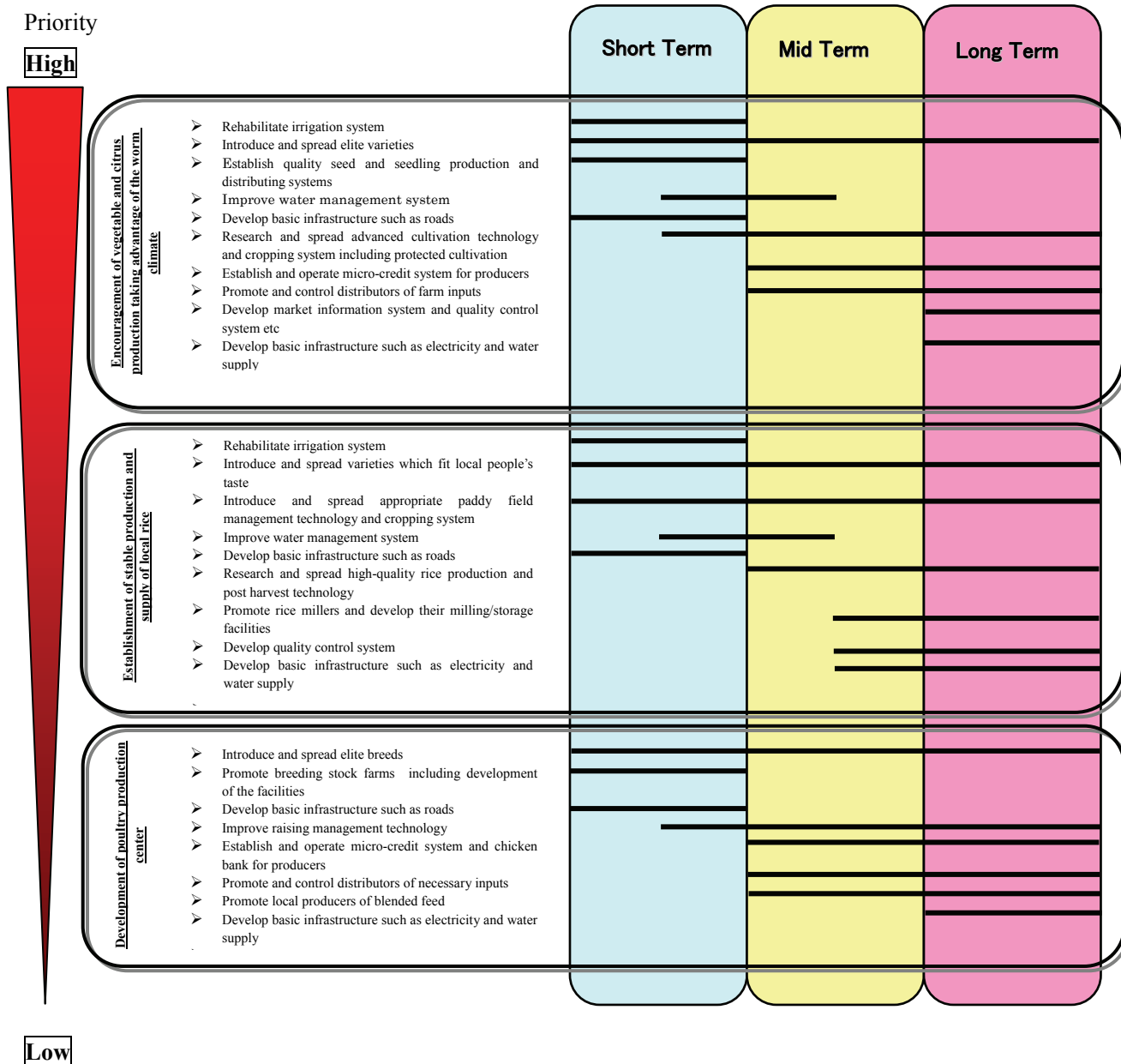
| Province                                          | Priority Issues                                                                       | Impediments                                                                                                                                                                                                                                                                                                                           | Possible Cooperation to Overcome the Impediments                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| All Areas<br>(strengthen administrative capacity) | (1) Strengthen agricultural administration institutions                               | <ul style="list-style-type: none"> <li>Insufficient understanding about actual situation and issues</li> <li>Shortage of human resources (manpower and ability)</li> <li>Poor facilities and equipment</li> </ul>                                                                                                                     | <ul style="list-style-type: none"> <li>To establish agricultural information system and empower concerned staff in collecting, accumulating and analyzing the related information</li> <li>To enhance project designing and planning abilities of concerned staff</li> <li>To formulate the master plan on local agricultural development</li> <li>To upgrade and develop facilities and equipment</li> </ul>                                           |
|                                                   | (2) Empowerment of agricultural research and extension system                         | <ul style="list-style-type: none"> <li>Unclear priority order of issues and topics to be addressed</li> <li>Shortage of human resources (manpower and ability)</li> <li>Poor facilities and equipment</li> </ul>                                                                                                                      | <ul style="list-style-type: none"> <li>To formulate the master plan on local agricultural development (clarification of the priority order)</li> <li>To improve the abilities of concerned staff</li> <li>To upgrade and develop facilities and equipment</li> </ul>                                                                                                                                                                                    |
|                                                   | (3) Reestablishment of farmland registration system                                   | <ul style="list-style-type: none"> <li>Lack of people's trust in the government</li> <li>Confused information about land property</li> <li>Poor administration ability</li> </ul>                                                                                                                                                     | <ul style="list-style-type: none"> <li>To collect and organize related information and establish a data base</li> <li>To reorganize the related regulations and promote an awareness campaign</li> <li>To improve the abilities of concerned staff</li> <li>To upgrade and develop facilities and equipment</li> </ul>                                                                                                                                  |
|                                                   | (4) Reorganization of hydrological monitoring system                                  | <ul style="list-style-type: none"> <li>Aging facilities</li> <li>Shortage of human resources (manpower and ability)</li> <li>Poor facilities and equipment</li> <li>Lack of rules about information accumulation system</li> </ul>                                                                                                    | <ul style="list-style-type: none"> <li>To rehabilitate hydrological monitoring facilities</li> <li>To rearrange the points for hydrological monitoring (reconstruction of the monitoring network)</li> <li>To collect and organize related information and establish a data base</li> <li>To improve the abilities of concerned staff</li> </ul>                                                                                                        |
|                                                   | (5) Reestablishment of water charge collection system and improvement of Mirab system | <ul style="list-style-type: none"> <li>Water charge has not been revised for a long time</li> <li>Confused information regarding irrigated land</li> <li>Lack of support system by the government</li> <li>Lack of water measurement and management facilities</li> <li>Shortage of human resources (manpower and ability)</li> </ul> | <ul style="list-style-type: none"> <li>To revise the water law that was established in 1925</li> <li>To update information about irrigated land and reset the water charge</li> <li>To upgrade and develop facilities to measure and manage intake water</li> <li>To upgrade and develop irrigation facilities as well as maintenance facilities and equipment in main rivers</li> <li>To secure human resources and improve their abilities</li> </ul> |

**Table 7.3.3 Project Outline**

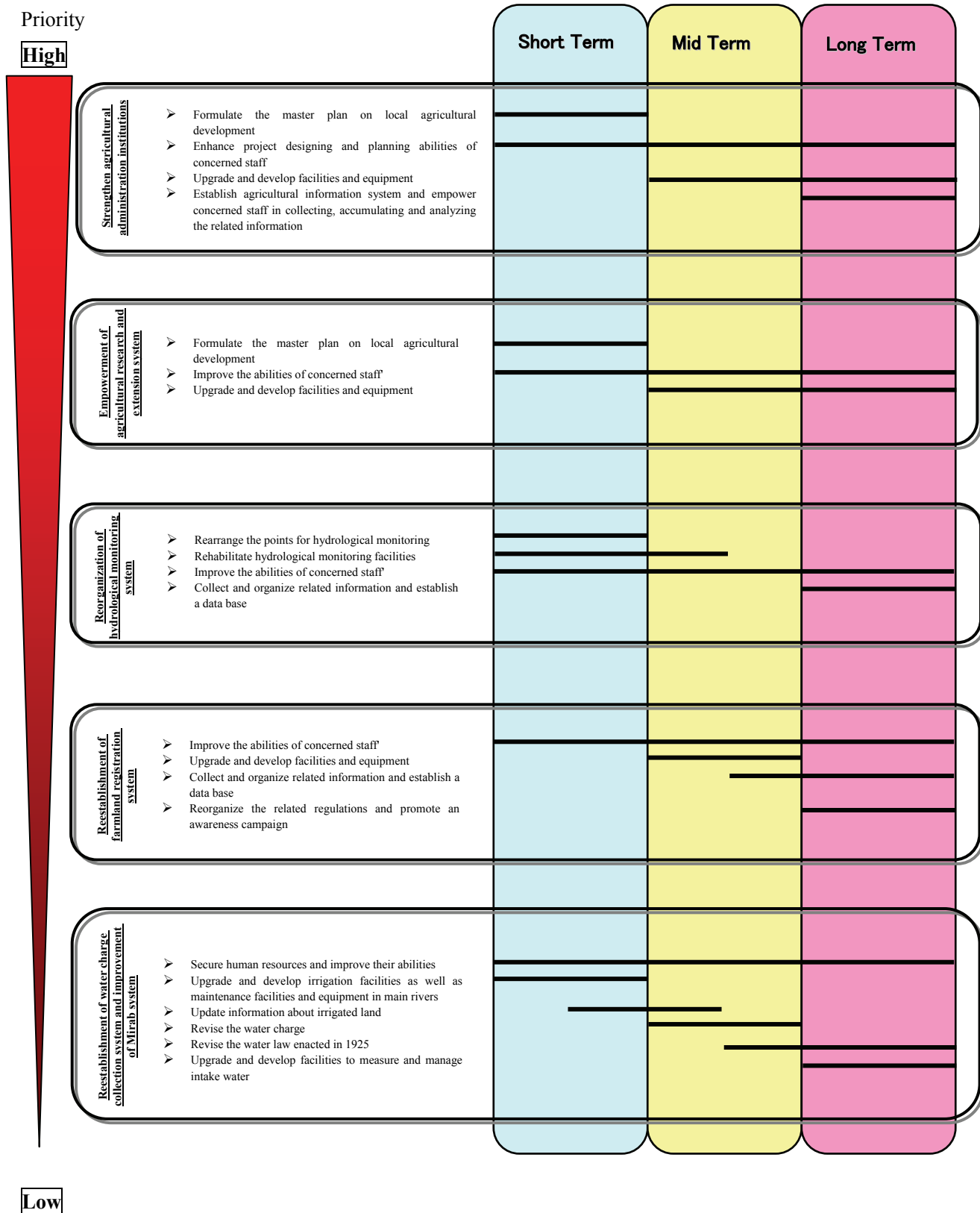
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|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. Project Title</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Improvement of Rice-based Agriculture in Nangarhar Province in Afghanistan                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>2. Background</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <p>Agricultural / rural development plays a vital role in heading towards the reconstruction of economy and society in Afghanistan. Improvement of household economy and reduction of poverty at the farmers level, as well as enhanced economic activities and social stability at the village level are strongly required through improved food production through the enhancement of agricultural land and increased yield. Particularly, with the situation of low self-sufficiency rate of major foodstuff in the country, increasing the production of major crops is an issue of food security. Though rice is one of the major grains, following wheat, the production does not match the amount of consumption, and is dependant on import.</p> <p>The eastern part of Afghanistan, centering Jalalabad, together with the northern regions, is the largest rice cultivation areas of the country. Blessed with abundant water and favorable weather, the area has high potential for rice production. On the other hand the Rice Research Center, constructed by Japanese Grant Aid (completed in 1989) has been completed during the disturbance of the Soviet invasion, but has come without the realization of the planned technical assistance (former technical cooperation project scheme). After the confusion brought by the long lasted war, basic infrastructure for agricultural production has deteriorated and human resources having the technology required for agricultural development is insufficient. Also, in regard of the necessity to introduce alternative crops for poppy, there is extremely high urgency / necessity to establish a system for agricultural research &amp; development, training and dissemination, centering technology on rice production.</p> <p>Under such situation, the Afghanistan Government requested the Government of Japan for a comprehensive technical assistance including the rehabilitation of the said centre, in order to realize increased farmer's income through promotion of agricultural production and quality improvement, mainly for rice cultivation in the region.</p> <p>In response, the Government of Japan carried out a preparatory study to examine the actual implementation plan and input of the project, and to confirm the rationality of the project. As result, the project was found rational. After the agreement on the project contents with the implementing agency in Afghanistan, a Record of Discussion (R/D) was signed on September 26, 2007.</p> |
| <b>3. Target of the Project</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <p>(1) Overall goal<br/>Agricultural productivities, centering rice in Nangarhar Province will be increased</p> <p>(2) Project purpose<br/>The technology for rice cultivation will be improved in regard of local climatic conditions, and the improved technology will be utilized in dissemination activities</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>4. Outputs of the Project</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <p>1. Increased research and development capacity of the Sishanbak Agricultural Experiment Lab</p> <p>2. Activated function of agricultural dissemination system</p> <p>3. Promoted coordination of research and dissemination activities</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>5. Activities</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <p>1-1 Identification of issues on agriculture in Nangarhar province centering rice production</p> <p>1-2 Installation of facility and equipment in Sishanbak Agricultural Experiment Lab</p> <p>1-3 Implementation of research works in the test field</p> <p>1-4 Holding workshops with other research institutions to share the results of R&amp;D</p> <p>2-1 Identification of issues on dissemination system, method and capacity of staff</p> <p>2-2 Training of dissemination staff on dissemination methods</p> <p>2-3 Selection of demonstration plot</p> <p>2-4 Training of farmers at demonstration plot</p> <p>3-1 Joint Periodical meetings between Sishanbak Agricultural Experiment Lab and dissemination centers in Nangarhar province</p> <p>3-2 Workshop for research staff and dissemination staff in Sishanbak Agricultural Experiment Lab</p> <p>3-3 Development of dissemination tool by the Experiment Lab and dissemination center</p> <p>3-4 Formulation of database on information benefitting research / dissemination activities and its disclosure</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>6. Implementation Period</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Three and a half years from September 2007 (tentative)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>7. Inputs</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <p>(1) Japanese side<br/>Dispatch experts, provide equipment, accept trainees, provide budget for activities</p> <p>(2) Afghanistan side<br/>Assign counterparts, provide facility and test field of Sishanbak Agricultural Experiment Lab, provide existing equipment, provide budget to maintain Sishanbak Agricultural Experiment Lab, provide demonstration plot, provide office space for the project.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |



**Fig. 7.3.1 Supposed Schedule of Cooperation Programs for Agricultural Development in the Three Target Provinces: Programs Related to Development of Foundation for Agricultural Production**



**Fig. 7.3.2 Supposed Schedule of Cooperation Programs for Agricultural Development in Nangarhar Province: Programs Related to Development of Foundation for Agricultural Production**



**Fig. 7.3.3 Supposed Schedule of Cooperation Programs for Agricultural Development in Afghanistan: Programs Related to Capacity Development of Agricultural Administration**

## **Appendix A Results of Field Survey by Local Consultants**

## Appendix A Results of Field Survey by Local Consultants

### A-1 Meteoro-hydrological and Soil Data

#### A-1-1 Meteorological Data

Meteorological stations are under the jurisdiction of Provincial Agriculture, Irrigation and Livestock department (PAIL). However, continuous observation is not carried out in 4 provinces due to problems of equipment. Meteorological data at airports could not be obtained by the survey, even though meteorological observation must be carried out at Mazar-e-Sharif Airport and Kunduz Airport. According to the result of the survey, meteorological observation is not carried out sufficiently in Northern and North-eastern regions. Data obtained by the survey are as follows.

#### (1) Balkh Province

**Table 1-1-1 Monthly Meteorological Observation Records in Balkh Province**

|                   |                                          |
|-------------------|------------------------------------------|
| Name of Station:  | Agriculture department of Balkh province |
| Name of District: | Mazar Sharif                             |
| Name of Province: | Balkh                                    |
| Latitude          | 36 42 826                                |
| Longitude         | 67 05 059                                |
| Elevation (m)     | 360                                      |

Year: 2009

| Items                                    | Month | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. |
|------------------------------------------|-------|------|------|------|------|-----|------|------|------|------|------|------|------|
| Monthly Average Max. Temperature (°C)    |       |      |      |      |      |     |      |      |      |      |      |      |      |
| Monthly Average Min. Temperature (°C)    |       |      |      |      |      |     |      |      |      |      |      |      |      |
| Monthly Average Min. Temperature (°C)    |       |      |      |      |      |     |      |      |      |      |      |      |      |
| Monthly Average Relative Humidity (%)    |       |      |      |      |      |     |      |      |      |      |      |      |      |
| Monthly Average Wind Speed (m/sec.)      |       |      |      |      |      |     |      |      |      |      |      |      |      |
| Monthly Accumulated Sunshine Hour (hour) |       |      |      |      |      |     |      |      |      |      |      |      |      |
| Monthly Accumulated Precipitation (mm)   |       | 17   | 61.5 | 20.5 | 105  | 0   | 0    | 0    | 0    | 0    |      |      |      |

#### (2) Kunduz Province

**Table 1-1-2 Monthly Meteorological Observation Records in Kunduz Province**

|                   |                         |
|-------------------|-------------------------|
| Name of Station:  | Station # 2 Center Farm |
| Name of District: | Kunduz                  |
| Name of Province: | Kunduz                  |
| Latitude          | 36 42 723               |
| Longitude         | 68 51 325               |
| Elevation (m)     | 395                     |

Year: 2006

| Items                                    | Month | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. |
|------------------------------------------|-------|------|------|------|------|-----|------|------|------|------|------|------|------|
| Monthly Average Max. Temperature (°C)    |       |      |      |      |      |     | 40.9 | 44.0 | 43.0 | 39.0 | 34.0 | 32.0 | 22.0 |
| Monthly Average Min. Temperature (°C)    |       |      |      |      |      |     | 36.0 | 10.5 | 36.0 | 20.0 | 15.0 | 9.0  | 4.0  |
| Monthly Average Relative Humidity (%)    |       |      |      |      |      |     | 15.0 | 20.0 | 21.0 | 18.0 | 19.0 | 33.0 | 90.0 |
| Monthly Average Wind Speed (m/sec.)      |       |      |      |      |      |     | 1.0  | 1.2  | 0.5  | 0.2  | 0.8  | 0.3  | 0.0  |
| Monthly Accumulated Sunshine Hour (hour) |       |      |      |      |      |     |      |      |      |      |      |      |      |
| Monthly Accumulated Precipitation (mm)   |       |      |      |      |      |     |      |      |      |      |      |      |      |

Year: 2007

| Items                                    | Month | Jan. | Feb. | Mar. | Apr. | May  | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. |
|------------------------------------------|-------|------|------|------|------|------|------|------|------|------|------|------|------|
| Monthly Average Max. Temperature (°C)    |       |      |      | 43.0 | 32.0 | 37.0 | 41.0 | 43.0 |      | 34.0 | 24.0 | 26.0 | 19.0 |
| Monthly Average Min. Temperature (°C)    |       |      |      | 21.0 | 20.0 | 17.0 | 27.0 | 24.0 |      | 23.0 | 13.0 | 6.0  | 7.0  |
| Monthly Average Relative Humidity (%)    |       |      |      | 60.0 | 88.0 | 28.0 | 40.0 |      |      |      |      |      |      |
| Monthly Average Wind Speed (m/sec.)      |       |      |      | 0.0  | 0.0  | 0.1  | 1.2  |      |      |      |      |      |      |
| Monthly Accumulated Sunshine Hour (hour) |       |      |      |      |      |      |      |      |      |      |      |      |      |
| Monthly Accumulated Precipitation (mm)   |       |      |      |      |      |      |      |      |      |      |      |      |      |

Year: 2008

| Items                                    | Month | Jan. | Feb. | Mar. | Apr. | May  | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. |
|------------------------------------------|-------|------|------|------|------|------|------|------|------|------|------|------|------|
| Monthly Average Max. Temperature (°C)    |       | 12.0 | 20.0 | 25.0 | 38.0 | 43.0 | 44.0 |      |      | 38.0 | 30.0 | 23.0 | 17.0 |
| Monthly Average Min. Temperature (°C)    |       | -6.0 | -8.0 | 12.0 | 12.0 | 26.0 | 36.0 |      |      | 16.0 | 14.0 | 7.0  | 6.0  |
| Monthly Average Min. Temperature (°C)    |       |      | 79.0 | 45.5 | 52.2 | 27.0 | 21.0 |      |      | 22.0 | 34.0 | 80.0 | 97.0 |
| Monthly Average Relative Humidity (%)    |       |      | 1.0  | 1.5  | 0.1  | 0.0  | 0.2  |      |      | 0.1  | 1.0  | 0.0  | 0.0  |
| Monthly Average Wind Speed (m/sec.)      |       |      |      |      |      |      |      |      |      |      |      |      |      |
| Monthly Accumulated Sunshine Hour (hour) |       |      |      |      |      |      |      |      |      |      |      |      |      |
| Monthly Accumulated Precipitation (mm)   |       | 35.0 | 11.8 | 18.2 | 23.9 | 12.5 | 0.0  | 0.0  | 0.0  | 0.0  | 20.0 | 7.8  | 42.1 |

Year: 2009

| Items                                    | Month | Jan. | Feb. | Mar. | Apr. | May  | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. |
|------------------------------------------|-------|------|------|------|------|------|------|------|------|------|------|------|------|
| Monthly Average Max. Temperature (°C)    |       | 21.0 | 17.5 |      |      | 28.0 | 39.0 | 41.4 | 44.0 |      |      |      |      |
| Monthly Average Min. Temperature (°C)    |       | 3.0  | 8.0  |      |      | 18.0 | 12.0 | 24.0 | 32.0 |      |      |      |      |
| Monthly Average Relative Humidity (%)    |       | 71.0 | 85.0 |      |      | 62.0 | 30.0 | 22.0 | 28.0 |      |      |      |      |
| Monthly Average Wind Speed (m/sec.)      |       | 0.0  | 0.0  |      |      | 0.2  | 0.4  | 0.4  | 7.0  |      |      |      |      |
| Monthly Accumulated Sunshine Hour (hour) |       |      |      |      |      |      |      |      |      |      |      |      |      |
| Monthly Accumulated Precipitation (mm)   |       | 48.6 | 58.2 | 33.5 | 62.0 | 28.5 | 7.5  | 0.0  | 0.0  |      |      |      |      |

### (3) Takhar Province

**Table 1-1-3 Monthly Meteorological Observation Records in Takhar Province**

|                   |                                  |       |      |
|-------------------|----------------------------------|-------|------|
| Name of Station:  | Baghi Zakhira-e-Reyaasati Zeraat | Year: | 2005 |
| Name of District: | Talugan                          |       |      |
| Name of Province: | Takhar                           |       |      |
| Latitude          | N- 36 44 134                     |       |      |
| Longitude         | E- 069 32 687                    |       |      |
| Elevation (m)     | 818m                             |       |      |

| Items                                    | Month | Jan. | Feb. | Mar. | Apr. | May | Jun | Jul | Aug | Sep | Oct | Nov  | Dec |
|------------------------------------------|-------|------|------|------|------|-----|-----|-----|-----|-----|-----|------|-----|
| Monthly Average Max. Temperature ( C )   |       |      |      |      |      |     |     |     |     |     |     |      |     |
| Monthly Average Min. Temperature ( C )   |       |      |      |      |      |     |     |     |     |     |     |      |     |
| Monthly Average Min. Temperature ( C )   |       |      |      |      |      |     |     |     |     |     |     |      |     |
| Monthly Average Relative Humidity (%)    |       |      |      |      |      |     |     |     |     |     |     |      |     |
| Monthly Average Wind Speed (m/sec.)      |       |      |      |      |      |     |     |     |     |     |     |      |     |
| Monthly Accumulated Sunshine Hour (hour) |       |      |      |      |      |     |     |     |     |     |     |      |     |
| Monthly Accumulated Precipitation (mm)   |       |      |      |      |      |     |     |     |     |     |     | 10mm |     |

|                                          |       | Year: 2006            |      |      |      |     |     |     |     |     |     |      |              |
|------------------------------------------|-------|-----------------------|------|------|------|-----|-----|-----|-----|-----|-----|------|--------------|
| Items                                    | Month | Jan.                  | Feb. | Mar. | Apr. | May | Jun | Jul | Aug | Sep | Oct | Nov  | Dec          |
| Monthly Average Max. Temperature ( C )   |       |                       |      |      |      |     |     |     |     |     |     |      |              |
| Monthly Average Min. Temperature ( C )   |       |                       |      |      |      |     |     |     |     |     |     |      |              |
| Monthly Average Min. Temperature ( C )   |       |                       |      |      |      |     |     |     |     |     |     |      |              |
| Monthly Average Relative Humidity (%)    |       |                       |      |      |      |     |     |     |     |     |     |      |              |
| Monthly Average Wind Speed (m/sec.)      |       |                       |      |      |      |     |     |     |     |     |     |      |              |
| Monthly Accumulated Sunshine Hour (hour) |       |                       |      |      |      |     |     |     |     |     |     |      |              |
| Monthly Accumulated Precipitation (mm)   |       | 23mm and 70cm Snowing | 0    | 0    | 45mm | 0   | 0   | 0   | 0   | 0   | 1mm | 54mm | 28cm Snowing |

|                                          |       | Year: 2008 |              |      |      |      |     |     |     |     |      |                      |              |
|------------------------------------------|-------|------------|--------------|------|------|------|-----|-----|-----|-----|------|----------------------|--------------|
| Items                                    | Month | Jan.       | Feb.         | Mar. | Apr. | May  | Jun | Jul | Aug | Sep | Oct  | Nov                  | Dec          |
| Monthly Average Max. Temperature ( C )   |       |            |              |      |      |      |     |     |     |     |      |                      |              |
| Monthly Average Min. Temperature ( C )   |       |            |              |      |      |      |     |     |     |     |      |                      |              |
| Monthly Average Min. Temperature ( C )   |       |            |              |      |      |      |     |     |     |     |      |                      |              |
| Monthly Average Relative Humidity (%)    |       |            |              |      |      |      |     |     |     |     |      |                      |              |
| Monthly Average Wind Speed (m/sec.)      |       |            |              |      |      |      |     |     |     |     |      |                      |              |
| Monthly Accumulated Sunshine Hour (hour) |       |            |              |      |      |      |     |     |     |     |      |                      |              |
| Monthly Accumulated Precipitation (mm)   |       | 55mm       | 24cm Snowing | 37mm | 70mm | 11mm | 0   | 0   | 0   | 0   | 24mm | 4mm and 27cm Snowing | 40Cm Snowing |

|                                          |       | Year: 2009             |                       |      |         |        |     |     |     |     |     |     |     |
|------------------------------------------|-------|------------------------|-----------------------|------|---------|--------|-----|-----|-----|-----|-----|-----|-----|
| Items                                    | Month | Jan.                   | Feb.                  | Mar. | Apr.    | May    | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| Monthly Average Max. Temperature ( C )   |       |                        |                       |      |         |        |     |     |     |     |     |     |     |
| Monthly Average Min. Temperature ( C )   |       |                        |                       |      |         |        |     |     |     |     |     |     |     |
| Monthly Average Min. Temperature ( C )   |       |                        |                       |      |         |        |     |     |     |     |     |     |     |
| Monthly Average Relative Humidity (%)    |       |                        |                       |      |         |        |     |     |     |     |     |     |     |
| Monthly Average Wind Speed (m/sec.)      |       |                        |                       |      |         |        |     |     |     |     |     |     |     |
| Monthly Accumulated Sunshine Hour (hour) |       |                        |                       |      |         |        |     |     |     |     |     |     |     |
| Monthly Accumulated Precipitation (mm)   |       | 37mm and 470cm Snowing | 67mm and 13cm Snowing | 33mm | 132.5mm | 78.5mm | 8mm |     |     |     |     |     |     |

### (4) Nangarhar Province

**Table 1-1-4 Monthly Meteorological Observation Records in Nangarhar Province**

|                   |                                 |       |      |
|-------------------|---------------------------------|-------|------|
| Name of Station:  | Hawa Shenasi Farm (Pashmi Bagh) | Year: | 2007 |
| Name of District: | Jalal Abad                      |       |      |
| Name of Province: | Nangarhar                       |       |      |
| Latitude          | N- 34 25 092                    |       |      |
| Longitude         | E- 70 28 082                    |       |      |
| Elevation (m)     | 566                             |       |      |

| Items                                    | Month | Jan.  | Feb.  | Mar.  | Apr.  | May   | Jun   | Jul   | Aug   | Sep   | Oct   | Nov   | Dec   |
|------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Monthly Average Max. Temperature ( C )   |       | 20.0  | 20.0  | 26.0  | 35.0  | 37.0  | 43.0  | 38.0  | 38.0  | 38.0  | 27.0  | 26.0  | 20.0  |
| Monthly Average Min. Temperature ( C )   |       | -2.0  | 2.0   | 10.0  | 12.0  | 18.0  | 17.0  | 24.0  | 19.0  | 20.0  | 5.0   | 6.0   | 1.0   |
| Monthly Average Relative Humidity (%)    |       | 63.0  | 58.8  | 69.0  | 57.7  | 52.3  | 53.6  | 52.5  | 61.2  | 70.5  | 66.9  | 60.2  | 61.4  |
| Monthly Average Wind Speed (m/sec.)      |       | 13.0  | 11.6  | 14.6  | 17.4  | 19.0  | 24.1  | 18.6  | 17.5  | 18.0  | 15.3  | 16.8  | 15.7  |
| Monthly Accumulated Sunshine Hour (hour) |       | 234.0 | 104.0 | 146.0 | 318.0 | 339.0 | 350.0 | 362.0 | 371.0 | 332.0 | 146.0 | 278.0 | 269.0 |
| Monthly Accumulated Precipitation (mm)   |       | 0.0   | 97.0  | 70.0  | 0.0   | 11.0  | 21.0  | 0.0   | 0.0   | 8.0   | 66.0  | 0.0   | 0.0   |

|                                          |       | Year: 2008 |       |       |       |       |       |       |       |       |       |       |       |
|------------------------------------------|-------|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Items                                    | Month | Jan.       | Feb.  | Mar.  | Apr.  | May   | Jun   | Jul   | Aug   | Sep   | Oct   | Nov   | Dec   |
| Monthly Average Max. Temperature ( C )   |       | 13.0       | 24.0  | 27.0  | 35.0  | 40.0  | 40.0  | 40.0  | 38.0  | 37.0  | 40.0  | 26.0  | 18.0  |
| Monthly Average Min. Temperature ( C )   |       | -7.0       | -2.0  | 10.0  | 6.0   | 15.0  | 22.0  | 22.0  | 20.0  | 20.0  | 21.0  | 12.0  | 1.0   |
| Monthly Average Relative Humidity (%)    |       | 70.0       | 60.3  | 60.8  | 69.6  | 57.8  | 58.2  | 60.9  | 63.6  | 54.6  | 66.2  | 56.3  | 61.1  |
| Monthly Average Wind Speed (m/sec.)      |       | 15.4       | 31.1  | 23.9  | 24.6  | 19.8  | 12.2  | 16.0  | 16.2  | 20.3  | 12.0  | 20.2  | 18.5  |
| Monthly Accumulated Sunshine Hour (hour) |       | 236.0      | 233.0 | 307.0 | 230.0 | 368.0 | 360.0 | 368.0 | 355.0 | 334.0 | 363.0 | 262.0 | 210.0 |
| Monthly Accumulated Precipitation (mm)   |       | 52.0       | 38.0  | 9.5   | 35.5  | 2.0   | 0.0   | 0.0   | 23.0  | 7.0   | 6.5   | 0.0   | 10.0  |

|                                          |       | Year: 2009 |       |       |       |       |       |       |       |       |     |     |     |
|------------------------------------------|-------|------------|-------|-------|-------|-------|-------|-------|-------|-------|-----|-----|-----|
| Items                                    | Month | Jan.       | Feb.  | Mar.  | Apr.  | May   | Jun   | Jul   | Aug   | Sep   | Oct | Nov | Dec |
| Monthly Average Max. Temperature ( C )   |       | 18.0       | 19.0  | 26.0  | 35.0  | 38.0  | 46.0  | 45.0  | 42.0  | 38.0  |     |     |     |
| Monthly Average Min. Temperature ( C )   |       | 0.0        | 0.0   | 7.0   | 7.0   | 10.0  | 17.0  | 20.0  | 20.0  | 20.0  |     |     |     |
| Monthly Average Relative Humidity (%)    |       | 67.8       | 62.4  | 63.2  | 64.4  | 62.3  | 48.8  | 58.9  | 61.2  | 59.9  |     |     |     |
| Monthly Average Wind Speed (m/sec.)      |       | 388.9      | 19.5  | 25.9  | 22.2  | 44.3  | 24.9  | 19.3  | 22.5  | 16.0  |     |     |     |
| Monthly Accumulated Sunshine Hour (hour) |       | 144.0      | 205.0 | 248.5 | 257.0 | 346.0 | 363.0 | 372.0 | 368.0 | 328.0 |     |     |     |
| Monthly Accumulated Precipitation (mm)   |       | 28.0       | 18.5  | 21.5  | 42.5  | 32.0  |       |       | 275.0 | 22.0  |     |     |     |

### A-1-2 Hydrological Data

Hydrological data obtained in this survey are; monthly flow volume and average water level in 2008 and 2009 of the Balkh River which is a major river in the Northern region, monthly flow volume fluctuation data

from 2007 to 2009 of the Khan Abad River which is a tributary of the Kunduz River, monthly flow volume fluctuation data in 2008 and 2009 of the Chardara River, monthly flow volume in 1979 and 2009 as well as monthly average water level in 2008 and 2009 of the Kunar River which is a major river in Eastern region, and monthly flow volume from 1969 to 1978 of the Kabul River.

Obtained data indicate that flow measurement have hardly been carried out at the Balkh River, the Kunar River and the Kabul River in recent years. Accumulation of past data is also insufficient. It is necessary to establish observation network and accumulation of data in order to draw up a water resource development plan. On the other hand, unit of data is mentioned as m<sup>3</sup>/sec., it will be m<sup>3</sup>, assuming from the figures in the table. Obtained data of the rivers are summarized as follows.

## (1) Balkh River (Balkh Province)

**Table 1-2-1 Monthly Flow Volume of the Balkh River**

|                    |              |
|--------------------|--------------|
| Name of Main River | Balkh River  |
| Name of Station:   | Rabat Bala   |
| Name of District   | Chemtal      |
| Name of Province:  | Balkh        |
| Latitude           | N- 36 37 153 |
| Longitude          | E- 66 56 044 |
| Elevation (m)      | 411          |

Unit: m<sup>3</sup>/sec.

| Year | Jan. | Feb. | Mar. | Apr. | May | Jun  | Jul | Aug | Sep | Oct | Nov | Dec |
|------|------|------|------|------|-----|------|-----|-----|-----|-----|-----|-----|
| 2009 |      |      |      |      | 35  |      |     |     |     |     |     |     |
| 2008 |      |      |      |      |     | 18.5 |     |     |     |     |     |     |

Note: the water flow record is Minimum 25 m<sup>3</sup>/sec and maximum is 55 m<sup>3</sup>/sec

**Table 1-2-2 Monthly Average Water Level of the Balkh River**

|                    |              |
|--------------------|--------------|
| Name of Main River | Balkh River  |
| Name of Station:   | Rabat Bala   |
| Name of District   | Dehdadi      |
| Name of Province:  | Balkh        |
| Latitude           | N- 36 37 153 |
| Longitude          | E- 66 56 044 |
| Elevation (m)      | 411          |

Unit: m

| Year | Jan. | Feb. | Mar. | Apr. | May | Jun  | Jul  | Aug  | Sep  | Oct | Nov  | Dec  |
|------|------|------|------|------|-----|------|------|------|------|-----|------|------|
| 2009 |      |      |      | 1    | 1.3 | 1.45 | 1.2  | 0.82 | 0.9  |     |      |      |
| 2008 | 0.92 | 0.91 | 1    | 1.15 | 1.3 | 1.32 | 1.05 | 0.8  | 0.78 |     | 0.93 | 0.92 |

Note the above mentioned data was register daily by responsible person, now the written data in every month is the average

## (2) Khan Abad River (Kunduz Province)

**Table 1-2-3 Monthly Flow Volume of the Khan Abad River**

|                    |                 |
|--------------------|-----------------|
| Name of River      |                 |
| Name of Main River | Khan Abad River |
| Name of Station:   | Puli Alchin     |
| Name of District   | Kundoz          |
| Name of Province:  | Kundoz          |
| Latitude           | 36 48 179       |
| Longitude          | 68 51 726       |
| Elevation (m)      | 387             |

Unit: m<sup>3</sup>/sec.

| Year | Jan.      | Feb.      | Mar.      | Apr.      | May       | Jun       | Jul       | Aug       | Sep       | Oct       | Nov       | Dec       |
|------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 2009 | 0.98-1.02 | 0.95-1.05 | 0.80-1.15 | 0.93-1.20 |           | 0.03-1.36 | 1.29-1.43 |           |           |           |           |           |
| 2008 | 0.44-0.54 | 0.43-0.50 | 0.15-0.48 | 0.00-0.46 | 0.00-0.80 | 0.00-0.80 | 0.00-0.00 | 0.00-0.00 | 0.00-0.16 | 0.14-0.46 | 0.97-1.05 | 0.95-1.20 |
| 2007 |           |           |           |           |           |           |           | 0.70-0.86 | 0.60-0.97 | 0.34-0.53 | 0.47-0.52 | 0.48-0.56 |

Note: The machine which is existed in the water management department is just measuring the high level of water, the above mentioned data collected from hydrology department

### (3) Chardara River (Kunduz Province)

**Table 1-2-4 Monthly Flow Volume of the Chardara River**

|                    |                |
|--------------------|----------------|
| Name of River      |                |
| Name of Main River | Chardara River |
| Name of Station:   | Puli Chardara  |
| Name of District   | Kundoz         |
| Name of Province:  | Kundoz         |
| Latitude           | 36 42 249      |
| Longitude          | 68 49 582      |
| Elevation (m)      | 383            |

Unit: m3/sec.

| Year | Jan.      | Feb.      | Mar.      | Apr.      | May       | Jun       | Jul       | Aug       | Sep       | Oct       | Nov       | Dec       |
|------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 2009 | 1.88-1.94 | 1.90-2.00 | 1.78-2.04 | 1.78-2.00 |           | 2.72-3.20 | 2.50-3.80 |           |           |           |           |           |
| 2008 | 0.50-0.89 | 0.70-0.94 | 0.44-0.80 | 0.37-0.60 | 0.32-2.08 | 0.35-1.50 | 0.00-0.60 | 0.00-1.48 | 1.48-1.73 | 1.73-1.90 | 1.85-1.90 | 1.83-1.88 |
| 2007 |           |           |           |           |           |           |           |           |           | 0.50-0.90 | 0.50-1.10 | 0.60-0.90 |

Note: the above mentioned data collected from irrigation management department, but there is no general data about water because there is no developed machine in water management department

### (4) Kunar River (Nangarhar Province)

**Table 1-2-5 Monthly Flow Volume of the Kunar River**

|                    |               |
|--------------------|---------------|
| Name of Main River | Kunar River   |
| Name of Station:   | Puli Kama     |
| Name of District   | Kama          |
| Name of Province:  | Nangarhar     |
| Latitude           | N- 34 27 699  |
| Longitude          | E- 070 33 254 |
| Elevation (m)      | 574           |

Unit: m3/sec.

| Year | Jan. | Feb. | Mar. | Apr. | May    | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|------|------|------|------|------|--------|-----|-----|-----|-----|-----|-----|-----|
| 2009 |      |      |      |      | 135.75 |     |     |     |     |     |     |     |

|                    |               |
|--------------------|---------------|
| Name of Main River | Kunar River   |
| Name of Station:   | Puli Behsood  |
| Name of District   | Behsood       |
| Name of Province:  | Nangarhar     |
| Latitude           | N- 34 26 525  |
| Longitude          | E- 070 27 594 |
| Elevation (m)      | 567           |

Unit: m3/sec.

| Year | Jan. | Feb. | Mar. | Apr. | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|------|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|
| 2009 |      |      |      |      | 90  |     |     |     |     |     |     |     |

Note: according to hydrology department that they have just data of May because they sent uncalculated data to Ministry of Irrigation and Electricity

|                    |          |
|--------------------|----------|
| Name of Main River | Kunar    |
| Name of Station:   | Now Abad |
| Name of District   | Center   |
| Name of Province:  | Kunar    |
| Latitude           | 34-49    |
| Longitude          | 71-07    |
| Elevation (m)      | 798      |

Unit: m3/sec.

| Year | Jan. | Feb. | Mar. | Apr. | May | Jun  | Jul  | Aug  | Sep  | Oct | Nov | Dec |
|------|------|------|------|------|-----|------|------|------|------|-----|-----|-----|
| 1977 | 108  | 91   | 123  | 236  | 423 | 867  | 1105 | 1105 | 863  | 218 | 151 | 119 |
| 1978 | 87   | 90   | 133  | 306  | 619 | 954  | 1331 | 1045 | 489  | 203 | 142 | 109 |
| 1979 | 114  | 102  | 137  | 468  | 674 | 1075 | 1095 | 1621 | 1090 | 256 | 185 | 144 |

**Table 1-2-6 Monthly Average Water Level of the Kunar River**

|                    |               |
|--------------------|---------------|
| Name of Main River | Kunar River   |
| Name of Station:   | Puli Kama     |
| Name of District   | Kama          |
| Name of Province:  | Nangarhar     |
| Latitude           | N- 34 27 699  |
| Longitude          | E- 070 33 254 |
| Elevation (m)      | 574           |

| Year | Jan. | Feb. | Mar. | Apr. | May  | Jun | Jul | Aug | Sep | Oct | Nov | Dec  |
|------|------|------|------|------|------|-----|-----|-----|-----|-----|-----|------|
| 2009 |      | 1.9  |      | 2.4  | 1.47 | 2.9 | 3.3 | 3.3 | 2.8 |     |     |      |
| 2008 |      | 2.34 | 2.35 |      |      |     |     |     |     |     | 0.4 | 1.09 |

Note : The above mentioned data was taken from hydrology dept and they said just the mentioned data they have

|                    |               |
|--------------------|---------------|
| Name of Main River | Kunar River   |
| Name of Station:   | Puli Behsood  |
| Name of District   | Behsood       |
| Name of Province:  | Nangarhar     |
| Latitude           | N- 34 26 525  |
| Longitude          | E- 070 27 594 |
| Elevation (m)      | 567           |

| Year | Jan. | Feb. | Mar. | Apr. | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|------|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|
| 2009 |      |      |      | 1.3  | 1.8 | 1.9 | 2.6 | 1.3 | 0.8 |     |     |     |
| 2008 |      |      | 1.08 |      |     |     |     |     |     |     |     |     |

Note : The above mentioned data was taken from hydrology dept and they said just the mentioned data they have

## (5) Kabul River (Nangarhar Province)

**Table 1-2-7 Monthly Flow Volume of the Kabul River**

|                    |           |
|--------------------|-----------|
| Name of Main River | Kabul     |
| Name of Station:   | Daka      |
| Name of District   | Lalpura   |
| Name of Province:  | Nangarhar |
| Latitude           | 34-14     |
| Longitude          | 71-02     |
| Elevation (m)      | 420       |

Unit: m3/sec.

| Year | Jan. | Feb. | Mar. | Apr. | May  | Jun  | Jul  | Aug  | Sep | Oct | Nov | Dec |
|------|------|------|------|------|------|------|------|------|-----|-----|-----|-----|
| 1969 | 197  | 162  | 345  | 655  | 789  | 1579 | 1456 | 1122 | 540 | 308 | 255 | 231 |
| 1970 | 251  | 231  | 222  | 507  | 858  | 1146 | 1034 | 1116 | 678 | 309 | 268 | 248 |
| 1971 | 153  | 137  | 146  | 369  | 848  | 1159 | 999  | 871  | 427 | 249 | 186 | 183 |
| 1972 | 126  | 131  | 196  | 567  | 1257 | 2219 | 1712 | 1211 | 650 | 224 | 218 | 176 |
| 1973 | 168  | 210  | 342  | 1289 | 1878 | 2213 | 2084 | 1425 | 763 | 269 | 210 | 178 |
| 1974 | 139  | 135  | 172  | 417  | 679  | 1240 | 1193 | 817  | 380 | 310 | 220 | 168 |
| 1975 | 89   | 81.2 | 104  | 576  | 992  | 1495 | 1281 | 1132 | 532 | 209 | 132 | 105 |
| 1976 | 168  | 175  | 185  | 659  | 899  | 1295 | 1548 | 891  | 496 | 251 | 199 | 180 |
| 1977 | 165  | 148  | 168  | 427  | 593  | 1117 | 1106 | 839  | 380 | 283 | 223 | 191 |
| 1978 | 132  | 150  | 228  | 567  | 1035 | 1474 | 1744 | 1160 | 543 | 238 | 196 | 158 |

## A-1-3 Soil Data

Names of major soils in the villages where sample survey was carried out, together with the color and productivity are identified. However, a soil map indicating the distribution of soil could not be obtained and major soil type of each province were not be clarified.

According to the result of the survey, clay, clay loam and loam are found in the target regions. Organic matter is abundant in the soil, and water retention capacity is high. The soils were generally found suitable for cultivation. Besides such soils, Sandy clay and sandy loam are found in a part of Kunduz province. This is said to have high water retention capacity and is suitable for cultivation. However, sandy loam is suitable for paddy field but productivity of upland crop is low. Sandy loam and silty loam are found in a part of Nangarhar province and these soils are said to be suitable for cultivation.

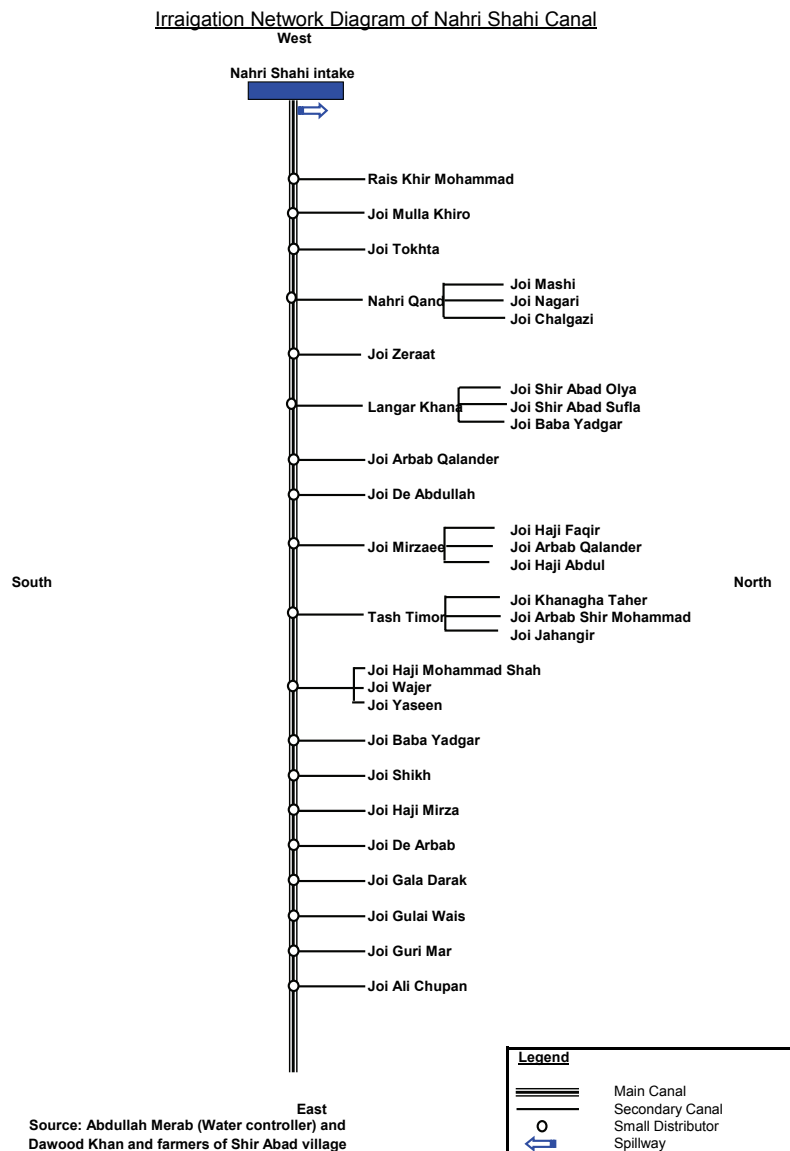
## **A-2     Existing Irrigation System**

Diagrams and outlines of some of irrigation systems have been surveyed. However, since obtained diagrams of the irrigation systems are not arranged appropriately, the location of individual irrigation system is not clear. Furthermore, it is not clarified whether the diagram covers all or part of the irrigation area of the system. Therefore, it is necessary to draw up the location map of existing irrigation systems of which the diagrams were obtained based on location map of existing irrigation network in 4 provinces in order to use the results of the survey effectively. Irrigation systems of which were both diagram and outline obtained are shown as follows. Meanwhile, irrigated area and length of the canals in the outline are obtained by interview survey. Therefore, these are not official figures. It is necessary to understand that these figures are rough indications.

### **A-2-1     Balkh Province**

#### **(1) Nahre-Shahi Irrigation System**

Nahre-Shahi Irrigation System takes water from the Balkh River. Total length of main and secondary canals are 30 km and 100 km, respectively. Irrigated area is 40,320 ha. The intake structure is a permanent structure made by concrete. However, the main and secondary canals are earth canals and these break easily. According to the result of interviews to Mirab and beneficial farmers, irrigation water used to become low after June or July, and therefore, rotation irrigation is performed. In regard that the irrigation water is said to become low at the end of the irrigation system, it is concerned that water distribution in the irrigation system is not performed properly. Problems besides lack of irrigation water is not pointed out. Diagram of Nahre-Shahi Irrigation System is shown in Fig. 2-1-1.

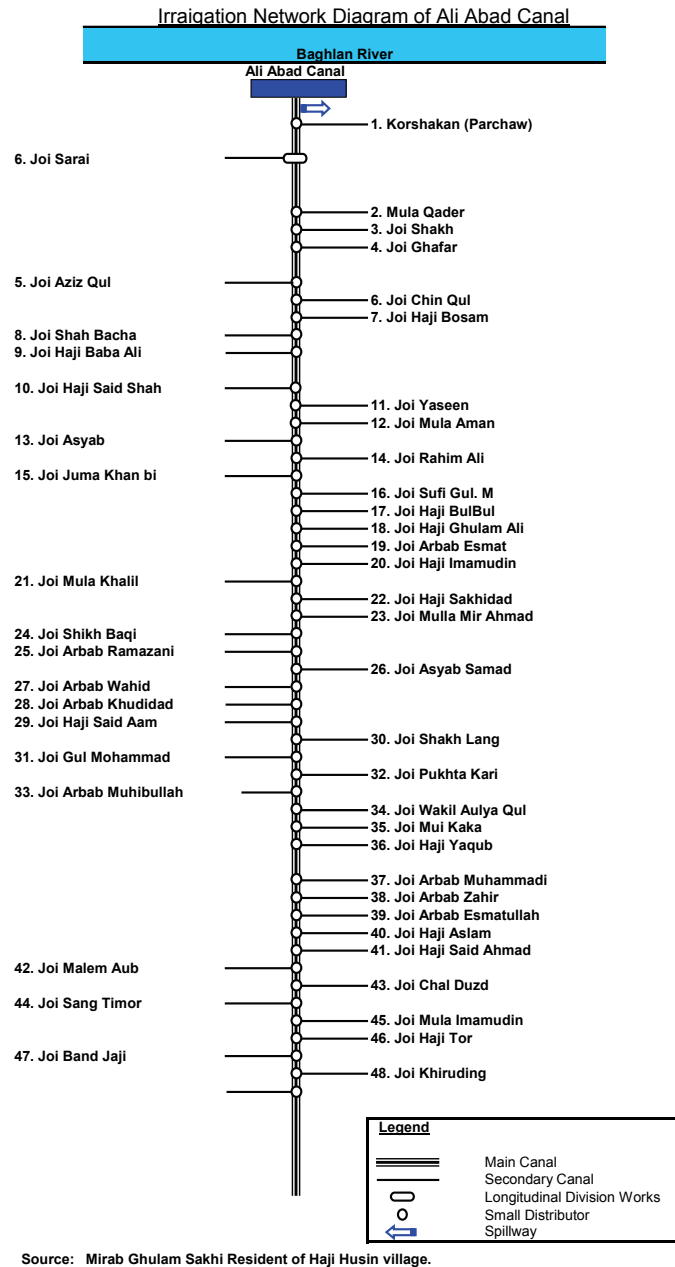


**Fig. 2-1-1 Diagram of Nahre Shahi Irrigation System**

## **A-2-2 Kunduz Province**

### **(1) Ali Abad Irrigation System**

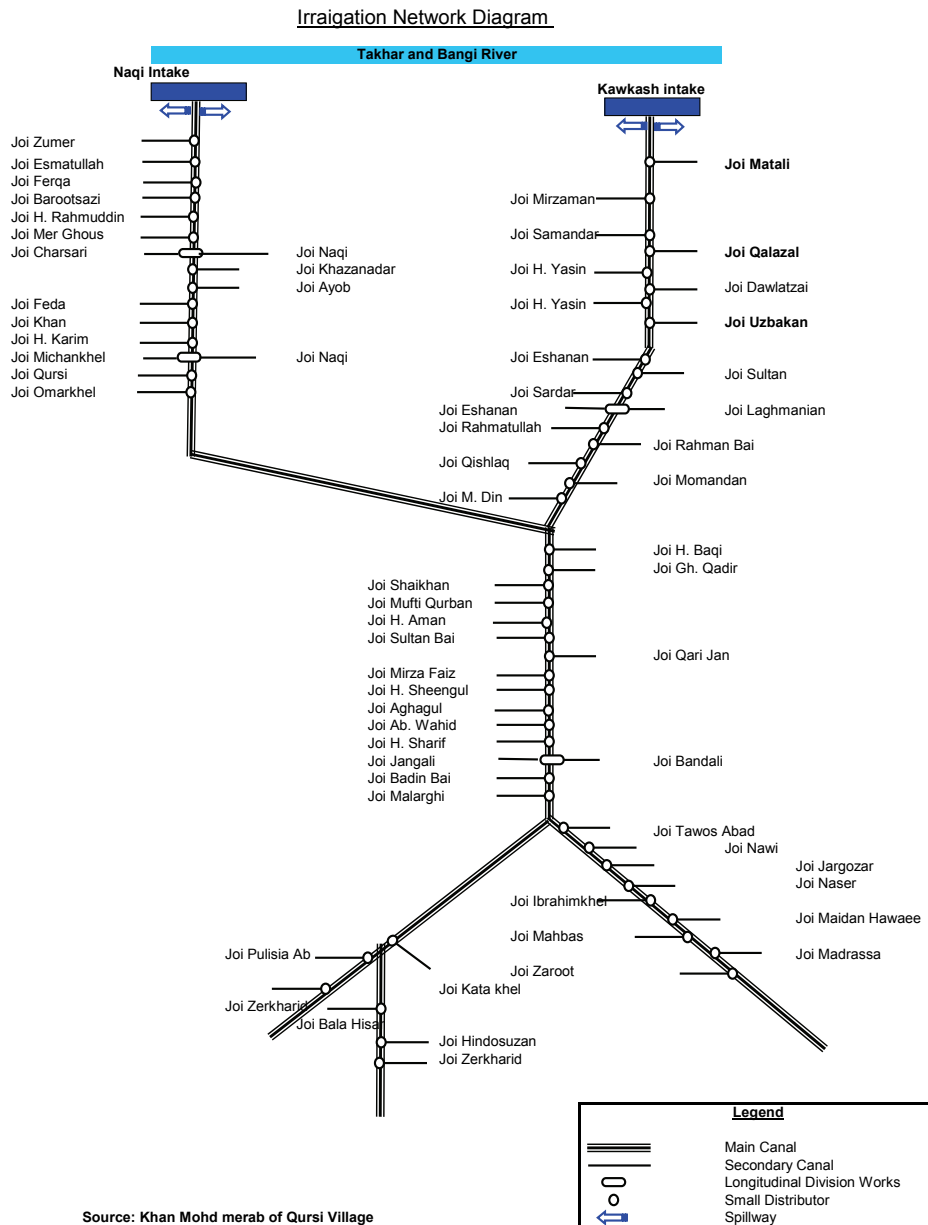
Ali Abad Irrigation System takes water from the Baghlan River and total length of main canals is 35 km. Irrigated area is 2,500 ha. Half of the intake structures are made by concrete. However, main and secondary canals are earth canal. Collapse of canals occurs every year. According to the result of interviews to beneficial farmers, rotation irrigation is performed in accordance with a schedule which is decided by Mirab due to lack of irrigation water. There are 3 Irrigation Systems such as Chardara, Ali Abad and Laqi in Ali Abad district and they face contention about water between the irrigation systems of Chardarah and Ali Abad, which occur in October when irrigation water becomes insufficient. Diagram of Ali Abad Irrigation System is shown in Fig. 2-2-1.



**Fig. 2-2-1 Diagram of Ali Abad Irrigation System**

## (2) Naqi Irrigation System

Naqi Irrigation System takes water from the Takhar and Bangi River and total length of main irrigation canals and secondary canals are 35 km and 190 km, respectively. Irrigated area is 30,000 ha. Half of the intake structure are made by concrete. However, main canals and secondary canals are earth canal. According to the result of interviews to Mirab and beneficial farmers, lack of water occurs in June and July. There are no serious problems, however, water leakage occurs in earth canal. Therefore, it is pointed out that water leakage could be solved by concrete lining. Diagram of Naqi Irrigation System and Gawkash Irrigation System are shown in Fig. 2-2-2.



**Fig. 2-2-2 Diagram of Naqi and Gawkash Irrigation Systems**

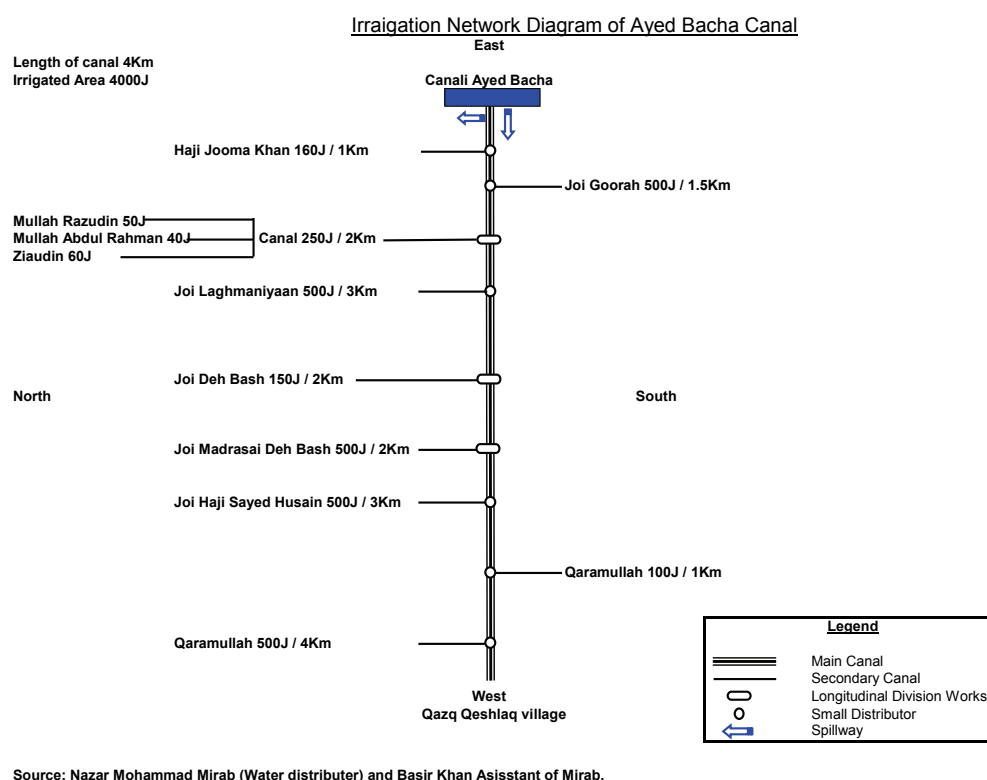
### (3) Gawkash Irrigation System

Gawkash Irrigation System takes water from the Takhar and Bangi River and total length of main canals and secondary canals are 40 km and 200 km, respectively. Irrigated area is 35,000 ha. Intake structures are made by concrete, however, rehabilitation is necessary. Meanwhile, main canals and secondary canals are earth canal. According to the result of interviews to Mirab and beneficial farmers, lack of water occurs at the downstream of the system due to leakage from earth canals. Therefore, it is pointed out that water leakage could be solved by concrete lining.

## A-2-3 Takhar Province

### (1) Ayed Bacha Irrigation System

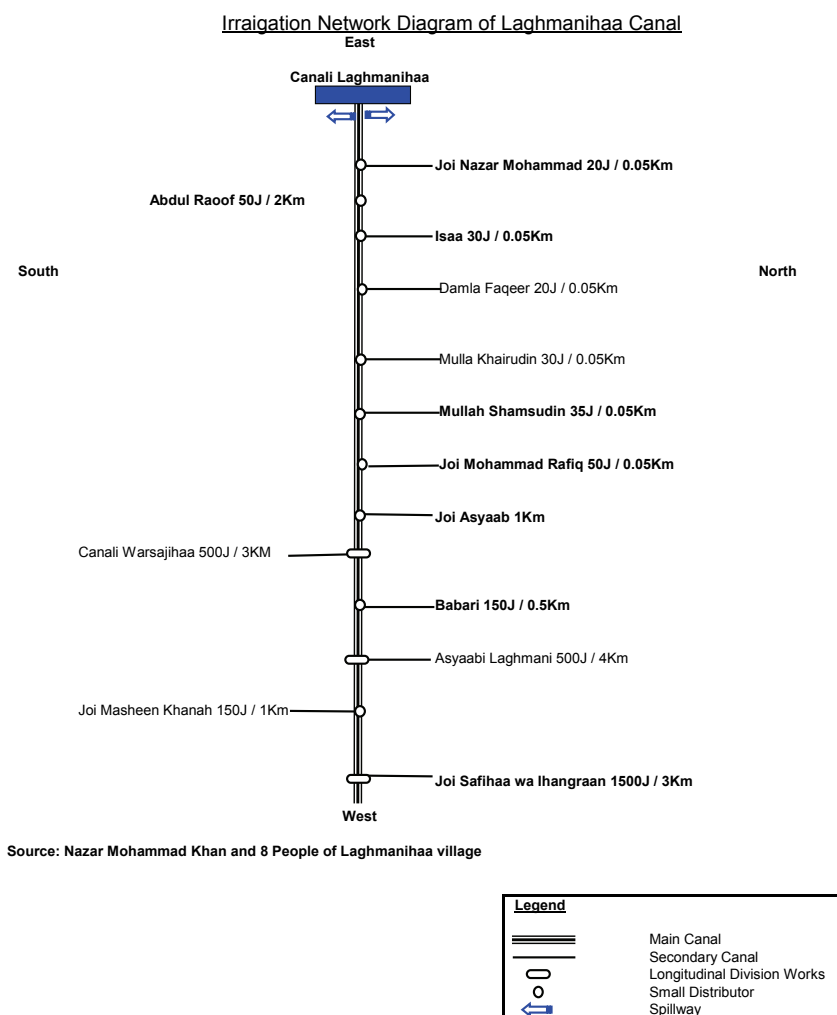
Ayed Bacha Irrigation System takes water from the Bamak Ab River and total length of main canals and secondary canals are 4 km and 19.5 km, respectively. Irrigated area is 800 ha. Specification of intake structure, as well as those of main and secondary canals are unclear. According to the result of interviews to Mirab and beneficial farmers, water level between Qaram Qul village and Qazaq Qeshlaq village becomes low during summer and farmers can not divert water to their farmland. Meanwhile, it is pointed out that 400 m of canal along the river is in danger of collapsing due to rise of river flow. Diagram of Ayed Bacha Irrigation System is shown in Fig. 2-3-1.



**Fig. 2-3-1 Diagram of Ayed Bacha Irrigation System**

### (2) Laghmanihaa Irrigation System

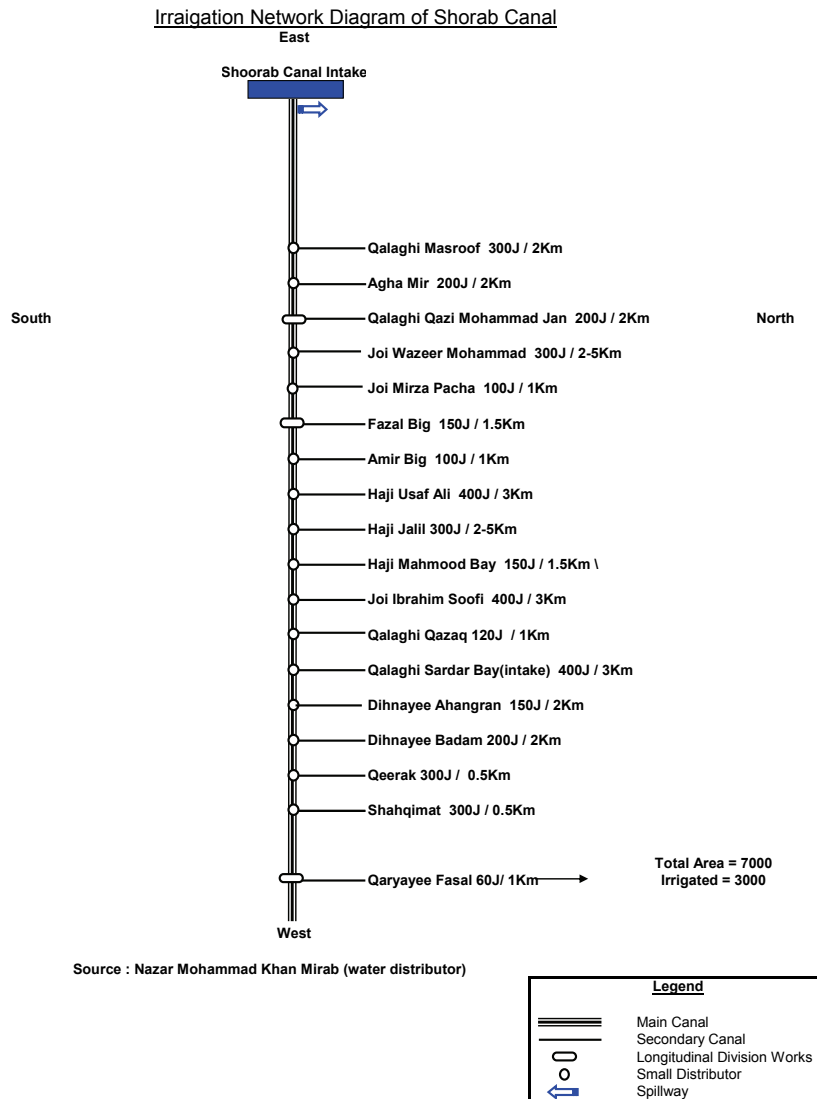
Laghmanihaa Irrigation System takes water from the Farkhar River and total length of main canals and secondary canals are 4 km and 12 km, respectively. Irrigated area is 500 ha. Intake structure is made by local materials and specification of main canals and secondary canals are unclear. According to the result of interviews to Mirab and beneficial farmers, paddy rice is cultivated at upstream using a large quantity of water. Due to this, downstream area face the problem of insufficient water. Meanwhile, since intake structure is not made by concrete, collapse of canals occur due to overflow during flood. Additionally, it is pointed out that canal clearing is necessary since failures occur in water flow due to lack of cleaning activity. Diagram of Laghmanihaa Irrigation System is shown in Fig. 2-3-2.



**Fig. 2-3-2 Diagram of Laghmanihaa Irrigation System**

### (3) Shorab Irrigation System

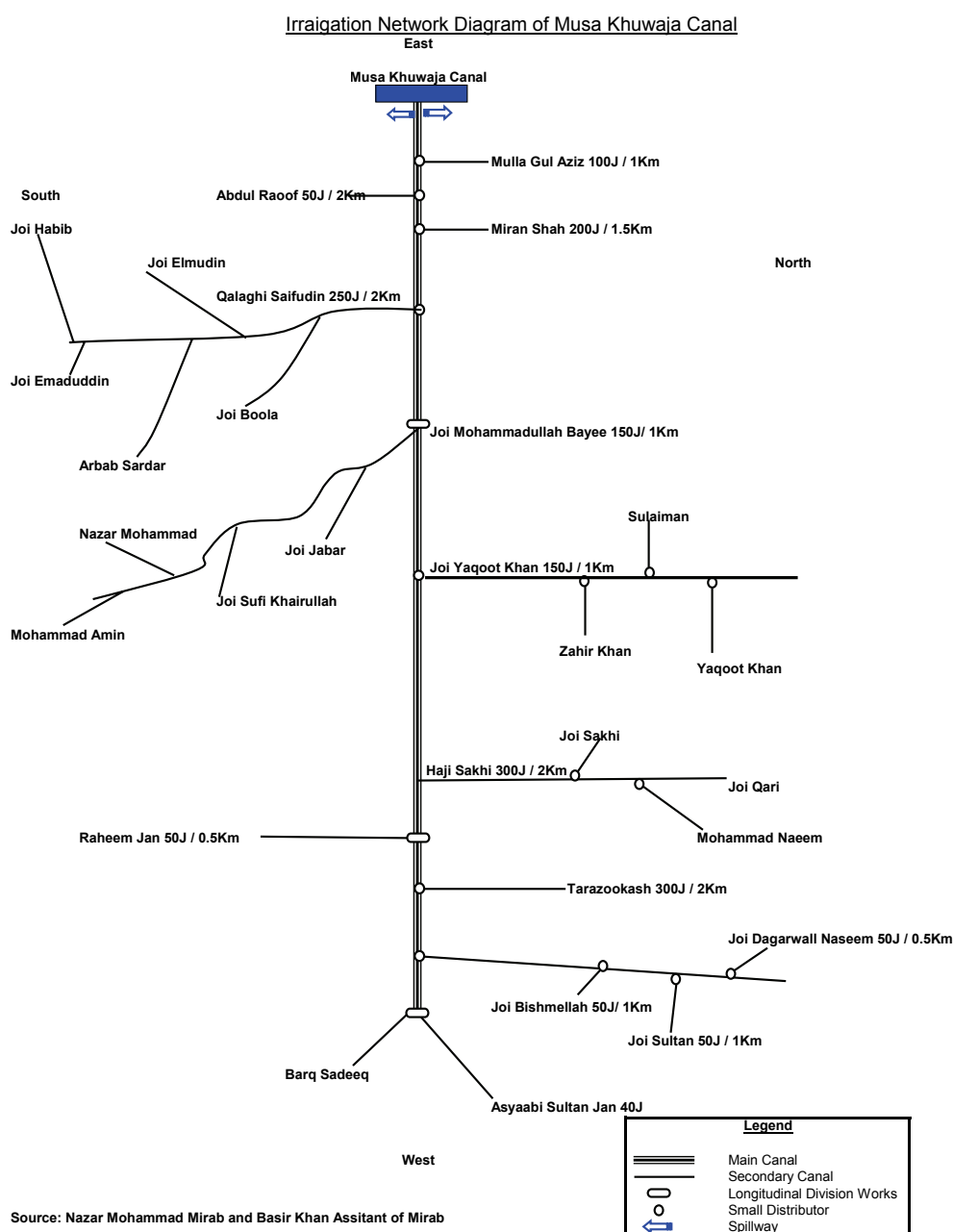
Shorab Irrigation System takes water from the Namak River and total length of main canals and secondary canals are 9 km and 31 km, respectively. Irrigated area is 1,400 ha. Specification of intake structure, main and secondary canals are unclear. According to the result of interviews to Mirab and beneficial farmers, the following 3 problems were pointed out. 1) Since intake structure of Shorab Irrigation System is located at downstream of Ayed Bacha Irrigation System, Ayed Bacha Irrigation System takes water in advance and Shorab Irrigation System can not take enough water during draught period. Elders of Shorab Irrigation System visited to Ayed Bacha and made a proposal that the water should distribute fairly in order to solve the problem. 2) Paddy rice is cultivated at upstream of the Irrigation System. In contrary,, only mung bean, sesame and flax are cultivated at downstream of the Irrigation System. Furthremore, sometimes they can not harvest any crop due to lack of water. 3) Canals are earth canal and 204 m of canal was destroyed completely in past years, and they ahd to be repaired by beneficial farmers. Under such situation, unfair distribution of irrigation water due to the lack of water by leakage of water and collapse of earth canal caused by flood are occurring. It is assumed that water management among Irrigation Systems and within the Irrigation System are not performed properly. Diagram of Shorab Irrigation System is shown in Fig. 2-3-3.



**Fig. 2-3-3 Diagram of Shorab Irrigation System**

#### **(4) Musa Khuwaja Irrigation System**

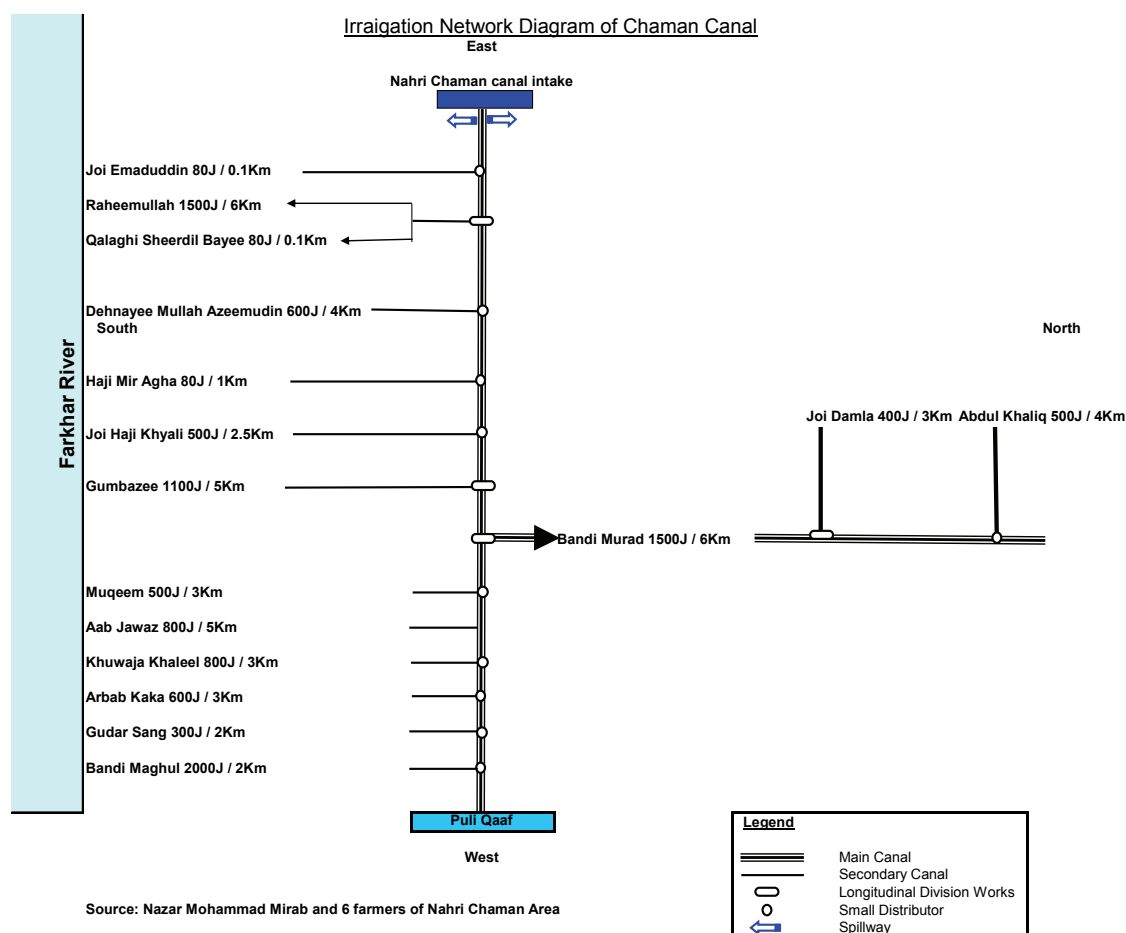
Musa Khuwaja Irrigation System takes water from the Farkhar River and total length of main canals and secondary canals are 6 km and 16 km, respectively. Irrigated area is 1,000 ha. Intake structure is made by concrete and specifications of main canals and secondary canals are unclear. According to the result of interviews to Mirab, it is pointed out that the structure gets damaged by overflow and flood because retaining wall of the river is not constructed completely. Through paddy rice is easily cultivated at upstream, cultivation cannot be performed easily due to lack of water at downstream. It is assumed that water management is not carried out properly in the Irrigation System. Diagram of Musa Khuwaja Irrigation System is shown in Fig. 2-3-4.



**Fig. 2-3-4 Diagram of Musa Khuwaja Irrigation System**

## (5) Chaman Irrigation System

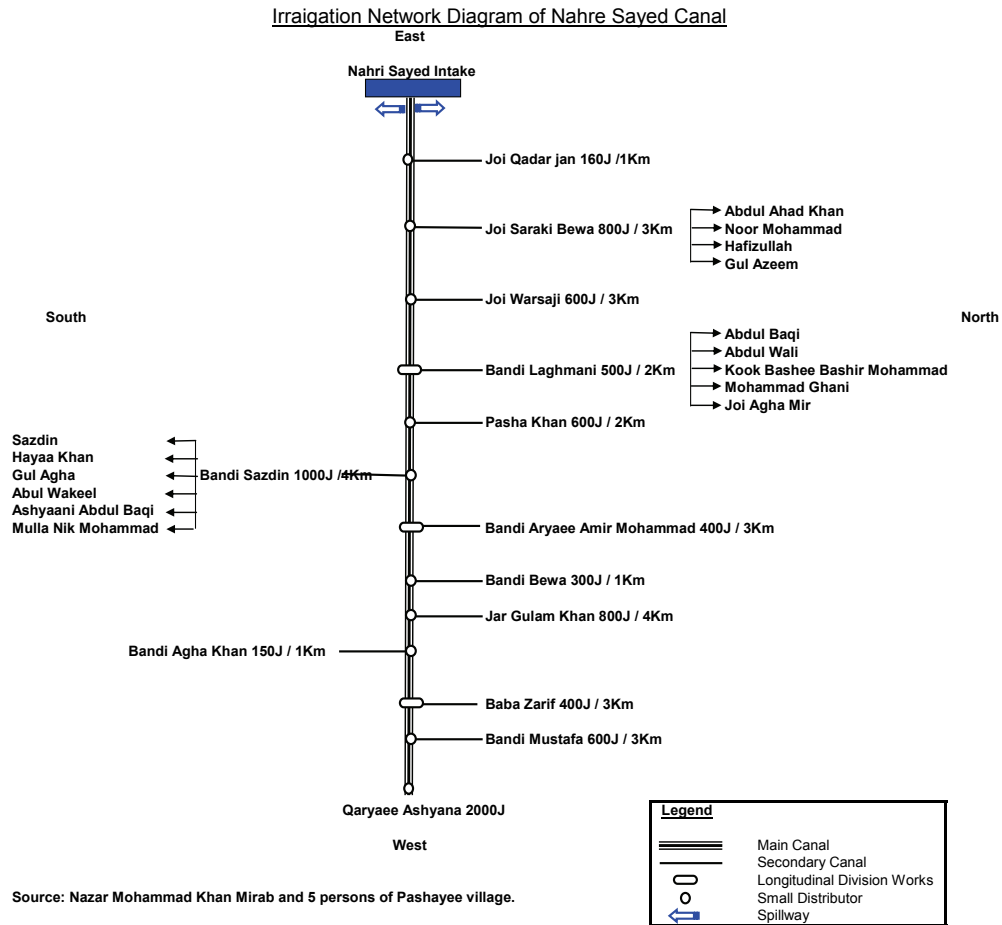
Chaman Irrigation System takes water from the Farkhar River and total length of main canals and secondary canals are 10 km and 36.7 km, respectively. Irrigated area is 1,800 ha. Specifications of intake structure, main canals and secondary canals are unclear. According to the result of interviews to Mirab and beneficial farmers, canals near the intake structure collapses frequently due to its earthen structure. Though paddy rice is easily cultivated at upstream, cultivation cannot be performed easily due to lack of water at downstream. It is assumed that water management is not carried out properly in the Irrigation System. Diagram of Chaman Irrigation System is shown in Fig. 2-3-5.



**Fig. 2-3-5 Diagram of Chaman Irrigation System**

## **(6) Nahre-Sayed Irrigation System**

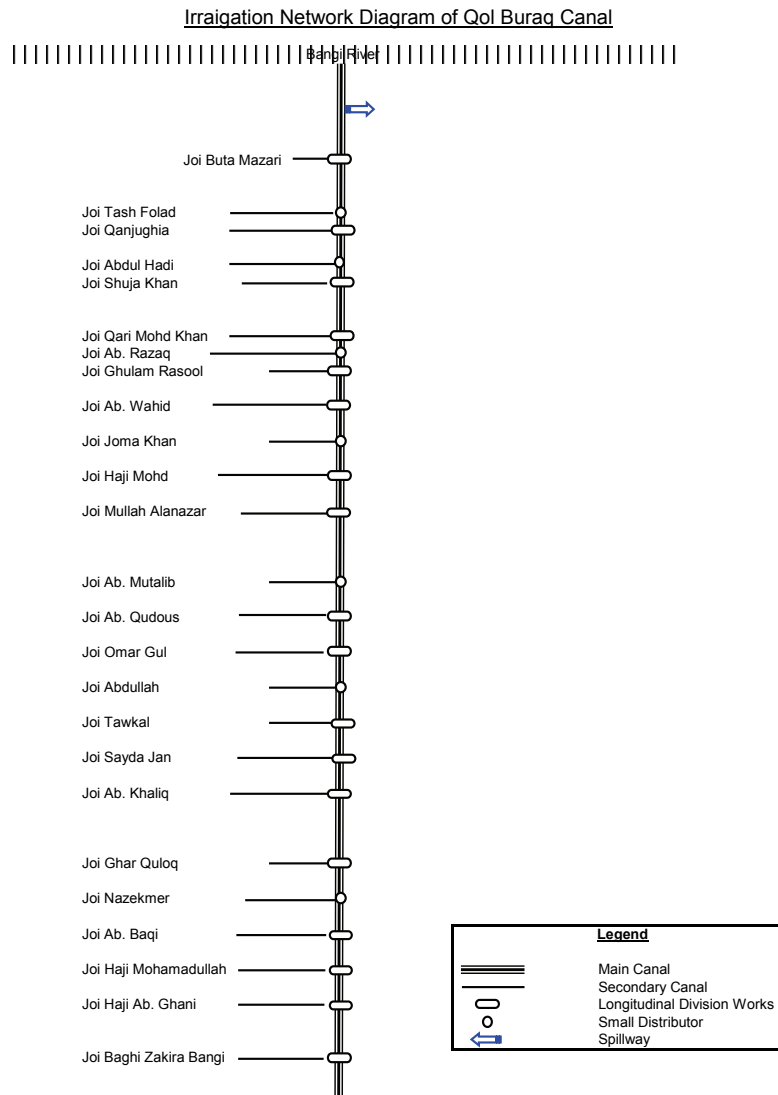
Nahre-Sayed Irrigation System takes water from the Farkhar River and total length of main canals is 9 km. Irrigated area is 1,800 ha. Intake structure is made by concrete and the upstream part of main canals are lined by concrete. Specifications of other main canals and secondary canals are unclear. According to the result of interviews to Mirab and beneficial farmers, Nahre-Sayed Irrigation System can not take the water from the river during drought period, because intake structures of Musa Khuwaja and Chaman Irrigation Systems are located at upstream of the river and they take the water from the river completely. Paddy rice is easily cultivated at upstream, but production volume of paddy rice at downstream is lower than that of upstream due to lack of water. It is assumed that water management among Irrigation Systems and within the Irrigation System are not performed properly. Diagram of Nahre-Sayed Irrigation System is shown in Fig. 2-3-6.



**Fig. 2-3-6 Diagram of Nahre-Sayed Irrigation System**

### (7) Qol Buraq Irrigation System

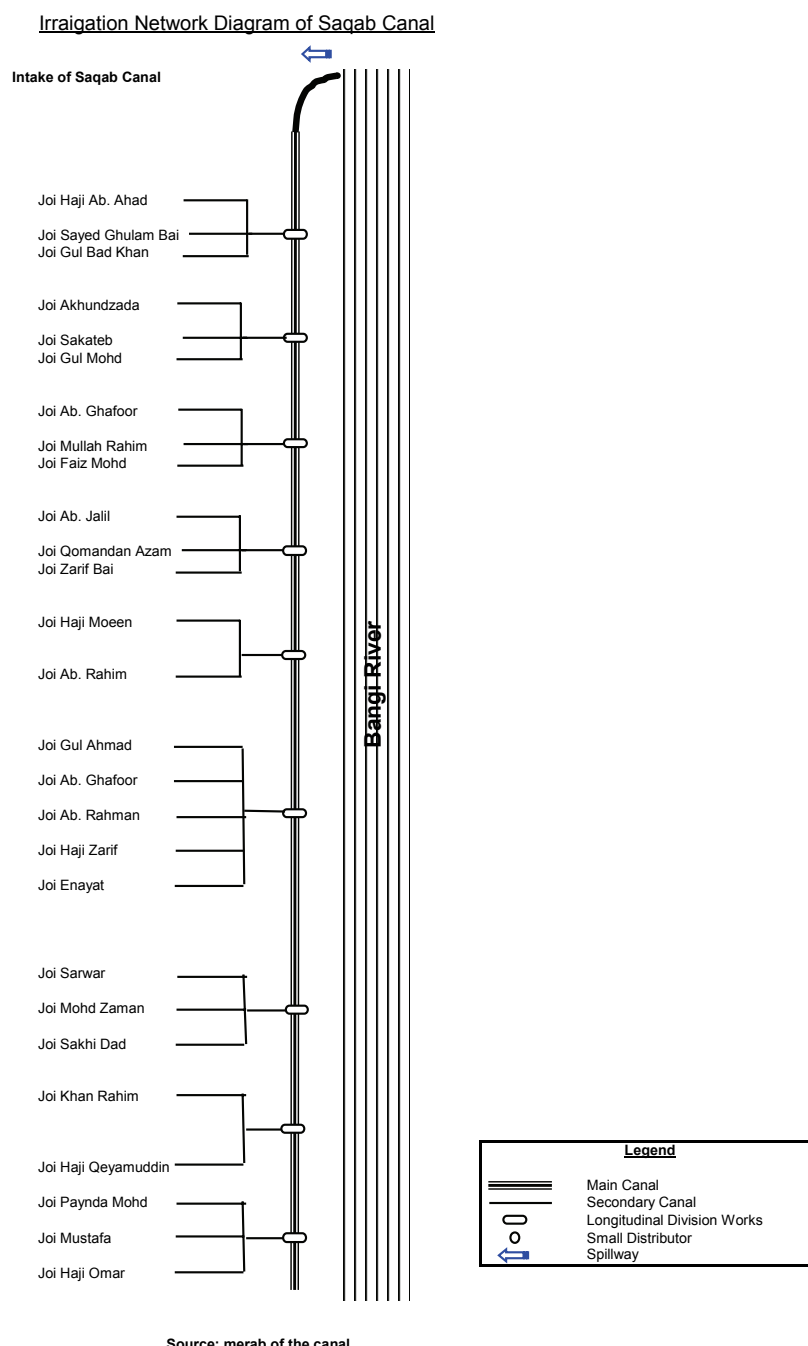
Qol Buraq Irrigation System takes water from the Bangi River and total length of main canals and secondary canals are 10 km and 2 km, respectively. Irrigated area is 150 ha. Specification of intake structure is unclear and structures of main canals and secondary canals are weak. According to the result of interviews to Mirab and beneficial farmers, though occasional problems occur, they are solved by the Mirab. It is assumed that management of the Irrigation System is carried out properly. Diagram of Qol Buraq Irrigation System is shown in Fig. 2-3-7.



**Fig. 2-3-7 Diagram of Qol Buraq Irrigation System**

### **(8) Saqab Irrigation System**

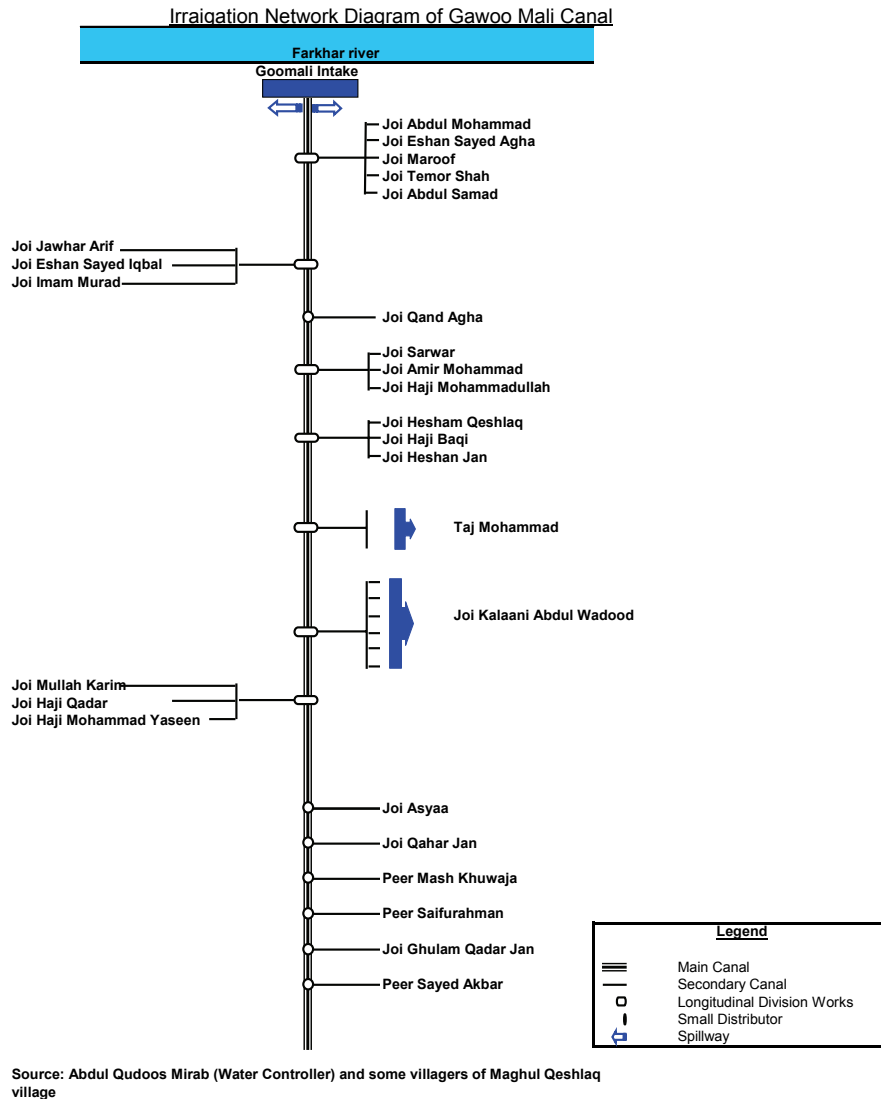
Saqab Irrigation System takes water from the Bangli River and total length of main canals and secondary canals are 8 km and 1.5 km, respectively. Irrigated area is 1,000 ha. Intake structure is made by local materials and structures of main canals and secondary canals are weak. According to the result of interviews to Mirab, rotation irrigation is performed during draught period. It is pointed out that collapse of intake structure are caused by floods because intake structure is not constructed by concrete. Diagram of Saqab Irrigation System is shown in Fig. 2-3-8.



**Fig. 2-3-8 Diagram of Saqab Irrigation System**

### **(9) Gawoo Mali Irrigation System**

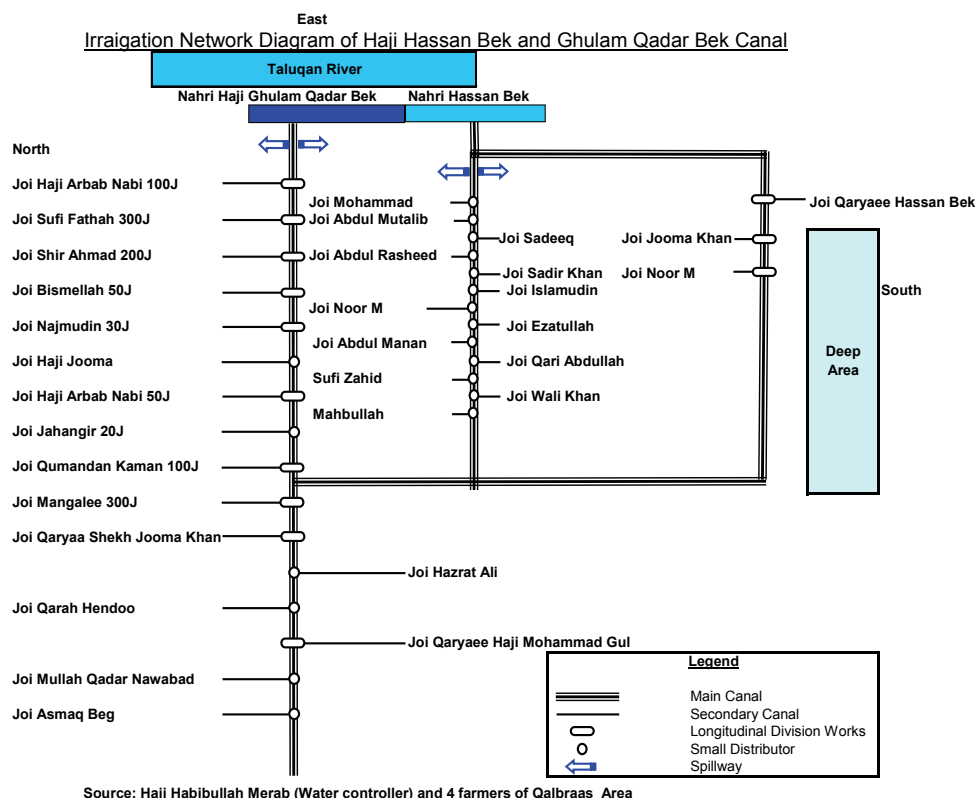
Gawoo Mali Irrigation System takes water from the Farkhar River and total length of main canals and secondary canals are 2 km and 0.6 km, respectively. Intake structure is made by local materials and structures of main canals and secondary canals are weak. According to the result of interviews to Mirab and beneficial farmers, it is pointed out that canals collapse by water flow and flood because they are not concrete structure. Diagram of Gawoo Mali Irrigation System is shown in Fig. 2-3-9.



**Fig. 2-3-9 Diagram of Gawoo Mali Irrigation System**

#### **(10) Haji Hassan Bek and Ghulam Qadar Bek Irrigation Systems**

Haji Hassan Bek and Ghulam Qadar Bek Irrigation Systems takes water from the Taluqan River and total length of main canals and secondary canals are 20 km and 5 km, respectively. Irrigated area is 5,000 ha. Specification of intake structure is unclear. Main canals are earth canal and a part of secondary canals are lined by concrete. According to the result of interviews to Mirab and beneficial farmers, there are following 3 problems. 1) There is a problem of water distribution arrangement with other Irrigation System at upstream of the river. The water can not be distributed to all of farmland during draught period. 2) There is enough water at upstream but the water is insufficient at downstream. 3) Collapse of canals and inflow of sediment occur frequently because upstream of main canals is earth canal. It is assumed that water management among Irrigation Systems and within the Irrigation System are not performed properly. It is also assumed that flood damage occur frequently because structure of intake is not appropriate. Diagram of Haji Hassan Bek and Ghulam Qadar Bek Irrigation Systems is shown in Fig. 2-3-10.

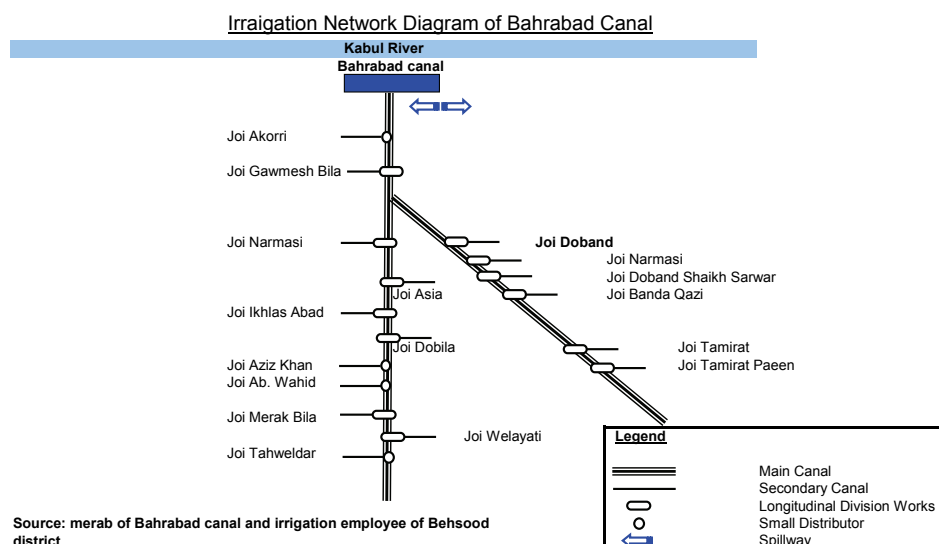


**Fig. 2-3-10 Diagram of Haji Hassan Bek and Ghulam Qadar Bek Irrigation Systems**

## **A-2-4 Nangarhar Province**

### **(1) Bahrabad Irrigation System**

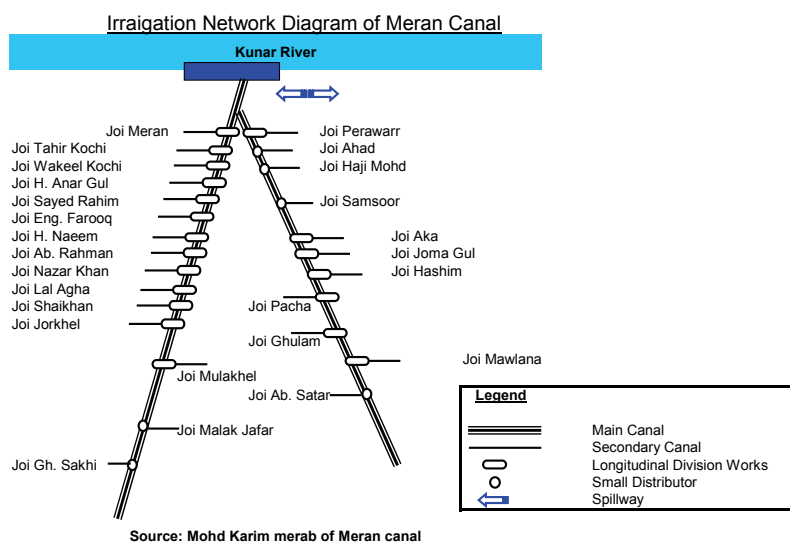
Bahrabad Irrigation System takes water from the Kabul River and total length of main canals and secondary canals are 5 km and 4 km, respectively. Irrigated area is 120 ha. Specification of intake structure is unclear. Structures of main canals and secondary canals are earth canal and weak. According to the result of interviews to Mirab, the only problem is that the intake structure is not concrete structure. It is not clear whether there is a problem of water distribution or not. Diagram of Bahrabad Irrigation System is shown in Fig. 2-4-1.



**Fig. 2-4-1 Diagram of Bahrabad Irrigation System**

## (2) Meran Irrigation System

Meran Irrigation System takes water from the Kunar River and total length of main canals and secondary canals are 7 km and 2.5 km, respectively. Irrigated area is 2,000 ha. Specification of intake structure is unclear. Structures of main canals and secondary canals are earth canal and weak. It is mentioned that Mirab said there is no problem. Diagram of Meran Irrigation System is shown in Fig. 2-4-2.

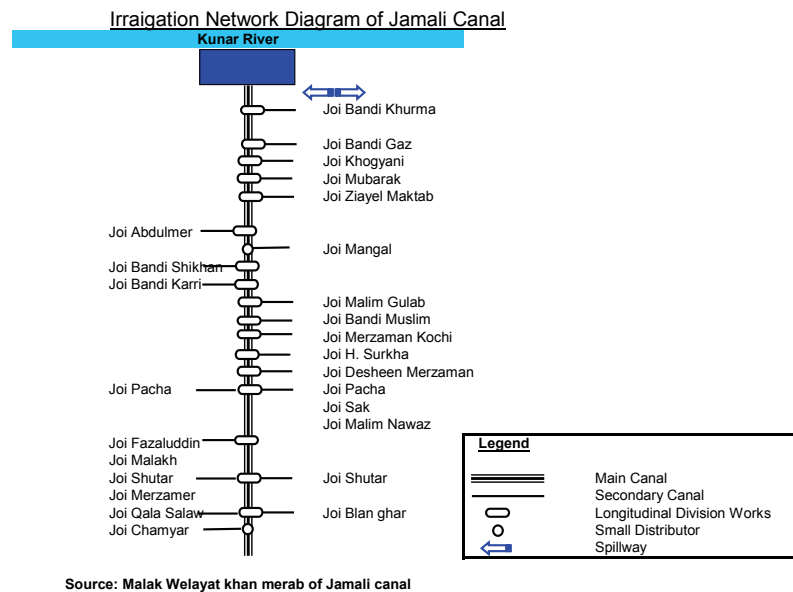


**Fig. 2-4-2 Diagram of Meran Irrigation System**

## (3) Jamali Irrigation System

Jamali Irrigation System takes water from the Kunar River and total length of main canals and secondary canals are 10 km and 1 km, respectively. Irrigated area is 3,000 ha. Specification of intake structure is unclear. Main canals and secondary canals are earth canal and weak. According to the result of interviews to Mirab, intake structure is destroyed easily when water level of the river becomes high because intake structure is not

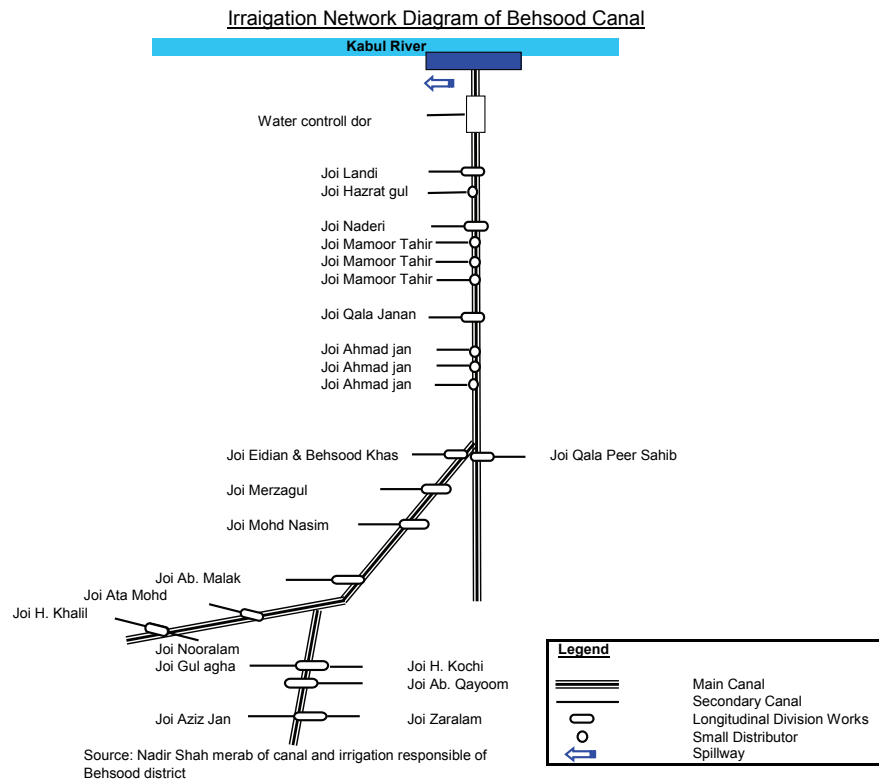
constructed by concrete. Meanwhile, fair water distribution can not be performed when water level is high because division work is not concrete structure. Diagram of Jamali Irrigation System is shown in Fig. 2-4-3.



**Fig. 2-4-3 Diagram of Jamali Irrigation System**

#### **(4) Behsood Irrigation System**

Behsood Irrigation System takes water from the Kabul River and total length of main canals and secondary canals are 14 km and 0.5 km, respectively. Irrigated area is 1,200 ha. Specification of intake structure is unclear. Main canals and secondary canals are earth canal and weak. According to the result of interviews to Mirab, problem concerning water distribution occurs when irrigation water becomes low. Meanwhile, it is mentioned that fair water distribution can not be performed when water level is high because division work is not concrete structure. Diagram of Behsood Irrigation System is shown in Fig. 2-4-4.

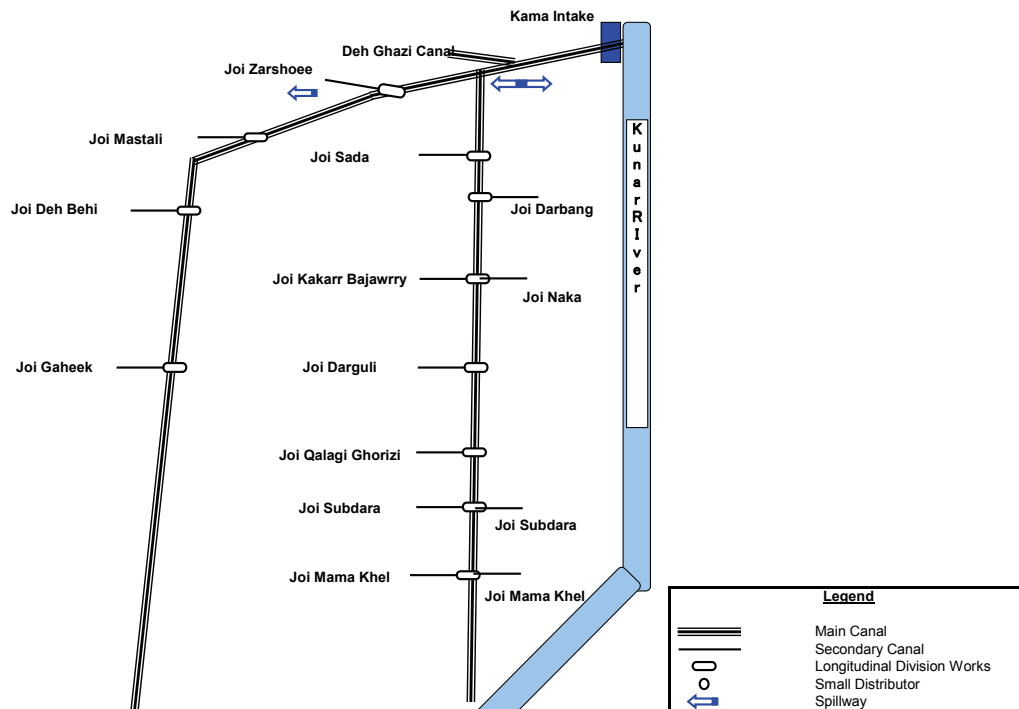


**Fig. 2-4-4 Diagram of Behsood Irrigation Sstem**

#### **(5) Kama Irrigation System**

Kama Irrigation System takes water from the Kunar River and total length of main canals and secondary canals are 9 km and 7 km, respectively. Irrigated area is 20,000 ha. Specification of intake structure is unclear. Main canals and secondary canals are earth canal and weak. According to the result of interviews to Mirab, when neighboring Irrigation Systems have enough water, the Kama Irrigation System take water from their canals without permission. There is enough water at upstream of the Irrigation System through the year, but there is not enough water through the year at downstream. It is pointed out that canals collapse during high water. It is assumed that water management among Irrigation Systems and within the Irrigation System are not performed properly. Diagram of Kama Irrigation System is shown in Fig. 2-4-5.

Irrigation Network Diagram of Kama Canal

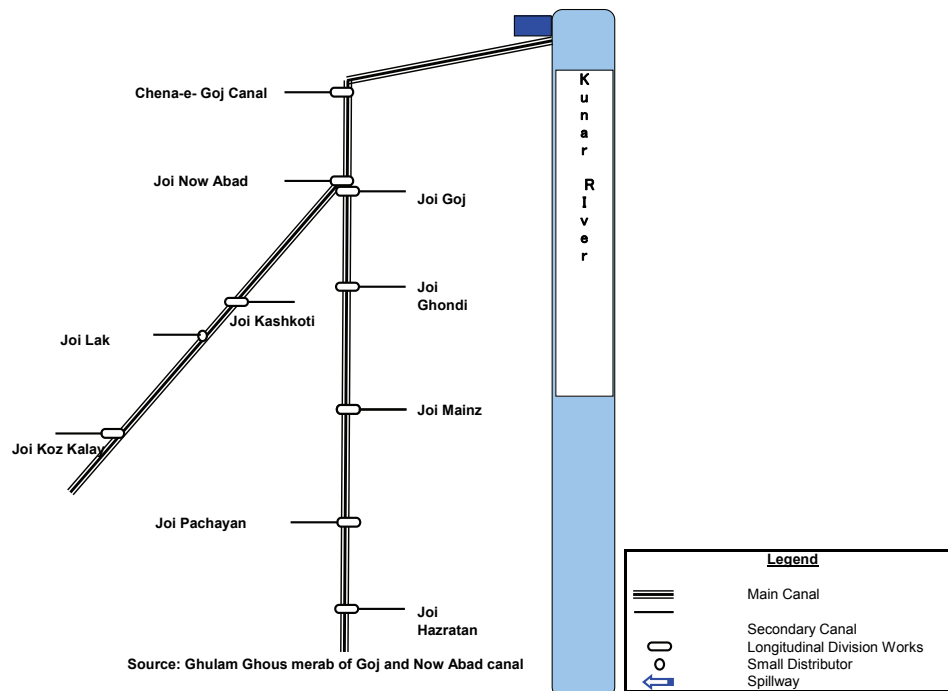


**Fig. 2-4-5 Diagram of Kama Irrigation System**

#### **(6) Goj and Now Abad Irrigation System**

Goj and Now Abad Irrigation System take water from the Kunar River and total length of main canals and secondary canals are 6 km and 2 km, respectively. Irrigated area is 2,000 ha. Specification of intake structure is unclear. Main canals and secondary canals are earth canal and weak. According to the result of interviews to Mirab, when the Goj and Now Abad Irrigation System has enough water, neighboring Irrigation Systems take water from their canals without permission. The irrigation system taking water without permission is assumed to be Kama Irrigation System, in regard of the information obtained through their interviews. There is enough water at upstream of the Irrigation System through the year, but not enough through the year at downstream. Furthermore, it is pointed out that nobody maintains the canals, and flow capacity of the canals can not be secured more than present condition. It is assumed that water management among Irrigation Systems and within the Irrigation System are not performed properly and there is a problem of operation and management of the Irrigation System. Diagram of Goj and Now Abad Irrigation System is shown in Fig. 2-4-6.

Irrigation Network Diagram of Goj and Now Abad Canal



**Fig. 2-4-6 Diagram of Goj and Now Abad Irrigation System**

### **A-3 Provincial Agriculture, Irrigation and Livestock Department**

#### **A-3-1 Role of Provincial Agriculture, Irrigation and Livestock Department**

It is reported that role of Provincial Agriculture, Irrigation and Livestock Department (PAIL) was not explained clearly during the survey. Therefore, the role of PAIL indicated in this section is based on the knowledge of the local consultants who performed this survey. Contents of explanation are as follows.

PAIL is a subordinate agency of Ministry of Agriculture, Irrigation and Livestock (MAIL) and is stationed in each province. The following divisions are set up in each PAIL.

- **Agricultural Extension Division:** Role of the division are introduction of new varieties of fruit trees, vegetables, wheat etc., to farmers and provision of technology guidance on cultivation, fertilizer use, irrigation, weeding and harvesting.
- **Livestock Division:** Role of the division are introduction of livestock activities and improved varieties, and veterinary service such as artificial insemination and treatment of disease etc. The division has district offices at all districts in the province.
- **Plant Protection Division:** Role of the division are to identify causes of plant diseases and to give advice on suitable treatment. The division has district offices at all districts in the province.

- **Planning Division:** Role of the division are to draw up annual activity plans of PAIL and to provide facilities to NGOs which act in the agricultural field. The division dose not have any offices at the district level.
- **Land Ownership Division (Amlak):** All private land and governmental land are registered in this division. When conflict on land ownership occurs, the division can clarify the land which each family and/or government own. The division has district offices at all districts.
- **Research Institute:** There are provincial research institutes in targeted 4 provinces that introduce new varieties of fruit trees, vegetables and wheat etc., to the Agricultural Extension Division, which is subsequently introduced to farmers by the Agricultural Extension Division.
- **Agricultural Machinery Division:** Agricultural Machinery Division is stationed at Balkh province, Kunduz province and Nangarhar province as a subordinate agency of PAIL in order to introduce new agricultural machinery. However, they do not have functioning agricultural machinery at present.
- **Irrigation Division:** Irrigation Division is currently in the organization chart of PAIL. Previously, the division belonged to the Ministry of Water and Energy and at that time, they were not performing actively. (The Ministry responsible for irrigation has changed several times during the past years. Therefore, there may be confusion in the command structure at the province level.)

### **A-3-2 Organization Chart of Provincial Agriculture, Irrigation and Livestock Department**

The survey was carried out to obtain information on staffing and organizational structure of each PAIL. However, the organization chart could not be obtained in Balkh province and staffing could not be obtained in Nangarhar province. Since classification method of staffing is different among each province, staffing of each province can not be directly compared. Staffing of each province are as follows.

**Table 3-2-1 Staffing of PAIL in Balkh Province**

| Position     | Number of Staff |
|--------------|-----------------|
| Director     | 1               |
| Engineer     | 9               |
| Manager      | 110             |
| Other Staffs | 87              |
| Total        | 207             |

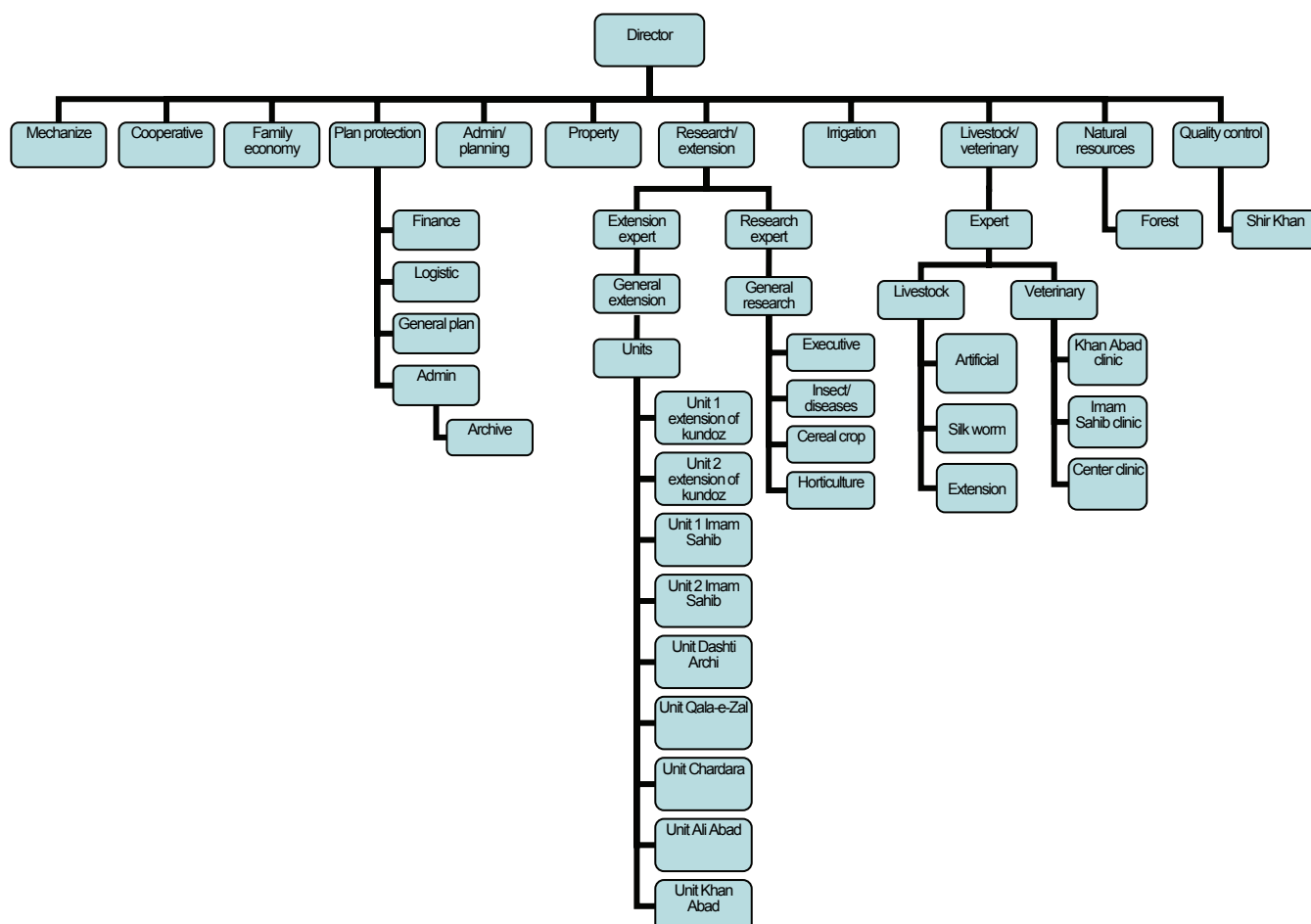
**Table 3-2-2 Staffing of PAIL in Kunduz Province**

| Position        | Number of Staff |
|-----------------|-----------------|
| Director        | 1               |
| Head            | 8               |
| General Manager | 21              |
| Manager         | 59              |
| Other Staffs    | 143             |
| Total           | 232             |

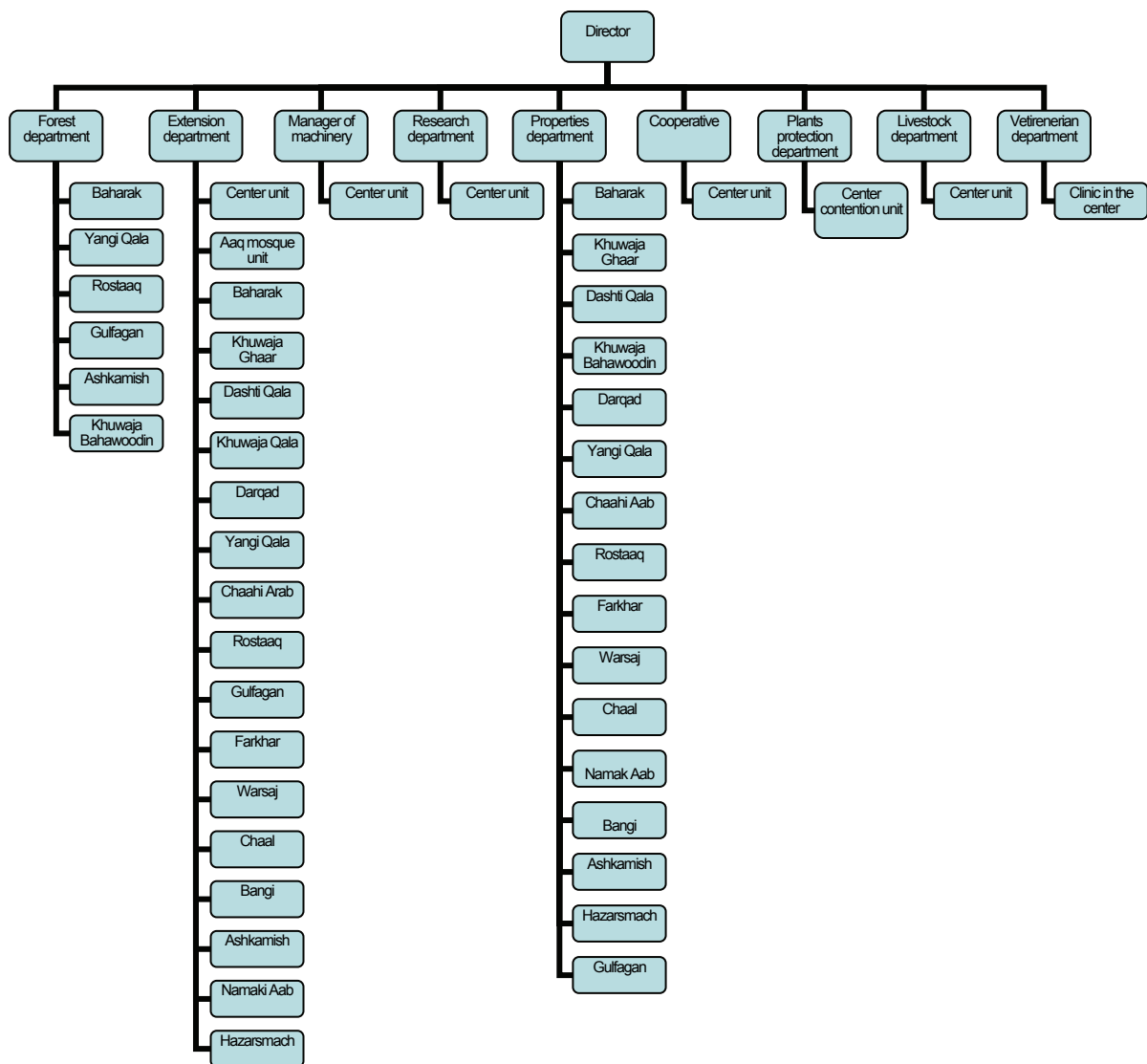
**Table 3-2-3 Staffing of PAIL in Takhar Province**

| Position                 | Number of Staff |
|--------------------------|-----------------|
| Director                 | 1               |
| Extension Manager        | 14              |
| Extension Worker         | 21              |
| Administrative Manager   | 1               |
| Plant Protection Manager | 1               |
| Plant Protection Worker  | 10              |
| Properties Manager       | 1               |
| Properties Worker        | 29              |
| Research Manager         | 1               |
| Research Worker          | 5               |
| Forest Manager           | 1               |
| Forest Worker            | 11              |
| Total                    | 96              |

Organization Chart of PAIL in Kunduz province, Takhar province and Nangarhar province are shown in Fig.3-2-1 to Fig. 3-2-3.



**Fig. 3-2-1 Organization Chart of PAIL in Kunduz Province**



**Fig. 3-2-2 Organization Chart of PAIL in Takhar Province**

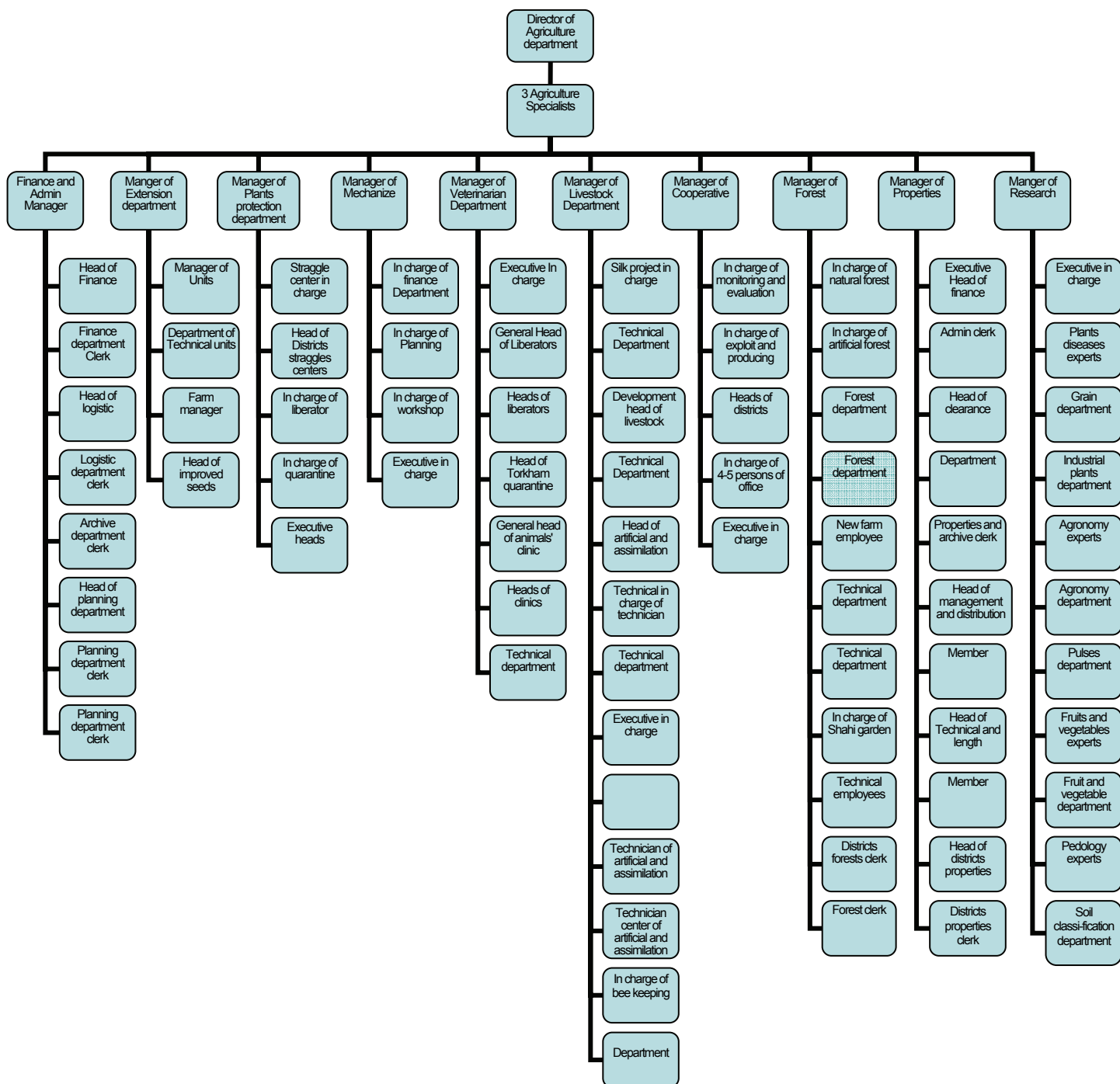


Fig. 3-2-3 Organization Chart of PAIL in Nangarhar Province

## A-4 Agricultural Production Statistics

Statistical data on agricultural production was collected from all target provinces. There are many incomplete data and abnormal figures, e.g. sudden change in cultivated area or production and unrealistic yield per ha in. Also, none of the figures of the collected wheat production statistics was consistent with the data of Afghanistan Statistical Yearbook, 2006 & 2007/08, issued by the Central Statistics Office Afghanistan.

Consequently, it must be judged that the collected statistics data lacks reliability in general. Though the statistics is shown below as it is, it can not be used for detailed analysis of agricultural situation in the target provinces, and should rather be used for imaging major crops and livestock in the provinces. The abnormal figures in crop production statistics are color-marked just for reference. The figures must be clarified by further study, if they will be referred to as a base data.

Unexpectedly, the present statistics reveals lack of an adequate system in agricultural statistics in the provinces. It is considered that development of an appropriate system at local level must be the highest priority policy to be tackled by the government for future agricultural development.

### A-4-1 Crop Production

#### (1) Balkh Province

**Table 4-1-1 Crop Production Statistics, Balkh Province (2005/06~2008/09)**

| Crop                        | 2005/06        |                   |                | 2006/07        |                   |                | 2007/08        |                   |                | 2008/09       |                   |                |
|-----------------------------|----------------|-------------------|----------------|----------------|-------------------|----------------|----------------|-------------------|----------------|---------------|-------------------|----------------|
|                             | Area<br>(ha)   | Yield<br>(ton/ha) | Prod.<br>(ton) | Area<br>(ha)   | Yield<br>(ton/ha) | Prod.<br>(ton) | Area<br>(ha)   | Yield<br>(ton/ha) | Prod.<br>(ton) | Area<br>(ha)  | Yield<br>(ton/ha) | Prod.<br>(ton) |
| <b>&lt;Crops&gt;</b>        |                |                   |                |                |                   |                |                |                   |                |               |                   |                |
| Irrigated Wheat             | 113,400        | 2.00              | 226,800        | 81,535         | 2.24              | 182,638        | 83,227         | 1.40              | 116,517        | 2,020         | 1.50              | 3,030          |
| Rainfed Wheat               | 10,500         | 1.00              | 10,500         | 39,365         | 0.30              | 11,809         | 73,865         | NA                | NA             | 20,147        | 1.10              | 22,162         |
| Wheat total                 | 123,900        | 1.92              | 237,300        | 120,900        | 1.61              | 194,447        | 157,092        | NA                | NA             | 22,167        | 1.14              | 25,192         |
| Paddy/Rice                  | NA             | NA                | NA             | NA             | NA                | NA             | NA             | NA                | NA             | NA            | NA                | NA             |
| Maize                       | 12,500         | 1.20              | 15,000         | 1,200          | 0.80              | 960            | 6,777          | 0.26              | 1,762          | 15,000        | 2.80              | 42,000         |
| Barley                      | 12,800         | NA                | NA             | 6,700          | 1.30              | 8,710          | 19,400         | 1.07              | 20,758         | 1,100         | 1.76              | 1,936          |
| Cotton                      | 9,000          | 2.10              | 18,900         | 9,500          | 1.50              | 14,250         | 18,050         | 0.66              | 11,913         | 900           | 1.10              | 990            |
| Flax                        | 3,080          | 0.40              | 1,232          | 800            | 0.60              | 480            | 2,887          | 0.60              | 1,732          | 780           | 1.60              | 1,248          |
| Sesame                      | 1,720          | 0.89              | 1,535          | 1,098          | 0.92              | 1,015          | 1,835          | 0.72              | 1,334          | 4,500         | 1.10              | 4,750          |
| <b>Sub-total</b>            | <b>163,000</b> |                   | <b>273,967</b> | <b>140,198</b> |                   | <b>219,862</b> | <b>206,041</b> |                   | <b>37,499</b>  | <b>44,447</b> |                   | <b>76,116</b>  |
| <b>&lt;Vegetables&gt;</b>   |                |                   |                |                |                   |                |                |                   |                |               |                   |                |
| Melon                       | 1,020          | 7.70              | 7,854          | 930            | 6.45              | 5,999          | 2,000          | 20.00             | 40,000         | 1,200         | 0.80              | 960            |
| Water melon                 | 620            | 4.50              | 2,790          | 570            | 4.90              | 2,793          | 2,510          | 24.80             | 62,248         | 2,400         | 0.60              | 1,440          |
| Onion                       | 530            | NA                | NA             | 500            | 1.60              | 800            | 345            | 15.10             | 5,210          | 5,450         | 14.00             | 76,300         |
| Tomato                      | 500            | 17.64             | 8,820          | 385            | 5.92              | 2,279          | 1,202          | 5.66              | 6,803          | NA            | NA                | NA             |
| <b>Sub-total</b>            | <b>2,670</b>   |                   | <b>19,464</b>  | <b>2,385</b>   |                   | <b>11,871</b>  | <b>6,057</b>   |                   | <b>114,261</b> | <b>9,050</b>  |                   | <b>78,700</b>  |
| <b>&lt;Fruits&gt;</b>       |                |                   |                |                |                   |                |                |                   |                |               |                   |                |
| Almond                      | 550            | 1.09              | 600            | 280            | 4.84              | 1,355          | 318            | 3.80              | 1,208          | 8,984         | 14.00             | 125,776        |
| Pomegranate                 | NA             | NA                | NA             | 403            | 24.50             | 9,874          | 105            | 95.00             | 9,975          | 3,752         | 35.00             | 131,320        |
| Grape                       | 340            | 10.25             | 3,485          | 510            | 2.60              | 1,326          | 238            | NA                | NA             | 4,165         | 17.60             | 73,304         |
| <b>Sub-total</b>            | <b>890</b>     |                   | <b>4,085</b>   | <b>1,193</b>   |                   | <b>12,555</b>  | <b>661</b>     |                   | <b>11,183</b>  | <b>16,901</b> |                   | <b>330,400</b> |
| <b>&lt;Fodder Crops&gt;</b> |                |                   |                |                |                   |                |                |                   |                |               |                   |                |
| Alfalfa                     | 4,107          | 17.33             | 71,174         | 713            | 70.99             | 50,616         | 1,640          | 4.30              | 7,052          | 5,000         | NA                | NA             |
| Clover                      | 1,783          | 11.72             | 20,897         | 320            | 31.26             | 10,003         | 889            | 2.47              | 2,196          | 1,000         | 2.00              | 2,000          |
| <b>Sub-total</b>            | <b>5,890</b>   |                   | <b>92,071</b>  | <b>1,033</b>   |                   | <b>60,619</b>  | <b>2,529</b>   |                   | <b>9,248</b>   | <b>6,000</b>  |                   | <b>2,000</b>   |
| <b>Total</b>                | <b>172,450</b> |                   | <b>389,587</b> | <b>144,809</b> |                   | <b>304,907</b> | <b>215,288</b> |                   | <b>172,191</b> | <b>76,398</b> |                   | <b>487,216</b> |

(Source) Balkh Province Agriculture Department

The statistics shows that the followings are major crops in Balkh Province.

**Table 4-1-2 Major Crops in Balkh Province**

| Category      | Crops                            |
|---------------|----------------------------------|
| General crops | Wheat, Barley, Cotton            |
| Vegetables    | Melon, Watermelon, Onion, Tomato |
| Fruits        | Almond, Pomegranate, Grape       |
| Fodder crops  | Alfalfa                          |

(Remarks) Rice production data is lacking

**(2) Kunduz Province**

**Table 4-1-3 Crop Production Statistics, Kunduz Province (2003/04~2007/08)**

| Crop                        | 2003/04        |                   |                | 2004/05        |                   |                | 2005/06        |                   |                | 2006/07        |                   |                | 2007/08        |                   |                |
|-----------------------------|----------------|-------------------|----------------|----------------|-------------------|----------------|----------------|-------------------|----------------|----------------|-------------------|----------------|----------------|-------------------|----------------|
|                             | Area<br>(ha)   | Yield<br>(ton/ha) | Prod.<br>(ton) | Area<br>(ha)   | Yield<br>(ton/ha) | Prod.<br>(ton) | Area<br>(ha)   | Yield<br>(ton/ha) | Prod.<br>(ton) | Area<br>(ha)   | Yield<br>(ton/ha) | Prod.<br>(ton) | Area<br>(ha)   | Yield<br>(ton/ha) | Prod.<br>(ton) |
| <b>&lt;Crops&gt;</b>        |                |                   |                |                |                   |                |                |                   |                |                |                   |                |                |                   |                |
| Irrigated wheat             | 94,700         | 2.30              | 217,810        | 94,800         | 2.35              | 222,780        | 95,000         | 2.40              | 228,000        | 95,800         | 2.45              | 234,710        | 47,900         | 1.75              | 83,825         |
| Rain fed wheat              | 14,400         | 1.50              | 21,600         | 14,450         | 1.60              | 23,120         | 14,500         | 1.70              | 24,650         | 15,000         | 1.75              | 26,250         | 2,000          | 0.35              | 700            |
| Wheat total                 | 109,100        | 2.19              | 239,410        | 109,250        | 2.25              | 245,900        | 109,500        | 2.31              | 252,650        | 110,800        | 2.36              | 260,960        | 49,900         | 1.69              | 84,525         |
| Paddy/Rice                  | 28,000         | 3.50              | 98,000         | 29,000         | 3.80              | 110,200        | 30,000         | 4.00              | 120,000        | 35,000         | 4.20              | 147,000        | 35,000         | 3.15              | 110,250        |
| Corn                        | 790            | 1.00              | 790            | 800            | 1.00              | 800            | 830            | 1.00              | 830            | 850            | 1.05              | 892            | 13,000         | 1.40              | 18,200         |
| Barley                      | 1,510          | 0.91              | 1,380          | 1,575          | 1.01              | 1,595          | 1,635          | 1.13              | 1,848          | 1,700          | 1.22              | 2,068          | 4,100          | 1.40              | 5,740          |
| Bean                        | 2,300          | 0.50              | 1,150          | 2,350          | 0.55              | 1,292          | 2,400          | 0.60              | 1,440          | 2,600          | 0.70              | 1,820          | 3,000          | 0.70              | 2,100          |
| Pea                         | 260            | 0.47              | 121            | 265            | 0.50              | 133            | 280            | 0.70              | 197            | 300            | 0.76              | 227            | 400            | 0.70              | 279            |
| Mungbean                    | 11,150         | 0.50              | 5,575          | 11,200         | 0.50              | 5,600          | 11,500         | 0.60              | 6,900          | 12,000         | 0.70              | 8,400          | 10,000         | 0.70              | 7,000          |
| Cotton                      | 4,000          | 2.00              | 8,000          | 4,200          | 2.00              | 8,400          | 4,500          | 2.20              | 9,900          | 4,700          | 2.27              | 10,669         | 4,700          | 1.40              | 6,580          |
| Flax                        | 1,750          | 0.82              | 1,450          | 1,805          | 0.91              | 1,652          | 1,865          | 0.92              | 1,732          | 1,980          | 1.22              | 1,837          | 1,500          | 1.22              | 1,837          |
| <b>Sub-total</b>            | <b>158,860</b> |                   | <b>355,876</b> | <b>160,445</b> |                   | <b>276,392</b> | <b>162,510</b> |                   | <b>395,497</b> | <b>169,930</b> |                   | <b>433,873</b> | <b>121,600</b> |                   | <b>236,511</b> |
| <b>&lt;Vegetables&gt;</b>   |                |                   |                |                |                   |                |                |                   |                |                |                   |                |                |                   |                |
| Water Melon                 | 880            | 34.70             | 30,540         | 1,130          | 29.48             | 33,310         | 1,150          | 30.48             | 35,050         | 1,175          | 33.34             | 39,180         | 1,500          | 33.25             | 49,875         |
| Melon                       | 4,800          | 27.98             | 134,300        | 4,870          | 28.97             | 141,060        | 4,920          | 29.93             | 147,270        | 4,957          | 30.40             | 150,685        | 3,500          | 29.75             | 104,125        |
| Onion                       | 980            | 24.00             | 23,520         | 985            | 25.00             | 24,625         | 1,000          | 25.25             | 25,250         | 1,000          | 26.25             | 26,250         | 900            | 21.00             | 18,900         |
| Potato                      | 800            | 14.00             | 11,200         | 850            | 15.00             | 12,752         | 900            | 15.20             | 13,680         | 950            | 15.79             | 14,962         | 400            | 2.45              | 980            |
| Garlic                      | 12             | 5.50              | 66             | 13             | 5.60              | 70             | 13             | 6.00              | 78             | 14             | 6.79              | 95             | 90             | 2.11              | 189            |
| Tomato                      | 930            | 15.00             | 13,950         | 940            | 16.00             | 15,040         | 950            | 17.00             | 16,150         | 1,000          | 17.50             | 17,500         | 1,000          | 2.10              | 2,100          |
| Cauliflower                 | 10             | 8.00              | 80             | 14             | 9.00              | 126            | 14             | 10.00             | 140            | 15             | 10.50             | 157            | 350            | 14.00             | 4,900          |
| Spinach                     | 20             | 5.00              | 100            | 25             | 5.00              | 125            | 25             | 6.00              | 150            | 29             | 7.00              | 203            | 440            | 10.50             | 4,620          |
| Turnip                      | 380            | 10.00             | 3,800          | 390            | 11.00             | 4,290          | 300            | 12.00             | 3,600          | 310            | 13.00             | 4,030          | 300            | 12.25             | 3,675          |
| Carrot                      | 35             | 25.00             | 875            | 35             | 26.00             | 910            | 36             | 26.00             | 936            | 36             | 28.00             | 1,008          | 490            | 17.50             | 8,575          |
| Other vegetable             | 10             | 1.50              | 15             | 10             | 1.50              | 15             | 10             | 1.50              | 15             | 10             | 1.75              | 17             | 140            | 8.75              | 1,225          |
| <b>Sub-total</b>            | <b>8,857</b>   |                   | <b>218,446</b> | <b>9,262</b>   |                   | <b>232,323</b> | <b>9,318</b>   |                   | <b>242,319</b> | <b>9,496</b>   |                   | <b>254,087</b> | <b>9,110</b>   |                   | <b>199,164</b> |
| <b>&lt;Fruits&gt;</b>       |                |                   |                |                |                   |                |                |                   |                |                |                   |                |                |                   |                |
| Grape                       | 78             | 2.00              | 156            | 79             | 2.00              | 158            | 80             | 2.00              | 160            | 87             | 2.80              | 243            | 650            | 10.50             | 6,825          |
| Apple                       | 29             | 29.00             | 841            | 30             | 30.00             | 900            | 30             | 31.00             | 930            | 39             | 31.15             | 1,215          | 140            | 5.25              | 735            |
| Almond                      | 150            | 2.00              | 300            | 160            | 2.00              | 320            | 165            | 2.00              | 330            | 171            | 2.10              | 359            | 1,390          | 2.80              | 3,892          |
| Apricot                     | 68             | 2.00              | 136            | 69             | 2.00              | 138            | 70             | 2.20              | 154            | 77             | 2.45              | 188            | 390            | 7.00              | 2,730          |
| Peach                       | 50             | 2.00              | 100            | 53             | 2.30              | 122            | 52             | 2.50              | 130            | 59             | 3.80              | 224            | 340            | 8.75              | 2,975          |
| Cherry                      | 100            | 2.50              | 250            | 110            | 2.60              | 286            | 120            | 2.80              | 336            | 130            | 3.00              | 390            | 440            | 10.50             | 4,620          |
| Other Fruits                | 600            | 1.50              | 900            | 620            | 1.50              | 930            | 640            | 1.60              | 1,024          | 645            | 1.75              | 1,128          | 100            | 1.75              | 175            |
| <b>Sub-total</b>            | <b>1,075</b>   |                   | <b>2,683</b>   | <b>1,121</b>   |                   | <b>2,854</b>   | <b>1,157</b>   |                   | <b>3,064</b>   | <b>1,208</b>   |                   | <b>3,747</b>   | <b>3,450</b>   |                   | <b>21,952</b>  |
| <b>&lt;Fodder Crops&gt;</b> |                |                   |                |                |                   |                |                |                   |                |                |                   |                |                |                   |                |
| Alfalfa                     | 300            | 9.00              | 2,700          | 320            | 4.00              | 1,280          | 350            | 9.50              | 3,325          | 372            | 9.80              | 3,645          | 300            | 7.00              | 2,100          |
| Clover                      | 300            | 8.00              | 2,400          | 320            | 8.00              | 2,560          | 350            | 8.50              | 2,975          | 376            | 8.75              | 3,290          | 400            | 7.00              | 2,800          |
| <b>Sub-total</b>            | <b>600</b>     |                   | <b>5,100</b>   | <b>640</b>     |                   | <b>3,840</b>   | <b>700</b>     |                   | <b>6,300</b>   | <b>748</b>     |                   | <b>6,935</b>   | <b>700</b>     |                   | <b>4,900</b>   |
| <b>Total</b>                | <b>169,392</b> |                   | <b>582,105</b> | <b>171,468</b> |                   | <b>515,409</b> | <b>173,685</b> |                   | <b>647,180</b> | <b>181,382</b> |                   | <b>698,642</b> | <b>134,860</b> |                   | <b>462,527</b> |

(Source) Kunduz Province Agriculture Department

The statistics data in Kunduz Province is relatively well arranged among the target provinces. The statistics shows that the followings are major crops in the Province.

**Table 4-1-4 Major Crops in Kunduz Province**

| Category      | Crops                                    |
|---------------|------------------------------------------|
| General crops | Wheat, Rice, Mungbean, Cotton            |
| Vegetables    | Melon, Watermelon, Onion, Tomato, Potato |
| Fruits        | Almond, Apricot, Cherry, Grape           |

### (3) Takhar Province

**Table 4-1-5 Crop Production Statistics, Takhar Province (2003/04~2007/08)**

| Crop                        | 2003/04        |                   |                | 2004/05        |                   |                | 2005/06        |                   |                | 2006/07        |                   |                | 2007/08        |                   |                |
|-----------------------------|----------------|-------------------|----------------|----------------|-------------------|----------------|----------------|-------------------|----------------|----------------|-------------------|----------------|----------------|-------------------|----------------|
|                             | Area<br>(ha)   | Yield<br>(ton/ha) | Prod.<br>(ton) | Area<br>(ha)   | Yield<br>(ton/ha) | Prod.<br>(ton) | Area<br>(ha)   | Yield<br>(ton/ha) | Prod.<br>(ton) | Area<br>(ha)   | Yield<br>(ton/ha) | Prod.<br>(ton) | Area<br>(ha)   | Yield<br>(ton/ha) | Prod.<br>(ton) |
| <b>&lt;Crops&gt;</b>        |                |                   |                |                |                   |                |                |                   |                |                |                   |                |                |                   |                |
| Irrigated wheat             | 19,578         | 2.62              | 51,392         | 39,667         | 2.14              | 84,779         | 39,109         | 1.78              | 69,614         | 43,898         | 2.60              | 114,087        | 52,767         | 2.31              | 121,892        |
| Rain fed wheat              | 59,279         | 1.32              | 78,011         | 42,100         | 1.04              | 43,764         | 71,870         | 0.26              | 18,686         | 96,958         | 0.55              | 52,972         | 94,844         | 0.09              | 8,974          |
| Wheat total                 | 78,857         | 1.64              | 129,403        | 81,767         | 1.57              | 128,543        | 110,979        | 0.80              | 88,300         | 140,856        | 1.19              | 167,059        | 147,611        | 0.89              | 130,866        |
| Paddy                       | 19,530         | 2.73              | 53,258         | 33,404         | 2.85              | 95,168         | 33,064         | 2.95              | 97,539         | 25,490         | 3.15              | 80,293         | 24,293         | 3.85              | 93,528         |
| Maize                       | 1,131          | 2.01              | 2,274          | 3,480          | 1.23              | 4,268          | 2,435          | 3.03              | 7,378          | 5,529          | 1.92              | 10,643         | 4,944          | 1.99              | 9,863          |
| Barley                      | 18,687         | 0.72              | 13,471         | 20,867         | 0.92              | 19,225         | 20,776         | 0.63              | 13,066         | 26,625         | 0.66              | 17,694         | 25,495         | 0.47              | 11,998         |
| Bean                        | 734            | 2.62              | 1,923          | 974            | 2.72              | 2,648          | 864            | 2.10              | 1,814          | 704            | 0.88              | 616            | 592            | 1.12              | 663            |
| Pulses                      | 7,874          | 0.53              | 4,161          | 5,696          | 0.60              | 3,405          | 4,994          | 0.23              | 1,143          | 7,628          | 0.27              | 2,028          | 7,176          | 0.22              | 1,595          |
| Mungbean                    | 1,210          | 1.32              | 1,597          | 1,541          | 1.91              | 2,951          | 1,893          | 1.33              | 2,517          | 3,585          | 1.34              | 4,788          | 4,939          | 1.15              | 5,704          |
| Black bean                  | 481            | 0.47              | 224            | 20             | 1.45              | 29             | 151            | 0.21              | 32             | 1,100          | 0.42              | 462            | 740            | 0.11              | 78             |
| Other Legume                | NA             | NA                | NA             | NA             | NA                | NA             | 1,980          | 0.22              | 426            | 1,904          | 0.49              | 932            | 3,054          | 0.14              | 427            |
| Cotton                      | 1,339          | 1.86              | 2,497          | 1,398          | 1.90              | 2,654          | 1,995          | 1.54              | 3,072          | 2,649          | 1.57              | 4,172          | 2,209          | 1.76              | 3,894          |
| Sugar Beat                  | 311            | 38.00             | 11,818         | 191            | 40.00             | 7,640          | NA             | NA                | NA             | 229            | 40.25             | 9,217          | 237            | 38.00             | 9,006          |
| Sesame                      | 3,459          | 0.37              | 1,266          | 4,205          | 0.36              | 1,516          | 8,490          | 0.55              | 4,644          | 3,737          | 0.14              | 528            | 1,285          | 0.71              | 908            |
| Other Rain Fed Crop         | 2,670          | 1.18              | 3,150          | 838            | 0.84              | 703            | 14             | 0.14              | 2              | 456            | 0.21              | 96             | 1,303          | 0.14              | 182            |
| <b>Sub-total</b>            | <b>136,283</b> |                   | <b>225,042</b> | <b>154,381</b> |                   | <b>268,750</b> | <b>187,635</b> |                   | <b>219,933</b> | <b>220,492</b> |                   | <b>298,528</b> | <b>223,878</b> |                   | <b>268,712</b> |
| <b>&lt;Vegetables&gt;</b>   |                |                   |                |                |                   |                |                |                   |                |                |                   |                |                |                   |                |
| Water Melon                 | 40,279         | 5.41              | 217,992        | 13,696         | 8.20              | 112,356        | 32,081         | 6.47              | 207,717        | 34,734         | 3.84              | 133,519        | 2,564          | 8.05              | 20,640         |
| Melon                       | 25,246         | 6.96              | 175,588        | 10,454         | 8.14              | 85,132         | 19,156         | 7.18              | 137,614        | 21,663         | 4.96              | 107,542        | 3,804          | 7.17              | 27,293         |
| Onion                       | 2,222          | 19.05             | 42,320         | 8,385          | 20.00             | 167,700        | 2,581          | 13.87             | 35,811         | 2,894          | 16.99             | 49,183         | 2,113          | 16.45             | 34,758         |
| Potato                      | 1,808          | 18.03             | 32,598         | 1,745          | 19.02             | 33,191         | 805            | 17.14             | 13,795         | 1,178          | 17.92             | 21,109         | 1,209          | 16.80             | 20,311         |
| Garlic                      | 37             | 0.59              | 22             | 843            | 14.90             | 12,560         | 16             | 0.75              | 12             | 27             | 4.44              | 120            | 15             | 8.00              | 120            |
| Tomato                      | 1,404          | 14.70             | 20,638         | NA             | NA                | NA             | 1,014          | 10.32             | 10,469         | 1,326          | 12.77             | 16,939         | 1,369          | 16.94             | 23,190         |
| Cauliflower                 | NA             | NA                | NA             | NA             | NA                | NA             | 388            | 19.60             | 7,604          | 130            | 20.00             | 2,600          | 74             | 40.00             | 2,960          |
| Spinach                     | NA             | NA                | NA             | 680            | 19.04             | 12,950         | 478            | 17.15             | 8,197          | 101            | 7.69              | 777            | 76             | 7.70              | 585            |
| Turnip                      | 152            | 18.66             | 2,836          | 850            | 16.07             | 13,663         | NA             | NA                | NA             | 720            | 23.03             | 16,581         | 932            | 21.70             | 20,224         |
| Carrot                      | 341            | 15.50             | 5,284          | 743            | 4.00              | 2,969          | 534            | 10.50             | 5,607          | 864            | 19.67             | 16,994         | 995            | 19.95             | 19,850         |
| Other vegetable             | 1,228          | 3.29              | 4,046          | 590            | 17.90             | 10,561         | 377            | 7.35              | 2,770          | 630            | 2.10              | 1,323          | 700            | 5.84              | 4,091          |
| <b>Sub-total</b>            | <b>72,717</b>  |                   | <b>501,324</b> | <b>37,986</b>  |                   | <b>451,082</b> | <b>57,430</b>  |                   | <b>429,596</b> | <b>64,267</b>  |                   | <b>366,687</b> | <b>13,851</b>  |                   | <b>174,022</b> |
| <b>&lt;Fruits&gt;</b>       |                |                   |                |                |                   |                |                |                   |                |                |                   |                |                |                   |                |
| Grape                       | 352            | 7.00              | 2,464          | 592            | 10.50             | 6,216          | 241            | 10.12             | 2,439          | 265            | 10.40             | 2,756          | 395            | 175.00            | 69,125         |
| Apple                       | 204            | 11.40             | 2,325          | 502            | 8.75              | 4,392          | 148            | 8.05              | 1,191          | 137            | 13.12             | 1,798          | 853            | 4.32              | 3,687          |
| Almond                      | 209            | 6.90              | 1,442          | 536            | 6.10              | 3,269          | 309            | 3.32              | 1,027          | 241            | 5.60              | 1,349          | 283            | 5.77              | 1,634          |
| Wal nuts                    | NA             | NA                | NA             | 361            | 11.90             | 4,295          | 36             | 11.00             | 396            | NA             | NA                | NA             | 49             | 4.18              | 205            |
| Pomegranate                 | NA             | NA                | NA             | NA             | NA                | NA             | 119            | 4.19              | 499            | NA             | NA                | NA             | 209            | 2.38              | 498            |
| Apricot                     | 75             | 11.40             | 855            | 347            | 10.40             | 3,608          | 124            | 15.15             | 1,878          | 227            | 15.00             | 3,405          | 283            | 16.45             | 4,655          |
| Peach                       | 306            | 9.62              | 2,943          | 602            | 9.26              | 5,574          | 243            | 15.63             | 3,798          | 568            | 16.80             | 9,542          | 471            | 16.97             | 7,995          |
| Cherry                      | 41             | 12.02             | 493            | 145            | 1.30              | 188            | 74             | 14.59             | 1,080          | 179            | 14.70             | 2,631          | 158            | 14.70             | 2,323          |
| Other Fruits                | 67             | 7.34              | 492            | 1,745          | 19.02             | 33,191         | 47             | 5.94              | 279            | NA             | NA                | NA             | 210            | 7.38              | 1,549          |
| <b>Sub-total</b>            | <b>1,254</b>   |                   | <b>11,014</b>  | <b>4,830</b>   |                   | <b>60,733</b>  | <b>1,341</b>   |                   | <b>12,587</b>  | <b>1,617</b>   |                   | <b>21,481</b>  | <b>2,911</b>   |                   | <b>91,671</b>  |
| <b>&lt;Fodder Crops&gt;</b> |                |                   |                |                |                   |                |                |                   |                |                |                   |                |                |                   |                |
| Alfalfa                     | 456            | 32.60             | 14,865         | 588            | 16.70             | 9,819          | NA             | NA                | NA             | 585            | 33.60             | 19,656         | 474            | 34.56             | 16,380         |
| Clover                      | 392            | 29.00             | 11,368         | NA             | NA                | NA             | NA             | NA                | NA             | 1,108          | 28.00             | 31,024         | 260            | 11.20             | 2,912          |
| <b>Sub-total</b>            | <b>848</b>     |                   | <b>26,233</b>  | <b>588</b>     |                   | <b>9,819</b>   | <b>0</b>       |                   | <b>0</b>       | <b>1,693</b>   |                   | <b>50,680</b>  | <b>734</b>     |                   | <b>19,292</b>  |
| <b>Total</b>                | <b>211,102</b> |                   | <b>763,613</b> | <b>197,785</b> |                   | <b>790,384</b> | <b>246,406</b> |                   | <b>662,116</b> | <b>288,069</b> |                   | <b>737,376</b> | <b>241,374</b> |                   | <b>553,697</b> |

(Source) Takhar Province Agriculture Department

While the statistic data of general crops in Takhar Province is also relatively well arranged, the data of vegetables and fruits lacks reliability. The statistics shows that the followings are major crops in the Province.

**Table 4-1-6 Major Crops in Takhar Province**

| Category      | Crops                                |
|---------------|--------------------------------------|
| General crops | Wheat, Rice, Barley, Pulses          |
| Vegetables    | Melon, Watermelon, Onion             |
| Fruits        | Apple, Almond, Apricot, Peach, Grape |

#### (4) Nangarhar Province

**Table 4-1-7 Crop Production Statistics, Nangarhar Province (2003~2008)**

| Crop                        | 2002/03      |                   |                | 2003/04      |                   |                | 2004/05      |                   |                | 2005/06      |                   |                | 2006/07      |                   |                | 2007/08      |                   |                |
|-----------------------------|--------------|-------------------|----------------|--------------|-------------------|----------------|--------------|-------------------|----------------|--------------|-------------------|----------------|--------------|-------------------|----------------|--------------|-------------------|----------------|
|                             | Area<br>(ha) | Yield<br>(ton/ha) | Prod.<br>(ton) | Area<br>(ha) | Yield<br>(ton/ha) | Prod.<br>(ton) | Area<br>(ha) | Yield<br>(ton/ha) | Prod.<br>(ton) | Area<br>(ha) | Yield<br>(ton/ha) | Prod.<br>(ton) | Area<br>(ha) | Yield<br>(ton/ha) | Prod.<br>(ton) | Area<br>(ha) | Yield<br>(ton/ha) | Prod.<br>(ton) |
| <b>&lt;Crops&gt;</b>        |              |                   |                |              |                   |                |              |                   |                |              |                   |                |              |                   |                |              |                   |                |
| Wheat                       | 33,124       | 1.77              | 58,614         | 32,121       | 1.20              | 38,652         | 42,033       | 2.01              | 84,591         | 41,181       | 0.30              | 12,418         | 55,583       | 2.69              | 149,523        | 63,771       | 2.80              | 178,623        |
| Rice                        | 263          | 9.19              | 2,418          | 3,352        | 3.46              | 11,585         | 6,810        | 3.50              | 23,815         | 4,622        | 2.80              | 12,944         | 14,193       | 0.77              | 10,985         | 18,864       | 3.50              | 66,024         |
| Maize                       | 13,489       | 2.45              | 33,050         | 7,228        | 1.92              | 13,864         | 15,484       | 2.45              | 37,937         | 11,748       | 2.40              | 28,156         | 20,220       | 1.93              | 39,105         | 17,476       | 2.38              | 41,593         |
| Cotton                      | 1,489        | 0.88              | 1,303          | 1,802        | 1.18              | 2,129          | 681          | 1.40              | 954            | 2,317        | 1.23              | 2,849          | 1,970        | 1.32              | 2,604          | 2,126        | 1.31              | 2,785          |
| Sugarcane                   | 387          | 42.00             | 16,254         | 1,934        | 28.88             | 55,855         | NA           | NA                | NA             | 325          | 28.62             | 9,303          | NA           | NA                | NA             | 500          | 8.00              | 4,000          |
| Sub-total                   | 48,752       |                   | 111,639        | 46,437       |                   | 122,085        | 65,008       |                   | 147,297        | 60,193       |                   | 65,670         | 91,966       |                   | 202,217        | 102,737      |                   | 293,025        |
| <b>&lt;Vegetables&gt;</b>   |              |                   |                |              |                   |                |              |                   |                |              |                   |                |              |                   |                |              |                   |                |
| Onion                       | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | 1,073        | 14.00             | 15,022         |
| Potato                      | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | 404          | 16.20             | 6,545          |
| Okra                        | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | 950          | 17.50             | 16,625         |
| Tomato                      | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | 1,527        | 12.25             | 18,706         |
| Carrot                      | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | 951          | 1.39              | 1,322          |
| Cauliflower                 | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | 934          | 17.50             | 16,345         |
| Eggplant                    | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | 229          | 14.00             | 3,206          |
| Water melon                 | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | 565          | 30.00             | 16,950         |
| Sub-total                   | NA           |                   | NA             | NA           |                   | NA             | NA           |                   | NA             | NA           |                   | NA             | NA           |                   | NA             | 6,633        |                   | 94,721         |
| <b>&lt;Fruits&gt;</b>       |              |                   |                |              |                   |                |              |                   |                |              |                   |                |              |                   |                |              |                   |                |
| NA                          | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             |
| <b>&lt;Fodder Crops&gt;</b> |              |                   |                |              |                   |                |              |                   |                |              |                   |                |              |                   |                |              |                   |                |
| NA                          | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             | NA           | NA                | NA             |
| Total                       | 48,752       |                   | 111,639        | 46,437       |                   | 122,085        | 65,008       |                   | 147,297        | 60,193       |                   | 65,670         | 91,966       |                   | 202,217        | 109,370      |                   | 387,746        |

(Source) Nangarhar Province Extension Dept. and Nursery Association

The statistics shows that the followings are major crops in Nangarhar Province.

**Table 4-1-8 Major Crops in Nangarhar Province**

| Category      | Crops                                    |
|---------------|------------------------------------------|
| General crops | Wheat, Rice, Maize                       |
| Vegetables    | Onion, Tomato, Okra, Carrot, Cauliflower |
| Fruits        | No data available                        |
| Fodder crops  | No data available                        |

#### A-4-2 Livestock

The number of livestock in the target provinces is shown below.

**Table 4-2-1 The Number of Livestock in Balkh Province**

| <b>&lt;Balkh Province&gt;</b> (unit: head) |         |         |         |         |         |         |         |
|--------------------------------------------|---------|---------|---------|---------|---------|---------|---------|
| Livestock                                  | 2002/03 | 2003/04 | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 |
| Cattle                                     | 64,045  | 85,393  | 90,346  | 97,989  | 76,325  | 51,238  | 129,063 |
| Sheep                                      | 363,798 | 606,330 | 808,440 | 932,741 | 932,741 | 937,741 | 260,240 |
| Qaraqul sheep                              | NA      | NA      | NA      | NA      | NA      | NA      | 204,590 |
| Goat                                       | 111,509 | 148,678 | 198,237 | 357,758 | 298,451 | 302,139 | 111,900 |
| Horse                                      | 6,666   | 8,847   | 72,132  | 16,436  | 14,159  | 14,159  | 11,525  |
| Donkey                                     | 42,166  | 39,172  | 62,586  | 80,159  | 1,288   | 1,288   | 36,800  |
| Camel                                      | 9,649   | 61,221  | 41,294  | 9,497   | 8,269   | 8,269   | 4,434   |
| Chicken                                    | 217,743 | 290,324 | 387,598 | 378,675 | 542,731 | 542,731 | NA      |
| Duck                                       | 846     | 1,129   | 942     | NA      | NA      | NA      | NA      |
| Turkey                                     | 888     | 664     | 1,041   | 3,566   | 5,526   | 5,526   | NA      |

(Source): Extension Department of Balkh Province

**Table 4-2-2 The Number of Livestock in Kunduz Province**

**<Kunduz Province>** (unit: head)

| Livestock | 2000/01 | 2001/02 | 2002/03 | 2003/04 | 2004/05 | 2005/06 | 2006/07   | 2007/08   |
|-----------|---------|---------|---------|---------|---------|---------|-----------|-----------|
| Cattle    | 300,000 | 300,000 | 300,000 | 400,000 | 420,000 | 450,000 | 520,000   | 657,000   |
| Sheep     | 500,000 | 500,000 | 500,000 | 600,000 | 700,000 | 900,000 | 1,200,000 | 1,500,000 |
| Goats     | 40,000  | 40,000  | 40,000  | 50,000  | 54,000  | 55,000  | 56,000    | 580,000   |
| Horse     | 60,000  | 60,000  | 60,000  | 55,000  | 50,000  | 45,000  | 40,000    | 33,000    |
| Camel     | 30,000  | 30,000  | 33,000  | 33,000  | 30,000  | 30,000  | 22,000    | 20,000    |
| Donkey    | 70,000  | 70,000  | 70,000  | 80,000  | 850,000 | 90,000  | 100,000   | 113,000   |
| Chickens  | 700,000 | 700,000 | 700,000 | 800,000 | 850,000 | 900,000 | 1,000,000 | 1,100,000 |

(Source) Extension Department of Kunduz Province

**Table 4-2-3 The Number of Livestock in Takhar Province**

**<Takhar Province>** (unit: head)

| Livestock | 2003/04 | 2004/05 | 2005/06 | 2006/07 | 2007/08 |
|-----------|---------|---------|---------|---------|---------|
| Cattle    | 262,700 | 236,194 | 269,000 | 273,221 | 283,144 |
| Sheep     | 402,500 | 324,031 | 408,525 | 409,238 | 419,328 |
| Goats     | 290,900 | 231,552 | 301,900 | 331,228 | 342,831 |
| Chicken   | NA      | NA      | NA      | NA      | NA      |

(Source): Veterinary and Livestock Department of Takhar Province

**Table 4-2-4 The Number of Livestock in Nangarhar Province**

**<Nangarhar Province>** (unit: head)

| Livestock | 2002/03 | 2003/04 | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 |
|-----------|---------|---------|---------|---------|---------|---------|---------|
| Cattle    | 382,000 | 398,800 | 417,000 | 465,000 | 485,000 | 493,000 | 516,000 |
| Sheep     | 333,000 | 353,000 | 380,000 | 388,000 | 397,000 | 403,000 | 417,000 |
| Goat      | 217,000 | 232,000 | 252,500 | 265,000 | 273,000 | 281,000 | 290,000 |
| Chicken   | 722,500 | 750,000 | 775,000 | 801,000 | 832,000 | 860,000 | 883,000 |

(Source): Agriculture and Livestock Department of Nangarhar Province

Cattle are the most important livestock in Afghanistan. The number is large in Kunduz and Nangarhar Provinces. While the number of sheep is the highest among animals (cattle, sheep and goats), the number is particularly large in Balkh and Kunduz Provinces. The number of cattle is higher than that of sheep only in Nangarhar Province, indicating that the importance of cattle is relatively higher or that of importance of sheep is relatively less in the Province. As compared with the number of goats, that of sheep is always higher in the target provinces. However, difference in the numbers is smaller in Takhar and Nangarhar Provinces, while the number of sheep overwhelms that of goats in Kunduz Province. Goats may be relatively important animals in Takhar and Nangarhar Provinces. As for chicken, the number is large in Kunduz and Nangarhar Provinces.

The numbers of animals shows an increasing trend except in Balkh Province. Since difference of numbers in 2008/09 and those of previous years is very large in Balkh Province, further examination should be done for these figures. On the other hand, the number of chicken shows an increased trend in all Provinces, though the data is not available for Takhar Province.

#### A-4-3 Farm-households and Farmland

**Table 4-3-1 The Number of Farm-households and Average Farming Area**

|                             | Balkh   | Kunduz  | Takhar  | Nangarhar |
|-----------------------------|---------|---------|---------|-----------|
| Number of farm-household    | 110,000 | 58,702  | 122,214 | 231,042   |
| Irrigated farmland (ha)     | 171,550 | 233,312 | 73,747  | 100,928   |
| Rainfed farmland (ha)       | 150,000 | 48,830  | 191,061 | 0         |
| Total farmland (ha)         | 321,550 | 282,142 | 264,808 | 100,928   |
| % of Irrigated farmland (%) | 53.4    | 82.7    | 27.8    | 100.0     |
| Ave. farmland (ha/farmer)   | 2.92    | 4.81    | 2.17    | 0.44      |
| (1) Irrigated farmland      | 1.56    | 3.97    | 0.60    | 0.44      |
| (2) Rainfed farmland        | 1.36    | 0.83    | 1.56    | 0.00      |

(Source)

CoAR Agriculture Department (Balkh Province)

Extension Department (Kunduz Province)

General Management of Extension Department (Takhar Province)

Extension Department (Nangarhar Province)

The number of farm-households is the largest in Nangarhar Province and the smallest in Kunduz Province. The total acreage of farmland area is the largest in Balkh Province and the smallest in the Nangarhar Province. The percentage of irrigated farmland is 100%, 82.7% 53.4% and 27.8% in Nangarhar, Kunduz, Balkh and Takhar, respectively. The summarized condition of target provinces is shown below.

**Table 4-3-2 Summarized Condition of Target Provinces**

| Province  | Condition                                                                                                                       |
|-----------|---------------------------------------------------------------------------------------------------------------------------------|
| Balkh     | Average farmland per farm-household is relatively large and acreage of irrigated farmland and rain-fed farmland is almost same. |
| Kunduz    | Average farmland per farm-household is large and the percentage of irrigated farmland is also high.                             |
| Takhar    | While average farmland per farm-household is on medium level, the percentage of irrigated farmland is low.                      |
| Nangarhar | Average farmland per farm-household is very small, though the percentage of irrigated farmland is 100%.                         |

#### A-4-4 Land Owners and Tenant Farms

**Table 4-4-1 Land Owners and Tenant Farms (Estimated Data)**

(unit: %)

| Management                            | Farm-household |        |        |           | Farmland Area Managed |        |        |           |
|---------------------------------------|----------------|--------|--------|-----------|-----------------------|--------|--------|-----------|
|                                       | Balkh          | Kunduz | Takhar | Nangarhar | Balkh                 | Kunduz | Takhar | Nangarhar |
| Land owner                            | 70             | 55     | 60     | 50        | 50                    | 70     | 50     | 60        |
| Land owner cum tenant farmer or share | 20             | 35     | 20     | 10        | 30                    | 20     | 20     | 10        |
| Tenant farmer                         |                | 5      | 5      | 10        |                       | 5      | 3      | 10        |
| Share cropper                         | 10             | 5      | 15     | 30        | 20                    | 5      | 27     | 20        |
| Total                                 | 100.0          | 100.0  | 100.0  | 100.0     | 100.0                 | 100.0  | 100.0  | 100.0     |

(Source)

CoAR Agriculture Department (Balkh Province)

Extension Department (Kunduz Province)

General Management of Extension Department (Takhar Province)

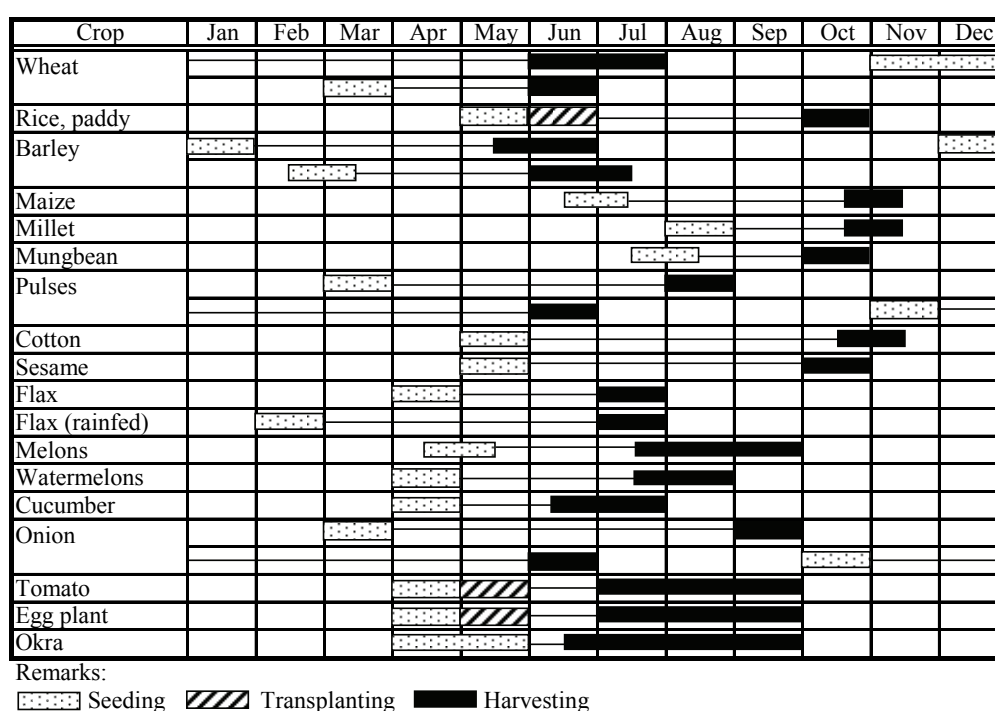
Extension Department (Nangarhar Province)

The percentage of land owner farm-households is the highest in Balkh Province, followed by Takhar Province in second, Kunduz Province in third and with Nangarhar Province as the last. The percentage of land owner farm-households in all provinces is smaller than 83%, which was the national average reported by the FAO study in 2002/03. It seems that the difference in managing farmland area between owner farmers and tenant farmers is not so big, though there might be numbers of big landlords in Kunduz Province.

#### A-4-5 Crop Calendar of Major Crops

There are no big differences in crop season of major crops among the target provinces. There are two major crop seasons, i.e. winter season and summer season. While winter crops are dominated wheat and some barley, other crops are grown mainly in summer season.

##### (1) Balkh Province



**Fig. 4-5-1 Crop Calendar of Major Crops in Balkh Province**

## (2) Kunduz Province

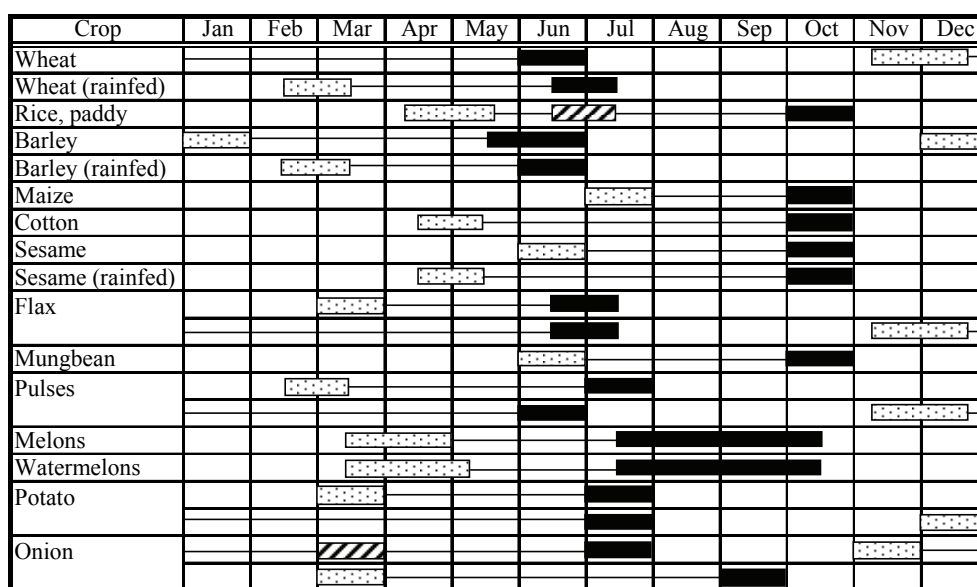


Fig. 4-5-2 Crop Calendar of Major Crops in Kunduz Province

## (3) Takhar Province

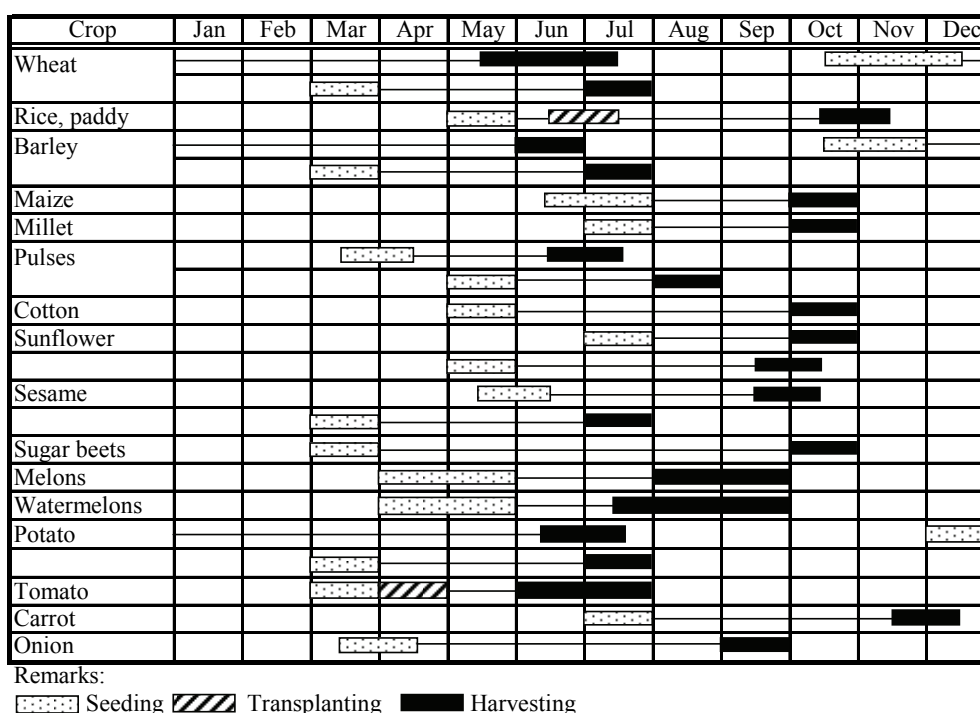


Fig. 4-5-3 Crop Calendar of Major Crops in Takhar Province

#### (4) Nangarhar Province

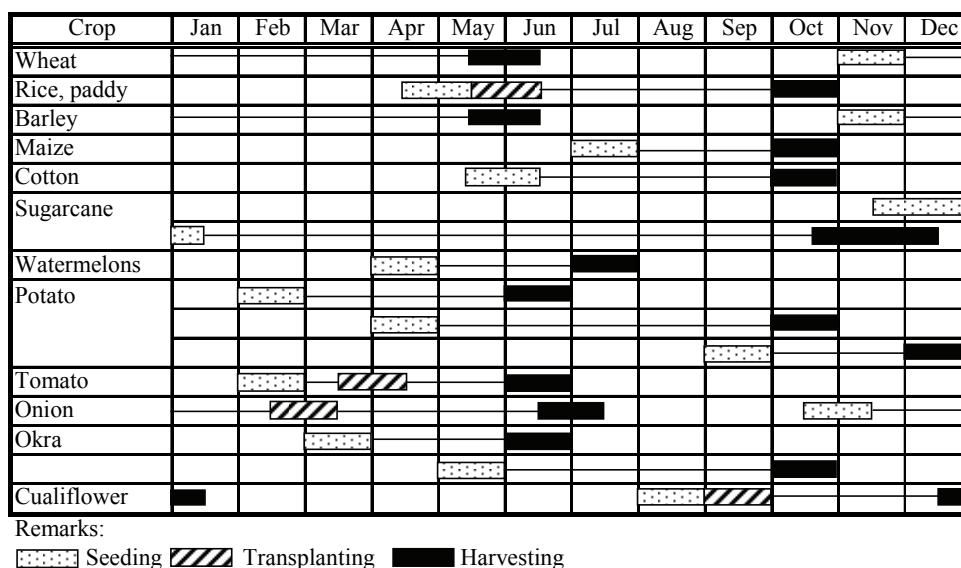


Fig. 4-54 Crop Calendar of Major Crops in Nangarhar Province

#### A-4-6 Problems in Growing Crops and Livestock

Table 4-6-1 Problems Recognized by Local Leaders in Growing Crops

| No | Crop                | Major Problem/Constraints                                                              |                                                                                          |                                                                                                                                            |                                                                                                                               |
|----|---------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
|    |                     | Balkh Province                                                                         | Kunduz Province                                                                          | Takhar Province                                                                                                                            | Nangarhar Province                                                                                                            |
| 1  | Wheat               | Shortage of improved seeds<br>Shortage of agro-chemicals<br>High price of fertilizers  | Shortage of improved seeds<br>Shortage of agro-chemicals<br>High price of fertilizers    | Shortage of improved seeds<br>Shortage of agro-chemicals<br>Lack of farm tools/equipment<br>Shortage of fertilizers                        | Shortage of improved seeds<br>Shortage of agro-chemicals<br>Shortage of fertilizers                                           |
| 2  | Rice                | Shortage of improved seeds<br>Shortage of water                                        | Shortage of improved seeds<br>Shortage of agro-chemicals                                 | Shortage of improved seeds<br>Shortage of agro-chemicals<br>Shortage of fertilizers<br>Lack of farm tools/equipment<br>High cost of farm   | High cost of farm<br>tools/equipment<br>Shortage of agro-chemicals<br>High price of fertilizers<br>Shortage of improved seeds |
| 3  | Maize               | Shortage of improved seeds                                                             | Shortage of agro-chemicals<br>Shortage of improved seeds<br>Lack of farm tools/equipment | Shortage of improved seeds<br>High price of fertilizers<br>Shortage of agro-chemicals<br>Lack of farm tools/equipment<br>High cost of farm | Shortage of improved seeds<br>Shortage of agro-chemicals<br>High price of fertilizers                                         |
| 4  | Barley              | Shortage of improved seeds                                                             | Shortage of improved seeds                                                               | Shortage of improved seeds<br>Lack of farm tools/equipment                                                                                 | Shortage of improved seeds<br>High price of fertilizers<br>Shortage of agro-chemicals<br>High cost of farm                    |
| 5  | Pulses              | Shortage of improved seeds                                                             | Shortage of improved seeds                                                               | Shortage of improved seeds<br>Lack of farm tools/equipment<br>Shortage of fertilizers                                                      | Shortage of improved seeds<br>Shortage of agro-chemicals<br>High cost of farm                                                 |
| 6  | Fodder crops        | Shortage of improved seeds                                                             | High price of fertilizers                                                                | Shortage of improved seeds<br>Shortage of fertilizers<br>Lack of farm tools/equipment                                                      | Shortage of improved seeds<br>Shortage of fertilizers<br>High price of fertilizers                                            |
| 7  | Cotton              | Shortage of improved seeds<br>Shortage of agro-chemicals                               | Shortage of improved seeds<br>No good market opportunity                                 | Shortage of improved seeds<br>Shortage of agro-chemicals                                                                                   | Shortage of improved seeds<br>Shortage of agro-chemicals<br>Shortage of fertilizers                                           |
| 8  | Vegetables & Melons | Shortage of improved seeds<br>Shortage of agro-chemicals<br>No good market opportunity | Shortage of improved seeds<br>Shortage of agro-chemicals                                 | Shortage of agro-chemicals<br>Shortage of improved seeds                                                                                   | Shortage of improved seeds<br>No good market opportunity<br>No storage facilities                                             |
| 9  | Fruits              | No good market opportunity<br>Shortage of good seedlings<br>Many diseases              | Shortage of good seedlings<br>Shortage of agro-chemicals                                 | Shortage of agro-chemicals<br>No good market opportunity                                                                                   | No good market opportunity<br>Shortage of agro-chemicals<br>Shortage of good seedlings<br>No storage facilities               |
| 10 | Nuts                | No good market opportunity<br>Many diseases                                            | Shortage of good seedlings                                                               | Lack of farm tools/equipment<br>Shortage of good seedlings                                                                                 | Shortage of agro-chemicals<br>Shortage of good seedlings                                                                      |

Many local leaders of the target provinces recognize that shortage of quality seeds or seedlings is the most

serious problem. As mentioned in the main part of this report, though a relatively high percentage of farm-households are purchasing wheat seeds, it is interesting an interesting fact that many people still have a problem in getting quality seeds or seedlings (including wheat seeds). While the further examination on the people's needs for quality seeds or seedlings is necessary, the problem is one of the priority issues for increasing crop production. Though availability of irrigation water must be the most serious problem among farmers, the issue is not mentioned much by the local leaders. They may consider that the water issue is a matter out of their control. The leaders' concern about availability of farm inputs other then seeds or seedlings becomes stronger as the province's location shifts to the east; from Balkh and Kunduz to Takhar and Nangarhar. This may represent the degree of farm intensification in the provinces.

**Table 4-6-2 Problems Recognized by Local Leaders in Growing Livestock**

| No | Livestock | Major Problem/Constraints                                        |                                        |                                            |                                                        |
|----|-----------|------------------------------------------------------------------|----------------------------------------|--------------------------------------------|--------------------------------------------------------|
|    |           | Balkh Province                                                   | Kunduz Province                        | Takhar Province                            | Nangarhar Province                                     |
| 1  | Cattle    | Shortage of medicine<br>No vaccination                           | Shortage of medicine<br>No vaccination | No clinic/veterinarian<br>Shortage of feed | No clinic/veterinarian<br>No breeding program or stock |
| 2  | Sheep     | Shortage of medicine<br>No vaccination                           | Shortage of medicine<br>No vaccination | No clinic/veterinarian                     | No clinic/veterinarian                                 |
| 3  | Goats     | No clinic/veterinarian<br>No vaccination                         | No vaccination<br>Shortage of medicine | No clinic/veterinarian<br>Shortage of feed | No clinic/veterinarian<br>Shortage of feed             |
| 4  | Chicken   | No vaccination<br>Shortage of medicine<br>No clinic/veterinarian | No vaccination                         | No vaccination                             | No vaccination                                         |

On the other hand, the leaders in the provinces share almost the same problem in growing livestock. Their most serious concern is assumed to be the issue of animal health.

#### **A-4-7 Selection of Summer Crops**

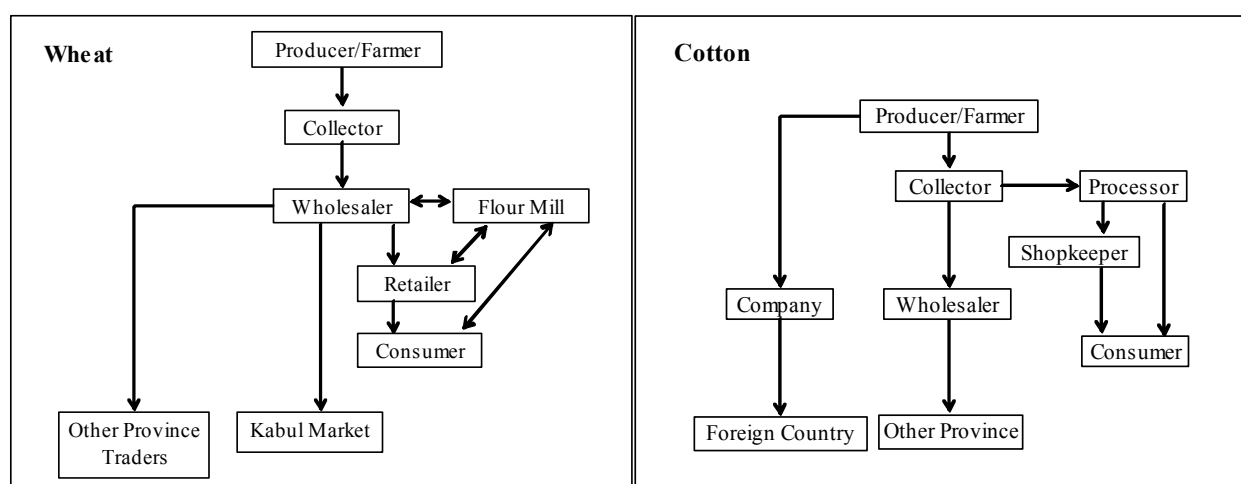
In contrary to winter crops, which are dominated by wheat, farmers must pay attention to many factors for selecting summer crops. The common and serious concern in the provinces is availability of farming resources, i.e. inputs and manpower. Especially lack of drawing power (animals or tractors) is assumed to be the critical hampering factor of many farmers. It is again interesting that many farmers do not concern about availability of irrigation water except for rice and vegetables. Few farmer pay serious attention to soil fertility or crop rotation factors for selecting summer crops.

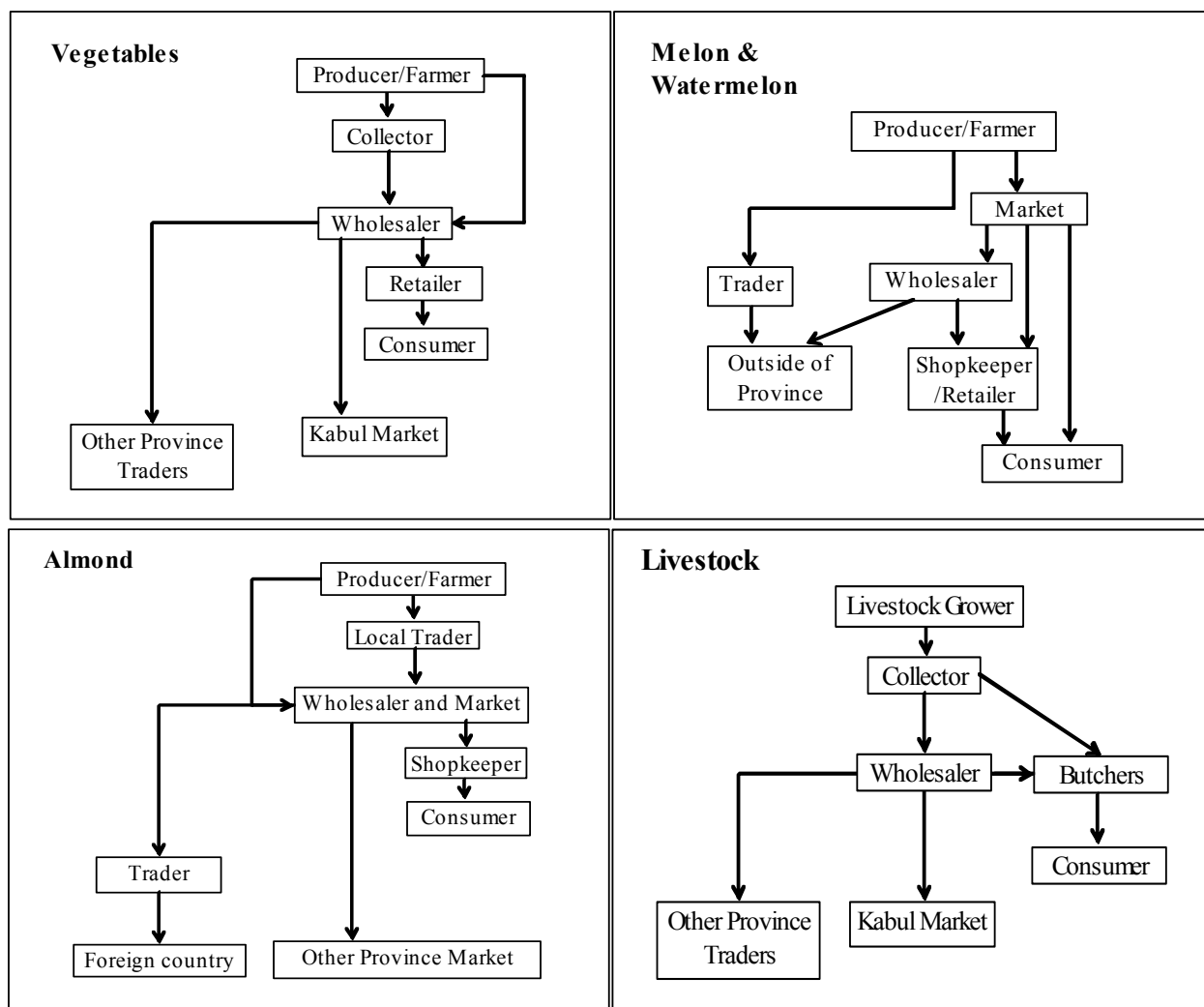
**Table 4-7-1 Farmer's Concerns for Selecting Summer Crops**

| Crops              | Major Concerns                                                                                                   |                                                                    |                                                                                                                                  |                                                                                                                                                                                |
|--------------------|------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    | Balkh Province                                                                                                   | Kunduz Province                                                    | Takhar Province                                                                                                                  | Nangerhar Province                                                                                                                                                             |
| Rice               | NA                                                                                                               | Drawing power (animal/tractor)<br>Home consumption<br>Manpower     | Irrigation water<br>Drawing power (animal/tractor)<br>Quality seeds<br>Manpower<br>Fertilizers                                   | Irrigation water<br>Drawing power (animal/tractor)<br>Fertilizers<br>Quality seeds<br>Fertilizers<br>Home consumption<br>Maintaining soil fertility<br>Market price            |
| Maize              | Drawing power (animal/tractor)<br>Home consumption                                                               | Drawing power (animal/tractor)                                     | Drawing power (animal/tractor)<br>Quality seeds<br>Irrigation water                                                              | Drawing power (animal/tractor)<br>Quality seeds<br>Irrigation water<br>Fertilizers                                                                                             |
| Pulses             | Drawing power (animal/tractor)<br>Home consumption<br>Market price                                               | Drawing power (animal/tractor)<br>Market price                     | Drawing power (animal/tractor)                                                                                                   | NA                                                                                                                                                                             |
| Alfalfa            | Securing animal feed<br>Drawing power (animal/tractor)                                                           | Securing animal feed<br>Drawing power (animal/tractor)             | Securing animal feed<br>Drawing power (animal/tractor)<br>Irrigation water                                                       | Securing animal feed<br>Irrigation water<br>Drawing power (animal/tractor)                                                                                                     |
| Cotton             | Drawing power (animal/tractor)<br>Market price<br>Manpower<br>Home requirement                                   | Drawing power (animal/tractor)<br>Market price<br>Manpower         | Drawing power (animal/tractor)                                                                                                   | Drawing power (animal/tractor)<br>Irrigation water<br>Quality seeds<br>Manpower<br>Fertilizers<br>Pesticides                                                                   |
| Melon & Watermelon | Drawing power (animal/tractor)<br>Manpower<br>Market price<br>Irrigation water<br>Home consumption               | Drawing power (animal/tractor)<br>Market price<br>Pesticides       | Drawing power (animal/tractor)                                                                                                   | NA                                                                                                                                                                             |
| Vegetables         | Drawing power (animal/tractor)<br>Market price<br>Manpower<br>Home consumption<br>Irrigation water<br>Pesticides | Drawing power (animal/tractor)<br>Irrigation water<br>Market price | Drawing power (animal/tractor)<br>Irrigation water<br>Quality seeds<br>Fertilizers<br>Manpower<br>Pesticides<br>Home consumption | Irrigation water<br>Quality seeds<br>Fertilizers<br>Drawing power (animal/tractor)<br>Manpower<br>Maintaining soil fertility<br>Market price<br>Pesticides<br>Home consumption |

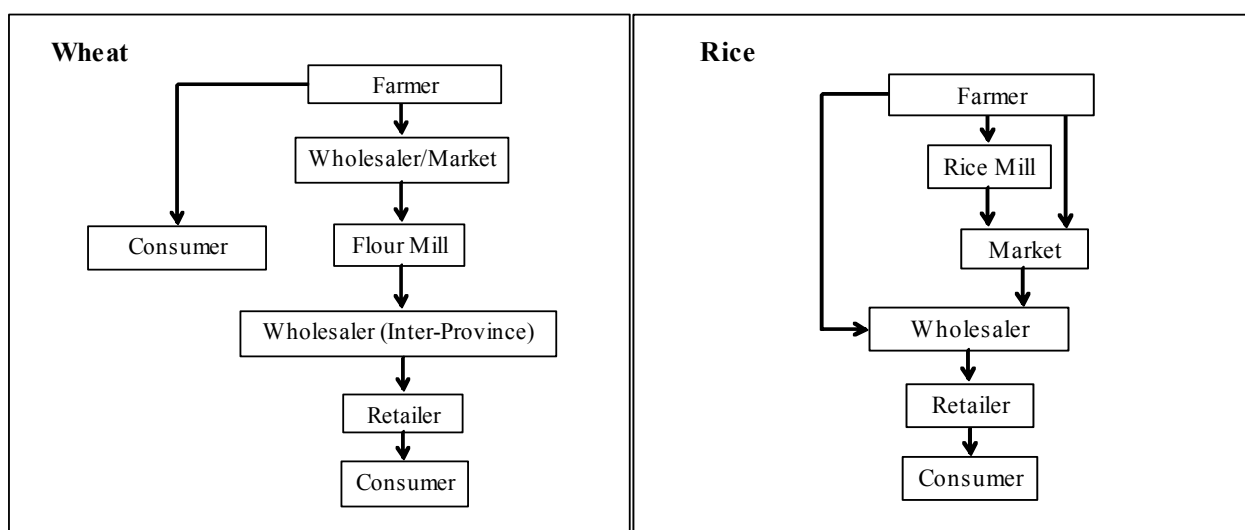
## **A-4-8 Marketing Channels of Major Agricultural Commodities**

### **(1) Balkh Province**

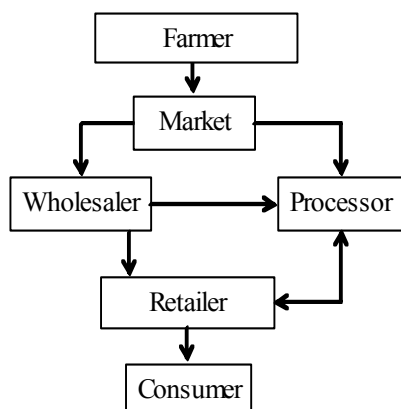




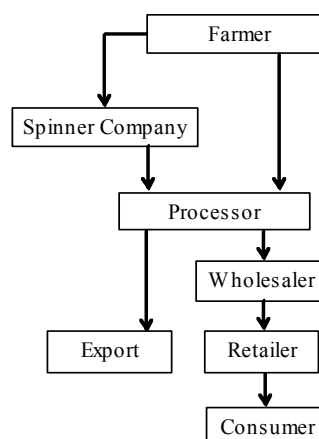
## (2) Kunduz Province



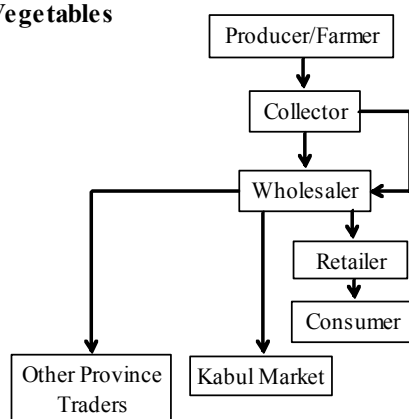
### Sesami & Flax



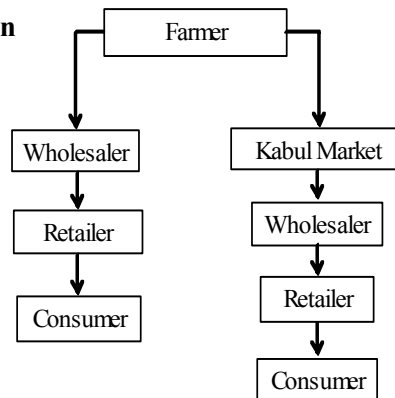
### Cotton



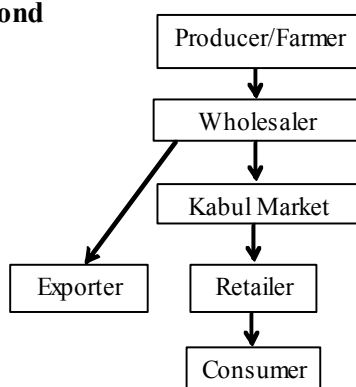
### Vegetables



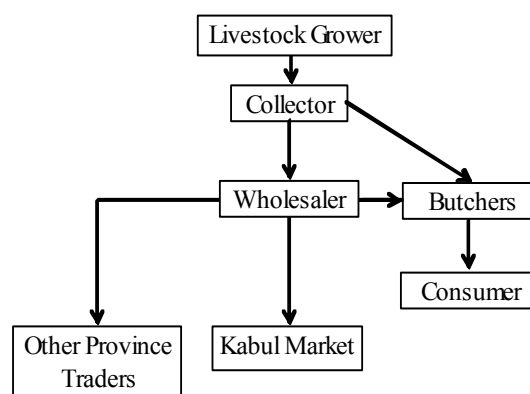
### Melon & Watermelon



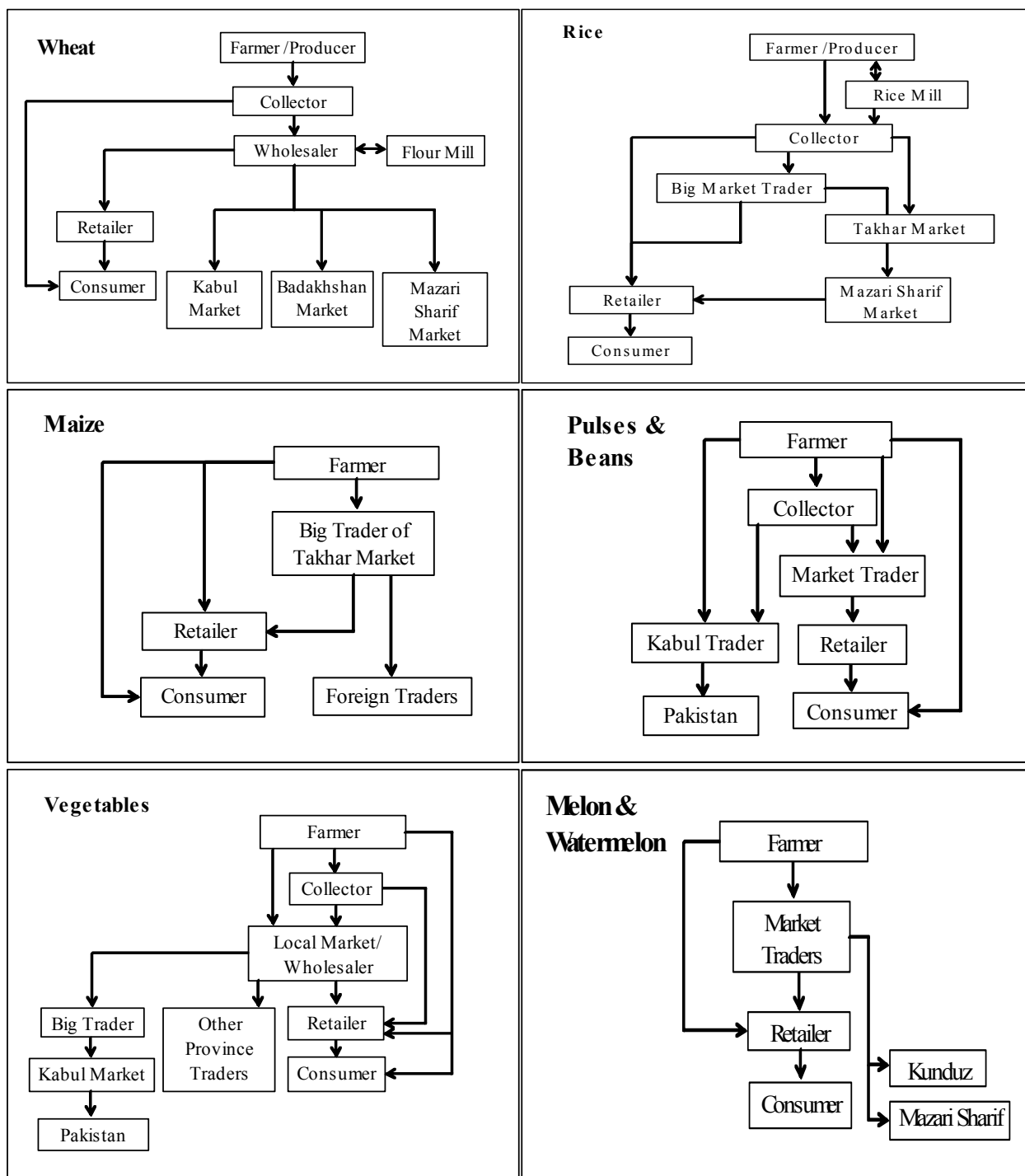
### Almond

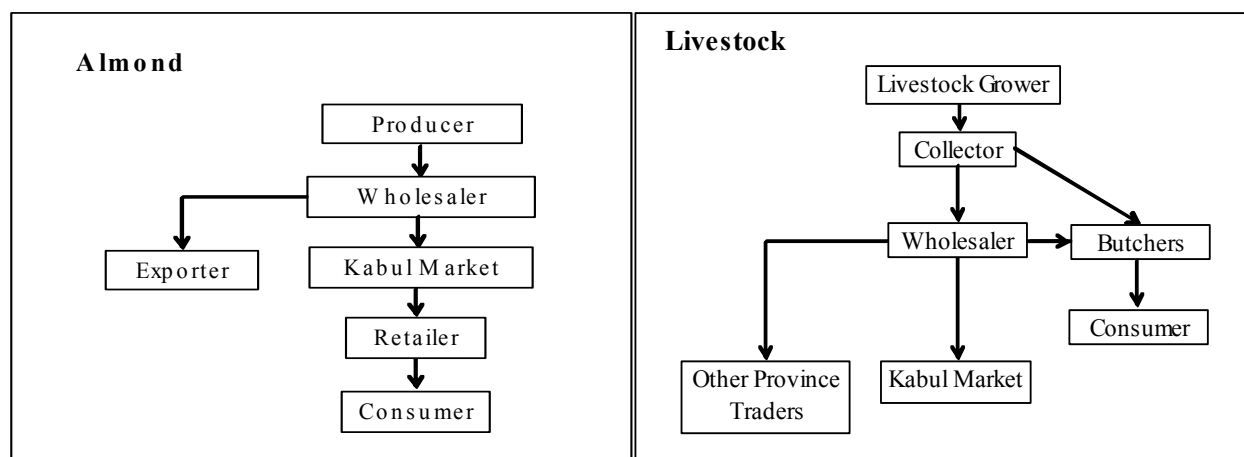


### Livestock

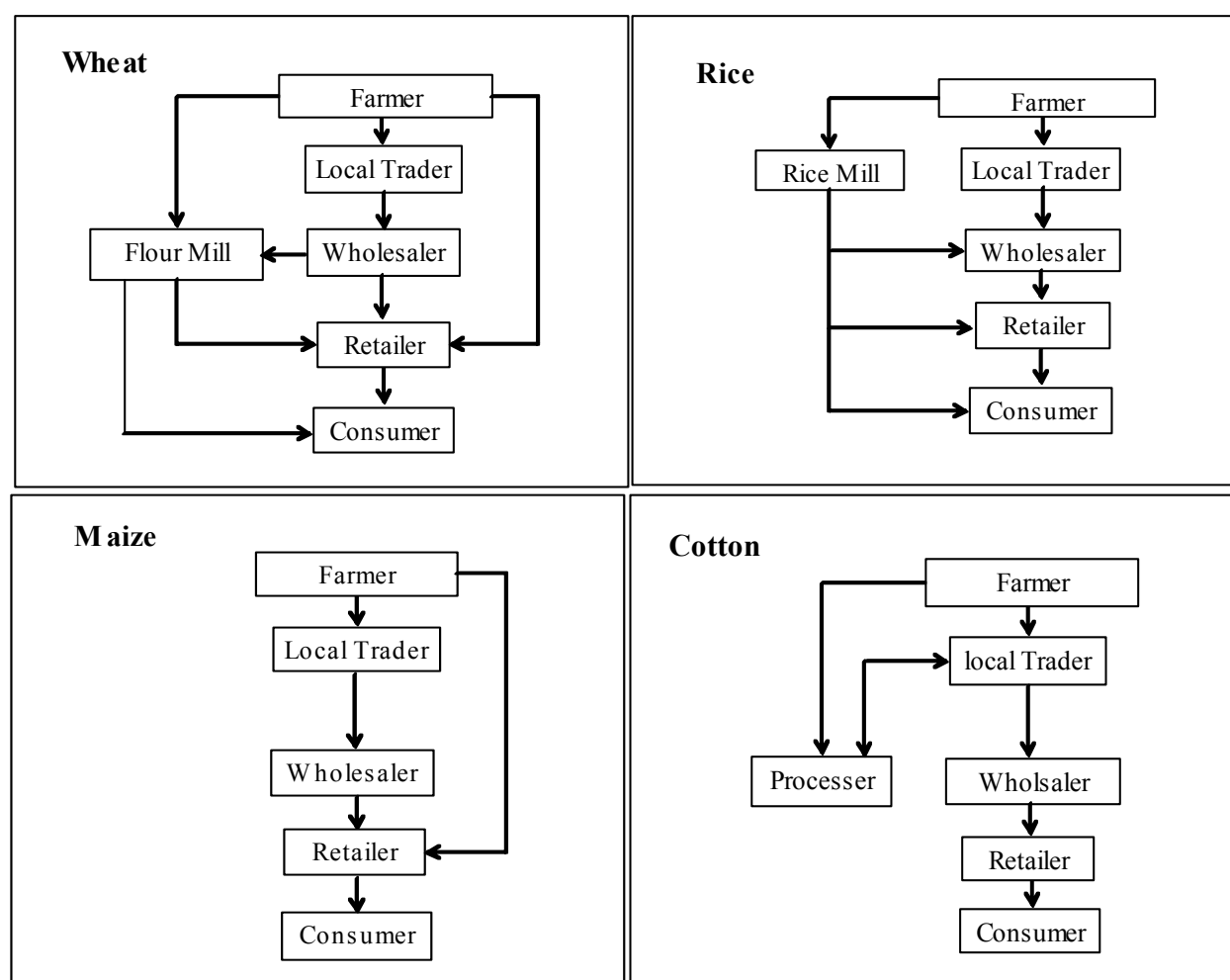


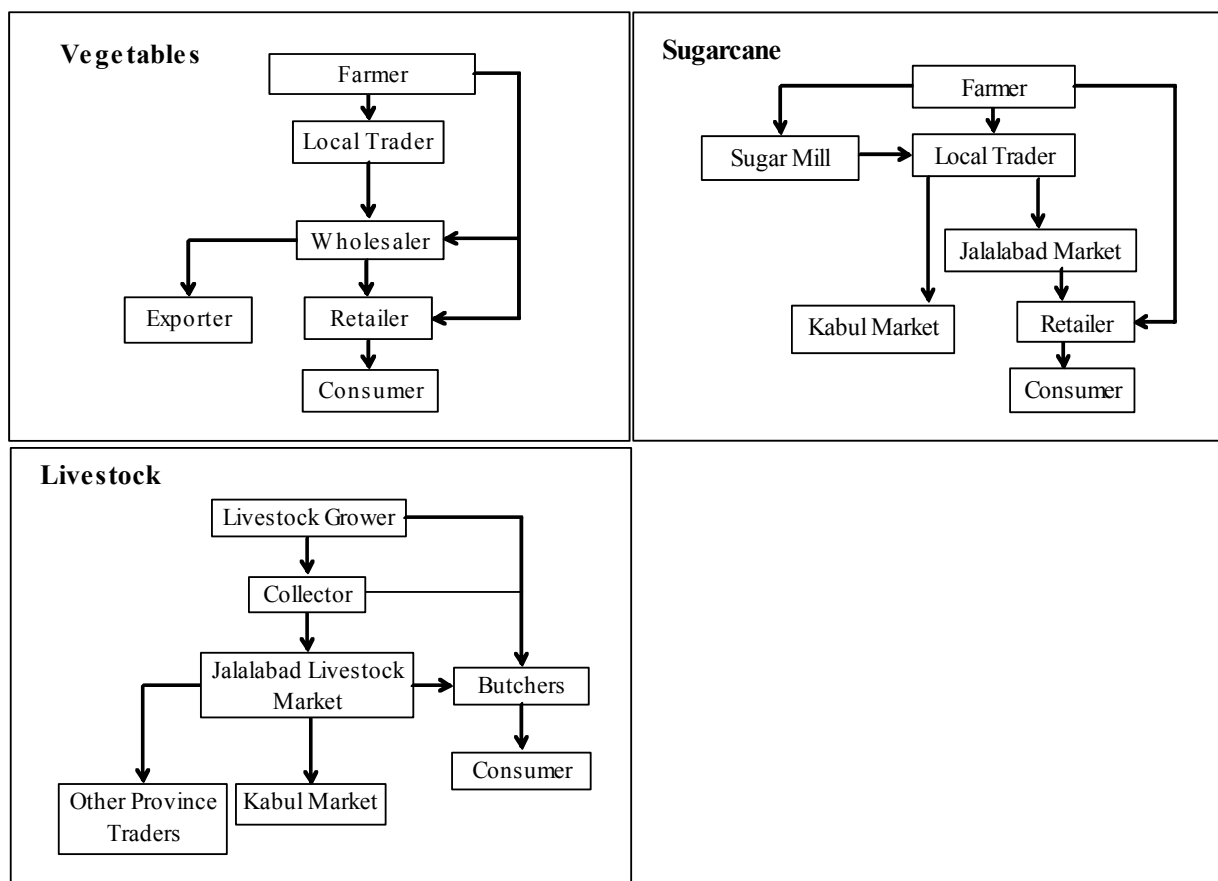
### (3) Takhar Province





**(4) Namgarhar Province**





#### A-4-9 Importance of Crops/Livestock to Local Economy

**Table 4-9-1 Importance of Crops/Livestock to Local Economy Evaluated by Local Leaders**

| No | Crop/Livestock | Importance (A>B>C>D>E) |                 |                 |                    |
|----|----------------|------------------------|-----------------|-----------------|--------------------|
|    |                | Balkh Province         | Kunduz Province | Takhar Province | Nangarhar Province |
| 1  | Wheat          | A                      | A               | A               | A                  |
| 2  | Rice           | C                      | A               | A               | A                  |
| 3  | Maize          | C                      | D               | B               | B                  |
| 4  | Barley         | C                      | C               | C               | D                  |
| 5  | Pulses         | C                      | D               | C               | E                  |
| 6  | Fodder crops   | C                      | C               | B               | C                  |
| 7  | Cotton         | B                      | C               | B               | C                  |
| 8  | Vegetables &   | B                      | C               | A               | A                  |
| 9  | Fruits         | B                      | C               | B               | C                  |
| 10 | Nuts           | B                      | C               | C               | E                  |
| 11 | Cattle         | B                      | B               | B               | A                  |
| 12 | Sheep          | B                      | B               | B               | B                  |
| 13 | Goats          | C                      | C               | C               | D                  |
| 14 | Chicken        | B                      | C               | C               | B                  |

Wheat is the most important agricultural commodity in all target provinces. The number of important commodities increases as the province's location shifts to the east. It shows that agricultural diversification is more advanced in the eastern provinces of the country.

## A-5 Priority Crops and Livestock in Agriculture and Rural Development Policy

The following tables show priority crops and livestock in agriculture and rural development policy by districts, based on information obtained through interviews to the provincial agricultural extension departments in the provinces. Wheat, cattle, sheep and goats have commonly high priority in the districts.

**Table 5-1 Priority Crops and Livestock in Agriculture and Rural Development Policy in Balkh Province**

| No | District   | Wheat | Rice, Paddy | Barley | Maize | Millet | Pulses | Potatoes | Melons | Water melons | Vegetables | Sugar Cane | Sugar Beets | Cotton | Sunflower | Sesame | Linseed | Peaches | Apricots | Pomegranate | Apple | Pears |
|----|------------|-------|-------------|--------|-------|--------|--------|----------|--------|--------------|------------|------------|-------------|--------|-----------|--------|---------|---------|----------|-------------|-------|-------|
| 1  | Dehdadi    | A     | C           | B      | B     | C      | B      | C        | B      | B            | A          | C          | C           | B      | C         | B      | C       | C       | C        | B           | C     | C     |
| 2  | Shulgara   | A     | A           | B      | B     | C      | C      | C        | B      | B            | B          | C          | C           | B      | C         | B      | C       | C       | C        | C           | B     | C     |
| 3  | Chamtal    | A     | C           | B      | B     | C      | C      | C        | B      | B            | A          | C          | C           | B      | C         | B      | C       | C       | C        | C           | C     | C     |
| 4  | Dowlatabad | A     | C           | B      | C     | C      | B      | C        | B      | B            | C          | C          | C           | B      | C         | B      | C       | C       | C        | C           | C     | C     |
| 5  | Charbolak  | A     | C           | B      | B     | C      | C      | C        | B      | B            | B          | C          | C           | B      | C         | B      | C       | C       | C        | C           | C     | C     |
| 6  | Balkh      | A     | C           | B      | B     | C      | B      | C        | B      | B            | A          | C          | C           | A      | C         | B      | C       | C       | C        | C           | C     | C     |
| 7  | Nahr Shahi | A     | C           | B      | C     | B      | B      | C        | B      | B            | A          | C          | C           | B      | C         | B      | C       | C       | C        | B           | C     | C     |
| 8  | Kholm      | A     | C           | B      | C     | C      | C      | C        | B      | B            | B          | C          | C           | B      | C         | B      | C       | C       | C        | A           | C     | C     |
| 9  | Zarea      | A     | C           | B      | C     | C      | C      | C        | B      | B            | C          | C          | C           | B      | C         | B      | C       | C       | C        | C           | B     | C     |
| 10 | Kaldar     | A     | C           | B      | C     | C      | C      | C        | B      | B            | C          | C          | C           | B      | C         | B      | C       | C       | C        | C           | C     | C     |
| 11 | Charkent   | A     | C           | B      | C     | C      | C      | C        | B      | B            | C          | C          | C           | C      | C         | B      | C       | C       | C        | C           | B     | C     |
| 12 | Kshndi     | A     | C           | B      | C     | C      | C      | C        | B      | B            | C          | C          | C           | C      | C         | B      | C       | C       | C        | C           | C     | C     |
| 13 | Marmal     | A     | C           | B      | C     | C      | C      | C        | B      | B            | C          | C          | C           | C      | C         | B      | C       | C       | C        | C           | C     | C     |
| 14 | Shurtepa   | A     | C           | B      | C     | C      | C      | C        | B      | B            | C          | C          | C           | C      | C         | B      | C       | C       | C        | C           | C     | C     |

| No | District   | Grapes | Figs | Oranges/Citrus | Almonds | Walnuts | Pistachios | Olives | Cattle | Sheep | Goats | Chickens | Horses | Camel | Donkey |
|----|------------|--------|------|----------------|---------|---------|------------|--------|--------|-------|-------|----------|--------|-------|--------|
| 1  | Dehdadi    | B      | C    | C              | B       | C       | C          | C      | A      | A     | A     | B        | B      | B     | B      |
| 2  | Shulgara   | B      | C    | C              | C       | C       | C          | C      | A      | A     | A     | B        | B      | B     | B      |
| 3  | Chamtal    | C      | C    | C              | C       | C       | C          | C      | A      | A     | A     | B        | B      | B     | B      |
| 4  | Dowlatabad | C      | C    | C              | A       | C       | C          | C      | A      | A     | A     | B        | B      | B     | B      |
| 5  | Charbolak  | C      | C    | C              | C       | C       | C          | C      | A      | A     | A     | B        | B      | B     | B      |
| 6  | Balkh      | C      | C    | C              | B       | C       | C          | C      | A      | A     | A     | B        | B      | B     | B      |
| 7  | Nahr Shahi | C      | C    | C              | B       | C       | C          | C      | A      | A     | A     | B        | B      | B     | B      |
| 8  | Kholm      | B      | B    | C              | C       | C       | C          | C      | A      | A     | A     | B        | B      | B     | B      |
| 9  | Zarea      | C      | C    | C              | C       | C       | C          | C      | A      | A     | A     | B        | B      | C     | B      |
| 10 | Kaldar     | C      | C    | C              | C       | C       | C          | C      | A      | A     | A     | B        | C      | B     | B      |
| 11 | Charkent   | C      | C    | C              | C       | B       | C          | C      | A      | A     | A     | B        | B      | C     | B      |
| 12 | Kshndi     | C      | C    | C              | C       | C       | C          | C      | A      | A     | A     | B        | B      | C     | B      |
| 13 | Marmal     | C      | C    | C              | C       | B       | B          | C      | A      | A     | A     | B        | B      | C     | B      |
| 14 | Shurtepa   | C      | C    | C              | C       | C       | C          | C      | A      | A     | A     | B        | B      | B     | B      |

**Remarks (Priority order):**

**A: High priority**

**B: Next priority**

**C: No priority**

(Source) Head of Extension Department

**Table 5-2 Priority Crops and Livestock in Agriculture and Rural Development Policy in Kundus Province**

|    |           | Wheat | Rice, Paddy | Barley | Maize | Millet | Pulses | Potatoes | Melons | Water melons | Vegetables | Sugar Cane | Sugar Beets | Cotton | Sunflower | Sesame | Linseed | Peaches | Apricots | Pomegranate | Apple | Pears |
|----|-----------|-------|-------------|--------|-------|--------|--------|----------|--------|--------------|------------|------------|-------------|--------|-----------|--------|---------|---------|----------|-------------|-------|-------|
| No | District  |       |             |        |       |        |        |          |        |              |            |            |             |        |           |        |         |         |          |             |       |       |
| 1  | Kunduz    | A     | A           | B      | C     | C      | C      | C        | A      | A            | A          | C          | C           | C      | C         | C      | C       | B       | C        | C           | C     | C     |
| 2  | Khan abad | A     | A           | B      | C     | C      | B      | C        | A      | A            | A          | C          | C           | B      | C         | C      | C       | B       | C        | C           | C     | C     |
| 3  | Ali abad  | A     | A           | B      | B     | C      | C      | C        | A      | A            | A          | C          | C           | B      | C         | C      | C       | B       | C        | C           | C     | C     |
| 4  | Imamsahib | A     | A           | B      | B     | C      | C      | B        | A      | A            | B          | C          | C           | B      | C         | B      | C       | B       | C        | C           | C     | C     |
| 5  | Archi     | A     | B           | B      | B     | C      | C      | C        | B      | B            | B          | C          | C           | B      | C         | C      | C       | C       | C        | C           | C     | C     |
| 6  | Qala Zal  | A     | A           | B      | B     | C      | C      | C        | B      | B            | B          | C          | C           | B      | C         | C      | C       | C       | C        | C           | C     | C     |
| 7  | Chardara  | A     | A           | B      | B     | C      | C      | C        | A      | A            | A          | C          | C           | B      | C         | C      | C       | B       | C        | C           | C     | C     |

|    |            | Grapes | Figs | Oranges/Citrus | Almonds | Walnuts | Pistachios | Olives | Cattle | Sheep | Goats | Chickens | Donky |
|----|------------|--------|------|----------------|---------|---------|------------|--------|--------|-------|-------|----------|-------|
| No | District   |        |      |                |         |         |            |        |        |       |       |          |       |
| 1  | Dehdadi    | A      | C    | C              | C       | C       | C          | C      | A      | A     | B     | B        | B     |
| 2  | Shulgara   | A      | C    | C              | C       | C       | C          | C      | A      | A     | B     | B        | B     |
| 3  | Chamtal    | C      | C    | C              | C       | C       | C          | C      | A      | A     | B     | B        | B     |
| 4  | Dowlatabad | C      | C    | C              | A       | C       | C          | C      | A      | A     | B     | B        | B     |
| 5  | Charbolak  | C      | C    | C              | C       | C       | C          | C      | A      | A     | B     | B        | B     |
| 6  | Balkh      | C      | C    | C              | C       | C       | C          | C      | A      | A     | B     | B        | B     |
| 7  | Nahr Shahi | C      | C    | C              | A       | C       | C          | C      | A      | A     | B     | B        | B     |

**Remarks (Priority order):**

**A: High priority**

**B: Next priority**

**C: No priority**

(Source) Head of Extension Department

**Table 5-3 Priority Crops and Livestock in Agriculture and Rural Development Policy in Takhar Province**

| No | District         | Wheat | Rice, Paddy | Barley | Maize | Millet | Pulses | Potatoes | Melons | Water melons | Vegetables | Sugar Cane | Sugar Beets | Cotton | Sunflower | Sesame | Linseed | Peaches | Apricots | Pomegranate | Apple |
|----|------------------|-------|-------------|--------|-------|--------|--------|----------|--------|--------------|------------|------------|-------------|--------|-----------|--------|---------|---------|----------|-------------|-------|
| 1  | Taloqan          | A     | A           | B      | B     | C      | C      | B        | B      | B            | B          | C          | C           | B      | C         | B      | C       | B       | C        | B           | C     |
| 2  | Baharak          | A     | A           | B      | B     | C      | C      | C        | B      | B            | B          | C          | C           | B      | C         | C      | C       | B       | C        | C           | C     |
| 3  | Bangi            | A     | A           | B      | B     | C      | B      | C        | C      | C            | B          | C          | C           | B      | C         | C      | C       | B       | C        | C           | C     |
| 4  | Khwaja Bahaoudin | A     | C           | B      | B     | C      | C      | C        | B      | B            | B          | C          | C           | C      | C         | B      | C       | C       | C        | C           | C     |
| 5  | Darqad           | A     | A           | B      | C     | C      | C      | C        | B      | C            | C          | C          | C           | C      | C         | B      | C       | C       | C        | C           | C     |
| 6  | Khwajaghar       | A     | A           | B      | B     | C      | C      | C        | C      | C            | B          | C          | C           | B      | C         | C      | C       | C       | C        | C           | C     |
| 7  | Namakab          | A     | C           | B      | C     | C      | B      | C        | B      | B            | C          | C          | C           | C      | C         | C      | C       | C       | C        | C           | C     |
| 8  | Kalfgan          | A     | C           | B      | B     | C      | B      | C        | C      | B            | C          | C          | C           | B      | C         | B      | C       | C       | C        | C           | C     |
| 9  | Farkhar          | A     | B           | B      | B     | C      | B      | B        | C      | B            | C          | C          | C           | C      | C         | C      | C       | B       | C        | C           | B     |
| 10 | Warsaj           | A     | C           | B      | C     | C      | B      | A        | B      | C            | C          | C          | C           | C      | C         | C      | C       | C       | C        | C           | B     |
| 11 | Dashti Qala      | A     | C           | B      | B     | C      | C      | C        | B      | B            | B          | C          | C           | B      | C         | B      | C       | B       | C        | C           | C     |
| 12 | Chahab           | A     | B           | B      | C     | C      | B      | C        | B      | B            | C          | C          | C           | C      | C         | B      | C       | C       | C        | C           | C     |
| 13 | Rostaq           | A     | B           | B      | C     | C      | B      | B        | C      | B            | B          | C          | C           | C      | C         | B      | C       | C       | C        | C           | C     |
| 14 | Shkamesh         | A     | C           | B      | B     | C      | B      | C        | B      | C            | C          | C          | C           | B      | C         | C      | C       | C       | C        | C           | C     |
| 15 | Chal             | A     | C           | B      | B     | C      | C      | C        | B      | B            | C          | C          | C           | C      | C         | C      | C       | C       | C        | C           | C     |
| 16 | Hazar smach      | A     | C           | B      | C     | C      | B      | C        | B      | —            | C          | C          | C           | C      | C         | C      | C       | C       | C        | C           | C     |
| 17 | Yangi Qala       | A     | B           | B      | C     | C      | B      | C        | C      | B            | B          | C          | C           | B      | C         | B      | C       | B       | C        | B           | C     |

| No | District         | Pears | Grapes | Figs | Oranges/Citrus | Almonds | Walnuts | Pistachios | Olives | Cattle | Sheep | Goats | Chickens | Horses | Donky |
|----|------------------|-------|--------|------|----------------|---------|---------|------------|--------|--------|-------|-------|----------|--------|-------|
| 1  | Taloqan          | C     | B      | C    | C              | B       | C       | C          | C      | A      | A     | A     | B        | B      | B     |
| 2  | Baharak          | C     | C      | C    | C              | C       | C       | C          | C      | A      | A     | A     | B        | C      | B     |
| 3  | Bangi            | C     | C      | C    | C              | C       | C       | C          | C      | A      | A     | A     | B        | C      | B     |
| 4  | Khwaja Bahaoudin | C     | C      | C    | C              | C       | C       | C          | C      | A      | A     | A     | B        | C      | B     |
| 5  | Darqad           | C     | C      | C    | C              | B       | C       | C          | C      | A      | A     | A     | B        | B      | B     |
| 6  | Khwajaghar       | C     | C      | C    | C              | C       | C       | C          | C      | A      | A     | A     | B        | C      | B     |
| 7  | Namakab          | C     | C      | C    | C              | C       | C       | C          | C      | A      | A     | A     | B        | C      | B     |
| 8  | Kalfgan          | C     | C      | C    | C              | C       | C       | C          | C      | A      | A     | A     | B        | C      | B     |
| 9  | Farkhar          | C     | C      | C    | C              | B       | B       | B          | C      | A      | A     | A     | B        | C      | B     |
| 10 | Warsaj           | C     | C      | C    | C              | B       | B       | C          | C      | A      | A     | A     | B        | C      | B     |
| 11 | Dashti Qala      | C     | C      | C    | C              | B       | C       | C          | C      | A      | A     | A     | B        | C      | B     |
| 12 | Chahab           | C     | C      | C    | C              | C       | C       | B          | C      | A      | A     | A     | B        | C      | B     |
| 13 | Rostaq           | C     | C      | C    | C              | C       | C       | B          | C      | A      | A     | A     | B        | C      | B     |
| 14 | Shkamesh         | C     | C      | C    | C              | C       | C       | C          | C      | A      | A     | A     | B        | C      | B     |
| 15 | Chal             | C     | C      | C    | C              | C       | C       | C          | C      | A      | A     | A     | B        | C      | B     |
| 16 | Hazar smach      | C     | C      | C    | C              | C       | C       | C          | C      | A      | A     | A     | B        | C      | B     |
| 17 | Yangi Qala       | C     | C      | C    | C              | B       | C       | C          | C      | A      | A     | A     | B        | B      | B     |

**Remarks (Priority order):**

**A: High priority**

**B: Next priority**

**C: No priority**

(Source) Head of Extension Department

**Table 5-4 Priority Crops and Livestock in Agriculture and Rural Development Policy in Nangarhar Province**

|    |             | Wheat | Rice, Paddy | Barley | Maize | Millet | Pulses | Potatoes | Melons | Water melons | Vegetables | Sugar Cane | Sugar Beets | Cotton | Sunflower | Sesame | Linseed | Peaches | Apricots | Pomegranate | Apple | Pears | Grapes | Figs | Oranges/Citrus | Almonds | Walnuts |
|----|-------------|-------|-------------|--------|-------|--------|--------|----------|--------|--------------|------------|------------|-------------|--------|-----------|--------|---------|---------|----------|-------------|-------|-------|--------|------|----------------|---------|---------|
| No | District    |       |             |        |       |        |        |          |        |              |            |            |             |        |           |        |         |         |          |             |       |       |        |      |                |         |         |
| 1  | Surkhrod    | A     | B           | B      | B     | C      | C      | B        | C      | C            | A          | C          | C           | B      | B         | C      | C       | C       | C        | C           | C     | C     | C      | C    | B              | C       | C       |
| 2  | Khogyani    | A     | B           | B      | B     | C      | C      | B        | C      | C            | A          | C          | C           | C      | C         | B      | C       | C       | B        | C           | C     | C     | B      | C    | C              | C       | B       |
| 3  | Sharzad     | A     | C           | B      | B     | C      | C      | C        | C      | C            | B          | C          | C           | C      | C         | C      | C       | C       | C        | B           | C     | C     | B      | C    | C              | C       | B       |
| 4  | Hesarak     | A     | C           | B      | B     | C      | C      | C        | C      | C            | B          | C          | C           | C      | C         | C      | C       | C       | C        | C           | C     | C     | B      | C    | C              | C       | B       |
| 5  | Behsood     | A     | A           | C      | B     | C      | C      | B        | C      | C            | A          | B          | C           | B      | C         | C      | C       | C       | C        | B           | C     | C     | C      | C    | B              | C       | C       |
| 6  | Khewa       | A     | A           | C      | B     | C      | C      | B        | C      | C            | A          | B          | C           | B      | C         | C      | C       | C       | C        | C           | C     | C     | C      | C    | B              | C       | C       |
| 7  | Dara e Noor | A     | B           | B      | B     | C      | C      | C        | C      | C            | B          | C          | C           | C      | C         | C      | C       | C       | C        | C           | C     | C     | B      | C    | C              | C       | B       |
| 8  | Kama        | A     | A           | B      | B     | C      | C      | B        | C      | C            | B          | A          | A           | C      | B         | C      | C       | C       | C        | B           | C     | C     | C      | C    | C              | B       | C       |
| 9  | Goshta      | A     | C           | C      | B     | C      | C      | B        | C      | C            | B          | A          | C           | C      | C         | C      | C       | C       | C        | C           | C     | C     | C      | C    | B              | C       | C       |
| 10 | Lalpoora    | A     | C           | C      | B     | C      | C      | A        | C      | C            | B          | C          | C           | C      | C         | C      | C       | C       | C        | C           | C     | C     | C      | C    | B              | C       | C       |
| 11 | Chaparhar   | A     | C           | C      | B     | C      | C      | C        | C      | C            | B          | C          | C           | B      | C         | C      | C       | C       | C        | C           | C     | C     | C      | C    | C              | C       | C       |
| 12 | Agam        | A     | B           | C      | B     | C      | C      | C        | C      | C            | B          | C          | C           | B      | C         | C      | C       | C       | C        | B           | C     | C     | C      | C    | C              | C       | B       |
| 13 | Kot         | A     | C           | C      | B     | C      | C      | C        | C      | C            | C          | B          | C           | C      | B         | C      | C       | C       | C        | C           | C     | C     | C      | C    | C              | C       | C       |
| 14 | Hesarshahi  | A     | C           | C      | B     | C      | C      | B        | C      | C            | B          | C          | C           | B      | C         | C      | C       | C       | C        | C           | C     | C     | C      | C    | C              | C       | C       |
| 15 | Dehbala     | A     | B           | B      | B     | C      | C      | C        | C      | C            | B          | C          | C           | B      | C         | C      | C       | C       | C        | C           | C     | C     | C      | C    | C              | C       | B       |
| 16 | Batikot     | A     | B           | C      | B     | C      | C      | A        | B      | A            | A          | B          | C           | B      | C         | C      | C       | C       | B        | C           | C     | C     | C      | C    | C              | C       | B       |
| 17 | Shinwar     | A     | C           | C      | B     | C      | C      | A        | C      | C            | A          | C          | C           | B      | C         | C      | C       | C       | C        | C           | C     | C     | C      | C    | C              | C       | B       |
| 18 | Nazyan      | A     | C           | C      | B     | C      | C      | C        | C      | C            | C          | B          | C           | C      | C         | C      | C       | C       | C        | C           | C     | C     | C      | C    | C              | C       | C       |
| 19 | Achin       | A     | C           | C      | B     | C      | C      | C        | C      | C            | B          | C          | C           | C      | C         | C      | C       | C       | C        | C           | C     | C     | C      | C    | C              | C       | C       |
| 20 | Spin Ghar   | A     | C           | C      | B     | C      | C      | C        | C      | C            | B          | C          | C           | C      | C         | C      | C       | C       | C        | C           | C     | C     | C      | C    | C              | C       | C       |
| 21 | Door Baba   | A     | C           | B      | B     | C      | C      | C        | C      | C            | B          | C          | C           | C      | C         | C      | C       | C       | C        | C           | C     | C     | C      | C    | C              | C       | C       |
| 22 | Mohmmandara | A     | B           | C      | B     | C      | C      | B        | C      | C            | B          | C          | C           | B      | C         | C      | C       | C       | C        | C           | C     | C     | C      | C    | C              | C       | C       |

|    |             | Pistachios | Olives | Cattle | Sheep | Goats | Chickens | Buffalo | Donky |
|----|-------------|------------|--------|--------|-------|-------|----------|---------|-------|
| No | District    |            |        |        |       |       |          |         |       |
| 1  | Surkhrod    | C          | C      | A      | B     | B     | B        | C       | B     |
| 2  | Khogyani    | C          | C      | A      | B     | B     | B        | C       | B     |
| 3  | Sharzad     | C          | C      | A      | B     | B     | B        | C       | B     |
| 4  | Hesarak     | C          | C      | A      | B     | A     | B        | C       | B     |
| 5  | Behsood     | C          | B      | A      | B     | B     | B        | B       | B     |
| 6  | Khewa       | C          | C      | A      | B     | B     | B        | C       | B     |
| 7  | Dara e Noor | C          | C      | A      | B     | A     | B        | C       | B     |
| 8  | Kama        | C          | C      | A      | B     | B     | B        | B       | B     |
| 9  | Goshta      | C          | C      | A      | B     | B     | B        | C       | B     |
| 10 | Lalpoora    | C          | C      | A      | B     | B     | B        | C       | B     |
| 11 | Chaparhar   | C          | C      | A      | B     | B     | B        | C       | B     |
| 12 | Agam        | C          | C      | A      | B     | B     | B        | C       | B     |
| 13 | Kot         | C          | C      | A      | B     | B     | B        | C       | B     |
| 14 | Hesarshahi  | C          | C      | A      | B     | B     | B        | C       | B     |
| 15 | Dehbala     | C          | C      | A      | B     | B     | B        | C       | B     |
| 16 | Batikot     | C          | B      | A      | B     | B     | A        | C       | B     |
| 17 | Shinwar     | C          | C      | A      | B     | B     | A        | C       | B     |
| 18 | Nazyan      | C          | C      | A      | B     | B     | B        | C       | B     |
| 19 | Achin       | C          | C      | A      | B     | A     | B        | C       | B     |
| 20 | Spin Ghar   | C          | C      | A      | B     | A     | B        | C       | B     |
| 21 | Door Baba   | C          | C      | A      | B     | A     | B        | C       | B     |
| 22 | Mohmmandara | C          | C      | A      | B     | B     | A        | C       | B     |

**Remarks (Priority order):**

**A: High priority**

**B: Next priority**

**C: No priority**

(Source) Head of Extension Department

## **Appendix B Procedure of Satellite Image Analysis**

## Appendix B Procedure of Satellite Image Analysis

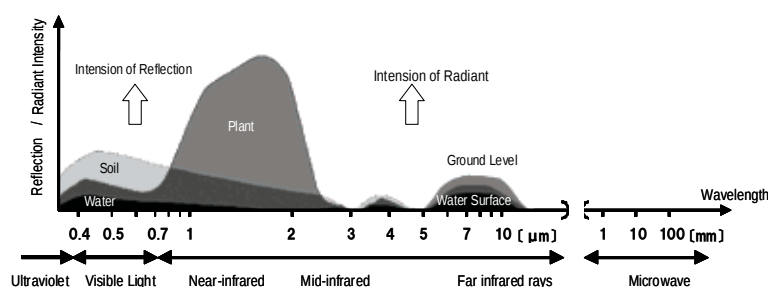
## B-1 Analysis of Low Resolution Satellite Image

Annual fluctuation (2000 to 2008) of vegetation area in Northern and North-eastern provinces as well as Nangarhar province is analyzed, using time-scale images of MODIS.

### B-1-1 Data Used for Analysis

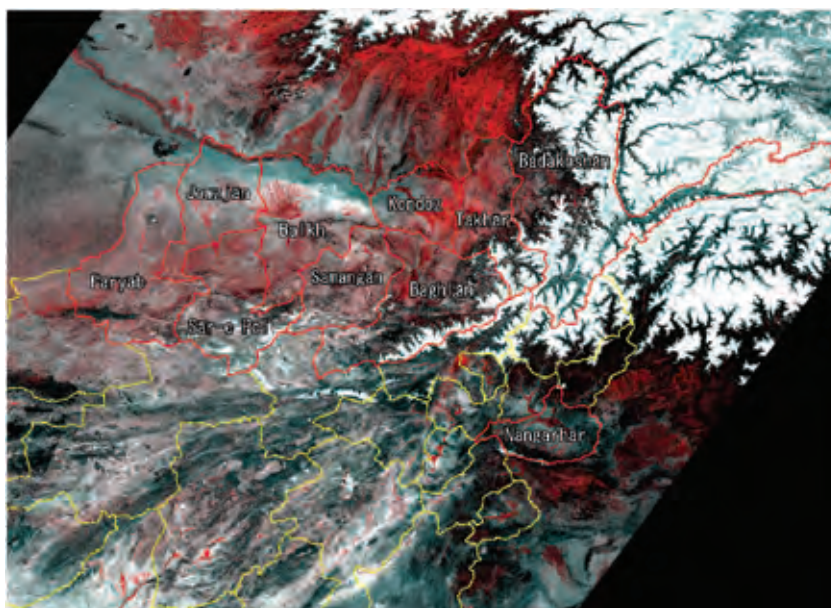
### (1) Specifications of Data

- PRODUCT : MODIS/Terra Surface Reflectance 8-Day L3, Global 250m SIN Grid V005
- ※Composite data for 8 days (To fill the gap due to defect of data caused by noise and atmosphere (cloud))
- Waveband: Visible • Near-infrared wavelength band 2 bands (refer to Fig. 1-1-1)  
Band1 : 0.620~0.670  $\mu\text{m}$ 、Band2 : 0.841~0.876  $\mu\text{m}$
- Resolution: 250 m



**Fig. 1-1-1 Example of Reflection and Radiation Characteristics from Materials**

- False Color Composite Image (Red series: Vegetation area, Gray series: Bare land)

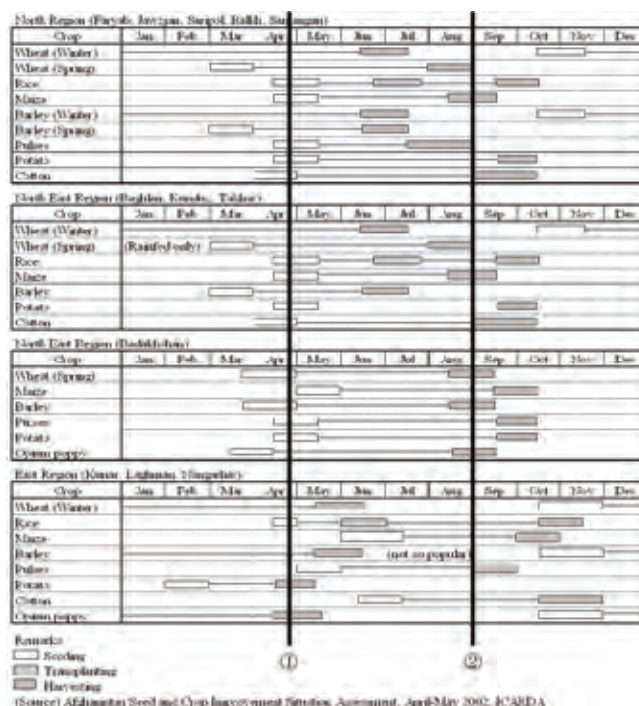


**Fig. 1-1-2 Example of MODIS Data (False Color Composite Image)**

## (2) Parameter

- 2000 to 2008 (9 years)
- Seasons of Analysis      1) Confirmation of Winter Crop: End of April (date: 22 to 29), 2) Confirmation of Summer Crop: Beginning of September (date: 1 to 8)
- Scenes which can cover whole 10 provinces (Northern and North-eastern provinces and Nangarhar province)

|      |                  | MODIS      |     |           |     |
|------|------------------|------------|-----|-----------|-----|
|      |                  | Start Data |     | Stop Data |     |
| Year | Month            | Month      | Day | Month     | Day |
| 2000 | ① End of Apr.    | 4          | 22  | 4         | 29  |
|      | ② Begin. of Sep. | 9          | 5   | 9         | 12  |
| 2001 | ① End of Apr.    | 4          | 23  | 4         | 30  |
|      | ② Begin. of Sep. | 9          | 6   | 9         | 13  |
| 2002 | ① End of Apr.    | 4          | 23  | 4         | 30  |
|      | ② Begin. of Sep. | 9          | 6   | 9         | 13  |
| 2003 | ① End of Apr.    | 4          | 23  | 4         | 30  |
|      | ② Begin. of Sep. | 9          | 6   | 9         | 13  |
| 2004 | ① End of Apr.    | 4          | 22  | 4         | 29  |
|      | ② Begin. of Sep. | 9          | 5   | 9         | 12  |
| 2005 | ① End of Apr.    | 4          | 23  | 4         | 30  |
|      | ② Begin. of Sep. | 9          | 6   | 9         | 13  |
| 2006 | ① End of Apr.    | 4          | 23  | 4         | 30  |
|      | ② Begin. of Sep. | 9          | 6   | 9         | 13  |
| 2007 | ① End of Apr.    | 4          | 23  | 4         | 30  |
|      | ② Begin. of Sep. | 9          | 6   | 9         | 13  |
| 2008 | ① End of Apr.    | 4          | 22  | 4         | 29  |
|      | ② Begin. of Sep. | 9          | 5   | 9         | 12  |



## B-1-2 Procedure of Analysis

### (1) Preprocessing of MODIS Data

MODIS data which fits into the above mentioned conditions was retrieved and collected. Geometric distortion of MODIS data was rectified based on Universal Transverse Mercator system. Subsequently, MODIS data of which geometric distortion was rectified were connected in order to cover target area (Mosaic processing among images).

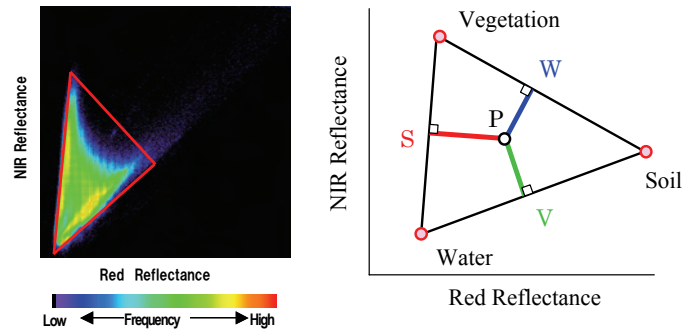
### (2) Calculation of VSW Index and Drawing up Thematic Figures

#### 1) Calculation of 3 Indexes such as Vegetation (V), Soil (S), Water (W) and Drawing up VSW Image

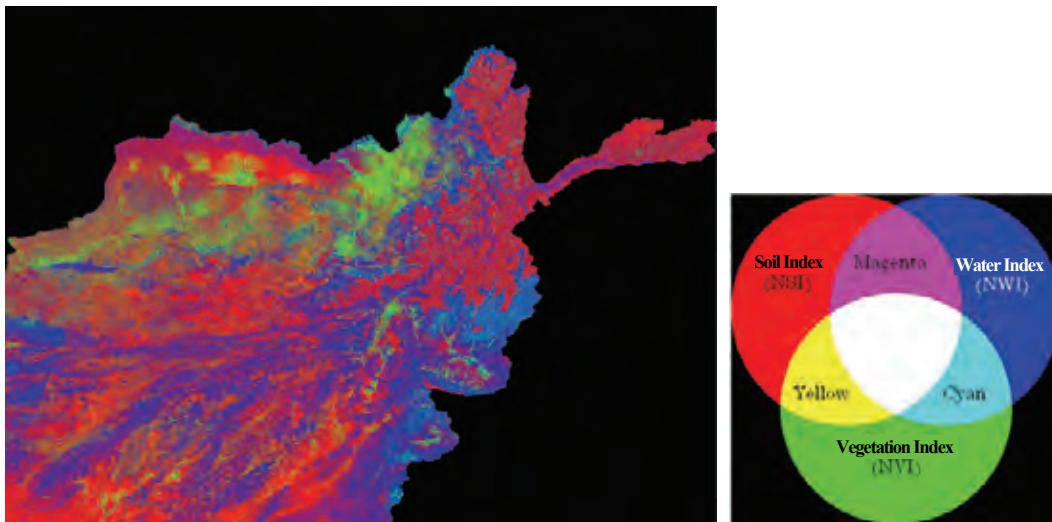
2 bands of MODIS were used.

- MODIS Band 1 : Red (Red radiation), Information of red color out of visible light
- MODIS Band 2 : NIR (Near-infrared radiation), Near-infrared information which wavelength is longer than visible light.

When pixel value is plotted on a R-NIR plane with the Red band as the vertical axis and NIR band as the horizontal axis, a triangle range appears (Fig. 1-2-1). The 3 indexes such as vegetable, soil, water were classified by the calculation of length of line such as PV, PS, PW which are the distances between 3 sides of triangle and arbitrary point P on the R-NIR plane (Fig. 1-2-2).



**Fig. 1-2-1 Spectral Scatter Diagram (Red-NIR Plane)**



**Fig. 1-2-2 VSW Image (As of April, 2000)**

## 2) Extraction of only Vegetation Index

Since soil index, water index and vegetation index are mixed in the VSW image shown in Fig. 1-2-3, it is difficult to distinguish vegetation index alone. Therefore, only vegetation index was extracted from 3 indexes.

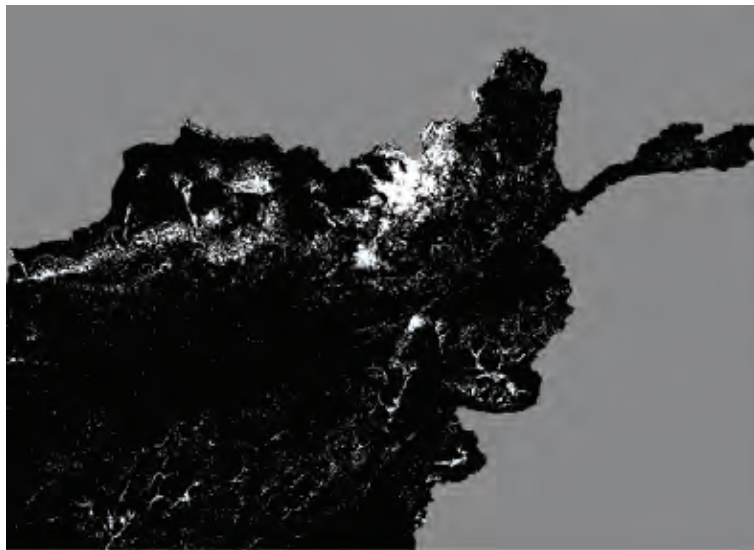


**Fig. 1-2-3 VSW Image (As of April, 2000) ※ Deep green pixel indicates high index value.**

### 3) Classification between Vegetation area and Non-vegetation area

When there is information of visible light similar with that of vegetation area, the area is classified as vegetation index in the calculation of VSW index. Threshold value to classify the vegetation area and non-vegetation area was set for extraction of highly reliable vegetation area based on the result of calculation of VSW index and vegetation area (white color).

Since present vegetation state is not clear, threshold value of the processing to classify the vegetation area and non-vegetation area was decided based on secular variation of vegetation area (red color) in the false color composite image (Threshold value was set 3/4 from highest index value out of all index value).



**Fig. 1-2-4 Figure of Classified Vegetation Area (As of April, 2000)**

**White color: Vegetation area, Black color: Non-vegetation area**

### **B-1-3 Classification of Snow Covered Area based on MODIS Data**

#### **(1) Selection of Data**

- Targeted Data: MODIS data in April (2000 to 2008)
- Processing Object: “Band 1: Red (Red radiation)” out of Visible / near Infrared wavelength band (Band1: Visible red wavelength band, Band 2: Near-infrared wavelength band).※。

※ Snow covered area is indicative of high degree of reflection at wide wavelength band. It will be high degree reflection at Band 1, 2 which are visible / near-infrared wavelength band and pixel value becomes high (in case of gray images, it will be white). On the other hand, in case of vegetation area, it will be high degree reflection at near-infrared wavelength band and pixel value become high at Band 2. Therefore, both snow covered area and vegetation area indicate high degree of reflection at Band 2 and it is difficult to classify both areas. Accordingly, Band 1 of which pixel value of vegetation area is relatively low was targeted in this processing.

## (2) Classification of Snow Covered Area

- Degree of reflection of non-snow covered area such as sand area is also high (pixel value is high and becomes white in gray image).
- In case that area with high degree of reflection is classified by data in April, sand area will be selected and misjudgment will occur.
- Therefore, difference between data in April and in September was classified in order to reduce influence of non-snow covered area, since snow covered area is not observed in the MODIS data of September (Since sand area does not change by season, difference of pixel value of the two seasons will be equivalent to 0.)

## (3) Calculation of Snow Covered Area

- Threshold amount which is a value to classify snow covered area and non-snow covered area was set based on the result of 2) and snow covered area has been quantified.
- Because snowpack in the site cannot be made clear, threshold amount is set based on information of snow in the False Color Composite Image (Threshold value was set 3/4 from highest index value out of all index value).

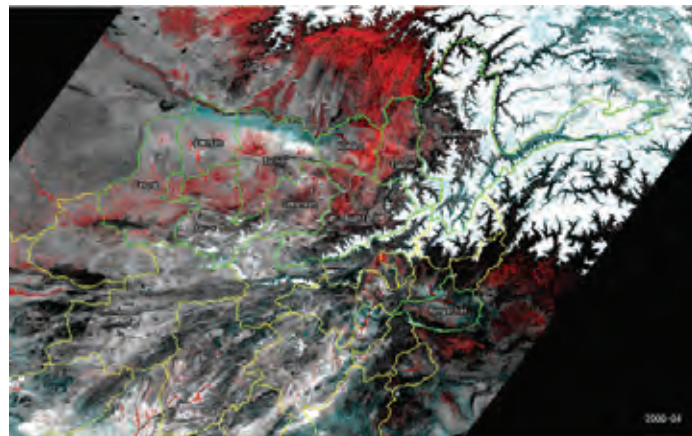


Fig. 1-3-1 MODIS False Color Composite Image (White color located in mountain area is snow covered area.)

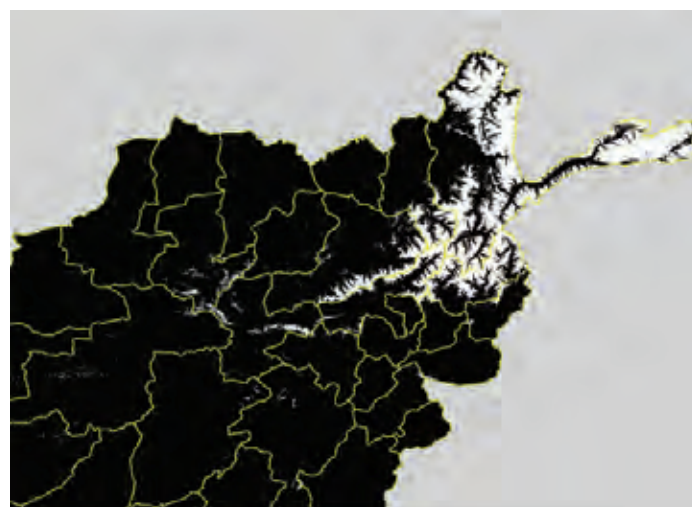


Fig. 1-3-2 The Result on Classification of Snow Covered Area (April, 2000) ※White area is snow covered area.

## **B-2    Analysis of Medium Resolution Satellite Imagery**

### **B-2-1   Classification of Vegetation Area**

Cropping classification of the provinces selected for detailed analysis ((Takhar, Kunduz and Balkh) are done in the following two steps, based on the time series data of Landsat imagery data (hereinafter called Landsat data).

#### **(1) Extraction of Vegetation Coverage**

The area of which cropping classification should be carried out will be extracted by setting a threshold value between areas covered / not covered by vegetation. This will be done by using a Normalized Difference Vegetation Index (NDVI) which shows strong correlation with the condition of vegetation growth. Areas that are not covered with vegetation are excluded from the cropping classification area as mask data.

#### **(2) Classification of Vegetated Area**

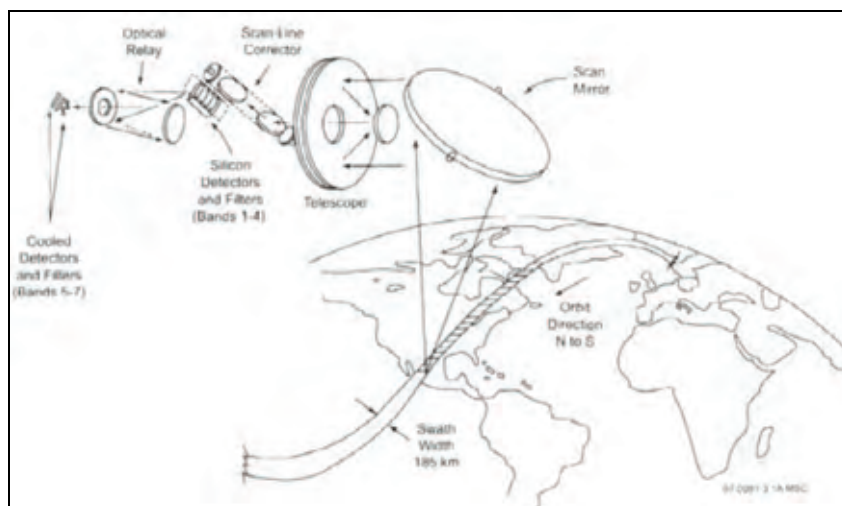
The area covered with vegetation is categorized into three groups, which are; winter crop area, paddy crop area (summer cultivation), and summer crop area (non-rice crops). This will be done by using the cluster technique, which is a method to rank the statistical trend of the picture element level of each band. Possibilities of categorizing grassland will be decided based on whether areas without changes in Landsat data for more than two years (in other words, land which is continuously not plowed) can be distinguished or not.

### **B-2-2   Data Used for Analysis**

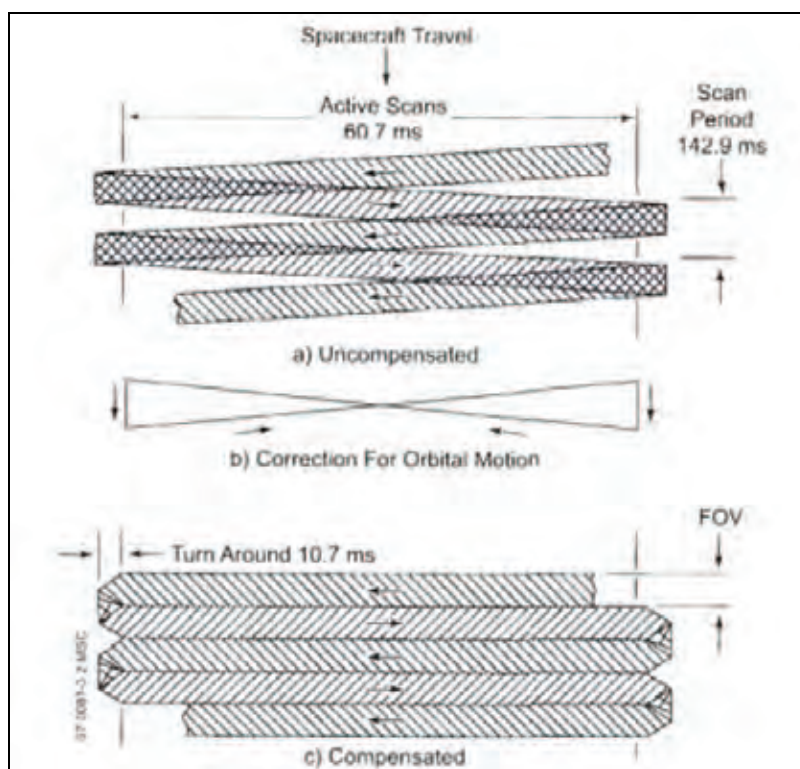
#### **(1) Specification of Data**

- Satellite Name and Sensor - Landsat 7 ETM+: Enhanced Thematic Mapper Plus

The Landsat satellite measures the radiance from Earth by redirecting it to a sensor with a scanning system consisting of multiple mirrors. As shown in Fig.2-2-1, the first Scan Mirror iteratively moves in a horizontal direction and scans the area with the width of 185km. At the same time, the satellite itself moves from the north to south which enables the collection of planer data. To avoid data coverage as shown in Fig. 2-2-2 (a), the satellite adopts the SLC (Scan Line Corrector) function, of which the second scanning mirror rotates in order to correct the scanned area to be as indicated in Fig. 2-2-2 (b).

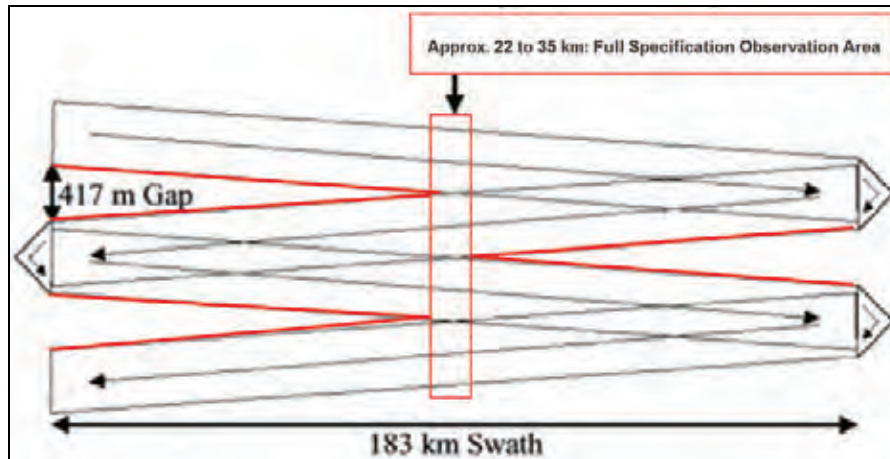


**Fig.2-2-1 Landsat 7 ETM+ Scanning Approach**

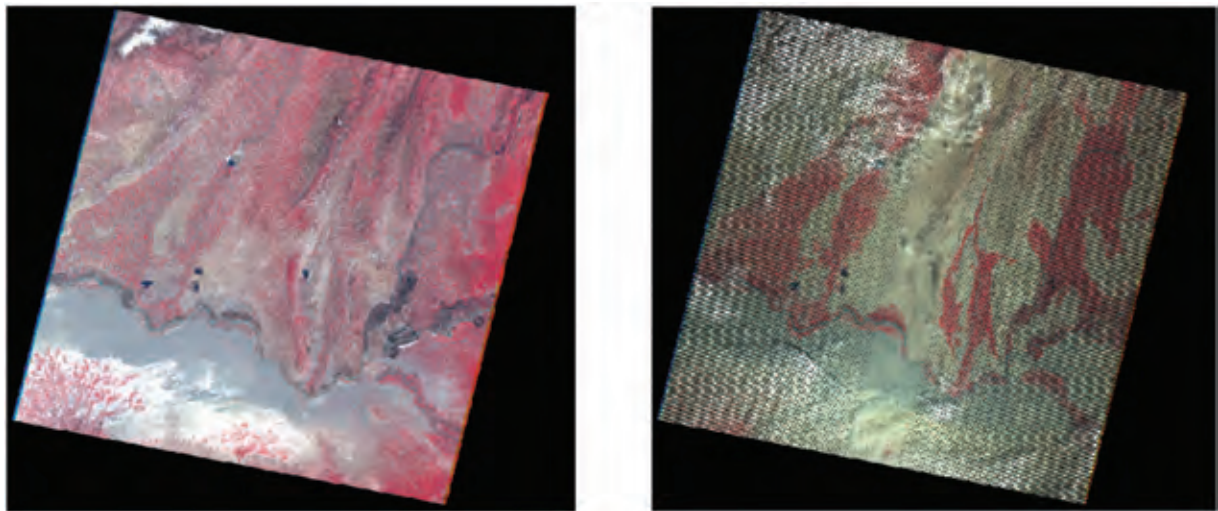


**Fig. 2-2-2 Scan Line Pattern and SLC Function**

However, the SLC has suddenly stopped on May 31, 2003. USGS investigated the cause of failure and tried to produce its recovery, but consequentially concluded that recovery was impossible because it is caused by a mechanical failure. Therefore, due to this reason, as shown in Fig. 2-2-3 and Fig. 2-2-4, the Landsat can currently collect full spec data for the width of 22-35km in the center of the image, and data is deficit in both sides. Since the sensor itself is functioning, Landsat is currently collecting data with the SLC function disconnected (SLC-Off).



**Fig. 2-2-3 Outline of SLC-Off Mode Imagery**



**Fig. 2-2-4 Difference of SLC Mode, Path154-Row034 Scene**  
**Left: SLC-on at 2000-04-07, Right: SLC-off at 2003-09-232**

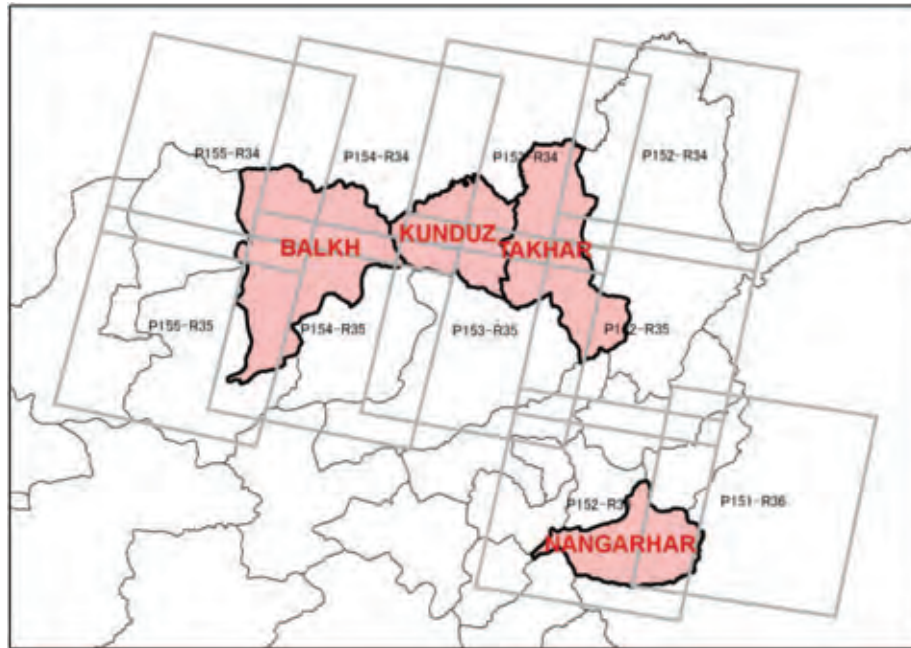
- Waveband and Resolution:
 

|         |                                 |
|---------|---------------------------------|
| Band 1  | : 0.45~0.52 $\mu\text{m}$ , 30m |
| Band 2  | : 0.52~0.60 $\mu\text{m}$ , 30m |
| Band 3  | : 0.63~0.69 $\mu\text{m}$ , 30m |
| Band 4  | : 0.76~0.90 $\mu\text{m}$ , 30m |
| Band 5  | : 1.55~1.75 $\mu\text{m}$ , 30m |
| Band 61 | : 10.4~12.5 $\mu\text{m}$ , 60m |
| Band 7  | : 2.09~2.35 $\mu\text{m}$ , 30m |

## (2) Parameters

- Period: 9 years from 2000 to 2008
- Three seasons per year: a) Winter Cropping (Late April to early May), b) Rice Cropping (Late June to early July), c) Summer Cropping (Late August to early September)

- Selected Scenes: Scenes were selected to cover 3 target Provinces (Takhar, Kunduz, Balkh) as well as Nangarhar Province which is analyzed as control.



**Fig. 2-2-5 Path-Row Location of Landsat Data in the Model Area**

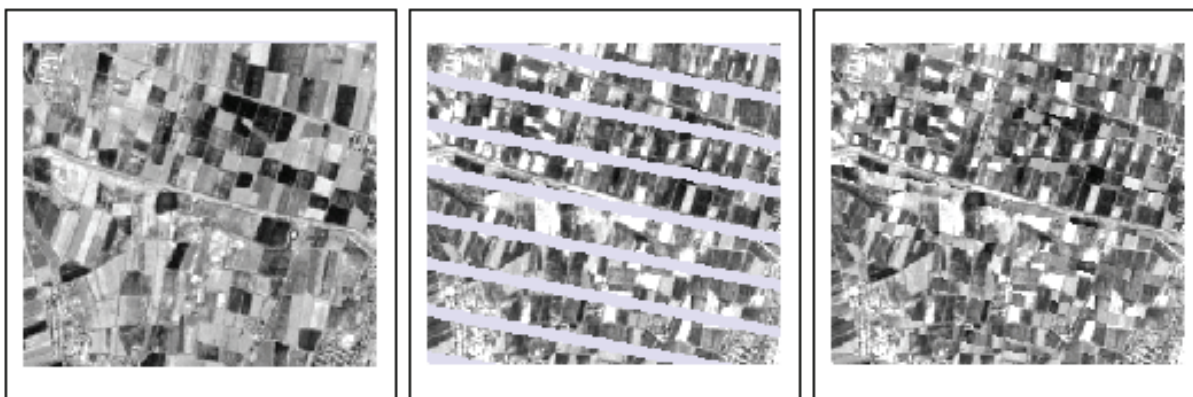
### **B-2-3 Analysis Process**

#### **(1) Data Search and Download**

Landsat data with previous parameters were searched and downloaded in EarthExplorer web site “<http://edcsns17.cr.usgs.gov/EarthExplorer/>” of USGS (US Geological Survey).

#### **(2) Data Pre-processing I (Georectification and matching of coordination system)**

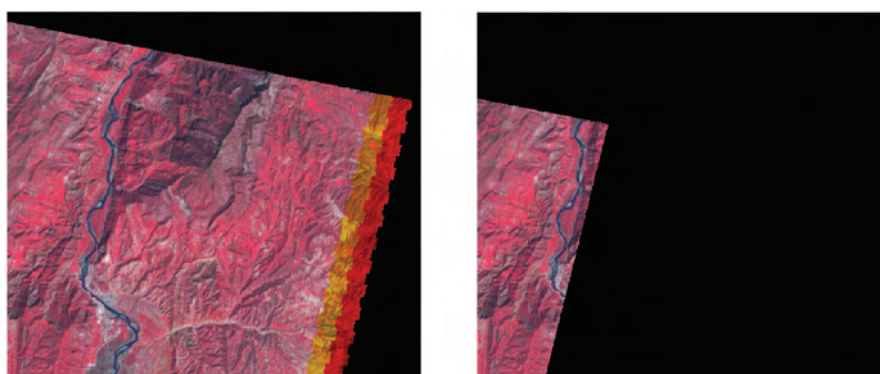
Data downloaded from the Earth Explorer web site is readily processed with a simple ortho photogrammetric georectification procedure on a UTM coordination system by WGS84 (World Geodetic System 1984) with GCP (Ground Control Point) corrected by USGS. With scenes of the same Path-row overlaid showing no visual differences in the location of ground objects (Fig. 2-3-2), further georectification was regarded to be unnecessary. On the other hand, some scenes which were set to UTM zone 41 (longitude 60 to 66 degrees east) were transformed into UTM Zone 42 (longitude 66 to 72 degrees east), to unify the coordination system.



**Fig. 2-3-1 Confirmation of Geographical Differences**  
**Part of Scene Path 143-Row 034, Band 3**  
**Left: at 2000-04-07, Center: at 2003-09-23, Right: Overlay Image**

### **(3) Data Pre-processing II (Mask processing)**

When all bands of one scene were overlaid, data deficits were identified on both ends (east and west) of the scene. To obtain data on all bands, scenes with all bands available were extracted after mask processing for approximately 10m at the east / west end and 5m at the north and south end of the scene.



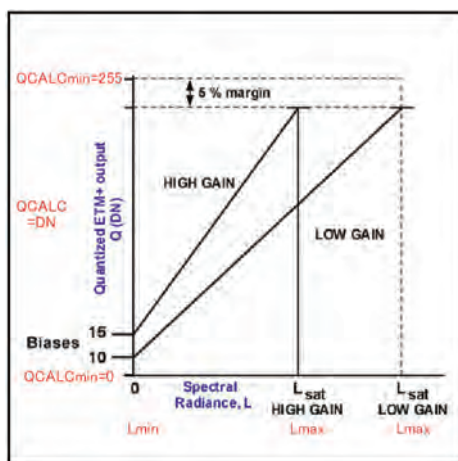
**Fig. 2-3-2 Mask Processing:**  
**Right-Upper Portion of Scene Path 154-Row at 2000-04-07, Band 2, 3, and 4**  
**Left: Before Processing, Right: After Processing**

### **(4) Data Pre-processing III (Radiance calculation and unification of gain setting)**

In order to store the radiance data collected by the sensor as a Digital Number (DN) of unsigned 8-bit integer (integer value of 255 levels, gray), Landsat transforms the image either by High Gain or Low Gain DN-Radiance Transformation Equation, depending on the scenes, date and band. Analysis such as comparison NDVI between different seasons or formulate mosaic data with other scenes cannot be directly done from DN data. Thus radiance must be calculated from the DN.

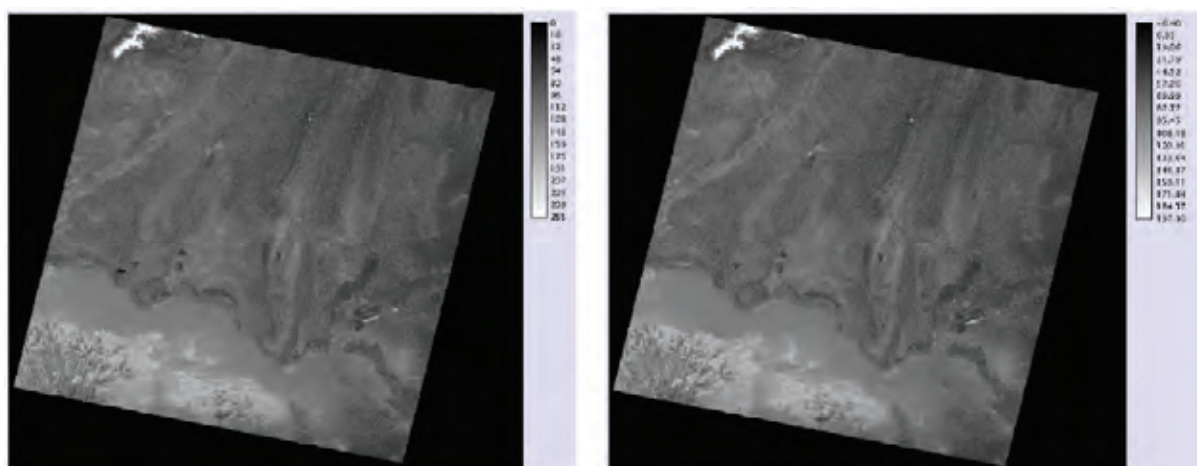
$$\text{Radiance} = ((L_{\text{max}} - L_{\text{min}}) / (QCAL_{\text{max}} - QCAL_{\text{min}})) * (QCAL - QCAL_{\text{min}}) + L_{\text{min}}$$

$QCAL_{min}=0$  : Maximum of DN  
 $QCAL_{max}=255$  : Minimum of DN  
 $QCAL=DN$  : DN  
 $L_{max}$  : Detectable Maximum of Radiance by Sensor  
 $L_{min}$  : Detectable Minimum of Radiance by Sensor



**Fig. 2-3-3 DN-Radiance Transformation Equation and Gain Setting**

Data downloaded from the Earth Explorer web site has a corresponding metadata file (MET), which records satellite orbit and sensor condition with parameters of DN-Radiance. Based on the parameters indicated in the MET, data for NDVI calculation was prepared by calculating the radiance of Band 3 and 4. Furthermore, a dataset unified in Low gain setting was prepared for false color composite imagery and cluster classification.



**Fig. 2-3-4 Example of DN-Radiance Transformation:**  
**Path 154-Row 034 at 2000-04-07, Band 2**  
**Left: DN (Min=0, Max=255), Right: Radiance (Min=-6.4, Max=197.3)**

## (5) Data Pre-processing IV (Mosaic processing)

The radiance data with unified gain was connected to formulate an image covering all 4 provinces, which are to be analyzed.

## (6) NDVI Calculation

NDVI is defined following equation, with the Landsat Band corresponding to individual radiances.

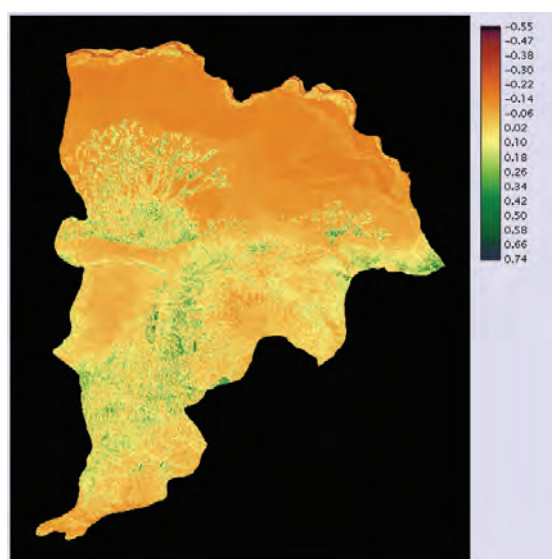
$$\text{NDVI} = (\text{NIR} - \text{Red}) / (\text{NIR} + \text{Red})$$

$$= \{(\text{Landsat Band 4}) - (\text{Landsat Band 3})\} / \{(\text{Landsat Band 4}) + (\text{Landsat Band 3})\}$$

NIR (Near-Infrared Radiation):                      Near-infrared information which wavelength is longer than visible light.

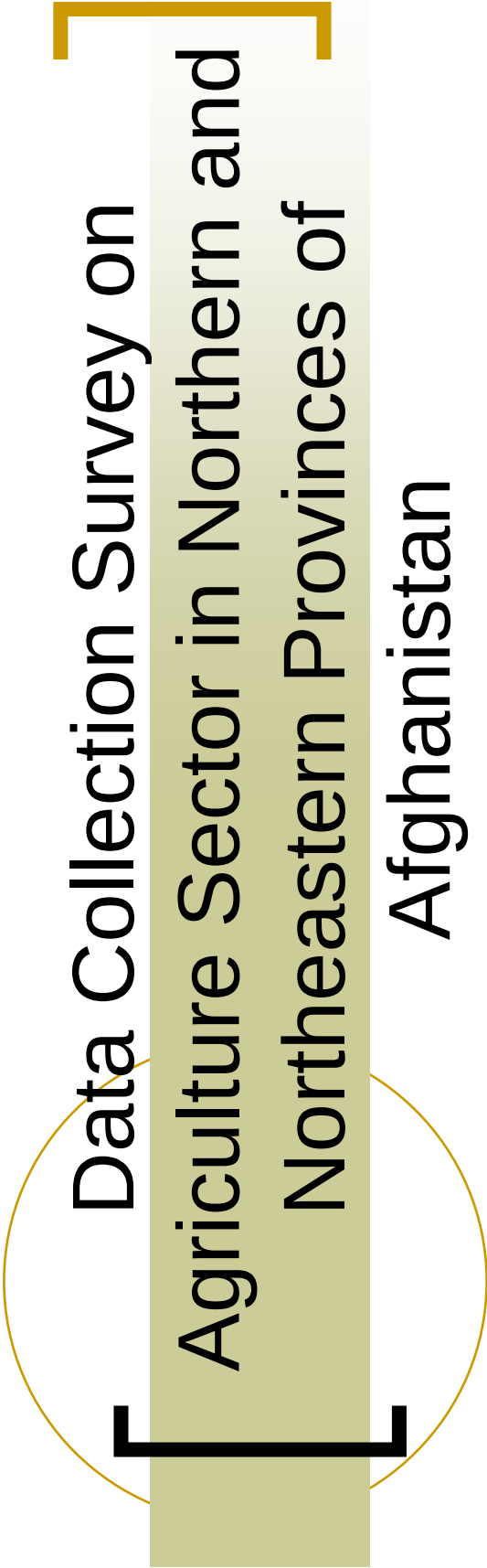
Red (Red Radiation):                                      Information of red color out of visible light

Based on this equation, NDVIs of the three seasons during the 9 year period of 2000 to 2008 were calculated.



**Fig. 2-3-5 Example of NDVI Image Data, Balkh Province in 2000-04**

## **Appendix C   Presentation Material**

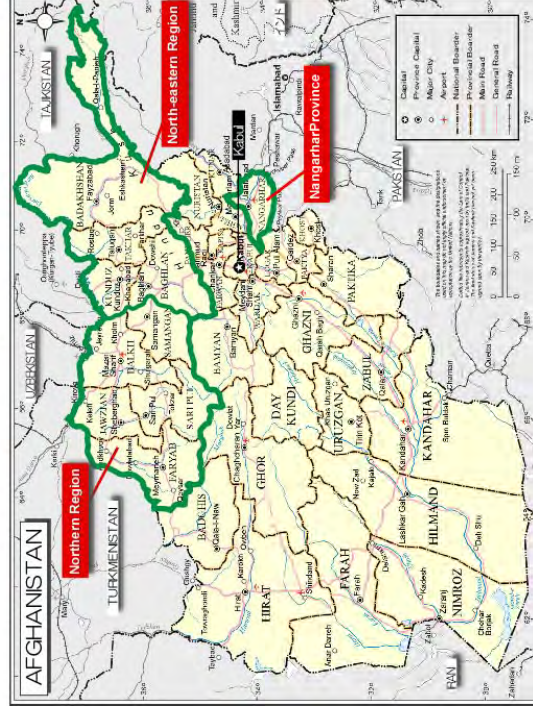


# Data Collection Survey on Agriculture Sector in Northern and Northeastern Provinces of Afghanistan

# [ Objectives of the Study and Study Area ]

## 【Objectives of the Study】

The objectives of the Study is to collect and analyze on a general situation and potentials of agriculture in order to examine a possibility that JICA shall carry out assistance on agriculture sector for future in the Northern and the Northeastern regions.



Location Map of the Study Area

# Location and Topography of Afghanistan

## 【Location】

Land Area: 652,000km<sup>2</sup>

Latitudes: 29° 21' N to 38° 30'

Longitudes: 60° 31' E to 75° 00'

## 【Topographical Regions】

- ① North Piedmont Plain
- ② Central Mountain Area
- ③ East and Eastern south mountains and massif
- ④ South and West flat area

## 【Afghanistan】

Arid-continental climate

Annual precipitation average : 300mm

## 【North and Northeastern】

Arid-continental climate

Desert climate (low altitude area )

## 【Nangarhar Province】

Subtropical climate (affected by Southeast monsoon )

# [Major River Systems of Afghanistan]

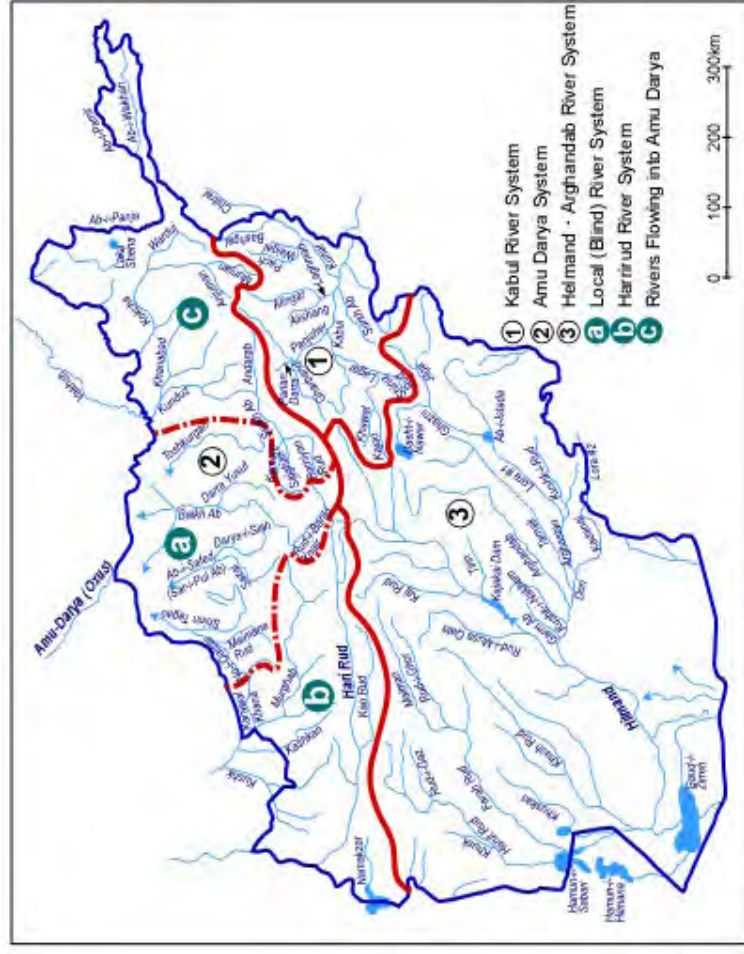
Water Resources:

75 billion m<sup>3</sup>

- Surface: 57 billion m<sup>3</sup>
- Underground: 18 billion m<sup>3</sup>)

Water Use for Irrigation:

20 billion m<sup>3</sup>



# Irrigation Systems in the Northern River System

- Irrigation systems in the Balkh River Basin established in the 6th century BC
- Existing irrigation systems which kept their functions became 11 systems out of 18 irrigation systems

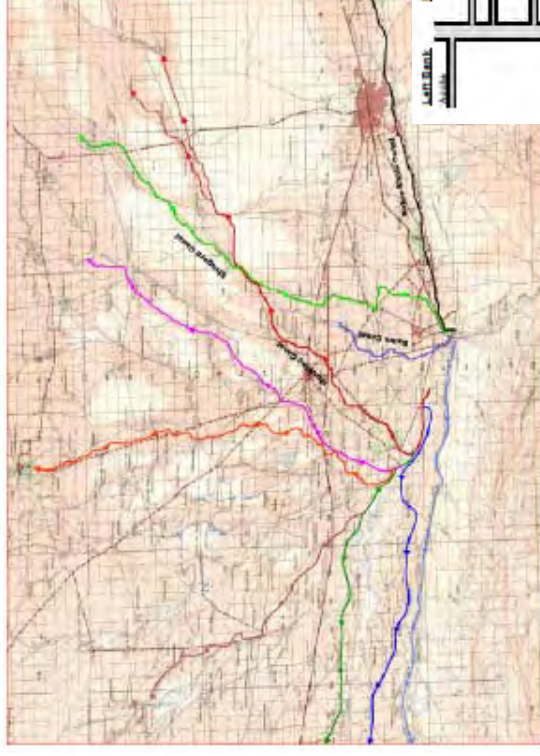


Fig. Canal Schemes Along Balkh River

# Water Management of Existing Irrigation Systems

## 【Mirab bashi】

- A foreman of the irrigation system and responsibility is up to diversion facilities to each village
- Remuneration is approximately 1/80 of production in the area

## 【Chak boshi】

- Selected by each village and responsibility is after diversion facilities to each village
- Remuneration is generally 3,000 to 4,000 Afg. in a month in case of cash or 400 kg wheat yearly in case in kind

# [Water Right and Water Fee]

## 【Water Right】

- Diversion volume from irrigation canals and irrigation area are decided by Paikal value
- Paikal allocation is based on a legal document granted in 1925/26
- Communities and individuals with water rights dating from this period refer to themselves as “People of the Contract” . Additional Paikal rights appear to have been granted to some new settlers in 1939.

## 【Water Fee】

- Water fee is based on the contract in 1925/26 and has not been modified
- Collection of water fee is difficult because of maelstrom of war for more than 20 years

# [Rural Society

## 【Traditional Governing Institutions】

Shura : traditional self-governing structure and/or council

- Shura has acted as the council in consensus building and decision-making for solution of public problems and conflicts in the tribe, between tribes and in rural society in every region

## 【New Governing Institutions】

CDC : Community Development Council

- New community organization which is established in order to rehabilitate and reconstruct devastated and exhausted rural society due to continuous civil war
- Ministry of Rural Rehabilitation and Development (MRRD) initiated establishment of CDC since 2003

# Administrative Organizations concerning Rural and Agricultural Fields

## 【Ministry of Agriculture, Irrigation and Livestock】

- Reducing poverty through realization of food security and agricultural development which does not rely on poppy production

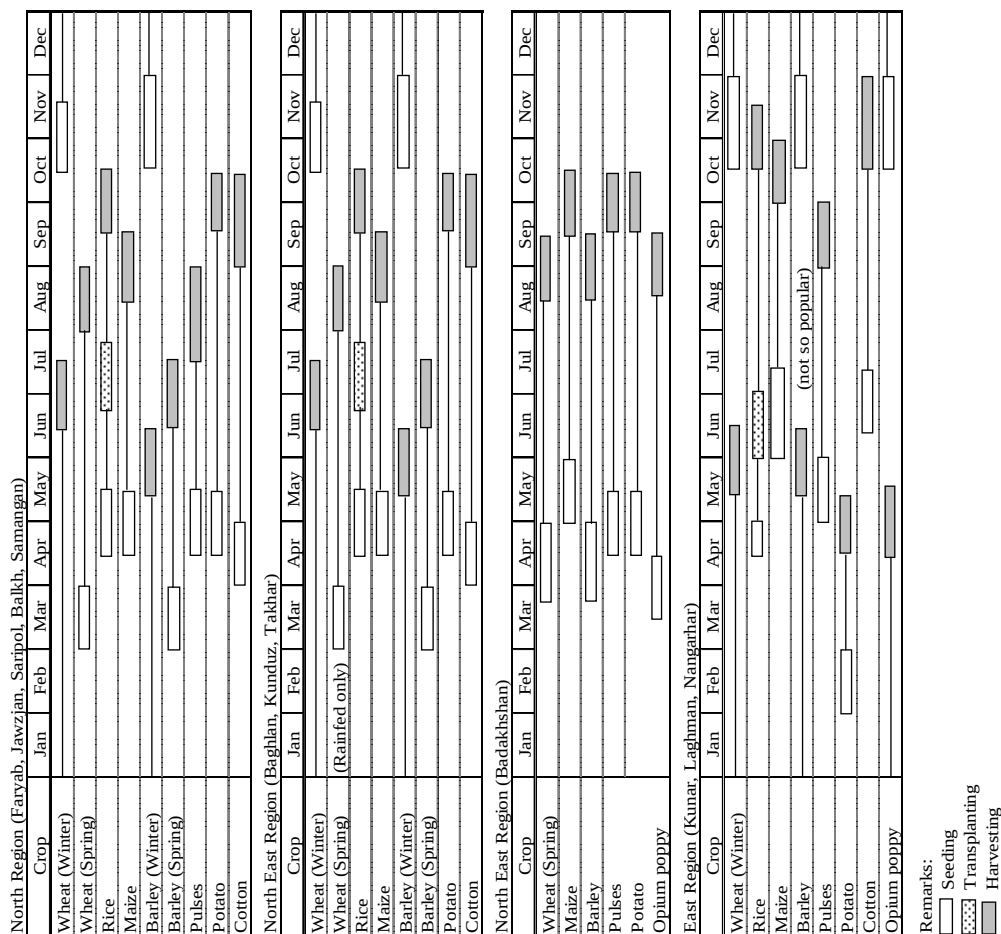
## 【Ministry of Rural Rehabilitation and Development】

- To achieve social, economical and political welfare for rural community, especially for the destitute peoples and the vulnerable through provision of basic services, establishment of local governance and promotion of sustainable life without relying on poppy production

# Outline of Crop Production in Target Regions

| Item                                             | Afghanistan                                                                                                                         | Northern R                                                                                         | North-eastern R                                                                                                                                         | Eastern R                                                                                                                              |
|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Crops                                            | Cereals, especially wheat, are dominant over other crops, in general                                                                |                                                                                                    |                                                                                                                                                         |                                                                                                                                        |
| (1) Cereals                                      | Wheat's share in the production is about 80%. Other major crops are rice, barley and maize                                          | The % of wheat in the production is very high. Rice and maize are not grown much                   | While the region is a national production center of wheat as well as rice, maize is not so popular                                                      | Wheat's share in the production is relatively low, while rice and maize are more popular                                               |
| 1) Wheat                                         | Almost a single staple food. While the production depends on the annual precipitation, yield/ha has been increasing in recent years | Wheat is much grown in the rain-fed farmland. The production shows a negative trend for long years | The % of planted area in the irrigated farmland is higher than the % in the Northern region. Production is more stable than that of the Northern region | Almost 100% of wheat is grown in irrigated farmland (almost impossible to grow in the rain-fed area). High yield and stable production |
| 2) Other Crops                                   | Rice is a more cash crop rather than a staple food. Barley and maize are mainly fed to animals                                      | While they are not so important, planted area has been increasing in recent years                  | Planted area of rice has more than 50% of the national share. Production of barley and maize shows a negative trend in recent years                     | While rice is popular crop, barley is not much grown. Every year there is a stable production of the crops                             |
| (2) Vegetables (Excluding melons & water-melons) | Maybe, less than 50% of farmers grow vegetables                                                                                     | While the % of farmers to grow vegetables is low, tomatoes and onion are popular                   | The % of farmers to grow vegetables is relatively high. In addition to tomatoes and onion, carrot and pumpkin are also popular                          | The % of farmers to grow vegetables is relatively high. In addition to tomatoes and onion, okra and garlic are popular                 |
| (3) Fruits & Nuts                                | They, mainly dried one, used to be a major exporting commodity. Maybe, less than 50% of farmers grow fruits and nuts                | Major fruits and nuts are grape, almond, walnuts, pistachio and apricot                            | Apple, apricot, peach and mulberry are popular. Most of fruits and nuts except grape have relatively higher national shares                             | The % of farmers to grow fruits and nuts is low. While citrus has a big national share, others are not                                 |
| (4) Other Miscellaneous Crops                    | Most of them are grown after wheat in summer season                                                                                 | Oilseeds and pulses are popular                                                                    | Oilseeds, pulses, potato and melons & watermelons are popular                                                                                           | Since crop diversification has progressed, many crops are grown                                                                        |
| (5) Poppy                                        | A production center in the world. Poppy is the second positioned crop after wheat in terms of monetary production                   | The planted area has been reducing in recent years                                                 |                                                                                                                                                         | The planted area has rebound in recent years, especially in Nangarhar province                                                         |

# Outline of Cropping Seasons in Target Regions



# Outline of Livestock in Target Regions

| Item        | Afghanistan                                                                                                                                                                                                                                                  | Northern R                                                                                                                                                                    | North-eastern R                                                                                                                                                | Eastern R                                                                                                                                                                  |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Livestock   | Cattle (cow and drawing power), sheep, goats and chicken are major livestock. Leather and woolen goods used to be major exporting commodities. The sector was heavily damaged by drought from 1999. Securing of feed is common critical issue in the sector. |                                                                                                                                                                               |                                                                                                                                                                |                                                                                                                                                                            |
| (1) Cattle  | The most important livestock. The % of household to grow cattle is the highest among livestock holders. The number is large in provinces in the eastern part bordering Pakistan                                                                              | The % of household to grow cattle and the average number of cattle per household is smaller than the national level. Share of drawing cattle is about 2/3 of the total number | The % of household to grow cattle and the average number per household is higher than the national level. The ratio of cow to drawing cattle is almost 50 : 50 | The % of household to grow cattle and the average number per household is higher than the national level. The number of drawing cattle is slightly larger than that of cow |
| (2) Sheep   | Sheep is used for meat, wool, and milking. Importance of its milk is less than that of goats. It is common that a wealth family to grow a large flock of sheep                                                                                               | While the % of household to grow sheep is smaller than the national level, the average number per household is opposite. The region is famous for its Karakul sheep.          | The % of household to grow sheep and the average number per household is much higher than the national level                                                   | The % of household to grow sheep and the average number per household is much less than the national level                                                                 |
| (3) Goats   | Goats are also used for meat, wool, and milking. While importance of their milk is higher than that of sheep, the wool is opposite                                                                                                                           | While the % of household to grow goats is smaller than the national level, the average number per household is opposite                                                       | The % of household to grow goats and the average number per household is higher than the national level                                                        | While the % of household to grow goats is higher than the national level, the average number per household is vary opposite                                                |
| (4) Poultry | Chicken is the major poultry. While chicken is used for meats and getting eggs, women concern much with egg production                                                                                                                                       | The % of household to grow poultry and the average number per household is much less than the national level                                                                  | While the % of household to grow poultry is higher than the national level, the average number per household is almost on the level                            | The % of household to grow sheep and the average number per household is much higher than the national level                                                               |

# Outline of Farm Inputs in Target Regions

| Item                                                                                              | Afghanistan                                                                                                                                | Northern R                                                                                                            | North-eastern R                                                                                                               | Eastern R                                                                                                              |
|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| Farm Inputs:<br>Relatively popular among farmers and application level is also on a certain level |                                                                                                                                            |                                                                                                                       |                                                                                                                               |                                                                                                                        |
| (1) Seeds                                                                                         | The % of improved variety is 52.9%. Annual seed renewal rate is high                                                                       | While the share of improved variety is almost as same as that of national average, annual seed renewal rate is higher | While the share of improved variety is higher than the national average, annual seed renewal rate is almost same              | While the % of improved variety is almost 100%, annual seed renewal rate is almost as same as that of national average |
| (2) Chemical Fertilizers                                                                          | DAP ( for basic dressing ) and urea(for top dressing) are common. More than 70% of farmers use the fertilizers, mainly for irrigated crops | The % of farmers using DAP and Urea is lower than the national average. Input amount per ha is also low               | The % of farmers using DAP and Urea is lower than the national average (90%more or less) and input amount per ha is also high |                                                                                                                        |
| (3) Tractor                                                                                       | 45.7% of farmers use tractors in 2002/03                                                                                                   | 39.5% of farmers use tractors in 2002/03                                                                              | 51.5% of farmers use tractors in 2002/03                                                                                      | 55.0% of farmers use tractors in 2002/03                                                                               |

# Outline of Farm Size and Land Ownership in Target Regions

| Item                                                                                                                                                                                                                                                                                                                                                           | Afghanistan                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Northern R                                                   | North-eastern R                                                                                  | Eastern R                                                           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| <p><b>Farm Size and Farmland Ownership :</b><br/>           Many farmers manage 2 – 5 ha of farmland, While 68.71% of farmers manage less than 5ha, the total farmland under management them is only 19.46 % of the total farmland. On the contrary, the % of farmers managing more than 20ha is only 7.07% and they manage 44.14 % of the total farmland.</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                              |                                                                                                  |                                                                     |
| (1) Farm Size                                                                                                                                                                                                                                                                                                                                                  | <p>Average 6.13ha<br/>           ( 2.86ha of irrigated are and 3.27ha of rain-fed area ) .<br/>           However, actual cultivated area may be less than a half of the areas due to fallow area</p>                                                                                                                                                                                                                                                                                                                                         | <p>Average 13.42ha<br/>           (10.21 ha is rain-fed)</p> | <p>A little bit larger than the national average for the irrigated are and the rain-fed area</p> | <p>Though farmlands are irrigated, average area is only 1.15 ha</p> |
| (2) Farmland Ownership                                                                                                                                                                                                                                                                                                                                         | <p>National land registration system does not function due to long time social turmoil. Almost farmers who claim their land ownership do not or can not complete official land registration. According to the FAO study in 2002/03, the report says that the % of tenant farmers (mixed tenant + pure tenant) is only 11.0% based on self declaration of sample farmers. However, there are many reports to explain the reverse situation. It is very difficult to judge the actual situation under the present condition of Afghanistan.</p> |                                                              |                                                                                                  |                                                                     |

# Outline of Food Situation in Target Regions

| Item                     | Afghanistan                                                                                                                                                                                                                                                                                                                                              | Northern R                                                                                                                                                                 | North-eastern R                                                                                                                                                                                         | Eastern R                                                                                                                                                                                   |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Food Situation (2004) | The % of households who can not take sufficient calories from foods is about 20%. Food intake much depends on wheat                                                                                                                                                                                                                                      | The % of households who can not take sufficient calories from foods is about 22%. The % of calorie intake from oil/fats, meat and nuts is higher than the national average | The % of households who can not take sufficient calories from foods is about 13%. While the of calorie intake from oil/fats and meat is higher than the national average, the % from fruits is opposite | The % of households who can not take sufficient calories from foods is about 19%. While the of calorie intake from sugar is higher than the national average, the % from fruits is opposite |
| 2. National Food Balance |                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                            |                                                                                                                                                                                                         |                                                                                                                                                                                             |
| (1) Wheat                | More than 90% of the self-sufficiency has been constantly kept in recent years. The Northern and North-eastern regions have more than 100% of the self-sufficiency every year, except in a severe drought year. They, especially the North-eastern region, must be a national breadbasket. On the contrary, the Eastern region has a deficit every year. |                                                                                                                                                                            |                                                                                                                                                                                                         |                                                                                                                                                                                             |
| (2) Rice                 | 70 – 80% of the self-sufficiency has been constantly kept in recent years. Among the target provinces, Balkh, Baghlan, Kunduz and Takhar have a surplus. Nangarhar is a deficit province, though it is a famous production center of rice (2007).                                                                                                        |                                                                                                                                                                            |                                                                                                                                                                                                         |                                                                                                                                                                                             |

# Outline of Distribution and Price of Farm Commodities in Target Regions

| Item                      | Afghanistan                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Northern R | North-eastern R | Eastern R |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------------|-----------|
| (1) Wheat                 | Only a part of local produced wheat is distributed to the market. Therefore, presence of imported wheat (mainly from Pakistan, Uzbekistan and Kazakhstan) is strong in the market. The prices of local wheat and imported wheat are almost same. Since local wheat milling industry is not well developed, most imported wheat cross the border in the form of wheat flour. There are no clear price difference between major cities and also no clear seasonal price fluctuation trend. The local retail price is strongly influenced by the international price and it is usually higher than the major international prices (FOB).                                               |            |                 |           |
| (2) Rice                  | While it is supposed that the % of distributed rice is higher than that of wheat, the distributed quantity itself is small. Therefore, presence of imported rice (maybe mainly from Pakistan) is strong. In general, retail price of imported rice is higher than that of local rice. Though there are price differences between major cities, there is not a clear trend that the price in a certain city is always higher than that of other cities. Also, there is no clear seasonal price fluctuation trend. As same as wheat, the local price is strongly influenced by the international price. The local retail price much higher than the major international prices (FOB). |            |                 |           |
| (3) Vegetables and Fruits | It is supposed that local produced vegetables and fruits are mostly consumed by producers or sold at local markets at village or district level. In the markets, there are several products from other provinces, as well as from other countries.                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |                 |           |
| (4) Livestock             | While livestock is an actual emergency stock for many growers, the % of marketed livestock is higher than that of marketed crops. Many growers sell animals to local traders near their living place. It is not common that the growers sell animals directly to butchers.                                                                                                                                                                                                                                                                                                                                                                                                          |            |                 |           |

# Outline of Farmer's Life in Target Regions

| Item                                                             | Afghanistari                                                                                                                                                                                                                                                              | Northern R                                                         | North-eastern R                                                                                                                                                                                                             | Eastern R                                                                                                                      |
|------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| 1. Farm Population and Family Size<br>(1) Farm Population (2003) | The % of farm population is 58.5% of the settled population. The % of rural population, including non-farm population, is 68.3%.                                                                                                                                          | The % of farm population is 69.6% of the settled population.       | The % of farm population is 62.2% of the settled population.                                                                                                                                                                | The % of farm population is 69.5% of the settled population.                                                                   |
| (2) Family Size and Age                                          | Average family size is 11.4 per farm household. Average age of the head of family is 47.                                                                                                                                                                                  | Average family size is 11.7 per farm household.                    | Average family size is 11.5 per farm household.                                                                                                                                                                             | Average family size is 10.4 per farm household.                                                                                |
| (3) Returnees and IDP (2002/03)                                  | 3.0% of the total farm-households                                                                                                                                                                                                                                         | 0.8% of the total farm-households                                  | 0.5% of the total farm-households                                                                                                                                                                                           | 10.2% of the total farm-households                                                                                             |
| 2. Income Sources (2002)                                         | Depending much on labor income & wages and borrowed money. The % of farm household who sold crops, animals and other farm products are 22.7%, 34.6% and 13.5%, respectively. It seems that majority of farm households depend their income mainly on non-farm activities. | Depending much on borrowed money.                                  | While the % of farm households to sell crops, animals and other farm products is relatively high, they also depend on labor income & wages and borrowed money. They have diverse income sources.                            | Depending much on labor income & wages and borrowed money. The % of farm households to sell crops, animals is relatively high. |
| 3. Self-sufficiency of Foods                                     | Totally deficit. The % of deficit farm households is 57.7% and 46.1%, respectively in 2002 and 2003                                                                                                                                                                       | Totally deficit. The % of deficit farm households is 51.8% in 2002 | Totally surplus. The % of deficit farm households is 18.0% in 2002                                                                                                                                                          | Totally much deficit. The % of deficit farm households is 77.1% in 2002                                                        |
| 4. Debts (2002)                                                  | 56.4% of farm households have average \$478 of debt. Major creditors to them are relatives, traders and fellow villagers. The lower food self-sufficiency households, the bigger % of debtor and the bigger amount of debt                                                | Average debt is \$324. Main creditors are non-farm households      | Average debt is \$464. It is almost same to the national average. It seems that there are wealth farmers who actively credit money to other farmers. There might be a big gap between the rich farmers and the poor farmers | Average debt is \$659. It is higher than the national average. Main creditors are non-farm households                          |

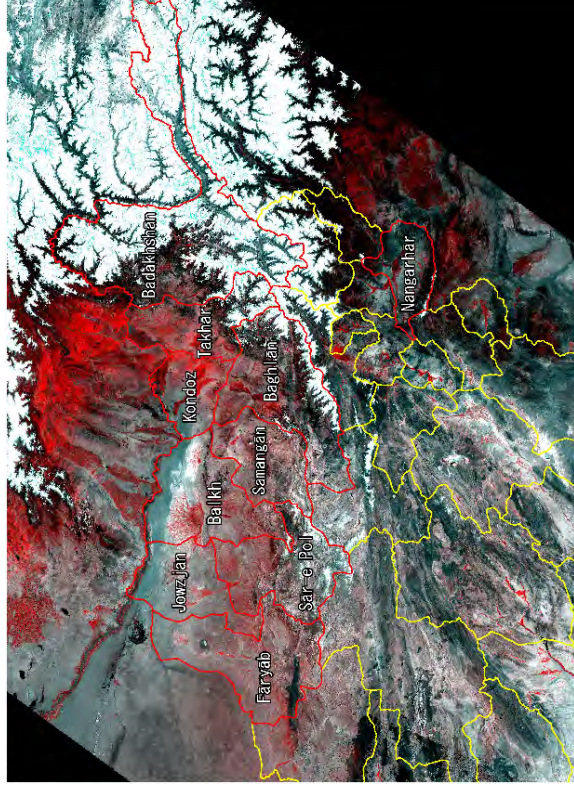
# Farming in Target Regions

| Item                                | Northern Region                                                                                                                                                            |                                                                                                                                                                                           | Northeastern Region                                                                                                                             |                                                                                                                                      | Eastern Region                                                                                                                                                           |  |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                                     | Flat Land                                                                                                                                                                  |                                                                                                                                                                                           | Mountain Area                                                                                                                                   |                                                                                                                                      |                                                                                                                                                                          |  |
| Farm Size                           | Around 10ha.                                                                                                                                                               | Around 5ha                                                                                                                                                                                | Around 5ha                                                                                                                                      | Around 5ha.                                                                                                                          | Around 1ha                                                                                                                                                               |  |
| Irrigation                          | Relatively large scale farms are dominant. The rate of irrigated farmland is 15~20%. Facilities are highly deteriorated. Crops are mainly cultivated in the irrigated land | Middle scale farms are dominant. The rate of irrigated farmland is 60~70%. Facilities are relatively well maintained. Crops are cultivated in irrigated land, as well as in rain-fed land | Middle scale farms are dominant. Facilities are relatively well maintained. Crops are cultivated in irrigated land, as well as in rain-fed land | Middle scale farms are dominant. Facilities are well maintained. Crops are cultivated in irrigated land, as well as in rain-fed land | Small scale farms are dominant. The rate of irrigated farmland is about 90%. Facilities are maintained to some extent. Crops are mostly cultivated in the irrigated land |  |
| Actual Annual Farming Area          | Around 5ha, depends on annual precipitation. A certain fallow land is kept every year by rotation system                                                                   | Around 5ha                                                                                                                                                                                | Around 5ha                                                                                                                                      | Around 5ha                                                                                                                           | Around 1ha                                                                                                                                                               |  |
| Land Utilization of Irrigated Land  | Almost 1 crop/year                                                                                                                                                         | 130~140%                                                                                                                                                                                  | 120~130%                                                                                                                                        | Almost 2 crops/year                                                                                                                  |                                                                                                                                                                          |  |
| Total Cropped Area                  | As same as the farming area                                                                                                                                                | Around 6ha                                                                                                                                                                                | Around 5ha                                                                                                                                      | Nearly 2ha                                                                                                                           |                                                                                                                                                                          |  |
| Crop Farming                        | Wheat is very dominant over other crops. Barley also grown to some extent                                                                                                  | Wheat is dominant over other crops. Barley and rice are relatively common crops                                                                                                           | Wheat is dominant over other crops. Barley and maize are relatively common crops                                                                | Importance of wheat is relatively low though it is the 1 <sup>st</sup> important crop. Rice, maize and vegetables are common crops   |                                                                                                                                                                          |  |
| (1) Under irrigation                | <Winter crops> Wheat, Barley<br><Summer crops> Mung-bean, Cotton, Melon & Watermelon                                                                                       | <Winter crops> Wheat (partly spring wheat), Barley, Pulses<br><Summer crops> Rice, Mung-bean, Cotton, Melon & Watermelon, Vegetables                                                      | <Winter crops> Wheat, Barley (Relatively few crops grow)<br><Summer crops> Wheat, Maize, Potato                                                 | <Winter crops> Wheat, Onion<br><Summer crops> Rice, Maize, Vegetables                                                                |                                                                                                                                                                          |  |
| (2) Under rain-fed                  | <Winter crops> Wheat (partly spring wheat), Barley<br><Summer crops> Oil-seeds, Melon & Watermelon                                                                         | <Winter crops> Wheat (partly spring wheat), Barley<br><Summer crops> Pulses, Melon & Watermelon                                                                                           | <Winter crops> Wheat, Barley (Relatively few crops grow)<br><Summer crops> Wheat, Maize                                                         | N.A. (Crops are mostly cultivated in the irrigated land)                                                                             |                                                                                                                                                                          |  |
| Fruits/Nuts                         | Almond, Grape, Pomegranate, Pistachio, Walnuts, Apricot                                                                                                                    | Almond, Apricot, Grape, Apple, Walnuts, Peach                                                                                                                                             | Apple, Apricot, Walnut                                                                                                                          | Peach, Apricot, Mulberry                                                                                                             | Gins, Mulberry                                                                                                                                                           |  |
| Livestock (Ave. per Farm-household) | Cattle: 1 head<br>Sheep: 8-9 heads<br>Goats: 2-3 heads<br>Poultry: 1-2 birds                                                                                               | Cattle: 2-3 heads<br>Sheep: about 30 heads<br>Goats: 2-3 heads<br>Poultry: 3 birds                                                                                                        | Cattle: 6-7 heads<br>Sheep: 8-9 heads<br>Goats: 7 heads<br>Poultry: 7 birds                                                                     | Cattle: 3-4 heads<br>Sheep: 0-1 heads<br>Goats: 1 head<br>Poultry: 10 birds                                                          | Deficit farm-households are dominant                                                                                                                                     |  |
| Self-sufficiency of Wheat           | Self-sufficient farm-households are dominant, though the situation remarkably                                                                                              | Self-sufficient farm-households are dominant, though the situation remarkably                                                                                                             | Self-sufficient farm-households are dominant, though the situation remarkably                                                                   | Self-sufficient farm-households are dominant, though the situation remarkably                                                        | Self-sufficient farm-households are dominant, though the situation remarkably                                                                                            |  |

# [Analysis of Low Resolution Satellite Image]

## 【Specifications of Data】

- MODIS/Terra Surface Reflectance 8-Day L3 Global 250m SIN Grid V005
- Waveband: Visible • Near-infrared wavelength band 2 bands
- Resolution: 250 m
- False Color Composite Image



Example of MODIS Data (False Color Composite Image)

# [Result on Analysis of Low Resolution Satellite Image]

## 【Parameter】

- Period: 9 years from 2000 to 2008
- Seasons of Analysis    1) Confirmation of Winter Crop: End of April (date: 22 to 29), 2) Confirmation of Summer Crop: Beginning of September
- Scenes which can cover whole 10 provinces (Northern and North-eastern provinces and Nangarhar province)

| No.   | Name of Province | Area (000 ha) <sup>※</sup>                 | 2000  | 2001  | 2002  | 2003  | 2004  | 2005  | 2006  | 2007  | 2008 | Ave.  |
|-------|------------------|--------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|
| 1     | Badkhisban       | Vegetation area on April only              | 96    | 195   | 416   | 162   | 241   | 124   | 124   | 149   | 117  | 180   |
|       |                  | Vegetation area on September only          | 17    | 9     | 96    | 145   | 60    | 145   | 28    | 20    | 13   | 59    |
|       |                  | Vegetation are on both April and September | 10    | 10    | 22    | 18    | 16    | 17    | 12    | 13    | 13   | 14    |
| 2     | Takhar           | Vegetation area on April only              | 379   | 321   | 400   | 358   | 308   | 348   | 444   | 401   | 109  | 341   |
|       |                  | Vegetation area on September only          | 10    | 11    | 16    | 20    | 25    | 18    | 11    | 7     | 15   | 15    |
|       |                  | Vegetation are on both April and September | 64    | 54    | 62    | 78    | 64    | 68    | 70    | 74    | 67   | 67    |
| 3     | Kunduz           | Vegetation area on April only              | 252   | 112   | 132   | 365   | 210   | 222   | 154   | 255   | 66   | 197   |
|       |                  | Vegetation area on September only          | 17    | 11    | 14    | 12    | 35    | 16    | 18    | 12    | 22   | 17    |
|       |                  | Vegetation are on both April and September | 91    | 81    | 114   | 142   | 114   | 131   | 132   | 140   | 105  | 117   |
| 4     | Bughlan          | Vegetation area on April only              | 227   | 113   | 302   | 396   | 411   | 397   | 341   | 370   | 66   | 292   |
|       |                  | Vegetation area on September only          | 10    | 6     | 7     | 12    | 14    | 11    | 8     | 5     | 8    | 9     |
|       |                  | Vegetation are on both April and September | 39    | 36    | 53    | 73    | 54    | 45    | 48    | 56    | 44   | 50    |
| 5     | Balkh            | Vegetation area on April only              | 198   | 93    | 326   | 707   | 210   | 336   | 446   | 453   | 68   | 315   |
|       |                  | Vegetation area on September only          | 24    | 21    | 24    | 26    | 33    | 33    | 17    | 21    | 21   | 24    |
|       |                  | Vegetation are on both April and September | 51    | 44    | 74    | 113   | 71    | 80    | 93    | 90    | 52   | 74    |
| 6     | Samangan         | Vegetation area on April only              | 82    | 37    | 205   | 371   | 148   | 166   | 121   | 274   | 16   | 158   |
|       |                  | Vegetation area on September only          | 2     | 1     | 2     | 1     | 1     | 3     | 1     | 1     | 1    | 2     |
|       |                  | Vegetation are on both April and September | 6     | 5     | 6     | 9     | 7     | 8     | 5     | 8     | 4    | 6     |
| 7     | Juzjan           | Vegetation area on April only              | 106   | 39    | 387   | 685   | 94    | 270   | 437   | 327   | 71   | 268   |
|       |                  | Vegetation area on September only          | 17    | 19    | 26    | 21    | 24    | 36    | 14    | 31    | 18   | 23    |
|       |                  | Vegetation are on both April and September | 16    | 11    | 34    | 80    | 16    | 27    | 56    | 37    | 11   | 32    |
| 8     | Sari-i-Pul       | Vegetation area on April only              | 194   | 85    | 395   | 479   | 94    | 332   | 475   | 442   | 42   | 282   |
|       |                  | Vegetation area on September only          | 3     | 3     | 7     | 6     | 24    | 10    | 3     | 3     | 3    | 7     |
|       |                  | Vegetation are on both April and September | 11    | 8     | 19    | 26    | 16    | 20    | 14    | 19    | 9    | 16    |
| 9     | Faryab           | Vegetation area on April only              | 162   | 44    | 1,079 | 1,296 | 390   | 764   | 475   | 920   | 113  | 583   |
|       |                  | Vegetation area on September only          | 2     | 2     | 5     | 3     | 3     | 3     | 3     | 2     | 2    | 3     |
|       |                  | Vegetation are on both April and September | 10    | 9     | 32    | 32    | 15    | 23    | 14    | 23    | 11   | 19    |
| 10    | Nangarhar        | Vegetation area on April only              | 41    | 33    | 43    | 54    | 17    | 40    | 36    | 54    | 48   | 41    |
|       |                  | Vegetation area on September only          | 10    | 22    | 16    | 9     | 23    | 29    | 17    | 16    | 12   | 17    |
|       |                  | Vegetation are on both April and September | 39    | 44    | 48    | 60    | 20    | 61    | 49    | 51    | 49   | 47    |
| Total |                  | Vegetation area on April only              | 1,737 | 1,071 | 3,687 | 4,874 | 2,124 | 2,999 | 3,055 | 3,646 | 714  | 2,656 |
|       |                  | Vegetation area on September only          | 111   | 106   | 213   | 256   | 242   | 302   | 121   | 119   | 114  | 176   |
|       |                  | Vegetation are on both April and September | 336   | 303   | 464   | 632   | 392   | 480   | 495   | 513   | 364  | 442   |

※1pixel = 0.25ha (250m×250m)

# Selection on Target Provinces of Detailed Study

## Selection Index and Items to be Clarified

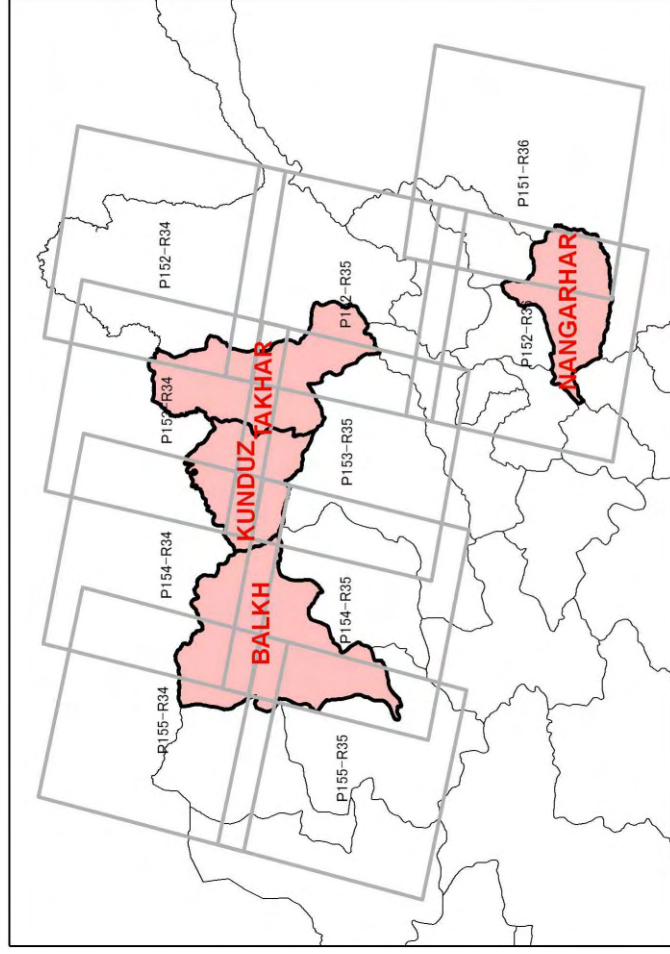
| No. | Evaluation Index                                               | Items to be Clarified                                                  |
|-----|----------------------------------------------------------------|------------------------------------------------------------------------|
| 1.  | Average area of Winter Crop                                    | Spillover effect on Improvement of Winter Crop                         |
| 2.  | Average area of Summer Crop                                    | Spillover effect on Improvement of Summer Crop and Irrigation Facility |
| 3.  | Average coefficient of fluctuation on Reduction of Water Crop  | Stability of Precipitation in Winter                                   |
| 4.  | Average coefficient of fluctuation on Reduction of Summer Crop | Stability of Water Source for Irrigation in Summer                     |

## Result of Selection

| No. | Region        | Name of Province | Winter Crop Cultivated Area ('000ha) | points | Summar Crop Cultivated Area ('000ha) | points | Coefficient of Fluctuation on Reduction of % | points | Coefficient of Fluctuation on Reduction of % | points | Total points | Ranking of points | Remarks                                                                           |
|-----|---------------|------------------|--------------------------------------|--------|--------------------------------------|--------|----------------------------------------------|--------|----------------------------------------------|--------|--------------|-------------------|-----------------------------------------------------------------------------------|
| 1   |               | Badakhshan       | 195                                  | 3      | 74                                   | 7      | -26.8                                        | 8      | -60.4                                        | 1      | 19           | ⑥                 |                                                                                   |
| 2   | North-eastern | Takhar           | 408                                  | 9      | 81                                   | 8      | -24.7                                        | 9      | -9.0                                         | 10     | 36           | ①                 | Selected by Specifications                                                        |
| 3   |               | Kunduz           | 313                                  | 6      | 134                                  | 10     | -28.2                                        | 7      | -15.2                                        | 8      | 31           | ②                 | Selected by Specifications                                                        |
| 4   |               | Bughlan          | 341                                  | 7      | 59                                   | 5      | -48.7                                        | 5      | -13.4                                        | 9      | 26           | ④                 |                                                                                   |
| 5   |               | Balkh            | 390                                  | 8      | 99                                   | 9      | -49.5                                        | 4      | -21.2                                        | 6      | 27           | ③                 | Selected by Evaluation                                                            |
| 6   |               | Samangan         | 164                                  | 2      | 8                                    | 1      | -47.4                                        | 6      | -21.5                                        | 5      | 14           | ⑧                 |                                                                                   |
| 7   | North         | Juzjan           | 300                                  | 5      | 55                                   | 4      | -56.0                                        | 3      | -40.2                                        | 2      | 14           | ⑧                 |                                                                                   |
| 8   |               | Sar-i-Pul        | 298                                  | 4      | 23                                   | 3      | -61.5                                        | 1      | -32.8                                        | 4      | 12           | ⑩                 |                                                                                   |
| 9   |               | Faryab           | 602                                  | 10     | 22                                   | 2      | -58.6                                        | 2      | -34.2                                        | 3      | 17           | ⑦                 | Winter crop area is different from statistic data, so, the data lack credibility. |
| 10  | East          | Nangarhar        | 88                                   | 1      | 64                                   | 6      | -20.7                                        | 10     | -15.5                                        | 7      | 24           | ⑤                 | Comparative Province                                                              |

# Target Provinces of Detailed Study by Medium Resolution Satellite

- Balkh Province
- Kunduz Province
- Takhar Province
- Nangarhar Province



# [Analysis of Medium Resolution Satellite]

## 【Specifications of Data】

- Landsat 7 ETM+ (Enhanced Thematic Mapper Plus)

## 【Parameter】

- Period: 9 years from 2000 to 2008
- Three seasons per year: a) Winter Cropping (Late April to early May), b) Rice Cropping (Late June to early July), c) Summer Cropping (Late August to early September)

# Cultivated Area by Result of Analysis

| No. | Province  | Area (Ha)       | 2000    | 2001    | 2002    | 2003    | 2004    | 2005    | 2006    | 2007    | 2008    | Min.    | Max.    | Ave.    |
|-----|-----------|-----------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 2   | Takhar    | Winter Cropping | 351,759 | 269,013 | 485,168 | 410,102 | 455,827 | 436,633 | 408,600 | 411,111 | 226,083 | 226,083 | 485,168 | 383,811 |
|     |           | Summer Cropping | 28,444  | 32,591  | 21,622  | –       | 34,262  | 36,392  | 14,958  | 21,565  | 11,022  | 11,022  | 36,392  | 25,107  |
|     |           | – Paddy         | 1,418   | 9,314   | 9,459   | –       | 11,546  | 19,628  | 4,902   | 5,886   | 5,988   | 1,418   | 19,628  | 8,518   |
|     |           | – Non Paddy     | 27,026  | 23,277  | 12,162  | –       | 22,717  | 16,764  | 10,056  | 15,679  | 5,034   | 5,034   | 27,026  | 16,589  |
| 3   | Kunduz    | Winter Cropping | 216,594 | 113,624 | 210,994 | 316,073 | 197,120 | 317,864 | 293,575 | 217,384 | 109,895 | 109,895 | 317,864 | 221,458 |
|     |           | Summer Cropping | 29,847  | 40,732  | 41,190  | –       | 55,079  | 58,372  | 31,446  | 37,614  | 5,592   | 5,592   | 58,372  | 37,484  |
|     |           | – Paddy         | 1,457   | 6,841   | 11,041  | –       | 13,204  | 29,570  | 8,121   | 9,074   | 2,223   | 1,457   | 29,570  | 10,191  |
|     |           | – Non Paddy     | 28,390  | 33,892  | 30,149  | –       | 41,875  | 28,802  | 23,325  | 28,541  | 3,369   | 3,369   | 41,875  | 27,293  |
| 5   | Balkh     | Winter Cropping | 292,337 | 119,544 | 400,328 | –       | 234,513 | 337,569 | 238,404 | 197,758 | 92,046  | 92,046  | 400,328 | 239,062 |
|     |           | Summer Cropping | 2,632   | 2,242   | 12,458  | 10,458  | 11,041  | 14,555  | 10,226  | 13,810  | 2,505   | 2,242   | 14,555  | 8,881   |
|     |           | – Paddy         | 21      | 77      | 304     | –       | 389     | 2,009   | 603     | 706     | 420     | 21      | 2,009   | 566     |
|     |           | – Non Paddy     | 2,612   | 2,164   | 12,154  | –       | 10,652  | 12,546  | 9,623   | 13,105  | 2,085   | 2,085   | 13,105  | 8,118   |
| 10  | Nangarhar | Winter Cropping | 82,558  | 136,328 | 136,245 | 169,385 | 79,142  | 148,172 | 135,013 | 102,720 | 133,849 | 79,142  | 169,385 | 124,824 |
|     |           | Summer Cropping | 14,998  | 4,109   | 21,510  | 20,628  | 11,766  | 20,075  | 12,345  | 29,374  | 5,620   | 4,109   | 29,374  | 15,603  |
|     |           | – Paddy         | 982     | –       | 2,342   | –       | 1,114   | 1,495   | 1,588   | 3,196   | 523     | 523     | 3,196   | 1,606   |
|     |           | – Non Paddy     | 14,016  | –       | 19,168  | –       | 10,652  | 18,579  | 10,757  | 26,178  | 5,097   | 5,097   | 26,178  | 14,921  |

# Cultivated Area Distribution Map

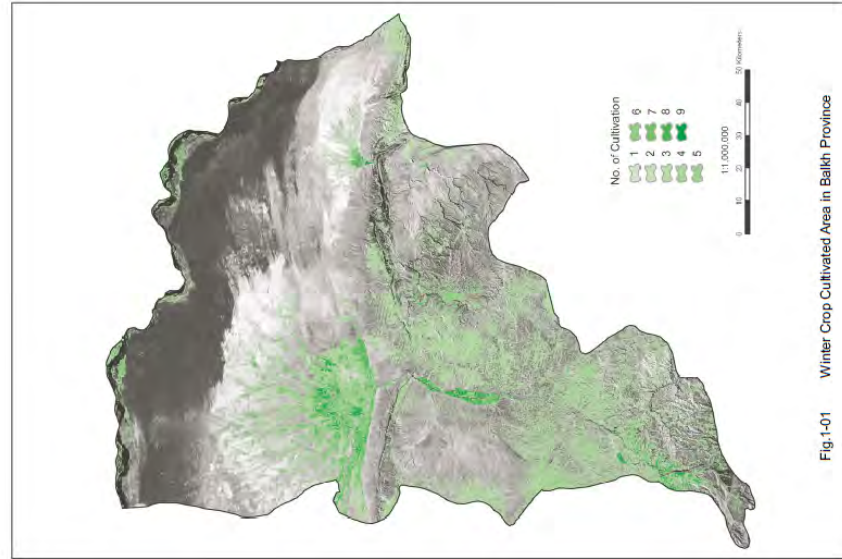


Fig.1-01 Winter Crop Cultivated Area in Balkh Province

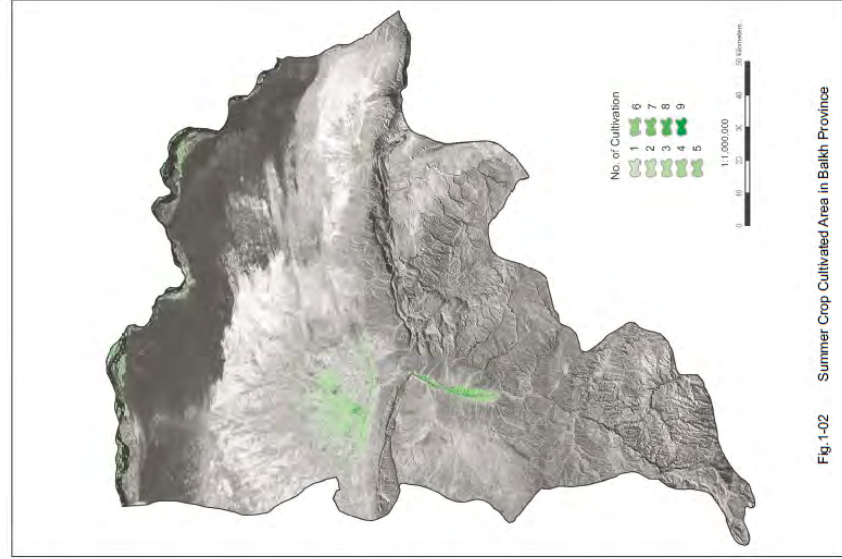
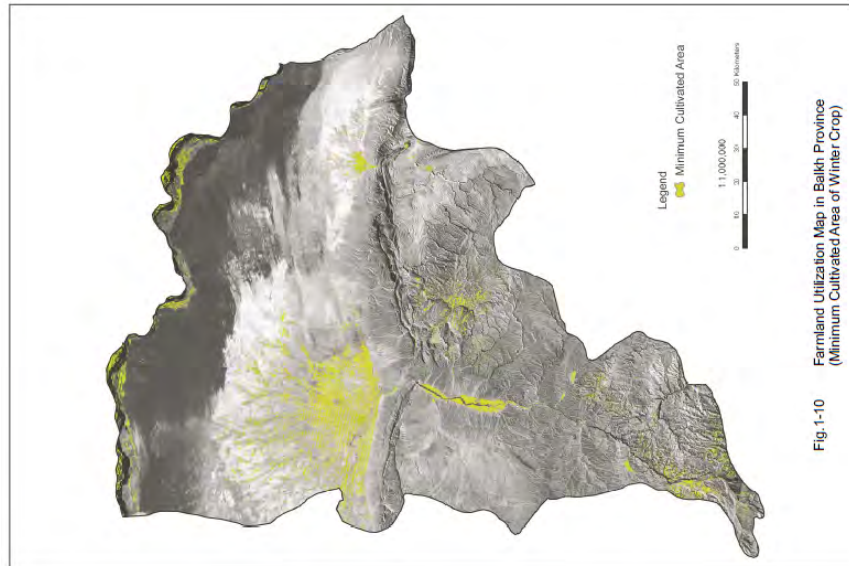
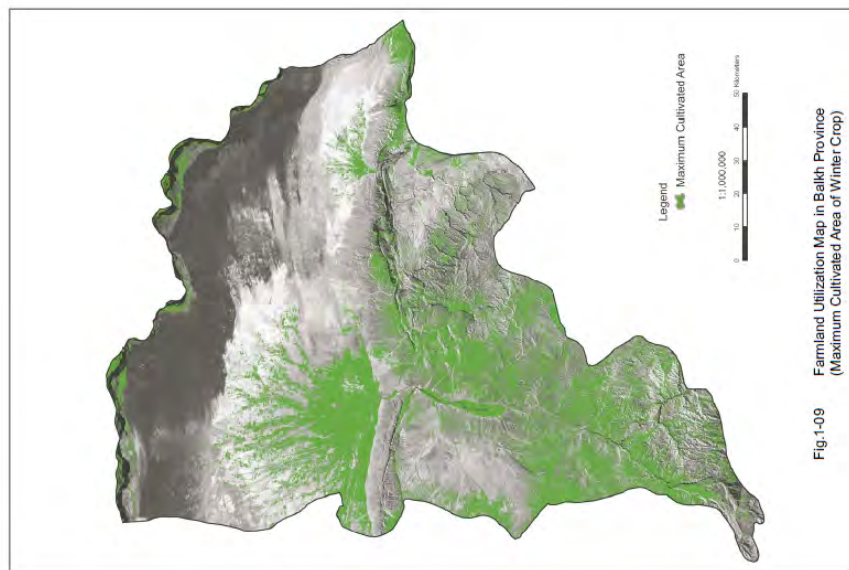


Fig.1-02 Summer Crop Cultivated Area in Balkh Province

# [Farmland Utilization Map



# [ Comparison of Fallow Cycle

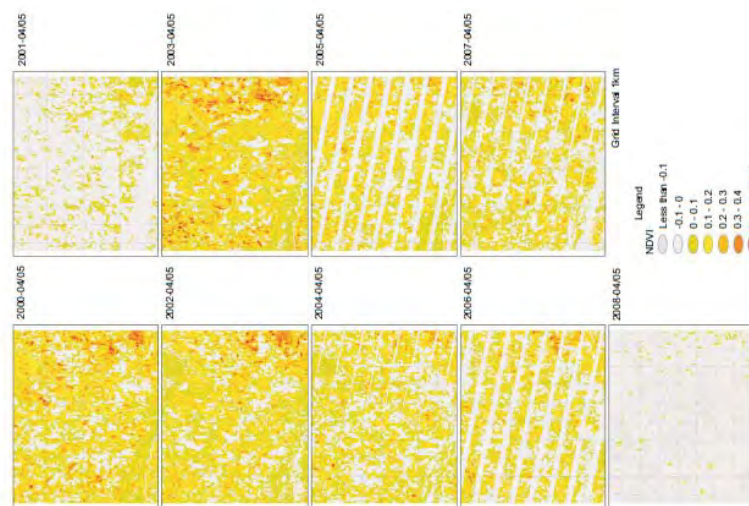


Fig.1-26 Comparison of Fallow Cycle of Balkh Province  
(Winter Crop: Upland)



Fig.1-27 Comparison of Fallow Cycle of Balkh Province  
(Summer Crop: Upland)

# Principle of Agricultural Development Strategy

- Consistency with ANDS
- Consistency with NAP
- Development of Local Potential
- Priority on Reconstruction Support  
(To connect the state of “reconstruction” to “future development” with continuity )

# [Strategy for Northern Region]

## 【Local Potential】

- Large arable land and pastureland, Wheat production, Fruits and nuts production, Sheep-based livestock, Handicrafts

## 【Strategy for Agricultural Development】

- Enhancement of stable production of wheat
- Improvement of traditional fruits and nuts production, rehabilitation of the related processing industry and enhancement of exports
- Promotion of sheep breeding (especially Karakul sheep), rehabilitation of leather and wool products and enhancement of export

# Strategy for Northeastern Region (Flat Land)

## 【Local Potential】

- Large area of arable land and relatively high irrigation rate, Wheat production, Rice production, Fruits and nuts production, Sheep-based livestock

## 【Strategy for Agricultural Development】

- Establishment of stable production and supply of wheat as Afghanistan's breadbasket
- Establishment of stable production and supply of local rice
- Increase the production of traditional fruits and nuts, rehabilitation of the processing industry and enhancement of the exports
- Promotion of sheep breeding (especially Karakul sheep), rehabilitation of leather and wool products and enhancement of exports

# Strategy for Northeastern Region (Mountain Area)

## 【Local Potential】

- Cool climate and rich pastureland, Production of fruits and nuts, Cattle-based livestock

## 【Strategy for Agricultural Development】

- Increase the production of traditional fruits and nuts, rehabilitation of the processing industry and enhancement of the exports
- Promotion of cow breeding and development of dairy farming including processing

# [Strategy for Eastern Region]

## 【Local Potential】

- Warm climate and diversity of crops, Rice production, Fruits and nuts production, Chicken breeding

## 【Strategy for Agricultural Development】

- Establishment of stable production and supply of local rice
- Encouragement of vegetable and citrus production taking advantage of the warm climate
- Development of poultry (chicken and egg) production centre

# Possible Cooperation Program for Agricultural Development

| Province           | Priority Issues                                                                                                                  | Impediments                                                                                                                                                                                                                                                                                                                                                                                                                   | Possible Cooperation to Overcome the Impediments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3 Target Provinces | (1) Establishment of stable production and supply of wheat as Afghanistan's breadbasket                                          | <ul style="list-style-type: none"> <li>Unstable rainfall and insufficient supply of irrigation water</li> <li>Unskilled post harvest technology</li> <li>Shortage of storage facilities</li> <li>Decline of commercial milling industry including aging facilities</li> <li>Unstable supply of electricity, water, etc</li> <li>Poor condition of local roads</li> </ul>                                                      | <ul style="list-style-type: none"> <li>To rehabilitate irrigation systems and improve water management systems</li> <li>To establish and disseminate practical soil conservation systems (crop rotation, fallow, etc)</li> <li>To introduce and spread drought-resistant and early ripening varieties (including quality seed production and distribution)</li> <li>To research and spread water-saving cultivation and improved post harvest technology</li> <li>To promote wheat millers and develop their milling/storage facilities</li> <li>To establish quality standards system</li> <li>To develop basic infrastructure such as electricity, water supply and roads</li> </ul>                  |
|                    | (2) Establishment of stable production and supply of local rice                                                                  | <ul style="list-style-type: none"> <li>Unstable rainfall and insufficient supply of irrigation water</li> <li>Lack of high-quality varieties of rice favorable for local people</li> <li>Unskilled cultivation technology</li> <li>Unskilled post harvest and rice milling technology</li> <li>Aging milling facilities</li> <li>Unstable supply of electricity, water, etc</li> <li>Poor condition of local roads</li> </ul> | <ul style="list-style-type: none"> <li>To rehabilitate irrigation systems and improve water management systems</li> <li>To introduce and spread varieties which have high-yielding capacity and fit local people's taste (including quality seed production and distribution)</li> <li>To introduce and spread appropriate paddy field management technology and cropping system</li> <li>To research and spread high-quality rice production and post harvest technology</li> <li>To promote rice millers and develop their milling/storage facilities</li> <li>To establish quality standards system</li> <li>To develop basic infrastructure such as electricity, water supply and roads.</li> </ul> |
|                    | (3) Increase the production of traditional fruits and nuts, rehabilitation of processing industry and enhancement of the exports | <ul style="list-style-type: none"> <li>Lack of elite (high-yielding and high-quality) varieties</li> <li>Unskilled cultivation technology</li> <li>Unskilled processing, packaging and quality control technology</li> <li>Insufficient market information</li> <li>Decline of local processing industry and exporters</li> <li>Unstable supply of electricity, water, etc</li> <li>Poor condition of local roads</li> </ul>  | <ul style="list-style-type: none"> <li>To introduce and spread elite varieties</li> <li>To establish quality seedling production and distributing system</li> <li>To introduce and spread advanced cultivation technology (pruning, fruit thinning, grafting, layering etc)</li> <li>To establish and operate micro-credit system for producers</li> <li>To rehabilitate processing industry including development of their facilities and to promote exporters</li> <li>To develop market information system and quality control system etc</li> <li>To develop basic infrastructure such as electricity, water supply and roads</li> </ul>                                                            |

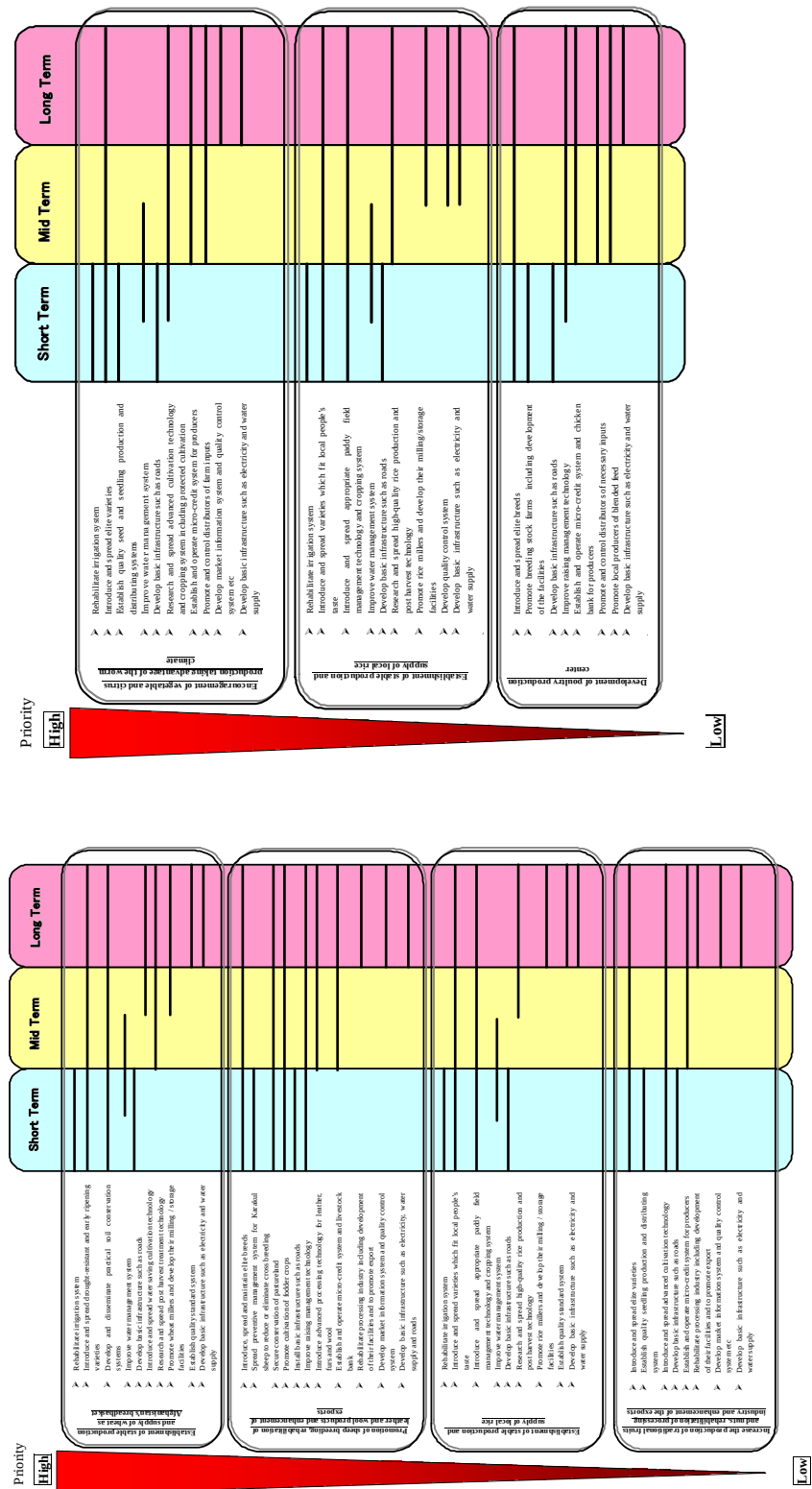
# Possible Cooperation Program for Agricultural Development (2)

|                       |                                                                                           |                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nangarhar<br>Province | (1) Establishment of stable production and supply of local rice                           | <ul style="list-style-type: none"> <li>Follow above (1) of 3 Target Provinces</li> </ul>                                                                                                                                                                                                                                                    | <ul style="list-style-type: none"> <li>Follow above (2) of 3 Target Provinces</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                       | (2) Encouragement of vegetable and citrus production taking advantage of the warm climate | <ul style="list-style-type: none"> <li>Lack of elite (high-yielding and high-quality) varieties</li> <li>Difficulty to procure necessary inputs</li> <li>Unskilled cultivation technology</li> <li>Unskilled post harvest and packing technology</li> <li>Insufficient market information</li> <li>Poor condition of local roads</li> </ul> | <ul style="list-style-type: none"> <li>To introduce and spread elite varieties</li> <li>To establish quality seed and seedling production and distributing systems</li> <li>To research and spread advanced cultivation technology and cropping system including protected cultivation (harvest control for vegetables and pruning, fruit thinning, grafting, layering etc for citrus)</li> <li>To establish and operate micro-credit system for producers</li> <li>To promote distributors of farm inputs</li> <li>To develop market information system and quality control system</li> <li>To rehabilitate irrigation systems and improve water management systems</li> <li>To develop basic infrastructure such as electricity, water supply and roads</li> </ul> |
|                       | (3) Development of poultry (chicken and egg) production centre                            | <ul style="list-style-type: none"> <li>Lack of elite breeds</li> <li>Difficulty to procure enriched feeds and inputs</li> <li>Unskilled raising and disease control technology</li> <li>Poor condition of local roads</li> </ul>                                                                                                            | <ul style="list-style-type: none"> <li>To introduce and spread elite breeds</li> <li>To promote breeding stock farms (farmers) including development of the facilities</li> <li>To improve raising management technology (including disease control such as vaccination)</li> <li>To establish and operate micro-credit system and chicken bank for producers</li> <li>To promote distributors of necessary inputs</li> <li>To promote local producers (farmers) of blended feed</li> <li>To develop basic infrastructure such as electricity, water supply and roads</li> </ul>                                                                                                                                                                                     |

# Possible Cooperation Program for Agricultural Development (3)

|                                                         |                                                                                       |                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| All Areas<br>(strengthen<br>administrative<br>capacity) | (1) Strengthen agricultural institutions                                              | <ul style="list-style-type: none"> <li>• Insufficient understanding about actual situation and issues</li> <li>• Shortage of human resources (manpower and ability)</li> <li>• Poor facilities and equipment</li> </ul>                                                                                                                         | <ul style="list-style-type: none"> <li>• To establish agricultural information system and empower concerned staff in collecting, accumulating and analyzing the related information</li> <li>• To enhance project designing and planning abilities of concerned staff</li> <li>• To formulate the master plan on local agricultural development</li> <li>• To upgrade and develop facilities and equipment</li> </ul>                                             |
|                                                         | (2) Empowerment of agricultural research and extension system                         | <ul style="list-style-type: none"> <li>• Unclear priority order of issues and topics to be addressed</li> <li>• Shortage of human resources (manpower and ability)</li> <li>• Poor facilities and equipment</li> </ul>                                                                                                                          | <ul style="list-style-type: none"> <li>• To formulate the master plan on local agricultural development (clarification of the priority order)</li> <li>• To improve the abilities of concerned staff</li> <li>• To upgrade and develop facilities and equipment</li> </ul>                                                                                                                                                                                        |
|                                                         | (3) Reestablishment of farmland registration system                                   | <ul style="list-style-type: none"> <li>• Lack of people's trust in the government</li> <li>• Confused information about land property</li> <li>• Poor administration ability</li> </ul>                                                                                                                                                         | <ul style="list-style-type: none"> <li>• To collect and organize related information and establish a data base</li> <li>• To reorganize the related regulations and promote an awareness campaign</li> <li>• To improve the abilities of concerned staff</li> </ul>                                                                                                                                                                                               |
|                                                         | (4) Reorganization of hydrological monitoring system                                  | <ul style="list-style-type: none"> <li>• Aging facilities</li> <li>• Shortage of human resources (manpower and ability)</li> <li>• Poor facilities and equipment</li> <li>• Lack of rules about information accumulation system</li> </ul>                                                                                                      | <ul style="list-style-type: none"> <li>• To upgrade and develop facilities and equipment</li> <li>• To rehabilitate hydrological monitoring facilities</li> <li>• To rearrange the points for hydrological monitoring (reconstruction of the monitoring network)</li> <li>• To collect and organize related information and establish a data base</li> <li>• To improve the abilities of concerned staff</li> </ul>                                               |
|                                                         | (5) Reestablishment of water charge collection system and improvement of Mirab system | <ul style="list-style-type: none"> <li>• Water charge has not been revised for a long time</li> <li>• Confused information regarding irrigated land</li> <li>• Lack of support system by the government</li> <li>• Lack of water measurement and management facilities</li> <li>• Shortage of human resources (manpower and ability)</li> </ul> | <ul style="list-style-type: none"> <li>• To revise the water law that was established in 1925</li> <li>• To update information about irrigated land and reset the water charge</li> <li>• To upgrade and develop facilities to measure and manage intake water</li> <li>• To upgrade and develop irrigation facilities as well as maintenance facilities and equipment in main rivers</li> <li>• To secure human resources and improve their abilities</li> </ul> |

# Supposed Schedule of Cooperation of Programs Related to Development of Foundation for Agricultural Production



# Supposed Schedule of Cooperation [Programs Related to Capacity Development of Agricultural Administration]

| Priority | Short Term                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Mid Term | Long Term |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-----------|
| High     | <p>Strengthening agricultural extension institutions</p> <ul style="list-style-type: none"> <li>Formulate the master plan on local agricultural development</li> <li>Enhance project designing and planning abilities of concerned staff</li> <li>Upgrade extension facilities and equipment</li> <li>Establish agricultural information system and empower concerned staff in collecting, accumulating and analyzing the related information</li> </ul>                                                                                                    |          |           |
|          | <p>Empowerment of agricultural research and extension system</p> <ul style="list-style-type: none"> <li>Formulate the master plan on local agricultural development</li> <li>Upgrade the abilities of concerned staff</li> <li>Upgrade and develop facilities and equipment</li> </ul>                                                                                                                                                                                                                                                                      |          |           |
|          | <p>Reorganization of hydrological monitoring system</p> <ul style="list-style-type: none"> <li>Reorganize the points for hydrological monitoring</li> <li>Rehabilitate hydrological monitoring facilities</li> <li>Upgrade the abilities of concerned staff</li> <li>Collect and organize related information and establish a data base</li> </ul>                                                                                                                                                                                                          |          |           |
|          | <p>Reestablishment of farmland reclamation system</p> <ul style="list-style-type: none"> <li>Improve the abilities of concerned staff</li> <li>Upgrade and develop facilities and equipment</li> <li>Collect and organize related information and establish a data base</li> <li>Reorganize the related regulations and promote an awareness campaign</li> </ul>                                                                                                                                                                                            |          |           |
| Low      | <p>Reestablishment of water charge collection system and environment of Mid-ship system</p> <ul style="list-style-type: none"> <li>Secure human resources and improve the abilities</li> <li>Upgrade and develop irrigation facilities as well as maintenance facilities and equipment in main rivers</li> <li>Update information about irrigated land</li> <li>Reorganize water charge</li> <li>Reorganize the related regulations and promote an awareness campaign</li> <li>Upgrade and develop facilities to measure and manage intake water</li> </ul> |          |           |

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