

3.5.5 Agricultural Support Services

(1) Government Organization

a) Department of Irrigation (DoI)

DoI under MoWR participated in many irrigation development projects of various scales and different characteristics, while seven Irrigation Development Boards under MoWR are involved in large-scale irrigation projects.

There are five divisions under the Director General of DoI: (i) Planning, Design, and Monitoring & Evaluation Division; (ii) Surface Irrigation Division, (iii) Ground water Irrigation Division, (iv) Irrigation Management Division, and (v) River Training, Environment and Mechanical Division. The Administration Division, Account Division, and Legal Section are also directly under the Director General. Under each division, different sections exist. The organization chart for DoI is shown in Figure 3-13.

At present the total number of officials in DoI is 192. Of these, two are agro-economists in the Monitoring and Evaluation Section and four are agronomists in the Design, Quality Standardization and Feasibility Study Section, System Management Section, Research & Technology Development Section, and Manpower Development & Training Section.

In addition to the above-mentioned officials, there are project implementation groups with a total number of 293 staff members.

b) Ministry of Agriculture (MoA)

There are three Development Boards and one commission directly under the Minister: the National Cooperation Development Board, National Dairy Development Board, Tea & Coffee Development Board, and Agricultural Price Commission. The research sectors such as the Nepal Agricultural Research Council (NARC) and Agricultural Research Programmes are also controlled directly by the Minister.

There are two departments and four divisions directly under the Secretary: DoAD, Department of Cooperative Development (DoCD), Women Farmer Development Division, Monitoring & Evaluation Division, Planning Division, and Agriculture Statistics Division. The Administration and Financial Division are also directly under the Secretary.

In addition to the above units, MoA has eight corporations under the Secretary: AIC, Dairy Development Corporation, Agricultural Tools Corporation, Agricultural Project Service Centre, Agriculture Lime Industry, Jute Development and Trading Corporation, National Seed Board, and Cotton Development Board.

Under DoAD, there are seven units headed by the Deputy Director Generals; (i) Planning, Monitoring & Evaluation; (ii) Crops; (iii) Livestock; (iv) Horticulture Development; (v) Plant Protection; (vi) Food Nutrition & Technology; and (vii) Fisheries. There exists five Regional Directorates under the DoAD. The organization chart for DoAD is shown in Figure 3-15.

There is a DADO in each district under the Regional Directorate. In the Study Area, there are three DADOs: Kathmandu, Lalitpur, and Bhaktapur. The organization charts for each DADO are shown in Figure 3-16.

(2) Research Services

Agricultural research work in Nepal is carried out under the umbrella of NARC. There are various commodity programs, research farms/stations, and disciplinary divisions for

carrying out research on specific crops, livestock, horticulture, and fisheries in the country.

NARC is now an autonomous body mandated with all the powers and responsibilities for the development of plans, programs, and policies concerning any matters and issues regarding agricultural research work in the country. The objectives of NARC are as follows:

- To formulate, coordinate, implement, monitor, and evaluate all the research plans and programs in the country;
- To improve research facilities, fiscal and personnel management, and overall research efficiency in the search for appropriate technology;
- To strengthen the research outreach program of the farms and stations by collaborating with extension programs and focusing the needs of the small farmers on the farming system approach,
- To strengthen the linkages with international agricultural research centres and relevant national research centres and institutes, and
- To publish research results and information concerning new technology, in appropriate forms, for the use of extension personnel, farmers, and administrators.

There are four Regional Research Stations and 16 Agricultural Research Stations in Nepal. At present, 10 commodity research programs, which carry out research on major crops and four on livestock and fisheries are in operation at a national level.

(3) Extension Services

Agricultural extension services in Nepal are carried out under the responsibility of the Director General of DoAD of MoA. The Regional Agricultural Director, Regional Directorate of Agriculture Development, is responsible for the coordination and supervision of agricultural development programs in the region including extension services, under the control of the Director General. Under the supervision of the Regional Agricultural Director, the District Agriculture Development Officer is responsible for all activities concerning the agricultural development programs in the district.

Agricultural extension services in each district are carried out by field level extension workers stationed at each Agricultural Service Centre: 6, 6, and 7 in Lalitpur, Bhaktapur, and Kathmandu districts, respectively. Each Agricultural Service Centre covers 6.8 villages and 1,600 ha of cultivated land in the three districts and are staffed with 7.5 extension workers, consisting of 2.5 Junior Technicians (JT) and 5 Junior Technical Assistants (JTA) on average, as shown in Table 3-14. The average number of villages and farm families and the average cultivated area covered by a centre per extension worker is 0.9 villages, 680 farmers and 209 ha, respectively. Regarding the number of extension workers, it can be said that there is no shortage in this area.

General extension activities are carried out using a group approach, by organizing farmers' groups which consist of around 15 farmers in each ward level. Parallel to the group approach, is the farm visit program which is generally used for answering individual farmers' questions. In addition to these, an ordinary approach, demonstration program, nursery establishment, farmers' day, crop competition, and training program are generally used by combining two or three extension methods.

The demonstration program is divided into several sections according to the main purposes of the demonstration. To show the results of the total technology package applied, the orientation demonstration is used, while to show the results of one or two items of technology applied such as recommended new varieties of seed or a recommended chemical fertilizer application, the result demonstration is used. For nutrition improvement, the kitchen garden demonstration has become popular in these districts.

Under the horticultural development program, the establishment of nurseries is carried out by providing training to interested farmers, regarding the recommended vegetable seed in order to promote privatization of seeds or seedling production at a village level.

A farmers' day is held once or twice a year by DADO in order to provide one day trips for participating farmers so that they can observe some progressive farmers' activities in the district.

The crop competition is held once a year at a district level and the winner is presented with an award on 13th October, at the World Food Day.

Training programs for farmers are provided at three levels, at a field level, district level, and regional level, according to the development program. At a field level, each Agriculture Service Centre provides training courses for leading farmers regarding the seasonal topics of crop production or animal husbandry. Each DADO provides training courses for representative leading farmers recommended by each Service Centre. The promising leading farmers selected through training courses are sent to the Regional Training Centre to acquire more professional techniques and know-how.

In 1991/92 the number of training courses and farmers who attended them, at a field level, was 79 courses and 1,700 farmers in total for the three districts, as shown in Table 3-15.

One of the unique extension activities is the 4-H Club promotion. To qualify for the 4-H Club people must be: (i) farmers' children; (ii) 13-25 year old boys and girls; (iii) who dropped out of upper school; and (iv) who are literate or illiterate, if any.

4-H Club members are classified into the following three categories:

- a) Primary knowledge level (13-15 years old)
 - Objective : to motivate the members in farming.
 - Aim : they should participate in a Joint Project.
- b) Demonstration skill level (16-19 years old)
 - Objective : to teach vocational skills.
 - Aim : they should participate in a Demonstration Project.
- c) Competition level (20-24 years old)
 - Objective : to develop self-confidence in farming.
 - Aim : they should participate in a Crop Competition.

After graduating from the 4-H Club, the members are expected to be an efficient group of farmers.

At present, the total number of 4-H Clubs and members in Nepal is 600 Clubs with 1,500 members in 55 districts. 4-H Clubs are not yet organized in 20 districts. In the 3 districts of Lalitpur, Bhaktapur, and Kathmandu, there are 37 4-H Clubs with 554 members, of which 348 are boys and 206 are girls, as shown in Table 3-15.

(4) Seed Multiplication

Regarding seed multiplication, production of the stock and foundation seeds is carried out on Government farms under the supervision of each division concerned. In the case of vegetable seed, production of foundation seed is carried out on seven major Government horticulture farms under the supervision of the Vegetable Development Division of DoAD.

Most of the commercial seeds are produced by the private sector, by contract growers in the areas identified and recommended by DoAD. Such areas are in the vicinity of Government farms. AIC also handles commercial seed production. In Jhumka, a cereal seed production farm, which produces certified seed, is managed by AIC itself. In the Kathmandu Valley, there

are only two seed multiplication programs (total 20 ha) for radishes and broad-leaf mustard in Bhaktapur (Sirutar and Suryavinayak).

In order to meet the field standards, the growers are aided technically by experts from Government farms of the respective production areas. For certification purposes, the seed crop has to be inspected by a team consisting of an expert from the government farm of the respective production area and a seed inspector from the Seed Development and Quality Control Service Division under DoAD. After the seed crop is recommended for certification by the field inspectors, the growers harvest, clean, grade, and pack the seed with the help of the experts and send it to the Regional Seed Testing and Quality Control Laboratories for verification of its standard. In Nepal, there are five laboratories for seed testing. If the seed in the verification test meets the recommended standard, then the seed is certified or recommended as quality seed. Such seed is procured by the respective seed dealers.

(5) Agricultural Input Supply

The farm inputs such as fertilizer, improved seeds, agro-chemicals, and agricultural tools, are supplied by AIC and private dealers. Most of the fertilizer is provided by AIC, but it only provides about 25% of the seed and agro-chemicals. There are no branch offices in the districts of the Kathmandu Valley, so a zonal office (Bagmati Zone) directly covers the three districts. Agricultural inputs are distributed to the private dealers, including agricultural cooperatives. The Agricultural Tools Corporation manufactures agricultural tools in Birganj. The tools manufactured are supplied through its branch offices and AIC's branch offices. In the Kathmandu Valley, one branch office exists at Dhobidhara.

Chemical fertilizer, mainly complex and urea are supplied through AIC. Comparisons between the actual and recommended dosage of fertilizer is shown in Table 3-16 and summarized below. Generally, it is considered that distributed quantities of nitrogen are rather high in the Study Area.

	(unit : kg/ha)					
	Present Quantity (N : P : K)			Recommended Q'ty (N : P : K)		
Average Amount of Fertilizers Supplied by AIC	122	25	1			
Actual Dosage, determined by the Farm Survey						
Paddy	146	20	0	100	30	30
Wheat	127	13	0	80	40	20
Maize	106	11	0	120	75	50
Potatoes	240	39	0	150	60	350
Mustard	86	40	0	34	22	28
Vegetables	117	69	0	100	60	50

The distribution of seed is generally carried out by the private dealers and/or AIC. Seeds are purchased from farmers including contract farmers, by dealers or AIC and then sold to growers. The procurement price under a contract between AIC and the growers is fixed by National Seed Board of MoA. In relation to the total demand for seed, the distribution of seed by AIC is very limited. According to AIC information, the seed distribution rate of each crop was 0.39% for paddy, 2.81% for wheat, 0.45% for maize, and 15% for vegetables, in 1991/92. In the Kathmandu Valley in 1991/92, the seed distribution rate of paddy, wheat, and maize was estimated at 0.8, 2.3, and 3.6%, respectively, as shown in the following table:

Crops	Demand			Supply	
	Seed rate (kg/ha)	Planted area (ha)	Demand (ton)	Supply (ton)	Distribution (%)
Paddy	53	18,500	980	8.1	0.8
Wheat	114	16,500	1,880	42.9	2.3
Maize	23	11,900	270	9.6	3.6

According to the farm survey, the use of agro-chemicals such as pesticides, herbicides, and fungicides is uncommon in the Study Area.

(6) Agricultural Credit

ADB/N which was established in 1968, is the only institutional agricultural credit system in Nepal. Under the head office located in Kathmandu, there are seven supervision and control offices and two main branch offices in Nepal. The Kathmandu Valley is covered by three branch offices, i.e. Lalitpur, Bhaktapur, and Kathmandu ADB/N branch offices under the control of the Kathmandu Supervision and Control Office.

There are several kinds of loans now provided by the ADB/N, which are summarized in the following table:

Description	Loan Term	Interest Rate	Collateral
a. Production Loan	within 1 year	18% per year	80% of the total land value
b. Marketing Loan	6 months - 1 year	20% per year	80% of the total land value
c. Agri-processing	1-2 years	20% per year	80% of the total land value
d. Agri-business/industry	2-5 years	19% per year	80% of the total land value
e. Agri-tools, Irrigation, and Biogases	2-5 years	18% per year	80% of the total land value
f. Horticulture (short)	2-5 years	18% per year	80% of the total land value
g. Horticulture (long)	7-10 years	18% per year	80% of the total land value
e. Godown, Cold Storage	10 years	20% per year	80% of the total land value

In 1991/92 the disbursement amount for the agri-business/industry loan and marketing loan make up nearly 90% of the total disbursement amount of the three districts. The agricultural production loan and agri-tools and irrigation loan make up 5% and 4.6% of the total disbursement amount, respectively, as shown in Table 3-17. The total disbursement amount for the area increased every year, except in 1990/91, reaching NRs.83 million in 1991/1992, which was about 50% higher than that of 1989/90. The total repayment amount also increased every year, reaching NRs.60 million in 1991/92, which was 72.6% of total disbursement amount in 1991/1992. However, the accumulated outstanding loan amount has been increasing and by the end of the 1991/92 fiscal year it reached NRs.211 million.

In order to provide agricultural credit for landless small farmers without collateral, the Small Farmer Development Program (SFDP) was established by ADB/N, in 1976. The outline of SFDP is shown in Table 3-18 and summarized below.

Small farmers should be organized at a village level into groups of 5 to 25 members. Each group should have an elected group leader. At least once a month, a meeting should be held in order to discuss various individual and group problems. Group plans for credit needs and social activities should be prepared by farmers themselves. The credit request should be submitted to SFDP. The group accepts joint responsibility for the loan received, its proper utilization, and repayment. If a member fails to repay the loan without reasonable cause, the group may be refused further credit.

Credit oriented economic activities in SFDP are as follows :

- a) Cereal and cash crop production
- b) Livestock development
- c) Horticultural development
- d) Farm mechanization
- e) Irrigation projects
- f) Cottage and rural industries
- g) Marketing of agricultural and cottage industry products
- h) Beekeeping and sericulture
- i) Production of medical plants

In addition, the following community level projects are included :

- a) Community irrigation projects
- b) Community storage construction
- c) Community fish farming
- d) Community agricultural processing unit
- e) Community biogas plant

Of the three districts in the Study Area, SFDP was firstly applied to Bhaktapur district in 1978/79 and covered 3 villages. Then it was applied to Lalitpur district and covered 8 villages in 1982/83. In Kathmandu district, it commenced in 1983/84 and covered 4 villages. In 1992/93, the total number of villages covered in the three districts was 15 and the total disbursement amount, repayment amount, and outstanding amount were NRs.5.9 million, NRs.5 million, and NRs.19.8 million, respectively, as shown in Table 3-18.

Despite the above, the institutional agricultural credit system in Nepal has been strengthened over the last 25 years and non-institutional credit sources such as friends, relatives, traders, and money lenders are playing an important role.

In the three districts, the number of farmers who borrowed an ADB/N loan in 1991/92 was 7,952, which was only 8.2% of the total number of farm households.

3.6 Agro-Economy and Social Conditions

3.6.1 Marketing and Prices

(1) Marketing System for Major Crop Products

The major crops (paddy, wheat, and maize) produced are mainly for home consumption purposes. A farmer who planted more than 0.3 ha of paddy would have a surplus of paddy, other than that for self-consumption. The total holding size of these farmers would be more than 0.6 ha. The number of farmers with more than 0.6 ha is only about 10% of the total number of farm households. Accordingly, most of the farmers in the Study Area do not sell any main cereal products, even if they have to buy some rice from the local market.

The main agricultural products marketed in the Kathmandu Valley are vegetables, although the total planted area is quite limited at present. The largest vegetable market is Kathmandu, the capital city of Nepal, with an urban population of about 414,000. In addition, the populations of the Lalitpur and Bhaktapur municipalities are mostly urban and amount to about 117,000 and 61,000, respectively. These urban populations are constant consumers of vegetables, with an estimated annual purchase amount of 61,000 tons of vegetables, as shown in Table 3-19. In addition, in 1992/93 about 1,000 tons of vegetables were consumed by 334,000 tourists in hotels and restaurants.

For supplying vegetables there are several vegetable market centres in and around

Kathmandu City. The largest market among these centres is Kalimati Fruit and Vegetable Wholesale Market (KWM), which is located in the central part of Kathmandu. It maybe referred to as a wholesale market, however, functionally there is no difference between it and other vegetable market centres, except that the minimum handling unit is set at about 5 kg. There is no auction, no grading, and no standards for packing. The annual amount handled at KWM was about 29,000 tons in 1992/93, which was about 47% of the total amount handled by the main vegetable markets, as shown in Table 3-20. Other major vegetable market centres in Kathmandu are Mahaboudha/Bir Hospital, Ason, Ranamukteshwar, Baneshwor, Maitidevi, and Maru. In Lalitpur, Sasto Bazaar and Mangal Bazaar, and in Bhaktapur, Thimi Bazaar, Sukuldhoka, and the Trolley bus park, are the major vegetable market centres. Marketing channels for vegetables in the Study Area are illustrated in Figure 3-17.

(2) Marketing System for Farm Inputs

The Kathmandu Valley is the highest farm input consuming area in Nepal. Most farmers use manure, about 10 tons/ha, purchased from neighbouring livestock farmers. According to the farm survey, the average consumption of chemical fertilizer is more than 300 kg/ha/crop. These chemical fertilizers are monopolistically distributed by AIC. In the Kathmandu Valley, AIC distributes chemical fertilizers and seed through appointed dealers, including cooperative societies and private dealers, which amount to 127 in Lalitpur, 240 in Bhaktapur, and 398 in Kathmandu districts, respectively. Agricultural chemicals are not only sold by AIC but also by private dealers.

The major marketing channels for supplying of agricultural inputs are illustrated in Figure 3-18. The dealer's commission from the sale of agricultural inputs is set by AIC, as shown in the following table:

Kind	Private Dealer	Co-operatives
Fertilizer	3.5% of Price	3.5% of Price
Cereal Seed	10.0% of Price	10.0% of Price
Vegetable Seed	15.0% of Price	15.0% of Price
Pesticide/Insecticide	5.0% of Price	6.0% of Price
Agricultural Tools	5.0% of Price	6.0% of Price

The prevailing AIC prices of agricultural inputs are shown in Table 3-21.

(3) Inventory of the Agro-industries and the Post-harvest and Marketing Facilities

According to the National Sample Census of Agriculture of 1991/92, 41,122 farmers owned 41,418 threshers in the Kathmandu Valley. Therefore, about 42% of farmers in the Valley possess threshers and each thresher covers about 0.75 ha of farmland. If a thresher is limited to only paddy cultivated areas, it can cover about 0.45 ha in the Kathmandu Valley.

Most of the farmers reap paddy with sickles and threshing is carried out manually using a pedal thresher, which is either owned or borrowed. Winnowing is carried out manually using the traditional method. After paddy is dried by the sun it is kept in bamboo baskets in the corner of the house. When people need rice for consumption, they bring paddy to the nearest rice mill for processing. In most of the communities or wards, there is a traditional water mill, which is owned by a group or large farmer. Some of these are still operating, but recently 164 commercial rice mills were developed in the Kathmandu Valley, as shown in Table 3-22. The average capacity of a rice mill is estimated at about 500 tons per year. The total capacity of these rice mills is estimated at 82,000 tons/year. In 1991/92, the total paddy production in the area was 83,130 tons. Therefore, the present post-harvest facilities are sufficient for processing paddy in the area.

The number of agro-based processing industries have increased in the Valley in recent years. Small-scale agro-based factories producing potato chips, noodles, bean curd, bread, and cakes, etc., amount to 74 at present, as shown in Table 3-22. Rather large-scale agro-based industries registered in the Department of Industry, are listed in Table 3-23. Most of the factories procure their raw materials such as wheat flour, maize grits, and broken rice mainly from other districts (about 53% of the total raw materials). Imported raw materials account for about 34% and those purchased in the Kathmandu Valley total 4,600 tons or only about 13% of the total amount of raw materials.

Most of the market centres are operated in open areas either on road squares or along the roads, except for KWM. KWM was established in 1987 on 2.05 ha of operating land. Some time later, shades were constructed with the assistance of FAO and UNDP. Currently, a master plan is being launched in order to construct a well equipped fruit and vegetable wholesale market centre in this area. The main components of construction in the plan are multipurpose shades, service buildings, and cold storage areas. For the construction of these facilities, the United Nations Capital Development Fund has provided grant assistance of US\$ 4,605,684. The construction works are expected to be completed in 1995.

(4) Price Mechanism for Major Crops

Information and data concerning the prevailing farm-gate price of vegetables in 1992/93 were collected from DADO in each district in the Valley and supplementary information and data were collected from vegetable growers in the vegetable model area and vegetable spot area, together with the sample farm survey. For information and data concerning the wholesale and retail prices prevailing in the markets in the three districts, the data were obtained from the Agricultural Marketing Development Division of DoAD.

The prices of vegetables mostly fluctuate according to the harvesting period. Even in KWM, prices were decided by face to face trading between sellers and buyers. Auctions and grading have not yet been introduced. The average prices of major vegetables are summarized in Table 3-24.

(5) Supply and Demand Balance of Crops

The Agricultural Marketing Development Division of DoAD worked on the food balance situation regarding cereals according to district, from 1987 to 1992. According to the food balance situation of Nepal described in the "Bulletin - Consumptive Cereals of Kingdom of Nepal 1987-92", it could be said that self-sufficiency was generally achieved in Nepal in recent years, as shown in Table 3-25. However, some people in the Kathmandu Valley always have an insufficient amount of food grain mainly because of the rapid increase of the urban population. The main cereals produced in the Kathmandu Valley are paddy, wheat, and maize, which are mostly consumed by farmers themselves. About 100,000 tons of rice are distributed annually from the Terai region, which is the granary of Nepal.

About 30% of the total amount of vegetables supplied to KWM in Kathmandu are provided by the Kathmandu Valley, except for potatoes and onions, which are mainly supplied by India. The other 70% of vegetables are distributed by districts such as Nuwakot, Dhading, Kavre, and Makwanpur in the hilly region and Bara, Sarlahi, and Dhanukha in the Terai region.

3.6.2 Agricultural Cooperative Society

Initially, a Land Reform Saving Corporation was established in 1966, in order to collect the compulsory savings from farmers, which was 5% of their annual production, through ward level committees in each village. The total saving amount was mobilized throughout the country in order to support the Land Reform Program.

Through the daily operation of the Land Reform Saving Corporation, it was expected that every village and ward in the country would be facilitated with banking services and from the collected savings the necessary funds, by direct investment or a form of credit, would be distributed to the field areas under the influence of the Land Reform Program. The remaining savings would be returned to individual depositors with interest. The credit from the corporation was limited to the following purposes; acquirement of farmland by tenant farmers, improvement of farming, purchase of agricultural tools and implements, construction of godown and storage facilities, investment in small hydroelectricity projects, rural electrification, the cottage industry, cooperative industries, and cooperative farming. Mainly because of insufficient business management skills, the corporation has been amalgamated with the ADB/N since 1974.

The concept of the cooperative society was constitutionally introduced after the second amendment of the "Constitution of Nepal, 2019" in 1976. Therefore, Agricultural Cooperative Societies were started based on the compulsory saving funds of the country. There was some confusion among member farmers of the societies. In some Agricultural Cooperative Societies, many of the member farmers did not know that they were members of the Society. Although the Agricultural Cooperative Society is the only systematic farmers' organization in Nepal, most of the societies are not operating well in their present activities and systematization.

The objectives of the societies are to raise the social and economic conditions of farmers. To achieve these objectives, business activities such as agricultural input supply, consumer goods supply, farm credit, and saving are specified in the basic regulations of the Agricultural Cooperative Society. To promote Agricultural Cooperative Societies, a District Cooperative Office (DCO) has been set up in each district under the control of MoA, since 1980. According to the information obtained from DCO in Lalitpur, Bhaktapur, and Kathmandu districts, the present organization of the Agricultural Cooperative Society is summarized in Table 3-26.

In each district, a District Cooperative Union was set up, but no federation was established at a National level. Under each District Cooperative Union, there are 9, 9, and 15 primary Agricultural Cooperative Societies in Lalitpur, Bhaktapur, and Kathmandu Districts, respectively. The percentage of villages which are not covered by any Agricultural Cooperative Society is about 5% to 7% of the total number of villages in the three districts. Each Agricultural Cooperative Society covered an average of 3.7 villages, ranging from 2 to 11 villages. The systematization rate of farmers is 50% in covered villages and 40% of the total number of villages in the three districts. There are 33 Agricultural Cooperative Societies, of which 2 are not in operation and 31 handle farm input supply as their only business activity. However, most of the societies', except for 2, bank accounts were in the red in 1991/92, as shown in Table 3-26. Most of the Agricultural Cooperative Societies in the Study Area, initiated by the Government through the District Cooperative Office in each district, are not active in credit, savings, and sales of farm products. However, a new independent farmers' organization has been set up to solve the common problems of inhabitants.

The Cooperative Saving and Service Centre (CSSC) in Bhaktapur is a kind of agricultural credit cooperative organized by farmers themselves. The purpose of this organization is to solve the common problems which occur for the members, who live in communities where poverty, ignorance, unemployment, inefficient working conditions, and environmental pollution exist. The CSSC in Bhaktapur was established in November 1991 with 51 members. At present, there are 85 members, of which 87% live in Nagadesh Village, 11% in Chapacho Village, and 2% in Bode Village. More than 90% of the members are from the Newar tribe. Generally, a monthly saving amount of NRs.50 to NRs.100/member was collectively deposited in the CSSC account, which amounted to NRs.151,400 at the end of May 1993. The total saving amount was lent to the members in the form of loans varying from NRs.5,000 to a maximum NRs.25,000. These loans were used for acquisition of land, businesses, and cottage industries, etc. This area is one of the most developed areas for vegetable production and was designated a Vegetable Model Area by the Agricultural Service Centre and DADO in Bhaktapur district. Most of the members of CSSC are vegetable growers.

They jointly invested in the construction of tube-wells or purchased water pumps for groups of around ten members. These members usually discussed vegetable growing techniques and assisted in acquiring farm inputs and selling farm products. Other than these daily farm activities, CSSC contributed to health care and the sanitation of resident's common yards. Free training in sewing was also provided for groups consisting of ten women members. In order to minimize the consumption of firewood, reduce the number of trees being cut down, and stop environmental pollution to some extent, CSSC bought large kerosene stoves and lent them to members in order to replace firewood stoves used for the preparation of various foods on special occasions, which generally occurred once a month in the Newar tribes' communities. In addition to cooperative saving, the current activities of CSSC are summarized below:

- a) Provision of scholarships in order to educate two children from the families of CSSC's members, who possess weak economic backgrounds.
- b) Provision of free sewing training for groups consisting of ten members.
- c) Provision of free sanitation equipment/materials distribution.
- d) Provision of a home delivery service for chemical fertilizer.

Further more, future services of CSSC may include sales/distribution of milk, payment of electricity bills, and payment of water bills.

3.6.3 Social Infrastructure

According to the demographic information obtained from the Central Bureau of Statistics, one of the demographic characteristics in the Study Area is that the male population exceeds the female population, which are of 51.4% and 48.6% respectively. However, in the whole of Nepal the male population is less than the female population, which are 49.9% and 50.1%, respectively. In addition, the annual population growth rate during 1981-1991 in the Study Area was as high as 3.7%, while that in whole Nepal was 2.1%. These figures show that rapid population increase is taking place in the Study Area. Regarding the age composition of the population, the percentage of 10 to 64 year olds, who are considered to be the economically active population, is estimated at 75% in the Study Area, which is higher than the national average of 66.7%.

Based on the farm survey, the literacy rate in the Study Area is estimated at 65%, of which 20% would just be able to read and write and 21% have been educated to primary level. The percentages of the literate population with lower secondary, secondary, and higher education are estimated at 15%, 27%, and 17%, respectively.

The proportions of major ethnic/caste groups living in the Study Area are estimated as 62% Newar, 14% Brahmin, and 23% Chettri. In most cases, one ethnic/caste population is clustered in one area and another ethnic/caste population in another area. Whenever more than one ethnic/caste population is residing in an area, they live in harmony in a traditional way.

Exchanging family labour, locally known as "*Perma*", is widely practised in the Study Area as the traditional system. No cash is paid for exchange labour instead an equivalent amount of labour time/effort is returned. The exchange labour, "*Perma*" system makes it easy for farmers to manage high labour demands during peak and crucial farming periods. Usually farmers' own labour and the exchange labour constitute 80% and 20% of the total family labour, respectively. Owing to religious beliefs, farmers in the Kathmandu Valley do not use bullocks as labour in farming or for other purposes.

There is no information available concerning the number of radios owned by households in the Study Area. However, it is believed that a significant number of farmers in the Study Area already possess radios. Recently, every morning, Radio Nepal has started broadcasting the previous days' prices of vegetables in KWM.

4. APPROACH TO THE PROJECT

4.1. General

This Project aims to rehabilitate the existing potential Government-managed irrigation schemes in the Kathmandu Valley, for which a formal request was made earlier by HMG. Through the rehabilitation, the following effects on the related fields are expected:

- 1) Extension of the irrigated command areas and increase of the irrigation efficiency of the existing canal systems;
- 2) Stabilization of crop cultivation in the Kathmandu Valley;
- 3) Rational utilization of the limited water resources in the Kathmandu Valley, thereby contributing to the other sectors, which also greatly need stable water resources for the intended development projects of the Government;
- 4) Increase and diversification of agricultural production in the Valley by making the existing farmlands more productive;
- 5) Activation of the farmers' participation in O&M of the irrigation facilities under the potential irrigation schemes; and
- 6) Reduction of the Government's budgetary burden by transferring the existing Government-managed irrigation schemes to the beneficiary farmers.

4.2. Selection of Potential Irrigation Schemes for Rehabilitation

4.2.1 Selection Criteria

Of 71 requested schemes, 52 schemes were visited by the Study Team and 38 schemes were included in the inventory survey list, during the Phase-I Study. Further selection of potential irrigation schemes for rehabilitation among these 38 schemes was carried out giving priority to schemes that had the following characteristics:

- 1) Schemes which are relatively large and whose intake facilities and canals are badly damaged, but through rehabilitation can become beneficial schemes;
- 2) Schemes which are considered to have relatively stable water resources even in the dry season;
- 3) Schemes under which farmers have the strong intention to continue with agricultural activities in the future and are willing to cooperate with the implementation and O&M of the Project in the future;
- 4) Schemes under which urbanization has less progressed or not yet started;
- 5) Schemes which are given priority by DoI; and
- 6) Schemes where access is not very difficult for the rehabilitation works.

4.2.2 Selected Potential Schemes for Rehabilitation

A study for the selection of potential schemes was carried out and the results are given

in Table 4-1. Based on the results, the Study Team selected the following 16 irrigation schemes as potential irrigation schemes for rehabilitation:

Kathmandu District (ha)		Bhaktapur District (ha)		Lalitpur District (ha)	
Biswambhara	125	Bidol	60	Khokana	250
Dakshinkali	100	Dhunge Dhara	210	Kotkhu	445
Boshan	210	Katunje	90	Lubhu	165
Indrayani	140	Kutudhal	147	Thika Bhairaw - I	600
Shali Nadi	300	Mahadev Khola	50	Thika Bhairaw - II	400
Tokha	90				
6 Schemes	965	5 Schemes	957	5 Schemes	1,860
			Total	16 Schemes	3,782

Note : Irrigation areas shown above are proposed gross command areas estimated based on the topographic map of 1/10,000 scale prepared by HMGN, which will be confirmed with a detailed topographic map of 1/5,000 scale to be prepared for the model scheme areas of the Phase-II Study.

Therefore, 6 schemes in Kathmandu district, 5 in Bhaktapur district, and 5 in Lalitpur district, in total 16 schemes (total gross command areas of 3,782 ha), were selected as potential irrigation schemes for rehabilitation under the Project.

4.3 Basic Strategy for the Rehabilitation of the Selected Irrigation Schemes

Based on the findings, from interviews with the government officials concerned, chairmen of the representative WUAs, and farmers who belong to each irrigation scheme during the Phase-I Field Survey, the Study Team proposed the following basic strategies for the rehabilitation of the potential irrigation schemes:

- 1) To establish safer irrigation systems against floods and more water saving canal systems;
- 2) To establish farmer friendly irrigation canal systems, especially with respect to O&M and water management, considering that the rehabilitated irrigation schemes will be handed over to the farmers in the future;
- 3) To provide upgraded irrigation facilities in order to enable the farmers to control irrigation water easily, paying full attention to the Government's "Irrigation Policy", especially for hilly areas, and the prevailing conditions of the existing irrigation schemes;
- 4) To promote farmers' participation in O&M, water management, and other related activities;
- 5) To encourage DIOs so that they can play a more important role in the implementation of the Project; and
- 6) To coordinate well with ongoing ISPs during the implementation of the Project.

4.4. Preliminary Assessment of Human Resources and Land Resources for the Selected Irrigation Schemes

It was observed by the Study Team that the Study area has abundant human resources for agriculture. In addition, it was discovered through the field survey that, in some selected schemes, the farmers' intention to continue with agricultural activities is strong, which is of great importance to the implementation of the Project. The total area of the Kathmandu Valley is 656 km², 387 km² of which is agricultural land. Agricultural land is classified into two types: lowland and upland types according to the prevailing cropping patterns. These agricultural land types are further classified into 4 categories: Class I to Class IV which are defined as arable lands. It has been assessed that the Kathmandu Valley still has potential agricultural land to be developed even though partial urbanization, even in the selected irrigation scheme areas, has been observed. Therefore, as a whole, human as well as land resources in the Kathmandu Valley have sufficient potential to be further developed through the Project.

5. FORMULATION OF THE REHABILITATION PLAN

5.1. General

During the field survey period, the Study Team conducted a survey for the 71 existing irrigation schemes, which were requested by HMGN for rehabilitation. Of the 71 schemes, 52 schemes were visited by the Study Team and 38 schemes were included in the inventory survey list, including 5 schemes which were rehabilitated or will be rehabilitated under ISP. A further study on the 38 schemes listed was carried out and 16 schemes were selected as the potential schemes for rehabilitation under the Project, applying the criteria presented in Chapter 4.

The rehabilitation plan for the 16 potential schemes was prepared as shown in Table 5-4. Based on the rehabilitation plan, cost estimates were carried out as shown in Table 5-5. The expected benefits of the Project were estimated and is shown in Table 5-6. Based on the estimated cost and incremental benefit of this rehabilitation Project, an economic evaluation was also carried out for the 16 selected schemes in order to judge the priority of the potential schemes, as described hereinafter.

5.2. General Concepts for Rehabilitation and O&M

5.2.1 General Concepts for Rehabilitation of the Selected Schemes

- 1) Rehabilitation of the targeted irrigation facilities will be carried out, considering their present status to utilizing remaining value of structures as much as possible, from an economic point of view.
- 2) Existing temporary intake facilities and badly damaged intake facilities, under the selected schemes, will be replaced with new ones.
- 3) Canal lining will be provided up to the tertiary canals in order to raise the transportation efficiency of irrigation water.
- 4) To strengthen the function of the existing canal systems, such canal structures as check structures with gates, turnouts, drops, side spillways, cross drainage structures, etc., will be provided for the canals to be rehabilitated, where necessary.
- 5) Gravel-metalled roads with a width of about 1.0 m, for O&M of the canals, will be constructed along the canals, where necessary.

With these concepts, the Project aims to establish irrigation canal systems : i) with less water loss; ii) which can be easily maintained and operated by farmers; and iii) which are resistant to natural hazards, etc.

5.2.2 General Concepts for O&M under the Project

The rehabilitated irrigation schemes under the Project will be handed over to the farmers in accordance with the regulations specified in the "Irrigation Policy 1992". This means that the farmers under the rehabilitated schemes will have to maintain the irrigation facilities at their own expense and with their own labour for a long period without the support of HMGN, except in emergencies which cannot be managed by the farmers themselves. Under these circumstances, farmers will be requested to gradually change their traditional way of thinking and practices with regard to O&M of the irrigation facilities, i.e., farmers will be requested to participate more in O&M activities at an actual field level. Thus, O&M of the rehabilitated irrigation schemes may be carried out according the following general concepts:

- 1) Farmers' organizations, under the rehabilitated schemes, should be established with the understanding that all farmers must cooperate with each other and regularly participate in checking the condition of the gates, canals, O&M roads along the canals, and the surrounding condition of the canals, etc., by themselves at least twice a month. During the examination of the schemes, if minor repairs in and along the canals or of the gates are necessary, these repairs must be immediately executed by the farmers themselves at their own expense and with their own labour. In addition, desilting and weeding of the canals should also be carried out regularly. In order to achieve this, each DIO is requested to give the farmers prior orientation, which suggests that farmers should carry out these tasks in a cooperative and organized way.
- 2) The technical level required for O&M of the rehabilitated irrigation schemes will become higher than the prevailing level. Accordingly, farmers are requested to acquire the techniques necessary to repair the damaged portions of the canals and gates, etc., using simple equipment and tools. Thus, DoI is requested to pay full attention to the prior training of farmers in regard to the: i) technical training for O&M of the irrigation facilities including the repair of canals and gates using simple equipment; ii) method of operation of the gates; and iii) method of water measurement by gauging devices, etc.

5.2.3 Basic Design Concepts for the Rehabilitation of the Selected Schemes

(1) Intake Structures

- a) Concrete fixed type weirs shall be considered for each intake structure under the schemes to be rehabilitated.
- b) In general, gates shall not be provided on the weirs to be constructed. However, depending on the site conditions small steel gates may be provided on the weirs to be constructed in order to flush out sedimentation at front of intake.
- c) Concrete aprons shall be provided upstream and downstream of the weirs in order to protect them from scoring. In general, the length of the aprons shall be 20 m for the fore-apron and 30 m for the rear apron.
- d) River bank protection works using gabions etc. shall be provided upstream and downstream of the weir. In general, the length of the protection works shall be 50 m for the upstream portion and 100 m for the downstream portion.
- e) Silt excluders shall be provided for each intake facility in general. Provision of stilling basins for the intake structures shall be discussed at the feasibility study stage.

(2) Canals

- a) The canals to be rehabilitated shall be lined with concrete, etc. up to the tertiary canals.
- b) In general, steel gates and water measuring devices shall be provided at the heads of the main canals and diversion points, from the main to the secondary and from the secondary to the tertiary canals in order to strengthen control of the irrigation water.
- c) Gravel-metalled roads with a width of about 1.0 m shall be provided along the main canals. However, if economic conditions do not permit, construction of the roads shall be neglected.
- d) In general, the shape of the main, secondary, and tertiary canals shall be rectangular, so that additional land acquisition will be minimized.

5.3. Agricultural Development in the Selected Irrigation Schemes

5.3.1 Agricultural Development Strategy

Efforts have been made by HMGN to promote agricultural development in conformity with the objectives of the Eighth Five Year Plan (1992 - 1997) and top priority has been given to the development of the agricultural sector. The program aimed at attaining national self-sufficiency in food production will be continued. Together with the attainment of self-sufficiency in cereal crops, agricultural diversification towards cash crops, fruit, vegetables, and livestock will be emphasized considering the comparative geographical advantages, transportation facilities, market accessibility as well as the supply and demand conditions.

The Project Area located in the Kathmandu Valley has a high potential for agricultural production because of the soil and climatic conditions. In addition to these natural conditions, farmers in this area can easily obtain farm inputs and gain access to markets, technical information, and services. Their farming practices are a higher level than any other area in Nepal, even though the average holding size is as small as 0.28 ha.

As mentioned above, agriculture in the Kathmandu Valley is far more developed than in any other region in Nepal, in relation to productivity and technology adopted. However, the following major constraints should be overcome in order to increase agricultural production and the living standard of farmers:

- a) Unstable agricultural production, which basically depends upon the rainfed conditions;
- b) A shortage of irrigation water due to superannuation and damage of existing irrigation facilities and the increasing demand for domestic water supplies;
- c) Decreasing farmland due to urbanization.

Most of the agricultural support systems are fairly well organized and operated intensively. Therefore, there is not much room for developing new functions for the agricultural support systems. However, a recommendation has been made to strengthen the staff and activities through more intensive training in each sector.

At present, one of the most serious problems associated with agricultural constraints is the insufficient marketing facilities for vegetables. However, this problem will be solved by the modernization of KWM, with the assistance of the World Bank, by the end of 1995.

Considering all the above mentioned factors, the basic concept of agricultural development for the Rehabilitation Project of the Irrigation Schemes in the Kathmandu Valley is as follows:

- 1) To maximize the potential agricultural benefits through the efficient use of limited available water and land resources; and
- 2) To maintain the existing agricultural areas and increase the crop intensity in order to create a vegetables supply base to meet the urban demand of Kathmandu.

In order to achieve these objectives, the strategy for agricultural development of the Project is as follows:

- 1) To maintain a stable amount of cereals for self-consumption which minimizing the cereal production area, by maximized the unit yields of cereal crops through the provision of stable irrigation water.

- 2) To extend the cultivated area of vegetables by maximising the efficiency of irrigation water supply.

5.3.2 Proposed Cropping Pattern

Considering the basic strategy for agricultural development of the Project, vegetables in addition to paddy, wheat, potatoes, mustard, and spring maize have been selected as the main crops in the framework of the future cropping pattern. By taking into account the following factors, the cropping pattern should be introduced after the irrigation schemes are rehabilitated, as shown in Figure 5-1

- a) the water requirement based on the availability of irrigation water during the peak and dry season;
- b) present farming practices and crops;
- c) limited family labour;
- d) socio-economic conditions.

The overall cropping intensity is calculated to be 200% and the cropped areas allocation under the proposed cropping pattern will be 80% for paddy and 20% for summer vegetables in the rainy season and 40% for wheat, 20% for vegetables, 20% for potatoes, 10% for mustard, and 10% for winter maize in the dry season.

5.3.3 Anticipated Yields and Production

The unit yields of crops in the future in "with - project" conditions are estimated on the basis of the results of agricultural experiments and the results of the sample farm survey carried out on irrigated land. The expected unit yields of main crops are summarized as follows:

Crops	Unit : ton/ha	
	without-project	with-project
Paddy	4.7	5.0
Wheat	1.7	2.0
Maize	2.1	2.5
Potatoes	11.1	13.0
Mustard	0.7	0.8

5.4 Irrigation Water Requirements

5.4.1 Basic Concepts and Data

With reference to the "Design Manuals for Irrigation Projects in Nepal, M-3 Hydrology and Agro-meteorology Manual 1990", irrigation water requirements were estimated on a semi-monthly basis, and under the following assumptions:

- (1) Reference crop evapotranspiration (ET_0) and open water evaporation (E_0) were calculated using the Penman method, which was recommended by Food and Agriculture Organization of the United Nations (FAO), and based on the meteorological data at Kathmandu airport following the above mentioned Design Manuals. The calculated semi-monthly ET_0 and E_0 are shown below:

Unit : mm

	Jan(E)	Jan(L)	Feb(E)	Feb(L)	Mar(E)	Mar(L)	Apr(E)	Apr(L)	May(E)	May(L)	Jun(E)	Jun(L)
ETo	1.73	1.93	2.40	3.05	3.80	4.40	4.75	5.23	5.50	5.60	5.15	4.65
Eo	2.30	2.55	3.00	3.85	4.65	5.25	5.70	6.10	6.40	6.55	6.00	5.60
	Jul(E)	Jul(L)	Aug(E)	Aug(L)	Sep(E)	Sep(L)	Oct(E)	Oct(L)	Nov(E)	Nov(L)	Dec(E)	Dec(L)
ETo	4.45	4.30	4.20	4.05	3.85	3.70	3.45	3.10	2.55	2.05	1.80	1.60
Eo	5.35	5.17	5.05	4.90	4.70	4.50	4.25	3.90	3.35	2.75	2.37	2.15

(2) Crop Factors (Kc) were estimated on a semi-monthly basis for the respective crops in the cropping pattern, based on the values recommended by FAO. The following values were applied:

Crops/Growing period	1	2	3	4	5	6	7	8	9	10
Paddy	1.10	1.10	1.10	1.10	1.05	1.05	0.95	0.95		
Wheat	0.43	0.65	1.05	1.05	1.15	1.15	1.15	0.90	0.90	0.40
Potatoes	0.42	0.55	0.79	1.01	1.13	1.08	0.94	0.77		
Maize	0.45	0.60	0.80	1.05	1.05	1.05	0.80			
Summer vegetables	0.34	0.54	0.93	1.05	1.04	0.91				
Winter vegetables	0.28	0.34	0.54	0.86	0.95	0.89				
Mustard	0.40	0.40	0.82	0.82	1.00	1.00	0.72			

(3) Zoning the Valley : Since rainfall patterns in the central and surrounding areas of the Kathmandu Valley are a little different from each other, the Valley was divided into two Zones: Zone-A and Zone-B according to the amount of annual rainfall based on the isohyet of 1,500 mm shown in Figure 3-4. For the respective zones, rainfall data observed at Kathmandu Airport and Changu Narayan were applied in order to calculate effective rainfall for the respective irrigation schemes as shown below:

	Zone A Central Area	Zone B Surrounding Area
Pattern of isohyet	R < 1,500 mm	1,500 ≤ R < 2,000 mm
Meteorological Station	No. 1030 Kathmandu Airport	No. 1059 Changu Narayan
Annual Rainfall	1,403 mm	1,677 mm
Schemes belonging to each Zone	AB-10 Katunje AB-14 Mahadev Khola AL-08 Khokana AL-10 Kotkhu AL-13 Lubhu AL-19 Thika Bhairaw-I AL-20 Thika Bhairaw-II	AK-04 Biswambhara AK-05 Boshan AK-07 Dakshinkali AK-14 Indrayani AK-25 Shali Nadi AK-27 Tokha AB-02 Bidol AB-04 Dhunge Dhara AB-12 Kutudhal

(4) Effective Rainfall (Re) was estimated for each zone, as shown below, using rainfall data with an 80% probability (R₈₀) referring to the Design Manual :

For paddy :

$$R_{80} \leq 5 \text{ mm}$$

$$R_e = 0$$

$$5 \text{ mm} < R_{80} < 10 \text{ mm}$$

$$R_e = R_{80} \times 0.85$$

$$10 \text{ mm} < R_{80} \leq 100 \text{ mm}$$

$$R_e = R_{80} \times 0.85$$

$$\text{and } R_{80} < T_{\text{loss}}, \text{ then}$$

$$R_e = T_{\text{loss}}$$

$$\text{and } R_{80} > T_{\text{loss}}, \text{ then}$$

$$R_{80} < 100 \text{ mm}$$

$$\text{and } R_{80} < T_{\text{loss}}, \text{ then } R_e = R_{80} \times 0.70$$

$$\text{and } R_{80} > T_{\text{loss}}, \text{ then } R_e = T_{\text{loss}}$$

$$\text{For upland field crops: } R_e = R_{80} \times 0.70$$

Where; T_{loss} : Total crop water requirement (in the case of paddy, percolation is added)

(5) Irrigation efficiency was estimated by taking into consideration the fact that the canals under the Project will be lined and water management will be improved:

Field efficiency:

- | | |
|---------------------|-----|
| 1) For paddy fields | 85% |
| 2) For upland crops | 60% |

Water transportation efficiency in the canals: 80%

(6) Percolation loss in the paddy fields was estimated at 5 mm/day, by taking soil conditions in the area and present field conditions into consideration.

5.4.2 Diversion Water Requirement

Based on the above assumptions and proposed cropping pattern, the diversion water requirement for the target irrigation schemes in Zones A and B was calculated on a semi-monthly basis. The unit diversion water requirement in each zone is shown in Table 5-1 and the diversion requirement of each scheme is shown in Table 5-2. From the tables, it is clear that the peak diversion water requirement occurs at the beginning of July in both zones, as summarized below:

Peak Diversion Water Requirement

Zone A : 1.52 lit/sec/ha or 13.1 mm/day
 Zone B : 1.26 lit/sec/ha or 10.9 mm/day

5.5. Assessment of Water Resources for the Selected Irrigation Schemes

The natural runoff at intake points was estimated based on the existing discharge data in neighbouring basins and by applying the relationship between the discharge, catchment area, and basin rainfall, as described in Section 3.2.4. The water availability for the schemes selected in Section 4.2.2 was then estimated using the water balance study and taking into consideration the amount of upstream water abstraction for the municipal water supply and irrigation and return flow. The estimated discharge at respective intakes was reviewed and modified according to the actual discharge measurement devised by the Study Team and other discharge information observed in previous studies. These results were also confirmed by interviewing the respective farmers and/or irrigation operators (*Dhalpa*) stationed at the intake sites.

A preliminary assessment of water resources both in the rainy and dry seasons for the selected schemes was carried out based on the comparison between the available water and irrigation water requirement of the proposed cropping pattern. The water balance study was carried out by applying the following assumptions:

- 1) The irrigation water abstraction figure is taken as the calculated irrigation water requirement for the present cropping pattern prevailing in the Valley due to the lack of data on the actual abstraction at the respective intake points. For this water balance study, the irrigation area of potential schemes is taken as the preliminarily proposed area and that of the other systems is based on the previous study on the water resource

inventory carried out under the Water and Energy Commission Secretariat (WECS). If the level of river flow is less than the calculated requirement, the abstraction figure corresponds to the level of the river flow. Return flow is assumed as 30% of the diverted water for the upstream irrigation system.

- 2) The irrigation water requirement is estimated based on the preliminarily proposed cropping pattern of the Phase-I study. However, if a water shortage occurs during the puddling stage in this water balance study, an alternative pattern, in which puddling is delayed by a maximum of one month, is adopted.
- 3) The balance of available water and required water is compared on a monthly basis with the mean monthly discharge and 80% dependable discharge. For the evaluation of projects, comparisons with the mean discharge are made.

Table 5-3 present the figures for the estimated water available for the selected irrigation schemes. The irrigable areas will be as shown below:

Scheme	Proposed Net Irrigation Area (ha)	Irrigable Area (ha)	
		Rainy S	Dry S.(% of Rainy S.)
AK-04	Biswambhara	100	57 (57 %)
AK-05	Boshan	168	168 (100 %)
AK-07	Dakshinkali	80	80 (100 %)
AK-14	Indrayani	112	112 (100 %)
AK-25	Shali Nadi	240	240 (100 %)
AK-27	Tokha	120	72 (60 %)
AB-02	Bidol	48	48 (100 %)
AB-04	Dhunge Dhara	168	20 (12 %)
AB-10	Katunje	72	38 (53 %)
AB-12	Kutudhal	118	49 (42 %)
AB-14	Mahadev Khola	360	213 (59 %)
AL-08	Khokana	200	200 (100 %)
AL-10	Kotkhu	356	356 (100 %)
AL-13	Lubhu	132	132 (100 %)
AL-19	Thika Bhairaw-I	480	480 (100 %)
AL-20	Thika Bhairaw-II	320	320 (100 %)

As is observed in the above table, the following may be noted from the viewpoint of water resources.

- 1) Generally speaking, water is sufficient in the rainy season to cover the proposed command areas of 15 of the 16 selected schemes, except the Tokha scheme (AK-27), while the irrigable area in the dry season is limited to 6 schemes, especially the Dhunge Dhara (AB-04), Kutudhal (AB-12), followed by Katunje (AB-10), Mahadev Khola (AB-14), and Biswambhara (AK-04) schemes, due to the lower availability of water.
- 2) It is necessary for the Khokana (AL-08), Thika Bhairaw-I (AL-19), and Thika Bhairaw-II (AL-20) schemes, to share water with other potential schemes: Bhore (AL-02), Champi (AL-03), and Saibu (AL-18), because these schemes depend upon the same water source, the Nakhu Khola, which has a small residual catchment area in its lower reaches.

For the Kotkhu scheme (AL-10) in the Kotkhu river basin and the Khokana (AL-08), Thika Bhairaw-I (AL-19), and Thika Bhairaw-II (AL-20) schemes in the Nakhu river basin, the detailed arrangement of the share of water is necessary for the Kotkhu and Nakhu Dam projects. The implementation of these water supply projects is being studied as mentioned in Section 3.2.3.

5.6 Schemewise Basic Rehabilitation Plan

Based on the rehabilitation plan described in Section 5.2, the rehabilitation plan for the 16 irrigation schemes was prepared, as presented in Table 5-4, taking into consideration the present status of each scheme.

5.7 Cost Estimates

Cost estimates for the 16 schemes were carried out by taking the following components into consideration. It should be mentioned that these cost estimates will be reviewed at the feasibility study stage when more data and information are available.

- 1) Direct cost, which includes construction and/or rehabilitation costs of the intake structures, canals, and related structures*.
- 2) Administrative cost at 15 % of the direct cost.
- 3) Price escalation at 15% of the direct cost.
- 4) Engineering fee at 7% of the direct cost.

Note * : Cost of related structures was estimated at 15 % of the total cost of construction and/or rehabilitation of the canals.

The cost estimates for the 16 irrigation schemes are presented in Table 5-5. The estimated cost varies from about NRs.146,000/ha to about NRs.326,000/ha, and the average is about NRs.188,000/ha.

5.8 Project Evaluation

5.8.1 Economic Evaluation

The Project benefits are the irrigation benefit obtained through the rehabilitation and improvement of the existing irrigation systems. The irrigation benefit will primarily be accrued by increased crop production and crop diversification owing to the stable irrigation water supply. The benefit is estimated as the difference between the annual net production values under "with" and "without" project conditions; the net production value is defined as gross production minus crop production cost.

In accordance with these definitions, the net production value under the "without" project condition is estimated at NRs.12,220/ha in the rainy season, NRs.5,400/ha in the dry season, and NRs.17,620/ha per annum on the basis of the present agricultural conditions, i.e. cultivated areas, yields, farm-gate prices, and crop budget, which were estimated based on the results of the farm survey. On the other hand, the net production value under the "with" project condition is estimated at NRs.12,690/ha in the rainy season, NRs.23,810/ha in the dry season, and NRs.60,500/ha per annum on the basis of the proposed cropping pattern and anticipated yields.

The net incremental benefit of the Project is estimated at NRs.42,880/ha per annum, which consist of NRs.24,470/ha of the rainy season crops and NRs.18,410/ha of the dry season crops, as shown in Table 5-6.

Using the economic cost and benefit mentioned above, a cost and benefit flow chart was prepared covering the full Project life, and then, the Economic Internal Rate of Return (EIRR) for the 16 schemes selected was computed on the basis of the following basic assumptions:

- a) A build-up period of two years is assumed, considering the current agricultural production levels and future improvement through the rehabilitation of the existing irrigation facilities. The benefit accrued during the build-up period is estimated to be 70% of the full benefit of the first year;
- b) The economic life of the Project is 30 years from the commencement of construction;
- c) The construction period for rehabilitation works is limited to one year in the case of schemes which have command areas of less than 300 ha, and two years for the other schemes.

The results of the economic evaluation are shown in Table 5-7. The highest EIRR is 22.6% for the Kotkhu (AL-10) scheme, followed by 22.1% for the Boshan (AK-05) scheme. Seven schemes have an EIRR above 18% or very close to it, which is the interest rate of the loan provided by ADB/N for the irrigation projects. Another seven schemes have an EIRR of more than 10% but less than 18%, which is the minimum standard rate for selection by DoI.

5.8.2 Project Effects

1) Stabilization of Agricultural Income

The stabilization and increase of the unit yields of main crops in the area would be realized by the rehabilitation of the irrigation facilities under the Project. As a result, the cultivated area of the main crops for self consumption would be minimized and the planting area for potatoes and vegetables would be increased. Thus, agricultural income would be greatly increased by such crop diversification.

2) Decreased Government Budget

By handing over the irrigation facilities to the beneficiaries, the Government budget allocated for the maintenance of the facilities every year would decrease and the Government staff engaged in related services would be able to shift to other activities and services.

5.8.3 Indirect Benefits

In addition to the direct benefits estimated in the economic evaluation, various secondary and intangible benefits are expected from the implementation of the Project :

1) Enhancing of Economic and Social Supporting Services

The local transportation system will be greatly improved by the construction of O&M roads along the irrigation canals, which will enhance economic activities and contribute to inter-regional accessibility and communication in the Project Area.

2) Improvement of the Domestic Water Supply

The rehabilitation and improvement of the irrigation canal system will contribute substantially to the domestic water supply. A sufficient domestic water supply ensured by the canals, would greatly improve the sanitary conditions of the people in and around the Project Area. In addition, farmers will be able to use water to wash harvested vegetables, which is expected to increase the value of vegetables in the market.

3) Increase in Land Value

The economic value of land will surely increase with the implementation of the Project. Therefore, economic activities in the area will be accelerated. After the completion of the Project, changes in land use in the Project Area will have to be controlled by HMGN in order to maintain agricultural land.

4) Demonstration Effect

Implementation of the rehabilitation Project will result in the accumulation of experience, technical knowledge, and skills for irrigated agricultural projects. The knowledge and skills will spread to the surrounding areas where HMGN is promoting a number of small-scale irrigation projects.

5.9. Selection of High Priority Schemes and Implementation Schedule

As discussed in Section 4.2 of Chapter 4, 16 schemes were selected as potential schemes for rehabilitation. It is recommended that the 16 selected schemes be implemented by dividing them into stages paying attention to the previous budgetary arrangement of HMGN for the irrigation sector, as well as considering the difficulties surrounding the budgetary arrangement for each DIO and also the difficulty of the immediate expansion of manpower required at each DIO.

For the formulation of the implementation schedule, priority was given to EIRR values, and further assessments relating to the following items were carried out:

- (1) Influence of urbanization on the schemes, which is progressing in the Kathmandu Valley, as well as the transformation of farmland into housing areas;
- (2) Size of farmland under the schemes to be rehabilitated;
- (3) Availability of a stable water supply especially in the dry season; and
- (4) Existing road conditions for transportation of not only construction materials and equipment for the Project, but also agricultural products after the completion of the Project, etc.

After the examination of the Project assessment carried out on the 16 schemes selected as potential schemes for rehabilitation, taking the above factors into consideration, the following were identified:

- (1) Of the 16 schemes, seven schemes (total net irrigation area of 1,854 ha) have an EIRR of more than 18% or very close to it, which is the interest rate of the long-term loan from ADB/N for the farmers who want to participate in the Project. The total project cost of these seven schemes amounts to about NRs.320 million, which is equivalent to about 15% of the development expenditure in the annual budget allocated to DoI, i.e. if these seven schemes are implemented within 5 years, the annual budgetary share to be allocated to the Project will be about 3% of the development expenditure in the annual budget allocated to DoI;
- (2) Of the 16 schemes, 13 schemes (total net irrigation area of 2,586 ha), excluding the Tokha scheme which has been identified as having a low available water supply, have an EIRR of more than 10%, which is the minimum rate for selection by DoI, for the application of foreign aid. The total cost of these 13 schemes amounts to about

NRs.450 million. If these 13 schemes are implemented within 5 years, the annual budgetary share to be allocated to the Project will be more than 4% of the development expenditure in the annual budget allocated to DoI;

- (3) Of the 16 schemes, 2 schemes i.e., the Dhunge Dhara and Khokana schemes have an EIRR of 7.6% and 9.0%, respectively. There is little water available in the Dhunge Dhara scheme especially during the dry season because the water resources under this scheme are also being used for drinking water in Bhaktapur City. In addition, the project cost of the Dhunge Dhara scheme is relatively high and a great deal of incremental benefit is not expected from it, especially during the dry season. With regard to the Khokana scheme, the existing intake facility is located a great distance from the benefiting areas and it is also located on the wide portion of the river. Accordingly, the rehabilitation cost is so high that EIRR is low.
- (4) The Tokha scheme, which has an EIRR of 11.6%, suffers from a shortage of irrigation water not only in the dry season but also in the rainy season. Accordingly, it is anticipated that of the planned irrigation area of 120 ha, only 72 ha could be irrigated even in the rainy season. This situation becomes worse during the dry season. The EIRR of 11.6% was estimated based on the project cost for 72 ha. Accordingly, it is anticipated that if the project cost was estimated on the basis of 120 ha, which was the figure requested by the farmers, the increase in the incremental benefit would be lower, thus resulting in a lower EIRR value than presently estimated.
- (5) The Mahadev Khola, Kotkhu, Lubhu, and Thika Bhairaw-I schemes, which have an EIRR of more than 18% or very close to it and are considered to have been partially urbanized, and the Katunje scheme which has an EIRR of 13.6%, will need to be further studied with regard to preservation from urbanization and industry and reasonableness and feasibility of investing in the areas, which are presently considered to be developing as planned urban expansion areas. However, it is considered that these factors will not affect the decision-making process involved in the selection of the priority schemes.
- (6) The Boshan, Kutudhal, Mahadev Khola, and Lubhu schemes which have an EIRR of more than 18% or very close to it, are considered to have relatively poor accessibility with regard to transportation of the construction materials and equipment to each site. Therefore, they may need to be further studied in relation to the necessary construction of access roads to each site. However, at present, it is also considered that this factor will not affect the decision-making process involved in the selection of the priority schemes.

Based on the above discussions, priority was given to 16 selected potential schemes, as summarized in Table 5-8:

- (1) First priority should be given to the following seven schemes:

Code and Name of the Scheme	Irrigation Area	
	Gross (ha)	Net (ha)
In Kathmandu District		
AK-05 Boshan	210	168
AK-25 Shali Nadi	300	240
Subtotal 2 schemes	510	408
In Bhaktapur District		
AB-12 Kutudhal	147	118
AB-14 Mahadev Khola	450	360
Subtotal 2 schemes	597	478

In Lalitpur District			
AL-10	Kotkhu	445	356
AL-13	Lubhu	165	132
AL-19	Thika Bhairaw-I	600	480
Subtotal	3 schemes	1,210	968
<hr/>			
Total	7 schemes	2,317	1,854

These schemes should be implemented within the target years for implementation of the Eighth Plan from 1992 to 1997. However, the examination, at the feasibility study stage, of the two schemes i.e., Kotkhu and Thika Bhairaw-I, may be necessary with regard to their water resources which may influence the "Kathmandu Valley Drinking Water Development Plan". Accordingly, it is suggested that the implementation of these schemes may be delayed until a solution is found.

- (2) The following six schemes were selected as second priority schemes :

Code and Name of the Scheme	Irrigation Area		
	Gross (ha)	Net (ha)	
<hr/>			
In Kathmandu District			
AK-04	Biswambhara	125	100
AK-07	Dakshinkali	100	80
AK-14	Indrayani	140	112
Subtotal	3 schemes	365	292
<hr/>			
In Bhaktapur District			
AB-02	Bidol	60	48
AB-10	Katunje	90	72
Subtotal	2 schemes	150	120
<hr/>			
In Lalitpur District			
AL-20	Thika Bhairaw-II	400	320
Total	6 schemes	915	732

These schemes should be implemented after the completion of the first seven priority schemes within the next 5 years from 1997 to 2002 or at the latest by 2005, in principle.

Considering the possibility of the early implementation of the Project through foreign aid which HMGN may procure, notwithstanding the above recommended implementation schedule, a feasibility study shall be carried out by the Study Team on these 13 model schemes which were classified into both first and second priority schemes. In the feasibility study, further in-depth studies regarding the rehabilitation and improvement plan of the Project, project cost, construction plan of the Project under the farmers' participation, economic viability of the Project, as well as an O&M plan of the rehabilitated irrigation facilities in consideration of the farmers' participation in the Project, etc., for each selected model scheme should be carried out.

An aero-topographic survey which will cover the 13 selected schemes should be carried out immediately. The topographic map, which will be produced by the aero-topographic survey, shall be on a scale of 1/5,000 with a contour interval of 1.0 m (5 m for mountainous areas and 0.5 m for relatively flat areas).

In addition to the above, it has been suggested that 3 schemes, which were excluded from the model schemes of the feasibility study, and another 9 schemes, which were identified as having the less potential in Chapter 4 (See Table 4-1 and Figure 5-2), may be implemented

after the completion of 13 high priority schemes. However, implementation of these schemes should be carefully examined by taking future changes in the surrounding conditions, etc. into consideration.

5.10. Necessary Supporting Organizations and Farmers' Involvement

For the successful implementation of the Project, coordination between government agencies, like DoI, CRID, and DIOs, and farmers is necessary. From an early stage DIOs are expected to play an important role in the execution of the Project. Under ISP, which is now operating in the Kathmandu Valley, DIOs' functions have been strengthened. As a result DIOs now have, within their organization, Association Organizers (AOs) and the Mobile Irrigation Team (MIT), which are mainly responsible for coordination between DIOs and farmers, as well as for formation, training, and monitoring of WUAs to be established under the program. For the implementation of the Project these existing organizations should be utilized fully. It may be necessary to further reinforce AOs and MIT when the Project is in full swing.

It is considered that three DIOs in Kathmandu, Bhaktapur, and Lalitpur districts must play an important role in the successful implementation of the Project. Therefore, prior to the commencement of the Project, it is necessary for HMGN to strengthen manpower in each district office, especially for the Project. It is recommended that one irrigation engineer who will be in charge of the Project, and two assistant engineers be assigned to each of the district offices.

It is necessary to make it clear that the farmers' participating in the Project should be organized, which means that all the farmers under the schemes to be rehabilitated are requested to attend to the welfare of all, not just a few, of the beneficiary farmers, through the Project, so that all the farmers who participate in the Project would equally benefit.

Therefore, for the satisfactory implementation of the Project in accordance with the Government's new irrigation policies, there should be sufficient time provided for the dissemination of information, technical preparations, and institutional activities before the rehabilitation of the physical facilities of the Project begin. The preparation time needed for the Project will be about eight months to one year, depending on the size and particular problems of the schemes to be rehabilitated. Thus, budgetary support for the Project should be provided for two activities, one is the preparatory activities of the Project and the other is the rehabilitation and/or construction of the Project. In addition, it is expected that all the beneficiary farmers will participate in the rehabilitation activities, especially in the rehabilitation of the tertiary and on-farm canals, etc., in an organized way

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes that this is crucial for ensuring transparency and accountability in the organization's operations.

2. The second part of the document outlines the various methods and tools used to collect and analyze data. It highlights the need for consistent and reliable data collection processes to support effective decision-making.

3. The third part of the document focuses on the role of technology in data management and analysis. It discusses how modern software solutions can streamline data collection, storage, and reporting, thereby improving efficiency and accuracy.

4. The fourth part of the document addresses the challenges associated with data management, such as data quality, security, and privacy. It provides strategies to mitigate these risks and ensure that data is used responsibly and ethically.

5. The fifth part of the document concludes by summarizing the key findings and recommendations. It stresses the importance of ongoing monitoring and evaluation to ensure that data management practices remain effective and aligned with the organization's goals.

6. The sixth part of the document provides a detailed overview of the data collection process, including the identification of data sources, the design of data collection instruments, and the implementation of data collection procedures.

7. The seventh part of the document discusses the various methods used for data analysis, such as descriptive statistics, inferential statistics, and regression analysis. It explains how these methods can be used to interpret and draw conclusions from the collected data.

8. The eighth part of the document focuses on the presentation and communication of data analysis results. It discusses the importance of using clear and concise visualizations and reports to effectively convey the findings to stakeholders.

9. The ninth part of the document addresses the ethical considerations surrounding data management and analysis. It discusses the need to protect individual privacy, ensure data security, and use data responsibly and transparently.

10. The tenth part of the document provides a final summary and conclusion, reiterating the key points and emphasizing the importance of data management and analysis in achieving organizational success.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

- (1) As a result of the Phase-I Study, seven schemes were chosen as first priority schemes which should be implemented within the target years of the Eighth Plan from 1992 to 1997, and six were chosen as second priority schemes to be implemented within the next 5 years from 1997 to 2002 or at least by 2005.
- (2) Considering the possibility of the early implementation of the Project through foreign aid, which HMGN may procure, these 13 schemes were selected as model areas for the feasibility study to be carried out by the Study Team. In the feasibility study, the improvement and implementation plan, project cost, construction plan under the farmers' participation, method of O&M of the rehabilitated irrigation facilities, and farmer's organizations (WUAs) for each selected scheme, etc., should be formulated.
- (3) An aero-topographic survey, which will at least cover the total irrigation area of the 13 selected schemes, should be carried out immediately. The topographic map to be produced by the survey shall be on a scale of 1/5,000 with a contour interval of 1.0 m in general; 5.0 m for mountainous areas and 0.5 m for relatively flat areas including riverbeds where new intake structures will be constructed or existing intake structures will be improved.
- (4) It is considered that three DIOs in Kathmandu, Bhaktapur, and Lalitpur districts, must play an important role in the successful implementation of the Project. Therefore, prior to the commencement of the Project, it is necessary for HMGN to strengthen manpower in each district office, especially for the Project. It is recommended that one irrigation engineer, who will be in charge of the Project, and two assistant engineers shall be assigned to each of the district offices.

6.2 Recommendations

- (1) As suggested in Section 5.2.2, all the farmers who belong to the tertiary irrigation block (in this Study the area of a typical tertiary irrigation block is 20 ha) under the Project must cooperate with each other and regularly participate in examining the condition of the gates, canals, O&M roads along the canals, and surrounding conditions of the canals etc., by themselves at least twice a month. During the examination, if it is found that minor repairs in and along the canals or to the gates are necessary, such portions must be immediately repaired by farmers themselves at their own expense and with their own labour. In addition, desilting and weeding should also be carried out regularly. If the irrigation facilities are badly damaged due to natural hazards like heavy rain and floods, which cannot be managed by farmers themselves, farmers are requested to immediately report the extent and degree of such damage to their DIO in order to discuss the measures to be taken for repairing the damaged facilities and necessary budgetary arrangement between the farmers and HMGN. Accordingly, for the successful implementation of O&M of the irrigation facilities by the farmers, each DIO is requested to give the farmers prior orientation, which suggests that farmers should carry out the tasks mentioned above.
- (2) All the farmers under the rehabilitated irrigation schemes are requested to regularly pay the O&M fee in order to maintain the irrigation facilities properly. The amount and mode of payment shall be fixed in the feasibility study stage, paying attention to the anticipated annual income of the farmers, the present status of the payment of the O&M fee under ISP, etc. For the proper management of the collected O&M fee, it should be deposited in an authorized bank account, regularly audited by the authorized accountants (at least two people for cross checking), and the results should be presented to all the

farmers without delay.

- (3) From the results of the water balance calculation for the proposed rehabilitation schemes, it is observed that the water available for irrigation, especially in the dry season is limited. To cope with this situation, planned water allocation within the rehabilitated schemes, especially allocation under the tertiary irrigation canals, is very important. Accordingly, farmers who belong to the tertiary blocks are requested to submit their annual cultivation plan providing such information as the kind of crops, size of area to be cropped, and period of cultivation, etc., beforehand to the "turn-out leader(s)" who is/are selected from the farmers. With this information, the turn-out leader will consult with the officials in charge of each DIO in order to receive the necessary advice regarding the water allocation plan for the year. The advice should focus on the measures to reduce water loss during the operation of the gates in the tertiary canals.
- (4) As previously stated, the required technical level for O&M of the irrigation facilities by farmers will be raised compared to the prevailing level. Accordingly, farmers are also requested to acquire, at least, the techniques necessary for repairing the damaged portions of the canals and gates using simple equipment and tools, in an organized and cooperative manner. Thus, DoI is requested to pay full attention to the prior training of farmers with regard to the: i) O&M of the irrigation facilities including repair of the canals and gates using simple equipment; ii) method of operation of the gates; and iii) method of water measurement by gauging devices, etc.
- (5) The high priority irrigation schemes to be rehabilitated are independently located. Thus, it will be difficult for farmers to exchange the necessary information and for them to cooperate with each other. It is anticipated that this situation will make it difficult for farmers to maintain and operate the rehabilitated facilities in a harmonized and organized manner. Accordingly, it is recommended that each DIO should publish, on a monthly basis, a simple newspaper and distribute it to the farmers concerned in order to help them acquire the necessary information. The paper will include the following:
 - i) Introduction of events, mainly concerning agriculture, in the neighbouring areas;
 - ii) Information concerning the current agricultural marketing status;
 - iii) Information concerning the status of cultivated crops;
 - iv) Information concerning O&M activities in the neighbouring areas;
 - v) Introduction of new knowledge concerning agriculture and agro-chemicals; and
 - vi) Information of long-term weather forecasting, etc.

Tables

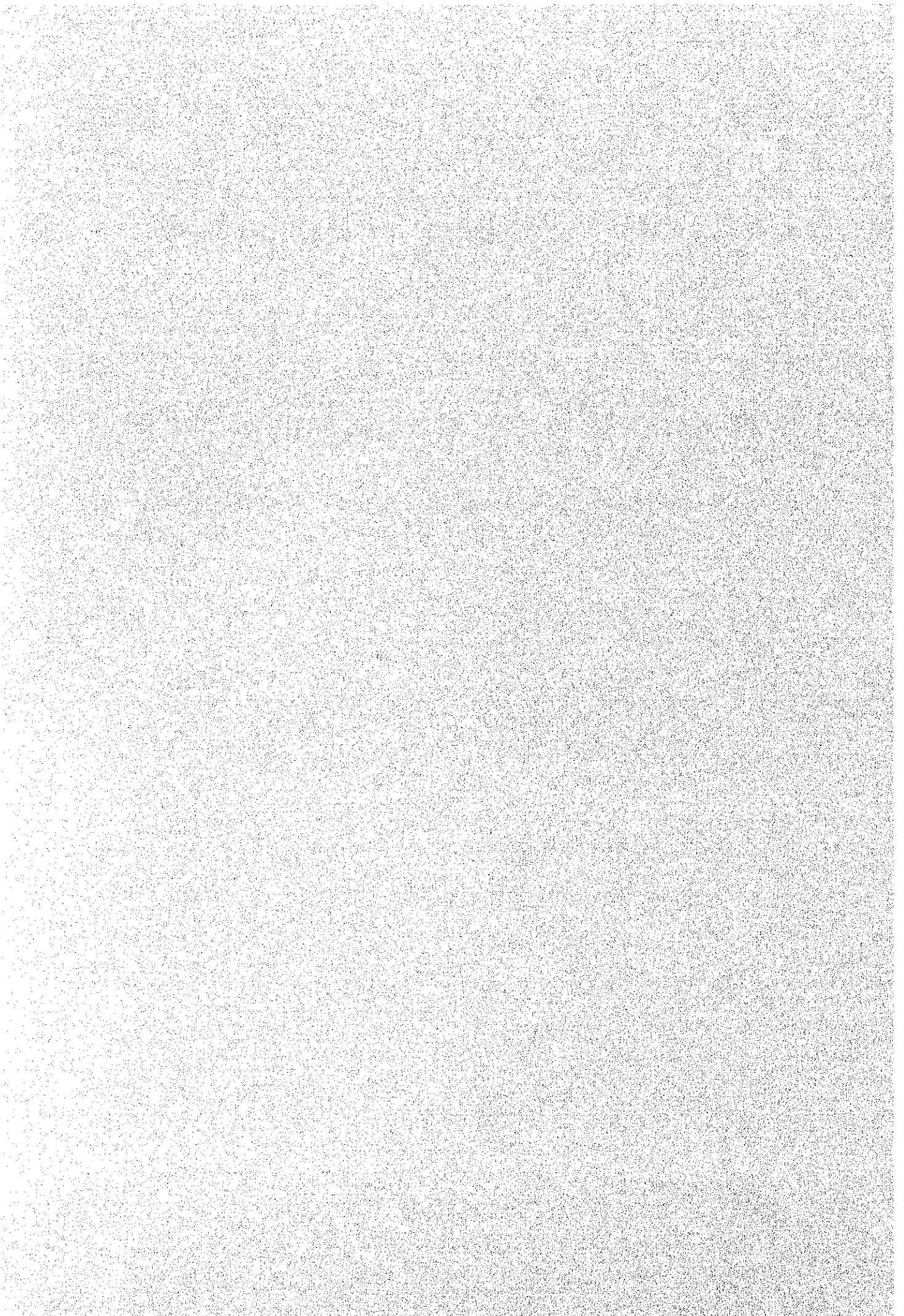


Table 2-1 Population and Population Growth Rate in Nepal and Kathmandu Valley

Location *1	Area (sq. km)	Population and Density						Projection			Annual Average Growth Rate *2		
		1952/54	1961	1971	1981	1991	2001	1952/54-1961	1961-1971	1971-1981	1981-1991		
Nepal	147,181	8,256,625	9,412,996	11,555,983	15,022,839	18,491,097	22,760,000	1.65%	2.07%	2.66%	2.10%		
Density per sq.km		56	64	79	102	126	155						
Urban		235,892	336,222	461,938	956,721	1,758,931		4.53%	3.23%	7.55%	6.28%		
Rural		8,020,733	9,076,774	11,094,045	14,066,118	16,732,166		1.56%	2.03%	2.40%	1.75%		
Kathmandu Valley	899	410,995	459,989	619,911	766,345	1,105,379		1.42%	3.03%	2.14%	3.73%		
Density per sq.km		457	512	690	852	1,230							
Urban		178,699	202,608	249,563	363,507	598,528		1.58%	2.11%	3.83%	5.11%		
Rural		232,296	257,381	370,348	402,838	506,851		1.29%	3.71%	0.84%	2.32%		
Bhaktapur District	119	83,460	89,822	110,157	159,767	172,952		0.92%	2.06%	3.79%	0.80%		
Density per sq.km		701	755	926	1,343	1,453							
Urban		32,118	33,877	40,112	48,472	61,405		0.67%	1.70%	1.91%	2.39%		
Rural		51,342	55,945	70,045	111,295	111,547		1.08%	2.27%	4.74%	0.02%		
Kathmandu District	395	193,782	224,866	353,756	422,237	675,341		1.88%	4.64%	1.79%	4.81%		
Density per sq.km		491	569	896	1,069	1,710							
Urban		105,247	121,018	150,402	235,160	421,258		1.76%	2.20%	4.57%	6.00%		
Rural		88,535	103,848	203,354	187,077	254,083		2.01%	6.95%	-0.83%	3.11%		
Lalitpur District	385	133,753	145,301	155,998	184,341	257,086		1.04%	0.71%	1.68%	3.38%		
Density per sq.km		347	377	405	479	668							
Urban		41,334	47,713	59,049	79,875	115,865		1.81%	2.15%	3.07%	3.79%		
Rural		92,419	97,588	96,949	104,466	141,221		0.68%	-0.07%	0.75%	3.06%		

Source : Population Monograph of Nepal, 1987 and Statistical Year Book of Nepal, 1993, Central Bureau of Statistics.

Note *1 : Urban area is defined as community with 5,000 population or more until 1981 and population in Municipalities in 1991.

*2 : Exponential model.

Table 2-2 Gross Domestic Product (GDP)

Industrial Origin	1974/75	1975/76	1976/77	1977/78	(Share)	1978/79	1979/80	1980/81	1981/82	1982/83	(Share)	1983/84
1 Agriculture, Fisheries & Forestry	11,435	11,495	10,389	11,616	(63.0%)	13,365	13,520	15,510	17,715	19,082	(60.3%)	22,570
2 Mining & Quarrying	22	23	26	26	(0.1%)	34	42	58	66	85	(0.3%)	111
3 Manufacturing	664	690	736	794	(4.3%)	848	936	1,029	1,243	1,460	(4.6%)	1,816
4 Electricity, Gas & Water	34	38	39	42	(0.2%)	48	60	67	82	127	(0.4%)	158
5 Construction	583	718	1,020	1,338	(7.3%)	1,559	1,570	1,974	2,342	2,377	(7.5%)	2,576
6 Trade, Restaurants & Hotels	540	603	636	707	(3.8%)	724	889	953	1,068	1,199	(3.8%)	1,520
7 Transport, Communication & Storage:	690	805	852	1,093	(5.9%)	1,248	1,541	1,889	1,992	2,129	(6.7%)	2,468
8 Financial & Real Estate	1,095	1,171	1,412	1,534	(8.3%)	1,613	1,833	2,077	2,366	2,594	(8.2%)	2,937
9 Community & Social Services	873	1,046	1,145	1,277	(6.9%)	1,340	1,495	1,889	2,163	2,591	(8.2%)	2,848
GDP at Factor Cost	15,936	16,589	16,255	18,427	(100%)	20,779	21,886	25,446	29,037	31,644	(100%)	37,004
Indirect Taxes less Subsidy	635	805	1,025	1,306		1,466	1,466	1,841	1,951	2,117		2,386
Agriculture	115	116	117	136		157	163	169	188	200		201
Non-agriculture	520	689	908	1,170		1,279	1,303	1,672	1,763	1,917		2,185
GDP at Market Price	16,571	17,394	17,280	19,733		22,215	23,352	27,287	30,988	33,761		39,390
Nominal GDP	16,571	17,394	17,280	19,732	(100%)	22,215	23,352	27,287	30,988	33,761	(100%)	39,390
Average Annual Growth Rate for Five Years	(5.99%) = three years' average											
Agriculture	11,550	11,611	10,506	11,752	(59.6%)	13,522	13,683	15,679	17,903	19,282	(57.1%)	22,771
Non-agriculture	5,021	5,783	6,774	7,980	(40.4%)	8,693	9,669	11,608	13,085	14,479	(42.9%)	16,619
Real GDP (1974/75 Price)	16,571	17,300	17,822	18,607	(100%)	19,048	18,607	20,143	20,920	20,297	(100%)	22,262
Average Annual Growth Rate for Five Years	(3.94%) = three years' average											
Agriculture	11,550	11,615	11,141	11,141	(59.9%)	11,480	10,933	12,066	12,616	12,478	(61.5%)	13,668
Non-agriculture	5,021	5,685	6,681	7,466	(40.1%)	7,568	7,674	8,077	8,304	7,819	(38.5%)	8,594
GDP Deflator	100.00	100.54	96.96	106.05		116.63	125.50	135.47	148.13	166.33		176.94
Agriculture	100.00	99.97	94.30	105.48		117.79	125.15	129.94	141.91	154.53		166.60
Non-Agriculture	100.00	101.72	101.39	106.88		114.87	126.00	143.72	157.57	185.18		193.38
GDP per Capita	12,502	12,835	13,176	13,526		13,886	14,255	14,634	15,023	15,338		15,660
at Current Prices	1,325	1,355	1,311	1,459		1,600	1,638	1,865	2,063	2,201		2,515
at 1974/75 Prices	1,325	1,348	1,353	1,376		1,372	1,305	1,376	1,393	1,323		1,422

Sources : Statistical Year Book of Nepal, 1993, Central Bureau of Statistics.

Note *1 : Revised Preliminary Estimate *2 : Revised Preliminary Estimate *3 : Preliminary Estimate

*4 : Population in other year than shown in Table 2-1 was estimated based on the average growth rate.

< to be continued >

Table 2-2 Gross Domestic Product (GDP) (Continued)

Industrial Origin	Unit : NRs. million									
	1984/85	1985/86	1986/87	1987/88 (Share)	1988/89	1989/90	1990/91	1991/92	1992/93 (Share)	*3
1 Agriculture, Fisheries & Forestry	23,927	26,555	30,448	35,477 (55.7%)	40,889	47,251	52,047	61,486	66,520 (49.3%)	
2 Mining & Quarrying	140	120	100	93 (0.1%)	101	116	131	162	232 (0.2%)	
3 Manufacturing	1,998	2,622	3,065	3,761 (5.9%)	3,799	4,775	6,333	9,330	11,300 (8.4%)	
4 Electricity, Gas & Water	196	342	415	467 (0.7%)	513	537	652	994	1,457 (1.1%)	
5 Construction	3,583	3,989	5,040	5,396 (8.5%)	6,074	7,042	8,155	10,193	11,824 (8.8%)	
6 Trade, Restaurants & Hotels	1,837	2,207	2,905	3,365 (5.3%)	3,911	4,512	5,901	7,536	8,721 (6.5%)	
7 Transport, Communication & Storage:	2,764	3,123	3,594	3,686 (5.8%)	3,572	4,751	5,894	7,652	9,921 (7.4%)	
8 Financial & Real Estate	3,420	3,942	4,715	5,599 (8.8%)	6,727	8,394	9,517	11,372	13,571 (10.1%)	
9 Community & Social Services	3,691	4,164	5,076	5,871 (9.2%)	6,717	7,385	8,314	9,196	11,277 (8.4%)	
GDP at Factor Cost	41,556	47,064	55,358	63,715 (100%)	72,303	84,763	96,944	117,921	134,823 (100%)	
Indirect Taxes less Subsidy	2,861	3,364	3,888	5,258	5,437	6,245	7,004	8,265	10,136	
Agriculture	244	264	311	348	190	190	200	210	220	
Non-agriculture	2,617	3,100	3,577	4,910	5,247	6,055	6,804	8,055	9,916	
GDP at Market Price	44,417	50,428	59,246	68,973	77,740	91,008	103,948	126,186	144,959	
Nominal GDP	44,417	50,428	59,246	68,973 (100%)	77,740	91,008	103,948	126,186	144,959 (100%)	
Average Annual Growth Rate for Five Years				(15.36%)					(16.01%)	
Agriculture	24,171	26,819	30,759	35,825 (51.9%)	41,079	47,441	52,247	61,696	66,740 (46.0%)	
Non-agriculture	20,246	23,609	28,487	33,148 (48.1%)	36,661	43,567	51,701	64,490	78,219 (54.0%)	
Real GDP (1974/75 Price)	23,630	24,645	25,617	27,515 (100%)	28,748	31,034	32,448	33,115	34,075 (100%)	
Average Annual Growth Rate for Five Years				(6.27%)					(4.37%)	
Agriculture	13,990	14,705	14,789	15,993 (58.1%)	17,234	18,513	19,026	18,805	18,579 (54.5%)	
Non-agriculture	9,640	9,940	10,828	11,522 (41.9%)	11,514	12,521	13,422	14,310	15,496 (45.5%)	
GDP Deflator	187.97	204.62	231.28	250.67	270.42	293.25	320.35	381.05	425.41	
Agriculture	172.77	182.38	207.99	224.00	238.36	256.26	274.61	328.08	359.22	
Non-Agriculture	210.02	237.52	263.09	287.69	318.40	347.95	385.20	450.66	504.77	
GDP per Capita										
Population (1,000) *4	15,989	16,324	16,667	17,017	17,374	17,739	18,111	18,491	18,879	
at Current Prices	2,778	3,089	3,555	4,053	4,475	5,130	5,740	6,824	7,678	
at 1974/75 Prices	1,478	1,510	1,537	1,617	1,655	1,750	1,792	1,791	1,805	

Sources : Statistical Year Book of Nepal, 1993, Central Bureau of Statistics.

Note *1 : Revised Estimate *2 : Revised Preliminary Estimate *3 : Preliminary Estimate

*4 : Population in other year than shown in Table 2-1 was estimated based on the average growth rate.

Table 2-3 Economically Active Population by Major Occupation

	3 Districts in Kathmandu Valley				Valley		
	Nepal	(Share)	Kathmandu	Lalitpur	Bhaktapur	Total	(Share)
In 1981							
Agriculture	6,244,289	(91.1%)	132,154	61,163	56,354	249,671	(75.5%)
Industry	39,035	(0.6%)	4,386	1,897	1,539	7,822	(2.4%)
Commerce & Services	109,446	(1.6%)	11,910	3,253	3,809	18,972	(5.7%)
Others	458,116	(6.7%)	35,615	11,110	7,523	54,248	(16.4%)
Total	6,850,886	(100%)	184,065	77,423	69,225	330,713	(100%)
		(45.6%)					(43.2%)
Total population	15,022,839	(100%)	422,237	184,341	159,767	766,345	(100%)
In 1991							
Agriculture	5,952,047	(81.1%)	60,323	42,544	44,967	147,834	(36.6%)
Industry	310,414	(4.2%)	50,537	21,022	8,320	79,879	(19.8%)
Commerce & Services	672,235	(9.2%)	64,973	16,499	8,277	89,749	(22.2%)
Others	404,890	(5.5%)	61,067	16,904	8,202	86,173	(21.3%)
Total	7,339,586	(100%)	236,900	96,969	69,766	403,635	(100%)
		(39.7%)					(36.5%)
Total population	18,491,097	(100%)	675,341	257,086	172,952	1,105,379	(100%)

Source : Statistical Year Book of Nepal, 1991 & 1993, Central Bureau of Statistics.

Table 2-4 Foreign Trade and Balance of International Payment

	1974/75	(Share)	1975/76	1976/77	(Share)	1977/78	1978/79	1979/80	1980/81	1981/82	(Share)	1982/83
Unit : NRs. million												
1 Export (f.o.b.)	889.6	*	1,185.8	1,164.7	*	1,046.2	1,296.8	1,150.5	1,608.7	1,491.5		1,132.0
Agricultural Product	520.3	(58.5%)	809.8	617.1	(53.0%)	518.9	329.5	641.9	641.9	798.3	(53.5%)	383.2
Non-Agricultural Product	369.3	(41.5%)	376.0	547.6	(47.0%)	527.3	967.3	508.6	966.8	693.2	(46.5%)	748.8
Trade with India	746.7	(83.9%)	893.7	779.6	(66.9%)	498.1	650.1	520.9	992.4	994.4	(66.7%)	843.3
Other countries	142.9	(16.1%)	292.1	385.1	(33.1%)	548.1	646.7	629.6	616.3	497.1	(33.3%)	288.7
2 Import (c.i.f.)	1,814.6		1,981.7	2,008.0		2,469.6	2,884.7	3,480.1	4,428.2	4,930.3		6,314.0
Agricultural Product	269.0	(14.8%)	340.9	277.8	(13.8%)	398.1	350.1	464.8	718.5	719.1	(14.6%)	1,053.5
Non-Agricultural Product	1,545.6	(85.2%)	1,640.8	1,730.2	(86.2%)	2,071.5	2,534.6	3,015.3	3,709.7	4,211.2	(85.4%)	5,260.5
Trade with India	1,475.7	(81.3%)	1,227.1	1,343.5	(66.9%)	1,534.1	1,581.7	1,786.4	2,179.2	2,280.9	(46.3%)	2,499.6
Other countries	338.9	(18.7%)	754.6	664.5	(33.1%)	935.5	1,303.0	1,693.7	2,249.0	2,649.4	(53.7%)	3,814.4
3 Trade Balance	-925.0		-795.9	-843.3		-1,423.4	-1,587.9	-2,329.6	-2,819.5	-3,438.8		-5,182.0
Agricultural Product	251.3	(29.2%)	468.9	339.3	(28.2%)	120.8	-20.6	177.1	-76.6	79.2	(23.6%)	-670.3
Non-Agricultural Product	-1,176.3	(70.8%)	-1,264.8	-1,182.6	(71.8%)	-1,544.2	-1,567.3	-2,506.7	-2,742.9	-3,518.0	(76.4%)	-4,511.7
Trade with India	-729.0	(82.2%)	-333.4	-563.9	(66.9%)	-1,036.0	-931.6	-1,265.5	-1,186.8	-1,286.5	(51.0%)	-1,656.3
Other countries	-196.0	(17.8%)	-462.5	-279.4	(33.1%)	-387.4	-656.3	-1,064.1	-1,632.7	-2,152.3	(49.0%)	-3,525.7
A Trade Balance *1	-925.0		-812.9	-856.4		-1,450.6	-1,608.8	-2,403.0	-2,830.2	-3,452.0		-5,197.0
i. Export f.o.b. *1	889.6		1,208.7	1,189.0		1,065.2	1,303.6	1,166.3	1,612.7	1,496.0		1,135.8
ii. Import c.i.f. *1	1,814.6		2,021.6	2,045.4		2,515.8	2,912.4	3,569.3	4,442.9	4,948.0		6,332.8
B Service Account	280.8		284.3	493.2		571.6	778.6	873.2	1,117.0	1,378.0		1,634.9
C Unrequited Transfers	523.9		588.6	617.9		587.5	869.5	1,188.2	1,417.3	1,682.0		1,890.7
D Current Account Balance	-120.3		60.0	254.7		-291.5	39.3	-341.6	-295.9	-392.0		-1,671.4
E Official Capital Net	86.7		145.8	214.8		291.9	428.6	577.3	633.0	774.1		927.7
F Miscellaneous Capital Items, Net	388.8		152.4	-158.7		10.4	115.5	-209.3	-143.8	119.7		72.0
G Change in Reserves Net	355.2		358.2	310.8		10.8	583.4	26.4	193.3	501.8		-671.7

Sources : Statistical Year Book of Nepal, 1991 & 1993, Central Bureau of Statistics.

* : Economic Survey Fiscal Year 1992-93, Ministry of Finance.

Note *1 : Revised on customs date basis at basic exchange rate, according to footnote on Statistic Year Book.

< to be continued >

Table 2-4 Foreign Trade and Balance of International Payment (Continued)

	1983/84	1984/85	1985/86	1986/87	(Share)	1987/88	1988/89	1989/90	1990/91	1991/92	(Share)	Growth Rate #2
Unit : NRs. million												
1 Export (f.o.b.)	1,703.9	2,740.6	3,078.0	2,991.4		4,114.6	4,195.3	5,156.2	7,387.5	13,939.4		(36.0%)
Agricultural Product	657.0	1,054.1	897.1	824.3	(27.6%)	985.9	684.5	640.2	1,199.6	2,220.7	(15.9%)	(21.9%)
Non-Agricultural Product	1,046.9	1,686.5	2,180.9	2,167.1	(72.4%)	3,128.7	3,510.8	4,516.0	6,187.9	11,718.7	(84.1%)	(40.2%)
Trade with India	1,160.7	1,601.7	1,241.1	1,302.5	(43.5%)	1,567.8	1,034.9	602.5	1,552.2	1,568.9	(11.3%)	(3.8%)
Other countries	543.2	1,138.9	1,836.9	1,688.9	(56.5%)	2,546.8	3,160.4	4,553.7	5,835.3	12,370.5	(88.7%)	(48.9%)
2 Import (c.i.f.)	6,514.3	7,742.1	9,341.2	10,905.4		13,869.6	16,263.7	18,324.9	23,226.5	32,951.3		(24.8%)
Agricultural Product	878.7	985.0	1,185.9	1,348.7	(12.4%)	2,048.5	1,872.4	2,310.6	2,819.2	4,623.6	(14.0%)	(27.9%)
Non-Agricultural Product	5,635.6	6,757.1	8,155.3	9,556.7	(87.6%)	11,821.1	14,391.3	16,014.3	20,407.3	28,327.7	(86.0%)	(24.3%)
Trade with India	3,058.0	3,895.8	3,970.9	4,262.1	(39.1%)	4,595.8	4,238.7	4,674.5	7,323.1	11,815.9	(35.9%)	(22.6%)
Other countries	3,456.3	3,846.3	5,370.3	6,643.3	(60.9%)	9,273.8	12,025.0	13,650.4	15,903.4	21,135.4	(64.1%)	(26.0%)
3 Trade Balance	-4,810.4	-5,001.5	-6,263.2	-7,914.0		-9,755.0	-12,068.4	-13,168.7	-15,839.0	-19,011.9		(19.2%)
Agricultural Product	-221.7	69.1	-288.8	-524.5	(15.6%)	-1,062.6	-1,187.8	-1,670.4	-1,619.6	-2,402.9	(14.6%)	(35.6%)
Non-Agricultural Product	-4,588.7	-5,070.6	-5,974.4	-7,389.5	(84.4%)	-8,692.4	-10,880.6	-11,498.3	-14,219.4	-16,609.0	(85.4%)	(17.6%)
Trade with India	-1,897.3	-2,294.1	-2,729.8	-2,959.6	(40.0%)	-3,028.0	-3,203.8	-4,072.0	-5,770.9	-10,247.0	(28.5%)	(28.2%)
Other countries	-2,913.1	-2,707.4	-3,533.4	-4,954.4	(60.0%)	-6,727.0	-8,864.6	-9,096.7	-10,068.1	-8,764.9	(71.5%)	(12.1%)
A Trade Balance *1	-4,823.6	-5,022.2	-6,286.3	-7,924.1		-9,765.5	-12,085.7	-13,186.6	-15,852.4	-19,039.8		(19.2%)
i. Export f.o.b. *1	1,709.9	2,746.4	3,085.6	3,003.0		4,127.3	4,211.1	5,169.9	7,403.3	13,958.5		(36.0%)
ii. Import c.i.f. *1	6,533.5	7,768.6	9,371.9	10,927.1		13,892.8	16,296.8	18,356.5	23,255.7	32,998.3		(24.7%)
B Service Account	1,406.8	1,079.5	1,574.5	2,327.4		2,211.7	2,989.5	2,752.9	2,691.5	3,893.1		(10.8%)
C Unrequited Transfers	2,073.4	2,093.7	2,240.9	2,692.3		2,931.0	2,761.4	2,790.1	3,661.2	4,294.3		(9.8%)
D Current Account Balance	-1,343.4	-1,849.0	-2,470.9	-2,904.4		-4,622.8	-6,334.8	-7,643.6	-9,499.7	-10,852.4		(30.2%)
E Official Capital Net	1,203.5	1,270.2	1,811.5	1,888.3		4,368.0	6,045.1	5,888.8	6,300.0	7,326.0		(31.1%)
F Miscellaneous Capital Items, Net	13.9	-287.2	1,220.4	1,644.6		2,527.8	365.6	4,404.4	7,331.9	7,859.6		(36.7%)
G Change in Reserves Net	-126.0	-866.0	561.0	628.5		2,273.0	75.9	2,649.6	4,132.2	4,333.2		(47.1%)

Sources : Statistical Year Book of Nepal, 1991 & 1993, Central Bureau of Statistics.

* : Economic Survey Fiscal Year 1992-93, Ministry of Finance.

Note #1 : Revised on customs date basis at basic exchange rate, according to footnote on Statistic Year Book.

#2 : An average annual growth rate during past five years (Exponential model).

Table 2-5 Trade Balance of Food Crops (1975/76 - 1991/92)

Item		Unit : ton								
		1975/76	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84
1 Rice	Export	157,716	129,216	62,915	67,598	12,216	45,453	61,714	2,698	18,916
	Import	1,493	1,091	4,698	7,095	37,526	55,156	8,813	34,478	13,266
	Food Aid	0	0	0	0	0	8,115	0	38,438	7,444
	Balance	156,223	128,125	58,217	60,503	-25,310	-17,818	52,901	-70,218	-1,794
2 Maize	Export	N.A.	2,025	4,012	3,592	2,328	17,749	15,988	246	3,000
	Import	N.A.					35,000		1,815	422
	Food Aid	N.A.					950		1,985	
	Balance		2,025	4,012	3,592	2,328	-18,201	15,988	-3,554	2,578
3 Wheat	Export	N.A.				169	11,417	10,417	563	5,234
	Import	N.A.					31,042	9,000	41,981	6,331
	Food Aid	N.A.	93	763	3,306	11,220	28,336	8,813	45,634	2,982
	Balance		-93	-763	-3,306	-11,051	-47,961	-7,396	-87,052	-4,079
4 Pulses	Export	N.A.	N.A.				17,000	21,000	8,745	13,214
	Import	N.A.	N.A.				4,000	3,000	3,991	2,968
	Food Aid	N.A.	N.A.	54	167	488	300	181	511	219
	Balance			-54	-167	-488	12,700	17,819	4,243	10,027
5 Potatoes	Export	N.A.	N.A.	N.A.	N.A.	N.A.	2,000	1,000	2,612	2,755
	Import	N.A.	N.A.	N.A.	N.A.	N.A.	16,000	12,000	23,474	23,589
	Balance						-14,000	-11,000	-20,862	-20,834

Item		Unit : ton							
		1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92
1 Rice	Export	58,962	20,209	2,152	41	216	244	224	
	Import	8,899	6,608	35,012	21,669	9,169	13,529	8,101	25,000
	Food Aid	4,008	0	17,002	871				
	Balance	46,055	13,601	-49,862	-22,499	-8,953	-13,285	-7,877	-25,000
2 Maize	Export	8,368	11,939	5,312	0	1,128	12	2,752	
	Import	458	287	260	4,043	384	604	60	
	Food Aid				10,046				
	Balance	7,910	11,652	5,052	-14,089	744	-592	2,692	0
3 Wheat	Export	7,007	3,435	255	114	16	85	4	
	Import	1,433	10,226	21,217	63,660	6,165	2,281	1,513	39,070
	Food Aid	843	1,400	100	2,478	7,720	93		2,196
	Balance	4,731	-8,191	-21,062	-66,024	-13,869	-2,289	-1,509	-41,266
4 Pulses	Export	24,495	34,929	18,023	21,159	11,011	12,814		
	Import	3,989	5,003	4,038	11,399	11,226	8,318		
	Food Aid	230	83	186	75	445			
	Balance	20,276	29,843	13,799	9,685	-660	4,496	0	0
5 Potatoes	Export	1,792	2,792	1,335	1,185	315	187	800	
	Import	36,007	37,157	29,527	53,985	50,752	39,375	41,446	
	Balance	-34,215	-34,365	-28,192	-52,800	-50,437	-39,188	-40,646	0

Sources : Agricultural Project Services Center, Essential Food Commodities Supply Management, Data Base Study, July 1990, Department of Customs, Foreign Trade Statistics, Fiscal Year 1987/88 to 1990/91, and Unpublished data from Nepal Food Corporation.

Table 2-6 Production Condition of Major Crops

Year	Major Food Crops												Major Cash Crops																							
	Paddy			Maize			Wheat			Millet			Barley			Oilseed			Potato			Sugar cane			Tobacco			Jute								
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield			
1980/81	1,275.5	2,464.3	1.93	457.5	742.9	1.62	391.8	477.2	1.22	121.8	121.5	1.00	26.7	23.0	0.86	2,273.2	3,829.0	1.68	122.3	77.1	0.63	49.6	280.5	5.66	24.0	479.8	20.02	7.2	5.5	0.76	52.0	59.0	1.13	255.0	2,528.3	
1981/82	1,296.5	2,560.1	1.97	475.5	751.5	1.58	399.9	525.9	1.32	122.1	121.7	1.00	27.0	23.3	0.86	2,321.0	3,982.6	1.72	113.9	79.1	0.69	52.0	321.1	6.17	25.2	590.0	23.44	6.8	4.8	0.70	35.3	42.7	1.21	233.2	2,554.3	
1982/83	1,264.8	1,832.6	1.45	510.8	718.2	1.41	483.8	656.6	1.36	129.1	121.1	0.94	24.3	21.2	0.87	2,412.9	3,349.7	1.39	110.3	69.6	0.63	59.2	373.0	6.30	25.4	616.1	24.25	9.0	6.6	0.74	30.4	39.0	1.28	234.3	2,647.2	
1983/84	1,334.2	2,757.0	2.07	503.8	761.1	1.51	471.8	633.7	1.34	123.9	114.9	0.93	24.8	22.3	0.90	2,458.4	4,289.0	1.74	110.7	73.4	0.66	58.9	383.1	6.51	22.7	509.1	22.39	9.1	6.9	0.76	23.7	25.0	1.06	225.0	2,683.5	
1984/85	1,376.9	2,709.4	1.97	578.7	819.9	1.42	451.9	533.7	1.18	134.4	124.4	0.93	27.6	23.6	0.86	2,569.4	4,211.1	1.64	127.8	84.0	0.66	65.5	420.2	6.41	17.5	408.3	23.36	8.6	6.4	0.75	27.2	33.1	1.22	246.6	2,816.0	
1985/86	1,391.0	2,804.5	2.02	614.7	873.8	1.42	482.8	598.0	1.24	151.1	137.9	0.91	29.3	23.4	0.80	2,668.9	4,437.6	1.66	138.5	78.7	0.57	70.0	356.7	5.10	23.0	558.3	24.27	8.7	4.7	0.54	47.2	61.1	1.29	287.3	2,956.2	
1986/87	1,333.4	2,372.0	1.78	626.7	868.4	1.39	535.5	701.0	1.31	150.8	137.6	0.91	28.6	24.7	0.86	2,674.9	4,103.7	1.53	142.9	82.5	0.58	74.3	395.1	5.32	24.9	616.6	24.75	8.8	4.9	0.55	19.8	23.5	1.18	270.8	2,945.7	
1987/88	1,423.3	2,981.8	2.09	673.8	901.5	1.34	596.8	744.6	1.25	164.8	150.1	0.91	29.1	24.3	0.83	2,887.7	4,802.3	1.66	151.5	94.4	0.62	80.2	570.0	7.11	29.5	814.4	27.59	6.5	4.5	0.69	14.5	15.8	1.09	282.1	3,169.8	
1988/89	1,450.5	3,283.2	2.26	721.9	1,071.6	1.48	599.3	830.1	1.39	182.6	183.1	1.00	29.5	27.0	0.92	2,983.6	5,395.0	1.81	154.9	99.2	0.64	81.6	640.9	7.86	29.6	903.0	30.56	7.3	5.4	0.74	13.6	17.6	1.30	286.8	3,270.5	
1989/90	1,432.9	3,389.7	2.37	751.2	1,201.0	1.60	604.2	855.0	1.41	193.5	224.8	1.16	29.5	27.4	0.93	3,011.3	5,697.8	1.89	153.7	98.1	0.64	83.4	671.8	8.06	31.5	988.3	31.37	7.6	6.6	0.87	14.1	16.1	1.14	290.2	3,301.5	
1990/91	1,455.0	3,502.0	2.41	757.7	1,231.0	1.62	592.7	836.0	1.41	198.6	231.6	1.17	29.6	27.8	0.94	3,033.6	5,828.4	1.92	156.3	92.1	0.59	84.3	738.0	8.76	33.0	1,106.0	33.55	7.3	7.0	0.96	15.5	19.1	1.23	296.3	3,330.0	
1991/92	1,411.8	3,222.5	2.28	754.1	1,204.7	1.60	571.3	779.2	1.36	198.4	228.7	1.15	29.7	27.6	0.93	2,965.2	5,462.7	1.84	154.6	87.8	0.57	85.3	732.9	8.59	37.4	1,291.3	34.52	6.5	6.0	0.92	15.0	19.0	1.27	298.8	3,666.4 *2	
(Share in 1991/92)	(38.5%)			(20.6%)			(15.6%)			(5.4%)			(0.8%)			(80.9%)																			(8.1%)	(100%)
Average (1980/81-84/85)	1,309.6	2,464.7	1.88	505.2	758.7	1.50	439.8	565.4	1.29	126.2	120.7	0.96	26.1	22.7	0.87	2,407.0	3,932.3	1.63	Average (1980/81-84/85)	117.0	76.6	0.66	57.0	355.6	6.23	23.0	520.6	22.68	8.1	6.1	0.75	33.7	39.8	1.18	238.8	2,645.8
Average (1987/88-91/92)	1,434.7	3,275.8	2.28	731.7	1,122.0	1.53	592.9	808.9	1.36	187.6	203.7	1.09	29.5	26.8	0.91	2,976.3	5,437.2	1.83	Average (1987/88-91/92)	154.2	94.3	0.61	82.9	670.7	8.09	32.2	1,020.6	31.71	7.0	5.9	0.84	14.5	17.5	1.21	290.9	3,347.6
1992/93 provisional	1,262.0	2,585.0	2.05	775.0	1,290.0	1.66	628.0	765.0	1.22	202.0	237.0	1.17	30.0	28.0	0.93	2,897.0	4,905.0	1.69	1992/93 provisional	166.0	94.0	0.57	87.0	733.0	8.43	39.0	1,366.0	35.03	7.0	6.0	0.86	9.0	10.0	1.11	308.0	3,205.0

Sources : Statistic Year Book of Nepal, 1991 & 1993, Central Bureau of Statistics, Statistical Data of Agriculture, 1990/91 & 1991/92, MoA, and Economic Survey, Fiscal Year 1992/93, Ministry of Finance.

Note *1 : Total cropped area shown in this column is total area of major food crops and major cash crops only except for 1991/92.

*2 : Total cropped area in 1991/92 was estimated at 3,666,400 ha consisting of 2,965,240 ha of food crops, 298,800 ha of cash crops, 261,860 ha of legume and 140,500 ha of vegetables.

Table 2 - 7 Cultivated Land and Irrigated Area in Nepal

unit : 1,000 ha

Description	Ecological Zone *1			Total *1	Target Development *2 In 8-th Plan Accumulated	Remarks
	Terai	Hill	Mountain			
1 Total Area	3,410	6,152	5,185	14,747		
2 Agricultural Land Use at Present						
Irrigated	725	179	29	933 (35%)	294	1,227 46% of Total Cultivated Area
Rainfed Area						
Irrigable	613	189	31	833 (32%)	-294	539 20% of Total Cultivated Area
Non irrigable	21	687	167	875 (33%)		875 33% of Total Cultivated Area
Total	634	876	198	1,708 (65%)	-294	1,414 54% of Total Cultivated Area
Total Cultivated Area	1,359	1,055	227	2,641	0	2,641
3 Potential Irrigable Area						
Irrigable Agricultural Area	1,338	368	60	1,766		1,766
Irrigable Non-Agricultural Area	406	5	1	412		412
Total Irrigable Area	1,744	373	61	2,178		2,178
4 Total Remaining Irrigable Area	1,019	194	32	1,245	-294	951
1 Government Managed Irrigation Area						
(1) DoI Managed Project	250	15	0	265 (10%)	-161.2	426.2 16% of Total Cultivated Area
Large scale projects					108.5	
Small & medium scale schemes					52.7	
(2) Agency Assisted Farmer Managed Irrigation Scheme (FMIS)	161	20	5	186 (7%)	119.7	305.7 12% of Total Cultivated Area
Total	411	35	5	451	280.9	731.9
2 Other Farmer Managed Irrigation Scheme	314	144	24	482 (18%)	13.1	495.1 19% of Total Cultivated Area
3 Total Irrigated Area	725	179	29	933 (35%)	294.0	1,227.0 46% of Total Cultivated Area

Sources *1 : Master Plan for Irrigation Development in Nepal, Cycle 2, 1990

*2 : Eighth Plan (1992-1997), Summary, National Planning Commission, July 1992

Table 2-8 Government Finance (Annual Budget Allocation) and Budgetary Position of HMGN

Unit : NRs. million

Items	1979 /80	1980 /81	1981 /82	1982 /83	1983 /84	1984 /85	1985 /86	1986 /87	1987 /88	1988 /89	1989 /90	1990 /91	1991 /92	1992 /93
I. EXPENDITURE														
A. Regular Expenditure														
1 General Administration	183.4	218.8	253.1	328.1	355.8	416.7	522.6	615.4	701.3	845.1	963.4	1,180.4	1,534.3	1,866.1
2 Revenue Administration	30.5	35.8	43.9	54.7	58.7	63.0	75.4	95.6	101.1	111.2	124.3	124.8	173.5	218.6
3 Defence	223.0	288.9	282.8	392.4	453.6	507.9	606.2	712.4	768.3	898.7	1,027.2	1,151.4	1,489.0	1,737.6
4 Social Services	184.5	210.2	249.6	320.4	360.5	410.6	493.1	508.2	562.0	634.9	716.1	742.6	999.0	1,302.4
5 Economic Services	105.7	110.1	130.5	165.7	174.6	199.4	232.3	286.0	289.7	351.5	423.7	374.9	548.6	699.1
5-1 Agriculture	7.7	3.4	3.7	4.5	5.2	6.3	6.6	8.3	9.0	29.8	31.6	33.0	40.4	55.1
5-2 Irrigation	2.4	3.2	3.6	4.7	5.1	5.8	6.2	6.9	7.9	8.7	10.1	4.6	8.9	12.0
5-3 Land Reform	12.0	12.9	15.7	18.1	19.2	17.5	23.6	27.4	29.6	11.5	11.9	13.9	14.6	35.2
5-4 Cadastral Survey	3.9	4.2	5.3	6.8	7.4	8.3	9.5	11.8	12.7	14.9	14.9	17.7	22.2	27.7
5-5 Forest	4.3	4.6	5.4	7.3	8.0	8.7	10.0	13.3	14.6	15.7	17.3	17.4	22.6	28.6
5-6 Other Economic Services	75.4	81.8	96.8	124.3	129.7	152.8	176.4	218.3	215.9	270.9	337.9	288.3	439.9	540.5
6 Loan Repayment & Interest	217.0	216.3	256.6	307.0	497.6	678.2	1,019.3	1,196.6	1,441.6	1,720.7	2,279.2	2,407.4	3,797.1	4,360.5
7 Others	218.0	311.1	417.8	428.8	372.0	630.4	635.0	709.4	758.1	1,114.4	1,138.3	1,592.6	1,363.9	1,815.9
Total	1,162.1	1,361.2	1,634.3	1,997.1	2,272.8	2,906.2	3,583.9	4,123.6	4,622.1	5,676.5	6,672.2	7,574.1	9,905.4	12,000.2
B. Development Expenditure														
1 Economic Development	1,813.3	2,101.0	2,556.0	3,287.0	3,582.5	3,617.0	4,414.6	5,168.6	6,751.8	8,241.1	8,200.7	11,893.3	11,063.3	14,360.1
1-1 Agriculture	153.4	257.0	468.0	668.6	547.1	703.6	856.2	681.7	928.9	1,016.2	1,183.5	1,534.6	1,276.0	2,266.3
1-2 Irrigation	232.7	288.2	359.6	487.4	545.3	652.2	846.7	846.8	854.7	1,023.2	1,204.8	1,118.9	2,212.2	2,054.3
1-3 Land Reform	11.3	12.2	16.3	20.6	21.4	17.9	18.9	26.7	19.6	29.3	38.8	40.4	31.3	8.0
1-4 Cadastral Survey	25.7	30.2	37.7	45.6	45.9	40.7	46.7	67.5	72.1	80.8	64.5	68.9	87.6	120.1
1-5 Forest	94.2	89.3	185.4	228.1	234.5	290.4	365.0	388.4	449.6	556.7	547.2	460.1	884.3	959.3
1-6 Other Economic Development	1,296.0	1,424.1	1,489.0	1,836.7	2,188.3	1,912.2	2,281.1	3,157.5	4,426.9	4,934.9	5,161.9	8,670.4	6,571.9	8,952.1
2 Social Development	444.3	572.5	1,059.6	1,540.3	1,493.5	1,501.2	1,699.9	2,036.3	2,433.4	3,309.2	3,973.2	3,569.3	5,040.3	7,051.6
3 Planning and Statistics	14.3	30.0	14.4	20.2	15.4	5.2	4.0	4.0	5.9	10.1	10.8	83.3	39.3	31.2
4 Administrative Reform	0.5	0.7	2.9	7.9	13.0	11.9	10.3	18.4	24.4	35.0	14.3	11.3	13.8	37.4
5 Miscellaneous	36.2	26.9	93.9	126.7	59.4	353.3	84.5	150.7	212.6	732.8	798.7	422.2	356.1	115.0
Total	2,308.6	2,731.1	3,726.8	4,982.1	5,163.8	5,488.6	6,213.3	7,378.0	9,428.1	12,328.2	12,997.7	15,979.4	16,512.8	21,595.3
TOTAL EXPENDITURE	3,470.7	4,092.3	5,361.1	6,979.2	7,436.6	8,394.8	9,797.2	11,501.6	14,050.2	18,004.7	19,669.9	23,533.5	26,418.2	33,395.3
II. RECEIPTS														
Revenue	2,685.6	3,288.1	3,612.8	3,931.7	4,285.9	4,840.0	5,817.4	7,260.1	9,427.2	9,457.5	11,262.9	12,894.6	15,559.6	21,621.8
Foreign Grant	1,880.0	2,419.2	2,679.5	2,841.6	3,409.3	3,916.6	4,644.5	5,975.1	7,350.4	7,776.9	9,287.5	10,729.9	13,303.2	17,001.1
Overall Surplus or Deficit (-)	805.6	868.9	933.3	1,090.1	876.6	923.4	1,172.9	1,285.0	2,076.8	1,680.6	1,975.4	2,164.7	2,256.4	4,620.7
Source of Financing Deficit	-785.1	-804.2	-1,748.3	-3,047.5	-3,150.7	-3,554.8	-3,979.8	-4,241.5	-4,623.0	-8,547.2	-8,407.0	-10,658.9	-10,858.6	-11,973.7
Foreign Loan & Reimbursement	534.9	693.3	729.9	985.8	1,670.9	1,764.9	2,501.1	2,705.8	3,815.8	5,666.4	5,959.6	6,256.7	7,075.6	10,353.4
Internal Loan	180.0	250.0	500.0	1,000.0	1,576.8	799.9	1,403.4	1,644.7	1,130.0	1,330.0	2,150.0	4,552.7	2,082.2	1,620.0
CASH BALANCE SURPLUS	-70.2	139.1	-518.4	-1,061.7	97.0	-990.0	-75.3	109.0	322.8	-1,550.8	-297.4	150.5	-1,700.8	-0.3

Source : * Statistic Year Book of Nepal, 1989 for 1979/80, 1991 for 1980/81 & 1982/83, and 1993 for 1983/84 to 1990/91

Note : * Revised Estimate in Statistic Year Book of Nepal 1993

** Estimate in Statistic Year Book of Nepal 1993

*1 Economic Survey Fiscal Year 1992-93, Ministry of Finance, 1993

*2 Estimate from Annual Budget in FY2049/2050B.S.(1992/93)

Table 2-9 Foreign Aid (Loan & Grants) Disbursement by Sectors

Sector	Unit : NRs. Million																
	1975 /76	1976 /77	1977 /78	1978 /79	1979 /80	1980 /81	1981 /82	1982 /83	1983 /84	1984 /85	1985 /86	1986 /87	1987 /88	1988 /89	1989 /90	1990 /91	1991 /92
1. Agriculture, Irrigation and Forestry	125.1	98.7	148.0	227.5	220.6	322.6	454.3	599.2	757.6	1,053.1	1,298.8	1,037.6	1,236.3	1,456.8	1,489.7	1,253.2	1,945.4
Grant	85.5	57.6	69.0	130.0	118.5	150.0	160.2	251.6	250.1	319.7	230.1	203.1	169.3	211.4	194.9	141.1	313.3
Loan	39.6	41.1	79.0	97.5	102.1	172.6	294.1	347.6	507.5	733.4	1,068.7	834.5	1,067.0	1,255.4	1,294.8	1,112.1	1,632.1
1 Agriculture	91.4	50.7	76.2	83.3	54.6	139.9	181.7	235.3	315.3	465.4	626.2	348.3	553.2	529.5	536.2	609.6	396.8
Grant	74.8	43.8	47.7	65.2	36.8	84.9	86.9	72.1	107.2	89.4	83.9	61.1	70.6	82.6	92.5	62.4	126.4
Loan	16.6	6.9	28.5	18.1	17.8	55.0	94.8	163.2	208.1	376.0	542.3	287.2	482.7	446.9	443.7	547.2	270.4
2 Irrigation	24.0	36.2	46.2	121.9	133.0	148.7	200.7	267.9	337.5	449.2	577.2	514.7	482.3	791.9	772.4	435.3	1,158.9
Grant	1.3	7.5	16.9	46.9	54.3	41.9	54.2	133.7	87.9	154.8	103.3	59.7	29.0	71.1	46.9	20.4	93.9
Loan	22.7	28.7	29.3	75.0	78.7	106.8	146.5	134.2	249.6	294.4	473.9	455.0	453.3	720.8	725.5	414.9	1,065.0
3 Forest & Others	9.7	11.8	25.6	22.3	33.0	34.0	71.9	96.0	104.8	138.5	95.4	174.6	200.7	145.4	181.1	208.3	389.7
Grant	9.4	6.3	4.4	17.9	27.4	23.2	19.1	45.8	55.0	75.5	42.9	82.3	69.7	57.7	55.5	58.3	93.0
Loan	0.3	5.5	21.2	4.4	5.6	10.8	52.8	50.2	49.8	63.0	52.5	92.3	131.0	87.7	125.6	150.0	296.7
2. Transport, Power and Communication	230.7	290.4	499.5	559.8	908.8	1,000.0	775.6	648.8	859.1	969.7	1,321.2	1,473.7	2,794.6	3,120.1	2,678.1	2,575.6	2,485.1
Grant	162.7	218.3	247.8	317.3	556.9	561.8	528.1	324.2	314.9	217.6	476.0	376.2	1,196.0	672.2	919.5	1,043.8	475.0
Loan	68.0	72.1	251.7	242.5	351.9	438.2	247.5	324.6	544.2	752.1	845.2	1,097.5	1,598.6	2,447.9	1,758.6	1,531.8	2,010.1
3. Industry and Commerce	62.3	91.8	68.9	30.6	76.6	69.7	143.9	211.2	494.9	191.8	275.7	183.4	445.7	191.1	656.6	1,390.9	2,174.3
Grant	36.2	63.5	54.0	18.1	36.3	28.8	39.0	60.4	45.0	50.8	43.1	63.1	252.1	48.2	10.7	120.2	30.6
Loan	26.1	28.3	14.9	12.5	40.3	40.9	104.9	150.8	449.9	141.0	232.6	120.3	193.6	142.9	645.9	1,270.7	2,143.7
4. Social Services	86.0	73.8	130.4	168.5	124.0	146.4	335.9	612.4	432.4	435.3	586.4	585.4	522.3	845.0	1,575.8	667.9	1,191.6
Grant	73.8	51.0	94.2	130.9	83.4	104.7	252.5	450.6	263.1	323.8	361.8	296.1	293.9	510.3	633.3	284.1	708.1
Loan	12.2	22.8	36.2	37.6	40.6	41.7	83.4	161.8	169.3	111.5	224.6	289.3	228.4	334.7	942.5	383.8	483.5
1 Education	21.9	12.7	25.7	22.0	22.2	31.5	76.8	167.9	138.8	101.9	194.6	169.9	180.4	268.9	184.6	122.2	205.1
Grant	0.0	0.0	0.0	0.6	1.2	3.2	27.1	27.4	57.9	49.2	120.5	47.5	44.8	34.5	65.9	30.8	58.2
Loan	48.6	24.1	34.8	46.9	29.6	47.6	74.9	116.7	99.7	141.5	137.5	148.4	139.7	288.8	129.6	105.4	182.0
2 Health	48.6	24.1	34.8	46.4	29.3	47.6	74.9	112.9	94.7	135.6	133.5	148.2	138.1	288.0	106.3	105.4	182.0
Grant	0.0	0.0	0.0	0.5	0.3	0.0	0.0	3.8	5.0	5.9	4.0	0.2	1.6	0.8	23.3	0.0	0.0
Loan	5.7	22.5	19.0	35.2	38.5	31.4	49.1	116.6	78.2	56.1	142.7	169.6	76.5	117.6	240.6	181.9	633.0
3 Drinking Water	0.0	4.5	0.0	3.4	2.0	0.0	1.0	6.2	2.8	17.6	20.3	7.4	11.9	62.2	90.7	50.4	417.9
Grant	5.7	18.0	19.0	31.8	36.5	31.4	48.1	110.4	75.4	38.5	122.4	162.2	64.6	55.4	149.9	131.5	215.1
Loan	9.8	14.5	50.9	64.4	33.7	35.9	135.1	211.2	115.7	135.8	111.6	97.5	125.7	169.7	1,021.0	238.4	171.5
4 Others	3.3	9.7	33.7	59.7	31.1	28.8	126.9	191.0	84.7	121.4	87.5	93.0	99.1	125.6	370.4	97.5	50.0
Grant	6.5	4.8	17.2	4.7	2.6	7.1	8.2	20.2	31.0	14.4	24.1	4.5	26.6	44.1	650.6	160.9	121.5
Loan	1.5	2.4	1.6	3.1	10.5	23.5	13.5	4.2	3.5	26.6	9.5	34.3	89.6	43.9	45.9	61.9	4.0
5. Others	1.5	2.4	1.6	3.1	10.5	23.5	13.5	3.3	3.5	11.6	9.5	14.0	82.9	34.2	39.4	0.3	4.0
Grant	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	15.0	0.0	20.3	6.7	9.7	6.5	61.6	0.0
Loan	505.6	557.1	848.4	989.5	1,340.5	1,562.2	1,723.2	2,075.8	2,547.5	2,676.5	3,491.6	3,314.4	5,088.5	5,666.9	6,446.1	5,949.5	7,800.4
TOTAL	359.7	392.8	466.6	599.4	805.6	868.8	993.3	1,090.1	876.6	923.5	1,120.5	952.5	1,994.2	1,476.3	1,797.8	1,589.5	1,531.0
Grant	145.9	164.3	381.8	390.1	534.9	693.4	729.9	985.7	1,670.9	1,753.0	2,371.1	2,361.9	3,094.3	4,190.6	4,648.3	4,360.0	6,269.4
Loan																	

Source : Economic Survey, Fiscal Year 1992-93, Ministry of Finance, 1993.

Table 2-10 Foreign Aid Disbursement in Nepal by Sources

Unit : US\$ million

DONOR	YEAR														Average	Maximum	TOTAL	Order Sec.	All
	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991						
Bilateral. DAC Countries																			
Australia	0.90	1.40	1.70	2.00	1.60	1.90	1.50	1.40	2.80	3.40	3.80	1.20	2.50	2.01	3.80	26.10			
Canada	5.20	4.30	6.20	6.80	6.80	7.30	7.70	6.30	7.80	12.50	10.50	8.40	6.40	7.40	12.50	96.20			
Finland	0.00	0.10	0.00	0.10	1.90	3.00	3.80	5.30	9.90	6.20	18.50	15.50	18.00	6.33	18.50	82.30			
France	-	0.30	0.20	3.20	2.00	2.50	1.80	3.50	2.20	5.50	17.80	33.96	14.70	7.31	33.96	87.66			
Germany	17.10	18.80	8.00	8.00	17.20	10.30	10.58	21.29	26.70	68.53	38.00	35.56	38.90	24.54	68.53	318.96	2	4	
Japan	19.70	24.30	33.10	35.22	28.31	28.52	50.74	68.06	76.78	62.35	77.39	55.17	127.54	52.86	127.54	687.18	1	1	
Netherlands	4.30	1.50	1.50	5.50	4.10	1.60	2.50	3.30	4.40	5.10	4.50	6.90	5.00	3.86	6.90	50.20			
Norway	0.40	0.30	0.80	2.50	1.60	1.40	2.00	3.90	3.10	3.80	5.00	9.80	5.80	3.11	9.80	40.40			
Switzerland	5.50	8.10	9.70	11.80	10.70	8.00	7.60	9.10	9.70	12.80	19.50	18.00	11.40	10.92	19.50	141.90	5	8	
U.K.	23.50	15.60	16.00	16.60	11.00	11.30	12.38	14.40	16.30	19.06	28.20	25.78	33.50	18.74	33.50	243.62	3	5	
U.S.A.	6.00	8.00	12.00	19.00	22.00	22.00	21.00	17.00	20.00	15.00	14.00	17.00	14.00	15.92	22.00	207.00	4	6	
Others	-0.20	1.30	-1.20	0.68	2.29	0.58	1.87	16.63	9.92	10.73	11.71	11.56	12.56	5.47	16.63	78.43			
Total	82.40	84.00	88.00	111.40	109.50	98.40	123.47	170.18	189.60	224.97	248.90	238.83	290.30	158.46	290.30	2,059.95			
Multilateral.																			
ADB	6.80	9.20	14.30	19.60	23.10	36.60	42.30	34.76	27.80	41.70	62.70	65.66	74.70	35.32	74.70	459.22	2	3	
E.E.C.	0.00	-	2.10	1.30	2.00	6.20	2.20	1.70	4.70	3.50	2.00	3.90	3.20	2.73	6.20	32.80			
IDA/IBRD	18.60	25.00	32.90	33.50	30.40	29.30	32.50	53.96	78.40	82.00	107.00	65.00	48.00	48.97	107.00	636.56	1	2	
IFAD	-	0.00	2.20	1.40	1.90	4.40	5.70	6.10	8.60	6.20	7.70	10.00	2.30	4.71	10.00	56.50			
IMF	5.40	4.70	0.10	-	-	-	-	-	-	12.00	7.80	-0.50	-0.10	4.20	12.00	29.40			
UNDP	8.10	8.30	11.40	12.60	10.80	11.00	12.10	11.99	13.50	18.00	20.90	22.83	20.70	14.02	22.83	182.22	3	7	
UNTA	1.30	0.20	1.80	1.60	2.70	1.20	2.50	1.20	2.50	1.80	3.30	2.00	3.40	1.96	3.40	25.50			
UNICEF	3.10	3.60	3.10	3.70	4.00	5.20	4.90	4.30	6.90	6.80	7.40	7.90	7.40	5.25	7.90	68.30			
WFP	4.50	14.90	8.20	4.90	10.80	2.40	6.80	7.70	5.50	6.90	5.40	6.60	1.10	6.59	14.90	85.70			
Arab OPEC	-	-	2.60	5.50	1.50	0.10	-0.10	0.60	1.80	-0.10	0.30	-1.20	-0.90	0.92	5.50	10.10			
Others	3.10	6.40	5.10	5.10	5.00	4.40	5.44	4.36	3.90	-8.95	25.70	5.44	4.20	2.67	25.70	69.19			
Total	50.90	72.30	83.80	89.20	92.20	100.80	114.34	126.67	153.60	169.85	250.20	187.63	164.00	127.35	250.20	1,655.49			
OPEC Countries	3.50	6.80	8.80	0.00	-0.90	-0.90	-1.50	4.10	3.60	4.30	2.30	2.30	-1.00	2.42	8.80	31.40			
TOTAL ODA NET	136.80	163.10	180.60	200.60	200.80	198.30	236.31	300.95	346.80	399.12	501.40	428.76	453.30	288.22	501.40	3,746.84			

Sources : Geographical Distribution of Financial Flows to Developing Countries, OECD Paris, 1984,1987,1990 & 1993

Table 2-11 Foreign Aid Disbursement by Major Sources and Share

DONOR	Unit : US\$ million (Share in %)												
	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Bilateral(DAC Countries), Top 4 and Others													
Japan	19.70 (14.4%)	24.30 (14.9%)	33.10 (18.3%)	35.22 (17.6%)	28.31 (14.1%)	28.52 (14.4%)	50.74 (21.5%)	68.06 (22.6%)	76.78 (22.1%)	62.35 (15.6%)	77.39 (15.4%)	55.17 (12.9%)	127.54 (28.1%)
Germany	17.10 (12.5%)	18.80 (11.5%)	8.00 (4.4%)	8.00 (4.0%)	17.20 (8.6%)	10.30 (5.2%)	10.58 (4.5%)	21.29 (7.1%)	26.70 (7.7%)	68.53 (17.2%)	38.00 (7.6%)	35.56 (8.3%)	38.90 (8.6%)
U. K.	23.50 (17.2%)	15.60 (9.6%)	16.00 (8.9%)	16.60 (8.3%)	11.00 (5.5%)	11.30 (5.7%)	12.38 (5.2%)	14.40 (4.8%)	16.30 (4.7%)	19.06 (4.8%)	28.20 (5.6%)	25.78 (6.0%)	33.50 (7.4%)
U. S. A.	6.00 (4.4%)	8.00 (4.9%)	12.00 (6.6%)	19.00 (9.5%)	22.00 (11.0%)	22.00 (11.1%)	21.00 (8.9%)	17.00 (5.6%)	20.00 (5.8%)	15.00 (3.8%)	14.00 (2.8%)	17.00 (4.0%)	14.00 (3.1%)
Others	16.10 (11.8%)	17.30 (10.6%)	18.90 (10.5%)	32.58 (16.2%)	30.99 (15.4%)	26.28 (13.3%)	28.77 (12.2%)	49.43 (16.4%)	49.82 (14.4%)	60.03 (15.0%)	91.31 (18.2%)	105.32 (24.6%)	76.36 (16.8%)
Total	82.40 (60.2%)	84.00 (51.5%)	88.00 (48.7%)	111.40 (55.5%)	109.50 (54.5%)	98.40 (49.6%)	123.47 (52.2%)	170.18 (56.5%)	189.60 (54.7%)	224.97 (56.4%)	248.90 (49.6%)	238.83 (55.7%)	290.30 (64.0%)
Multilateral, Top 3 and Others													
IDA/IBRD	18.60 (13.6%)	25.00 (15.3%)	32.90 (18.2%)	33.50 (16.7%)	30.40 (15.1%)	29.30 (14.8%)	32.50 (13.8%)	53.96 (17.9%)	78.40 (22.6%)	82.00 (20.5%)	107.00 (21.3%)	65.00 (15.2%)	48.00 (10.6%)
ADB	6.80 (5.0%)	9.20 (5.6%)	14.30 (7.9%)	19.60 (9.8%)	23.10 (11.5%)	36.60 (18.5%)	42.30 (17.9%)	34.76 (11.6%)	27.80 (8.0%)	41.70 (10.4%)	62.70 (12.5%)	65.66 (15.3%)	74.70 (16.5%)
UNDP	8.10 (5.9%)	8.30 (5.1%)	11.40 (6.3%)	12.60 (6.3%)	10.80 (5.4%)	11.00 (5.5%)	12.10 (5.1%)	11.99 (4.0%)	13.50 (3.9%)	18.00 (4.5%)	20.90 (4.2%)	22.83 (5.3%)	20.70 (4.6%)
Others	17.40 (12.7%)	29.80 (18.3%)	25.20 (14.0%)	23.50 (11.7%)	27.90 (13.9%)	23.90 (12.1%)	27.44 (11.6%)	25.96 (8.6%)	33.90 (9.8%)	28.15 (7.1%)	59.60 (11.9%)	34.14 (8.0%)	20.60 (4.5%)
Total	50.90 (37.2%)	72.30 (44.3%)	83.80 (46.4%)	89.20 (44.5%)	92.20 (45.9%)	100.80 (50.8%)	114.34 (48.4%)	126.67 (42.1%)	153.60 (44.3%)	169.85 (42.6%)	250.20 (49.9%)	187.63 (43.8%)	164.00 (36.2%)
OPEC Countries	3.50 (2.6%)	6.80 (4.2%)	8.80 (4.9%)	0.00 (0.0%)	-0.90 (-0.4%)	-0.90 (-0.5%)	-1.50 (-0.6%)	4.10 (1.4%)	3.60 (1.0%)	4.30 (1.1%)	2.30 (0.5%)	2.30 (0.5%)	-1.00 (-0.2%)
TOTAL ODA NET	136.80 (100%)	163.10 (100%)	180.60 (100%)	200.60 (100%)	200.80 (100%)	198.30 (100%)	236.31 (100%)	300.95 (100%)	346.80 (100%)	399.12 (100%)	501.40 (100%)	428.76 (100%)	453.30 (100%)

Sources : Geographical Distribution of Financial Flows to Developing Countries, OECD Paris, 1984,1987,1990 & 1993

Table 3-1 Basic Demographic Data in the Study Area (1991/1992)

Village Development Committee	Nos. of	Area			Population			Farmhousehold			
		Total Area (ha)	Cultivated Area (ha)	Average Farm Size (ha/Household)	Household	Population	Family Size Average	Density (person / sq.km) (1981 - 1991)	Growth Rate	Household	% in Total Household
Nepal		14,718,100	2,598,970	0.95	3,328,721	18,491,097	5.56	125.6	2.1%	2,736,050	82.2%
Kathmandu District (the Study Area)	67	39,500	13,560	0.30	127,196	675,341	5.31	1,709.7	4.8%	45,541	35.8%
Lalitpur District (the Study Area)	11	3,800	2,110	0.34	7,486	41,737	5.58	1,098.3		6,254	83.5%
Bhaktapur District (the Study Area)	22	11,900	6,445	0.28	28,160	172,952	6.14	1,453.4	0.8%	22,725	80.7%
Total (3 Districts) The Study Area	40	89,900	29,877	0.31	201,038	1,105,379	5.50	1,229.6	3.7%	97,217	48.4%
		22,000	10,111	0.28	54,263	304,921	5.62	1,386.0		35,885	66.1%

Source : Statistical Year Book of Nepal, 1993 & National Population Census, 1991/1992

Table 3-2 List of Irrigation Systems in the Kathmandu Valley

Kathmandu District		Bhaktapur District (Continued)	
Name of System	Command Area (Seasonal)	Name of System	Command Area (Seasonal)
AK-01 Bahi u	25	AB-14 Mahadev Khola LP	150
AK-02 Baharu LP	30	AB-17 Nii Bahali	100
AK-03 Baharu Khola	25	AB-18 Sirdol Kanajje	175
AK-04 Baidhu	80	AB-20 Sweeny	150
AK-05 Bawambhara	150	1. Nandub Kulo P.	325
AK-06 Bawambhara River	200	2. Nalichok Ko-4 an. Kulo	100
AK-07 Boudhanath LP	100	3. Raj Kulo	125
AK-08 Dattakhal LP	130	4. Tereu Kulo	300
AK-09 Dhaulipuri LP	75	11. Dhangadhi ko kulo	200
AK-10 Gogal Indrayani	35	12. Bhairabhan ko Kulo	80
AK-11 Gokarna LP	100	13. Bajraj Kulo	25
AK-12 Khatoli LP	74	14. Chakhu Kulo	30
AK-13 Indrayani LP	150	15. Eodol Ko Kulo	10
AK-14 Pharping LP	35	16. Reethado Ko Kulo	4
AK-15 Sati Nadi LP	100	17. Jagate Kulo	15
AK-16 Sudesthal LP	20	18. Debre Kulo	4
AK-17 Taha LP	20	19. Dalichok Ko Kulo	11
1. Narayan Khola LP	20	20. Babasa ko Mahabho Kulo	3
2. Ghantiko Kulo	15	21. Talo Kulo (Maha Gaus Ko)	8
3. Gagalko Kulo	20	22. Karamat Kulo	46
4. Thako Kulo LP	6	23. Tabyakhasti Khola	27
5. Bahulo	120	24. Tabyakhasti Khola	13
6. Sweborahi LP	15	25. Saa Talli Kulo	11
7. Raize Kulo	30	26. Hauramte Chaulo Ko Kulo	27
8. Khahare Kulo	15	27. Thali Ko Kulo	4
9. Fatchare LP	30	28. Trib of Sweete Khola	5
10. Bahura LP	32	29. Trib of Sweete Khola	10
11. Ghate Kulo	100	30. Trib of Sweete Khola	28
12. Pabureshi LP	6	31. Trib of Sweete Khola	6
13. Chaurahi LP	16	32. Trib of Sweete Khola	4
14. Fanchera LP	100	33. Trib of Sweete Khola	5
15. Manamjhi LP	30	34. Trib of Sweete Khola	10
16. Lamabagar LP	15	35. Trib of Sweete Khola	28
17. Alle Mihan I. System	30	36. Trib of Sweete Khola	6
18. Mahadevthok Kulo	15	37. Sarawati Khola	4
19. Dhungabawungu Kulo	50	38. Khayang Khunung Khola	2
20. Karvembhali Kulo	55	39. Khayang Khunung Khola	46
21. Mahabho Kulo	80	40. Khayang Khunung Khola	19
22. Sira Kulo	20	41. Khayang Khunung Khola	11
23. Bohang I. System	70	42. Khayang Khunung Khola	5
24. Lapsang LP	40	43. Trib of Khayang Khunung	17
25. Tereganu Kulo	80	44. Trib of Khayang Khunung	17
26. Ramkot LP	25	45. Churkhaude Khola	37
27. Ghate Khola LP	70	46. Churkhaude Khola	3
28. Manamati LP	20	47. Dhunge Khola	47
29. Thararez Kulo	30	48. Trib of Hamamte	3
30. Daudale Khola Kulo	30	Sub-total	2,661
31. Thapa Dhara LP	80		
32. Saungali I. System	10		
33. Machlogang I. System	11		
34. Thako Khola I. System	20		
35. Kumbhi LP	20		
36. Simlebot Spring	20		
37. Kumbhi Kulo	25		
38. Samuli Kulo	30		
39. Ghantako Kulo	25		
40. Dullu Khola LP	30		
41. Tallo Rajhulo	30		
42. Chate LP	20		
43. Hindole Rajhulo	35		
44. Thabim Kulo	3,099		
Sub-total	3,099		
		Others: Water Resources Inventory Study, WECS	to be continued
			9,118

Table 3-3 List of Drinking Water Supply

(1) Municipal Water Supply

System	Intake	Water Source	River Basin
<u>Existing and under construction</u>			
Balaju	Pauchmani	River	Mahadev Khola
	Mahadev Khola	River	Mahadev Khola
	Allye	River	Mahadev Khola
	Boude	River	Bisnumati Khola
	Bhandare	River	Bisnumati Khola
	Chhahare	Spring	(outside valley)
Bansbari	Bisnumati (U/S)	River	Bisnumati Khola
Maharajganj	Bisnumati (D/S)	River	Bisnumati Khola
	Shivapuri		Dhobi Khola
Sundarijal	Sundarijal	Tail Water from Power Station	Bagmati River
Mahankal Chaur	Dhobi Khola	River	Dhobi Khola
Shaibu	Shesh Narayan	Spring	
	Sat Mul	Spring	
	Kutori Mul	Spring	
Sundarighat	Nakhu Khola	River	Nakhu Khola
Chapagaon	Muldore	Spring	
	Nakhu pump house	River	Nakhu Khola
Dood Pokhari	Dood Pokhari	Spring	
Lokhat	Lokhat	Spring	
Bhaktapur	Mahadev Khola	River	Hanumante River
<u>Planned</u>			
Manohala	Manohala	River	Manohara River
Balkhu	Balkhu Khola	River	Balkhu Khola
Lambagar	Lambagar Khola	River	Lambagar Khola

Source : Nepal Water Supply Corporation

(2) Rural Water Supply

District	Total No. of Rural Water Supply Project	Design Population (person)	Total Design Discharge (lit/sec)
Kathmandu District			
Existing	8	33,130	20.58
On-going	9	42,018	51.06
Planned	6	13,835	36.41
(Sub-total)	(23)	(88,983)	(108.05)
Bhaktapur District			
Existing	6	37,722	17.60
On-going	3	10,923	6.35
Planned	5	7,521	11.50
(Sub-total)	(14)	(56,166)	(35.45)
Lalitpur District			
Existing	5	17,116	7.56
On-going	4	30,665	3.12
Planned	2	38,358	3.49
(Sub-total)	(11)	(86,139)	(14.17)
Total	48	231,288	157.67

Source : Department of Water Supply and Sewerage

Table 3-4 (1/3)

Summary of Water Resources Inventory (1/3)

Code No.	AK-01	AK-02	AK-03	AK-04	AK-05	AK-06	AK-07
Project Name	Balaju	Balambu	Balkhu	Biswambhara	Boshan	Budhanilkantha	Daksinhkali
Command Area (rainy season)	25	50	25	80 *	150 *	200	100 *
(dry season)	20	50		60 *	125 *	150	60 *
Water Source		Indrawati Khola	Bhalkhu Khola	Manohara River	Boshan Khola	Bisnumati Khola	Kharpa Khola
Catchment Area (km ²)		23	38	5.83	6.8	3.5	10
Basin Rainfall (mm/yr)		2,230	2,100	2,210	2,250	2,730	2,610
Upstream Water Use							
Irrigation intake			5 farmers' systems (170 ha)				AK-24 and 2 farmers' systems (114 ha)
Water supply and Hydropower generation						Urban water supply intake	
Discharge measurement by DOI			1.2 m ³ /sec (April)	0.12 m ³ /sec (date is not given)			
shown in WECS report				0.07 m ³ /sec (March)	0.05 m ³ /sec (April)	Low in dry season	Low in dry season
by Study team						0.07 m ³ /sec (May 5, 1993)	
Estimated discharge given in Project request sheet (Dry season)				0.05 m ³ /sec			
(Rainy season)							
Estimated discharge in this study (Dry season (Feb.))		0.27 m ³ /sec	0.41 m ³ /sec	0.064 m ³ /sec	0.115 m ³ /sec	0.12 m ³ /sec	0.099 m ³ /sec
(Rainy season (Jun.))		1.4 m ³ /sec	1.4 m ³ /sec	0.215 m ³ /sec	0.294 m ³ /sec	0.29 m ³ /sec	0.411 m ³ /sec
Estimated flood discharge (1/10)		68 m ³ /sec	96 m ³ /sec	26 m ³ /sec	29 m ³ /sec	18 m ³ /sec	38 m ³ /sec
(1/50)		105 m ³ /sec	150 m ³ /sec	39 m ³ /sec	44 m ³ /sec	27 m ³ /sec	58 m ³ /sec

Code No.	AK-09	AK-10	AK-12	AK-13	AK-14	AK-24	AK-25
Project Name	Dhulopuro	Gagal Indrayani Kul	Gokarna	Ichadol	Indrayani	Pharung Dhangre D	Shali Nadi
Command Area (rainy season)	25	130	75	35	100 *	74	150 *
(dry season)			60	30	73 *	60	100 *
Water Source	Dukan Khola	Ghatte Khola	Bagmati river	Tribeni Khola	Ghatte Khola	Hundu Khola	Sali Nadi
Catchment Area (km ²)	0.3	0.6	56	9.8	5.2	8.3	12
Basin Rainfall (mm/yr)	2,200	2,280	2,480	1,960	2,510	2,680	2,660
Upstream Water Use							
Irrigation intake			AK-09, 26 and 8 farmers' systems (442 ha)	5 farmers' systems (225 ha)	1 farmers' system (15 ha)		1 farmers' system (20 ha)
Water supply and Hydropower generation							
Discharge measurement by DOI					0.07 m ³ /sec (date is not given)		
shown in WECS report	No water in dry season		0.3 m ³ /sec (March)	0.8 m ³ /sec (April)	0.025 m ³ /sec (March)	Low in dry season	0.1 m ³ /sec (March)
by Study team							0.11 m ³ /sec (Apr. 27, 1993) 0.83 m ³ /sec (Jul. 26, 1993)
Estimated discharge given in Project request sheet (Dry season)							
(Rainy season)							
Estimated discharge in this study (Dry season (Feb.))	0 m ³ /sec	0.01 m ³ /sec	0.72 m ³ /sec	0.12 m ³ /sec	0.057 m ³ /sec	0.14 m ³ /sec	0.153 m ³ /sec
(Rainy season (Jun.))	0.02 m ³ /sec	0.4 m ³ /sec	2.4 m ³ /sec	0.53 m ³ /sec	0.213 m ³ /sec	0.62 m ³ /sec	0.526 m ³ /sec
Estimated flood discharge (1/10)	3.3 m ³ /sec	5.3 m ³ /sec	127 m ³ /sec	37 m ³ /sec	24 m ³ /sec	33 m ³ /sec	43 m ³ /sec
(1/50)	4.7 m ³ /sec	7.7 m ³ /sec	198 m ³ /sec	57 m ³ /sec	36 m ³ /sec	51 m ³ /sec	66 m ³ /sec

Table 3-4 (2/3)

Summary of Water Resources Inventory (2/3)

Code No.	AK-26	AK-27	AB-01	AB-02	AB-03	AB-04	AB-07
Project Name	Sundarjal	Tokha	Balaku	Bidol	Chakhu Khola	Dhunge Dhala	Ghatte Kulo
Command Area (rainy season)	35	100	60	100 *	60	120	190
(dry season)	35	80	50	60 *	60	120	290
Water Source	Bagmati river	Tokha Khola	Kaica Kushi	Tholo Khola	Sipadol Khola	Ghatte Khola	Ghatte Khola
Catchment Area (km ²)	34	0.3	1.9	3.6	4.4	6.9	
Basin Rainfall (mm/yr)	2,810	2,230	1,650	1,790	1,900	1,900	
Upstream Water Use							
Irrigation intake	2 farmers' systems (135 ha)		3 farmer's systems (122 ha)		AB-7,18 (290 ha)		AB-18 (100 ha)
Water supply and Hydropower generation	Urban water supply intake Hydropower generation	Rural water supply intake				Urban water supply intake	Urban water supply intake
Discharge measurement by DOI				0.004 m ³ /sec (Feb.1, 1991)		0.07 m ³ /sec (date is not given)	
shown in WECS report	0.03 m ³ /sec (March)	0.045 m ³ /sec (April)	0.019 m ³ /sec (Mar.8, 1988)	0.004 m ³ /sec (Mar.5, 1988)	0.003 m ³ /sec (Mar.4, 1988)	0.012 m ³ /sec (Mar.5, 1988)	0.009 m ³ /sec (Mar.4, 1988)
by Study team	0.014 m ³ /sec (Apr.27, 1993)	0.004 m ³ /sec (May 5, 1993)				0.007 m ³ /sec (Apr.29, 1993) 0.16 m ³ /sec (Jul.26, 1993)	
Estimated discharge given in Project request sheet (Dry season)							
(Rainy season)						0.05 m ³ /sec	
Estimated discharge in this study (Dry season (Feb.))	0.5 m ³ /sec	0.004 m ³ /sec	0.02 m ³ /sec	0.032 m ³ /sec	0.05 m ³ /sec	0.03 m ³ /sec	
(Rainy season (Jun.))	1.7 m ³ /sec	0.02 m ³ /sec	0.09 m ³ /sec	0.108 m ³ /sec	0.23 m ³ /sec	0.31 m ³ /sec	
Estimated flood discharge (1/10)	89 m ³ /sec	3.3 m ³ /sec	12 m ³ /sec	19 m ³ /sec	21 m ³ /sec	29 m ³ /sec	
(1/50)	139 m ³ /sec	4.7 m ³ /sec	18 m ³ /sec	28 m ³ /sec	32 m ³ /sec	44 m ³ /sec	

Code No.	AB-08	AB-10	AB-12	AB-13	AB-14	AB-17	AB-18
Project Name	Hanumante	Katunje	Kutudhal	Lapetar	Mahadev Khola	Nil Barahi	Sipadol Katunje
Command Area (rainy season)	150	100 *	100 *	60	375 *	60	100
(dry season)	150	100 *	80 *		300 *	40	40
Water Source	Hanumante Kh.	Ghatte Khola	Ghatte Khola	Gundu Khola	Mahadev Kh. ?	Manohara River	Sipadol Khola
Catchment Area (km ²)	12	2.4	7.3	1.6	4.4	54	1.4
Basin Rainfall (mm/yr)	1,780	1,540	1,880	1,750	1,900	2,200	2,080
Upstream Water Use							
Irrigation intake	AB-04, 06 and 1 farmers' system (230 ha)	AB-13 and 1 farmers' system (69 ha)	AB-04 (120 ha)		3 farmers systems (19 ha)	AB-10, 14 and 6 farmers' systems (578 ha)	
Water supply and Hydropower generation	Urban water supply intake		Urban water supply intake			Urban water supply intake	Rural water supply intake
Discharge measurement by DOI		0.3 m ³ /sec (date is not given)	0.03 m ³ /sec (Feb.2, 1991) 0.12 m ³ /sec (date is not given)		0.03 m ³ /sec (Jan.31, 1991) 0.07 m ³ /sec (date is not given)		
shown in WECS report	0.006 m ³ /sec (Mar.5, 1988)	0.004 m ³ /sec (Mar.8, 1988)		0.006 m ³ /sec (Mar.8, 1988)	0.062 m ³ /sec (Mar.2, 1988)		
by Study team		0.02 m ³ /sec (Apr.29, 1993)	0.009 m ³ /sec (Apr. 29, 1993)		0.03 m ³ /sec (Apr.29, 1993)		
Estimated discharge given in Project request sheet (Dry season)							
(Rainy season)		0.02 m ³ /sec	0.06 m ³ /sec		0.1 m ³ /sec		
Estimated discharge in this study (Dry season (Feb.))	0.11 m ³ /sec	0.011 m ³ /sec	0.01 m ³ /sec	0.02 m ³ /sec	0.028 m ³ /sec	0.61 m ³ /sec	0.02 m ³ /sec
(Rainy season (Jun.))	0.37 m ³ /sec	0.045 m ³ /sec	0.134 m ³ /sec	0.08 m ³ /sec	0.122 m ³ /sec	2.1 m ³ /sec	0.08 m ³ /sec
Estimated flood discharge (1/10)	43 m ³ /sec	14 m ³ /sec	30 m ³ /sec	11 m ³ /sec	21 m ³ /sec	123 m ³ /sec	10 m ³ /sec
(1/50)	66 m ³ /sec	21 m ³ /sec	46 m ³ /sec	16 m ³ /sec	32 m ³ /sec	193 m ³ /sec	14 m ³ /sec

Table 3-4 (3/3)

Summary of Water Resources Inventory (3/3)

Code No.	AB-20	AL-02	AL-03	AL-05	AL-08	AL-10	AL-13
Project Name	Sweety	Bhorle	Champi	Godawari	Khokana	Kotkhu	Lubhu
Command Area (rainy season)	23	150	100	175	150	325 *	100 *
(dry season)	23	150	100	150	150	200 *	75 *
Water Source	Shishougari Kh.	Nakhu Khola	Nakhu Khola	Godawari Khola	Nakhu Khola	Kotkhu Khola	Sineri Khola
Catchment Area (km ²)	2.7	44	43	7.8	49	16	5.2
Basin Rainfall (mm/yr)	1,830	2,490	2,500	2,200	2,380	1,800	1,750
Upstream Water Use							
Irrigation intake	4 farmers' systems (170 ha)	AL-03, 19 and 13 farmers' systems (612 ha)	AL-19 and 13 farmers' systems (512 ha)	1 farmers' system (100 ha)	AL-02, 03, 19, 20 and 13 farmers' (962 ha)	1 farmers' system (10 ha)	1 farmers' system (10 ha)
Water supply and Hydropower generation		Kakhu dam project (Water supply master plan)	Kakhu dam project (Water supply master plan)			Kotkhu dam project (Water supply) P/S level	
Discharge measurement by DOI					1.25 m ³ /sec (April)	2.4 m ³ /sec (June)	1.83 m ³ /sec (June)
shown in WECS report				0.99 m ³ /sec in rainy season			
by Study team				0.044 m ³ /sec (May 2, 1993)		0.19 m ³ /sec (May 2, 1993)	
Estimated discharge given in Project request sheet (Dry season)					1.25 m ³ /sec	1.26 m ³ /sec	0.091 m ³ /sec
(Rainy season)							
Estimated discharge in this study (Dry season (Feb.))	0.03 m ³ /sec	0.56 m ³ /sec	0.34 m ³ /sec	0.11 m ³ /sec	0.33 m ³ /sec	0.113 m ³ /sec	0.044 m ³ /sec
(Rainy season (Jun.))	0.14 m ³ /sec	1.9 m ³ /sec	0.9 m ³ /sec	0.48 m ³ /sec	0.71 m ³ /sec	0.429 m ³ /sec	0.149 m ³ /sec
Estimated flood discharge (1/10)	15 m ³ /sec	107 m ³ /sec	105 m ³ /sec	32 m ³ /sec	115 m ³ /sec	53 m ³ /sec	24 m ³ /sec
(1/50)	23 m ³ /sec	167 m ³ /sec	164 m ³ /sec	48 m ³ /sec	180 m ³ /sec	81 m ³ /sec	36 m ³ /sec

Code No.	AL-18	AL-20	AL-19
Project Name	Saibu	Tika Bhairav-II	Tika Bhairav-I
Command Area (rainy season)	90	200 *	300 *
(dry season)	125	150 *	200 *
Water Source	Nakhu Khola	Nakhu Khola	Lele & Nallu Kh.
Catchment Area (km ²)	52	47	39
Basin Rainfall (mm/yr)	2,320	2,410	2,270
Upstream Water Use			
Irrigation intake	AL-02, 03, 08, 19, 20 and 13 farmers' syst's. (1,112 ha)	AL-03, 19, 20 and 13 farmers' syst's. (1,112 ha)	10 farmers' systems (196 ha)
Water supply and Hydropower generation	Kakhu dam project (Water supply master plan)	Kakhu dam project (Water supply master plan)	Kakhu dam project (Water supply master plan)
Discharge measurement by DOI		1.5 m ³ /sec (April)	4.75 m ³ /sec (June)
shown in WECS report			
by Study team		0.35 m ³ /sec (May. 3, 1993)	0.13 m ³ /sec (May. 3, 1993) 0.73 m ³ /sec (Jul.27, 1993)
Estimated discharge given in Project request sheet (Dry season)			0.30 m ³ /sec
(Rainy season)			
Estimated discharge in this study (Dry season (Feb.))	0.28 m ³ /sec	0.235 m ³ /sec	0.34 m ³ /sec
(Rainy season (Jun.))	0.47 m ³ /sec	1.565 m ³ /sec	1.361 m ³ /sec
Estimated flood discharge (1/10)	120 m ³ /sec	112 m ³ /sec	98 m ³ /sec
(1/50)	188 m ³ /sec	175 m ³ /sec	153 m ³ /sec
			Lele Khola 57 m ³ /sec Nallu Khola 64 m ³ /sec
			87 m ³ /sec 99 m ³ /sec

Note *: Command area of each scheme is nominal area registered on the list prepared by DIO.
Actual irrigation area of the selected model schemes shall be referred to the result of Phase-II Study.

Table 3-5 Annual Maintenance Budget for Government-Managed Irrigation Schemes in the Kathmandu Valley

Unit : NRs.1,000

Name of Irrigation Schemes	Fiscal Year					Remarks
	1985/86	1986/87	1987/88	1988/89	1989/90	
Kathmandu District						
AK-01 Balaju	33	40	95	50	-----	50
AK-02 Balambu	-	-	-	-	-----	-
AK-03 Balkhu	-	-	-	-	-----	-
AK-04 Biswambhara	80	100	160	200	-----	140
AK-05 Boshan	134	175	375	250	-----	100
AK-06 Budhanikantha	32	50	50	50	-----	65
AK-07 Chaitya Kulo	30	75	100	100	-----	20
AK-08 Dakshinkali	60	150	400	150	-----	90
AK-09 Dally Kulo	-	-	-	-	-----	-
AK-09 Dhulopuro	-	-	-	-	-----	-
AK-10 Gogai Indrayani Kulo	-	-	-	-	-----	-
AK-11 Ghatie Khola	-	-	-	-	-----	-
AK-12 Gokarna	148	200	100	150	-----	80
AK-13 Ichadol	44	50	75	150	-----	50
AK-14 Indrayani	110	150	180	200	-----	75
AK-15 Itakot	-	-	-	-	-----	-
AK-16 Kudali Kulo	-	5	5	5	-----	5
AK-17 Lamabagar	-	-	-	-	-----	-
AK-18 Lupang	-	-	-	-	-----	-
AK-19 Manamatti	-	-	-	-	-----	-
AK-20 Narayan Khola	-	-	-	-	-----	-
AK-21 Panchmane	-	-	-	-	-----	-
AK-22 Pashupati	50	50	50	60	-----	25
AK-23 Patichaur	-	-	-	-	-----	-
AK-24 Pharping Dhunge Dhara	44	50	55	100	-----	25
AK-25 Shali Nadi	-	-	-	-	-----	-
AK-26 Sundarijal	-	-	-	-	-----	-
AK-27 Tokha	25	40	55	50	-----	25
AK-28 Takucha Rajilulo	-	-	-	-	-----	-
Kathmandu District Total	790	1,135	1,700	1,515	-----	750
Bhaktapur District						
AB-01 Balakhu including for	90	150	190	300	-----	150
AB-02 Bidol	-	-	-	-	-----	-
AB-04 Dhunge Dhara	-	-	-	-	-----	-
AB-12 Kutudhal	-	-	-	-	-----	-
AB-03 Chakhu Khola	59	100	100	200	-----	50
AB-05 Dhungre Kulo	-	-	-	-	-----	-
AB-06 Doko and Triveni	-	-	-	-	-----	-
AB-07 Ghatie Kulo	-	-	-	-	-----	-
AB-08 Hanumante	38	100	50	125	-----	50
AB-09 Kathuraji Kulo	-	-	-	-	-----	-
AB-10 Katunje	25	50	75	125	-----	50
AB-11 Khasyan Khusung	-	-	-	-	-----	-
AB-13 Lapsetar	-	-	-	-	-----	-
AB-14 Mahadev Khola	90	150	190	300	-----	150
AB-15 Nala Kulo	-	-	-	-	-----	-
AB-16 Narayanthali	-	-	-	-	-----	-
AB-17 Nil Barahi	-	-	-	-	-----	-
AB-18 Sipadol Katunje	-	-	-	-	-----	-
AB-19 Surya Biyanak	-	-	-	-	-----	-
AB-20 Sweety (Shishaugari)	-	-	-	-	-----	-
AB-21 Thimi Manohara Kulo	-	-	-	-	-----	-
AB-22 Walarkhe Kulo	-	-	-	-	-----	-
AB-23 Yogdhara Kulo	-	-	-	-	-----	-
Bhaktapur District Total	302	550	605	1,050	-----	450
Lalitpur District						
AL-01 Apha Kulo	-	-	-	-	-----	-
AL-02 Bhorle	-	-	-	-	-----	-
AL-03 Champi	-	-	-	-	-----	-
AL-04 Giindi	-	-	-	-	-----	-
AL-05 Godawan	80	125	225	250	-----	70
AL-06 Ikudhal Kulo	-	-	-	-	-----	-
AL-07 Kamabhu Kulo	-	-	-	-	-----	-
AL-08 Khokana	-	-	-	-	-----	-
AL-09 Khurmi Khola	-	-	-	-	-----	-
AL-10 Kotkhu	144	100	150	200	-----	70
AL-11 Kumbheswar	-	-	-	-	-----	-
AL-12 Lele Kulo	-	-	-	-	-----	-
AL-13 Lubhu	129	150	40	125	-----	100
AL-14 Lukani Besi	-	-	-	-	-----	-
AL-15 Manikhet	-	-	-	-	-----	-
AL-16 Melfar	-	-	-	-	-----	-
AL-17 Pyutar	-	-	-	-	-----	-
AL-18 Saibu / Makal Kulo, Sara Kulo	-	-	-	-	-----	-
AL-19 Thika Hhairaw-I	163	150	280	40	-----	100
AL-20 Thika Hhairaw-II	170	350	325	100	-----	60
Lalitpur District Total	686	875	1,020	715	-----	400
Total in Kathmandu Valley	1,778	2,560	3,325	3,280	-----	1,600

Note : Data provided by the CRID. Data in FY 1989/90 are not available in CRID.

Table 3-6 Irrigation Schemes under Irrigation Sector Program (ISP)

No.	Name of Scheme	Command Area (ha.)	Subject Cost (Rs.)	Cost per ha. (Rs.)	Farmer's Contribution		EIRR (%)	Remarks JICA No.
					Cash (Rs.)	Labor (Rs.)		

List of Approved Project

Kathmandu District

IK-1	Balambu	50.0	1,229,750.00	24,595.00	29,182.88	129,817.12	20.00	AK-02
IK-2	Bhare	100.0	5,033,125.70	50,331.26	12,321.88	301,927.00	23.00	
IK-3	Chunnikhel	55.0	1,491,203.00	27,112.78	22,916.67	114,583.33	15.00	
IK-4	Dhulopuro	30.0	875,944.00	29,198.13	17,509.73	72,490.27	15.00	AK-09
IK-5	Dhungana Besi	80.0	2,363,148.28	29,539.35	41,337.00	171,255.00	29.00	
IK-6	Ghatte Khola I	25.0	213,155.00	8,526.20	10,658.00	42,631.00	38.00	AK-11
IK-7	Ghatte Khola II	20.0	1,129,040.00	56,452.00	10,285.71	61,714.29	14.00	AK-11
IK-8	Jantara Khola	30.0	1,234,275.00	41,142.50	12,342.00	74,056.00	19.00	
IK-9	Lamabagar	36.0	186,480.00	5,180.00	9,325.00	37,300.00	30.00	AK-17
IK-10	Narayan Khola	52.0	1,457,795.00	28,034.52	30,350.19	125,649.81	15.00	AK-20
IK-11	Pakhure Salle	52.0	292,684.94	5,628.56	51,219.00	212,965.00	20.00	
IK-12	Panchmane	21.0	200,172.00	9,532.00	10,009.00	40,035.00	47.00	AK-21
IK-13	Patchaur	50.0	1,374,000.00	27,480.00	29,182.88	120,817.12	15.00	AK-23
IK-14	Setidevi	32.0	929,775.00	29,055.47	16,271.00	67,408.00	30.00	
IK-15	Sundarijal Barchatar	150.0	5,308,800.00	35,392.00	92,404.00	384,888.00	22.00	
IK-16	Swet Brahi	100.0	2,229,800.00	22,298.00	58,365.75	241,634.24	21.00	
IK-17	Taudha Boshan	50.0	1,372,600.00	27,452.00	29,182.88	120,817.12	23.00	AK-05
IK-18	Thadokulo	80.0	2,328,640.00	29,108.00	46,692.61	193,307.39	30.00	
IK-19	Tokhel	30.0	884,730.00	29,491.00	17,509.73	72,490.27	25.00	

Bhaktapur District

IB-1	Amdol	12.5	218,000.00	17,440.00	5,045.00	27,250.00	33.00	
IB-2	Chankhu Khola	59.0	882,286.00	14,954.00	24,583.33	183,916.67	25.00	
IB-3	Dhumbu Khola	130.0	3,499,000.00	26,915.38	61,233.00	253,678.00	25.00	
IB-4	Dhusi Phat	32.0	989,000.00	30,906.25	17,308.00	71,703.00	24.00	
IB-5	Dobhan Khola	55.0	978,010.00	17,782.00	24,450.25	122,251.25	24.00	
IB-6	Doke Khola I	38.0	475,000.00	12,500.00	15,833.33	79,166.67	22.00	AB-06
IB-7	Doke Khola II	29.0	240,207.00	8,283.00	12,010.00	38,042.00	18.00	AB-06
IB-8	Ghatte Khola	30.0	394,920.00	13,164.00	12,500.00	63,500.00	26.00	
IB-9	Hernancha	50.0	1,081,250.00	21,625.00	29,182.88	120,817.12	18.00	
IB-10	Idol	18.0	114,984.00	6,388.00	5,750.00	22,998.00	7.00	
IB-11	Kasyan Khusing	40.0	524,320.00	13,108.00	16,666.67	83,333.33	34.00	AB-11
IB-12	Nanabu	78.0	670,020.00	8,590.00	33,501.00	13,400.40	35.00	
IB-13	Sirutar	55.0	1,404,000.00	25,527.27	24,570.00	101,790.30	28.00	
IB-14	Suiti Khola	23.0	140,461.00	6,107.00	7,008.00	28,091.00	17.00	
IB-15	Vigali Khola	36.0	1,409,000.00	39,138.89	24,658.00	102,139.00	30.00	

Lalitpur District

IL-1	Bugmati	63.0	624,834.00	9,918.00	31,241.00	124,963.00	7.00	
IL-2	Champpi	125.0	2,200,000.00	17,600.00	55,000.00	275,000.00	30.00	AL-03
IL-3	Majha Kulo	100.0	1,411,000.00	14,110.00	41,666.67	208,333.33	22.00	
IL-4	Makal Kulo	90.0	1,909,368.55	21,215.21	47,734.22	238,671.11	27.50	AL-18
IL-5	Moti Rajkulo I.P.	65.0	1,350,000.00	20,769.23	33,750.00	168,750.00	19.00	
IL-6	Mulpani I.P.	60.0	12,000,000.00	200,000.00	30,000.00	150,000.00	27.50	
IL-7	Phulingdhal	68.0	266,128.00	3,913.65	13,306.00	53,225.00	31.00	
IL-8	Sidhipur	150.0	1,899,900.00	12,666.00	62,500.00	312,500.00	23.00	
IL-9	Sirkha Dol	125.0	1,427,000.00	11,416.00	52,083.33	260,416.67	24.00	

List of Projects to be Appraised

Kathmandu District		Nil						
Bhaktapur District		Nil						
Lalitpur District								
IL-10	Bumadi	75.0	1,950,000.00	26,000.00	48,750.00	243,750.00	23.00	
IL-11	Harisiddhi	80.0	2,398,000.00	29,975.00	41,965.00	173,855.00	18.00	
IL-12	Khokana	250.0	3,500,000.00	14,000.00	87,300.00	437,500.00	31.00	AL-08
IL-13	Khyakdol I.P.	250.0	700,000.00	2,800.00	12,250.00	50,750.00	20.00	
IL-14	Nagdaha	30.0	895,000.00	29,833.33	15,662.50	64,887.50	21.50	
IL-15	Piple Dol	90.0	2,380,000.00	26,444.44	41,650.00	172,550.00	27.00	

Table 3-7 Summary Sheet of Inventory Survey

No.	Sub No.	Name of Scheme	Project Area (ha.)				Priority by DoI	Involvement by ISP	Remarks	Inventory Survey
			Informed	Rainy Season	Dry Season	Planned				
Kathmandu District										
AK-01	K-09	Balaju	60	25	20	----	----	Almost urbanized	Listed	
AK-02	K-20	Balambu	20	50	20	----	----	Approved	Listed	
AK-03	----	Balkhu	25	25	----	----	----	Almost urbanized, and too small	Listed	
AK-04	K-07	Biswambhara	200	80	32	125	1/6	----	Listed	
AK-05	K-3	Boshan	260	150	50	210	2/6	----	Listed	
AK-06	K-8	Budhanikantha	200	200	150	----	----	----	Listed	
AK-07	K-1	Dakshinkali	100	100	60	100	----	----	Listed	
AK-08	----	Dalu Kulo	10	----	----	----	----	Almost urbanized, and too small	Omitted	
AK-09	K-17	Dhulopuro	25	25	----	----	Approved	----	Listed	
AK-10	K-13	Gogal Indrayani Kulo	162	130	----	----	----	----	Listed	
AK-11	----	Ghate Khola	15	----	----	----	Approved	----	Omitted	
AK-12	K-6	Gokarna	375	75	60	----	6/6	----	Listed	
AK-13	K-5	Ichadol	70	35	30	----	----	----	Listed	
AK-14	K-11	Indrayani	145	100	73	140	4/6	----	Listed	
AK-15	----	Itakot	3	----	----	----	----	Not identified by DoI	Omitted	
AK-16	K-4	Kudali Kulo	10	----	----	----	----	Too small	Omitted	
AK-17	K-22	Lambagar	40	----	----	----	Implemented	----	Omitted	
AK-18	----	Lupang	5	----	----	----	----	Not identified by DoI	Omitted	
AK-19	K-19	Manamatti	6	----	----	----	----	Too small	Omitted	
AK-20	K-15	Naryan Khola	30	----	----	----	Implemented	----	Omitted	
AK-21	K-12	Panchmane	60	----	----	----	Approved	----	Omitted	
AK-22	----	Pashupati	75	----	----	----	----	Almost urbanized	Omitted	
AK-23	K-16	Patichaur	40	----	----	----	Approved	----	Omitted	
AK-24	K-2	Pharping Dhunge Dhara	339	74	60	----	----	----	Listed	
AK-25	K-14	Shali Nadi	600	150	100	300	3/6	----	Listed	
AK-26	K-18	Sundarjal	20	35	35	----	----	----	Listed	
AK-27	K-10	Tokha	200	100	80	150	5/6	----	Listed	
AK-28	----	Takucha Rajbulo	30	----	----	----	----	Almost urbanized	Omitted	
Bhaktapur District										
AB-01	B-05	Balaku	60	60	50	----	----	----	Listed	
AB-02	B-07	Bidol	65	100	60	60	----	----	Listed	
AB-03	B-04	Chakra Khola	100	60	60	----	----	----	Listed	
AB-04	B-10	Dhunge Dhara	520	210	120	210	2/4	----	Listed	
AB-05	----	Dhunge Kulo	28	----	----	----	Approved	----	Omitted	
AB-06	----	Doke and Triveni	180	----	----	----	Approved	----	Omitted	
AB-07	----	Ghate Kulo	350	190	290	----	----	----	Listed	
AB-08	B-08	Hanumante	100	150	150	----	----	----	Listed	
AB-09	----	Katuraji Kulo	400	----	----	----	----	Not identified by DoI	Omitted	
AB-10	B-02	Katunje	95	100	100	90	4/4	----	Listed	
AB-11	----	Khasyan Khusung	20	----	----	----	Approved	----	Omitted	
AB-12	B-09	Kutudhal	40	100	80	147	3/4	----	Listed	
AB-13	----	Lapsetar	60	60	----	----	----	----	Listed	
AB-14	B-01	Mahadev Khola	375	373	300	450	1/4	----	Listed	
AB-15	----	Nala Kulo	120	----	----	----	----	Outside Kathmandu Valley	Omitted	
AB-16	----	Naryanbali	30	----	----	----	----	Not identified by DoI	Omitted	
AB-17	B-11	Nil Barahi	60	60	40	----	----	----	Listed	
AB-18	B-03	Sipadol Katunje	100	100	40	----	----	Water shortage is anticipated in the future	Listed	
AB-19	----	Surya Biyanak	50	----	----	----	----	Fatal lack of irrigation water	Omitted	
AB-20	B-06	Sweete (Shishaugari)	23	23	23	----	----	----	Listed	
AB-21	----	Thimi Manohara Kulo	40	----	----	----	----	Not identified by DoI	Omitted	
AB-22	----	Walukhe Kulo	40	----	----	----	----	Not identified by DoI	Omitted	
AB-23	----	Yogdhara Kulo	400	----	----	----	----	Not identified by DoI	Omitted	
Lalitpur District										
AL-01	----	Aphar Kulo	250	----	----	----	----	Outside Kathmandu Valley	Omitted	
AL-02	L-06	Bhorle	50	150	150	----	Implemented	----	Listed	
AL-03	L-09	Champi	100	100	100	----	Implemented	----	Listed	
AL-04	----	Gimdi	20	----	----	----	----	Outside Kathmandu Valley	Omitted	
AL-05	L-03	Godawari	104	175	150	----	6/6	----	Listed	
AL-06	----	Ikudhal Kulo	120	----	----	----	----	Outside Kathmandu Valley	Omitted	
AL-07	----	Kamabbu Kulo	50	----	----	----	----	Outside Kathmandu Valley	Omitted	
AL-08	L-07	Khokana	300	150	150	250	5/6	----	Listed	
AL-09	----	Khurmi Khola	15	----	----	----	----	Outside Kathmandu Valley	Omitted	
AL-10	L-04	Kotkhu	100	240	150	445	4/6	----	Listed	
AL-11	----	Kumbheswar	50	----	----	----	----	Outside Kathmandu Valley	Omitted	
AL-12	----	Lete Kulo	25	----	----	----	----	Outside Kathmandu Valley	Omitted	
AL-13	L-05	Lubhu	600	115	75	165	3/6	----	Listed	
AL-14	----	Lukani Besi	10	----	----	----	----	Outside Kathmandu Valley	Omitted	
AL-15	----	Manikhet	40	----	----	----	----	Outside Kathmandu Valley	Omitted	
AL-16	----	Meljar	10	----	----	----	----	Outside Kathmandu Valley	Omitted	
AL-17	----	Fyutar	20	----	----	----	----	Outside Kathmandu Valley	Omitted	
AL-18	L-08	Saibu / Makal Kulo, Sara Kulo	50	90	125	----	Approved	----	Listed	
AL-19	L-01	Thika Bhairaw-I	400	500	500	600	1/6	----	Listed	
AL-20	L-02	Thika Bhairaw-II	300	200	150	400	2/6	----	Listed	

Table 3-8 Planted Area, Production, and Yield of Major Crop in the Study Area

Crops	Nepal (1991/92)			Kathmandu Valley (1991/92)			The Study Area			
	Planted Area (ha)	Production (ton)	Yield (ton/ha)	Planted Area (ha)	Production (ton)	Yield (ton/ha)	Planted Area (ha)	Production (ton)	Yield (ton/ha)	
<i>Paddy</i>	1,411,810	3,222,540	2.28	18,550	83,130	4.48	5,900	28,000	4.74	
<i>Wheat</i>	571,260	779,160	1.36	16,480	27,410	1.66	5,300	9,000	1.69	
<i>Maize</i>	754,090	1,204,710	1.60	11,890	30,090	2.53	3,800	7,900	2.08	
<i>other cereals*</i>	228,080	256,300	1.12	2,380	3,570	1.50	850	1,100	1.29	
<i>Potatoes</i>	85,300	732,860	8.59	2,040	21,000	10.29	650	7,200	11.12	
<i>Mustard</i>	154,570	87,840	0.57	550	320	0.58	200	130	0.65	
<i>Legumes</i>	261,860	154,540	0.59	510	310	0.61	350	200	0.57**	
<i>Vegetables***</i>	142,500	1,127,836	7.91	3,519	34,242	9.73	450	4,450	9.88	
							Total Planted Area:	17,500		

Remarks * : Including the Millet Barley etc.

** : Including such legumes as Black gram, Horse gram, Soybean etc.

*** : Including follow vegetables and spices;

Cauliflower, Radish, Cabbage, Broadleaf mustard, Tomato, Brinjal, Gourd, Sweet chilli, Cucumber, etc., and Ginger, Turmeric, Chilli, Garlic, etc.

Source : Agricultural Statistics in Nepal 1991/92

Sample Farm Survey by JICA Study Team 1993

Data from Each DADO office Horticulture Section

Table 3 - 10 Livestock Population in the Study Area

Livestocks	Nepal		CDR		Kathmandu Valley		The Study Area			Ave. Nos. / holding	
	Total Head	Average No. per Farm Household	Total Head	Average No. per Farm Household	Total Head	Average No. per Farm Household	Total Head	Average No. per Farm Household	No. of holding		
Cattle	6,245,682	8.3	1,470,824	7.5	81,942	0.8	26,820	0.7	26,820	41.1	1.8
Buffallo	3,058,341	4.1	775,987	4.0	31,706	0.3	11,950	0.3	11,950	16.8	2.0
Sheep	912,372	1.2	109,092	0.6	14,864	0.2	4,740	0.1	4,740	5.1	2.6
Goat	5,405,793	7.2	1,666,219	8.5	104,992	1.1	40,090	1.1	40,090	34.2	3.3
Pig	598,955	0.8	81,220	0.4	3,431	0.0	1,460	0.0	1,460	1.1	3.9
Poultry	13,496,245	17.9	5,517,166	28.3	1,096,171	11.3	291,270	8.1	291,270	34.2	23.8
Duck	389,542	0.5	125,566	0.6	9,994	0.1	3,790	0.1	3,790	1.6	6.4

Remarks * : Proportion of livestock holdings to total farm household
 Source : Agricultural Statistics 1991/1992
 National Sample Census of Agriculture , 1991/1992

Table 3 - 11 Livestock Production in the Study Area

Description	Nepal	CDR	Kathmandu Valley	The Study Area
Milk Production (unit : Mt)				
No. of Milk Cow (% of total head)	695,130 (11.1)	161,641 (11.0)	15,804 (19.3)	5,834 (21.8)
No. of Milk Buffalo (% of total head)	751,920 (24.6)	186,522 (24.0)	18,213 (57.4)	6,723 (56.3)
Cow Milk	259,230	74,353	10,975	4,051
Buffalo Milk	612,004	174,146	18,567	6,854
Milk Total	871,234	248,499	29,542	10,905
Meat Production (unit : Mt)				
Buffalo	96,013	34,160	8,056	2,974
Mutton	3,044	369	89	33
Goat	29,844	7,626	1,530	565
Pig	10,407	1,523	455	168
Chicken	9,119	4,250	1,986	733
Duck	268	86	4	1
Total	148,695	48,014	12,120	4,474
Egg Production (unit : '000' Nos)				
No. of Hen (% of total head)	4,187,282 (31.0)	1,780,224 (32.3)	529,467 (48.3)	195,438 (67.1)
No. of Duck (% of total head)	202,352 (51.9)	66,107 (52.6)	3,766 (37.7)	1,390 (36.7)
Hen Egg	352,983	166,003	62,600	23,107
Duck Egg	15,181	5,008	280	103
Egg Total	368,164	171,011	62,880	23,210
Wool Production (unit : kg)				
No. of Sheep	912,372	109,092	14,864	5,487
Wool Production	620,413	74,183	13,997	5,167

Source : Agricultural Statistics 1991/1992
 National Sample Census of Agriculture , 1991/1992

Table 3-12 Pond Area, Water Surface and Production Amount of Fish Culture

Region/Area	Nos. of Pond	Area of Pond (ha)	Area of Water Surface (ha)	Area of Paddy cum Fish Culture (ha)	Production Quantity (ton)	Yield (ton/ha)
Whole Nepal						
Total	16,562	8,381	4,746		9,125.0	1.92
Terai	15,691	8,230	4,630	97.56%	8,922.0	97.78% 1.93
Hill	858	149	115	2.42%	202.0	2.21% 1.76
Mountain	13	2	1	0.02%	1.0	0.01% 1.00
Central Development Region (CDR)						
Total	6,045.0	4,040.8	2,054.7		3,842.8	1.87
Terai	5,732.0	3,967.4	1,998.8	97.28%	3,753.0	97.66% 1.88
Hill	300.0	71.6	54.8	2.67%	88.3	2.30% 1.61
Mountain	13.0	1.8	1.1	0.05%	1.5	0.04% 1.33
Kathmandu Valley						
Total	135.0	35.1	25.0		33.2	1.33
Kathmandu	77.0	15.7	13.2	52.66%	21.0	63.25% 1.59
Lalitpur	57.0	17.7	10.5	41.86%	9.2	27.71% 0.88
Bhaktapur	1.0	1.7	1.4	5.48%	3.0	9.04% 2.19

Source : Unpublished Agricultural Statistics Data, MoA, 1991/92

Table 3-13 Annual Farm Budget of Average Size Farm Household

Average Size Farm			
Holding Land	: 0.282 ha	Cropping Intensity	172 %
Family Member	: 6		
Workable Member	: 3.5		
Main Crops	: Paddy, Wheat, Maize, Potatoes, and Vegetables		
Livestock	: Cattle 2, Buffalo 1, Goats 3, and Poultry 30		
		NRs.	Proportion
Gross Farm Income		11,482	
Production Cost		3,367	
Net Farm Income		8,115	23.0%
Other Farm Income (Livestock)		1,136	3.2%
Non Farm Income		26,084	73.8%
Total Household Income		35,335	100.0%
Living Expenses			
Food		19,924	57.3%
Clothing		3,865	11.1%
Housing		6,657	19.2%
Medicine		1,543	4.4%
Education		1,492	4.3%
Transport		297	0.9%
Social Expenses		969	2.8%
Total		34,747	100.0%
Saving/Reserve		588	

Table 3-14 Number of Extension Workers

Item	Lalitpur	Bhaktapur	Kathmandu	Total
Agricultural Service Center	6	6	7	19
Agricultural Service Sub-Center	11	-	7	18
Nos. of villages covered by a Center	7.0	3.6	9.6	6.8
Cultivated Area covered by a Center (ha)	1,937	1,074	897	3,908
Nos. of Extension Worker	52	31	60	143
Assistant Agri.. Development officer	8	-	-	8
Junior Technician	13	6	29	48
Junior Technical Assistant	31	25	31	87
Nos. of Village per worker	0.8	0.7	2	0.9
Nos. of Farm Families per worker	557	733	759	680
Average covering area per worker (ha)	190	208	226	209

Table 3-15 Activities of Extension Services in 1991/92

Item	Lalitpur	Bhaktapur	Kathmandu	Total
Number of Farmers Group	122	45	179	346
Member of Farmers Group	2,076	900	1,960	4,936
Number of 4-H Club	10	18	9	37
Member of 4-H Club	156	245	153	554
Training Course for Farmers				
1) Field Level				
Annual Training Courses	12	40	27	79
Attended farmers	500	800	400	1,700
2) District Level				
Annual Training Courses	16	7	3	26
Horticulture	4	3	-	7
Cereal Crops	12	4	3	19
Attended Farmers	340	175	75	590
3) Regional Level				
Dispatched Number of farmers	49	36	30	115

Table 3-16 Comparison of Actual Dosage and Recommendation in the Study Area

(Unit : kg/ha)

<i>Average Amount of Fertilizers Supplied by AIC</i>				Total	N	P	K	
		Nutrients content (N : P : K)		Consumption				
1.	Urea	(46 :	0 :	0)	197	91	0	0
2.	Complex	(20 :	20 :	0)	118	24	24	0
3.	Murate of Potash	(0 :	0 :	60)	1	0	0	1
4.	T.S.P	(0 :	48 :	0)	0	0	0	0
5.	D.A.P	(18 :	46 :	0)	2	0	1	0
6.	Anmonium Sulphate	(21 :	0 :	0)	35	7	0	0
Total					122	25	1	

<i>Actual Dosage and Recommendation to Major Crop</i>				Actual Dosage *1	Recommendation *2	Recommendation	
		(N : P : K)		(N : P : K)	(N : P : K)	(N : P : K)	
1.	Paddy	146	20	0	100	30	30
2.	Wheat	127	13	0	80	40	20
3.	Maize	106	11	0	120	75	50
4.	Potatoes	240	39	0	150	60	350
5.	Mustard	86	40	0	34	22	28
6.	Vegetables *3	117	69	0	100	60	50

Remarks *1 : Farm Survey by JICA Study Team , 1993
 *2 : Source : Trainer's manual, Manpower Development Agriculture Project, DoA.
 *3 : Average of cauliflower, tomato, and radish.

Table 3-17 Agricultural Credit and Condition

Unit : NRs.1,000 (%)

	1988/89		1989/90		1990/91		1991/92	
1. Disbursement								
a. Agri. production	3,112	(7.6%)	4,664	(8.0%)	3,973	(7.2%)	4,131	(5.0%)
b. Agri. tools & irrigation	796	(1.9%)	1,630	(2.8%)	1,336	(2.4%)	3,783	(4.6%)
c. Agri. business	13,271	(32.4%)	29,791	(51.2%)	23,408	(42.3%)	21,864	(26.3%)
d. Agri. industry & marketing	22,098	(54.0%)	19,601	(33.7%)	25,295	(45.7%)	52,669	(63.4%)
e. Bio-gass plant	581	(1.4%)	1,149	(2.0%)	222	(0.4%)	119	(0.1%)
f. Horticulture	126	(0.3%)	854	(1.5%)	1,142	(2.1%)	458	(0.6%)
g. Housing & land development	917	(2.2%)	474	(0.8%)	17	(0.0%)	-	-
Total	40,901	(100.0%)	58,163	(100.0%)	55,393	(100.0%)	83,024	(100.0%)
Annual Increase Rate	100.0%		42.2%		-4.8%		49.9%	
2. Repayment								
a. Agri. production	2,369	(6.5%)	3,389	(9.1%)	3,240	(7.9%)	5,694	(9.4%)
b. Agri. tools & irrigation	962	(2.6%)	1,248	(3.3%)	1,490	(3.6%)	2,255	(3.7%)
c. Agri. business	18,172	(50.0%)	16,381	(43.9%)	17,746	(43.2%)	22,146	(36.7%)
d. Agri. industry & marketing	14,563	(40.0%)	15,721	(42.1%)	18,063	(44.0%)	28,998	(48.1%)
e. Bio-gass plant	256	(0.7%)	438	(1.2%)	426	(1.0%)	389	(0.6%)
f. Horticulture	38	(0.1%)	125	(0.3%)	55	(0.1%)	193	(0.3%)
g. Housing & land development	15	(0.0%)	31	(0.1%)	22	(0.1%)	591	(1.0%)
Total	36,375	(100.0%)	37,333	(100.0%)	41,042	(100.0%)	60,266	(100.0%)
Annual Increase Rate	100.0%		2.6%		9.9%		46.8%	
3. Outstanding	139,624		162,630		175,779		211,055	
Total out standing index	100		116		126		151	
4. Number of borrower	-		6,070		6,068		7,952	

Sources : Agricultural Development Bank, Nepal

Table 3-18 Present Condition of Small Farmer Development Program in the Study Area

Unit : NRs.1,000

Description	Lalitpur	Bhaktapur	Kathmandu	Total
Number of Covered Village	8	3	4	15
Disbursement Amount	3,791	846	1,248	5,885
Repayment Amount	2,442	677	1,924	5,043
Outstanding (accumulated)	11,858	3,632	4,275	19,765

Sources : Agricultural Development Bank, Nepal

Table 3-19 Estimated Annual Consumption of Vegetables by Major Urban Population in the Study Area

Municipality	Population	Per capita Consumption *1		Total Annual Purchase	
		g/day	kg/yr	Total Annual Consumption tons	Amount *2 tons
Lalitpur	117,203	227	83	9,727	10,894
Bhaktapur	61,112	241	88	5,378	6,023
Kathmandu	414,264	260	95	39,335	44,055
Total	592,579	252	92	54,440	60,972

Source *1 : Department of Agriculture Development

Note *2 : Loss and waste rate is assumed 12%.

Table 3-20 Annual Total Handling Amount of Main Vegetable Markets

Unit : tons (%)

Market	Monthly Average	Annual Amount	Proportion of Handling Amount
Kalimati WM	2,421	29,052	46.8%
Ason	565	6,780	10.9%
Ranamukteshowar	599	7,188	11.6%
Mahaboudha/Bir Hospital	283	3,396	5.5%
Sasto Bazaar	466	5,592	9.0%
Mangal Bazaar	238	2,856	4.6%
Sukuldhoka	599	7,188	11.6%
Total	5,171	62,052	100.0%

Source : Marketing Development Division, DoAD

Table 3-21 Prices of Agriculture Input

		Unit : NRs./Unit					
Input	Unit	FY92/93			FY91/92		FY90/91
		Feb.'93	Jan.'93	Nov.'92	July'92	Aug.'91	
1. Fertilizer							
Urea (46:0:0)	Kg	5.60	5.14	5.14	5.71	5.14	4.07
Complex (20:20:0)	Kg	10.00	10.00	10.00	6.30	5.68	4.50
DAP (18:46:0)	Kg	12.50	12.50	11.00	8.36	7.52	6.32
A. Sulfate (21:0:0)	Kg	6.90	6.90	4.20	4.67	4.20	3.11
Potash (0:0:60)	Kg	8.50	8.50	6.00	3.21	2.90	2.32
TSP (0:46:0)	Kg	8.00	8.00	8.00	5.15	4.64	3.96
2. Crop Seed							
Paddy	Kg		16.70				
Wheat	Kg		12.00		12.05		9.55
Maize	Kg		14.70		14.70		11.00
3. Vegetables Seed							
Cauliflower	Kg		300.00				
Cabbage (late large)	Kg		150.00				
Cabbage (pride of India)	Kg		180.00				
Broccoli	Kg		150.00				
Cress	Kg		50.00				
Radish (ME-L)	Kg		55.00				
Radish (Tokinashi)	Kg		125.00				
Broad Leaf Mustard (MBL)	Kg		80.00				
Broad Leaf Mustard (KBL)	Kg		50.00				
Fenugreek (L)	Kg		30.00				
Fenugreek (I)	Kg		60.00				
Spinach	Kg		50.00				
Onion	Kg		25.00				
Bitter Gourd	Kg		150.00				
Cucumber	Kg		250.00				
4. Pesticide/Insecticide							
BHC Dust	Kg		6.00				
Hinosan	100 ml bottle		50.80				
Metacid	100 ml bottle		59.95				

Table 3-22 Inventory of Post-harvest Facilities

Item	Unit : Nos.			
	Lalitpur	Bhaktapur	Kathmandu	Total
1. Rice Mills	37	72	55	164
a. Rice only	8	34	52	94
b. Dual purpose	4	20	3	27
2. Beaten Rice Mill	4	9	2	15
3. Flour Mill	6	7	5	18
4. Spice Mill	6	5	14	25
5. Feed Mill	2	10	13	25
6. Oilseed Mill	9	4	3	16
7. Agri-based Factory	24	9	41	74

Note : Number is only registered one in Department of Industry since 1990/90 - 1992/93.

Capacity of rice mill is estimated about 500 tons per year on an average.

Source: Department of Cottage and Small Industries, Ministry of Industry.

**Table 3-23 Inventory of Large Scale Agri-based Industry
In the Kathmandu Valley (1992/93)**

Number of Company	Main Products	Amount of Products	Raw Material Total	Unit : ton		
				From K. Valley	From Other Districts	Imported
1	Poultry Feeds	2,012	2,188	755	1,025	408
	Cattle Feeds	60				
2	Wheat Flour	8,200	9,700		9,700	
	Wheat Bran	2,500				
3	Biscuits	1,955	2,190	1,721	437	32
4	Butter	16				
	Milk	912	957		946	11
5	Biscuits	69	82		75	7
6	Beer	8,000	10,387	60	2	10,325
7	Instant Noodle	1,329				
8	Snacks	66	1,671	41	1,063	567
9	Cattle & Poultry Feeds	7,088	7,768	2,011	5,297	460
Total		32,207	34,943	4,588	18,545	11,810
%			100.0	13.1	53.1	33.8