Mahendrakot VDCs, and so far disbursed Rs.190,000, consisting of Rs.15,000 for special crops and Rs.175,000 for livestock.

D.3.7 Farmers' Organization

The Cooperative Society (Sajha) is a government guided farmers' organization supplying credit and farm inputs to the farmers. After reorganization of DOC in 1992, DOC became the supervising agency to support organizing the cooperatives and to monitor the cooperatives' activities. Financing to the cooperative societies is given by ADB/N and farm input supply to them is supported by AIC.

In the study area, two cooperative societies are functioning under the District Cooperative Union in Taulihawa and their offices are located in Gorusinghe and Dhankauli. The main activity of these societies is the sale of farm inputs to member farmers. In addition, there is a dairy cooperative in Basantapur Village to collect milk from the farmers. The beneficiary farmers under the Ranikudwa farmers' irrigation system have organized a Water Users' Association (WUA) for the management, operation and maintenance of the system.

(1) Arniko Cooperative Society

The Arniko Cooperative Society office is located in Gorusinge in Jayanagar VDC near the East-West Highway. This society was established in 1985. The working areas of the society are Buddi, Barkalpur, Dubiya, Mahendrakot and Jayanagar VDCs. It has an adhoc working committee which consists of following members:

VDCs	Shareholder
Mahendrakot	193
Buddi	251
Dubiya	109
Barkalpur	367
Jayanagar	134
Total	1,054

Source : Arniko Cooperative Society office, Gorusinge

The total number of shareholders is 1,054. Only 11 members are female. Initially, the society had a fund of Rs.360,300 in total and has disbursed by Rs.163,000 in loans, but 33% of the disbursement has not been repaid. The cooperative has 1 Kathha land in Gorsuinge and 5 Kathha in Pattharkot, and has been managed by 135 representatives elected from five VDCs, each of which has 27 representatives comprising 3 of each of nine wards. The cooperative has been operated by the working committee, of which the assignment term is 2 years. The working committee members are elected from the shareholders every two years.

Although there is no form to be filled in when the farmers apply for the membership of the society, persons pay Rs.10 for the membership fee and Rs.2 for the entrance fee which is a proof of being a shareholder. Then, names are registered officially in the office register book.

The cooperative society does not have its own building, and thereby pays Rs.800 per month for the rent of the office. At present, the society requires one mill, one warehouse and one tractor. The tractor will be used for collecting grain, the mill for processing grains, and the warehouse for storing farm inputs such as fertilizers, agri-chemicals, etc. The facilities will help to use manpower efficiently. Access to these facilities has therefore be assured for the farmers' convenience. At present, ADB/N has stopped issuing loans through the cooperative society because about 70 % of the total loan has been outstanding.

(2) Janasewa Cooperative Society

The Janasewa Cooperative Society office is placed in a rented private house located in Dhankauli VDC, south of the study area. The society was established in 1976 and their services cover 4 VDCs. The number of shareholders is shown below:

VDCs	Shareholder
Dhankauli	926
Rajipur	495
Mahuwa	841
Hariharpur	565
Total	2,827

Source : Janasewa Cooperative Society office, Dhankauli

The society is proposed to strengthen and support the cooperative activities. As the transport facility is so poor as a fair-weather road of 8 km exists between the office and the East-West Highway, the farmers face great difficulty in transporting farm inputs and products in the rainy season. One warehouse and one milling facility are required for the society.

(3) Water Users' Group

For the management, operation and maintenance of the Ranikudwa Irrigation System which commands an area of about 600 ha in 12 villages (mouja), the farmers themselves have organized an informal organization of Water Users' Group (WUGs). In each unit (mouja), there exists one elected canal chief (Badaghar) and one secretary (Sachiv). Under them, a Chaukidar is employed to supervise the canal line throughout a day. The Canal Chief of the Patharkot village, being on the head reach of the Ranikudwa Farmers' Irrigation System, is the Chairman of Mahendrakot VDC and also the Chairman of the entire system. The Secretary keeps all the records of the labor contribution from each household in his village. When a family refuses the labor contribution for the maintenance work against the request of the chairman, a penalty is imposed to the household. WUGs have no fixed venue and meeting schedule, the meeting is held as and when necessary. The scheduled meeting is once every three years, and is held along with a religious ceremony.

D.4 BASIC CONCEPT FOR AGRICULTURAL DEVELOPMENT

D.4.1 Agricultural Constraints

The arable lands of the project area are mostly paddy fields. Wheat, pulses and mustard in winter and maize in spring are grown to some extent. Although the different water resources such as the Gudrung river and the Ghorahi drain, irrigation ponds, springs, etc. have been used for the irrigation, the present irrigation areas are very limited due to the primitive and inefficient.irrigation systems. A major part of the project area relies on uncertain rainfall for the cultivation, resulting in very low yield for each crop.

Major constraints of irrigated agriculture development are as follows:

(i) Inefficiency of the existing irrigation systems and variation in precipitation from year to year have been affecting the cropping area as well as crop yield.

(ii) Due to insufficient supply of farm inputs such as improved seeds, fertilizers, pesticides, etc. and improper extension services, the present crop yields are low.

(iii) Modern irrigated farming and cultivation techniques have not yet been introduced because of improper extension services.

(iv) No additional land can be reclaimed for cultivation, hence, there is no possibility of increasing production by expanding the average landholding of 1.0 ha (including 0.97 ha for paddy field), even to the district average of 1.5 ha.

D.4.2 Basic Concept for Development

The main objective of the project is to eradicate poverty and to correct the imbalance of the rural and urban economy, which is also the policy adopted by HMG/N, by increasing farmers' income through a stable increase in agricultural production. The efficient use of the rainwater and the discharge of the Gudrung river.is essential to attain the objective. The basic development concepts of the project are set as follows:

(i) Increase of unit yield and production of summer paddy by the construction of new irrigation facilities and introduction of modern irrigated farming techniques;

(ii) Increase of agricultural production by extending cropping area in winter and spring seasons through the year round irrigation;

(iii) Enlargement of irrigation area by the available water of the Gudrung and Kondre rivers, ponds, natural drains, etc.;

(iv) Provision of a simple irrigation system for easy O&M and water management, and for equitable distribution of irrigation water so as to maintain a balance in production within the project area;

(v) Provision of a drainage system to assure ideal growing conditions for paddy, wheat and other crops by improving poor drainage in the paddy fields;

(vi) Establishment of the proper water management and O&M by involving the beneficiary farmers right from the planning stage by organizing a Water Users' Association;

(vii) Improvement of village roads to facilitate easy and smooth transportation of agriculture inputs and farm products. This will also improve the socio-economic condition of the project area; and

(viii) Reorganization of the existing Water Users' Association and Cooperatives and improvement of agricultural support services such as input supply, extension services and credit facilities through the coordination of the agencies.concerned

D.5 AGRICULTURAL DEVELOPMENT PLAN

D.5.1 General

The main feature of the proposed project is to construct the irrgation system commanding about 1,800 ha of farmlands including about 600 ha of the existing Ranikudwa irrigation area and to improve the agricultural support services in order to increase the agricultural production and upgrade the farmers' living standard by efficiently utilizing the available water of the Gudrung river. The facilities required for the project therefore include a headworks, headrace canal, primary and secondary feeder canals, irrigation ponds, main and secondary irrigation canals, drainage canals, farm roads, facilities for farmers' organizations and agricultural support services.

The project area is a considerably matured area, which has a fixed crop rotation system for the agricultural production under the partial or non-irrigation condition. The agricultural production and farmers' economy are rather stable despite of the low levels, and thereby no significant improvement will be made unless an irrigation project is implemented. Because the production techniques such as introduction of new varieties, efficient use of fertilizers, prevention of pests and diseases as well as water management will be not realized under the rainfed condition.

Therefore, the agricultural economy of the project area will be much improved by the implementation of the proposed irrigation project. Although the agricultural productivity in the project area may gradually increase in the future without implementing the project, such increase will be few and thereby disregarded in the project evaluation.

D.5.2 Change in Landuse

The provision of irrigation water and introduction of improved technology by the project will not basically cause the change of the landuse pattern, but will raise the cropping intensity.

As almost all the farmland to be covered by the project are the existing paddy fields, no significant change in the type of crops to be planted will occur even in the future, and paddy will remain as the main crop in the rainy season. With the completion of the Rajkudwa Irrigation project, all the paddy fields in the project area will be fully irrigated and more intensive use of the farmland will be realized.

The different scenarios of landuse under the with and without project conditions can be compared as follows:

(Unit: ha)

Description	Without Project	With Project	Increment
Gross project area	2,000	2,000	-
Irrigation/drainage canals and farm roads and field borders	160	200	40
Paddy fields	1,840	1,800	-40
Net irrigation area	850	1,800	950

Ref. : Table D.5.1

On the other hand, the landuse in the surroundings which are not incorporated in the project area will remain unchanged because of the rainfed culture.

D.5.3 Proposed Cropping Pattern

The following basic principles are adopted to determine the crops and cropping pattern for the project:

(i) Higher benefit for farmers;
(ii) Optimum utilization of irrigation water;
(iii) Practical farming for family labor; and
(iv) Crops and cropping pattern acceptable to farmers.

Rice is the most prevailing crop in the project area and acceptable to farmers. Farmers have long experience in rice cultivation and will therefore easily master the irrigated rice cultivation to realize higher production and thereby large irrigation benefits under the project. Wheat, oilseeds and vegetables (potato, tomato, pulses, okra, red pepper, cauliflower, etc.) are also important for home consumption at present. In the future project condition, such crops remain unchanged because of the climatic condition, soil condition, available water, socio-economic condition, etc. in the project area.

In order to achieve the prospective goals, an agricultural development strategy is set to increase agricultural production by raising the unit yields and expanding the irrigated lands, taking into account the following:

(i) To maximize the cultivation area of paddy during the rainy season by the supply of reliable irrigation water taken from Gudrung river;

(ii) To extend the cultivation area of winter crops such as wheat, oilseeds (mustard) and vegetables during the dry season by the efficient use of the limited river water in the dry season; and

(iii) To extend the cultivation area of spring crops such as vegetables by available water.

Since the discharge of the Gudrung river decrease sharply in the dry season rainfall due to small rainfall, the cropping areas of winter and spring crops in the dry season are considerably limited. Based on the water requirement for different crops and the water balance study as described in Chapter 4.2.3, the maximum irrigable area in the different season is estimated as follows:

Water Resources	Net Irrigation Area	Total Cropping Area	Summer Crops	Winter Crops	Spring Crops
a) Gudrung River :	1,800 ha	3,030 ha	1,800 ha	1,130 ha	100 ha

Note : Gudrung river includes ponds

In order to study the optimum cropping pattern, the following five alternatives were carefully examined from the view points of the climatic condition, agronomic requirement for farming practices and seasonal water availability:

	Cropping Intensity	Summer Crops	Winter Crops	Spring Crops
Pattern A :	300 %	100 %	100 %	100 %
Pattern B :	250 %	100 %	100 %	50 %
Pattern C :	209 %	100 %	100 %	9 %
Pattern D :	182 %	100 %	75 %	7 %
Pattern E :	168 %	100 %	63 %	5 %

For the determination of the optimum pattern, the comparative study of the above alternatives was carried out, paying attention to the profitability, labor requirement and water requirement for each alternative. The profitability of each pattern, calculated by net production value per ha per annum is shown in Table D.5.2. The results of the comparative studies are summarized as follows:

Alternative	Cropping Intensity (%)	Profitability (Rp./ha)	Labor Requirement (man-day/ha)	Water Requirement ($10^3 m^3$/ha)
Pattern A	300	99,615	475.8	8.8
Pattern B	250	80,343	372.8	7.6
Pattern C	209	64,494	288.0	6.7
Pattern D	182	56,676	252.7	5.9
Pattern E	168	52,696	234.7	5.4

Pattern A is the most profitable, and followed by pattern B, pattern C and pattern D in order.

The unit profitability per MD of labor and per m^3 of irrigation water are calculated for each alternative pattern as shown below:

Alternative	Unit Profitability	
	Labor (Rp./man-day)	Water (Rp./m^3 of water)
Pattern A	209.4	11,379
Pattern B	215.5	10,545
Pattern C	223.9	9,644
Pattern D	224.3	9,661
Pattern E	224.5	9,671

Pattern E will create the largest economic returns from labor to be spent for farming works under the project, while pattern A will create the largest economic returns from irrigation water to be supplied by the project.

The annual net production values for each alternative pattern are also calculated on the basis of the maximum areas to be irrigated under the respective alternatives. Pattern E will bring about the largest production value as shown below:

Alternative	Unit Production Value (10^3 Rp./ha)	Maximum Adaptable Area (ha)	Annual Net Production Value (10^3 Rp.)
Pattern A	136.9	100	13,690
Pattern B	110.1	200	22,020
Pattern C	99.4	1,000	99,400
Pattern D	76.8	1,500	115,490
Pattern E	71.4	1,800	128,530

Patterns A and B are not attractive because of small beneficiary area and production value. In the light of the basic principles for the future cropping pattern, pattern E is the most applicable to the project. The proposed cropping patterns under the without and with project conditions are illustrated in Figure. D.5.1.

D.5.4 Proposed Farming Practices

Introduction and extension of appropriate irrigation farming practices are essential to realize full exploitation of the agricultural potential in the project area. The proposed farming practices for the proposed cropping pattern (Pattern E) are summarized as follows:

(1) Paddy

Land preparation should be initiated with occurrence of the first rains. Land should be cultivated to the desirable depth by ploughing the land 3 to 4 times using improved primary and secondary tillage implements such as mould board plows, disc plows, tine cultivators, harrows, and puddlers drawn by draft animals. A basal dose of fertilizers , i.e., a half amount of nitrogen and full amount of phosphate and potash should be applied to the fields at the time of puddling. A second dose of nitrogen should be applied as top dressing after transplanting. The proposed per ha quantity of fertilizers is 120 kg, consisting of 60 kg of N, 30 kg of P and 30 kg of K. The application of biofertilizers such as sesbania or azolla as green manures at the time of land preparation will greatly help farmers in fertilizer economy, and at the same time boost crop yields. Paddy fields should be well puddled with sufficient water and finally levelled by the

levelling board or plank drawn by draft animals. The levelled paddy fields should be enclosed by water tight - leaves or bunds to hold and consume irrigation water in each field. .

Transplanting, which is a common practice in the Terai plain, should be carried out after puddling. Seedlings should be uprooted from the nursery without injuring or breaking leaves and roots. Seedlings, 21-25 days old in the case of early maturing varieties and 30 - 35 days old in the case of late maturing varieties should be transplanted at a rate of 2 - 3 seedlings per hill, a density of 20 - 25 hills per m^2, and at spaces of 15 cm x 20 cm.

Weeding should be performed two to three times according to weed growth. Manual weeding is better than herbicide use. A depth of about 5 - 6 cm of water should be maintained up to the dough stage of the crop. Timely control of insect-pests and diseases should also be ensured by using pesticides recommended by the extension agents or technicians concerned.

Application of insecticides and fungicides will be inevitable if the plants are severely attacked by insects and diseases. Resistant varieties should be used to reduce the outbreak of insects and diseases. The plant protection work should be systematically and widely carried out by each tertiary unit in collaboration with the farmers' cooperative. Individual protection is not recommended because insects and diseases extend urgently and widely.

Harvesting should be carried out when the ears are nearly ripe and the straw is still slightly green. Paddy is to be harvested by manual labor, using a sickle, dried in the field for 3 or 4 days, stacked in the threshing yard for a week or so and then threshed using either a bullock or a mechanical thresher.

(2) Wheat

Wheat is one of the crops which well respond to irrigation and farm inputs under the irrigation condition. The old wheat varieties such as RR21 and UP262, which are still popular in the project area, should be replaced by new high yielding varieties such as Nepal 297, H.D.1982 and B.L.1022, recommended by the Buddi Agricultural Service Center for the project area. Farmers in the project area are expecting to extend the wheat cultivation area under the irrigation. .

Land should be prepared by ploughing 3 - 4 times as same as land preparation for paddy fields. A basal dose of fertilizers should be given to the field at the time of land preparation at a rate of a half amount of nitrogen and full amount of phosphate and potash. A fertilizer dose of 150 kg/ha (N: 80 kg, P: 40 kg, K: 30 kg) is recommended.

The optimum time of sowing is in the middle of November. There are some short term varieties which can be planted in the first week of December after the harvest of the late

maturing paddies and keep reasonable yields. However, in the case of wheat planted either very early or very late, remarkable yield reductions have been observed.

The pre-sowing irrigation will be necessary in the case that the fields have insufficient moisture content in the soils for the sowing. In general, three or four times of irrigation at the critical growith stagees such as crown root initiation, maximum tillering, heading, and dough stage are recommended to increase the unit yield to the target.

The remaining half amount of nitrogen is applied at the time of first irrigation, which is useally supplied at the crown root initiation stage in 21 to 25 days after sowing.

Wheat should be harvested when it reaches physiological maturity, indicating the yellowishness of the peduncle. The harvesting should be carried out by manpower, using sickles, and then the harvested wheat would be carried to the threshing yard and threshed after a few days of drying.

(3) Oilseeds (mustard)

Mustard is a remunerative crop under irrigated condition. Nepalese people consume mainly mustard oil for cooking and hence are required to import whenever necessary. Improved varieties such as Type 9 and Bikas, which have an average yield potential of 1.0 to 1.5 t/ha, are available. Mustard should be sown at the optimum time in November, since timely sowing is a prerequisite for higher yields. Mustard may suffer seriously from a special parasite known as orobanche and other varieties of pests and diseases if improved resistant varieties are not used and sowing is not carried out in optimum time. Mustard well responds to a fertilizer dose of 60: 40: 20 kg of N: P: K/ha under the irrigated condition. As mustard is a cross-pollinated crop, certain isolations in time and space should be maintained to harvest genuine seeds for the next season.

Land is prepared by ploughing 3 - 4 times to a desired depth by using improved primary and secondary tillage implements available in the area. Soeing should be done on continuous solid rows at intervals of 30 - 40 cm, and followed by thinning at the 3 - 4 leaf stage. Plant protection should be carried out against pests (aphids) and diseases (rust, mildews and alternaria) in consultation with the extension agents, if the damage is broken out. The matured plants should be harvested when the siliqua turn yellow before the pods start shattering, dried for some days in a threshing yard and then threshed by sticks or bullocks.

(4) Vegetables

Potato, radish, leaf mustard, cauliflower, cabbage, onion and garlic are proposed for winter vegetable, while tomato, okra and water melon are recommended as spring vegetables. Potato has been commercially grown in the northern part of the project area. Okra (lady's finger) is one of the most profitable crops in the spring season. Regarding potato, improved varieties such as Kufri, Badshah, Dejire and C.I.P. 720088 should be used to get higher yield and production, and land should be prepared by ploughing and levelling 4 - 5 times. Vegetables well respond to a fertilizer dose of

60: 50: 40 kg of N: P: K /ha under the irrigated condition. Irrigation should be applied at an interval of 10 - 15 days in case that there is no rainfall. Sufficient water in furrows after earthling up is needed for the potato growing. Weeding should be done by hoeing at least 3 times during the growing period to control the weeds.

D.5.5 Anticipated Crop Yield and Crop Production

After construction of the project facilities, the crop yields would gradually increase from the present level to the target level and stabilize in the fifth year after the completion of the project facilities. The anticipated crop yields are set at 4.5 tons/ha of dried paddy, 3.0 tons/ha of wheat, 2.5 tons/ha of maize, 1.0 tons/ha of pluses and 1.2 tons/ha of oilseeds under the "with project" condition. These unit yields were estimated from the present crop yield of crops under full irrigation condition in the Terai plain and they are rather conservative in comparison with those in the data for the past 10 years (1983 to 1992) obtained from the District Agricultural Development Office (DADO).

The target unit yields of the proposed crops under the "with project" and the "without project" conditions are compared as follows:

(Unit : tons/ha)

Crops		Without Project	With Project	Increment
Paddy	: partially irrigated	2.20	4.50	2.30
	non-irrigated	1.42	4.50	3.08
Wheat	: partially irrigated	1.70	3.00	1.30
	non-irrigated	0.98	3.00	2.02
Maize	: partially irrigated	1.72		
	non-irrigated	1.33		
Pulses	: partially irrigated	0.66		
	non-irrigated	0.56		
Oilseeds	: partially irrigated	0.71	1.20	0.49
	non-irrigated	0.46	1.20	0.74
Vegetables	: partially irrigated	3.85	12.0	8.15

To achieve the target yields, optimum application of farm inputs is required as well as effective water management. The target unit yields will be attained in the fifth year after the completion of the project facilities, particularly the irrigation and drainage facilities.

Total agricultural production in the project area under the with and without project conditions is estimated by multiplying the target unit yield and cultivation area of the proposed crops as follows:

Crops		Without Project P.I.	N.I.	Total	With Project F.I.	Increment
Paddy	: P.A (ha)	840	850	1,690	1,800	110
	Prod. (tons)	1,840	1,210	3,050	8,100	5,050
Wheat	: P.A (ha)	310	110	420	680	260
	Prod. (tons)	520	110	630	2,040	1,410
Maize	: P.A (ha)	25		25		-25
	Prod. (tons)	40		40		-40
Pluses	: P.A (ha)	80	190	270		-270
	Prod. (tons)	50	110	160		-160
Oilseeds	: P.A (ha)	80	30	110	225	115
	Prod. (tons)	60	10	70	270	200
Vegetables	: P.A (ha)	50		50	325	275
: Prod. (tons)		190		190	3,900	3,710

Note : P.I. : Partially Irrigation, N.I. : Non-irrigation, F.I.: Full irrigation
P.A : Planted Area, Prod. : Production (Ref. : Table D.5.4)

Annual incremental production of paddy, wheat, mustard and vegetables at the full development stage is expected to be 5,050 tons, 1,410 tons, 200 tons and 3,710 tons, respectively as tabulated above.

D.6 IMPROVEMENT PLAN FOR AGRICULTURAL SUPPORT SERVICES

D.6.1 Reinforcement of Agricultural Support Services

After the completion of the project facilities, it is essential to increase the agricultural productivity as well as production to the proposed target level by improving the input situation, providing proper extension services, providing necessary credit facilities and strengthening farmers' organizations, including cooperatives for the proper marketing facilities.

However, the existing situation of the above-mentioned services and facilities are not very encouraging and need a lot of improvement and intervention. Regarding the supply of farm inputs, a cooperative dealer is functioning at Gorusinge in the project area, but the farmers can seldom buy the inputs in time and in necessary quantity. Instead of getting them in credit, they have often to pay in advance and wait for the inputs to be delivered.

Only one agriculture service center, located at Buddi, exists in the project area, but its service for the extension works is minimal since it has to cover quite a large area compared to its staff.

There is no branch office of ADB/N in the project area to provide credit facilities for the agricultural development. Only a minor part of the total farm households has access to a branch office of the bank located at Taulihawa, the district headquarters. Necessity of undergoing a complicated procedure for the loan sanctioning including mortgaging, which is difficult for the small farmers, is another problem in the credit supply.

Two cooperatives, each located at Gorsinge, and Kaudalihya in Dhankauli VDC are functioning for the project area, but, their services are not effective. Their services, in input supply, providing market facilities, etc. are minimal. Besides, the cooperatives are also facing the problem of lack of facilities compared to the command area.

Taking the future agricultural development into consideration, the following improvements in farmers' organization and agricultural support services were suggested during a series of discussions with farmers, village chiefs and representatives of district agencies:

(1) Strengthening of the extension services in the northern part of the project area by establishing a special demonstration cum seed multiplication farm, of which operation and management will be carried out by the farmers' association under the technical guidance and supervision of agricultural extension technicians of the Buddi Agricultural Service Center:

(2) Establishment of a farmers' association center, consisting of a farmers' cooperative office, a water users' association office and a sub-branch office of ADB/N, in the centre of the project area (along the East - West Highway). The reason why the center is required is to bring all the agencies concerned in proper coordination;

(3) Extension of the cooperative activities and construction of godowns (100 MT capacity each) for the buffer stock of farm inputs and products in each VDC; and

(4) Establishment of rice mill(s) for easy access to the farmers of Dhankauli, Mahuwa, Rajpur and Hariharpur VDCs where transportation is difficult.

Therefore, the reinforcement of the agricultural support services and organization of farmers' association are proposed to achieve the target of the crop yield and production. The proposed facilities plan is as follows:

(a) Farmers' Association Center :		One (1) (site area 3,000 m^2)	
- Farmers' Cooperative Office ;		Cooperative society office	16 m^2
		Water users' association office	16 m^2
		Credit service office	16 m^2
		Meeting room	75 m^2
- Processing Building :		Warehouse	200 m^2
		Drying floor	1,000 m^2
(b) VDC Cooperative Office	:	Five (5) (each site area 500 m^2)	
- VDC Cooperative Office		Cooperative cum WUA office	40 m^2
		Meeting room	50 m^2
- Godown		Godown	160 m^2

D.6.2 Strengthening of Farmers' Organization

Before the implementation of the project, existing two cooperative societies (Aniko and Janasewa) should be re-organized into a Rajkudwa Farmers' Association (RFA), besides the VDC (village) cooperative should be established in each of five (5) VDCs as an effective grass root level organization which promotes the proposed agricultural development. These cooperatives will be operated by their own management under the supervision of RFA. The members of such farmer's cooperatives should also be the members of the water users' association for the better coordination and efficient management of the two organizations.

The main objective of the cooperative is to enable the farmers to receive better agricultural support services from the deferent agencies which were conspicuously absent in the past. The first activity of the cooperative is to organize target groups such as cooperative sub-groups at ward level and water users' groups at tertiary irrigation block level by motivating and creating awareness of the farmers through an individual and group approach and to assist them in providing various services available for the agricultural development. Therefore, a group organizer should be assigned by group to assess the basic needs of the farmers and to assist them in preparing their farming plan and budget and maintaining the proper accounting of the group.

For the strengthening of the existing cooperatives, the following recommendation shall be taken up by the member farmers:

(1) RFA and VDC cooperatives should be organized for purposes of timely procurement of farm inputs by establishing better relationship among the cooperatives, AIC and ADB/N and timely distribution of them to the members. The warehouse and godowns are therefore required for temporary storage of the farm inputs before selling them to the members;

(2) RFA and VDC cooperatives should be adequately staffed and also provided with transport facilities to facilitate access to the member farmers for purposes of distribution of farm inputs and collection of farm products;

(3) RFA and VDC cooperativs should have market channels to smoothly sell farm products harvested by the member farmers. For this purpose RFA's warehouse and drying or processing facilities and VDC cooperative's godown should be constructed for the temporal storage of the products; and

(4) VDC cooperatives should train their staff for business management, inventory, store handling and book keeping.

D.6.3 Integrated Improvement Plan for Agricultural Support Services

The following integrated improvement plan, of which details are shown in Fig. D.3 and D.4., is proposed to further strengthen the agricultural support services:

(1) Block Production Programme

The Block Production Programme should be handled by DADO, Taulihawa to provide the farmers with the support services by production block. The programme includes:

(a) to motivate the farmers for their participation to the cropping based on the proposed cropping pattern;
(b) to assist farmers in filling credit application forms in line with their farming plan;
(c) to arrange timely supply of credits, inputs and technology for farmers;
(d) to guide farmers for post-harvest activities;
(e) to train farmers about the improved farming practices by production block; and
(f) to supervise the farmers' farming activities by production block .

In connection with the above programme, it is recommended to reinforce the organization and staffing of the existing ASC at Buddi as well as to establish a sub-center or branch of Buddi ASC in the northern part of the project area.

(2) Strengthening of Credit Service

ADB/N at Taulihawa is sole organization to provide the farmers in the project area with agricultural credit. Although the Nepal Bank Ltd. at Pattharkot which is also providing

agricultural credit, its disbursement is limited to the priority sectors. ADB/N usually provides the farmers with agriculture credit through cooperative societies. For the sustainable agriculture in the project area, it is essential to harmonize the improved technology, input supply and credit. It is therefore recommended to establish a sub-branch of ADB/N in the project area during the implementation of the project in order to provide the farmers with easy access to the credit facility.

(3) Establishment of Model Farm

Individual farmers in the project area have few experience on the modernized irrigation farming and systematic irrigation water management, though they are acquainted with paddy cultivation under the rainfed condition. Therefore, the farmers' training on the irrigated paddy cultivation and water management is essential for the success and sustainability of the proposed farming in the project area. For this purpose, it is recommended to establish a model cum demonstration farm in the project area.

The model farm, of which size may be 30 ha of one tertiary block, should be set up at the early stage of the project implementation. The major training activities in the model farm will be as follows:

(a) setting-up of a farmers' group and/ or water users' group;
(b) demonstration of the improved farming practices for the irrigated farming;
(c) farmers' training on the water management, and operation and maintenance practices, particularly at the on-farm level; and
(d) encouragement of the farmers who are still hesitating changes from their traditional farming to modernized one, including use of new variety seeds, fertilizers and agro-chemicals.

In addition to the above, the proposed cropping pattern will be practised by farmers in the model farm. In the practce, the farmers will be technically guided by an extension worker of Buddi ASC so as to use the recommended varieties' seeds, fertilizers and agro-chemicals, which will be supplied by AIC through a newly established cooperative. New practical technologies developed in the Agricultural Research Station will also be demonstrated by the leader farmers in the model farm.

(4) Integrated Implementation Plan

For successful implementation of the agricultural development proposed for the project, an integrated approach by the agencies concerned will be proposed, and the integrated plan to be implemented step-wisely will include the following programmes;

(a) Improvemet of Farming Practices
- Field trail and demonstration of the improved farming by NARC
- Seed multiplication by NARC
- Demonstration of the irrigated farming practices by NARC and DADO
- Promotion of the block production programme by NARC and DADO

(b) Supporting Programme for Agricultural Extension
- Competition of the on-farm production by DADO
- Execution of a minikit programme by DADO
- Arrangement of the farmers' field visits and tours by DADO
- Production and management competition by DADO

(c) Farmers' Training Programme
- Preparation of the farmers' training programme by CATC and DADO
- Guidance on the organization of the farmers' groups and training of the farmers' groups by CATC, DADO and DIO
- Leader farmers' training at agriculture service center level by DADO and DIO
- Farmers' group training at field level by DADO and DIO

(d) Strengthening of Farmers' Organization
- Organization of sub-unit cooperatives at ward level by DADO
- Construction of the farmers' association center with processing facilities by DIO and DADO
- Construction of VDC cooperative offices by DIO and DADO

(e) Improvement of Marketing System
- Preparation of marketing programme by DADO and NFA
- Establishment of local markets (haat basar) by DADO and ADB
- Arrangement of proper marketing channels by DADO
- Organization of a marketing cooperative for collecting, treating, storing, packing and selling of farm products by DADO, AIC and NFA

TABLES

Table D.2.1 PRESENT FARMLAND CONDITION BY VDCS IN THE STUDY AREA

(Unit : ha)

Description	Cropping Type	Name of Village Development Commitee (VDC) Mahendrakot	Dubiya	Janagar	Buddhi	Rajpur	Mahuwa	Dhankauli	Total Area
A. Irrigated Paddy Field									
1. Ranikudwa	A-1	25							25
Irrigation	A-2	160	45	20	20				245
System	A-3	95	25	10	10				140
	A-4	120	30	10	20				180
	Sub-total	400	100	40	50	0	0	0	590
2. Buddhi Pond	A-2				110				110
Irrigation	A-3				15				15
System	A-4				15				15
	Sub-total	0	0	0	140	0	0	0	140
3. Other Ponds	A-3		15		10				25
Irrigation	A-4		15		20				35
System	Sub-total	0	30	0	30	0	0	0	60
4. Ghorai Drain	A-2		5	5	10				20
Irrigation	A-3		5	5	5				15
System	A-4		10	10	5				25
	Sub-total	0	20	20	20	0	0	0	60
5. Jasbariya Dam	A-3					130			130
Irrigation	A-4					170			170
System	Sub-total	0	0	0	0	300	0	0	300
6. Banganga	A-1						5	10	15
Pumping	A-2						35	70	105
Irrigation	A-3						5	10	15
System	A-4						5	10	15
	Sub-total	0	0	0	0	0	50	100	150
	Total	400	150	60	240	300	50	100	1,300
B. Non-irrigated Paddy Field									
	B-1	30	70	170	60	150	190	270	940
	B-2	80	150	400	150	350	450	610	2,190
	Sub-total	110	220	570	210	500	640	880	3,130
C. Upland									
	C	0	30	40	0	20	40	0	130
	Sub-total	0	30	40	0	20	40	0	130
Total Cropping Area by Cropping Type	A-1	25	0	0	0	0	5	10	40
	A-2	160	50	25	140	0	35	70	480
	A-3	95	45	15	40	130	5	10	340
	A-4	120	55	20	60	170	5	10	440
	B-1	30	70	170	60	150	190	270	940
	B-2	80	150	400	150	350	450	610	2,190
	C	0	30	40	0	20	40	0	130
Total		510	400	670	450	820	730	980	4,560

Note : Cropping types are estimated based on the farm survey by the F/S team.

(Unit : %)

Cropping Type	A-1	A-2	A-3	A-4	B-1	B-2	C
Paddy	100.0	100.0	100.0	95.5	95.0	82.6	
Wheat	75.0	60.0	45.0		40.0		
Maize	100.0						69.2
Oilseeds	25.0	12.5	14.0		10.0		
Plues		10.4	20.0		25.0	17.5	25.0
Vegetables		16.5					
Cropping Intensity	300.0	199.4	179.0	95.5	170.0	100.1	94.2

Table D.2.2 CROPPING AREA AND CROP INTENSITY IN THE STUDY AREA

Name of VDC / Crops	Irrigated Paddy Field					Non-Irrigated Paddy Field			Upland	Total	Cropping
	A-1	A-2	A-3	A-4	Sub-total	B-1	B-2	Sub-total	C	Area	Intensity (%)
1. MAHENDRAKOT	25.0	160.0	95.0	120.0	400.0	30.0	80.0	110.0	0.0	510.0	
Paddy	25.0	160.0	95.0	114.6	394.6	28.5	66.1	94.6		489.2	95.9%
Wheat	18.8	96.0	42.8		157.5	12.0		12.0		169.5	33.2%
Maize	25.0				25.0					25.0	4.9%
Oilseeds	6.3	20.0	13.3		39.6	3.0		3.0		42.6	8.3%
Pluses		16.6	19.0		35.6	7.5	14.0	21.5		57.1	11.2%
Vegetables		26.4			26.4					26.4	5.2%
Cropping Area	75.0	319.0	170.1	114.6	678.7	51.0	80.1	131.1		809.8	158.8%
2. DUBIYA	0.0	50.0	45.0	55.0	150.0	70.0	150.0	220.0	30.0	400.0	
Paddy		50.0	45.0	52.5	147.5	66.5	123.9	190.4		337.9	84.5%
Wheat		30.0	20.3		50.3	28.0		28.0		78.3	19.6%
Maize									20.8	20.8	5.2%
Oilseeds		6.3	6.3		12.6	7.0		7.0		19.6	4.9%
Pluses		5.2	9.0		14.2	17.5	26.3	43.8	7.5	65.5	16.4%
Vegetables		8.3			8.3					8.3	2.1%
Cropping Area		99.7	80.6	52.5	232.8	119.0	150.2	269.2	28.3	530.2	132.5%
3. JAYANAGAR	0.0	25.0	15.0	20.0	60.0	170.0	400.0	570.0	40.0	670.0	
Paddy		25.0	15.0	19.1	59.1	161.5	330.4	491.9		551.0	82.2%
Wheat		15.0	6.8		21.8	68.0		68.0		89.8	13.4%
Maize									27.7	27.7	4.1%
Oilseeds		3.1	2.1		5.2	17.0		17.0		22.2	3.3%
Pluses		2.6	3.0		5.6	42.5	70.0	112.5	10.0	128.1	19.1%
Vegetables		4.1			4.1					4.1	0.6%
Cropping Area		49.9	26.9	19.1	95.8	289.0	400.4	689.4	37.7	822.9	122.8%
4. BUDDHI	0.0	140.0	40.0	60.0	240.0	60.0	150.0	210.0	0.0	450.0	
Paddy		140.0	40.0	57.3	237.3	57.0	123.9	180.9		418.2	92.9%
Wheat		84.0	18.0		102.0	24.0		24.0		126.0	28.0%
Maize											
Oilseeds		17.5	5.6		23.1	6.0		6.0		29.1	6.5%
Pluses		14.6	8.0		22.6	15.0	26.3	41.3		63.8	14.2%
Vegetables		23.1			23.1					23.1	5.1%
Cropping Area		279.2	71.6	57.3	408.1	102.0	150.2	252.2		660.2	146.7%
5. RAJPUR	0.0	0.0	130.0	170.0	300.0	150.0	350.0	500.0	20.0	820.0	
Paddy			130.0	162.4	292.4	142.5	289.1	431.6		724.0	88.3%
Wheat			58.5		58.5	60.0		60.0		118.5	14.5%
Maize									13.8	13.8	1.7%
Oilseeds			18.2		18.2	15.0		15.0		33.2	4.0%
Pluses			26.0		26.0	37.5	61.3	98.8	5.0	129.8	15.8%
Vegetables											0.0%
Cropping Area			232.7	162.4	395.1	255.0	350.4	605.4	18.8	1,019.2	124.3%
6. MAHUWA	5.0	35.0	5.0	5.0	50.0	190.0	450.0	640.0	40.0	730.0	
Paddy	5.0	35.0	5.0	4.8	49.8	180.5	371.7	552.2		602.0	82.5%
Wheat	3.8	21.0	2.3		27.0	76.0		76.0		103.0	14.1%
Maize	5.0				5.0				27.7	32.7	4.5%
Oilseeds	1.3	4.4	0.7		6.3	19.0		19.0		25.3	3.5%
Pluses		3.6	1.0		4.6	47.5	78.8	126.3	10.0	140.9	19.3%
Vegetables		5.8			5.8					5.8	0.8%
Cropping Area	15.0	69.8	9.0	4.8	98.5	323.0	450.5	773.5	37.7	909.6	124.6%
7. DHANKAULI	10.0	70.0	10.0	10.0	100.0	270.0	610.0	880.0	0.0	980.0	
Paddy	10.0	70.0	10.0	9.6	99.6	256.5	503.9	760.4		859.9	87.7%
Wheat	7.5	42.0	4.5		54.0	108.0		108.0		162.0	16.5%
Maize	10.0	0.0			10.0					10.0	1.0%
Oilseeds	2.5	8.8	1.4		12.7	27.0		27.0		39.7	4.0%
Pluses	0.0	7.3	2.0		9.3	67.5	106.8	174.3		183.5	18.7%
Vegetables	0.0	11.6			11.6					11.6	1.2%
Cropping Area	30.0	139.6	17.9	9.6	197.0	459.0	610.6	1,069.6		1,266.6	129.2%
Total Cropping Area	40.0	480.0	340.0	440.0	1,300.0	940.0	2,190.0	3,130.0	130.0	4,560.0	
Paddy	40.0	480.0	340.0	420.2	1,280.2	893.0	1,808.9	2,701.9		3,982.1	87.3%
Wheat	30.0	288.0	153.0		471.0	376.0		376.0		847.0	18.6%
Maize	40.0				40.0				90.0	130.0	2.9%
Oilseeds	10.0	60.0	47.6		117.6	94.0		94.0		211.6	4.6%
Pluses		49.9	68.0		117.9	235.0	383.3	618.3	32.5	768.7	16.9%
Vegetables		79.2			79.2					79.2	1.7%
Total Cropping Area	120.0	957.1	608.6	420.2	2,105.9	1,598.0	2,192.2	3,790.2	122.5	6,018.6	132.0%

Note : Cropping Patterns are estimated based on the farm survey by F/S team. (ref. ; Table D.1)

Crops/ Cropping Pattern	A-1	A-2	A-3	A-4	B-1	B-2	C
Paddy	100.0	100.0	100.0	95.5	95.0	82.6	
Wheat	75.0	60.0	45.0		40.0		
Maize	100.0						69.2
Oilseeds	25.0	12.5	14.0		10.0		
Pluses		10.4	20.0		25.0	17.5	25.0
Vegetable		16.5					
Crop Intensity (%)	300.0	199.4	179.0	95.5	170.0	100.1	94.2

Table D.2.3 PRESENT FARM INPUTS AND LABOR REQUIREMENT

Items		Unit per ha	Paddy P.I.	Paddy N.I.	Wheat P.I.	Wheat N.I.	Maize P.I.	Maize N.I.	Oilseeds P.I.	Oilseeds N.I.	Pulses P.I.	Pulses N.I.	Vegetable P.I.
A. Farm Inputs													
1. Seeds		(Kg)	60	65	126	130	25	25	12	14	35	40	500
2. FYM/ Compost		(tons)	0.9	0.9	0.9	0.6	0.9	0.6	0.2	0.2	0.0	0.0	1.0
3. Fertilizer													
- N		(Kg)	0	0	0	0	0	0	0	0	0	0	0
- P2O2		(Kg)	0	0	0	0	0	0	0	0	0	0	0
- K2O		(Kg)	0	0	0	0	0	0	0	0	0	0	0
4. Agro-chemicals		(lit)	0	0	0	0	0	0	0	0	0	0	0
B. Labor													
1. Land Preparation	Male	(man-day)	15	13	12	10	12	10	12	10	12	10	25
	Female	(man-day)	5	3	2	2	2	2	2	2	2	2	5
		Sub-total	20	16	14	12	14	12	14	12	14	12	30
2. Nursery/ sowing	Male	(man-day)	10	8	0	0	0	0	0	0	0	0	2
	Female	(man-day)	2	2	0	0	0	0	0	0	0	0	0
		Sub-total	12	10	0	0	0	0	0	0	0	0	2
3. Transplanting	Male	(man-day)	15	15	12	12	12	12	12	12	12	12	30
/Sowing	Female	(man-day)	10	10	5	5	5	5	5	5	5	5	15
		Sub-total	25	25	17	17	17	17	17	17	17	17	45
4. Fertilizer Application	Male	(man-day)	4	4	2	2	2	2	2	2	0	0	0
	Female	(man-day)	2	1	0	0	0	0	0	0	0	0	0
		Sub-total	6	5	2	2	2	2	2	2	0	0	0
5. Weeding	Male	(man-day)	15	15	12	12	12	12	10	10	10	10	15
	Female	(man-day)	10	10	5	5	5	5	4	4	4	4	10
		Sub-total	25	25	17	17	17	17	14	14	14	14	25
6. Water Management	Male	(man-day)	2	0	1	0	1	0	1	0	1	0	3
	Female	(man-day)	0	0	0	0	0	0	0	0	0	0	0
		Sub-total	2	0	1	0	1	0	1	0	1	0	3
7. Harvesting	Male	(man-day)	18	15	18	16	15	13	10	8	15	13	35
	Female	(man-day)	8	5	8	6	5	4	5	3	5	3	25
		Sub-total	26	20	26	22	20	17	15	11	20	16	60
8. Threshing, others	Male	(man-day)	12	12	12	10	18	16	15	13	15	13	13
	Female	(man-day)	5	5	5	5	4	4	5	3	5	3	8
		Sub-total	17	17	17	15	22	20	20	16	20	16	21
Total	Male	(man-day)	91	82	69	62	72	65	62	55	65	58	123
	Female	(man-day)	42	36	25	23	21	20	21	17	21	17	63
			133	118	94	85	93	85	83	72	86	75	186
C. Draft Animals		(pair/day)	38	38	30	30	30	30	25	25	25	25	40

Source : Farm survey, 1992 by the JICA Team

Note : P.I. ; Partially irrigated field, N.I. ; Non-irrigated field

Table D.2.4 PLANTED AREA, PRODUCTION AND UNIT YIELD IN KAPILVASTU DISTRICT

Crops / Year		1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	10 Years Average
1. PADDY												
Planted Area	(ha)	76,870	79,220	73,280	76,980	61,580	71,150	71,020	71,000	70,710	65,240	71,705
Production	(tons)	99,990	127,120	125,780	138,560	75,280	135,300	140,450	142,000	171,600	97,860	125,394
Unit Yield	(ton/ha)	1.30	1.60	1.72	1.80	1.22	1.90	1.98	2.00	2.43	1.50	1.75
2. WHEAT												
Planted Area	(ha)	23,120	22,760	20,480	20,500	26,780	26,580	20,100	22,090	21,680	15,870	21,996
Production	(tons)	34,680	29,590	24,570	28,700	37,450	32,430	30,150	34,240	33,600	21,840	30,725
Unit Yield	(t/ha)	1.50	1.30	1.20	1.40	1.40	1.22	1.50	1.55	1.55	1.38	1.40
3. MAIZE												
Planted Area	(ha)	360	2,500	750	660	800	970	550	450	870	900	881
Production	(tons)	600	7,220	1,210	1,420	1,400	1,360	970	800	1,860	1,710	1,855
Unit Yield	(ton/ha)	1.67	2.89	1.61	2.15	1.75	1.40	1.76	1.78	2.14	1.90	2.11
4. MILLET												
Planted Area	(ha)	540	790	370	300	350	100	100	120	120	120	291
Production	(tons)	490	720	370	300	320	90	90	130	130	140	278
Unit Yield	(ton/ha)	0.91	0.91	1.00	1.00	0.91	0.90	0.90	1.08	1.08	1.17	0.96
5. BARLEY												
Planted Area	(ha)	180	100	50	40	100	160	150	140	130	120	117
Production	(tons)	100	100	40	30	90	140	150	140	130	120	104
Unit Yield	(ton/ha)	0.56	1.00	0.80	0.75	0.90	0.88	1.00	1.00	1.00	1.00	0.89
6. OILSEEDS												
Planted Area	(ha)	1,600	1,840	2,000	2,200	2,310	2,200	2,000	2,200	2,320	2,050	2,072
Production	(tons)	800	1,080	1,170	1,030	1,260	1,100	1,200	1,530	1,570	1,230	1,197
Unit Yield	(ton/ha)	0.50	0.59	0.59	0.47	0.55	0.50	0.60	0.70	0.68	0.60	0.58
7. POTATO												
Planted Area	(ha)	300	220	320	350	330	300	350	360	480	410	342
Production	(tons)	1,800	1,320	1,860	1,300	2,010	1,900	3,280	3,600	4,720	4,420	2,621
Unit Yield	(ton/ha)	6.00	6.00	5.81	3.71	6.09	6.33	9.37	10.00	9.83	10.78	7.66
8. PULSES												
Planted Area	(ha)	-	-	10,620	11,150	11,480	9,130	7,900	9,080	9,680	9,370	7,841
Production	(tons)	-	-	7,280	7,690	8,100	4,920	4,340	5,400	6,080	5,670	4,948
Unit Yield	(ton/ha)	-	-	0.69	0.69	0.71	0.54	0.55	0.59	0.63	0.61	0.63
Total Planted Area (ha)		102,970 *	107,430 *	107,870	112,180	103,730	110,590	102,170	105,440	105,990	94,080	103,654

Source : Statistical Year Book of Nepal, 1991, CBS

*) ; Detailed data is not available.

Table D.2.5 ANNUAL CROP PRODUCTION IN THE STUDY AREA

Crops / Year		1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	Average
1. PADDY												
Partially Irrigated Field												
Planted Area	(ha)	1,285	1,300	1,282	1,290	1,230	1,300	1,287	1,287	1,283	1,256	1,280
Production	(ton)	2,429	2,730	2,795	2,877	2,263	2,990	3,037	3,050	3,413	2,550	2,813
Unit Yield	(ton/ha)	1.89	2.10	2.18	2.23	1.84	2.30	2.36	2.37	2.66	2.03	2.20
Non-irrigated Field												
Planted Area	(ha)	2,942	3,075	2,765	2,949	2,207	2,628	2,653	2,652	2,782	2,367	2,702
Production	(ton)	2,942	3,967	3,843	4,335	2,053	4,100	4,324	4,402	5,731	2,793	3,849
Unit Yield	(ton/ha)	1.00	1.29	1.39	1.47	0.93	1.56	1.63	1.66	2.06	1.18	1.42
Total												
Planted Area	(ha)	4,227	4,375	4,047	4,239	3,437	3,928	3,940	3,939	4,065	3,623	3,982
Production	(ton)	5,371	6,697	6,638	7,212	4,316	7,090	7,362	7,453	9,144	5,343	6,662
Unit Yield	(ton/ha)	1.27	1.53	1.64	1.70	1.26	1.80	1.87	1.89	2.25	1.47	1.67
2. WHEAT												
Partially Irrigated Field												
Planted Area	(ha)	483	480	455	455	522	521	450	472	467	405	471
Production	(ton)	942	696	660	678	778	729	878	1,029	1,018	608	801
Unit Yield	(ton/ha)	1.95	1.45	1.45	1.49	1.49	1.40	1.95	2.18	2.18	1.50	1.70
Non-irrigated Field												
Planted Area	(ha)	401	392	343	344	480	478	335	378	366	244	376
Production	(ton)	421	357	288	337	470	406	352	412	395	234	367
Unit Yield	(ton/ha)	1.05	0.91	0.84	0.98	0.98	0.85	1.05	1.09	1.08	0.96	0.98
Total												
Planted Area	(ha)	884	872	798	799	1,002	999	785	850	833	649	847
Production	(ton)	1,363	1,053	948	1,015	1,248	1,136	1,229	1,441	1,413	842	1,169
Unit Yield	(ton/ha)	1.54	1.21	1.19	1.27	1.25	1.14	1.57	1.70	1.70	1.30	1.38
3. MAIZE												
Partially Irrigated Field												
Planted Area	(ha)	38	44	38	42	42	39	38	36	40	38	40
Production	(ton)	61	101	59	81	66	57	60	58	73	65	68
Unit Yield	(ton/ha)	1.60	2.30	1.55	1.94	1.58	1.46	1.58	1.60	1.82	1.71	1.72
Non-irrigated Field												
Planted Area	(ha)	37	255	77	67	82	99	56	46	89	92	90
Production	(ton)	38	472	76	92	89	89	61	51	121	109	120
Unit Yield	(ton/ha)	1.03	1.85	0.99	1.37	1.09	0.90	1.09	1.10	1.36	1.19	1.33
Total												
Planted Area	(ha)	75	299	115	109	124	138	94	82	129	130	130
Production	(ton)	99	573	135	173	156	146	121	108	194	174	188
Unit Yield	(ton/ha)	1.32	1.92	1.18	1.59	1.26	1.06	1.29	1.32	1.50	1.34	1.45
4. OILSEEDS												
Partially Irrigated Field												
Planted Area	(ha)	83	70	116	103	125	110	119	146	149	150	117
Production	(ton)	56	50	84	67	88	74	87	114	115	110	84
Unit Yield	(ton/ha)	0.67	0.72	0.72	0.65	0.70	0.67	0.73	0.78	0.77	0.73	0.71
Non-irrigated Field												
Planted Area	(ha)	67	81	90	101	108	102	90	101	108	93	94
Production	(ton)	27	38	42	37	48	41	43	57	58	45	44
Unit Yield	(ton/ha)	0.40	0.47	0.47	0.37	0.44	0.40	0.48	0.56	0.54	0.48	0.46
Total												
Planted Area	(ha)	150	151	206	204	233	212	209	247	257	243	211
Production	(ton)	82	88	126	104	135	115	130	170	173	154	128
Unit Yield	(ton/ha)	0.55	0.59	0.61	0.51	0.58	0.54	0.62	0.69	0.67	0.63	0.61
5. PLUSES												
Partially Irrigated Field												
Planted Area	(ha)			127	134	138	110	95	110	116	113	118
Production	(ton)			99	106	113	54	48	65	77	69	79
Unit Yield	(ton/ha)			0.78	0.79	0.82	0.49	0.5	0.59	0.66	0.61	0.66
Non-irrigated Field												
Planted Area	(ha)			706	741	763	606	525	603	643	621	651
Production	(ton)			438	459	488	291	257	326	367	335	370
Unit Yield	(ton/ha)			0.62	0.62	0.64	0.48	0.49	0.54	0.57	0.54	0.56
Total												
Planted Area	(ha)			833	875	901	716	620	713	759	734	769
Production	(ton)			537	565	601	345	305	391	443	404	449
Unit Yield	(ton/ha)			0.64	0.65	0.67	0.48	0.49	0.55	0.58	0.55	0.58
6. VEGETABLES (Potato)												
Partially Irrigated Field												
Planted Area	(ha)			76	86	84	78	77	80	84	78	80
Tatal Planted Area	(ha)	5,336 *	5,697 *	6,075	6,312	5,781	6,071	5,725	5,911	6,127	5,457	6,019
Cropping Intensity	(%)			1.33	1.38	1.27	1.33	1.26	1.30	1.34	1.20	1.32

Remark : Figures are estimated based on data of District Agricultural Development Office and Buddhi Agriculture Service Center.

*) Pluses and vegetables detailed data are not available. (Ref. ; D.2)

Table D.5.1 ESTIMATION OF CROPPING AREA UNDER WITHOUT- AND WITH PROJECT

(Unit : ha)

Description	Cropping Area under Without Project Condition						Total Area	Cropping Area under With Project Condition	Increment
	Partially Irrigation				Non-irrigation				
	A-1	A-2	A-3	A-4	B-1	B-2		Full Irrigation	
A. Cropping Area by VDCs									
1. MAHENDRAKOT VDC	25	160	95	120	30	80	510	499	-11
Paddy	25	160	95	115	29	66	489	499	10
Wheat	19	96	43		12		170	189	19
Maize	25						25		-25
Oilseeds	6	20	13		3		43	62	20
Pluses		17	19		8	14	57		-57
Vegetables		26					26	90	64
Sub-total	75	319	170	115	51	80	810	840	30
Cropping Intensity							159%	168%	10%
2. DUBIYA VDC		50	45	55	10	20	180	176	-4
Paddy		50	45	53	10	17	174	176	3
Wheat		30	20		4		54	67	12
Maize									
Oilseeds		6	6		1		14	22	8
Pluses		5	9		3	4	20		-20
Vegetables		8					8	32	24
Sub-total		100	81	53	17	20	270	296	27
Cropping Intensity							150%	168%	18%
3. JAYANAGAR VDC		15	10	15	160	340	540	528	-12
Paddy		15	10	14	152	281	472	528	56
Wheat		9	5		64		78	200	122
Maize									
Oilseeds		2	1		16		19	66	47
Pluses		2	2		40	60	103		-103
Vegetables		2					2	95	93
Sub-total		30	18	14	272	340	674	889	215
Cropping Intensity							125%	168%	43%
4. BUDDHI VDC		80	30	40	30	80	260	254	-6
Paddy		80	30	38	29	66	243	254	12
Wheat		48	14		12		74	96	23
Maize									
Oilseeds		10	4		3		17	32	15
Pluses		8	6		8	14	36		-36
Vegetables		13					13	46	33
Sub-total		160	54	38	51	80	383	428	46
Cropping Intensity							147%	168%	21%
5. RAJPUR VDC			50	60	60	180	350	342	-8
Paddy			50	57	57	149	313	342	29
Wheat			23		24		47	129	83
Maize									
Oilseeds			7		6		13	43	30
Pluses			10		15	32	57		-57
Vegetables								62	62
Sub-total			90	57	102	180	429	576	147
Cropping Intensity							123%	168%	46%
B. Total Cropping Area	25	305	230	290	290	700	1,840	1,800	-40
Paddy	25	305	230	277	276	578	1,691	1,800	109
Wheat	19	183	104		116		421	680	259
Maize	25						25		-25
Oilseeds	6	38	32		29		106	225	119
Pluses		32	46		73	123	273		-273
Vegetables		50					50	325	275
Sub-total	75	608	412	277	493	701	2,566	3,030	465
Cropping Intensity							139%	168%	29%

Note : Cropping Intensity is estimated based on present condition. (Ref. D.2.)

Without Project	A-1	A-2	A-3	A-4	B-1	B-2	With Project	
Paddy	100.0	100.0	100.0	95.5	95.0	82.6	Paddy	100.0
Wheat	75.0	60.0	45.0		40.0		Wheat	37.8
Maize	100.0						Vegetables(W)	12.5
Oilseeds	25.0	12.5	14.0		10.0		Oilseeds	12.5
Plues		10.4	20.0		25.0	17.5	Vegetables(S)	5.6
Vegetables		16.5						
Cropping Intensity (%)	300.0	199.4	179.0	95.5	170.0	100.1		168.4

Table D.5.2 ALTENATIVE STUDY FOR PROPOSED CROPPING PATTERN

Items / Alternative Cropping Pattern	Pattern - A				Pattern - B				Pattern - C				Pattern - D				Pattern - E			
	Summer	Winter	Spring	Total	Summer	Winter	Spring	Total	Summer	Winter	Spring	Total	Summer	Winter	Spring	Total	Summer	Winter	Spring	Total
Total Cropped Area (ha)	100	100	100	300	200	200	100	500	1,130	1,130	100	2,360	1,500	1,130	100	2,730	1,800	1,130	100	3,030
Cropping Intensity (%)				300%				250%				209%				182%				168%
Gross Production Value																				
1. Paddy																				
Cropped Area (ha)	100			100	200			200	1,130			1,130	1,500			1,500	1,800			1,800
Unit Yield (t/ha)	4.5				4.5				4.5				4.5				4.5			
Production (tons)	450			450	900			900	5,085			5,085	6,750			6,750	8,100			8,100
Production Value (Rp.x,000)	4,347			4,347	8,694			8,694	49,121			49,121	65,205			65,205	78,246			78,246
Production Cost (Rp.x,000)	1,067			1,067	2,134			2,134	12,059			12,059	16,008			16,008	19,210			19,210
Total Net Income (Rp.)	3,280			3,280	6,560			6,560	37,062			37,062	49,197			49,197	59,036			59,036
Net Income per ha (Rp/ha)	32,798			32,798	32,798			32,798	32,798			32,798	32,798			32,798	32,798			32,798
2. Wheat																				
Cropped Area (ha)		60		60		120		120		680		680		680		680		680		680
Unit Yield (t/ha)		3.0				3.0				3.0				3.0				3.0		
Production (tons)		180		180		360		360		2,040		2,040		2,040		2,040		2,040		2,040
Production Value (Rp.x,000)		2,540		2,540		5,080		5,080		28,784		28,784		28,784		28,784		28,784		28,784
Production Cost (Rp.x,000)		686		686		1,371		1,371		7,769		7,769		7,769		7,769		7,769		7,769
Total Net Income (Rp.)		1,854		1,854		3,709		3,709		21,015		21,015		21,015		21,015		21,015		21,015
Net Income per ha (Rp/ha)		30,905		18,543		30,905		18,543		30,905		18,598		30,905		14,010		30,905		11,675
3. Oilseeds																				
Cropped Area (ha)		20		20		40		40		225		225		225		225		225		225
Unit Yield (t/ha)		1.2				1.2				1.2				1.2				1.2		
Production (tons)		24		24		48		48		270		270		270		270		270		270
Production Value (Rp.x,000)		358		358		716		716		4,026		4,026		4,026		4,026		4,026		4,026
Production Cost (Rp.x,000)		156		156		311		311		1,751		1,751		1,751		1,751		1,751		1,751
Total Net Income (Rp.)		202		202		404		404		2,275		2,275		2,275		2,275		2,275		2,275
Net Income per ha (Rp/ha)		10,111		2,022		10,111		2,022		10,111		2,013		10,111		1,517		10,111		1,264
4. Vegetables																				
Cropped Area (ha)		20	100	120		40	100	140		225	100	325		225	100	325		225	100	325
Unit Yield (t/ha)		12.0	12.0			12.0	12.0			12.0	12.0			12.0	12.0			12.0	12.0	
Production (tons)		240	1,200	1,440		480	1,200	1,680		2,700	1,200	3,900		2,700	1,200	3,900		2,700	1,200	3,900
Production Value (Rp.x,000)		1,075	5,376	6,451		2,150	5,376	7,526		12,096	5,376	17,472		12,096	5,376	17,472		12,096	5,376	17,472
Production Cost (Rp.x,000)		304	1,522	1,826		609	1,522	2,130		3,424	1,522	4,946		3,424	1,522	4,946		3,424	1,522	4,946
Total Net Income (Rp.)		771	3,854	4,625		1,542	3,854	5,396		8,672	3,854	12,526		8,672	3,854	12,526		8,672	3,854	12,526
Net Income per ha (Rp/ha)		38,543	38,543	46,252		38,543	38,543	26,980		38,543	38,543	11,085		38,543	38,543	8,351		38,543	38,543	6,959
Total Production Value																				
Total Cropping Area (ha)	100	100	100	300	200	200	100	500	1,130	1,130	100	2,360	1,500	1,130	100	2,730	1,800	1,130	100	3,030
Total Income (Rp. x,000)	3,280	2,827	3,854	9,961	6,560	5,655	3,854	16,069	37,062	31,963	3,854	72,879	49,197	31,963	3,854	85,014	59,036	31,963	3,854	94,853
Net Income per ha (Rp/ha)	32,798	28,274	38,543	99,615	32,798	28,274	38,543	80,343	32,798	28,285	38,543	64,494	32,798	28,285	38,543	56,676	32,798	28,285	38,543	52,696
(US$/ha)	656.0	565.5	770.9	1,992.3	656.0	565.5	770.9	1,606.9	656.0	565.7	770.9	1,289.9	656.0	565.7	770.9	1,133.5	656.0	565.7	770.9	1,053.9

Crops	Unit Price (Rp./kg)	Production Cost (Rp./ha)	Unit Labor Requirement (man-day/ha)	Unit Water Requirement (m3/ha)
Paddy	9.66	10,672	145	3,360
Wheat	14.11	11,425	109	3,660
Oilseed	14.91	7,781	91	2,270
Vegetables (w)	4.48	15,217	206	2,370
Vegetables (s)	4.48	15,217	206	5,860

Crops	Cropped Area (ha)	Total Labor Req. (man-days)	Total Water Req. (x,000 m3)	Cropped Area (ha)	Total Labor Req. (man-days)	Total Water Req. (x,000 m3)	Cropped Area (ha)	Total Labor Req. (man-days)	Total Water Req. (x,000 m3)	Cropped Area (ha)	Total Labor Req. (man-days)	Total Water Req. (x,000 m3)	Cropped Area (ha)	Total Labor Req. (man-days)	Total Water Req. (x,000 m3)
Paddy	100	14,500	336.0	200	29,000	672.0	1,130	163,850	3,796.8	1,500	217,500	5,040.0	1,800	261,000	6,048.0
Wheat	60	6,540	219.6	120	13,080	439.2	680	74,120	2,488.8	680	74,120	2,488.8	680	74,120	2,488.8
Oilseed	20	1,820	45.4	40	3,640	90.8	225	20,475	510.8	225	20,475	510.8	225	20,475	510.8
Vegetables (w)	20	4,120	47.4	40	8,240	94.8	225	46,350	533.3	225	46,350	533.3	225	46,350	533.3
Vegetables (s)	100	20,600	227.0	100	20,600	227.0	100	20,600	227.0	100	20,600	227.0	100	20,600	227.0
	300	47,580	875.4	500	74,560	1,523.8	2,360	325,395	7,556.6	2,730	379,045	8,799.8	3,030	422,545	9,807.8
		475.8	8.8		372.8	7.6		288.0	6.7		252.7	5.9		234.7	5.4
Unit Production Value (Rp / man-day or m3)		209.36	11,379		215.51	10,545		223.97	9,644		224.28	9,661		224.48	9,671

Table D.5.3 FARM INPUTS AND LABOR REQUIREMENT UNDER WITH- AND WITHOUT PROJECT CONDITION

Items		Unit per ha	Paddy W/P F.I.	Paddy Without Project P.I.	Paddy Without Project N.I.	Wheat W/P F.I.	Wheat Without Project P.I.	Wheat Without Project N.I.	Maize W/P F.I.	Maize Without Project P.I.	Maize Without Project N.I.	Oilseeds W/P F.I.	Oilseeds Without Project P.I.	Oilseeds Without Project N.I.	Pulses W/P F.I.	Pulses Without Project P.I.	Pulses Without Project N.I.	Vegetables W/P F.I.	Vegetables WO/P P.I.
A. Farm Inputs																				
1. Seeds		(Kg)	50	60	65	120	126	130	25	25	25	10	12	14	30	35	40	500	500
2. FYM/ Compost		(tons)	2.0	0.9	0.9	1.0	0.9	0.6	1.0	0.9	0.6	1.0	0.2	0.2	1.0	0.0	0.0	2.0	1.0
3. Fertilizer																			
- N		(Kg)	60	0	0	80	0	0	70	0	0	60	0	0	20	0	0	60	0
- P2O2		(Kg)	30	0	0	40	0	0	40	0	0	40	0	0	20	0	0	50	0
- K2O		(Kg)	30	0	0	30	0	0	30	0	0	20	0	0	20	0	0	40	0
4. Agro-chemicals		(lit.)	2	0	0	2	0	0	1	0	0	1	0	0	1	0	0	3	0
B. Labor																			
1. Land Preparation	Male	(man-day)	15	15	13	12	12	10	12	12	10	12	12	10	12	12	10	25	25
	Female	(man-day)	5	5	3	5	2	2	5	2	2	5	2	2	5	2	2	5	5
		Sub-total	20	20	16	17	14	12	17	14	12	17	14	12	17	14	12	30	30
2. Nursery/ Sowing	Male	(man-day)	10	10	8	0	0	0	0	0	0	0	0	0	0	0	0	2	2
	Female	(man-day)	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Sub-total	12	12	10	0	0	0	0	0	0	0	0	0	0	0	0	2	2
3. Transplanting	Male	(man-day)	15	15	15	12	12	12	12	12	12	12	12	12	12	12	12	30	30
/Sowing	Female	(man-day)	10	10	10	5	5	5	5	5	5	5	5	5	5	5	5	15	15
		Sub-total	25	25	25	17	17	17	17	17	17	17	17	17	17	17	17	45	45
4. Fertilizer Application	Male	(man-day)	5	4	4	4	2	2	5	2	2	5	2	2	5	0	0	5	0
	Female	(man-day)	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Sub-total	7	6	5	4	2	2	5	2	2	5	2	2	5	0	0	5	0
5. Weeding	Male	(man-day)	15	15	15	12	12	12	12	12	12	10	10	10	10	10	10	15	15
	Female	(man-day)	10	10	10	5	5	5	5	5	5	4	4	4	4	4	4	10	10
		Sub-total	25	25	25	17	17	17	17	17	17	14	14	14	14	14	14	25	25
6. Water Management	Male	(man-day)	5	2	0	3	1	0	3	1	0	3	1	0	3	1	0	4	3
	Female	(man-day)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Sub-total	5	2	0	3	1	0	3	1	0	3	1	0	3	1	0	4	3
7. Harvesting	Male	(man-day)	20	18	15	20	18	16	18	15	13	10	10	8	15	15	13	40	35
	Female	(man-day)	10	8	5	10	8	6	5	5	4	5	5	3	5	5	3	30	25
		Sub-total	30	26	20	30	26	22	23	20	17	15	15	11	20	20	16	70	60
8. Threshing, Others	Male	(man-day)	15	12	12	15	12	10	20	18	16	15	15	13	15	15	13	15	13
	Female	(man-day)	6	5	5	6	5	5	5	4	4	5	5	3	5	5	3	10	8
		Sub-total	21	17	17	21	17	15	25	22	20	20	20	16	20	20	16	25	21
Total	Male	(man-day)	100	91	82	78	69	62	82	72	65	67	62	55	72	65	58	136	123
	Female	(man-day)	45	42	36	31	25	23	25	21	20	24	21	17	24	21	17	70	63
			145	133	118	109	94	85	107	93	85	91	83	72	96	86	75	206	186
C. Draft Animals		(pair/day)	40	38	38	30	30	30	25	25	25	25	25	25	25	25	25	40	40

Source : Farm survey, 1992 by the JICA Team

Note : W/P ; With Project, WO/P ; Without Project, F.I. ; Full Irrigated field, P.I. ; Partially irrigated field, N.I. ; Non-irrigated field

Table D.5.4 CROP PRODUCTION UNDER WITHOUT- AND WITH-PROJECT

Description	Without Project Condition			With Project Condition	
	Partially Irrigation	Non Irrigation	Total	Full Irrigation	Increment
1. Paddy					
Cropping Area (ha)	837	854	1,691	1,800	109
Unit Yield (t/ha)	2.20	1.42		4.50	
Production (tons)	1,841	1,213	3,054	8,100	5,046
2. Wheat					
Cropping Area (ha)	306	116	422	680	258
Unit Yield (t/ha)	1.70	0.98		3.00	
Production (tons)	520	114	634	2,040	1,406
3. Maize					
Cropping Area (ha)	25		25		-25
Unit Yield (t/ha)	1.72				
Production (tons)	43		43		-43
4. Oilseeds					
Cropping Area (ha)	77	29	106	225	120
Unit Yield (t/ha)	0.71	0.46		1.20	
Production (tons)	54	13	68	270	202
5. Pluses					
Cropping Area (ha)	78	195	273		-273
Unit Yield (t/ha)	0.66	0.56			
Production (tons)	51	109	161		-161
6. Vegetables					
Cropping Area (ha)	50		50	325	275
Unit Yield (t/ha)	3.85			12.00	
Production (tons)	193		193	3,900	3,708

FIGURES

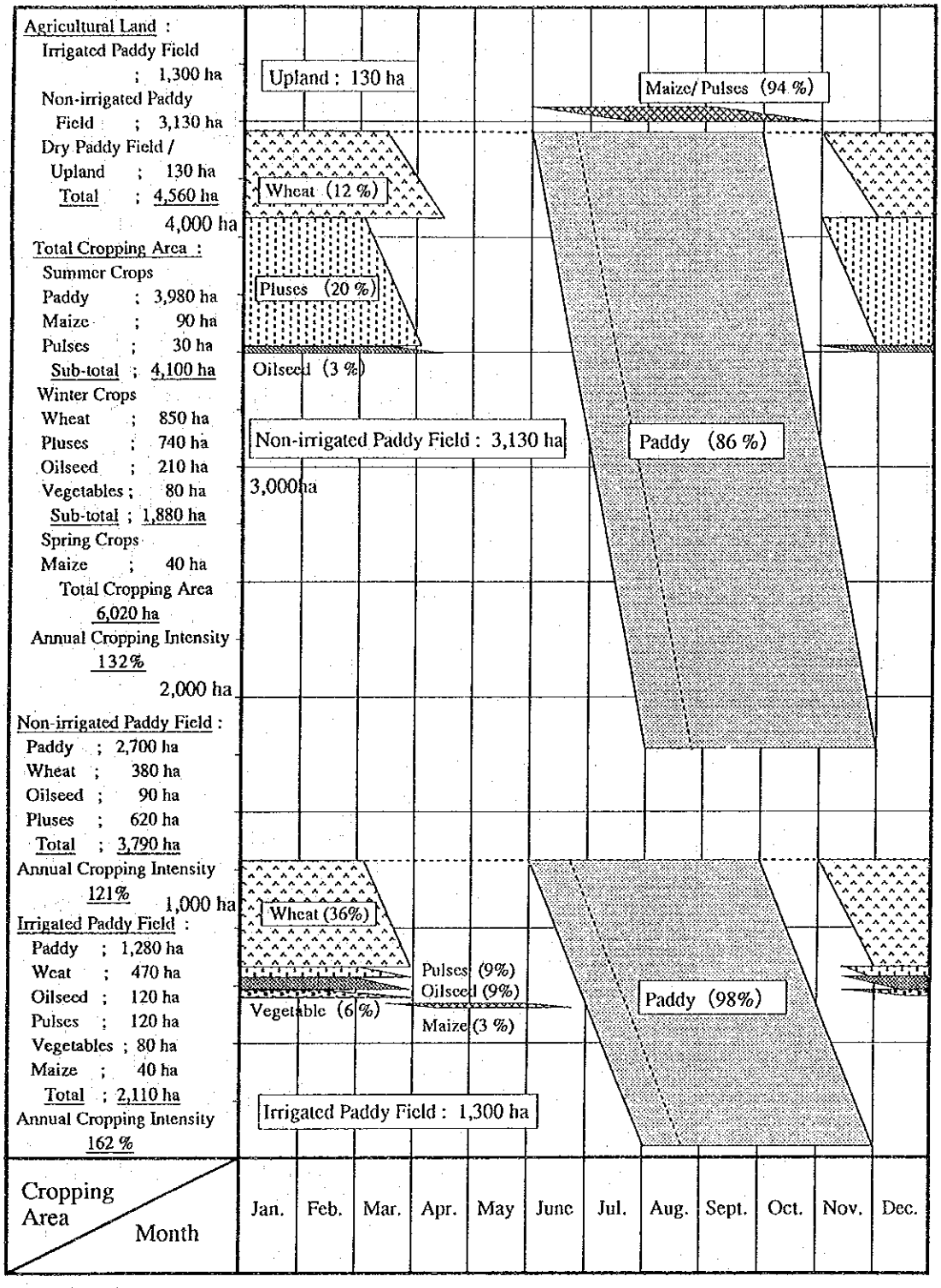


Fig. D.2.1 PRESENT CROPPING PATTERN

HIS MAJESTY'S GOVERNMENT OF NEPAL

FEASIBILITY STUDY ON
THE RAJKUDWA IRRIGATION
PROJECT

JAPAN INTERNATIONAL COOPERATION AGENCY

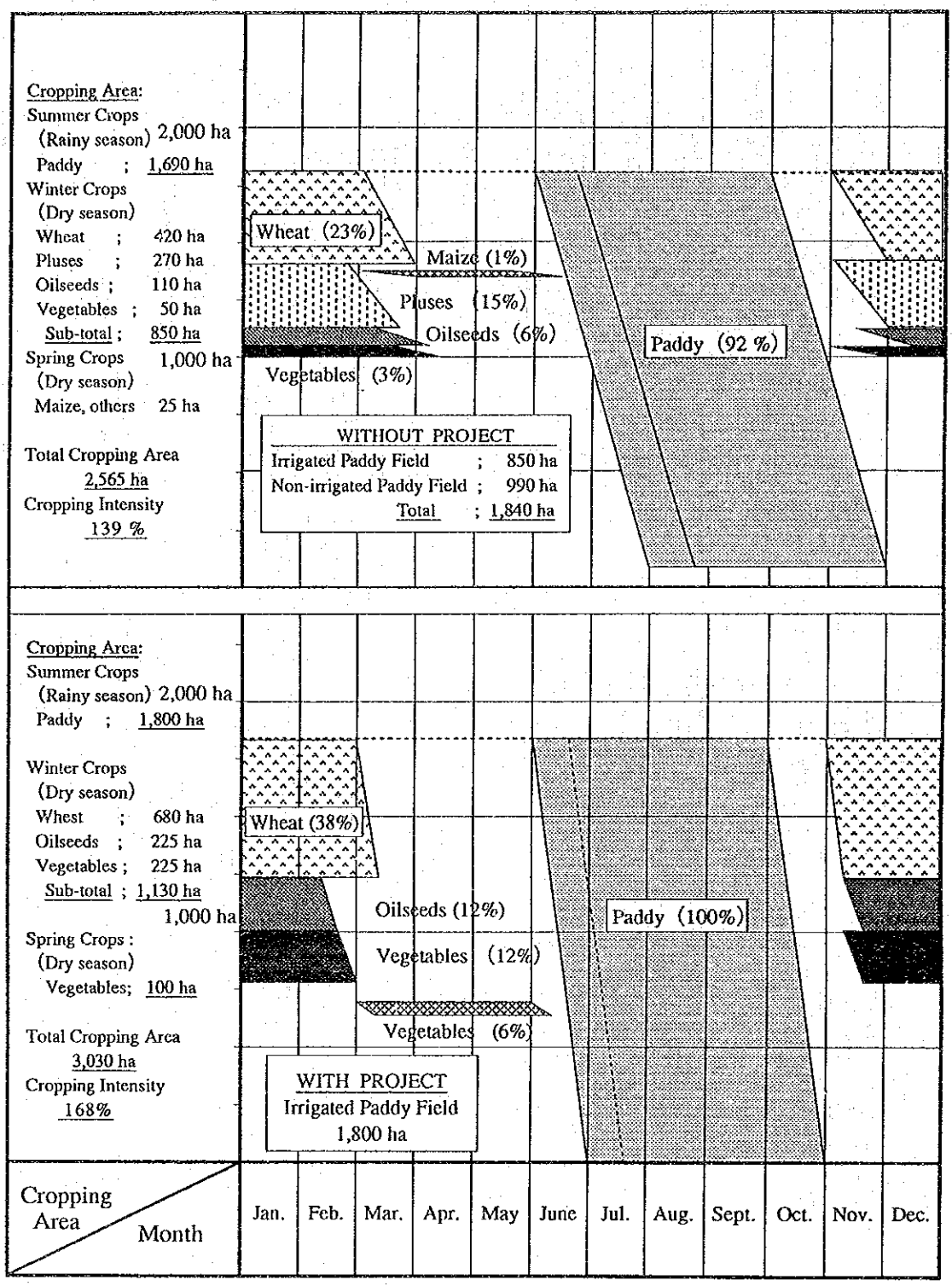


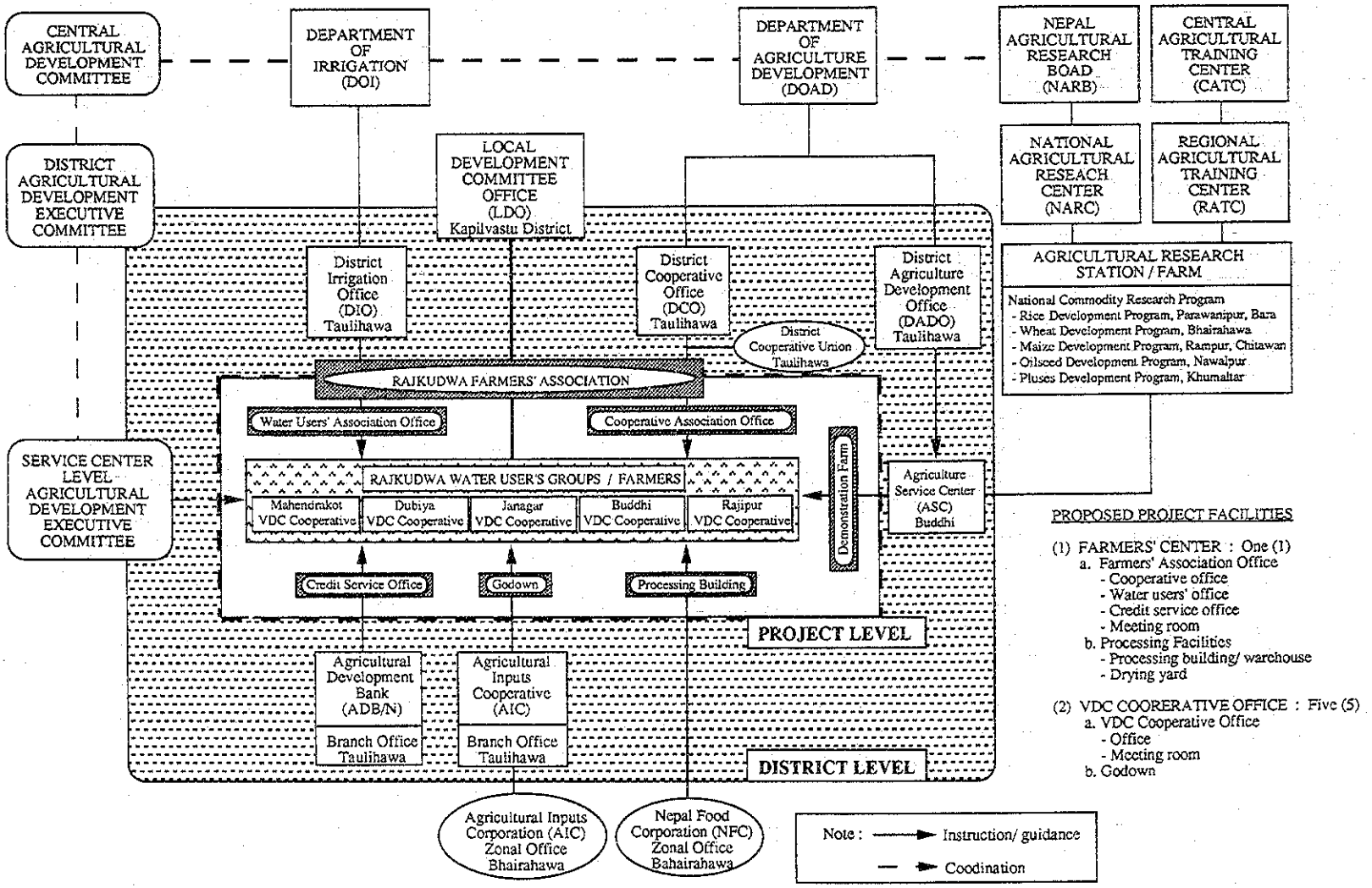
Fig. D.5.1 PROPOSED CROPPING PATTERN

HIS MAJESTY'S GOVERNMENT OF NEPAL

FEASIBILITY STUDY ON
THE RAJKUDWA IRRIGATION
PROJECT

JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. D.6.1 PROPOSED STRUCTURE FOR IMPROVEMENT TO AGRICULTURAL SUPPORT SERVICES



HIS MAJESTY'S GOVERNMENT OF NEPAL
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Fig.D.6.2 PROPOSED INTEGRATED IMPLEMENTATION PLAN FOR AGRICULTURAL DEVELOPMENT

Description	Main Agency	STEP - I	STEP - II	STEP - III	STEP - IV	Object and Outputs
A. Improvement of Farming Practices						
A-1 Farmers Field Trial Demonstration	NARC					Demonstration of new farming practice and introduction of new technic to farmers
A-2 Seed Multiplication	NARC					Seed production of extension seeds and introduction of high yield varieties
A-3 Improvement of Farming Practices	NARC/DOAD					Increment of production by proper fertilization, plant spacing and protection
A-4 Block Production Programme	NARC/DOAD					Integration of agricultural services through farmers group activities
B. Supporting Programme for Agricultural Extension						
B-1 On-farm Production Competition	DOAD					Increasing crop production with farmers intention
B-2 Minikit Programme	DOAD					Distribution of new seed varieties
B-3 Farmers Field Day / Tours	DOAD					Introduction of new knowledge for new farming practices
B-4 Production and Management Competition	DOAD					Increment of crop production through block production programme with monitoring and evaluation of agriculture extension system
C. Farmers Training Programme						
C-1 Preparation of Training programme	CATC/DOAD					Introduce new training programme with training facilities
C-2 Organise and Conduct Farmers Training	CATC/DOAD/DOI					Provide knowledge for crop production, water and farm management
C-3 ASC Level Leader Farmers Training	CATC/DOAD/DOI					Improvement of production practices to leader farmers
C-4 Field Level Group Training	CATC/DOAD/DOI					Coordinating on farm and water management by each farmers
D. Strengthening of Farmers Organization						
D-1 Organise Sub-unit Cooperative by Ward Level	DOAD					Straightening of cooperative activities at Ward and VDC level
D-2 Construction of Farmers Center	DOI/DOAD					Improvement of quality in farm products by office, warehouse, processing facilities
D-3 Construction of VDC Cooperative Office	DOAD/AIC/ADB					Reduction of post harvesting losses by processing facilities and godown
D-4 Introduce Model cum Demonstration Farm	DOAD					Integration of agricultural services with block approach
E. Improvement of Marketing System						
E-1 Preparation of Marketing Programme	DOAD/NFA					Introduce new marketing system including marketing facilities
E-2 Establishment of Local Markets (haat basar)	DOAD/NFA					Setting proper marketing price for farm products by a Joint Marketing Activities
E-3 Arrange Proper Marketing Channel	DOAD/NFA					Straightening of bargaining power
E-4 Organise Marketing Cooperative including Collection Depots, Packing and Transportation Facilities	DOAD NFA/AIC					Arrangement of timely supply of credits, farm inputs and collect farm products and improve Availability of institutional credit through joint marketing activities

Note : DOAD ; Department of Agriculture Development and District Agriculture Development Office (DADO)
DOI ; Department of Irrigation and District Irrigation Office (DOI)
NFC ; Nepal Food Cooperation
NARC ; National Agriculture Research Center
CATC ; Central Agriculture Training Center
AIC ; Agricultural Inputs Corporation
ADB ; Agriculture Development Bank
ASC ; Agriculture Service Center
VDC ; Village Development Committee

HIS MAJESTY'S GOVERNMENT OF NEPAL
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ANNEX - E

AGRICULTURAL ECONOMY

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AGRICULTURAL ECONOMY

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Ref. E.2 Statistical Pocket Book, Nepal, 1992, CBS.
Ref. E.3 Nepal in Figures, CBS, 1992.
Ref. E.4 Economic Survey, Ministry of Finance, 1992.
Ref. E.5 Foreign Trade Statistics, 1991/92, Nepal Rastra Bank, 1992.
Ref. E.6 Quarterly Economic Bulletin, vol. 26 (No. 3 & 4), Nepal Rastra Bank, 1992.
Ref. E.7 Agricultural Statistics of Nepal 1990, Department of Food and Agricultural Marketing Services (DFAMS).
Ref. E.8 Agricultural Indicators of Nepal 1992, DFAMS.
Ref. E.9 Credit Statistics of Agricultural Development Bank of Nepal (1968/69 - 1989/90), Agricultural Development Bank of Nepal (ADB/N).
Ref. E10 Eighth Plan (1992 - 1997) summary, National Planning Commission (NPC), 1992.
Ref. E.11 Food Statistics of Nepal 1992, DFAMS.
Ref. E.12 Farm Survey for the Rajkuduwa Irrigation Project, JICA/Nepal Consult (P) LTD, 1992.
Ref E.13 A Study on Marketing Costs and Margins of Major Commodities in Nepal, DFAMS, 1985.
Ref. E.14 Report on Cost and Production for Major Crops in Nepal (1990/91), Department of Agricultural Development, 1992.
Ref. E.15 Agricultural Handbook Nepal, P.M. Joshi & M.K. Khatiwada, Agri. Publication series, 1986.
Ref. E.16 Design Manuals for Irrigation Project in Nepal, M.10, Engineering Cost Estimating and Economics Manual, Department of Irrigation (DOI), 1990.

ANNEX E AGRICULTURAL ECONOMY

E.1 NATIONAL BACKGROUND

E.1.1 Land and Population

The Kingdom of Nepal is a landlocked country surrounded by India and China. The total area is 147,181 km^2. The total population is 18,462,000 according to the preliminary results of a population census in 1991, and the population density is 131 persons per km^2.

Administratively, Nepal is divided into five (5) development regions, the Eastern, Central, Western, Middle Western and Far West development regions, 14 zones, 75 districts, and 4,015 village development committees (VDCs) and 33 municipalities. On the other hand, the country is ecologically divided into three (3) areas; the mountain, the hill, and the Terai areas.

(1) The Mountain Area:
The mountain area lies in between 4,000 m to 8,848 m above the sea level. It is the most sparsely populated area because of its cool climate and steep topography. This area comprises about one third of the national land area, while the population in the area is 7.8 % of the total population. The main occupation of the people in this area is raising sheep and Yak.

(2) The Hill Area:
The elevation of the hill area varies from 275 m and 4,000 m above sea level. It is composed of high ridges with steep canyons embracing numerous streams. There are several populated valleys like Kathmandu, Pokhara, Hetauda, and others. This area has a food deficit due to the high population density and limited agricultural land; therefore, a considerable amount of food has to be supplied from the Terai area.

(3) The Terai Area:
The Terai area is a part of the Gangetic plain and therefore flat, lying from 90 m to 275 m above sea level, with a subtropical climate. It includes most of the fertile land in Nepal, and is a major agricultural production area. This area has a large potential for the increase of cropping intensity in areas received irrigation. The population of this area is concentrated due to migration from the mountain and hill areas. About 75 % of the national road network is located in the Terai area giving it a marked advantage over the hill and mountain areas in its access to farm inputs and marketing services.

The total area of agricultural lands in Nepal is 26,530 km^2, or 18.0 % of the nation. Land use is shown in the following table.

Land Type	Area (km^2)	(%)
Agriculture	26,533	18.0
Forest	55,334	37.6
Snow	22,462	15.3
Pasture	19,785	13.4
Water	4,000	2.7
Settlements & Roads	1,033	0.7
Others *	18,033	12.3
Total	147,181	100.0

Remarks *: Waste land, Barren land, Slopes, etc.
Source: Ref. E.2

Table E.1.1 and E.1.2 show the population and population growth rate of Nepal, and it is summarized in the table below. The population growth rate in Nepal was 2.08 % from 1981 to 1991. The Central Bureau of Statistics (CBS) estimated that the population in 2001 will increase to 23.6 million. More than 90 % the total population still lives in rural areas and most of them are engaged in agricultural activities.

Ecological Area	Population (x1,000) 1981		1991 *		Average Annual Growth Rate (%)
Mountain Area	1,303	(8.7%)	1,445	(7.8%)	1.04
Hill Area	7,163	(47.7%)	8,411	(45.6%)	1.62
Terai Area	6,557	(43.6%)	8,606	(46.6%)	2.76
Total	15,023	(100.0%)	18,462	(100.0%)	2.08

Remarks: * , Preliminary results of the population census in 1991.
Source: Ref. E.2.

E.1.2 National Economy

E.1.2.1 General

The economy of Nepal achieved relatively stable growth during the last seven (7) years (1984/85-1991/92) with an overall annual growth rate of 4.9 % as shown Table E.1.3. The gross domestic product (GDP) amounted to NRs. 130,685 million in 1991/92. The agricultural sector shared 51 % of the GDP. The per capita GDP was NRs. 7,079 (about US$ 166) in 1991/92, and it is estimated that the living standard of 49 % of the households is under the poverty line.

E.1.2.2 Foreign Trade and Balance of Payments

Table E.1.4 shows the foreign trade of Nepal. The amount of foreign trade, including export and import, has been increasing. However, the import trade has considerably exceeded the export trade. Trade with India makes up 20 to 30 % of the foreign trade. Raw materials, edible oil, jute, dry ginger and live animals are major commodities for export, however, the export of food grains has decreased somewhat due to a recent increase in domestic demand and low production brought about by weather in the recent years.

The balance of payments in Nepal shows that the income from work done abroad which has continuously increased over the past years, it has not been enough to make up for the growing trade deficit. As a result, the current account deficit is gradually increasing. The balance of payments deficit was equivalent to NRs. 4,781.2 million in 1990/91. Table E.1.5 shows the balance of payments for the past years.

E.1.2.3 Consumer Price Index

The average increase in the consumer price index was 10.2 % per year during the period 1983/84 to 1990/91. For commodities, the price index of grain and cereal products in 1990/91 was relatively low, however, those of pulses, vegetables and fruits, and milk and/or milk products were over 240. The following table shows the overall national consumer indexes.

Year	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
Overall Index	100.0	104.1	120.6	136.6	151.7	164.0	179.9	197.6
Increase Rate		4.1%	15.9%	13.3%	11.1%	8.1%	9.7%	9.8%

Source: Ref. E.2 and E.3

E.1.3 Agriculture and Irrigation

E.1.3.1 Agricultural Production

The total area of agricultural land in Nepal amounts to 2,653,000 ha or 18 % of the whole country. Taking steep topography and environmental factors into consideration, it is very hard to enlarge the agricultural area. Cereals, such as paddy, wheat, and maize, are major crops amounting to about 80 % of the total cropped area. Though Nepal was once an exporting country of food grains, in recent years, the production and consumption of food grains has been barely balanced due to stagnating production. Although food grain production has gradually been increasing since middle 1980's, it still remains at a low level. The Terai accounts for a large part of the nation's agricultural production, especially of paddy and wheat. Table E.1.6 shows the cropped area, total production, and unit yield of major crops; and the following table shows averages for the last five (5) years.

	Nepal			Terai Area		
	Area	Production	Yield	Area	Production	Yield
	(1000ha)	(1000ton)	(ton/ha)	(1000ha)	(1000ton)	(ton/ha)
Cereal Crops						
Paddy	1,435	3,276	2.28	1,054	2,440	2.31
Wheat	593	809	1.36	308	474	1.54
Maize	732	1122	1.53	153	267	1.73
Millet	188	204	1.08	13	13	1.04
Barley	30	27	0.19	3	3	.0.94
(Sub-total)	(2,978)	(5,438)	(1.82)	(1,531)	(3,197)	(2.09)
Other Crops						
Pulses	266	155	0.59	211	123	0.58
Oilseeds	154	94	0.61	123	75	0.61
Sugar Cane	32	1,021	31.52	30	979	32.73
Potatoes	83	671	9.08	19	202	10.86
Tobacco	7	7	0.83	7	6	0.84
(Total)	(3,520)			(1,921)		

Note: Figures show the average in the period of 1987/88 to 1991/92
Source: Ref. E.1. and DFAMS

E.1.3.2 Agricultural Support Services

(1) Agricultural Credit

The Agricultural Development Bank of Nepal (ADB/N) is the main source of institutional credit for agriculture. Its main function is to lend money to the agricultural sector, originally through a cooperative society (Sajha Sansthan). ADB/N has another channel of credit, Small Farmers Development Program (SFDP), which provides farmers directly with loan and technical assistance to efficiently organize small- scale farmer groups. ADB/N has 208 branches and 456 sub-branches located throughout the country, and provides short, medium, and long term agricultural loans for various purposes, such as crop farming, livestock, small scale irrigation development, farm mechanization, cottage/agro-industry, marketing, etc. The annual disbursement and the amount of repayment are increasing. However, the rate of disbursement is higher than that of repayment as shown in Table E.1.7.

(2) Agricultural Input Supply

The Agricultural Input Corporation (AIC) is the sole government agency responsible for supplying agricultural inputs. AIC deals with the distribution of improved seeds, chemical fertilizer, agro-chemicals, agricultural tools, and machinery. AIC branch offices distribute agricultural inputs at the district level through cooperatives and private dealers with uniform prices for each input throughout the country. Table E.1.8 shows the amount of agricultural inputs distributed by AIC.

(3) Agricultural Extension Services

The Department of Agriculture Development (DAD), Ministry of Agriculture, is divided into seven (7) sections: crop, horticulture, livestock, fishery, plant protection, marketing and monitoring/evaluation. The department is responsible for the agricultural extension services for the whole country, and the Chief Agricultural Development Officer appointed in each district is responsible for the agricultural extension activities at the district level. Recently, each

district has stationed nine (9) Agricultural Service Centers to provide all the agricultural extension activities to the farmers at the village level. Junior Technicians (JTs) and Junior Technical Assistants (JTAs), who do agricultural extension work in the District Office of Agricultural Development and Agricultural Service Center, are aiding farmers with farming techniques.

The Agricultural Research Council is an autonomous body which is solely responsible for agricultural research in Nepal.

(4) Cooperative Society (Sajha)

The main role of the cooperative society at present is to distribute agricultural inputs and provide agricultural credits to farmers. Other activities of the cooperatives involve supporting the village community through establishment of small industries, storage, and cooperative shops.

The cooperative offices which were established as a governmental institution to distribute inputs and provide credit, is presently only responsible for guidance, supervision, and auditing the cooperative society activities under the New Cooperative Act.

E.1.3.3 Irrigation

There are 943,000 ha of irrigated farmlands, of which 832,000 ha (88 %) is irrigated by surface water, while the rest by groundwater. About 267,000 ha (28 %) of the irrigated area is under DOI and the rest is irrigation schemes managed by farmers. Only about one-third of the irrigated area has permanent facilities. Table E.1.9 shows the irrigated area in Nepal, and it is summarized below:

Total Irrigated Area	943,000 ha	(36% of total cultivated area)
Irrigation Schemes Type		
Department of Irrigation Projects	267,000 ha	
Farmers Managed Irrigation Schemes	676,000 ha	
Water Source		
Surface Water	833,000 ha	
Groundwater	110,000 ha	

Source: Ref. E.7

E.1.4 National Development Plan

E.1.4.1 Five Year Development Plan

The Eighth National Development Plan (1992 to 1997) was launched in 1992, succeeding the Seventh Plan (1984/85 to 1989/90). The principal objectives of the Eighth Plan are; i) sustainable economic growth, ii) alleviation of poverty, and iii) reduction of regional imbalances.

A special priority given on: i) agricultural intensification and diversification, followed by ii) energy development, iii) development of rural infrastructure, iv) employment generation and human resource development, v) reduction in population growth, vi) industry and tourism development, vii) export promotion and diversification, viii) macro-economic stabilization, ix) administration reform, and x) monitoring and evaluation.

E.1.4.2 Agricultural Development Plan

The basic objectives in the agricultural sector are: i) to contribute to the national economy by increasing agricultural production, ii) to meet the growing domestic food demand, iii) to enhance production and productivity of the raw materials for agro-industries, iv) to augment employment opportunities for the majority of small/marginal farmers, and v) to maintain a balance between agricultural development and the environment.

The policies to achieve the objectives are: i) formulation and implementation of an agricultural development program for each agro-economic regions, ii) commercialization and diversification of agricultural products, iii) encouragement of the production of crops which can be used as raw material for industry, iv) unification of agricultural extension services through farmers' groups at village level, v) encouragement of the private sector to produce, import, and distribute of agricultural inputs including improved seeds and technology, vi) simplification of agricultural credit disbursement, and vii) revitalization of cooperatives. Agricultural development programs lead mainly to intensification, diversification, and commercialization. Consequently, the targeted production increase per year for the plan is 5.4 % for food grains, 9.1 % for cash crops, 5.4 % for horticulture products, and 3.8 % for livestock products as shown in Table E.1.10.

E.1.4.3 Irrigation Development Plan

In order to increase agricultural production, the investment plan has laid emphasis on the irrigation sector as shown in Table E.1.11. The basic objectives of the irrigation sector are: i) to increase agricultural production through the proper application of irrigation technologies, ii) to improve the management of existing irrigation systems, and iii) to realize efficient use of irrigation facilities utilization through farmer participation.

The policies to achieve the objectives are; 1) implementation of large and medium size projects by the government, ii) farmer participation in the implementation of small-scale projects (less than 2000 ha in Terai), iii) to hand over the irrigation facilities constructed by the

government to farmers' groups for operation and maintenance, iv) involvement of farmers in the project at all stages from planning to construction, collection of water fees by farmer groups and, so forth.

The target of the irrigation sector in the eighth plan is to increase the irrigated farmlands by 294,000 ha, of which 108,000 ha, 53,000 ha, and 133,000 ha are to be attained by large-scale projects, medium to small-scale projects, and private sector projects assisted by ADB/N, respectively.

E.2 SOCIO/AGRO-ECONOMIC CONDITIONS OF THE STUDY AREA

E.2.1 Location and Administrative Situation

The study area is located in the northern part of Kapilvastu District of Lumbini Zone in the Western Development Region. The study area lies on the Terai plain which gently slopes from north to south towards the India - Nepal border. The ground elevation varies from 90 m to 275 m. The East-West Highway passes through the study area and divides it into northern and southern parts.

The study area, administratively, belongs to Kapilvastu District, Ilaka No. 6. It covers 59 wards in the seven (7) village development committees (VDCs) listed below:

Name of VDC	No. of Wards
1. Mahendrakot VDC.	9
2. Dubiya VDC	5
3. Jayanagar VDC	9
4. Buddi VDC	9
5. Rajpur VDC	9
6. Mahuwa VDC	9
7. Dhankauli VDC	9
Total	59

E.2.2 Population and Labor Force

E.2.2.1 Population and Household Number

The total population in the study area was estimated at 33,260, in 1990, of which 52.3 % is male. The annual population growth rate was 2.3 % during the last decade, which is slightly higher than the national average of 2.1 %. The population density is 272 persons per km^2.

The number of households is 5,153, out of which, 4,580, or 89 %, are independent farmers. The other households can be divided into landless farmers and households engaged in the service and industry sectors. The number of landless farmers was estimated at 340 (6.6 %). Therefore, the total number of farm households, including landless farmers is 4,920. The average family size in the area is about 6.5 persons. The demographic and land conditions by ward are presented in Table E.2.1.

Name of VDC	Area	Male	Female	Total	Population Density	No. of. Households	Family Size
	km^2				per km^2		person
Mahendrakot	28.8	2,938	2,947	5,885	204	919	6.4
Dubiya	9.5	790	740	1,530	161	272	5.6
Jayanagar	22.5	2,564	2,379	4,943	220	598	8.3
Buddi	13.3	2,257	2,064	4,321	325	760	5.7
Rajpur	11.5	3,660	3,184	6,844	595	814	8.4
Mahuwa	12.0	2,016	1,896	3,912	326	707	5.5
Dhankauli	24.6	3,170	2,652	5,822	237	1,083	5.4
Total	122.2	17,395	15,862	33,257	272	5,153	6.5

E.2.2.2 Agricultural Labor Force

The economically active population (EAP) in the total population was estimated at 17,030, on the basis of the ratio of EAP/total population from the 1981 population census. A large portion of EAP is engaged in agriculture. The population and number of households in each ward are listed in Table E.2.1, and it is summarized below:

Name of VDC	Total Population	EAP	No. of. Households	No. of Farm Households	Agricultural Labor Force
	(persons)	(persons)			(persons)
Mahendrakot	5,885	3,010	919	816	2,670
Dubiya	1,530	780	272	270	780
Jayanagar	4,943	2,530	598	581	2,450
Buddi	4,321	2,210	760	756	2,200
Rajpur	6,844	3,510	814	794	3,420
Mahuwa	3,912	2,010	707	683	1,930
Dhankauli	5,822	2,980	1,083	1,020	2,800
Total	33,257	17,030	5,153	4,920	16,250

Note EAP: Economically Active Population
No. of Farm Households includes landless farmers

The total available agricultural labor force in the study area was estimated at 16,250 persons. Based on the assumption that a year has working days of 80 %, the labor force was calculated at 4,745 x 10^3 man-days per year or 395,000 man-days per month.

On the other hand, the actual labor requirement for farming activities in the study area was estimated at 667,000 man-days per year on the basis of the present cropping pattern and land use conditions as shown in Table E.2.2. This means that only 14 % of the yearly available labor force is utilized by farming activities.

E.2.3 Social Infrastructure

E.2.3.1 Roads and Communication

The East-West highway (EWH) passes through the middle of the study area. EWH is the most important national highway connecting the eastern and western areas in the Terai. Two other lines of gravel roads, namely the Gorusinge-Patharkot (11 km) and the Gorusinge-Taulihawa (14 km) roads, pass along east of the study area. The Gorusinge-Taulihawa road is cut during the rainy season at the Banganga river where no bridge has been constructed. Except the rainy season, the Gorusinge-Patharkot road is passable up to Sandhikarka, the headquarters of Arghakhanchi District in the hill area. Small earthen roads are used for transporting farm inputs and agricultural products, and for villagers' daily life and communication. However, these roads are generally passable only during the dry season.

There are two post offices, one in Mahendrakot VDC and the other in Jayanagar VDC. However, a telephone system has not been established in the area. Villagers can use a telephone in Taulihawa and Krishnagar only.

E.2.3.2 Electricity and Water Supply

Electrical power lines have not been installed in the study area. Small generators owned by private parties work only during the festival in Patharkot and Gorusinge market areas. A power line for the general public is being constructed from Rupandehi District to Gorusinge along EWH. This line will be in service in 1994 providing power to Gorusinge market area.

Most of the villagers get their drinking water from dug wells or tubewells. An existing drinking water system in Patharkot supplies spring water to parts of Patharkot and Birpur.

E.2.3.3 Cottage Industry and Agro-processing

The total number of cottage or small scale industries in the study area is presented in the following table. There is no large or medium scale facility in the area. The rice mills, usually with flour mill equipment and the occasionally with oil mill equipment for oilseed, are in small scale, using 10 to 15 horse-power diesel engine with a milling capacity of 150 to 250 kg per hour. The mills process paddy, wheat, and maize which are carried by villagers themselves for their own consumption. The processing capacity, which is estimated at 13,000 tons per year, would be sufficient for present condition. Brickwork is carried out on a household basis to fulfill their own needs, but some are sold on a commercial basis. Other industries include manufacturing of cement tile, textiles, baking bread, and vehicle repair service.

VDC	Rice Mill	Brick Factory	Others
Mahendrakot	10	20	1
Dubiya	3	-	-
Jayanagar	3	15	7
Buddi	3	5	-
Rajpur	6	5	-
Mahuwa	1	2	-
Dhankauli	7	10	-
Total	33	57	8

Source: Ref. E.12

Medium and large scale millers are located in Taulihawa, Krishnagar, Butwal, and Bhairahawa. The number of large/medium scale mills in Lumbini zone is 40 in Kapilvastu, 75 in Rupandehi, and 25 in Nawarparashi. These millers also act as rice wholesalers.

There are no storage facility for inputs and agricultural products in the study area.

E.2.4 Marketing and Prices

E.2.4.1 Consumption and Marketable Products

The marketable products in the study area can be roughly estimated from per capita consumption, total population, and total production. The per capita consumption is estimated from the farm survey and Ref. E.14. About 5 % of paddy and wheat production is surplus and is marketable; however, the production of others are nearly equal to or less than the total demand in the study area.

Product	Per Capita Consumption	Total Consumption	Seed & waste	Total Production	Marketable Product
	kg/person/year	ton	ton	ton	ton
Paddy	170	5,654	666	6,662	342
Wheat	30	998	117	1,169	54
Maize	6	200	19	188	-31
Pulses	15	499	45	449	-95
Oilseeds	14	466	13	128	-351
Vegetables	35	1,164	31	308	-887

Note: Figures of total consumption were calculated from per capita consumption x population (33,260)

E.2.4.2 Marketing System

(1) Agricultural Products

The marketable amount of agricultural products in the study area is not expected to be large at present due to a high population density, small size of farm land holdings, and low productivity. The main marketable product is paddy, and other products are sold in limited quantities, while others are still consumed by the farmers themselves and are, therefore, not much marketable.

The major market centers are Taulihawa and Krishnagar in Kapilvastu District, and Bhairahawa and Butwal in Rupandehi District. Large millers and wholesalers are located in these market centers. Local markets in and around the study area are Gorusinge, Patharkot, and Emilia. At the local markets, traders and assemblers buy the marketable products from the farmers and sell them at the major market centers to the millers and wholesalers. Village merchants in a study area buy paddy and other products at farm-gates and sell them at local markets and market centers.

Harvesting of paddy starts in November, and forwarding of paddy to the market is concentrated in the period immediately after harvesting, from November to February. According to the market survey conducted in and around the study area, the marketable paddy from the study area is handled by local market traders and local assemblers at Patharkot, Gorusinge, Emilia, and Dhankauli. About 50 % of the marketed paddy is sold to local assemblers or wholesalers at the local markets. The rest of it is handled by village merchants or sold to millers or wholesalers in Taulihawa by the farmers themselves. Paddy bought by millers or wholesalers is sold to the hill area through Taulihawa, Bhairahawa, Butwal, or Narayanghat after milling. Part of the milled rice is also supplied to the Arghakanchi District, located north of the study area, to alleviate the food-grain shortage.

Marketable wheat supply is in shortage because the farmers consumes their own production. One of the marketing channels is to sell to local market traders at local markets, the other is to sell to assemblers at farm gates. The assemblers and local market traders then sell the products to wholesalers or millers in Bhairahawa, Janakpur, Birganji or Kathmandu.

Most of the mustard seed is consumed as cooking oil after milling by small-scale millers in the villages. Some of the seed is sold to oil millers in Butwal and Bhairahawa through middlemen. Vegetables, including potato, onion, cauliflower, etc., are almost all consumed by the farmers themselves or in the village. Only a small part of them are sold at weekly village markets or Taulihawa market by middlemen or the farmers themselves.

The Nepal Food Corporation (NFC) is the government agency responsible for the procurement of grains, and is supposed to buy the grain at fixed price. The branch of NFC located in Bhairahawa covers the Western development region. However, NFC's involvement in the marketing process does not exert a significant influence in the study area due to the low procurement prices and insufficient marketing facilities.

The market channels of these products are illustrated in Fig. E.2.1.

(2) Farm Input Supply

Farm inputs, such as seed, fertilizer, agro-chemicals, and farm equipment are supplied by the Agricultural Inputs Corporation (AIC) through the cooperatives and private dealers. The retail prices of the inputs are fixed by AIC and are the same through out the country being subsidized for transport.

AIC zone office, which is located at Bhairahawa, has two offices near the study area, in Taulihawa and Bahadruganji in Kapilvastu District. Each branch office supplies farm inputs to 10 cooperatives in the district. The farmers in the study area get farm inputs through two cooperatives located in Gorusinge (Arinko Cooperative Society) and Dhankauli (Janasewa Cooperative Society). The Arinko cooperative is supplied by the Bahadruganji branch office, and the Janasewa cooperative is supplied by the Taulihawa branch office. However, both cooperatives have no storage for inputs. Generally, the inputs by AIC do not meet the farmers' demand both in terms of quantity and timing. When inputs cannot be obtained through the nearby cooperatives, the farmers seek fertilizer and agro-chemicals at the cooperative in Taulihawa.

The farm inputs supplied by the district and related cooperatives are shown in Table E.2.3.

E.2.4.3 Prices of Agricultural Products and Farm Inputs

The farm gate prices of agricultural products are established by the competitive purchase of local market traders, assemblers, village merchants, wholesalers and millers. Among these, the wholesalers and large miller-wholesalers have significant power to establish prices in the study area. The farm survey and farm economy survey indicate farm gate prices of major crops in the project area as follows:

Product	Paddy	Wheat	Maize	Pulses	Oilseeds	Vegetables
NRs/kg	5.25	6.00	6.00	14.00	16.25	5.00

The prices of farm inputs distributed by AIC in March of 1993 are shown in Table E.2.4. The farm survey indicated that hiring labor costs at NRs. 40 per day for male labors and NRs. 35 per day for female labors. It also indicated that the price of draft-animals is NRs. 50 per day for a pair of bullocks.

E.2.5 Crop Budgets

Gross income, production costs and the profit of major crops per ha in the study area under the present condition were estimated from the results of the field survey and various information such as Ref. E.14 and E.15. The gross income was calculated from the farm-gate price and the average yield of each crop, under partially-irrigated and non-irrigated conditions. The production cost of each crop was estimated on the basis of input quantity and labor cost which were determined according to the farm survey. The yield, inputs, and labor requirement under the present condition are mentioned in the Chapter 2 of Annex D. The profit per ha is higher for vegetables and partially irrigated paddy, and lower for wheat and oilseeds under non-irrigated condition. The results are presented below:

(unit: per ha)

Crop	Cond-ition	Unit Yield	Unit Price	Gross Income	Production Cost	Net Return
		kg/ha	NRs/kg	NRs	NRs	NRs
Paddy	P.I.	2,200	5.25	11,550	4,730	6,820
Paddy	N.I.	1,420	5.25	7,460	4.560	2,900
Wheat	P.I.	1,700	6.00	10,200	4,880	5,320
Wheat	N.I.	980	6.00	5,880	4,710	1,170
Maize	P.I.	1,720	6.00	10,320	3,530	7,790
Maize	N.I.	1,330	6.00	7,980	3,330	4,650
Pulses	P.I.	660	14.00	9,240	3,510	5,730
Pulses	N.I.	560	14.00	7,840	3,370	4,470
Oilseeds	P.I.	710	16.25	11,540	2,990	8,550
Oilseeds	N.I.	460	16.25	7,470	2,890	4,580
Vegetables	P.I.	3,850	5.00	19,250	9,860	9,390

Note: P.I.: Partially Irrigated N.I.: Non-irrigated

The total crop production value and total net profit value were estimated from the cropped area, gross income and net return per ha, mentioned above. The total crop production value and total net profit value are NRs. 52.86 x 10^6, and NRs. 25.97 x10^6 respectively, while those of per ha are NRs. 8,780 and NRs. 4,310 respectively. The details are shown in Table E.2.5 and summarized as follows:

Crop	Total Production Value	Total Net Profit Value
	(1000 NRs)	(1000 NRs)
Paddy	34,930	16,560
Wheat	7,020	2,950
Maize	1,130	690
Oilseeds	2,050	1,430
Pulses	6,190	3,590
Vegetables	1,540	750
Total	52,860	25,970

E.2.6 Farmers' Economy

E.2.6.1 Land Holding and Land Tenure

The farm households in the study area are divided into four (4) categories by land holding size: marginal, small, medium and large, excluding landless farmers. The land holding condition in the study area is estimated on the basis of the land register records at the Land Tenure Office in Taulihawa. Detailed results are presented in Table E.2.6. The average land holding size is 1.00 ha, ranging from 7.43 ha for large-scale farmers to 0.36 ha for marginal farmers. About 68 % of the farmers have lands less than 1.0 ha in size. The marginal farmers hold about one fourth of the total lands. The land holding condition is summarized as below:

Category of Farmer	Farm Size (ha)	No. of Farmers	(%)	Total Area (ha)	(%)	Average Size (ha)
Marginal	under 1.0	3,105	67.8	1,127	24.7	0.36
Small	1.0 to 2.5	1,031	22.5	1,481	32.5	1.44
Medium	2.5 to 5.0	329	7.2	1,097	24.1	3.33
Large	over 5.0	115	2.5	855	18.8	7.43
Total		4,580	100.0	4,560	100.0	1.00

Note: No. of farmers does not include landless farmers (340 households)

The farm survey (Ref. E.12) reports land tenure status in the study area as follows.

Tenure Status	%
Exclusive owner	56.4
Owner cum Rented-in	40.0
Owner cum Rented-out	3.6

In general, the tenant fees are paid by products by half-and-half sharing to the land owner.

E.2.6.2 Farm Economy

Based on the farm survey, an analysis of farm economy was made on farm types in the study area. The farm budgets for the various farm types are presented in Table E.2.7 and summarized below:

(Unit: NRs.)

	Farmers' Categories				
	Large	Medium	Small	Marginal	Average
A. Income	28,400	19,070	16,130	12,200	14,180
- Farm Income /1	21,660	13,080	9,290	2,840	5,700
- Livestock Income /2	2,880	1,210	2,610	2,720	2,580
- Non-farm Income /2	3,860	4,780	4,230	6,640	5,900
B. Expenditure					
- Living Expense /2	24,690	17,440	16,130	12,200	13,790
C. Net Reserve	3,710	1,630	0	0	390

Note: /1 Refer Table E.2.7
/2 Estimated from Ref. E.12

E.3 FUTURE AGRICULTURAL PROSPECT

E.3.1 General

The most optimum project area has been examined by assessment of the water resources, land resources, profitability, and technical feasibility on eight (8) alternative irrigation plans. As a result of the study considering optimization of beneficial area and number of farmers, the project area was delineated 1,800 ha of net irrigable area which will be irrigated by the water from the Gudrung river. The project area is located in the northern part of the study area, which is composed of 29 wards in five (5) VDCs: Mahendrakot, Dubiya, Jayanagar, Buddi, and Rajpur. The present features of the project area are shown below:

Total Population		16,000	(48%)
Farm Households	Total	2,265	(46%)
	Large	47	(37%)
	Medium	128	(39%)
	Small	472	(46%)
	Marginal	1,533	(49%)
	Total landowner	2,180	(48%)
	Landless	85	(25%)
Average Paddy Field Size (ha/farmer)		0.84	(87%)
Paddy Field (ha)	Total	1,840	(40%)
	Mahendrakot VDC	510	(100%)
	Dubiya VDC	180	(45%)
	Jayanagar VDC	540	(79%)
	Buddi VDC	260	(58%)
	Rajpur VDC	350	(43%)
	Mahuwa VDC	0	(0%)
	Dhankauli	0	(0%)

Note: Figures in brackets show the proportion of the project area to the study area

As shown in the figures above, the paddy field in the project area occupies 40 % of the study area, however, the number of farm households occupies 46 %. It means that average land holding size of farmers in the project area is smaller than that of the study area, and that the proportion of smaller size framers to all the farmers in the project area is higher than that of the study area.

E.3.2 Crop Production

The proposed land use, crop selection, cropping pattern, and anticipated unit yield under with project condition have been mentioned in detail in the Annex D. Future agricultural situation under without project will not be improved because of little potential to improve the situation under limited water supply by existing facilities and shortage of inputs. Therefore, it is assumed that the cultivated area, cropping intensity, and unit yield without project will remain at the level of the present condition. The summary of without project condition and with project condition is shown below:

	Without Project	With Project	Difference
Land use (ha)			
Paddy field	1,840	1,800	-40
Note: 40 ha will be allocated for canals, farm roads, etc.			
Irrigation condition (ha)			
Non-irrigated	990	0	-990
Partially irrigated	850	0	-850
Full irrigated	0	1,800	1,800
Irrigated crop area (ha)			
Summer crops	840	1,800	960
Winter crops	510	1,130	620
Spring crops	25	100	75
Cropped area (ha)			
Paddy	1,690	1,800	110
Wheat	420	680	260
Maize	25	0	-25
Pulses	270	0	-270
Oilseeds	110	225	115
Vegetables	50	325	275
Note: Cropping patterns under without and with project conditions are illustrated in Figure of Annex D.			
Cropping Intensity (%)	139	168	29
Unit yield (ton/ha)			
Paddy	2.20 ~1.42	4.50	2.30 ~3.08
Wheat	1.70 ~0.98	3.00	1.30 ~2.02
Maize	1.72	-	-
Pulses	0.66 ~0.56	-	-
Oilseeds	0.71 ~0.46	1.20	0.49 ~0.74
Vegetables	3.85	12.00	8.15

Based on the assumptions mentioned above, the crop production under without and with project conditions, and the incremental production are shown in the following table.

(unit: ton)

Crop	Total production under without project	Total production under With project	Incremental Production
Paddy	3,050	8,100	5,050
Wheat	630	2,040	1,410
Maize	40	0	-40
Pulses	160	0	-160
Oilseeds	70	270	200
Vegetables	190	3,900	3,710

E.3.3 Marketing and Prices

Marketable surplus of agricultural products in the full development stage in the project area was estimated to be 4,300 tons of paddy, 1,310 tons of wheat, 2,890 tons of vegetables as shown below:

Product	Per Capita Consumption	Total Consumption	Seed & waste	Total Production	Marketable Product
	kg/person/year	ton	ton	ton	ton
Paddy	187	2,990	810	8,100	4,300
Wheat	33	530	200	2,040	1,310
Oilseeds	15	240	30	270	0
Vegetables	39	620	390	3,900	2,890

Note 1: Figures of total consumption were calculated from per capita consumption x population (16,000)
2: Per capita consumption = present amount x 1.1

It is considered that such marketable surplus products are expected to be designated for populated area, such as Taulihawa, Krishnagar, Bhairahawa, Butwal, Kathmandu, etc., and for hill area where food is in shortage through exiting market channels. Taulihawa, Krishnagar, Bhairahawa, and Butwal which are market centers near the project area, have many large/medium-scale mills and wholesalers with processing and storage facilities. The project area has an easy access to these market centers via East-west Highway. Furthermore, farm road improvement by the project will improve the accessibility from farm-gates to the Highway.

Market price (financial price) at farm-gates in the future under without and with project conditions at 1993 constant price is assumed constant, because the total amount of marketable products is small against that in the vicinity area.

Economic prices of the agricultural products and farm inputs were estimated in order to evaluate the project economy. The economic prices of international tradable commodities: paddy, wheat and fertilizer, were estimated making reference with the World Bank price forecast in 2000 at 1993 constant price. Regarding commodities which are not tradable for international market, farm-gate prices were applied market price with considering of transportation and handling cost, because those prices were affected by the market price near the India-Nepal border. The detailed economic prices of farm inputs and outputs at farm-gates are shown in Table H.2 1 of Annex H, and it is summarized in the following table:

	Financial	Economic
Outputs	NRs/kg	NRs/kg
Paddy	5.25	9.66
Wheat	6.00	14.11
Maize	6.00	10.41
Pulses	14.00	12.66
Oilseeds	16.25	14.91
Vegetables	5.00	4.48

	Financial	Economic
Inputs	NRs/kg	NRs/kg
Fertilizer (N)	11.17	31.60
Fertilizer (P)	16.67	26.22
Fertilizer (K)	14.17	19.31

Note: prices of fertilizer are shown by the nutrient content

E.3.4 Irrigation Benefit

E.3.4.1 Crop Budgets

Based on the farm input requirement of the present and proposed farming practices discussed in Annex D, financial and economic crop budgets for respective crops under without and with project conditions are presented in Tables E.3.1 to E.3.4. The summary of the crop budgets is shown below:

(Financial Farm Budgets)

(unit: NRs. per ha)

		Without Project			With Project			
Crops	Cond -ition	Gross Income	Production Cost	Net Profit	Gross Income	Production Cost	Net Profit	Incremental Net Profit
Paddy	N.I.	7,460	4,560	2,900	-	-	-	13,740
	P.I.	11,550	4,730	6,820	-	-	-	9,820
	F.I.	-	-	-	23,620	6,980	16,640	-
Wheat	N.I.	5,880	4,710	1,170	-	-	-	9,510
	P.I.	10,200	4,880	5,320	-	-	-	5,360
	F.I.	-	-	-	18,000	7,320	10,680	-
Maize	P.I.	7,980	3,330	4,650	-	-	-	-
Pulses	N.I.	7,840	3,370	4,470	-	-	-	-
	P.I.	9,240	3,510	5,730	-	-	-	-
Oilseed	N.I.	7,470	2,890	4,580	-	-	-	9,800
	P.I.	11,540	2,990	8,540	-	-	-	5,840
	F.I.	-	-	-	19,500	5,120	14,380	-
Vegetables	P.I.	19,250	9,860	9,390	-	-	-	37,740
	F.I.	-	-	-	60,000	12,870	47,130	-

Note: Figures are shown in the average farmers' (size: 0.84 ha) case.
N.I.: Non-irrigated, P.I.: Partially Irrigated, F.I.: Fully Irrigated

(Economic Farm Budgets)

(unit: NRs. per ha)

		Without Project			With Project			
Crops	Cond -ition	Gross Income	Production Cost	Net Profit	Gross Income	Production Cost	Net Profit	Incremental Net Profit
Paddy	N.I.	13,720	6,130	7,590	-	-	-	25,210
	P.I.	21,250	6,490	14,760	-	-	-	18,040
	F.I.	-	-	-	43,470	10,670	32,800	-
Wheat	N.I.	13,830	6,280	7,550	-	-	-	23,360
	P.I.	23,990	6,540	17,450	-	-	-	13,460
Maize	P.I.	17,910	4,610	13,300	-	-	-	-
Pulses	N.I.	7,090	3,930	3,160	-	-	-	-
	P.I.	8,350	4,300	4,050	-	-	-	-
Oilseed	N.I.	6,860	3,550	3,310	-	-	-	6,800
	P.I.	10,590	3,820	6,770	-	-	-	3,340
	F.I.	-	-	-	17,890	7,780	10,110	-
Vegetables	P.I.	17,250	9,960	7,290	-	-	-	31,250
	F.I.	-	-	-	53,760	15,220	38,540	-

Note: N.I.: Non-irrigated, P.I.: Partially Irrigated, F.I.: Fully Irrigated

E.3.4.2 Net Irrigation Benefit

Economic irrigation benefit by the project to be expected is defined as the difference of net profit from crops between future with and without project conditions. The irrigation benefit at full development stage was estimated as shown in Table E.3.5 and summarized as follows:

(unit: 1000 NRs)

Crop	Net Profit		Irrigation Benefit
	Without Project	With Project	
Paddy	18,840	59,040	40,200
Wheat	6,220	21,020	14,800
Maize	330	0	-330
Pulses	930	0	-930
Oilseed	620	2,280	1,660
Vegetables	360	12,520	12,160
Total	27,300	94,860	67,560

E.3.5 Farm Budget

In order to assess the irrigation project from the viewpoint of farmers' economy, analysis was made under both with and without project conditions for four (4) categorized farmers type. The following table shows the summary of the farm budgets, and details are presented in Table E.3.6.

(unit: NRs.)

Farmers Type	Large	Medium	Small	Marginal	Average
Without Project					
Average paddy field size (ha)	6.81	3.05	1.32	0.34	0.84
Farm Net Profit	24,000	14,040	9,670	3,010	5,460
With Project					
Average paddy field size (ha)	6.67	2.99	1.29	0.33	0.82
Farm Net Profit	151,070	80,210	41,540	12,680	25,720
Incremental					
Average paddy field size (ha)	-0.14	-0.06	-0.03	-0.01	-0.02
Farm Net Profit	127,070	66,170	31,870	9,670	20,260

The results indicate that the farm net profit of the each type of farmer under with project condition is expected to be four (4) to six (6) times of that under without condition. After implementation of the project, it is expected that even typical marginal farmers possibly exceed the poverty line, and their living condition will be substantially improved compared with that under without project condition.

TABLES

Table E.1.1 Population and Population Growth Rate of Nepal

Year	1911	1921	1930	1940	1952/54	1961	1971	1981	1991*
Total Population (x1000)	5,639	5,574	5,533	6,284	8,473	9,413	11,556	15,023	18,462
Average Growth Rate per Annum (%)	-	-0.13	-0.07	1.16	2.30	1.65	2.07	2.66	2.08

Remark *: Preliminary results of population census in 1991
Source: Ref. E.2

Table E.1.2 Population by Area-wise

		1981	1991*					Average
	Area	Population	Population	Male	Female	No. of Household	Ave.Family Size	Population Density	Growth Rate per Annum
	km2	person	person	person	person		person	person/km2	%
Nepal	147,181	15,022,839	18,462,081	9,220,914	9,241,167	3,345,052	5.52	125	2.08
East. Dev. Region	28,456	3,708,923	4,448,374	2,229,624	2,218,750	825,774	5.39	156	1.83
Cent. Dev. Region	27,410	4,909,357	6,174,237	3,146,690	3,027,547	1,123,029	5.50	225	2.32
West. Dev. Region	29,398	3,128,859	3,751,922	1,815,286	1,936,636	691,839	5.42	128	1.83
M.W. Dev. Region	42,378	1,955,611	2,406,095	1,203,405	1,202,690	417,197	5.77	57	2.09
F.W. Dev. Region	19,538	1,320,089	1,681,453	825,909	855,544	287,213	5.85	86	2.45
Mountain Area	50,647	1,302,896	1,444,481	717,153	727,328	276,064	5.23	29	1.04
Hill Area	62,515	7,163,115	8,411,309	4,109,169	4,302,140	1,567,120	5.37	135	1.62
Terai Area	34,019	6,556,828	8,606,291	4,394,592	4,211,699	1,501,868	5.73	253	2.76
Kapilvastu District	1,738	270,045	372,205	192,535	179,670	60,990	6.10	214	3.26

Remarks *: Preliminary results of population census in 1991
Source: Ref. E.1 and E.2

Table E.1.3 Gross Domestic Product in Nepal

(unit: million NRs.)

Year	1974/75	1979/80	1984/85	1987/88	1988/89	1989/90	1990/91	1991/92 *
NOMINAL GDP	16,571	23,351	44,417	68,858	77,534	90,825	105,300	130,685
Agriculture	11,550	13,683	24,171	35,825	41,299	49,588	56,230	67,029
Non-agriculture	5,021	9,668	20,246	33,033	36,235	41,237	49,070	63,656
REAL GDP (1974/75 price)	16,571	18,606	23,630	27,475	28,621	30,367	32,052	33,055
Agriculture	11,550	10,933	13,990	15,993	17,240	18,516	19,034	19,129
Non-agriculture	5,021	7,673	9,640	11,482	11,381	11,851	13,018	13,926
SECTOR-WISE GDP								
Agriculture	11,485	13,520	23,927	35,477	40,889	49,117	55,713	66,419
Mining & Quarrying	22	42	140	93	101	116	131	162
Manufacturing	664	936	1,998	3,646	3,619	4,546	7,078	11,704
Electricity, Gas & Water	34	60	196	467	513	564	868	1,106
Construction	583	1,570	3,583	5,396	6,074	6,621	7,216	9,020
Trade, Restaurant & Hotel	540	889	1,837	3,365	3,911	4,615	5,580	7,287
Transport, Communication & Storage	1,095	1,833	3,420	3,686	3,572	3,964	4,746	6,269
Financial & Real estate	873	1,495	3,691	5,599	6,727	8,122	9,152	11,126
Community & Social service	648	1,221	3,035	5,871	6,691	6,915	7,812	9,327
(GDP AT FACTOR COST)	(15,936)	(21,886)	(41,556)	(63,600)	(72,097)	(84,580)	(98,296)	(122,420)
Indirect Taxes (Net)	635	1,465	2,861	5,258	5,437	6,245	7,004	8,265
a) Agriculture	115	163	244	348	410	471	517	610
b) Non-agriculture	520	1,302	2,617	4,910	5,027	5,774	6,487	7,655

Note *: Figures of 1990/91 are preliminary estimate and its of 1991/92 are tentative estimate.

Source: Ref. E.3 and Ref. E.4

Table E.1.4 Foreign Trade of Nepal

(unit: million NRs.)

Year	1974/75	1979/80	1984/85	1987/88	1988/89	1989/90	1990/91	1991/92*
Export FOB	889.6	1,150.5	2,740.6	4,114.6	4,195.3	5,235.5	7,387.5	13,939.4
Agri. Commodities	733.6	799.1	1,541.0	1,499.7	934.4	891.1	1,431.7	2,678.4
Share in Total (%)	82.5	69.5	56.2	36.4	22.3	17.0	19.4	19.2
To India	746.7	520.9	1,601.7	1,567.8	1,034.9	666.6	1,552.2	1,568.9
Share in Total (%)	83.9	45.3	58.4	38.1	24.7	12.7	21.0	11.3
Import CIF	1,814.6	3,480.1	7,742.1	13,869.6	16,263.7	18,401.5	23,226.5	32,951.3
Agri. Comodities	332.8	565.7	1,409.5	3,085.3	3,045.1	3,765.0	4,832.6	8,386.3
Share in Total (%)	18.3	16.3	18.2	22.2	18.7	20.5	20.8	25.5
From India	1,475.7	1,786.4	3,895.8	4,595.8	4,238.7	4,646.3	7,323.1	11,815.9
Share in Total (%)	81.3	51.3	50.3	33.1	26.1	25.2	31.5	35.9
Trade Balance	-925.0	-2,329.6	-5,001.5	-9,755.0	-12,068.4	-13,166.0	-15,839.0	-19,011.9
Agri. Comodities	400.8	233.4	131.5	-1,585.6	-2,110.7	-2,873.9	-3,400.9	-5,707.9
With India	-729.0	-1,265.5	-2,294.1	-3,028.0	-3,203.8	-3,979.7	-5,770.9	-10,247.0
Exported Major Agricultural Commodities to India								
Timber	283.2	136.1	25.7	0.0	0.0	0.0	0.0	0.0
Husked Rice	116.7	2.9	250.0	0.0	0.0	0.0	0.0	0.0
Maize	0.0	2.7	10.9	0.0	1.3	0.1	0.0	0.0
Mustard and Linseed	29.4	0.0	25.7	141.3	50.8	3.7	62.1	61.0
Herbs	2.2	13.5	27.8	16.4	13.7	4.5	21.3	13.2
Ghee	52.0	21.2	39.4	46.7	49.9	7.8	27.6	13.2
Dry Ginger	29.0	8.6	38.7	37.3	30.3	9.9	29.4	16.2
Pulses	0.0	0.0	0.0	123.1	51.8	2.7	77.0	14.3
Kutch	0.0	0.0	0.0	105.4	43.6	0.0	5.8	10.1
Live Animals	0.0	0.0	0.0	162.5	126.1	73.1	178.1	58.0
Flour	0.0	0.0	0.0	0.2	0.1	0.2	4.5	1.7
Ginger	0.0	0.0	0.0	34.1	30.5	29.2	73.4	67.7
Oil Cake	0.0	0.0	0.0	57.5	49.0	22.6	78.1	58.6
Catechu	0.0	0.0	0.0	9.0	3.3	11.0	93.1	98.2
Rice Bran Oil	0.0	0.0	0.0	79.0	53.2	5.1	136.4	94.0
Salseed Oil	0.0	0.0	0.0	56.9	35.8	0.0	33.9	0.0
Raw Jute	0.0	12.9	43.9	44.1	36.5	117.5	5.7	0.0
Jute Cuttings	0.0	7.5	0.0	8.6	10.5	0.0	0.0	0.5
Jute Goods	0.0	8.3	260.0	188.7	134.0	4.5	272.3	191.4
Exported Major Agricultural Commodities to Other Countries								
Raw Jute	45.9	119.6	0.0	30.3	0.0	11.3	2.5	0.0
Jute Goods	34.3	115.0	0.0	0.4	0.0	4.1	0.0	0.0
Pulses	8.0	81.9	108.6	4.0	46.0	208.8	169.9	1,144.3
Rice	3.8	39.4	0.0	0.0	0.0	0.0	0.0	3.8
Linseed	6.0	0.0	0.0	0.0	157.0	27.7	0.0	0.0
Cardamom(large)	6.7	16.4	14.6	20.0	14.9	5.6	0.8	0.0
Dry Ginger	5.3	1.5	0.0	0.0	0.0	0.0	0.0	0.0
Herbs	9.9	1.5	0.8	0.2	0.8	2.6	1.2	3.8
Catechu	0.9	3.9	1.9	1.4	1.6	0.0	0.0	0.0
Imported Major Agricultural Commodities from India								
Rice	-	-	-	-	-	-	0.0	206.5
Wheat	-	-	-	-	-	-	0.0	178.4
Live Animals	-	-	-	-	-	-	388.9	41.6
Row Cotton	-	-	-	-	-	-	23.4	94.0
Vegetables	-	-	-	-	-	-	94.9	106.2
Fruits	-	-	-	-	-	-	77.8	50.7
Tobacco	-	-	-	-	-	-	249.4	114.1
Tea	-	-	-	-	-	-	57.2	69.2
Dry Chilly	-	-	-	-	-	-	4.4	15.3
Fertilizer	-	-	-	-	-	-	0.0	253.7
Imported Major Agricultural Commodities from Other Countries								
Edible Oil	-	-	-	-	-	-	458.1	657.9
Sugar	-	-	-	-	-	-	15.4	42.0
Row Cotton	-	-	-	-	-	-	0.0	24.4
Palm Oil	-	-	-	-	-	-	90.1	130.3
Insecticide	-	-	-	-	-	-	20.0	7.0
Fertilizer	-	-	-	-	-	-	793.7	1,351.3
Agri. Equipments	-	-	-	-	-	-	103.6	22.6

Note: 1991/92*: Provisional
Source: Ref. E.4 and Ref.E.5

Table E.1.5 Balance of Payment of Nepal

(Unit: million NRs.)

Discription	1974/75	1979/80	1984/85	1987/88	1988/89	1989/90	1990/91	1991/92
Trade Balance	-925.0	-2,403.0	-5,022.2	-9,765.5	-12,085.7	-13,186.2	-15,852.4	-19,039.8
1. Export (FOB)	889.6	1,166.3	2,746.4	4,127.3	4,211.1	5,169.5	7,403.3	13,958.5
2. Import (CIF).	1,814.6	3,569.3	7,768.6	13,892.8	16,296.8	18,355.7	23,255.7	32,998.3
Services, net	280.8	873.2	1,079.5	2,211.7	2,989.5	2,613.2	2,691.5	3,893.1
1. Receipts	693.3	1,719.0	2,718.4	4,785.4	6,189.7	6,368.0	7,679.0	11,756.7
1.1 Freight on Merchandise								
1.2. Other Transportation							230.8	1,350.6
1.3. Travel	170.6	636.8	735.4	1,675.7	2,787.5	3,121.2	3,587.6	5,016.9
1.4. Investment Income	108.7	190.3	93.5	196.0	503.8	651.2	856.5	1,123.3
1.5. Government, n.i.e							1,271.6	2,217.0
1.6. Other services	414.0	891.9	1,889.5	2,913.7	2,898.4	2,595.6	1,732.5	2,048.9
2. Payments	412.5	845.8	1,638.9	2,573.7	3,200.2	3,754.8	4,987.5	7,863.6
1.1. Freight on merchandise							605.2	889.8
1.2. Other Transportation							789.5	1,872.8
1.3. Travel							1,433.9	1,780.9
1.4. Investment Income							458.9	530.3
1.5. Government n.i.e.	242.0	761.7	1,332.8	1,278.7	1,272.7	1,072.7	256.0	192.9
1.6. Other Services	3.4	45.4	31.8	43.3	31.8	171.6	1,444.0	2,596.9
Unrequitted Transfers, net	523.9	1,188.2	2,093.7	2,931.0	2,761.4	2,818.9	3,661.2	4,294.3
1. Private	204.3	357.3	690.7	1,608.4	1,628.6	1,784.2	1,749.0	2,122.4
1.1. Inwards Transfers							2,128.3	2,316.5
1.2. Outward Transfers							379.3	194.1
2. Central Government							1,912.2	2,171.9
2.1. Grants							1,694.0	1,689.5
2.2. Indian Excise Refund	108.2	36.9	71.8	112.8	87.2	0.2	188.0	422.0
2.3. Other Transfer Receipts							30.2	61.9
2.4. Transfer Payments	34.0	13.1	33.4	112.2	258.9	209.8	-	1.5
Current Account Balance	-120.3	-341.6	-1,849.0	-4,622.8	-6,334.8	-7,754.1	-9,499.7	-10,852.4
Official Capital, net	86.7	577.3	1,270.2	4,368.0	6,045.1	5,888.8	6,300.0	7,326.0
1. Foreign loans	104.0	598.0	1,362.5	4,675.4	6,425.2	6,617.6	7,154.0	8,710.3
2. Amortization	17.3	20.7	92.3	307.4	380.1	728.8	-854.0	-1,384.3
Miscellaneous capital items, net	388.8	-209.3	-287.2	2,527.8	365.6	4,514.9	7,331.9	7,859.6
Change in Reserves, net (-increase)	422.4	26.4	-866.0	2,273.0	75.9	2,649.6	-4,132.2	-4,333.2

Source: Ref. E.4 and Ref. E.6

Table E.1.6 Harvest Area, Production and Unit Yield of Major Crops (1/2)

(unit: ha, ton, ton/ha)

		1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	Average
(1) Paddy												
	Area	1,264,840	1,334,200	1,376,860	1,391,040	1,333,360	1,423,290	1,450,470	1,432,850	1,455,170	1,411,810	1,387,389
Nepal	Production	1,832,620	2,756,980	2,709,430	2,804,490	2,372,020	2,981,780	3,283,210	3,389,670	3,502,160	3,222,540	2,885,490
	Yield	1.45	2.07	1.97	2.02	1.78	2.09	2.26	2.37	2.41	2.28	2.07
	Area	990,620	1,049,930	1,050,130	1,046,280	984,030	1,049,900	1,066,380	1,056,090	1,069,180	1,030,000	1,039,254
Terai Area	Production	1,297,430	2,149,660	2,061,660	2,155,490	1,731,080	2,249,090	2,444,640	2,535,470	2,594,800	2,377,760	2,159,708
	Yield	1.31	2.05	1.96	2.06	1.76	2.14	2.29	2.40	2.43	2.31	2.07
Kapilvastu	Area	76,870	79,220	73,280	76,980	61,580	71,150	71,020	71,000	70,710	65,240	71,705
District	Production	99,990	127,120	125,780	138,560	75,280	135,300	140,450	142,000	171,600	97,860	125,394
	Yield	1.30	1.60	1.72	1.80	1.22	1.90	1.98	2.00	2.43	1.50	1.75
(2) Wheat												
	Area	483,820	471,750	451,890	482,820	535,530	596,750	599,290	604,240	592,740	571,260	539,009
Nepal	Production	656,630	633,700	533,720	598,000	701,040	744,600	830,050	854,960	835,970	779,160	716,783
	Yield	1.36	1.34	1.18	1.24	1.31	1.25	1.39	1.41	1.41	1.36	1.33
	Area	315,560	301,710	265,510	258,830	292,760	313,280	314,260	316,910	308,260	289,180	297,626
Terai Area	Production	444,460	416,310	335,710	362,290	430,360	433,750	493,850	507,120	490,020	445,290	435,916
	Yield	1.41	1.38	1.26	1.40	1.47	1.38	1.57	1.60	1.59	1.54	1.46
Kapilvastu	Area	23,120	22,760	20,480	20,500	26,780	26,580	20,100	22,090	21,680	15,870	21,996
District	Production	34,680	29,590	24,570	28,700	37,450	32,430	30,150	34,240	33,600	21,840	30,725
	Yield	1.50	1.30	1.20	1.40	1.40	1.22	1.50	1.55	1.55	1.38	1.40
(3) Maize												
	Area	510,770	503,770	578,720	614,680	626,710	673,810	721,870	751,170	757,710	754,090	649,330
Nepal	Production	718,240	761,110	819,850	873,750	868,350	901,500	1,071,610	1,200,990	1,230,950	1,204,710	965,106
	Yield	1.41	1.51	1.42	1.42	1.39	1.34	1.48	1.60	1.62	1.60	1.48
	Area	148,450	145,120	129,190	134,250	138,340	137,490	147,650	158,640	161,840	160,590	146,156
Terai Area	Production	227,280	264,870	203,800	211,640	215,150	207,710	249,030	289,640	296,360	292,020	245,750
	Yield	1.53	1.83	1.58	1.58	1.56	1.51	1.69	1.83	1.83	1.82	1.67
Kapilvastu	Area	360	2,500	750	660	800	970	550	450	870	900	881
District	Production	600	7,220	1,210	1,420	1,400	1,360	970	800	1,860	1,710	1,855
	Yield	1.67	2.89	1.61	2.15	1.75	1.40	1.76	1.78	2.14	1.90	1.91
(4) Millet												
	Area	129,110	123,870	134,370	151,050	150,780	164,770	182,560	193,490	198,570	198,240	162,681
Nepal	Production	121,070	114,910	124,430	137,940	137,590	150,130	183,090	224,780	231,630	228,660	165,423
	Yield	0.94	0.93	0.93	0.91	0.91	0.91	1.00	1.16	1.17	1.15	1.00
	Area	21,320	17,110	10,730	11,550	11,180	13,340	11,730	12,220	12,710	13,020	13,491
Terai Area	Production	17,840	15,940	10,450	10,470	10,150	12,400	11,970	13,190	13,930	13,740	13,008
	Yield	0.84	0.93	0.97	0.91	0.91	0.93	1.02	1.08	1.10	1.06	0.97
Kapilvastu	Area	540	790	370	300	350	100	100	120	120	120	291
District	Production	490	720	370	300	320	90	90	130	130	140	278
	Yield	0.91	0.91	1.00	1.00	0.91	0.90	0.90	1.08	1.08	1.17	0.99
(5) Barley												
	Area	24,340	24,830	27,570	29,320	28,560	29,110	29,450	29,540	29,610	29,660	28,199
Nepal	Production	21,160	22,270	23,640	23,430	24,670	24,290	27,020	27,390	27,840	27,640	24,935
	Yield	0.87	0.90	0.86	0.80	0.86	0.83	0.92	0.93	0.94	0.93	0.88
Terai	Area	4,420	4,940	4,240	3,440	3,560	3,480	3,350	3,380	3,390	3,340	3,754
Area	Production	3,890	4,730	3,800	3,020	3,280	3,050	3,170	3,240	3,280	3,200	3,466
	Yield	0.88	0.96	0.90	0.88	0.92	0.88	0.95	0.96	0.97	0.96	0.92
Kapilvastu	Area	180	100	50	40	100	160	150	140	130	120	117
District	Production	100	100	40	30	90	140	150	140	130	120	104
	Yield	0.56	1.00	0.80	0.75	0.90	0.88	1.00	1.00	1.00	1.00	0.89

Source: Ref. E.1 and DFAMS's data

Table E.1.6 Harvest Area, Production and Unit Yield of Major Crops (2/2)

(unit: ha, ton, ton/ha)

		1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	Average
(6) Sugarcane												
	Area	24,510	22,740	17,480	23,010	24,910	29,520	29,550	31,500	32,960	37,410	27,359
Nepal	Production	616,090	509,070	408,260	558,340	616,580	814,400	903,010	988,300	1,105,960	1,291,340	781,135
	Yield	25.1	22.4	23.4	24.3	24.8	27.6	30.6	31.4	33.6	34.5	27.75
	Area	22,780	20,710	15,950	20,950	22,740	27,170	27,240	28,830	30,370	34,950	25,169
Terai Area	Production	574,740	478,310	382,160	525,690	581,050	775,820	861,200	943,730	1,063,480	1,249,500	743,568
	Yield	25.2	23.1	24.0	25.1	25.6	28.6	31.6	32.7	35.0	35.8	28.66
Kapilvastu	Area	1,600	1,510	1,400	1,400	1,500	1,500	1,380	1,020	1,020	1,020	1,335
District	Production	35,200	33,230	30,800	28,000	40,230	37,500	44,160	33,660	35,000	35,700	35,348
	Yield	22.0	22.0	22.0	20.0	26.8	25.0	32.0	33.0	34.3	35.0	27.21
(7) Oilseeds												
	Area	110,340	110,700	127,820	138,460	142,890	151,490	154,860	153,660	156,310	154,570	140,110
Nepal	Production	69,590	73,350	84,030	78,660	82,500	94,370	99,190	98,060	92,140	87,840	85,973
	Yield	0.63	0.66	0.66	0.57	0.58	0.62	0.64	0.64	0.59	0.57	0.61
Terai Area	Area	85,250	86,710	100,530	111,090	113,960	121020	122,900	121,870	125,130	123,940	111,240
Area	Production	55,750	58,870	66,940	62,890	66,080	76,260	79,600	77,450	71,810	71,150	68,680
	Yield	0.65	0.68	0.67	0.57	0.58	0.63	0.65	0.64	0.57	0.57	0.62
Kapilvastu	Area	1,600	1,840	2,000	2,200	2,310	2,200	2,000	2,200	2,320	2,050	2,072
District	Production	800	1,080	1,170	1,030	1,260	1,100	1,200	1,530	1,570	1,230	1,197
	Yield	0.50	0.59	0.59	0.47	0.55	0.50	0.60	0.70	0.68	0.60	0.58
(8) Tobacco												
	Area	8,960	9,050	8,550	8,680	8,820	6,470	7,300	7,610	7,290	6,520	7,925
Nepal	Production	6,640	6,880	6,430	4,680	4,890	4,460	5,380	6,600	6,980	6,005	5,895
	Yield	0.74	0.76	0.75	0.54	0.55	0.69	0.74	0.87	0.96	0.92	0.75
	Area	8,720	8,770	8,230	8,430	8,540	6,260	7,180	7,470	7,150	6,390	7,714
Terai Area	Production	6,480	6,700	6,200	4,520	4,740	4,350	5,310	6,500	6,880	5,900	5,758
	Yield	0.74	0.76	0.75	0.54	0.56	0.69	0.74	0.87	0.96	0.92	0.75
Kapilvastu	Area	80	60	120	120	100	90	20	20	20	20	65
District	Production	50	40	90	100	70	60	10	10	10	15	46
	Yield	0.63	0.67	0.75	0.83	0.70	0.67	0.50	0.50	0.50	0.75	0.65
(9) Potato												
	Area	59,200	58,880	65,540	69,960	74,310	80,180	81,570	83,350	84,280	85,300	74,257
Nepal	Production	372,970	383,080	420,160	356,720	395,110	566,950	640,910	678,100	738,030	732,860	528,489
	Yield	6.30	6.51	6.41	5.10	5.32	7.07	7.86	8.14	8.76	8.59	7.00
Terai	Area	15,250	13,190	16,430	16,840	17,770	18,750	18,830	18,420	18,230	18,900	17,261
Area	Production	104,520	88,960	111,160	78,640	86,440	168,310	197,370	200,470	219,280	225,130	148,028
	Yield	6.85	6.74	6.77	4.67	4.86	8.98	10.48	10.88	12.03	11.91	8.42
Kapilvastu	Area	300	220	320	350	330	300	350	360	480	410	342
District	Production	1,800	1,320	1,860	1,300	2,010	1,900	3,280	3,600	4,720	4,420	2,621
	Yield	6.00	6.00	5.81	3.71	6.09	6.33	9.37	10.00	9.83	10.78	7.39
(10) Pulses												
	Area	-	-	228,020	253,660	262,940	264,570	265,730	268,540	267,720	261,860	259,130
Nepal	Production	-	-	131,680	146,160	166,090	139,490	156,680	163,230	161,320	156,540	152,649
	Yield	-	-	0.58	0.58	0.63	0.53	0.59	0.61	0.60	0.60	0.59
	Area	-	-	192,250	212,880	219,900	212,340	212,670	214,700	211,340	202,830	209,864
Terai Area	Production	-	-	110,830	124,660	141,990	110,830	127,330	131,450	120,590	125,390	124,134
	Yield	-	-	0.58	0.59	0.65	0.52	0.60	0.61	0.57	0.62	0.59
Kapilvastu	Area	-	-	10,620	11,150	11,480	9,130	7,900	9,080	9,680	9,370	9,801
District	Production	-	-	7,280	7,690	8,100	4,920	4,340	5,400	6,080	5,670	6,185
	Yield	-	-	0.69	0.69	0.71	0.54	0.55	0.59	0.63	0.61	0.62

Source: Ref. E.1 and DFAMS's data

Table E.1.7 Agricultural Credit by ADB/N

(unit: 1000 NRs.)

	ADB/N Loan			SFDP		
	1989/90	1990/91	1991/92	1989/90	1990/91	1991/92
1. Disbursement						
1 Cereal Crop Farming	206,378	187,099	249,804	39,204	33,121	40,404
2 Cash Crop Farming	177,403	166,185	184,791	38,099	31,518	32,727
3 Agricultural Marketing	109,983	84,783	113,032	18,500	17,828	18,892
4 Agricultural Tools	84,209	99,908	125,516	27,730	26,471	30,729
5 Irrigation	73,211	81,139	149,427	14,028	16,921	19,952
6 Agricultural Business	276,444	255,277	291,202	91,346	82,589	89,686
7 Cottage Industry	124,672	148,822	227,538	14,325	12,699	11,795
8 Bio-gas	44,473	27,036	53,482	1,458	811	2,751
9 Land Improvement	3,929	2,774		4,285	2,375	5,036
10 Horticulture	40,227	27,416	23,991	9,919	5,599	4,294
11 Godown & Cold Store	8,502	4,823	17,697	22	9	82
12 Tea/Coffee Cultivation	5,904	7,678	11,127	251	51	49
13 Horsing	15,504	2,161	3,795	5,304	493	15
Total	1,170,839	1,095,101	1,451,402	264,471	230,485	256,412
2. Collection						
1 Cereal Crop Farming	148,652	145,868	226,521	26,375	28,892	34,675
2 Cash Crop Farming	110,548	117,577	163,923	20,909	25,058	29,945
3 Agricultural Marketing	91,802	72,023	96,637	11,355	12,923	15,358
4 Agricultural Tools	58,668	56,321	95,769	12,318	12,276	19,672
5 Irrigation	68,001	71,725	118,761	9,173	11,764	17,416
6 Agricultural Business	148,128	147,437	208,981	38,723	39,052	57,823
7 Cottage Industry	81,608	100,807	142,962	7,535	8,556	10,615
8 Bio-gas	22,117	20,532	34,116	506	407	1,297
9 Land Improvement	4,395	2,003		1,297	1,151	2,282
10 Horticulture	9,508	11,134	16,377	1,494	1,681	2,776
11 Godown & Cold Store	8,000	4,159	8,737	64	17	63
12 Tea/Coffee Cultivation	3,218	1,362	1,920	72	38	40
13 Horsing	230	363	14,289	101	54	2,129
Total	754,875	751,311	1,128,993	129,922	141,869	194,091
3. Outstanding						
1 Cereal Crop Farming	464,730	505,799	529,082	53,675	61,107	67,017
2 Cash Crop Farming	330,052	378,660	399,528	47,962	58,655	60,713
3 Agricultural Marketing	119,948	132,687	149,082	22,599	28,039	32,041
4 Agricultural Tools	247,560	291,101	320,848	71,215	87,567	98,291
5 Irrigation	208,403	217,817	248,483	31,569	37,806	38,448
6 Agricultural Business	805,068	912,908	995,129	214,509	259,965	294,022
7 Cottage Industry	354,434	402,449	487,025	34,540	39,765	41,414
8 Bio-gas	80,784	87,288	106,654	2,768	6,452	4,401
9 Land Improvement	8,791	9,562		10,498	10,603	13,171
10 Horticulture	168,714	184,996	192,610 *	28,303	32,614	35,434
11 Godown & Cold Store	57,366	58,631	67,591	881	379	796
12 Tea/Coffee Cultivation	91,284	97,600	106,807	909	868	519
13 Horsing	47,526	49,324	48,392	13,104	12,190	12,175
Total	2,984,660	3,328,822	3,651,231	532,532	636,010	698,442

Note *: Including Land Improvement
Source: ADB/N

Table E.1.8 Agricultural Input Supply by AIC

Input		Unit	1989/90	1990/91	1991/92
1 Fertilizer					
Ammonium Sulfate	(21:0:0)	ton	6,555.0	6,947.6	3,631.5
Urea	(46:0:0)	ton	70,861.0	80,999.7	92,674.0
TSP	(0:46:0)	ton	3,241.0	12,680.9	2,268.1
Potash	(0:0:60)	ton	1,572.0	1,460.8	2,070.8
Complex	(20:20:0)	ton	72,352.0	59,130.0	63,023.1
Complex	(19:19:10)	ton	3,954.0	6,566.0	3,597.7
DAP	(18:46:0)	ton	65.0	760.3	18,198.8
Others		ton	21.0	91.0	49.5
Total		ton	158,621.0	168,636.2	185,513.3
2 Agro-Chemicals					
Liquid		liter	4,885.9	3,944.7	3,235.8
Dust		kg	651.9	429.3	391.0
Agricultural Lime		kg	319.6	162.2	64.1
3 Seeds					
Paddy		ton	146.0	156.0	276.5
Wheat		ton	2,122.6	2,074.9	1,910.2
Maize		ton	125.6	43.7	66.3
Millet		ton	0.1	0.2	0.2
Barley		ton	0.1		
Gram		ton	2.8	6.2	0.9
Lentil		ton	15.3	12.0	27.9
Soybean		ton	4.4	1.9	2.3
Groundnut		ton	3.3	1.9	2.1
Mustard		ton	7.7	1.7	0.1
Green Manure	(Dheainch)	ton	4.1	4.0	2.8
Vegetables		ton	28.4	21.6	25.5
Total		ton	2,460.3	2,324.1	2,315.0
4 Tools		1000NRs	4,386.2	4,440.3	2,738.6

Source: Agricultural Inputs Corporation

Table E.1.9 Irrigated Area in Nepal

(unit: 1000ha)

1. Irrigation Development Target and Achievement in the National Plan Periods

Five Year Dev. Plan		Target	Achievement	% of Achievement
Prior to the 1st Plan		-	6	-
The 1st Plan	(1955-60)	21	5	25.1
The 2nd Plan	(1960-65)	33	1	3.2
The 3rd Plan	(1965-70)	51	53	104.4
The 4th Plan	(1970-75)	254	38	14.9
The 5th Plan	(1975-80)	230	95	41.4
The 6th Plan	(1980-85)	233	173	74.1
The 7th Plan	(1985-90)	235	99	41.9
The 8th Plan	(1992-97)	294	-	-

2. Distribution of Cultivated Area, Irrigated Area and Irrigable Area

Area	Total Area	Cultivated Area(A)	Irrigated Area(B)	Rainfed Area	Irrigable Land	(B/A) %
Nepal	14,749	2,641	943	1,698	1,766	35.7
Eastern Dev. Region	2,854	749	319	430	522	42.6
Central Dev. Region	2,734	716	267	449	542	37.3
Western Dev. Region	2,936	521	164	357	322	31.5
Mid-West. Dev.Region	4,281	398	105	293	223	26.4
Far-West. Dev.Region	1,944	257	88	169	157	34.2
Mountain Area	5,188	227	34	193	60	15.0
Hill Area	6,152	1,055	188	867	368	17.8
Terai Area	3,409	1,359	721	638	1,338	53.1

3. Irrigation System

Area	DOI*	(%)	FMIS**	(%)	Total
Nepal	267	28.3	676	71.7	943
Eastern Dev.Region	132	41.4	187	58.6	319
Central Dev.Region	76	28.5	191	71.5	267
Western Dev.Region	36	22.0	128	78.0	164
Mid-West. Dev.Region	5	4.8	100	95.2	105
Far-West. Dev.Region	18	20.5	70	79.5	88
Mountain Area	0	0.0	34	100.0	34
Hill Area	15	8.0	173	92.0	188
Terai Area	252	35.0	469	65.0	721

4. Irrigation Water Source

Area	Surface Water	(%)	Groundwater	(%)	Total
Nepal	833	88.3	110	11.7	943
Eastern Dev.Region	286	89.9	32	10.1	318
Central Dev.Region	231	86.2	37	13.8	268
Western Dev.Region	147	89.6	17	10.4	164
Mid-West. Dev.Region	97	92.4	8	7.6	105
Far-West. Dev.Region	72	81.8	16	18.2	88
Mountain Area	34	100.0	0	0.0	34
Hill Area	187	99.6	1	0.4	188
Terai Area	612	84.9	109	15.1	721

Note: DOI*: Department of Irrigation Schemes
FMIS**: Farmers Managed Irrigation Schemes

Source: Ref. E.7

Table E.1.10 Target of Agricultural Production and Productivity for the Eighth Plan

Crop	Unit	Production		Targeted Output increase per year	Productivity	
		Based year 1990/91	Target year 1996/97		Based year 1990/91	Target year 1996/97
				(%)	(ton/ha)	(ton/ha)
Food Grains				5.4		
Paddy	1000ton	3,392.0	4,452.0	5.5	2.350	2.850
Maize	1000ton	1,168.0	1,476.0	4.7	1.570	1.930
Wheat	1000ton	840.0	1,258.0	8.4	1.400	2.040
Millet	1000ton	213.0	236.0	2.1	1.110	1.130
Buckwheat	1000ton	23.0	32.0	6.8	0.540	0.640
Barley	1000ton	27.0	32.0	3.4	0.930	1.140
Pulses Crops	1000ton	124.0	186.0	8.4	0.600	0.820
Cash Crops				9.1		
Oilseeds*	1000ton	108.0	174.0	10.0	0.647	0.906
Sugarcane	1000ton	1,106.0	1,530.0	6.7	33.560	38.250
Tobacco	1000ton	6.3	9.5	8.6	0.854	0.990
Jute Fiber	1000ton	16.4	25.0	8.8	1.215	1.400
Horticulture Crops				5.4		
Citrus	1000ton	86.0	128.0	8.3	9.520	9.820
Other Fruits	1000ton	416.0	507.0	4.0	9.940	10.290
Vegetables	1000ton	1,075.0	1,278.0	3.5	7.090	9.100
Potato	1000ton	738.0	1,033.0	7.0	8.680	10.760
Livestock Development				3.8		
Milk	1000ton	865.0	1,028.0	3.5		
Eggs	million peaces	369.5	479.8	5.4		
Meat	1000ton	147.0	173.0	3.3		
Wool	ton	767.0	814.0	1.2		
Fish	ton	12,656.0	22,311.0	12.0		
Miscellaneous						
Tea	1000ton	1.5	2.5	10.7	0.545	0.645
Cotton	1000ton	1.7	7.1			
Silk(cocoon)	ton	30.0	400.0			
Mushroom	ton	56.0	300.0			
Ginger	1000ton	19.5	32.5			
Cardamom	ton	3,002.0	3,540.0			
Coffee	ton		153.0			

Note: *: Including Peanut
Source: Ref. E.10

Table E.1.11 Investment and Outlay for the Eighth Plan Period

(unit: million NRs, at 1991/92 price)

	Seventh Plan		Eighth Plan	
	Amount	Share (%)	Amount	Share (%)
A) Total Gross Fixed Investment	103,014	100.0	170,332	100.0
Agriculture, Irrigation & Forestry	25,270	24.5	43,876	25.8
Industry & Mining	7,572	7.4	14,925	8.8
Electricity, Gas & Water	17,246	16.7	27,668	16.2
Construction	3,382	3.3	5,072	3.0
Trade, Hotel & Restaurant	2,678	2.6	6,581	3.8
Transport & Communication	15,881	15.4	26,119	15.3
Finance & Real estate	23,970	23.3	33,184	19.5
Social services	7,015	6.8	12,907	7.6
B) Total Development Outlay	74,174	100.0	113,479	100.0
Agriculture, Irrigation & Forestry	20,045	27.0	29,193	25.7
(Agriculture Sector in Economic Services)			(10,947)	(9.6)
(Irrigation Sector in Services)			(11,966)	(10.4)
Industry & Mining	4,539	6.1	22,245	2.0
Electricity	12,751	17.2	23,719	20.9
Trade & Tourism	422	0.6	1,481	1.3
Transport & Communication	11,657	15.7	20,030	17.7
Social services	21,894	29.5	35,808	31.5
Miscellaneous	2,866	3.9	1,003	0.9

Source: Ref. E.10

Table E.2.1 Population, Households, Labor Force and Cultivated Area in the Study Area

Name of V.D.C. / Ward No. & Village Name	Population			Total Household	Family Size	No. of Farm Household			Labor Force		Cultivated Area		
	Total	Male	Female			Landowner	Landless	Total	EAP*	Agriculture	Total (ha)	Paddy	Upland
1 MAHENDRAKOT V.D.C.													
1.1 Pachkaiya,Kapasi	470	223	247	54	8.7	54			241		57		
1.2 Basantapur,Jhagarthawa	670	340	330	95	7.1	55			343		34		
1.3 Bhelai East	930	470	460	130	7.2	91			476		51		
1.4 Bhelai West	550	270	280	85	6.5	60			282		22		
1.5 Tikker	320	162	158	60	5.3	60			164		17		
1.6 Birpur,Khayarbhatti	1,090	575	515	200	5.5	164			558		86		
1.7 Patharkot Gaon	985	468	517	144	6.8	144			504		114		
1.8 Patharkot Bazaar	575	285	290	98	5.9	65			294		61		
1.9 Changhat	295	145	150	53	5.6	53			151		64		
TOTAL	5,885	2,938	2,947	919	6.4	746	70	816	3,013	2,673	506	506	0
2 DUBIYA V.D.C.													
2.1 Murmy	261	127	134	59	4.4	58			134		99		
2.2 Murmy	187	93	94	36	5.2	36			96		53		
2.3 Ghanchaura,Uttardada	337	165	172	49	6.9	49			173		53		
2.4 Dubiya	415	225	190	60	6.9	60			212		52		
2.5 Ghanchaura,Mukauli	330	180	150	68	4.9	67			169		137		
TOTAL	1,530	790	740	272	5.6	270	0	270	783	777	396	366	30
3 JAYANAGAR D.V.C.													
3.1 Bakadaria	600	325	275	80	7.5	80			307		71		
3.2 Bakadaria	500	275	225	60	8.3	60			256		51		
3.3 Purena	1,000	450	550	60	16.7	60			512		57		
3.4 Gorusinge	200	110	90	70	2.9	70			102		126		
3.5 Gorusinge	200	125	75	40	5.0	30			102		58		
3.6 Gorusinge	306	150	156	47	6.5	45			157		67		
3.7 Gorusinge	560	290	270	75	7.5	55			287		87		
3.8 Gorusinge	377	189	188	35	10.8	35			193		39		
3.9 Badahara	1,200	650	550	131	9.2	131			614		121		
TOTAL	4,943	2,564	2,379	598	8.3	566	15	581	2,531	2,452	677	635	42
4 BUDDHI V.D.C.													
4.1 Buddi	730	353	377	131	5.6	131			374		95		
4.2 Buddi	500	257	243	75	6.7	75			256		46		
4.3 Kasnar,Bhairampur,Kitauri	506	283	223	85	6.0	85			259		49		
4.4 Jitpur,Nayabasti	648	335	313	100	6.5	100			332		68		
4.5 Paschim tola,Chaura	594	303	291	109	5.4	109			304		47		
4.6 Pratrappur	186	101	85	30	6.2	26			95		24		
4.7 Chaurangi,Debari,Miltole	509	282	227	108	4.7	108			261		46		
4.8 Gelwar,Debara	354	173	181	71	5.0	71			181		39		
4.9 Morma	294	170	124	51	5.8	51			151		33		
TOTAL	4,321	2,257	2,064	760	5.7	756	0	756	2,212	2,199	447	447	0
5 RAJPUR V.D.C.													
5.1 Pakarchata	725	400	325	62	11.7	53			371		65		
5.2 Pakarchata	637	337	300	65	9.8	65			326		42		
5.3 Chauri	1,267	700	567	183	6.9	183			649		226		
5.4 Islam Nagar	622	337	285	113	5.5	113			318		65		
5.5 Bichawapur	660	350	310	65	10.2	50			338		75		
5.6 Pakarchati	693	375	318	70	9.9	48			355		51		
5.7 Rajpur	745	387	358	53	14.1	49			381		50		
5.8 Magurgadh	715	372	343	103	6.9	103			366		87		
5.9 Mohammad Nagar	780	402	378	100	7.8	100			399		135		
TOTAL	6,844	3,660	3,184	814	8.4	764	30	794	3,504	3,415	816	800	16
6 MAHUWA V.D.C.													
6.1 Mahuwa	661	352	309	122	5.4	122			338		178		
6.2 Panditpur,Semarhawa	547	290	257	90	6.1	90			280		103		
6.3 Shivpura,Bhirihawa	473	246	227	80	5.9	68			242		83		
6.4 Laxmipur	390	199	191	64	6.1	64			200		104		
6.5 Laxmanpur	382	187	195	78	4.9	78			196		79		
6.6 Laxmanpur	554	268	286	93	6.0	36			284		27		
6.7 Kohanauliya	384	200	184	92	4.2	92			197		92		
6.8 Kohanauliya	342	180	162	48	7.1	28			175		18		
6.9 Nayanagar,Shrigung	179	94	85	40	4.5	40			92		50		
TOTAL	3,912	2,016	1,896	707	5.5	618	65	683	2,003	1,933	734	690	44
7 DHANKAULI V.D.C.													
7.1 Dhankauli	957	555	402	157	6.1	106			490		169		
7.2 Malawa	820	450	370	150	5.5	68			420		101		
7.3 Bijgauri	628	303	325	115	5.5	80			322		93		
7.4 Bhagani,Gajani	520	250	270	85	6.1	48			266		40		
7.5 Hardasdihawa	400	215	185	60	6.7	60			205		67		
7.6 Piparhawa,Dharihawa Pokarhawa,Haradihawa	502	202	300	75	6.7	67			257		58		
7.7 Alinagar,Debpur,Logaranta	475	275	200	108	4.4	108			243		100		
7.8 Dharmapur,Bhagawanpur, Siripur	579	379	200	65	8.9	55			296		65		
7.9 Chatradehi,Motinagar, Baikunthapur,Janakpur Muthurapur	941	541	400	268	3.5	268			482		271		
TOTAL	5,822	3,170	2,652	1,083	5.4	860	160	1,020	2,981	2,805	954	984	0
GRAND TOTAL	33,257	17,395	15,862	5,153	6.45	4,580	340	4,920	17,028	16,253	4,560	4,426	132

Note: EAP: Economically Active Population
Source: District Development Committee and Kapilvastu Land Revenue Office

Table E.2.2 Labor Requirement for Farming Activities in the Study Area

Crop	Condition	Requirement	Cropped Area	Total Requirement
		man-day/ha	ha	man-day
(1) Without Project Conditions				
Paddy	P.I.	133	1,280	170,240
	N.I.	118	2,702	318,836
Wheat	P.I.	94	471	44,274
	N.I.	85	376	31,960
Maize	P.I.	93	40	3,720
	N.I.	85	90	7,650
Pulses	P.I.	86	118	10,148
	N.I.	75	651	48,825
Oilseeds	P.I.	83	117	9,711
	N.I.	72	94	6,768
Vegetables	P.I.	186	80	14,880
Total			6,019	667,012

Table E.2.3 Agricultural Input Supply in Kapilvastu District

Input	Year	1990/91					1991/92				
	Unit	(1) AIC Taulihawa	(2) AIC Bahadruganji	(1+2) Kapilvastu Total	Arniko Cooperative Gorusinge	Jenasewa Cooperative Dhankauli	(1) AIC Taulihawa	(2) AIC Bahadruganji	(1+2) Kapilvastu Total	Arniko Cooperative Gorusinge	Jenasewa Cooperative Dhankauli
A Crop Seeds											
1 Paddy	ton	16.2	1.7	17.9	0.0	2.5	12.5	0.9	13.4	0.0	0.0
2 Wheat	ton	16.4	6.5	22.9	0.6	0.0	23.4	5.2	28.6	0.1	0.0
3 Maize	ton	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.3	0.0	0.0
4 Lentil	ton	0.2	0.9	1.1	0.0	0.0	1.4	0.6	2.0	0.0	0.0
5 Vegetables	kg	48.8	32.0	80.8	8.0	0.0	111.0	31.7	142.7	10.0	0.0
B Fertilizer											
1 Urea	ton	2,061.7	1,075.5	3,137.2	59.6	215.3	2,168.5	959.3	3,127.8	37.8	16.3
2 Complex	ton	1,180.3	734.2	1,914.5	33.7	123.2	1,093.8	1,137.8	2,231.6	23.4	39.3
3 KCl	ton	13.6	3.0	16.6	0.1	1.6	14.1	19.0	33.1	0.1	0.2
4 TPS	ton	484.0	338.4	822.4	13.1	11.8	198.1	231.8	429.9	7.3	1.3
5 Ammo.Sulfate	ton	0.0	0.2	0.2	0.0	0.0	0.0	1.1	1.1	0.0	0.0
6 DAP	ton	30.0	0.0	30.0	0.0	0.0	332.6	48.3	380.9	0.0	3.0
7 Potash Sulfate	ton	0.0	9.2	9.2	0.0	0.0					
8 Lime	ton	0.0	0.0	0.0	0.0	0.0	0.0	3.4	3.4	0.0	0.0
C Agro-chemicals											
1 Liquid	Liter	30.7	2.5	33.2	0.2	0.2	44.0	0.0	44.0	0.0	0.0
2 Dust	ton	0.3	1.9	2.1	1.0	0.0	12.0	0.7	12.7	2.1	0.0
D Farm Equipment	NRs.	6,527	74	6,601	0	0	26,788	1,054	27,842	0	0

Source: Office Records of Respective Offices

Note: Arniko and Janesawa Cooperatives are located in the study area

Table E.2.4 Farm-gate Prices of Agricultural Products and Farm Inputs

Name of Inputs and Outputs		Unit	Price (NRs.)
I. Farm Inputs			
A. Fertilizer			
1 Complex	20:20:0	kg	10.00
2 Complex	19:19:10	kg	10.00
3 KCl	0-0-60	kg	8.50
4 TSP	0-46-0	kg	8.00
B. Agro-Chemicals			
1 Hinosan	100ml	Bottle	46.00
2 Metacide	100ml	Bottle	57.00
3 Quicktos		Tube	17.71
4 Nepsiltos		kg	570.25
5 BHC	dust 10%	kg	5.65
6 Diathine	M-45	kg	225.00
C. Tools			
1 Sprayer	9 liter	Piece	2769.00
2 Iron Spade		Piece	70.70
3 Small spade (Kuto)		Piece	18.18
4 Point spade (Chuche Kuto)		Piece	23.84
5 Plough		Piece	252.50
6 Pitcher	10 liter	Piece	151.50
D. Seeds			
1 Paddy	(course)	kg	8.20
2 Paddy	(fine)	kg	9.05
3 Wheat		kg	12.50
4 Maize		kg	12.00
5 Mustard		kg	30.00
6 Lentil		kg	22.00
7 Cauliflower	(Pusa, Dipali, Snow bawl)	kg	550.00
8 Cauliflower	(local)	kg	305.00
9 Cabbage		kg	380.00
10 Radish		kg	110.00
11 Leaf mustard	(Chaudapat)	kg	170.00
12 Leaf mustard	(Khumal)	kg	130.00
13 Cress	(local)	kg	125.00
14 Spinach		kg	100.00
15 Carrot	(Nantas)	kg	310.00
16 Carrot	(Carota)	kg	330.00
17 Broccoli		kg	310.00
18 Swisschart		kg	140.00
19 Onion	(Red crebble)	kg	225.00
20 Pea	(Arkil,Nonbil)	kg	75.00
21 Tomato	(Pusarushi)	kg	660.00
22 Eggplant	(Pusasabitri)	kg	75.00
II. Agricultural Products			
1 Paddy		kg	5.25
2 Wheat		kg	6.00
3 Maize		kg	6.00
4 Mustard Seed		kg	14.00
5 Pulses		kg	16.25
6 Vegetables		kg	5.00

Source: Farm Inputs: Cooperative Union Taulihawa, March. 1993
Agricultural Products: Farm Economy Survey conducted by the Study Team

Table E.2.5 **Agricultural Production Value under Present Condition in the Study Area**

(1) Per ha (unit: per ha)

Crop	Condition	Unit Yield	Unit Price	Gross Income	Production Cost	Net Return
		kg/ha	NRs/kg	NRs	NRs	NRs
Paddy	P.I.	2,200	5.25	11,550	4,733	6,817
	N.I.	1,420	5.25	7,455	4,555	2,900
Wheat	P.I.	1,700	6.00	10,200	4,877	5,323
	N.I.	980	6.00	5,880	4,715	1,165
Maize	P.I.	1,720	6.00	10,320	3,531	6,789
	N.I.	1,330	6.00	7,980	3,330	4,650
Pulses	P.I.	660	14.00	9,240	3,512	5,728
	N.I.	560	14.00	7,840	3,369	4,471
Oilseeds	P.I.	710	16.25	11,538	2,992	8,545
	N.I.	460	16.25	7,475	2,892	4,583
Vegetables	P.I.	3,850	5.00	19,250	9,856	9,394

Note: P.I. : Partially Irrigated, N.I. : Non-irrigated

(2) Total Area (unit: per ha)

Crop	Condition	:opped Area	Total Production	Gross Income	Production Cost	Net Return
		ha	ton	1000NRs	1000NRs	1000NRs
Paddy	P.I.	1,280	2,816	14,784	6,058	8,726
	N.I.	2,702	3,837	20,143	12,308	7,836
Wheat	P.I.	471	801	4,804	2,297	2,507
	N.I.	376	368	2,211	1,773	438
Maize	P.I.	40	69	413	141	272
	N.I.	90	120	718	300	419
Pulses	P.I.	118	78	1,090	414	676
	N.I.	651	365	5,104	2,193	2,911
Oilseeds	P.I.	117	83	1,350	350	1,000
	N.I.	94	43	703	272	431
Vegetables	P.I.	80	308	1,540	788	752
Total		6,019	8,887	52,860	26,895	25,965

Note: P.I. : Partially Irrigated, N.I. : Non-irrigated

Table E.2.6 Land Holding Structure in the Study Area

No. of VDC & Ward	No. of Land Owner					Land Area (ha)					Average per Household
	Total	>5.0	5.0-2.5	2.5-1.0	<1.0	Total	>5.0	5.0-2.5	2.5-1.0	<1.0	
1.1	54	3	4	14	33	57	17	14	16	10	1.1
1.2	55	1	3	7	44	34	5	10	8	11	0.6
1.3	91	2	2	13	74	51	11	6	14	20	0.6
1.4	60	0	0	4	56	22	0	0	5	17	0.4
1.5	60	0	0	2	58	17	0	0	3	14	0.3
1.6	164	2	6	20	136	86	14	19	23	30	0.5
1.7	144	3	10	29	102	114	21	31	31	31	0.8
1.8	65	2	6	14	43	61	13	18	17	13	0.9
1.9	53	3	4	15	31	64	24	13	16	11	1.2
Total	746	16	35	118	577	506	105	111	133	157	0.7
Distribution (%)		2.1	4.7	15.8	77.3		20.8	21.9	26.3	31.0	
			Average Holding Size (ha)				6.56	3.17	1.13	0.27	
2.1	58	5	6	17	30	99	35	22	24	18	1.7
2.2	36	1	4	8	23	53	12	16	12	13	1.5
2.3	49	1	2	15	31	55	7	8	24	16	1.1
2.4	60	0	3	17	40	52	0	10	23	19	0.9
2.5	67	4	12	21	30	137	28	52	38	19	2.0
Total	270	11	27	78	154	396	82	108	121	85	1.5
Distribution (%)		4.1	10.0	28.9	57.0		20.7	27.3	30.6	21.5	
			Average Holding Size (ha)				7.45	4.00	1.55	0.55	
3.1	80	1	7	23	49	71	8	19	32	12	0.9
3.2	60	0	8	9	43	51	0	24	12	15	0.9
3.3	60	0	7	17	36	57	0	20	22	15	1.0
3.4	70	6	14	36	14	126	36	40	43	7	1.8
3.5	30	2	4	18	6	58	16	13	25	4	1.9
3.6	45	0	6	31	8	67	0	18	42	7	1.5
3.7	55	2	4	38	11	87	13	14	53	7	1.6
3.8	35	1	1	13	20	39	8	4	18	9	1.1
3.9	131	2	14	29	86	121	14	42	34	31	0.9
Total	566	14	65	214	273	677	95	194	281	107	1.2
Distribution (%)		2.5	11.5	37.8	48.2		14.0	28.7	41.5	15.8	
			Average Holding Size (ha)				6.79	2.98	1.31	0.39	
4.1	131	3	5	28	95	95	17	15	30	33	0.7
4.2	75	1	2	6	66	46	6	7	9	24	0.6
4.3	85	0	2	9	74	49	0	6	11	32	0.6
4.4	100	1	4	17	78	68	7	14	21	26	0.7
4.5	109	1	1	14	93	47	6	3	16	22	0.4
4.6	26	0	2	10	14	24	0	7	12	5	0.9
4.7	108	0	1	13	94	46	0	3	15	28	0.4
4.8	71	0	0	14	57	39	0	0	18	21	0.5
4.9	51	1	2	6	42	33	6	6	7	14	0.6
Total	756	7	19	117	613	447	42	61	139	205	0.6
Distribution (%)		0.9	2.5	15.5	81.1		9.4	13.6	31.1	45.9	
			Average Holding Size (ha)				6.00	3.21	1.19	0.33	
5.1	53	0	11	14	28	65	0	35	22	8	1.2
5.2	65	0	1	12	52	42	0	4	17	21	0.6
5.3	183	9	9	31	134	226	96	34	47	49	1.2
5.4	113	1	6	15	91	85	8	23	25	29	0.8
5.5	50	2	5	17	26	75	15	17	30	13	1.5
5.6	48	1	5	8	34	51	10	16	16	9	1.1
5.7	49	1	3	11	34	50	9	10	18	13	1.0
5.8	103	4	3	13	83	87	26	12	21	28	0.8
5.9	100	4	5	24	67	135	55	16	39	25	1.4
Total	764	22	48	145	549	816	219	167	235	195	1.1
Distribution (%)		2.9	6.3	19.0	71.9		26.8	20.5	28.8	23.9	
			Average Holding Size (ha)				9.95	3.48	1.62	0.36	
6.1	122	3	18	42	59	178	24	60	67	27	1.5
6.2	90	3	4	32	51	103	16	13	54	20	1.1
6.3	68	1	7	24	36	83	5	19	42	17	1.2
6.4	64	4	6	19	35	104	33	24	32	15	1.6
6.5	78	0	8	21	49	79	0	30	31	18	1.0
6.6	36	1	1	6	28	27	6	4	9	8	0.8
6.7	92	2	6	27	57	92	13	18	39	22	1.0
6.8	28	0	2	2	24	18	0	7	3	8	0.6
6.9	40	2	4	9	25	50	13	13	13	11	1.3
Total	618	16	56	182	364	734	110	188	290	146	1.2
Distribution (%)		2.6	9.1	29.4	58.9		15.0	25.6	39.5	19.9	
			Average Holding Size (ha)				6.88	3.36	1.59	0.40	
7.1	106	8	18	26	54	189	61	62	44	22	1.8
7.2	68	4	9	10	45	101	35	32	17	17	1.5
7.3	80	3	10	14	53	93	18	33	23	19	1.2
7.4	48	0	5	9	34	40	0	17	11	12	0.8
7.5	60	1	4	22	33	67	6	13	35	13	1.1
7.6	67	1	3	15	48	58	5	11	23	19	0.9
7.7	108	2	6	20	80	100	18	21	31	30	0.9
7.8	55	3	5	9	38	65	17	17	15	16	1.2
7.9	268	7	19	52	190	271	42	62	83	84	1.0
Total	860	29	79	177	575	984	202	268	282	232	1.1
Distribution (%)		3.4	9.2	20.6	66.9		20.5	27.2	28.7	23.6	
			Average Holding Size (ha)				6.97	3.39	1.59	0.40	
Grand											
Grand Total	4,580	115	329	1,031	3,105	4,560	855	1,097	1,481	1,127	1.0
Distribution (%)		2.5	7.2	22.5	67.8		18.8	24.1	32.5	24.7	
			Average Holding Size (ha)				7.43	3.33	1.44	0.36	1.00

Note: No. of VDC & Ward* : See Table E.2.1
Source: Figures are calculated from Land Revenue Register

Table E.2.7 Farm Budget under Present Condition in the Study Area

Crop		Large Farmer (size:7.43ha)			Medium Farmer (size:3.33ha)			Small Farmer (size:1.44ha)		
			Cropped	Total		Cropped	Total		Cropped	Total
		Profit	Area	Profit	Profit	Area	Profit	Profit	Area	Profit
		NRs/ha	ha	NRs	NRs/ha	ha	NRs	NRs/ha	ha	NRs
Paddy	P.I.	4,225	2.09	8,812	5,197	0.93	4,858	7,504	0.40	3,033
	N.I	598	4.40	2,633	1,461	1.97	2,883	3,510	0.85	2,995
Wheat	P.I.	3,742	0.77	2,872	4,170	0.34	1,434	5,811	0.15	864
	N.I.	127	0.61	78	384	0.27	105	1,607	0.12	191
Maize	P.I.	4,956	0.07	323	5,643	0.03	165	7,275	0.01	92
	N.I	2,977	0.15	437	3,604	0.07	237	5,094	0.03	145
Pulses	P.I.	4,036	0.19	776	4,670	0.09	402	6,176	0.04	230
	N.I.	2,993	1.06	3,175	3,547	0.48	1,686	4,863	0.21	1,000
Oilseeds	P.I.	6,915	0.19	1,318	7,526	0.09	643	8,978	0.04	332
	N.I.	3,166	0.15	485	3,697	0.07	254	4,959	0.03	147
Vegetables	P.I.	5,781	0.13	754	7,135	0.06	417	10,352	0.03	262
Total			9.81	21,661		4.40	13,084		1.90	9,290

Crop		Marginal Farmer size:0.36ha)			Average (size1.00ha)		
			Cropped	Total		Cropped	Total
		Profit	Area	Profit	Profit	Area	Profit
		NRs/ha	ha	NRs	NRs/ha	ha	NRs
Paddy	P.I.	8,802	0.10	889	6,817	0.28	1,914
	N.I	4,664	0.21	995	2,900	0.59	1,718
Wheat	P.I.	6,735	0.04	250	5,323	0.10	550
	N.I.	2,441	0.03	72	1,165	0.08	96
Maize	P.I.	8,194	0.00	26	6,789	0.01	60
	N.I	5,923	0.01	42	4,650	0.02	92
Pulses	P.I.	7,023	0.01	65	5,728	0.03	148
	N.I.	5,604	0.05	288	4,471	0.14	638
Oilseeds	P.I.	9,795	0.01	90	8,545	0.03	219
	N.I.	5,669	0.01	42	4,583	0.02	94
Vegetables	P.I.	12,163	0.01	77	9,856	0.02	173
Total			0.48	2,838		1.32	5,702

Note: P.I.: Partially Irrigated, N.I.: Non-irrigated

Table E.3.1 Financial Crop Budget under Without Project Condition (1/2)

	Crop		Paddy					Wheat					Maize				
	Condition			P.I.		N.I.			P.I.		N.I.			P.I.		N.I.	
		Unit	Price	Quantity	Value	Quantity	Value	Price	Quantity	Value	Quantity	Value	Price	Quantity	Value	Quantity	Value
A	Gross Income		NRs		NRs		NRs	NRs		NRs		NRs	NRs		NRs		NRs
	(1) Main Product	kg	5.25	2,200	11,550	1,420	7,455	6.00	1,700	10,200	980	5,880	6.00	1,720	10,320	1,330	7,980
	(2) By-product	kg			0		0			0		0			0		0
	Total Income				11,550		7,455			10,200		5,880			10,320		7,980
B	Production Cost																
B1	Inputs	kg															
	(1) Seed	kg	8.2	60	492	65	533	12.5	126	1,575	130	1,625	12.0	25	300	25	300
	(2) FYM/Compost	ton	250	0.90	225	0.90	225	250	0.90	225	0.60	150	250	0.90	225	0.60	150
	(3) Fertilizer																
	N	kg	11.17	0	0	0	0	11.17	0	0	0	0	11.17	0	0	0	0
	P2O5	kg	16.67	0	0	0	0	16.67	0	0	0	0	16.67	0	0	0	0
	K2O	kg	14.17	0	0	0	0	14.17	0	0	0	0	14.17	0	0	0	0
	(4) Agro-chemicals	NRs		0	0	0	0		0	0	0	0		0	0	0	0
(B2)	Total labor requirement																
	Male	M/D		91		82			69		62			72		65	
	Female	M/D		42		36			25		23			21		20	
LARGE FARMER																	
B2	Hired Labor	(85.3% of total labor requirement)															
	Male	M/D	40.00	78	3,105	70	2,798	40.00	59	2,354	47	1,867	40.00	61	2,457	55	2,218
	Female	M/D	35.00	36	1,254	31	1,075	35.00	21	746	20	687	35.00	18	627	17	597
B3	Draft Animal	Pair/D	50.00	38	1,900	38	1,900	50.00	25	1,250	23	1,150	50.00	30	1,500	30	1,500
B4	Miscellany	NRs			349		327			308		274			255		238
	Total Cost	NRs			7,325		6,857			6,458		5,753			5,364		5,003
C	Net Return	NRs			4,225		598			3,742		127			4,956		2,977
MEDIUM FARMER																	
B2	Hired Labor	(67.2% of total labor requirement)															
	Male	M/D	40.00	61	2,446	55	2,204	40.00	46	1,855	35	1,419	40.00	48	1,935	44	1,747
	Female	M/D	35.00	28	988	24	847	35.00	17	588	15	541	35.00	14	494	13	470
B3	Draft Animal	Pair/D	50.00	38	1,900	38	1,900	50.00	30	1,500	30	1,500	50.00	30	1,500	30	1,500
B4	Miscellany	NRs			303		285			287		262			223		208
	Total Cost	NRs			6,353		5,994			6,030		5,496			4,677		4,376
C	Net Return	NRs			5,197		1,461			4,170		384			5,643		3,604
SMALL FARMER																	
B2	Hired Labor	(24.2% of total labor requirement)															
	Male	M/D	40.00	22	881	20	794	40.00	17	668	15	600	40.00	17	697	16	629
	Female	M/D	35.00	10	356	9	305	35.00	6	212	6	195	35.00	5	178	5	169
B3	Draft Animal	Pair/D	50.00	38	1,900	38	1,900	50.00	30	1,500	30	1,500	50.00	30	1,500	30	1,500
B4	Miscellany	NRs			193		188			209		203			145		137
	Total Cost	NRs			4,046		3,945			4,389		4,273			3,045		2,886
C	Net Return	NRs			7,504		3,510			5,811		1,607			7,275		5,094
MARGINAL FARMER																	
B2	Hired Labor	(0.0% of total labor requirement)															
	Male	M/D	40.00	0	0	0	0	40.00	0	0		0	40.00	0	0	0	0
	Female	M/D	35.00	0	0	0	0	35.00	0	0		0	35.00	0	0	0	0
B3	Draft Animal	Pair/D	50.00	38	1,900	38	1,900	50.00	30	1,500	30	1,500	50.00	30	1,500	30	1,500
B4	Miscellany	NRs			131		133			165		164			101		98
	Total Cost	NRs			2,748		2,791			3,465		3,439			2,126		2,048
C	Net Return	NRs			8,802		4,664			6,735		2,441			8,194		5,933
AVERAGE																	
B2	Hired Labor	(37.0% of total labor requirement)															
	Male	M/D	40.00	34	1,347	30	1,214	40.00	26	1,021	23	918	40.00	27	1,066	24	962
	Female	M/D	35.00	16	544	13	466	35.00	9	324	9	298	35.00	8	272	7	259
B3	Draft Animal	Pair/D	50.00	38	1,900	38	1,900	50.00	30	1,500	30	1,500	50.00	30	1,500	30	1,500
B4	Miscellany	NRs			225		217			232		225			168		159
	Total Cost	NRs			4,733		4,555			4,877		4,715			3,531		3,330
C	Net Return	NRs			6,817		2,900			5,323		1,165			6,789		4,650

Note: P.I. : Partially Irrigated N.I. : Non-irrigated

Table E.3.1 Financial Crop Budget under Without Project Condition (2/2)

	Crop		Pulses					Oilseeds					Vegetables		
	Condition			P.I.		N.I.			P.I.		N.I.			P.I.	
		Unit	Price	Quantity	Value	Quantity	Value	Price	Quantity	Value	Quantity	Value	Price	Quantity	Value
A	Gross Income		NRs		NRs		NRs	NRs		NRs		NRs	NRs		NRs
	(1) Main Product	kg	14.00	660	9,240	560	7,840	16.25	710	11,538	460	7,475	5.00	3,850	19,250
	(2) By-product	kg			0		0			0		0			0
	Total Income				9,240		7,840			11,538		7,475			19,250
B	Production Cost														
B1	Inputs	kg													
	(1) Seed	kg	22.0	35	770	40	880	30.0	12	360	14	420	9.0	500	4,500
	(2) FYM/Coenpost	ton	250	0.00	0	0.00	0	250	0.20	50	0.20	50	250	1.00	250
	(3) Fertilizer														
	N	kg	11.17	0	0	0	0	11.17	0	0	0	0	11.17	0	0
	P2O5	kg	16.67	0	0	0	0	16.67	0	0	0	0	16.67	0	0
	K2O	kg	14.17	0	0	0	0	14.17	0	0	0	0	14.17	0	0
	(4) Agro-chemicals	NRs		0	91	0	0		0	0	0	0		0	0
(B2)	Total labor requirement														
	Male	M/D		65		58			62		55			123	
	Female	M/D		21		17			21		17			63	
LARGE FARMER															
B2	Hired Labor	(85.3% of total labor requirement)													
	Male	M/D	40.00	55	2,218	49	1,979	40.00	53	2,115	47	1,877	40.00	105	4,197
	Female	M/D	35.00	18	627	15	508	35.00	18	627	15	508	35.00	54	1,881
B3	Draft Animal	Pair/D	50.00	25	1,250	25	1,250	50.00	25	1,250	25	1,250	50.00	40	2,000
B4	Miscellany	NRs			248		231			220		205			641
	Total Cost	NRs			5,204		4,847			4,623		4,309			13,469
C	Net Return	NRs			4,036		2,993			6,915		3,166			5,781
MEDIUM FARMER															
B2	Hired Labor	(67.2% of total labor requirement)													
	Male	M/D	40.00	44	1,747	39	1,559	40.00	42	1,667	37	1,478	40.00	83	3,306
	Female	M/D	35.00	14	494	11	400	35.00	14	494	11	400	35.00	42	1,482
B3	Draft Animal	Pair/D	50.00	25	1,250	25	1,250	50.00	25	1,250	25	1,250	50.00	40	2,000
B4	Miscellany	NRs			218		204			191		180			577
	Total Cost	NRs			4,570		4,293			4,012		3,778			12,115
C	Net Return	NRs			4,670		3,547			7,526		3,697			7,135
SMALL FARMER															
B2	Hired Labor	(24.2% of total labor requirement)													
	Male	M/D	40.00	16	629	14	561	40.00	15	600	13	532	40.00	30	1,191
	Female	M/D	35.00	5	178	4	144	35.00	5	178	4	144	35.00	15	534
B3	Draft Animal	Pair/D	50.00	25	1,250	25	1,250	50.00	25	1,250	25	1,250	50.00	40	2,000
B4	Miscellany	NRs			146		142			122		120			424
	Total Cost	NRs			3,064		2,977			2,560		2,516			8,898
C	Net Return	NRs			6,176		4,863			8,978		4,959			10,352
MARGINAL FARMER															
B2	Hired Labor	(0.0% of total labor requirement)													
	Male	M/D	40.00	0	0	0	0	40.00	0	0	0	0	40.00	0	0
	Female	M/D	35.00	0	0	0	0	35.00	0	0	0	0	35.00	0	0
B3	Draft Animal	Pair/D	50.00	25	1,250	25	1,250	50.00	25	1,250	25	1,250	50.00	40	2,000
B4	Miscellany	NRs			106		107			83		86			338
	Total Cost	NRs			2,217		2,237			1,743		1,806			7,088
C	Net Return	NRs			7,023		5,604			9,795		5,669			12,163
AVERAGE															
B2	Hired Labor	(37.0% of total labor requirement)													
	Male	M/D	40.00	24	962	21	858	40.00	23	918	20	814	40.00	46	1,820
	Female	M/D	35.00	8	272	6	220	35.00	8	272	6	220	35.00	23	816
B3	Draft Animal	Pair/D	50.00	25	1,250	25	1,250	50.00	25	1,250	25	1,250	50.00	40	2,000
B4	Miscellany	NRs			167		160			142		138			469
	Total Cost	NRs			3,512		3,369			2,992		2,892			9,856
C	Net Return	NRs			5,728		4,471			8,545		4,583			9,394

Note: P.I. : Partially Irrigated N.I. : Non-Irrigated

Table E.3.2 Financial Crop Budget under With Project Condition

	Crop		Paddy			Wheat			Oilseeds			Vegetables		
	Condition			F.I.			F.I.			F.I.			F.I.	
		Unit	Price	Quantity	Value	Price	Quantity	Value	Price	Quantity	Value	Price	Quantity	Value
A	Gross Income		NRs		NRs	NRs		NRs	NRs		NRs	NRs		NRs
	(1) Main Product	kg	5.25	4,500	23,625	6.00	3,000	18,000	16.25	1,200	19,500	5.00	12,000	60,000
	(2) By-product	kg			0			0			0			0
	Total Income				23,625			18,000			19,500			60,000
B	Production Cost													
B1	Inputs	kg												
	(1) Seed	kg	8.2	50	410	12.5	120	1,500	30.0	12	360	9.0	500	4,500
	(2) FYM/Compost	ton	250	2.00	500	250	1.00	250	250	1.00	250	250	2.00	500
	(3) Fertilizer													
	N	kg	11.17	60	670	11.17	80	894	11.17	60	670	11.17	60	670
	P2O5	kg	16.67	30	500	16.67	40	667	16.67	40	667	16.67	50	834
	K2O	kg	14.17	30	425	14.17	30	425	14.17	20	283	14.17	40	567
	(4) Agro-chemicals	NRs			180			180			90			270
(B2)	Total labor requirement													
	Male	M/D		100			78			67			136	
	Female	M/D		45			31			24			70	
LARGE FARMER														
B2	Hired Labor	(85.3% of total labor requirement)												
	Male	M/D	40.00	85	3,412	40.00	67	2,661	40.00	57	2,286	40.00	116	4,640
	Female	M/D	35.00	38	1,343	35.00	26	926	35.00	20	717	35.00	60	2,090
B3	Draft Animal	Pair/D	50.00	38	1,900	50.00	25	1,250	50.00	25	1,250	50.00	40	2,000
B4	Miscellany	NRs			467			438			329			804
	Total Cost	NRs			9,808			9,190			6,902			16,874
C	Net Return	NRs			13,817			8,810			12,598			43,126
MEDIUM FARMER														
B2	Hired Labor	(67.2% of total labor requirement)												
	Male	M/D	40.00	67	2,688	40.00	52	2,097	40.00	45	1,801	40.00	91	3,656
	Female	M/D	35.00	30	1,058	35.00	21	729	35.00	16	564	35.00	47	1,646
B3	Draft Animal	Pair/D	50.00	38	1,900	50.00	30	1,500	50.00	25	1,250	50.00	40	2,000
B4	Miscellany	NRs			417			412			297			732
	Total Cost	NRs			8,748			8,653			6,233			15,375
C	Net Return	NRs			14,877			9,347			13,267			44,625
SMALL FARMER														
B2	Hired Labor	(24.2% Of total labor requirement)												
	Male	M/D	40.00	24	968	40.00	19	755	40.00	16	649	40.00	33	1,316
	Female	M/D	35.00	11	381	35.00	8	263	35.00	6	203	35.00	17	593
B3	Draft Animal	Pair/D	50.00	38	1,900	50.00	30	1,500	50.00	25	1,250	50.00	40	2,000
B4	Miscellany	NRs			297			322			221			562
	Total Cost	NRs			6,231			6,755			4,643			11,812
C	Net Return	NRs			17,394			11,245			14,857			48,188
MARGINAL FARMER														
B2	Hired Labor	(0.0% of total labor requirement)												
	Male	M/D	40.00	0	0	40.00	0	0	40.00	0	0	40.00	0	0
	Female	M/D	35.00	0	0	35.00	0	0	35.00	0	0	35.00	0	0
B3	Draft Animal	Pair/D	50.00	38	1,900	50.00	30	1,500	50.00	25	1,250	50.00	40	2,000
B4	Miscellany	NRs			229			271			179			467
	Total Cost	NRs			4,815			5,686			3,749			9,808
C	Net Return	NRs			18,810			12,314			15,751			50,192
AVERAGE														
B2	Hired Labor	(37.0% of total labor requirement)												
	Male	M/D	40.00	37	1,480	40.00	29	1,154	40.00	25	992	40.00	50	2,013
	Female	M/D	35.00	17	583	35.00	11	401	35.00	9	311	35.00	26	907
B3	Draft Animal	Pair/D	50.00	38	1,900	50.00	30	1,500	50.00	25	1,250	50.00	40	2,000
B4	Miscellany	NRs			332			349			244			613
	Total Cost	NRs			6,981			7,320			5,116			12,873
C	Net Return	NRs			16,644			10,680			14,384			47,127

Note: Condition F.I. : Fully Irrigated

Table E.3.3 Economic Crop Budgets under Without Project Condition

	Crop		Paddy					Wheat					Maize				
	Condition			P.I.		N.I.			P.I.		N.I.			P.I.		N.I.	
		Unit	Price	Quantity	Value	Quantity	Value	Price	Quantity	Value	Quantity	Value	Price	Quantity	Value	Quantity	Value
A	Gross Income		NRs		NRs		NRs	NRs		NRs		NRs	NRs		NRs		NRs
(1)	Main Product	kg	9.66	2,200	21,252	1,420	13,717	14.11	1,700	23,987	980	13,828	10.41	1,720	17,905	1,330	13,845
(2)	By-product	kg			0		0			0		0			0		0
	Total Income				21,252		13,717			23,987		13,828			17,905		13,845
B	Production Cost																
B1	Inputs	kg															
(1)	Seed	kg	11.59	60	695	65	753	16.93	126	2,133	130	2,201	12.49	25	312	25	312
(2)	FYM/Compost	ton	220	0.90	198	0.90	198	220	0.90	198	0.60	132	220	0.90	198	0.60	132
(3)	Fertilizer																
	N	kg	31.60	0	0	0	0	31.60	0	0	0	0	31.60	0	0	0	0
	P2O5	kg	26.22	0	0	0	0	26.22	0	0	0	0	26.22	0	0	0	0
	K2O	kg	19.31	0	0	0	0	19.31	0	0	0	0	19.31	0	0	0	0
(4)	Agro-chemicals			0	0	0	0		0	0	0	0		0	0	0	0
B2	Labor																
	Male	M/D	28.00	91	2,548	82	2,296	28.0	69	1,932	62	1,736	28.0	72	2,016	65	1,820
	Female	M/D	24.50	42	1,029	36	882	24.5	25	613	23	564	24.5	21	515	20	490
B3	Draft Animal	Pair/D	45.00	38	1,710	38	1,710	45.0	30	1,350	30	1,350	45.0	30	1,350	30	1,350
B4	Miscellany	NRs			309		292			311		299			220		205
	Total Cost				6,489		6,131			6,537		6,282			4,610		4,309
C	Net Return	NRs			14,763		7,586			17,450		7,546			13,295		9,536
	Net Return/Output				69.5		55.3			72.7		54.6			74.3		68.9

	Crop		Pulses					Oilseeds					Vegetables*				
	Condition			P.I.		N.I.			P.I.		N.I.			P.I.			
		Unit	Price	Quantity	Value	Quantity	Value	Price	Quantity	Value	Quantity	Value	Price	Quantity	Value		
A	Gross Income		NRs		NRs		NRs	NRs		NRs		NRs	NRs		NRs		
(1)	Main Product	kg	12.66	660	8,356	560	7,090	14.91	710	10,586	460	6,859	4.48	3,850	17,248		
(2)	By-product	kg			0		0			0		0			0		
	Total Income				8,356		7,090			10,586		6,859			17,248		
B	Production Cost																
B1	Inputs	kg															
(1)	Seed	kg	14.4	35	504	40	576	18	12	216	14	252	4.96	500	2,480		
(2)	FYM/Compost	ton	220	0.00	0	0.00	0	220	0.20	44	0.20	44	220	1.00	220		
(3)	Fertilizer																
	N	kg	31.60	0	0	0	0	31.60	0	0	0	0	31.60	0	0		
	P2O5	kg	26.22	0	0	0	0	26.22	0	0	0	0	26.22	0	0		
	K2O	kg	19.31	0	0	0	0	19.31	0	0	0	0	19.31	0	0		
(4)	Agro-chemicals			0	91	0	0		0	0	0	0		0	0		
B2	Labor				42												
	Male	M/D	28.0	65	1,820	58	1,624	28.0	62	1,736	55	1,540	28.0	123	3,444		
	Female	M/D	24.5	21	515	17	417	24.5	21	515	17	417	24.5	63	1,544		
B3	Draft Animal	Pair/D	45.0	25	1,125	25	1,125	45.0	25	1,125	25	1,125	45.0	40	1,800		
B4	Miscellany	NRs			205		187			182		169			474		
	Total Cost				4,301		3,929			3,817		3,546			9,962		
C	Net Return	NRs			4,054		3,161			6,769		3,312			7,286		
	Net Return/Output				48.5		44.6			63.9		48.3			42.2		

Note: P.I.: Partially Irrigated Condition N.I.: Non-irrigated Condition
*: Potato, Tomato, Bean, Chili, Cauliflower, Lady's finger, etc.

Table E.3.4 Economic Crop Budgets under With Project Condition

	Crop		Paddy			Wheat		
	Condition		F.I.			F.I.		
		Unit	Price	Quantity	Value	Price	Quantity	Value
A	Gross Income		NRs		NRs	NRs		NRs
(1)	Main Product	kg	9.66	4,500	43,470	14.11	3,000	42,330
(2)	By-product	kg			0			0
	Total Income				43,470			42,330
B	Production Cost							
B1	Inputs	kg						
(1)	Seed	kg	11.59	50	580	16.93	120	2,032
(2)	FYM/Compost	ton	220	2.00	440	220	1.00	220
(3)	Fertilizer							
	N	kg	31.60	60	1,896	31.60	80	2,528
	P2O5	kg	26.22	30	787	26.22	40	1,049
	K2O	kg	19.31	30	579	19.31	30	579
(4)	Agro-chemicals				180			180
B2	Labor							
	Male	M/D	28.00	100	2,800	28.0	78	2,184
	Female	M/D	24.50	45	1,103	24.5	31	760
B3	Draft Animal	Pair/D	45.00	40	1,800	45.0	30	1,350
B4	Miscellany	NRs			508			544
	Total Cost				10,672			11,425
C	Net Return	NRs			32,798			30,905
	Net Return/Output	%			75.4			73.0

	Crop		Oilseeds			Vegetables*		
	Condition		F.I.			F.I.		
		Unit	Price	Quantity	Value	Price	Quantity	Value
A	Gross Income		NRs		NRs	NRs		NRs
(1)	Main Product	kg	14.91	1,200	17,892	4.48	12,000	53,760
(2)	By-product	kg			0			0
	Total Income				17,892			53,760
B	Production Cost							
B1	Inputs	kg						
(1)	Seed	kg	18	10	180	4.96	500	2,480
(2)	FYM/Compost	ton	220	1.00	220	220	2.00	440
(3)	Fertilizer							
	N	kg	31.60	60	1,896	31.60	60	1,896
	P2O5	kg	26.22	40	1,049	26.22	50	1,311
	K2O	kg	19.31	20	386	19.31	40	772
(4)	Agro-chemicals				90			270
B2	Labor							
	Male	M/D	28.0	67	1,876	28.0	136	3,808
	Female	M/D	24.5	24	588	24.5	70	1,715
B3	Draft Animal	Pair/D	45.0	25	1,125	45.0	40	1,800
B4	Miscellany	NRs			371			725
	Total Cost				7,781			15,217
C	Net Return	NRs			10,112			38,543
	Net Return/Output	%			56.5			71.7

Note: F.I.: Fully Irrigation Condition

*: Potato, Tomato, Beans, Chili, Lady's Finger, Cauliflower, etc.