

CHAPTER 7

CHAPTER 7 PROJECT PLAN

7.1 Project Components

The Project will comprise the following 2 plans and 3 programs.

Name	Main content and objectives
<Plan>	
i. L/B irrigation plan	<ul style="list-style-type: none">- 9 month irrigation plan with total benefit area of 620 ha including the former Battar irrigation area with water source at Trisuli power station balancing reservoir- Comprising gravity and pump irrigation of the 12 sub-projects A~K. Includes new construction of intake facility ~ main canal (pipeline) ~ pump station, etc.
ii. R/B irrigation plan	<ul style="list-style-type: none">- Has its water source at the main Trishuli river, and comprises pump irrigation of a total benefit area of 129 ha- Perennial irrigation- Benefit area comprises the single L sub-
<Programs>	
i. Social preparation program	<ul style="list-style-type: none">- Project preparation program involving beneficiary farmers, farmer representatives, WUA representatives, district government officials, etc.
ii. Water management program	<ul style="list-style-type: none">- To overlap the last half of the social preparation program; envisioned for the implementation of water management under the Project.
iii. Monitoring program	<ul style="list-style-type: none">- To be carried out in 3 stages during construction start-up ~ on-going construction ~ post construction; intended to ensure achievement of Project objectives

7.2 Plan and Program Components

(I) Irrigation Plan

The irrigation plan comprises two schemes with components as indicated below.

Scheme	Design area (ha)	Intake	Main canal	Management facilities	Branch canal facilities	Terminal facilities
L/B irrigation plan	620	Intake tower: 1 Intake pipe (ø 100): 50m Diversion works: 1 set	L = 5.8 km (ø 1000, ø 600)	Regulation reservoir (V = 1200 m ³): 1 Administrative office (A = 120 m ²) Storages: 3	L = 7.0 km (ø 200-450) Pump station: 5 Receiving tank: 10	Canal works: 1 set
R/B irrigation plan	129	Pump station: 1 (intake tank)	L = 0.15 km (conveyance pipe)	Receiving tank: 2 Storages: 1	L = 3.3 km	Canal works: 1 set

(2) Programs

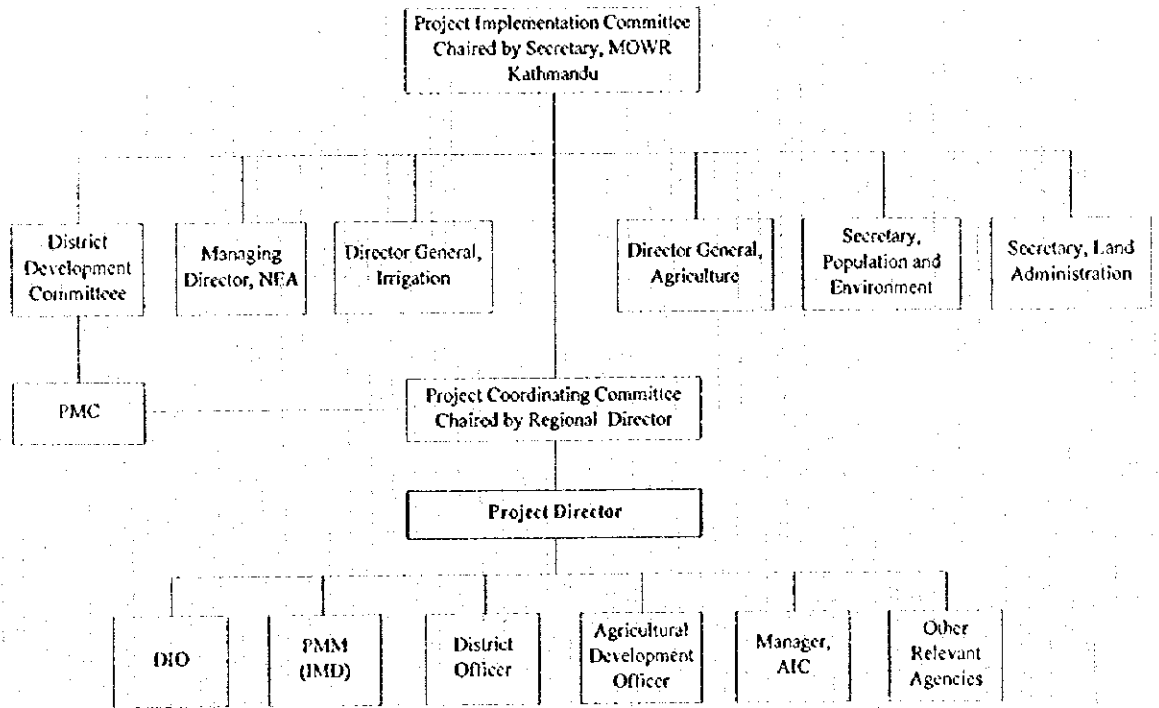
Components of the social preparation, water management plan and monitoring programs are indicated below.

	Plan	Components
Social preparation, water management and monitoring programs	Training program	Farmer orientation, sub-block farmer representative training, WUA representative training, farmer training, concerned government official training, pump operation training
	Training equipment procurement plan	2 sets each of TV, VCR, screen, OHP, slide projector, video camera; 10 sets of white board
	Equipment procurement for WUA	Motorecycle (4 nos.), computer (2 nos.), portable microphone (4 nos.), radio transeiver (2 sets)
	Administrative office	Multipurpose community hall cum office (1 building; 10 × 12 = 120 m ²)

7.3 Project Implementation Structure (proposed)

The subject Project is not directed solely at the new construction of irrigation facilities, but rather aims as well at a range of related aspects including the strengthening of farmer organizations, upgrading the functioning of the various farmer support activities, implementation of project monitoring programs, etc. In order to effectively implement all of the foregoing a well coordinated executing structure involving related agencies is essential. In this regard, it is planned that the Ministry of Water Resources select appropriate personnel to be responsible for project implementation (Project Director). Centering on the function of the PD, it is anticipated the a coordinating set-up in line with the following figure be established to pursue Project implementation.

Fig. 7.3 - 1 Project Implementation Structure



MOWR: Ministry of Water Resources
 NEA: Nepal Electricity Authority
 PMC: Project Managing Committee
 DIO: District Irrigation Office
 PMM: Project Managers
 IMD: Irrigation Management Division
 AIC: Agriculture Inputs Corporation

7.4 Implementation Plan

Construction tendering for the Project is scheduled for completion by September 1998. In order to meet this schedule, detailed design and tender document preparation are planned for commencement from May 1998. The construction period itself would extend for 18 months from October 1998 to March 2000. Implementation schedule is indicated in Figure 7.4-1.

7.4.1 Implementation Schedule

(1) Implementation Preparatory Period (January 1998 ~ September 1998; 9 months)

-Funding arrangements:	December 1997 ~ June 1998 (7 months)
-Consultant selection:	January 1998 ~ June 1998 (5 months)
-Basic/detailed designs,	

tender document preparation: January 1998 ~ August 1998 (7 months)
-Construction tendering, tender evaluation: August 1998 ~ October 1998 (3 months)

(2) Construction Period

October 1998 ~ March 2000 (1.5 years)

(3) Program Plan

It is essential that the social preparation program be carried out prior to commencement of construction works. The program would be carried out in two phases, i.e. phase I (8 months from February 1998 to the start of construction), and phase II (for 24 months, to continue on after construction completion).

Fig 7.4-1 Implementation Schedule

Name of Schemes	1998				1999				2000				2001			
	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th
1. D/D & Tender		Tender														
2. Construction																
(1) Procurement				40	60	80	100									
(2) Intake Works				20	100											
(3) Main Canal Works						60	80	100								
(4) Control Facilities Works								20	100							
(5) Branch Canal Works						30	50	60	100							
(6) On Farm Facility Works								20	100							
3. Program																
(1) Social Preparation	5	10	20	30	40	50	60	70	80	90	100					
(2) Monitoring				10	20	30	40	50	60	65	70	75	80	85	90	100

7.5 Project Cost

7.5.1 Calculation Criteria for Project Cost

Project cost was calculated applying the following criteria.

(1) Unit Cost

Unit costs for construction works were adopted from the Construction Works Rate Norms, revised as of 1996 (original: February 1990).

Unit costs for equipment and labor are adopted from unit costs of DIO, Nuwakot district (1996-97).

(2) Calculation criteria for Indirect Cost

Rates conventionally applied for works in Nepal were used.

Land acquisition cost	:	0.5% of direct construction cost
Administration cost	:	Rs. 500,000
Engineering services	:	8% of direct construction cost
Physical contingency	:	2% of direct construction cost
Price contingency	:	10% of direct construction cost and total for above

(3) Others

Exchange rate : US\$ 1 = Rs 56.7 (conversion rate as of March 1997)

Ratio of foreign currency / local currency portions : Items which can be procured locally to be computed in local currency; others to be computed in foreign currency.

Unit costs for construction works were adopted from the Construction Works Rate Norms, revised as of 1996 (original: February 1990).

Unit costs for equipment and labor are adopted from unit costs of DIO, Nuwakot district (1996-97).

7.5.2 Project Cost

Project cost has been estimated as shown below.

Description	Project Cost				Farmers' Contribution		HMGN Food		Other Food			
	Total (000Rs.)	(%)	L/C (000Rs.)	F/C (000Rs.)	L/C (000Rs.)	(%)	L/C (000Rs.)	(%)	Total (000Rs.)	(%)	L/C (000Rs.)	F/C (000Rs.)
A. Construction Cost												
I. Direct Cost												
I-1 Intake Works	9,339	100.0%	3,280	6,059					9,339	100.0%	3,280	6,059
I-2 Main Canal Facilities	256,315	100.0%	76,376	179,939					256,315	100.0%	76,376	179,939
I-3 Proposed Control Tank	14,566	100.0%	10,316	4,250					14,566	100.0%	10,316	4,250
I-4 Branch Canal Facilities	57,795	100.0%	14,341	43,454					57,795	100.0%	14,341	43,454
I-5 On farm Level Facilities	48,316	100.0%	37,243	11,073	37,243	77.1%	0	0.0%	11,073	22.9%	0	11,073
I-6 Zone B Construction Cost	34,901	100.0%	11,916	22,985	6,099	17.5%	0	0.0%	28,801	82.5%	5,816	22,985
I-7 Storage Construction Cost	2,695	100.0%	2,695	0	2,695	100.0%	0	0.0%	0	0.0%	0	0
I-8 Equipment Owng Cost	27,847	100.0%	0	27,847					27,847	100.0%	0	27,847
Sub-total (I)	451,773	100.0%	156,165	295,608	46,037	10.2%	0	0.0%	405,736	89.8%	110,128	295,608
II. Indirect Cost												
II-1 Common Temporary Cost	35,000	100.0%	35,000	0					35,000	100.0%	35,000	0
II-2 Site Administration	40,000	100.0%	40,000	0					40,000	100.0%	40,000	0
II-3 Supervision	20,000	100.0%	20,000	0					20,000	100.0%	20,000	0
II-4 Transport & Packing	40,000	100.0%	0	40,000					40,000	100.0%	0	40,000
Sub-total (II)	135,000	100.0%	95,000	40,000					135,000	100.0%	95,000	40,000
Construction Cost Total (I+II)	586,773	100.0%	251,165	335,608	46,037	7.8%	0	0.0%	540,736	92.2%	205,128	335,608
III. Land Acquisition (0.5% of I)	2,259	100.0%	2,259	0			2,259	100.0%	0	0.0%	0	0
IV. Administration	500	100.0%	500	0			500	100.0%	0	0.0%	0	0
V. Engineering Services (8.0% of I)	36,142	100.0%	12,493	23,649			3,683	10.2%	32,459	89.8%	8,810	23,649
VI. Physical Contingency (2.0% of I)	9,035	100.0%	3,123	5,912			921	10.2%	8,115	89.8%	2,203	5,912
Sub-total (I-VI)	634,710	100.0%	269,541	365,169	46,037	7.3%	7,363	1.2%	581,310	91.6%	216,141	365,169
VII. Price Contingency (10.0%)	63,471	100.0%	26,954	36,517			5,340	8.4%	58,131	91.6%	21,614	36,517
Total (A)	698,181	100.0%	296,495	401,686	46,037	6.6%	12,703	1.8%	639,441	91.6%	237,755	401,686
B. Cost for Program												
1. Training Program	500	100.0%	500	0			500	100.0%	0	0.0%	0	0
2. Equipment for Water Management	1,020	100.0%	0	1,020					1,020	100.0%	1,020	0
3. Equipment for Training	750	100.0%	0	750					750	100.0%	750	0
4. Multipurpose Community Hall	1,220	100.0%	1,220	0					1,220	100.0%	1,220	0
Total (B)	3,490	100.0%	1,720	1,770			500	14.3%	2,990	85.7%	2,990	0
Grand Total	701,671	100.0%	298,215	403,456	46,037	6.6%	13,203	1.9%	642,431	91.6%	240,745	401,686

Exchange Rate: US\$1= Rs 56.7 (March 1997)

7.5.3 Operation and Maintenance Cost

(1) Annual Operation and Maintenance Cost

- 1) General management cost = 0.5% of direct cost component of the overall project cost
- 2) Operational cost for O&M equipment and DOI O&M Cost = Rs. 500,000/year
- 3) Monitoring cost for the 1st year = Rs. 100,000/year. From the second year, said cost is computed at Rs. 50,000/year.

CHAPTER 8

CHAPTER 8 PROJECT EVALUATION

8.1 Purpose of Project Evaluation

The purpose of project evaluation is to assess the feasibility and viability of this Project from economic, financial, technical, environmental, social and institutional points of view.

8.2 Economic and Financial Evaluation

8.2.1 Methodology

Economic evaluation aims at assessment of the Project in terms of its contribution to the national economy, while financial evaluation is carried out to estimate the profitability of individual household economies after project implementation. On the basis of project benefit and cost comparison for the two cases of (i) future without Project (hereinafter called FW/O), and (ii) future with Project (hereinafter called FW), the profitability of the Project is examined in terms of the 3 criteria of Net Present Value (NPV), B/C Ratio, and Economic Internal Rate of Return (EIRR). Financial evaluation centered on farm income analysis with different land holding sizes.

8.2.2 Basic Evaluation Criteria

(1) Interpretation of Future Without Project Case

For the FW/O case, it is assumed that the present farming system such as cropped area, unit yield, and farming techniques will remain unchanged over the future.

(2) Interpretation of Future with Project Case

In the 4th year of the Project (2001), it is estimated that power shortage will be eliminated with completion of the new construction works for the Trishuli power station (see Appendix 8.2.2-1). Furthermore, with the design discharge of $Q = 0.63 \text{ m}^3/\text{s}$ perennial irrigation will be well achievable and in this light 9 month irrigation is planned for the first 4 years of the Project to be subsequently followed by year-round irrigation from the fifth year (2002).

(3) Project Life

Project life is set at 25 years considering the durable period of the proposed irrigation and drainage facilities, including the full 2 years of construction period.

(4) Project Benefit and Cost

Under financial evaluation, project benefit and cost are expressed in terms of market prices (financial prices), and as border prices (economic prices) under economic evaluation.

(5) Inputs and Outputs

1) Traded Goods

Financial prices of traded goods such as agricultural products and fertilizer are based on 1996 domestic market prices, while 2005 international market prices (1996 constant prices) are adopted for economic prices. As a result, inflation is not considered for evaluation.

Farmgate prices of paddy, upland paddy, maize, wheat, and fertilizer such as urea and DAP (in economic terms) are based on CIF prices by taking into account tariffs, port handling charges, and transport/handling costs, after which tariffs and taxes are then eliminated and the necessary conversion factor applied (see Appendix 8.2.2-2). However, the farmgate prices (in economic terms) for OFCs (niger) and vegetables have been converted to border prices applying the standard conversion factor (SCF) (see Appendix 8.2.2-3).

2) Non-traded Goods

In the case of non-traded goods, domestic market prices have been applied for financial prices. On the other hand, in the case of economic prices the composition of non-traded goods has been broken down into traded component, non-traded component, labor and transfer payment. In the case of the traded, non-traded, and labor components, border price, SCF, and shadow wage rate are applied, respectively.

(6) Capital

The World Bank's estimated value of 10% for Nepal is applied as the opportunity cost of capital.

(7) Foreign Exchange

The official exchange rate, as of December 1996 of US\$ 1 = Rs.56.7 is adopted under both financial and economic evaluation.

(8) Labor

The nominal wage rate is applied under financial evaluation. Under economic evaluation, the shadow wage rate (SWR) is estimated at 0.675, which was derived by multiplying a conversion factor of 0.75 for unskilled labor by the SCF of 0.9, following the recent study of the Nepal Irrigation Sector Project, December 1995. In the case of the SWR for skilled labor, on the other hand, the SCF is applied.

(9) Conversion Factors

An SCF of 0.9 has been adopted (taken from the above report), and a conversion factor for road transportation and handling services is set at 0.9.

8.2.3 Total Project Cost

Total Project cost comprises the construction cost, the program cost, and the operation and maintenance cost.

(1) Construction Cost

In order to convert costs for individual construction work items (financial prices) into economic prices, transfer payment was eliminated and conversion factors applied (see Appendix 8.2.3-1~2). As the salvage value of the facilities is small, it was not included in the calculation.

(2) Program Cost

The SCF was applied to convert this cost into economic prices (see Appendix 8.2.3-2).

(3) Operation and Maintenance Cost

O&M cost (financial prices) is converted to economic prices applying the SCF.

8.2.4 Project Benefit

The benefits to be generated by the Project are diverse, including external economic benefits (secondary benefits); however, the quantifiable incremental benefit (impact from increased cropped area and unit yield) from increased production of agricultural products and by-products was computed as the benefit under the Project.

(1) Crop Yield

Target yield under the Project for paddy, upland paddy, maize, wheat, and vegetables are assumed to be achieved in the 3rd year from the 1st year of cultivation possible in the Project area (see Appendix 8.2.4-1).

(2) Benefit from Increased Production of Agricultural Products

The benefit from increased production of agricultural products is calculated in terms of the net incremental value based on comparison of the FW/O and FW cases (see Appendix 8.2.4-2~5).

(3) Benefit from Increased Production of By-products

Bran and chaff are included in project benefit as by-products. Yields for these are calculated at 80kg and 220kg, respectively, for 1 metric ton of paddy.

(4) Crop Yield Decrease due to Unusual Climatic Condition

Based on the DOA's data, it is assumed that 8% decrease in unit yield of paddy, upland paddy, and maize in the FW/O and FW cases would occur due to late or low rainfall every 4 years from start of project construction.

8.2.5 Project Profitability Indicators

In terms of the 3 criteria in the previous section 8.2.1, profitability indicators are as follows (see App.8.2.5-1~2).

NPV (Rs.1,000) (10% discount rate)	B/C Ratio (10% discount rate)	EIRR (%)
195,726	1.37	14.8

The above result shows that this Project is economically viable, with even greater benefit when socio-economic ripple effect of the Project is considered.

8.2.6 Sensitivity Analysis

The following 3 cases were assumed to analyze the impact of economic uncertainty on the profitability indicators of the Project.

- Case ① : Total project cost increases by 10% due to increase in construction cost
- Case ② : Project benefit drops by 10% due to difficulty in achieving target unit yields
- Case ③ : Combination of cases ① and ②

Results of sensitivity analysis on the basis of the above 3 cases are indicated in the table below:

Case	EIRR (%)
①	13.2
②	13.1
③	11.7

Although the project profitability is more sensitive to decrease in project benefit rather than increase in project cost, no significant effect on economic justifiability is anticipated.

8.2.7 Farm Income Analysis

Farm income analysis estimates the incremental benefits arising from farming activities as a result of project implementation. The impact of implementation on the farm incomes of households in the Project area will be considerable with shift from rainfed agriculture to irrigated agriculture (see Appendix 8.2.7-1). In the case of FW (9 months and perennial irrigation), the project impact on income distribution of different land size holders is shown in Table 8.2.7-1.

With project implementation, average annual net farm income per farm household will increase from Rs. 13,821 to Rs. 22,802 in the case of 9 months irrigation (to Rs. 27,020 in the perennial irrigation condition) for marginal farmers, and from Rs 35,010 to Rs. 156,038 in the case of 9 months irrigation (to Rs. 212,370 in the perennial irrigation condition) for large farmers. It shows the increase of farm income by 165% under the 9 months irrigation condition, and by 195% under the perennial condition for marginal farmers.

8.2.8 Cost Recovery

(1) Operation and Maintenance Cost

Farm income analysis shows that project investments generate large increase in farm income for all sizes of farmers. The financial capability to pay for water charges of full operation and maintenance cost under the 9 month or perennial condition has been estimated at 1.3% (for gravity irrigation area) and 8.7% (for pump irrigation area), or 1.1% (for gravity irrigation area) and 8.2% (for pump irrigation area) of the net income increment for marginal farmers, and at 1.3% (for gravity irrigation area) and 8.6% (for pump irrigation area), or 1.1% (for gravity irrigation area) and 8.1% (for pump irrigation area) of the net income increment for large farmers (see Appendix 8.2.8-1). Therefore, the farmer's capability to pay for water charges would be high enough to cover the cost, and the charges are concluded to pose no heavy burden to their farm economies.

(2) Capital Cost Recovery

Under the irrigation Policy 1992, beneficiary farmers who use irrigation water form canals have to share 7% of the project cost in cash or kind. Accordingly, based on the policy this capital cost sharing rule is applied to this Project.

Payment schedule for the capital cost sharing has been determined in consideration of the condition of farm household economy and the payment condition. Assuming a twenty year payment period with interest rate of 5% in reference with similar hill projects in Nepal, the annual capital cost payment of farmer loans and incremental net farm income with the future project are represented in Appendix 8.2.8-2, wherein the

net farm income is calculated subtracting production cost and O&M cost from gross farm income.

As a result of analysis, the capital cost payment to be made by beneficiary farmers under 9 month or perennial condition has been estimated at 7.7% (for gravity irrigation area) and 8.3% (for pump irrigation area), or 5.2% (for gravity irrigation area) and 5.6% (for pump irrigation area) of the incremental net farm income for marginal farmers, and at 7.6% (for gravity irrigation area) and 8.2% (for pump irrigation area), or 5.2% (for gravity irrigation area) and 5.6% (for pump irrigation area) of the same income for large farmers. Therefore, the financial capability to pay for the Project would be high enough to cover capital cost.

8.2.9 Socio-economic Ripple Impact

In addition to the direct benefit from the Project as a result of the increased production of agricultural products as well as by-products, the following indirect ripple impact would occur.

Table 8.2.7-1 Project Impact on Income Distribution

Item	Unit	Marginal			Small			Medium			Large			Average		
		FW/O	FW ¹⁾	FW ²⁾	FW/O	FW ¹⁾	FW ²⁾	FW/O	FW ¹⁾	FW ²⁾	FW/O	FW ¹⁾	FW ²⁾	FW/O	FW ¹⁾	FW ²⁾
Average Land Size	ha	0.12	0.12	0.12	0.37	0.37	0.37	0.78	0.78	0.78	1.60	1.60	1.60	0.524	0.524	0.524
Average Household Size	no.	5.3	5.3	5.3	5.8	5.8	5.8	6.5	6.5	6.5	7.7	7.7	7.7	6.0	6.0	6.0
Income																
- Agriculture	R/year	10,177	23,222	29,705	14,714	54,201	74,368	24,143	106,564	148,834	38,167	214,665	301,223	17,757	74,616	102,621
Crop	R/year	2,637	15,682	22,165	8,725	48,212	68,379	19,418	101,839	144,109	32,572	209,070	295,628	11,838	68,697	96,702
Livestock & Casual Farm Wage	R/year	7,540	7,540	7,540	5,989	5,989	5,989	4,725	4,725	4,725	5,595	5,595	5,595	5,919	5,919	5,919
- Non-agriculture	R/year	5,096	5,096	5,096	6,809	6,809	6,809	10,731	10,731	10,731	14,106	14,106	14,106	8,467	8,467	8,467
Business & Service	R/year	5,096	5,096	5,096	6,809	6,809	6,809	10,731	10,731	10,731	14,106	14,106	14,106	8,467	8,467	8,467
- Sub-total	R/year	15,273	28,318	34,801	21,523	61,010	81,177	34,874	117,295	159,565	52,273	228,771	315,329	26,224	83,083	111,088
Expenditure																
- Agriculture	R/year	1,452	5,516	7,781	4,429	16,636	23,676	10,263	35,588	50,347	17,263	72,733	102,959	6,291	23,975	33,756
(Livestock)	R/year	(195)	(195)	(195)	(271)	(271)	(271)	(1,017)	(1,017)	(1,017)	(1,761)	(1,761)	(1,761)	(656)	(656)	(656)
- Household (Foods)	R/year	13,639	13,639	13,639	16,724	16,724	16,724	22,394	22,394	22,394	28,417	28,417	28,417	19,118	19,118	19,118
- Sub-total	R/year	15,091	19,155	21,420	21,153	33,360	40,400	32,657	57,982	72,741	45,680	101,150	131,376	25,409	43,093	52,874
Agricultural Income	%	66.6	82.0	85.4	68.4	88.8	91.6	69.2	90.9	93.3	73.0	93.8	95.5	67.7	89.8	92.4
Non-agricultural Income	%	33.4	18.0	14.6	31.6	11.2	8.4	30.8	9.1	6.7	27.0	6.2	4.5	32.3	10.2	7.6
Per Capita Net Income	R/year	2,608	4,302	5,098	2,947	7,651	9,914	3,786	12,570	16,803	4,547	20,365	27,581	3,322	9,851	12,889
Possible Saving Amount	R/year	182	9,163	13,381	370	27,650	40,777	2,217	59,313	86,824	6,593	127,621	183,953	815	39,990	58,214
Engel's Coefficient	%	77.9	77.9	77.9	71.1	71.1	71.1	71.1	71.1	71.1	66.3	66.3	66.3	71.4	71.4	71.4
Net Farm Income	R/year	13,821	22,802	27,020	17,094	44,374	57,501	24,611	81,707	109,218	35,010	156,038	212,370	19,933	59,108	77,332
Net Incremental Income	R/year	-	8,981	13,199	-	27,280	40,407	-	57,096	84,607	-	121,028	177,360	-	39,175	57,399

Note: FW¹⁾ indicates 9 months irrigation condition, while FW²⁾ shows 12 months irrigation condition.
Source: DDC survey and JICA 202 household survey.

(1) Forward Related Impact

With the increased production of agricultural products, seeds, fertilizer, and agro-chemical consumption will also increase, which will in turn stimulate industries related to the production and marketing of these items and thereby generate increased employment opportunities. Estimated annual income increase for agricultural inputs sales outlets in the Project area is indicated below (see Appendix 8.2.9-1~3).

(Unit: Rs.1,000)

Type of Sales Outlets	No. of Outlets	9 Month Irrigation		Perennial Irrigation	
		Incremental Income (Rs.1,000)	Per Outlet Incremental Income (Rs.)	Incremental Income (Rs.1,000)	Per Outlet Incremental Income (Rs.)
Seeds	9	6,352.4	705,800	10,049.9	1,116,700
Fertilizer	11	77.7	7,000	134.4	12,200
Agro-chemicals	9	122.5	13,600	187.8	20,900

(2) Backward Related Impact

Increased production of cereal crops will be expected to induce the following annual income increase for local collectors and millers (see Appendix 8.2.9-4~5).

(Unit: Rs.1,000)

Type of Sales Outlets	No. of Collectors/ Millers	9 Month Irrigation		Perennial Irrigation	
		Incremental Income (Rs.1,000)	Per Outlet Incremental Income (Rs.)	Incremental Income (Rs.1,000)	Per Outlet Incremental Income (Rs.)
Local Collectors	21	529.0	25,200	1,042.0	49,600
Local Millers	26	568.5	21,900	568.5	21,900
Millers in Kathmandu	6	362.0	60,300	913.5	152,300

(3) Generation of Employment Opportunities

Project implementation will generate an estimate 852,000 man-days of employment (equivalent to Rs. 68.2 million / 2 years) during the construction period.

With completion of the Project, it is expected to generate approximately 179,400 man-days of additional employment opportunities amounting to Rs. 7,175,000/year in the case of 9 months irrigation, and 301,800 man-days of the same amounting to Rs. 12,071,000/year in the perennial irrigation condition. If this labor demand is met with

the current landless, marginal, and small farmers (economically active population), this is equivalent to 54.4 days of labor, earning additionally about Rs. 2,200 /year in the case of 9 months irrigation, and 91.5 days, earning Rs. 3,700/year in the perennial irrigation condition (see Appendix 8.2.9-6).

(4) Enhanced Standard of Living

Increased farm income will improve farmer standards of living, also increase farmer purchasing power, and further stimulate commercial activity in the Project area. This will also contribute to rectifying the gap in living standards between urban and rural areas.

(5) Generation of Added Value

With project implementation, a considerable portion of the project cost will be directed at the procurement of locally produced construction materials. Also, large scale employment of local labor during the construction period will increase the purchasing power of these workers, thereby stimulating production activities in construction material and consumer goods industries and leading to generation of new added value.

Consideration of the above indirect ripple impact indicates a considerable overall socio-economic profitability to emerge under the Project.

8.3 Technical Evaluation

- (1) On the basis of examination of water source, the subject Project irrigation plan is to be stable 9 month irrigation.
- (2) From the standpoint of system operation and maintenance, the intake has been selected at a site at the balancing reservoir downstream of the NEA desilting basin in order to preclude sediment inflow into the envisioned canals, and thereby enhance Project sustainability.
- (3) In the case of the pump lift irrigation planned under the Project, concentration of discharge lift at one main station as was the case in the previous Battar project will be avoided, and instead a number of small, sub-block wise pump stations will be adopted to dilute the risk of malfunction and make O&M of equipment a more immediate concern of beneficiaries.
- (4) The adoption of a large diameter, pipeline main canal is considered optimum given the rugged topography of the Project area and other socio-economic factors prevailing therein.

8.4 Environmental Evaluation

As discussed in Section 6.7.4, the Project takes into careful consideration environmental aspects, and is judged to pose under EIA no negative environmental impacts.

8.5 Social Evaluation

The expected social impacts of the Project on various social strata are described below:

(1) Impact on Poverty Incidence

Present rate of poverty in the Project area is 83.1%, which will be reduced with implementation of the Project to 30.4% in the case of 9 month irrigation and 16.4% in the case of perennial irrigation enabling the socially disadvantaged group of landless, marginal and small farmers to escape from the grip of poverty (see Table 8.5-1~2). This is well in line with the policy of the 8th Five Year National Plan policy of poverty eradication.

(2) Impact on Poor Households

As the quantitative analysis of the impact of the Project on the poor in the earlier section clearly demonstrates, the Project will significantly reduce the percentage of the poor households in the Project area. Most of the poor households in the Project area have some land and their lands will be irrigated under the Project, so they will surely benefit from the Project. Landless people can also benefit from the Project, because the demand for agricultural labor will definitely increase for the irrigated farm.

(3) Impact on Women

As the gender analysis in the earlier section shows, women's contributions to agriculture and irrigation management are very significant. Since the Project aims at promoting women's participation in water user's associations through gender-specific interventions such as literacy education, awareness creation activities and skill development trainings, women will be the beneficiaries of the Project. Although the irrigation may make women busier than now, all women interviewed by the Study Team clearly declared they will be happier to work harder for more income than continuing with the status quo. During the training sessions, the Project can emphasize the importance of mutual cooperation between men and women so that men become more willing to help women and women can avoid too much overburden.

(4) Impact on Disadvantaged Ethnic Groups

The most disadvantaged group in the Project area is the Kumal ethnic group. Since Kumal people are the original inhabitants in the Project area, most of the Kumal

households have medium or large lands, although currently these lands are not so productive. With irrigation, the productivity of these lands will skyrocket if the Kumal people can adopt new agricultural technologies such as cultivating rice and cash crops in irrigated fields. Accordingly, the Project will emphasize the introduction of the agricultural training sessions which specifically target Kumal people.

8.6 Institutional Evaluation

The proposed irrigation project will be managed jointly by the Department of Irrigation and the WUAs, some of which are based on existing social groups in the area. The activation of WUAs in the Project area will strengthen the mutual cooperation among villagers and increase awareness of the importance of the self-management of the village-level infrastructure as well as self-help voluntary activities in the village. If the WUAs succeed in the Project area, this will enhance villager's self-confidence in their capacity to organize themselves to achieve development, and provide a platform for facilitating the future additional organization of community groups to improve their living standards.

Table 8.5-1 Number of Poor Households with Different Land Holding Size (9 Months Irrigation)

Irrigation Block	Municipality/VDC	Ward No.	Settlement Name	No. of Household (HH)		No. of Poor Households* (%)	Land Holding											
				No. of Household	No. of HH responded		Landless		Marginal (< 0.2ha)		Small (0.2 - 0.5ha)		Medium (0.5 - 1.0ha)		Large (1.0ha +)			
							No.	%	No.	%	No.	%	No.	%	No.	%		
A	Gerkhar	3	Gerkhar	15	15	26.7	1	100.0	2	13.3	3	20.0	7	46.7	5	33.3		
				20	20	33.3	0	0.0	1	5.0	2	10.0	3	15.0	5	25.0		
				35	35	50.0	1	2.9	3	8.6	14	40.0	10	28.6	7	20.0		
B	Bidur	1	Dhunge	10	10	30.0	2	20.0	7	70.0	1	10.0	0	0.0	0	0.0		
				10	10	50.0	3	30.0	3	30.0	1	10.0	1	10.0	1	10.0		
				42	36	19.4	1	2.4	5	11.9	11	26.2	14	33.3	7	16.7		
C	Bidur	5	Batar (upland)	52	37	16.2	6	11.5	9	16.7	14	26.7	15	28.8	6	11.5		
				155	155	40.6	15	9.7	38	24.5	54	34.8	17	11.0	4	2.6		
				36	36	58.3	7	19.4	13	36.1	11	30.6	5	13.9	1	2.8		
D	Bidur	6	Batar (lowland)	18	18	22.2	6	33.3	0	0.0	3	16.7	6	33.3	3	16.7		
				18	18	50.0	0	0.0	1	5.6	11	61.1	5	27.8	0	0.0		
				297	204	68.7	32	10.8	61	20.1	93	31.3	26	8.4	11	3.7		
E	Bidur	6	Dhigaua Marandhi	18	17	23.5	1	5.6	5	29.4	7	39.5	4	21.1	0	0.0		
				107	103	35.9	1	1.0	11	10.7	64	62.1	16	15.6	3	2.9		
				125	120	34.2	2	1.6	16	12.9	53	42.4	17	13.5	4	3.2		
F-G	Bidur	7	Tallo Pipatar	178	159	23.9	1	0.6	18	10.1	61	34.3	49	27.5	6	3.4		
				155	103	33.0	3	1.9	24	15.6	34	21.9	9	5.8	0	0.0		
				178	159	44.7	1	0.6	18	10.1	61	34.3	49	27.5	6	3.4		
H	Bidur	7	Devighat	155	103	33.0	3	1.9	24	15.6	34	21.9	9	5.8	0	0.0		
				155	103	33.0	3	1.9	24	15.6	34	21.9	9	5.8	0	0.0		
				133	111	27.0	0	0.0	18	13.6	32	24.1	38	28.6	6	4.5		
I	Bidur	5	Majhar	133	111	27.0	0	0.0	18	13.6	32	24.1	38	28.6	6	4.5		
				133	111	27.0	0	0.0	18	13.6	32	24.1	38	28.6	6	4.5		
				133	111	27.0	0	0.0	18	13.6	32	24.1	38	28.6	6	4.5		
J	Bidur	5	Pipatar Thulegaun	16	15	60.0	3	100.0	2	100.0	4	200.0	2	100.0	0	0.0		
				35	32	37.5	0	0.0	4	11.4	15	41.4	10	28.6	3	8.6		
				51	47	44.7	3	100.0	6	12.8	19	39.2	14	29.4	5	10.0		
K	Bidur	5	Pipatar	72	65	29.2	0	0.0	7	9.7	25	33.3	11	14.8	6	8.1		
				72	65	29.2	0	0.0	7	9.7	25	33.3	11	14.8	6	8.1		
				72	65	29.2	0	0.0	7	9.7	25	33.3	11	14.8	6	8.1		
L	Khadga Bhanjyan	5	Phirkep Devighat	89	87	28.7	1	1.1	8	9.1	34	38.2	35	39.3	6	6.7		
				15	15	13.3	0	0.0	2	1.7	4	3.3	8	6.7	0	0.0		
				32	32	21.9	0	0.0	3	9.4	9	28.1	2	6.3	14	43.8		
M	Bidur	7	Shirkhali	93	91	14.3	0	0.0	12	13.0	83	89.0	2	2.2	3	3.2		
				229	225	20.9	1	0.4	20	8.7	63	27.5	171	74.7	9	4.0		
				1,445	1,291	30.4	75	4.7	215	13.1	457	30.0	390	26.3	154	9.9		

Remarks * Poverty Line: 3,945 Rs. per Capita per Annum.
No. of Poor Households out of Responded Households.

Table S.5-2 Number of Poor Households with Different Land Holding Size (12 Months Irrigation)

Irrigation Block	Municipality/VDC	Ward No.	Settlement Name	No. of Household (HH)		No. of Poor Household* (HH) (%)	Land Holding														
				No. of Household	No. of HH responded		Marginal (< 0.2ha)			Small (0.2 - 0.5ha)			Medium (0.5 - 1.0ha)			Large (1.0ha -)					
							No.	HH	%	No.	HH	%	No.	HH	%	No.	HH	%			
A	Cerkthar Bidur	3	Cerkthar	15	15	13.3	1	100.0	2	1	50.0	3	0	0.0	7	0	0.0	2	0	0.0	
		1	Simbuar	20	20	15.0	0	0	100.0	11	1	9.1	3	1	33.3	5	0	0.0	5	0	0.0
			Sub-Total	35	35	14.3	1	100.0	3	2	66.7	14	1	7.1	10	1	10.0	7	0	0.0	
B	Bidur	1	Dhunge	10	10	30.0	2	100.0	7	2	28.6	1	0	0.0	0	0	0.0	0	0	0.0	
		3	Bidar (upland)	10	10	20.0	3	33.3	2	0	0.0	3	0	0.0	1	1	100.0	1	0	0.0	
		4	Bidar (lowland)	42	36	8.3	1	100.0	5	2	40.0	11	0	0.0	14	0	0.0	5	0	0.0	
			Sub-Total	62	56	14.3	6	50.0	14	4	28.6	15	0	0.0	15	1	6.7	6	0	0.0	
C	Bidur	3	Battar (upland)	52	37	5.4	9	11.1	9	1	11.1	14	0	0.0	4	0	0.0	1	0	0.0	
		4	Battar (lowland)	155	155	25.2	35	18	51.4	38	8	21.1	54	7	13.0	17	4	23.5	11	2	18.2
		4	Battar Purano Bajar	36	36	36.1	7	2	28.6	13	9	69.2	11	1	9.1	4	1	25.0	1	0	0.0
		4	Sungam Chok Battar	18	18	11.1	6	0	0.0	0	0	0.0	3	0	0.0	6	2	33.3	3	0	0.0
		4	Danki	18	18	16.7	0	0	0.0	1	0	0.0	11	0	0.0	3	1	33.3	3	2	66.7
			Sub-Total	297	264	22.3	57	21	36.8	61	18	29.5	93	8	8.6	34	8	23.5	19	4	21.1
D	Bidur	5	Inarpati (upland)	18	18	22.2	0	0	100.0	2	1	50.0	9	1	11.1	3	2	66.7	4	0	0.0
		6	Inarpati (lowland)	90	88	25.0	1	100.0	21	13	61.9	36	3	8.3	26	5	19.2	4	0	0.0	
			Sub-Total	108	106	24.5	1	100.0	23	14	60.9	45	4	8.9	29	7	24.1	8	0	0.0	
E	Bidur	6	Dhigaun Marandhi	18	17	5.9	1	100.0	5	0	0.0	7	0	0.0	4	0	0.0	0	0	0.0	
		6	Maharandhi	107	103	16.5	1	0	0.0	11	5	45.5	46	5	10.9	39	7	17.9	6	0	0.0
			Sub-Total	125	120	15.0	2	100.0	16	5	31.3	53	5	9.4	43	7	16.3	6	0	0.0	
F+C	Bidur	7	Tallo Pipaltar	178	159	9.4	1	0	0.0	18	7	38.9	64	5	7.8	49	1	2.0	27	2	7.4
			Sub-Total	178	159	9.4	1	0	0.0	18	7	38.9	64	5	7.8	49	1	2.0	27	2	7.4
H	Bidur	7	Devghat	155	103	20.4	3	2	66.7	24	11	45.8	34	4	11.8	30	3	10.0	12	1	8.3
			Sub-Total	155	103	20.4	3	2	66.7	24	11	45.8	34	4	11.8	30	3	10.0	12	1	8.3
I	Bidur	5	Majhitar	133	111	15.3	0	0	100.0	18	10	55.6	32	3	9.4	48	4	8.3	13	0	0.0
			Sub-Total	133	111	15.3	0	0	100.0	18	10	55.6	32	3	9.4	48	4	8.3	13	0	0.0
J	Bidur	5	Pipaltar Thulegaun	16	15	6.3	3	100.0	2	1	50.0	4	0	0.0	4	2	50.0	2	0	0.0	
		5	Pipaltar Majhagaun	35	32	6.3	0	0	100.0	4	0	0.0	15	1	6.7	10	1	10.0	3	0	0.0
			Sub-Total	51	47	8.1	3	100.0	6	1	16.7	19	1	5.3	14	3	21.4	5	0	0.0	
K	Bidur	5	Pipaltar	72	65	16.9	0	0	100.0	7	4	57.1	25	4	16.0	27	2	7.4	6	1	16.7
			Sub-Total	72	65	16.9	0	0	100.0	7	4	57.1	25	4	16.0	27	2	7.4	6	1	16.7
L	Khadga Bhanjyan	5	Phirkep Devghat	89	87	13.8	1	100.0	8	3	37.5	34	3	8.8	32	5	15.6	12	0	0.0	
		5	Majhagaun	15	15	0.0	0	0	100.0	2	0	0.0	4	0	0.0	8	0	0.0	1	0	0.0
			Sub-Total	32	32	6.3	0	0	100.0	3	2	66.7	9	0	0.0	14	0	0.0	6	0	0.0
	Bidur	7	Shirkhali	93	91	11.0	0	0	100.0	12	9	75.0	16	1	6.3	37	0	0.0	26	0	0.0
			Sub-Total	229	225	16.7	1	100.0	25	14	56.0	63	4	6.3	91	5	5.5	45	0	0.0	
			Total	1,445	1,291	16.4	75	33	44.0	215	90	41.9	457	39	8.5	390	42	10.8	154	8	5.2

Remarks - Poverty Line: 3,945 Rs. per Capita per Annum.
No. of Poor Households out of Responded Households.

CHAPTER 9

CHAPTER 9 CONCLUSION AND RECOMMENDATIONS

- (1) The subject Feasibility Study was carried out from the initial stage with the active participation of the Project area farmers. This was accomplished through meetings on a block-wise base with beneficiary farmers, and the elicitation of their joint effort in subsequent field survey works.
- (2) Area farmers exhibited an extremely high degree of interest in the Project throughout the course of the Study period, and expressed their keen desire that the long standing dream that sufficient water for viable and profitable agriculture in the area be realized.

In response to this keen interest on the part of area farmers, layout plans for the envisioned irrigation system were presented to farmer meetings in the latter part of the field survey period. Farmer aspirations and hopes with regards to the Project were carefully identified and are integrally reflected in the Project plan.

- (3) As a result of social and agricultural survey, it is established that the number of beneficiary farm households under the Project is 1,445, or a total beneficiary population of 8,742. On the basis of poverty line criteria established by the National Planning Commission, 1976/77, and adjusted to 1997 price levels yielding a poverty line cut-off of Rs 3,945 per capita per annum, it was identified that 1,072 households in the scheme areas subsist below the poverty line (83% of 1,291 households responding to the district survey).

Implementation of the Project (9 month irrigation plan) is estimated to result in a dramatic reduction of impoverished households to 346 households (26.8%). In addition, in the case of the subject remaining 346 households, it is anticipated the increase in employment opportunities under the Project will gradually propel these households over the poverty line as well.

Accordingly, it is recommended that the Project be implemented at the earliest, as an alleviation measure for the long term poverty which has plagued area farmers.

- (4) The timely implementation of the Project is premised on consultation and agreement between DOI and NEA with regards to the following:

- Shift of intake point from the originally proposed location at aqueduct no. 2 to downstream of the balancing reservoir (option 3)

In light of the fact that irrigation system construction based on the originally proposed location would be prohibitively costly both in terms of local and international criteria, option 3 is considered essential to Project realization.

- (5) The Project comprises an irrigation system plan, agricultural development plan, farmer organization plan, participatory O&M plan, and monitoring and environmental conservation plan.

The Project area lacks farmer organization as well as an overall irrigation system. Implementation of the Project requires the earliest possible organization of farmers, this in light of the fact that consensual agreements are necessary between the government and farmer groups in order to move forward with the Project.

Also, capacity building directed at farmers is essential with regard to modern technology for agricultural diversification, accessing market information, irrigation system management, etc., and to achieve this a social preparation program is proposed under the Project.

Attachments

- 1. Scope of Work and Minutes of Meeting on S/W**
- 2. Minutes of Meeting on Inception Report**
- 3. Minutes of Meeting on Draft Final Report**

Attachment-1

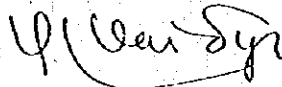
**Scope of Work and Minutes of Meeting on S/W
(July 15, 1996)**

SCOPE OF WORK
FOR
THE FEASIBILITY STUDY
ON
TRISHULI IRRIGATION PROJECT
IN
THE KINGDOM OF NEPAL

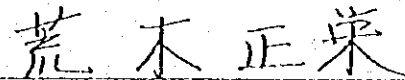
AGREED UPON BETWEEN

DEPARTMENT OF IRRIGATION
MINISTRY OF WATER RESOURCES
AND
THE JAPAN INTERNATIONAL COOPERATION AGENCY

KATHMANDU, 15 JULY, 1996



Mr. Y.L. Vaidya
Director General,
Department of Irrigation
His Majesty's Government of Nepal



Mr. Shohei Araki
Leader,
Japanese Preparatory Study Team,
The Japan International Cooperation
Agency

I. Introduction

In response to the request of the His Majesty's Government of Nepal (hereinafter referred to as "HMGN"), the Government of Japan decided to conduct the Feasibility Study on the Trishuli Irrigation Project (hereinafter referred to as "the Study"), in accordance with the relevant laws and regulations in force in Japan.

Accordingly, Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of technical cooperation programs of the Government of Japan, will undertake the Study in close cooperation with the authorities concerned of HMGN.

The Department of Irrigation, Ministry of Water Resources (hereinafter referred to as "DOI") shall act as counterpart agency to the Japanese study team and also as the coordinating body in relation with other governmental and non-governmental organizations concerned for the smooth implementation of the Study.

The present document sets forth the scope of work with regard to the Study.

II. Objectives of the Study

The objectives of the Study are;

1. To formulate the feasibility study report on the Trishuli Irrigation Project (hereinafter referred to as "the Project") utilizing 3m³/s of water from headrace canal of Trishuli Devighat Hydropower Upgrading Project, and
2. To carry out technology transfer to the Nepalese counterpart personnel through on-the-job training in the course of the Study.

III. Study area

The Study area covers approximately 1,000ha of left and right bank terrace of Trishuli river located in the Nuwakot district.

IV. Scope of the Study

The Study will cover the following:

1. Phase I (work in Nepal)

1.1. Review of the existing regional and national development plans related to the Study area

1.2. Collection and analysis of the existing data and information of the Study area;

(1) natural condition

- 1) topography
- 2) meteorology and hydrology
- 3) geology
- 4) pedology
- 5) water quality of Trishuli river
- 6) environment and ecology

(2) social condition

- 1) population
- 2) regional socio-economic condition and economic activities
- 3) social infrastructure
- 4) others

(3) agricultural condition

- 1) land use
- 2) farming and cropping
- 3) agro-economy, agricultural credit, processing, and marketing system
- 4) agricultural supporting system (government institutions, farmers' organizations, supporting organizations, and extension service organizations)
- 5) others

(4) present condition of irrigation and drainage

- 1) pump and pumping station
- 2) irrigation system and facilities
- 3) drainage system and facilities
- 4) water management system

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(5) surveying

- 1) route survey (intake to the Study area)
- 2) topographic survey (the Study area)

1.3. Examination on alternative approach;

(1) irrigation and drainage systems: route of headrace, combination of gravity irrigation and pumping irrigation, irrigation block, etc.

(2) irrigation and drainage facilities: standard, construction methods, engineering, technology, materials, farmers' participation, etc.

(3) cropping pattern

(4) operation and maintenance

- 1) farmers' participation and water users association
- 2) water tariff
- 3) others

1.4. Initial Environmental Examination

2. Phase II (work in Japan)

2.1. Evaluation on alternative approach;

(1) irrigation and drainage systems: route of headrace, combination of gravity irrigation and pumping irrigation, irrigation block, etc.

(2) irrigation and drainage facilities: standard, construction methods, engineering, technology, materials, farmers' participation, etc.

(3) cropping pattern

(4) operation and maintenance

- 1) farmers' participation and water users association
- 2) water tariff
- 3) others

(5) cost estimation

2.2. Formulation of a development plan of the Project with the following components:

(1) Irrigation and drainage with maximum effort on utilization of existing irrigation infrastructure.

- 1) settling basin
- 2) canal (headrace canal, main canal, secondary canal, tertiary canal)
- 3) replacement of pumps and rehabilitation of pumping station
- 4) other minor facilities

(2) Cropping pattern

(3) Farmers' organization, water users association and supporting service

(4) Post harvest and marketing system

(5) Environmental preservation plan (including land conservation)

(6) Preliminary design of major structures

(7) Operation and maintenance plan for major structures

(8) Project implementation schedule

(9) Estimation of project cost and benefits

2.3 Evaluation of the development plan

2.4 Recommendations

V. Study schedule

The Study will be carried out in accordance with the attached tentative work schedule. (ANNEX)

VI. Reports

JICA will prepare and submit the following reports in English to the HIMGN.

1. Inception Report

Twenty (20) copies at the commencement of the Phase I field study.

2. Progress Report

Twenty (20) copies at the end of the work in Nepal of the Phase I study.

3. Draft final Report

Twenty (20) copies at the end of the Phase II study. HMGN will provide its comments on the Draft Final Report to JICA within one (1) month after receiving the Draft Final Report.

4. Final Report

Fifty (50) copies within two (2) months after the receipt of comments on the Draft Final Report.

VII. Undertakings of HMGN

1. To facilitate smooth conduct of the Study, HMGN shall take necessary measures:
 - (1) to secure the safety of the Japanese study team;
 - (2) to permit the members of the Japanese study team to enter, leave and sojourn in the Kingdom of Nepal for the duration of their assignment therein, and exempt them from foreign registration requirements and consular fees.
 - (3) to exempt the members of the Japanese study team from taxes, duties, fees and any other charges on equipment, machinery and materials brought into the Kingdom of Nepal for the conduct of the Study;
 - (4) to exempt the members of the Japanese study team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Japanese study team for their services in connection with the implementation of the Study;
 - (5) to provide necessary facilities to the Japanese study team for the remittance as well as utilization of the funds introduced into the Kingdom of Nepal from Japan in connection with the implementation of the Study;
 - (6) to secure permission for entry into private properties or restricted areas for the implementation of the Study as and when necessity arises;
 - (7) to secure permission for the Japanese study team to take all data and documents related to the Study including photographs and maps out of the Kingdom of Nepal to Japan;
and
 - (8) to provide medical services as needed. Its expenses will be chargeable on the members of the Japanese study team.




A-6

2. HMGN shall bear claims, if any arises, against the members of the Japanese study team resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Japanese study team.
3. DOI shall, at its own expense, provide the Japanese study team with the following, in cooperation with the Department of Agriculture and authorities concerned;
 - (1) available data and information necessary and related to the Study;
 - (2) counterpart personnel and supporting staff necessary for the Study;
 - (3) suitable office space(s) with necessary equipment in Kathmandu and the Study area and ;
 - (4) credentials or identification cards.

VIII. Undertakings of JICA

For the implementation of the Study, JICA shall take the following measures;

- (1) to dispatch, at its own expense, the study team to the Kingdom of Nepal and
- (2) to pursue technology transfer to the Nepalese counterpart personnel in the course of the Study.

IX. Others

JICA and the DOI shall consult with each other in respect of any matter that may arise from or in connection with the Study.



ANNEX

TENTATIVE WORK SCHEDULE

Month	1	2	3	4	5	6	7	8	9	10
Work in Kingdom of Nepal	[Solid bar]							[Solid bar]		
Home office work in Japan	[Dashed bar]			[Dashed bar]			[Dashed bar]			
Reports	△ Ic/R		△ P/R				△ Df/R	◎	△ F/R	

(Remarks)

Ic / R : Inception Report

P / R : Progress Report

Df/R : Draft Final Report

F / R : Final Report

◎ : Comments on DF/R by the Nepali side

WCE

SP

List of Participants

1. Nepalese Side

Department of Irrigation, Ministry of Water Resources

Mr. Y.L. Vaidya	Director General
Mr. S.N. Poudel	Deputy Director General, Planning, Design, Monitoring and Evaluation
Mr. N.N. Vaidya	Superintending Engineer, Planning, Design, Monitoring and Evaluation
Mr. Yatsuhiko Chiba	Advisor to DOI
Mr. B. Chhatkuli	Engineer, Central Region Irrigation Directorate
Mr. M. Belbase	Engineer, Planning Section

2. Japanese Side

Mr. Shoei Araki	Leader of Preparatory Study Team, JICA
Mr. Masashi Nakai	Member of Preparatory Study Team, JICA
Mr. Akinori Ishikawa	Member of Preparatory Study Team, JICA
Mr. Kunio Nishimura	Member of Preparatory Study Team, JICA
Mr. Noriaki Nagatomo	Member of Preparatory Study Team, JICA
Mr. Atsushi Uchida	Assistant Resident Representative, JICA Nepal Office
Mr. Narendra Gurung	Senior Program Officer, JICA Nepal Office

*MINUTES OF MEETING
ON
SCOPE OF WORK
FOR
THE FEASIBILITY STUDY
ON
TRISHULI IRRIGATION PROJECT
IN
THE KINGDOM OF NEPAL*

The preparatory study team(hereinafter referred to as "the Team")organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA"), and headed by Mr.Shoci Araki, visited the Kingdom of Nepal from 8 to 16, July, 1996 for the purpose of discussing and confirming the Scope of Work for the Feasibility Study on TRISHULI IRRIGATION PROJECT(hereinafter referred to as "the Study").

The Team had a series of discussions with officials concerned of the Department of Irrigation, Ministry of Water Resources(hereinafter referred to as "DOI")on the Scope of Work for the Study. The list of Participants in a series of meetings is attached in the Annex.

As a result of the discussions, DOI and the Team agreed on the Scope of Work for the Study.

The following are the main issues discussed and agreed upon by both sides in relation to the Scope of Work for the Study.

1. The Study area covers approximately 1,000ha located in the part of Gerkhutar, Bidur, Maharani Dihi, Battar, Pipaltar, Majhitar, Chandi, Pokhari, Lower Pipaltar and Pokhare Phant in Nuwakot District.
- 2.The existing coordinating committee of DOI and DOA(Department of Agriculture) shall coordinate for the smooth implementation of the Study.
- 3.The DOI shall get a permission for using the aero-photograph covering the Study area and taking it out of the Kingdom of Nepal from the Survey Department and related authorities.

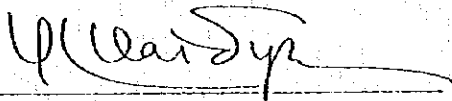




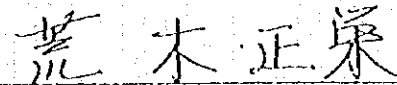
4. The DOI shall provide drivers to the Japanese study team.

5. DOI requested the counterpart training in Japan.
The Team promised to convey its request to the Government of Japan.

KATHMANDU, 15 JULY, 1996



Mr. Y.L. Vaidya
Director General,
Department of Irrigation
His Majesty's Government of Nepal



Mr. Shoei Araki
Leader,
Japanese Preparatory Study Team,
The Japan International Cooperation
Agency

Attachment-2

**Minutes of Meeting on Inception Report
(December 9, 1996)**

**MINUTES OF THE MEETING ON THE INCEPTION REPORT
FOR
THE FEASIBILITY STUDY ON
TRISHULI IRRIGATION PROJECT IN
THE KINGDOM OF NEPAL.**

Date: December 9, 1996
Venue: Conference Room of the Department of Irrigation
Participants: Listed in Annex-1

A. SUBMITTING OF INCEPTION REPORT (IC/R)

The Feasibility Study Team (hereafter refer to as "the Study Team") dispatched by the Japan International Cooperation Agency (hereafter referred to as "JICA") has arrived at the Kingdom of Nepal for the purpose of execution of the Field Survey from December 4, 1996 to March 22, 1997.

At commencement of the Field Survey, the Study Team has submitted 20 copies of the Inception reports to Department of Irrigation, Ministry of Water Resources (hereafter referred to as "DOI") of the His Majesty's Government of Nepal (hereafter referred to as "HMG/N") on December 5, 1996.

Mr. Masanitsu Fujioka, Team Leader of the Study Team, explained contents of the IC/R to the concerned officials of DOI.

Through series of discussions, the contents of the Inception Report were in principle accepted by DOI.

The followings are the main issues discussed and agreed upon by both sides in relation to the Inception Report.

1. In response to the proposal by the Study Team, HMG/N proposed as shown in section B shown in the following page.
2. Counterparts, listed in Annex-2 attached herein, are assigned from DOI to be involved as full time and contact persons of DOI for this Study during the entire period of the Study in Nepal.
3. The first workshop/meeting of CCG will be held on December 25, 1996. The possible venue for the CCG workshop/meeting shall be at DPTC, Lalitpur.
4. List of agenda/issues to be discussed in the workshop/meeting (CCGs and FLAGS) shall be provided by the Study Team to DOI, one week prior to the workshop/meeting.
5. DOI shall have the prime responsibility of coordinating the participants and will take responsibility of requesting the concerned agencies to participate in workshop/meeting of CCGs and FLAGS during the entire Study period

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6. Two drivers are to be provided by DOI for the Study Team.
7. Two vehicles from JICA will be handed over to DOI after the completion of this Study.

B. HMG/N PROPOSAL TO THE INCEPTION REPORT

HMG/N proposal to the compositions of the Central Coordinating Group (CCG) and Field Level Action Group (FLAG) as agreed by JICA Study Team on page 22 and 23 in the IC/R shall be made by officials of DOI as mentioned in Annex-3(a) and Annex-3(b).



Mr. Mahesh Man SHRESTHA
Acting Director General, DOI



Mr. Masamitsu FUJIOKA
Team Leader, JICA Study Team

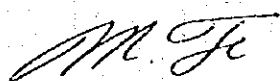
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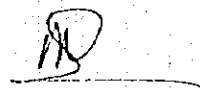


Mr. Atsushi UCHIDA
Assistant Resident Representative,
JICA Nepal Office

LIST OF PARTICIPANTS

- | | |
|-------------------------------|--|
| 1. Mr. Mahesh Man Shrestha | Acting Director General, DOI |
| 2. Mr. Som Nath Poudel | Deputy Director General, DOI |
| 3. Mr. Nirjara Nanda Vaidya | Superintending Engineer, DOI |
| 4. Mr. Sharada Prasad Sharma | Regional Director, CRID, DOI |
| 5. Mr. Shiv Kumar Sharma | Senior Divisional Engineer, DOI |
| 6. Mr. Shital Babu Regmi | Senior Divisional Engineer, CRID, DOI |
| 7. Mr. Mahesh Bahadur Pradhan | Engineer, DOI |
| 8. Mr. Prakash Man Shrestha | Engineer, DOI |
| 9. Mr. Khila Nath Dahal | Engineering Geologist, DOI |
| 10. Mr. Yatsuhiko Chiba | JICA Expert, DOI |
| 11. Mr. Masamitsu Fujioka | Team Leader, JICA Study Team |
| 12. Mr. Kuniki Iwata | Irrigation and Drainage, JICA Study Team |
| 13. Dr. Shiva Kumar Chaudhary | Farm Management, JICA Study Team |
| 14. Dr. Prachanda Pradhan | Farmer Organization, JICA Study Team |
| 15. Mr. Kiyofumi Tanaka | Rural Society, JICA Study Team |
| 16. Mr. Kazumitsu Tsumura | Facility Design/Cost Estimate, JICA Study Team |
| 17. Mr. Kentarou Usuda | Toposurvey Supervision, JICA Study Team |
| 18. Mr. Atsushi Uchida | Assistant Resident Representative, JICA Nepal Office |
| 19. Mr. Narendra Gurung | Senior Program Officer, JICA Nepal Office |





LIST OF COUNTERPARTS

Full Time Counterparts

- | | | |
|----|---|---------------------------------------|
| 1. | Mr. Mahesh Bahadur Pradhan(Chief Counterpart) | Engineer, DOI |
| 2. | Mr. Prakash Man Shrestha | Engineer, DOI |
| 3. | Mr. Khila Nath Dahal | Engineering Geologist, DOI |
| 4. | Mr. Nirmal Gadai | Agronomist, CRID, DOI |
| 5. | Mr. H. K. Jha | Environmentalist, Environment Section |

Contact Persons

<u>Discipline</u>	<u>Name of Counterparts</u>	<u>Position / Agencies</u>
1. Team leader	Mr. Nirjara Nanda Vaidya	Superintending Engineer, DOI
2. Irrigation and Drainage		
- Central Level	Mr. Mahesh Bahadur Pradhan	Engineer, DOI
- Regional Level	Mr. Shital Babu Regmi	Senior Divisional Engineer, DOI
- District Level	Mr. L. D. Shrestha	Office in Charge, DOI
3. Farm Management		
- Regional Level	Mr. Nirmal Gadai	Agronomist, CRID, DOI
- District Level	Mr. N. P. Khanal	Agriculture Dev. Officer, DOA
4. Farmer Organization		
- Central Level	Mr. P. R. Dhungana	DOI
- District Level		Association Organizers, DOI
5. Rural Society	Ms. Sangita Singh	Sociologist, CRID, DOI
6. Agro-Economy / Cost Evaluation	Mr. D. B. Khanal	Agri-Economist, DOI
7. Facility Design / Cost Estimate	Mr. Prakash Man Shrestha	Engineer, DOI
8. Environment	Mr. H. K. Jha	Environmentalist, Environment Section
9. Toposurvey Supervision	Mr. Prakash Man Shrestha	Engineer, DOI

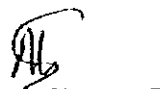
**SELECTED MEMBERS OF CENTRAL COORDINATING GROUP
(CCG)**

Policy Making Group

- | | |
|---|--------------------|
| 1. Director General, DOI (Chairman) | Mr. Y. L. Vaidya |
| 2. Deputy Director General, DOI, | |
| 1) Irrigation, Management & Water Utilization Division | Mr. M. M. Shrestha |
| 2) Planning, Design, Monitoring & Evaluation Division | Mr. S. N. Paudel |
| 3) Surface Irrigation Division | Mr. M. Aryal |
| 3. Regional Directors, DOI | |
| 1) Regional Directorate of Irrigation, Central Development Region | Mr. S. P. Sharma |
| 2) Senior Divisional Engineer, CRID | Mr. S. B. Regmi |
| 3) Chief, Training & Research Branch | Mr. K. R. Sharma |
| 4. Representatives | |
| 1) National Planning Commission | |
| 2) Department of Agriculture | |
| 3) Department of Forestry | |
| 4) Department of Soil Conservation | |
| 5) Agricultural Development Bank | |
| 6) Agricultural Input Corporation | |
| 7) Ministry of Population & Environment | |
| 8) Ministry of Water Resources | |
| 9) Nepal Electricity Authority (NEA): Preferably Project Manager, | |
| Trishuli-Devighat Hydropower Rehabilitation Project | |
| 10) Chief, Planning & Feasibility Study, DOI | |
| 11) Experts of related Fields | |

Planning Group (Counterparts arranged by the related agencies)

- 1) Irrigation Management & Water Utilization
- 2) Department Agriculture
- 3) Department of Forestry
- 4) Department of Soil Conversation
- 5) Officers of related Agencies



**PROPOSED MEMBERS OF FIELD LEVEL ACTION GROUP
(FLAG)**

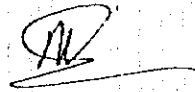
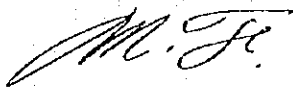
Concerned Government Agency Group

- 1) District Irrigation Office
- 2) Agriculture Service Center
- 3) Co-operative Society
- 4) Agricultural Development Bank (ADB/N)
- 5) District Agricultural Development Office
- 6) Agricultural Input Corporation (AIC)
- 7) Branch Office of Department of Food & Marketing Services
- 8) Local Development Officer, DDC, Nuwakot
- 9) Manager of NEA (Trishuli-Devighat Hydropower Rehabilitation Project)

Beneficiary Farmer Group

Around 40 Farmers from user beneficiaries selected on the basis of the survey to determine beneficiary farmers

Composition of one ward group : Chairman (1) and Farmer representatives (5-6 nos.)



Attachment-3

**Minutes of Meeting on Draft Final Report
(July 24, 1997)**

**Minutes of Meeting
for
Draft Final Report
on
Feasibility Study on Trisuli Irrigation Project
in the Kingdom of Nepal**

Date : July 24, 1997

Place : Meeting Room of the Director General of the Department of Irrigation, Ministry of Water Resources.

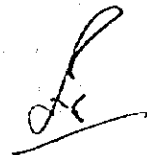
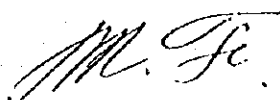
Attendants : As listed in the table attached hereto

JICA Study Team submitted the Draft Final Report on the Feasibility Study on Trisuli Irrigation Project in twenty (20) copies in total to the Department of Irrigation, Ministry of Water Resources on July 13 and 17, 1997.

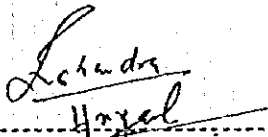
On July 17, 1997, JICA Study Team explained to the officials concerned of the Department of Irrigation and other line agencies on the contents of the Draft Final Report at the conference room of the Department stressing that the project would address poverty alleviation through intensive agricultural development in the project area. At the meeting, high construction cost was pointed out by the Department of Irrigation, compared to other similar hill projects. In reply to the question, JICA Study Team justified its high construction cost due to geographical constraints in the hills, introduction of a pipeline system and limited construction period. The Study Team also explained that the shifting of the original intake from Aqueduct No. 2 to the downstream portion of the balancing reservoir (option 3) as proposed is the best alternative for the project.

As a result of discussions both parties have reached the following concurrence:

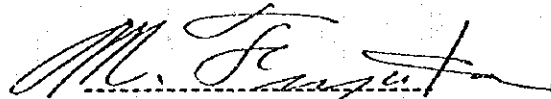
1. The Draft Final Report was in general accepted by the Department of Irrigation.



2. The Department of Irrigation agreed to provide comments on the Draft Final Report if any to JICA within one (1) month after receiving the Draft Final Report.
3. JICA Study Team agreed to submit the Final Report in fifty (50) copies to the Department of Irrigation through JICA within two (2) months after the receipt of comments from the Department.
4. The Final Report shall be opened to public whenever it is requested.



M.N. Aryal
Director General
Department of Irrigation
Ministry of Water Resources



M. Fujioka
JICA Team Leader

Witnessed by



M. Kitanaka
Deputy Director
Agricultural Development Study Division
Agriculture, Forestry and Fisheries
Development Study Department
Japan International Cooperation Agency (JICA)

List of Attendants

	Full Name (in Block Letters)	Occupational Status	Name of Organization	Signature
1.	Mahendra N. Aryal	Director General	DOE	
2.	Nigina Nantavongk	S.E.	DOE	
3.	Tejman Singh Bhandari	Chief Hydrogeologist	DOE	
4.	Sunil Kumar Shrestha	J.S.G.	DOE	
5.	Mahesh B. Pradhan	Engineer (Overseas)	DOE	
6.	Narunata Gurung	Sr. Program. Officer	JICA	
7.	Atsushi Uchida	A.R.R.	JICA	
8.	Yatsubiko CHIBA	JICA expert to DOE		
9.	MAKOTO KITANAKA	Deputy Director	JICA	
10.	MASAMITSU FUJIOKA	Leader of JICA Study Team		
11.	KUNIKI IWATA	Member of JICA Study Team		
12.	NOBUKI TOYOOKA	Member of JICA Study Team		

List of Attendants

Full Name	Occupational Status	Name of Organization
M.N Aryal	D.G	DOI
N.N Vaidya	S.E	DOI
T.S Bhandari	Chief Hydrogeologist	DOI
S.M Shrestha	DDG	DOI
M.B Pradhan	Engineer	DOI
N. Gurung	Senior Program Officer	JICA
A. Uchida	A.R.R	JICA
Y. Chiba	JICA expert	DOI
M. Kitanaka	Deputy Director	JICA
M. Fujioka	Team Leader	JICA Study Team
K. Iwata	Irrigation and Drainage	JICA Study Team
N. Toyooka	Agro Economy / Project Evaluation	JICA Study Team

JICA