Paper 7: Joint Management Experiences from Mahakali Irrigation Project

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PROJECT BACKGROUND

Mahakali Irrigation Project (MIP) is located in Far-Western Development Region of Nepal on the left bank of the Mahakali River in Kanchanpur District of Mahakali zone. The project area is being developed in three stages: Stage I (4,800 ha), Stage II (6,800 ha) and Stage III (28,000 ha - initially proposed 11,600 ha.). Stage-I of the project was implemented in 1980 to 1989 and Stage-II started in 1990 and now they are in operational status. Stage-III project is going to have its feasibility study done in near future. World Bank (IDA Credit) financed both Stage-I and Stage-II projects. The Stage-II covers various wards of Daiji, Rauteli-Bichuwa, Beldani, Rampur-Bilaspur and Shripur VDCs of Kanchanpur district. Stage-I area falls under newly cleared forestland while most of the Stage-II area falls under the old flood plain of Mahakali River.

Climate

The climate is subtropical with two distinct seasons - the wet season from June to October and the dry season from November to May. The annual average rainfall is about 1,500 mm and temperatures vary from 15 to 40°C. Uneven distribution of rainfall in the wet season makes supplementary irrigation necessary for rice cultivation. Rainfall during dry season occurs in occasional showers and is insufficient for good crop yields.

Water Resource

The catchment area of the Mahakali River at the Sarada Barrage is about 15,640 km^2. There are wide seasonal variations in river flows and its sediment concentrations. The mean monthly flows vary from 130 cumecs in May up to 1,000 cumecs in the monsoon. As the source of water is Sarada Barrage, the flows vary only on seasonal basis.

The basic ground of the project formulation was the existing water right from Sarada Barrage provided under the Letter of Exchange between Nepal and India in 1920 about its construction and management. According to the agreement, 460 cusecs water would be provided in Kharif season (15 May to 15 October) and 150 cusecs in Rabi season (16

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October to 14 May). The agreement also lays provision of maximum supply of water to 1,000 cusecs in case of surplus water.

Mahakali Treaty

A Bilateral Agreement between Nepal and India regarding utilization of Mahakali river was signed on 12th February 1996 and became effective after the ratification from the House of Parliament and exchange of letters. Treaty spells, "...Nepal shall have the right to a supply of 28.35 cumecs of water in the wet season and 8.5 cumecs in the dry season". In case the Sarada Barrage becomes non-functional due to any cause, the water to be received from Sarada Barrage will also be supplied from Tanakpur Barrage. Water availability, therefore, is not a problem for MIP.

PROJECT IMPLEMENTATION APPROACH

Initially the Department of Irrigation with its own resources started MIP in 1970. In contrast to the proposed command area, due to water management problems, irrigation was available only in about 3,400 ha. The features of the canal network in 1975 were as follows:

Main Canal	13 Km
Main Canal Capacity	28.35 m^3/s
Branch and Secondary canals	60 Km
Tertiary Canals	80 Km

In light of potential command area extension and abundant supply of water from Sarada Barrage, improvements and extension of existing irrigation system (MIP-I) was carried out in 1980 and after its successful completion, Stage-II was executed under the same principles of design and construction. The salient features of the project are presented in Table 7.1.

Rationale and Objectives

Realizing the potential of irrigated agriculture to cope up with the ever-increasing population pressure coming into this area from the hills, HMG/N gave high priority to irrigation development in Kanchanpur district. The main objectives of the Mahakali Irrigation Project is to increase the agricultural production and farm income through the improvement and extension of the existing irrigation and drainage system and the efficient utilization of the available resources. The primary rationale for IDA involvement was to advance the rehabilitation and development of irrigation and drainage system and to improve operation and maintenance through the farmers' participation right from the implementation of the project. Farmers' participation and their active involvement in operation and maintenance were not conceived in the project design. However, during the course of project implementation there were needs for

farmer's participation in all stages of project development and the project started incorporating their participation. MIP Stage-I underwent its operation and maintenance activities on Joint Management Basis according to which the project is responsible for operation and maintenance from main canal to the head of the tertiary canals and the farmers are responsible for water allocation, distribution and maintenance within their tertiary canals and *chak* boundaries. The design and construction of tertiary canals of Stage-II area incorporated active participation of beneficiary farmers. Farmers' contribution to the capital cost of the irrigation network consists of the cost of land for tertiary canals and cost of canal box cutting and grass sodding along with the contribution and fixation of canal alignment.

In this article, attempt has been made to assess the impact of Joint Management and farmers' participation in improving irrigation system management through increased agricultural production, improved farm income, reduction in operation and maintenance budget and increased rate of irrigation service fee. The extent and quality of farmers participation in the project management is therefore a subject of analysis based on performances of actual project implementation and not only from the planning perspective.

IMPACT OF SYSTEM IMPROVEMENT

Cropping Pattern and Cropping Intensity

Improvements in the cropping pattern and cropping intensity are one of the major indicators of improved agricultural practices and increased production. A socioeconomic baseline survey undertaken in June 1997 in the command area of MIP has shown significant improvements in cropping patterns and cropping intensities both in Stage I and Stage II area. There has been an increase in the areas of paddy, wheat and pulses, while the areas of maize and oilseeds have declined. In the command area, paddy is dominant crop, followed by wheat and oilseeds. Sugarcane is the main cash crop in Stage-II area but, due to inadequate processing capacity within reasonable proximity, significant expansion is unlikely. With regard to crop diversification, farmers of stage-I have shown keen interest in sunflower production. With the improved irrigation facilities farmers are expanding their areas of potatoes and green vegetables in response to market demand.

With the comparison of agricultural impact study of Stage I in 1989, the results of the 1997 baseline survey indicate positive impact on system improvement and management. The increase in cropping intensities is shown in Table 7.2.

Crop Yields

In recent years, there have been significant increases in the productivity of paddy and wheat in the command areas of both the stages of MIP. The changes in crop yields are

presented in Table 7.3. These changed results of crop yields are the products of improved agricultural practices with reliable supply of irrigation water in Stage I area. The improvements in crop yields of Stage II are outcomes of adoption of improved seeds and use of chemical fertilizer. These significant increases in both the area and the production of basic staple crops i.e. rice and wheat, have brought positive impact on food grain production, farm incomes and employment generations.

OPERATION AND MAINTENANCE

Following the completion of improvements and extension works on stage I area in 1989 operation and maintenance activities became part of the scope of work of Stage II project. By the implementation of Irrigation Regulation and Irrigation Policy-1992, MIP underwent its operation and maintenance activities on Joint Management basis as discussed earlier.

Operation

As the operation of the system deals with the water allocation, distribution and their monitoring, the project has appointed gate operators, supervisors and canal caretakers (Dhalpas) for regular observation of the system. The Indian authorities at Sarada Barrage control allocation of water in the main canal and its operation and supply of water is based on the Bilateral Agreement and/or written request of the project. The distribution system of the project is designed and remodeled on Rotational Water Supply principle, but it is not yet practiced. It may not be worth to make the physical system compatible for rotational supply system, as there is sufficient allocation of water in the main canal.

Maintenance

To maintain the irrigation system in sustainable operational order and to protect the command area from harsh regime of river Mahakali are the main targets of system maintenance activities. Moreover, the siltation in main and secondary canals and increasing demand for communication structures (canal, drain and road crossings) are in the priorities of maintenance practices.

Tertiary Maintenance: As the responsibility of tertiary maintenance lies with the tertiary canal committee, farmers desilt their canals before transplanting the paddy crop. In practice, the desilting work is carried out by volunteer labors based on number of households or by labors hired by the landowners. Due to the encroachment on canal toes by the adjacent farmers and cultivation of dry root crops on the banks and slopes, seepage in some tertiary canals is frequent resulting in increasing demand for lining.

Block Maintenance: The desilting of main and secondary canals is usually carried in alternate years. Block maintenance (secondary canal to the head of the tertiary) is carried out on the basis of priority fixed by respective WUAs.

Procedures of Priority Fixation: Soon after the start of new fiscal year and stoppage of the monsoon rain, maintenance demands from the farmers come to the WUA of each block. Tertiary chairman either certifies these demands or the outlet leader or individual farmer may put forth the demand directly. All demands should come in written form addressed to the chairman of the WUA and these demands are collected and compiled by the office bearers of WUA. Moreover, a meeting held in the beginning of the fiscal year will fix priority through a sub-committee headed by executive member of WUA. In practice, this meeting falls during September to October. Based on the maintenance demands collected and compiled in the office, the sub-committee has to verify the sites and submit its report with a list of respective priority works. After the submission of all priority lists, a meeting is held to discuss and make a consensus. In case of disputes, executive members jointly inspect the site to identify the necessity of the works to be done. In the mean time, WUAs hold a meeting to know the proposed budget ceiling of their block. Project Manager or his representative (usually SDE of operation and maintenance division) should attend this meeting. Depending upon the proposed budget and nature of the problem, WUA unanimously makes priority list of works to be carried out in the near future and sends it to the MIP requesting the execution of all these genuine demands.

After the arrival of priority lists from all four blocks, MIP starts survey works and prepares estimate of these works. In practice, the survey is carried out with a walk-through with respective WUA members and concerned farmers. Depending up on the nature of work and budget provisions, construction management activities proceed in consultation with WUA members.

These priority fixation activities reflect the farmers' active participation in their system improvement and management through their decision making process and feeling of ownership towards the system. However, increasing demands of communication and lining structures may lead to dependency syndrome among the farmers (See Table 7.8 for typical lists of priority works).

IRRIGATION SERVICE FEE COLLECTION

To meet the operation and maintenance requirements of the system users are expected to pay Irrigation Service Fee (ISF). In MIP it has been NRs. 200 per hectare per year irrespective of crops grown and water actually received since 1985.

Collection Procedures

Generally, farmers come to the project office to pay ISF. They are expected to pay levied charges by the end of Chaitra (Mid April) for each fiscal year. If a farmer defaults, he or she will have to pay penalty as per Irrigation Regulations. If a farmer pays his charges a month ahead of the deadline (end of Falgun), he can have a rebate of 5%. Notice to the

farmers is sent through the official staff or through water users associations. Sometimes the staff also go to the farmers door to collect the previous delayed charges (बक्यौता). In tertiary committee meeting, farmers usually discuss on ISF and encourage the late payers to pay.

MIP also requests the cooperation of District Land Revenue Office and District Agriculture Development Bank in ISF collection. Farmers who come to buy and sell their land or to ask for credit should clear ISF fee also. But in practice it is not yet satisfactorily happened due to lack of legal procedures. The collection of ISF is presented in Table 7.4.

The rate of ISF collection has significantly increased since the introduction of joint management in Stage I area. However, the collection results show yearly fluctuations in the rates of collection, which are probably governed by the effort devoted to ISF collection. Water Revenue Section of MIP, which is responsible for ISF collection, comprises of 5 staff.

INSTITUTIONAL DEVELOPMENT

After the promulgation of Irrigation Regulation 1989, farmers' participation became mandatory at all levels of irrigation development, from the project identification; design and construction; to operation and maintenance of the completed system. According to the policy in public irrigation systems, the farmers will carry out the operation & maintenance of the canals commanding less than 25 ha area and farmers will also do the construction themselves.

To implement the Policy Guidelines in the field, a program was set to hand over all the tertiary canals of Stage I area to the farmers who use the water. The handing over of these tertiary canals was a historic event in the sustainable development of MIP, which was performed in a series of institutional development activities. They involved:

- Listing of users in each tertiary canal
- Confirming chak boundaries
- Fixing outlet group and its leader
- Electing or selecting tertiary committee and its chairman
- Electing block committee

After completing all basic institutional development activities, a walk-through program was set of to verify the physical system and to make a list of structures to be repaired or added. The walk-through team comprised of an engineer and his subordinates including farmer representatives and institutional development staff. After repairing, the verified system hand over process was launched. Association Organizers of the project played a vital role in the handing over process.

The case of Stage II is different. The construction of all tertiary canals by the farmers became impossible after conducting a series of meetings with the farmers. As the tertiary canals are crucial part of large irrigation system without which water cannot be delivered to the field, the construction of these tertiary canals became the prime concern of the project management. In spite of several meetings held with beneficiary farmers and development of association organizer and consultants, farmers of the area expressed their inability to construct tertiary canals by themselves. At first, the project decided to construct the required structures and to ask the farmers for earthworks. But farmers refused to support this arrangement also. At last realizing the seriousness of the issue, the project decided to construct the tertiary canals on the basis of following cost sharing arrangements. The farmers' participation included the cost of land for tertiary canals, borrow area along the canals, canal box cutting and grass sodding whereas project bore the cost of all construction including the cost of standing crop compensation.

In order to materialize the above mentioned participatory approach in tertiary canal construction, several activities were carried out during pre-construction period:

- Preparation of farm holding register-based on hydrological boundary and commanding capacity of an outlet.
- Fixation of canal alignment-based on farm boundary
- Determination of technical feasibility
- Formation of tertiary committee
- Construction Agreement

In construction agreement farmers were informed about their entailing operation and maintenance responsibility of tertiary canals after their successful completion.

Organizational Setup

The organizational setup is designed as per the structural system of the canal and the Rotational Water Supply principle. The canals of MIP are divided into four main categories.

- Main Canal
- Branch and Distributary Canals (Minors also)
- Tertiary Canal
- Field Channel

Accordingly, the water users associations are also organized into four tiers. At the bottom tier is the outlet group, above it is the water users group (WUG-Tertiary committee) and above WUG lies water users associations (WUA-Block committee). At the apex, there is one water users associations coordination committee (WUACC), which was formed in December 1993, initially representing farmers of stage I area and later

following the formation of all organizations in stage II, representing farmers of both Stage I and Stage II.

Composition of Committee

The water users of one outlet have to constitute one outlet group consisting of one outlet leader. A leader of an outlet is elected from all users of that outlet command area and all users are group members. There is one water users group for each area covered by a tertiary canal. All leaders of outlet group will become automatically members of water users group and they elect one chairman and one secretary from among themselves. Similarly, one water users association is formed for each block area covered by respective branch and distributor canals. All chairmen of WUGs will become members of WUA assembly. The executive committee of WUA comprised five members from WUG representatives, operation and maintenance chief of MIP and chief of Agriculture Pilot Farm and from these five farmer representatives, one chairman and one secretary are elected. The representation of WUA from WUG is based on following principles:

Group	Representation in WUA (Assembly of Representatives)		Minimum representation in executives of WUA	
A	Gadda minor	2	Bhujela distributary	3
	Bhujela distributary	36	Gadda minor and main canal direct tertiary	1
	Main canal direct tertiary	6	Woman reservation	1
	Total	44		5
B	Basantpur minor	5	Majgaon minor	1
	Mahendranagar branch	19	Mahendranagar branch	2
	Majgaon minor	13	Basantpur minor and main canal direct tertiary	1
	Main Canal direct tertiary	6	Woman reservation	1
	Total	43		5
C	Ultakham distributary	38	Ultakham distributary	3
	Bhagatpur minor	5	Bhagatpur minor and main canal direct tertiary	1
	Main canal direct tertiary	6	Woman reservation	1
	Total	44		5
D	Chunaria minor	3	Suda branch	2
	Suda branch	23	Sisaiya branch	1
	Sisaiya branch	11	Main canal direct tertiary	1
	Main canal direct tertiary	8	Woman reservation	1
	Total	45		5

The women members must be tertiary chairpersons of outlet leaders of respective block. At the central level there will be a coordination committee. All executive members WUA will be represented in the central committee and elect 15 members executive committee including chairman and secretary from among themselves. The chairmen and secretaries

of WUA will not be elected or nominated in executive committee of WUACC. The composition of WUACC is as follows:

Chairman	1
Vice Chairman	1
Secretary	1
Joint-Secretary	1
Members	8
Project Manager of MIP	1
Chief of Pilot farm	1
Woman reservation	1
Total	15

The tenure of WUA members is of 3 years.

Functions

Each tier of organization has its own rules and regulations, which are clearly mentioned in their constitution - 2048 and corresponding amendments. Other than in operation and maintenance of tertiary canal, the organization is responsible for assisting in ISF collection, water allocation and distribution, conflict management in water issues and maintenance of main canal. As the system is not operated on rotational basis, there are no problems regarding the water allocation and its distribution.

Training

As the training is instrumental in strengthening institutional activities of an organization, MIP conducted several training programs since the introduction of Joint Management. Training programs were organized for farmers as well as for association organizers. Farmer-to-farmer interaction of completed irrigation projects and observation tour of farmer-managed and agency-managed irrigation systems are conducted each year. The training activities are presented in Table 7.7.

Resources Mobilization and Management

According to the construction, each tier has its own rules and regulations regarding the resource mobilization. The main forms are labor contribution in canal cleaning and share of collected ISF. Toll collection from canal roads of each block is also a source. The 25% of ISF collection is distributed among three tiers of organizations, of which 80% goes to tertiary committee, 15% goes to block committee, and the remaining 5% goes to coordination committee. Each organization has its own bank account and the expenditures are to be approved by general meetings. Till date, about 100 tertiary canal committees have their own bank accounts and others are in process. In practice,

expenditures are made on maintaining their offices and sometimes to pay for hired labors in tertiary canal cleanings.

Joint Management Program in MIP shows positive indications to turnover all branch and secondary canals to respective farmers' organizations.

CONCLUSIONS AND RECOMMENDATIONS

The overall assessment of the operation and maintenance of MIP has revealed that the project has been successful in attaining its major goals of raising agricultural production and farm income. The crop yield survey indicates that the improved irrigation facilities have helped to adopt multiple cropping patterns. As a result, the cropping intensity has increased to 196 % in Stage I.

Farmers have positive acceptance on system improvements as it insures reliable supply of water in all fields from head to tail. However, they often complain about the supply of agricultural inputs, improved seeds, and chemical fertilizers.

With regard to the extent and quality of farmers' participation in operation and maintenance, the project has positive impact on water allocation, distribution and conflicts resolutions of the system. However, with regards to reduction in operation and maintenance cost through mobilization of local resources, only marginal success has been achieved. However, the indicators of organizational effectiveness i.e. no of times meetings held in a year, participation of members in the meeting, settlements of disputes, implementation of decisions and changes in farming system, show optimistic results. The project has been able to hand over almost all tertiary canals of stage I area and has not yet formulated any program to hand over secondary and distributary canals.

As farmers' participation has been incorporated in Stage II area right from the planning stage of tertiary canals, joint management agreement has been made before the completion of physical system. The project management should pay more attention to organize farmers to make them engaged in box cutting first.

Comparing the magnitude of maintenance work within and outside of tertiary canal, per unit maintenance cost is less than 5 percent even not considering the main canal's maintenance cost. There is no record of maintenance expenditure in tertiary canals. In practice, tertiary committees used to spend the fund received from MIP as a share of water cess collection in desilting the canals rather than doing it by volunteer labors. Moreover, the procurement of construction materials and tools and plants to be used in the maintenance to tertiary canals and field channels is not practiced by the organizations. This is so because most of such demands are fulfilled by MIP block maintenance budget.

To avoid all these Joint Management consequences the project should monitor the farmers' participation activity and should limit fulfilling ever-increasing demands for maintenance works. The cost sharing arrangement in large projects, as provisioned in the Irrigation Policy-1997 (25% for tertiary canals commanding 10 to 30 ha), is difficult to maintain in practice. Experiences of MIP stage II have shown that farmers provide land free of cost for tertiary canals and contribute in canal section cutting. However, to involve them in such cost sharing arrangement farmers seek better cooperation and friendly behavior from both project management and field level staff. Moreover, farmers seek training in on-farm water management and agricultural practices right from the implementation of participatory approach. Delays in payments for acquired land (other than tertiary canals) and crop compensations, which fall in irrigation and drainage alignment, may adversely effect the participatory approach.

On top of that, reliability of water supply is the most governing factor in attaining farmers' participation either in construction phase or in its operation and maintenance. Once farmers see the water in their parent canal, they will start forgetting the misunderstandings if any created during the course of participatory approach and will proceed towards getting the water to their fields. Hence, all project activities and the attitude of working personnel should be focused only in the direction of supplying water to the fields within the targeted time.

Table 7.1: Salient Features of Mahakali Irrigation Project

S. N.	Work scope	Unit	Stage I	Stage II
1.	Command Area	ha	4,800	6,800
2.	Main Canal			
	Rehabilitation	km	13.70	14.30
	New	km		21.00
	Structures	nos.	64	49
3	Secondary Canals			
	Rehabilitation	Km	37.10	
	New	km	15.70	93.00
	Structures	nos.	144	257
4	Tertiary Canals			
	Rehabilitation	km	34.80	
	New	km	171.20	352.00
	Structures	nos.	1572	40.00
5.	Drains			
	Rehabilitation	km	102.30	
	New	km	121.80	40.00
	Structures	nos.	827	19
6.	Roads			
	Public/Off-canal Roads	km	15.0	21.0
	Service/On-canal Roads	km	55.6	108.0
7	River Training			
	Mahakali	km	0.50	
	Rautela	km	2.20	
	Chaudhar Diversion	km		5.75
	Flood Bunds	km		2.0

Table 7.2: Changes in Cropping Pattern

	Stage I			Stage II		
	Original	Targeted	Actual	Original	Targeted	Actual
Cropping Intensity	134 (1980)	165	196 (1997)	159 (1988)	184	171 (1997)

Table 7.3: Changes in Cropping Yields

	Stage I			Stage II		
Main crops Tonne/ha	Original (1980)	Targeted	Actual (1997)	Original (1988)	Targeted	Actual (1997)
Cropping Intensity	134	165	196	159	184	171

Table 7.4: Irrigation Service Fee Collection

Fiscal Year	Amount Due NRs.	Amount Collected NRs.		Percentage Collection
		Current year's	Last year's	
1985/86	399,486.00	110,171.00		28%
1986/87	546,043.00	112,606.00		21%
1987/88	544,000.00	425,600.00		78%
1988/89	736,200.00	468,123.00		64%
1989/90	610,112.00	378,504.00		62%
1990/91	606,569.00	384,564.00		63%
1991/92	606,569.00	534,898.00		88%
1992/93	606,569.00	388,264.00	228.437.00	64%
1993/94	684,418.00	436,395.00	272,449.00	64%
1994/95	684,418.00	509,455.00	491,094.00	74%
1995/96	684,418.00	518,815.00	411,644.00	76%
1996/97	684,418.00	509,529.00	263,125.00	74%
1997/98	684,418.00			

Table 7.5: Operation and Maintenance Budget

Fiscal Year	Total Budget in '000 NRs.	Budget per ha in NRs.
2049/50	6,500	1,354.2
2050/51	6,000	1,250.0
2051/52	5,000	1,041.7
2052/53	4,500	937.5
2053/54	5,100	1,062.5
2054/55	3,500	729.2

Table 7.6: Institutional Development Activity Stage -II

Period	User List Nos. of Tertiary Canals	Water users groups	Tertiary Committee	Construction Agreement
Target	262	1,834	262	252
July-Dec 1995	40	231	27	16
Jan-June 1996	9	70	10	10
July-Dec 1996	143	979	147	131
Jan-June 1997	62	386	52	60
July-Nov 1997	5	109	14	20
Total	260	1,775	250	237

Table 7.7: Farmer Organization Activities Stage-I

Period	Tertiary Cleaning		Upper level meetings					Nos of paricipants
	Length	Man days	Group A	Group B	Group C	Group D	WUACC	
1990	51.69	1,438						1,165
1991	70.81	3,620						132
1992	36.59	8,059	2	3	5	7	7	46
1993	21.52	5,141	3	2	2	2	4	164
1994	6.85	331	3	2	7	2	4	176
1995	81.24	2,512	5	6	4	3	12	50
1996	84.44	5,789	2	4	3	3	12	176
1997	19.4	1,124	5	5	5	5	11	50

Table 7.8 Typical Priority Lists

Group-A	**Fiscal Year-2053/54**	**Proposed Budget**	**15 Lakhs**
1.	Mahakali River bank protection and spurs		4 lakhs
2.	Gadda tail escape maintenance		2 lakhs
3.	BJR 1/1 Tertiary maintenance		1 lakh
4.	Desilting of Bhujela distributary and other branch canals and minors including following lists of 44 tertiary canals		8 lakhs
a.	Road crossing culverts		43 nos.
b.	Foot bridge with crate abutment and pre-cast slab		91 nos.
c.	Tertiary crossing pre-cast slabs		180 nos.
d.	Gabion crate works in all drains of this block		
e.	Additional outlets		27 nos.
f.	Check gates and check plates		185 nos.
g.	Hume pipes:		
	600 mm dia		15 nos.
	900 mm dia		10 nos.
	300 mm dia		200 nos.
h.	Maintenance of non-canal gravel roads		
	Pipariya branch		
	Bankatti branch		
	Gadda minor		

Group-B	**Fiscal Year-2053/54**	**Proposed Budget**	**15 Lakhs**
1.	Desilting work of Mahendranagar branch from Kalopool to Khairbatti		
2.	Pre-cast slab for tertiary crossing		12 nos.
3.	Pipe culvert 900-mm dia near Ram Janaki temple and\ Skill Development and training center		1 nos.
4.	Drainage protection works with gabions		1 nos.
5.	Hume Pipes		
	900 mm dia		5 nos.
	600 mm dia		1 no.
	300 mm dia		65 nos.
6.	Tertiary lining:		
	MN L 1/1 and BS 3/2		
7.	On-canal road repair:		
	Basantapur minor		
	Mahedranagar branch		
8.	Leveling on ground by MIP Dodger		
9.	Drain crossings with gabion crate and pre-cast slab		
10.	Contingencies		NRs. 50,000.00