

**Medium Term Expenditure Framework
(2002/3-2004/5)
Irrigation Sector**

Nepal Development Forum-2002

**His Majesty's Government of Nepal
Kathmandu
February, 2002**

Executive Summary

Medium Term Expenditure Framework

(2002/3 – 2004/5)

Irrigation Sector

Present status

Until 1950s, irrigation development in Nepal was a result of farmers' own initiation and investment in the construction and management of irrigation systems. Such irrigation systems are referred to as farmer managed irrigation systems (FMISs). It is estimated that about 70 per cent of the country's irrigated area is covered by such systems, which make a substantial contribution to the national economy. Besides this, with the start of first five-year plan in 1957, the government also started development of irrigation in planned way. Since then several medium and major irrigation systems were developed with the assistance of donor agencies

At present irrigation water is provided to approximately 42 per cent of net cultivated land which forms about 62 per cent of net irrigable area. About 41 per cent of net irrigated area is being supplied with year round (YR) irrigation water. It is estimated that existing irrigation systems are the basis for approximately 33 per cent of the current agricultural production of the country (WECS, 2001).

Irrigation Sector Issues

A recently formulated National Water Resource Strategy (NWRS) has also identified several constraints for irrigation development. They are:

- Reorientation of supply-driven approach.
- Lack of effective implementation of APP.
- Farmer's dependency syndromes and sustainability.
- Weak institutional capability
- Symbiotic relationship between agriculture and irrigation (weak linkages)
- Poor participation of users in irrigation development

Unavailability of sufficient fund, stringent covenant associated with donors loan agreement, subsistence farming, and skewed land distributions with very small land holding are also identified as constraints for irrigation development.

Sector objectives and goals

The objective and goals of irrigation sector is to develop controlled and year-round irrigation in a sustainable way through proper utilization of available water resources for increasing the agricultural productivity thereby raising livelihood of rural community.

Key reforms proposed under MTEF

Following key reforms are proposed for irrigation development programs.

- Re-visit and update APP
- Revise irrigation policy in the context of National Water Resources Strategy
- Formulate National Irrigation Water Plan under the umbrella of National Water Plan
- Implement institutional reform of DOI for strengthening its implementation capacity
- Prepare action plan to enhance the participatory approach to maximize the use of surface and ground water irrigation.
- Empower water users associations legally to manage irrigation systems and to collect irrigation service fees (ISF)
- Initiate user-focussed design of irrigation systems for their sustainability
- Initiate involvement of private sector and NGOs in the development of irrigation, especially on ground water and other micro irrigation development.
- Prepare action plan to enhance the capacity of water users associations.

Outputs and outcomes

Based on the proposed activities, outcomes and outputs of the three-year MTEF are sustainable management of existing irrigation system and sustainable development of new irrigation system to provide year round irrigation.

Key programs and activities

Key programs and activities of the three years MTEF are categorized into two categories.

- (a) Sustainable management of existing irrigation system
- (b) Sustainable development of new irrigation system to provide reliable year round irrigation

Some of these activities will be completed in three-year period while some of them will be continued in the fourth and fifth years of the tenth five year plan. These activities at a glance are presented below

S.N.	Activities	Physical targets in ha.			Total
		1st year	2 nd year	3 rd year	
1	Operation and maintenance of AMISs	245,910	245,910	245,910	
2	Maintenance of major hydraulic structure	Non specifiable			
3	Management Transfer	25,000	3,600	3,600	32,200
4	Rehabilitation of FMIS	12,000	12,000	12,000	36,000
5	Renovation of AMIS	0	1,000	1,200	2,200
6	Ongoing and new irrigation development	12,000	12,000	15,000	39,000
7	Special irrigation development program			500	500
8	Research, training and monitoring	On going	On going	On going	
9	Feasibility studies	On going	On going	On going	

Budget Required for MTEF period

Fiscal year	HMG (Rs. 000)	Foreign Aid (Rs. 000)	Total Budget (Rs. 000)
1. Sustainable management of existing irrigation system			
A. Fiscal year 2002/2003	650,700	952,600	1,603,300
B. Fiscal year 2003/2004	672,100	788,600	1,460,700
C. Fiscal year 2004/2005	623,150	988,600	1,611,750
Sub Total (1)	1,945,950	2,729,800	4,675,750
2. Develop new irrigation and drainage infrastructures			
A. Fiscal year 2002/2003	279,300	657,400	936,700
B. Fiscal year 2003/2004	382,600	1036,400	1419,000
C. Fiscal year 2004/2005	498,660	1250,640	1749,300
Sub Total (2)	1,160,560	2,944,404	4,105,000
Total of Irrigation Sector	3,106,510	5,674,204	8,780,750
3. Water Induced Disaster Prevention			
A. Fiscal year 2002/2003	90,000	390,000	480,000
B. Fiscal year 2003/2004	100,000	420,000	520,000
C. Fiscal year 2004/2005	100,000	440,000	540,000
Sub Total (3)	290,000	1250,000	1,540,000
Total	3,396,510	6,924,204	10320750
HMG Recurrent expenditure	420,000	0	420,000
Grand Total	3,816,510	6924204	10740750

Three Years Budget

Rs. in million

Fiscal Year	HMG	Foreign	Total
02/03	1020.0	2000.0	3020.0
03/04	1154.7	2245.0	3399.7
04/05	1221.81	2679.24	3901.05
Recurrent Expenditure	420	0	420
Total	3816.51	6924.24	10740.75

Trends of allocations in percentage with respect to total budget (percentage)

Program	01/02	02/03	03/04	04/05	Trend
1. O & M and Rehab.					
1.1 O&M of AMISs	4.7	8.38	7.97	7.65	Decreasing
1.2 Repair of Weirs & Barrages	0	1.92	1.66	1.33	Decreasing
1.3 Rehab of AMIS	0	4.47	3.24	3.11	Decreasing
1.4 IMTP	4.41	6.34	1.33	1.07	Decreasing
1.5 Renovation of FMISs	33.01	31.01	26.26	26.73	Decreasing
2.Expansion of New Area					
2.1 New & Ongoing	43.29	30.5	41.64	46.94	Increasing
2.2 Misc. programs	0.30	1.77	3.46	3.46	Increasing
2.3 Water Induced Disaster Prevent.	14.26	15.38	14.4	12.27	Decreasing

Conclusions and Key Recommendations

Despite great effort, irrigation development program in the country has not been very much satisfactory in terms of achieving objective of the 9th five-year plan. Following are the reasons for this, which are also explained earlier.

- Lack of clear-cut guideline in both the policy and implementation defining whether irrigation water is a social or an economic good.
- Non availability of water during lean period in the source river of many irrigation systems, which in turn has affected development of year round irrigation.
- Resource Constraint to develop irrigation systems either from the major rivers or through inter basin transfer for year round irrigation.
- Unsatisfactory people's participation in sharing capital cost of irrigation infrastructure.
- Removal of subsidy on development of shallow tube wells
- High operating cost of tube well mainly due to the price hike of diesel and electricity
- Lack of effective implementation of APP.
- Weak institutional capability
- Symbiotic relationship between agriculture and irrigation (weak linkages)

In addition to the above reasons, there are issues such as effective transformation of policy to the field level, coordination with line agencies related with agriculture, effective monitoring of the programs which are to be addressed in the years to come through necessary policy reforms.

Under MTEF, the level of investment in some of the present irrigation development program will be reduced. For example, under rehabilitation of FMISs, instead of re-engineering them, only the bottleneck infrastructure will be rehabilitated. Similarly, in command area development program of AMISs, intensity of irrigation infrastructure at lower level will be minimized.

For enhancing the present level of irrigation service and to promote year round irrigation, two new irrigation development programs are proposed to be included under MTEF. These include maintenance of major hydraulic structure and special irrigation development programs.

In order to achieve the objective of MTEF, following action programs are recommended:

- Re-visit APP and revise irrigation policy in the context of National Water Resources Strategy
- Formulate National Irrigation Water Plan under the umbrella of National Water Plan
- Implement institutional reform of DOI for strengthening its implementation capacity
- Prepare action plans to enhance capacity of WUAs and participatory approach
- Empower water users associations legally
- Initiate user-focused design of irrigation systems

With the proposed reforms and optimized programs in place, it is hoped that irrigation sector will take a new direction towards enhancing agriculture growth of the Country.

Medium Term Expenditure Framework (2002/3 – 2004/5) Irrigation Sector

1. Background/ introduction

1.1 Present status

Until 1950s, irrigation development in Nepal was a result of farmers' own initiation and investment in the construction and management of irrigation systems. Such irrigation systems are referred to as farmer managed irrigation systems (FMISs). It is estimated that about 70 per cent of the country's irrigated area is covered by such systems, which make a substantial contribution to the national economy. Besides this, with the start of first five-year plan in 1957, the government also started development of irrigation in planned way. Since then several medium and major irrigation systems were developed with the assistance of donor agencies. Following table shows present status of irrigation development in Nepal.

Present status of irrigation development in Nepal

Geographic Region	Overall Cultivated Area '000 ha	Total Irrigable Area '000 ha	Total Irrigated Area '000 ha	Irrigated as % of cultivated	Year Round Irrigated Area '000 ha	Year Round Irrigated As % of Irrigated	Year Round Irrigated as % of Cultivated
Terai	1,360	1,338	889	65%	368	41%	27%
Hill	1,054	369	167	16%	66	39%	6%
Mountain	227	60	48	21%	18	38%	8%
Totals	2,642	1,766	1,104	42%	452	41%	17%

Source: WECS (2001)¹

At present irrigation water is provided to approximately 42 per cent of net cultivated land which forms about 62 per cent of net irrigable area. About 41 per cent of net irrigated area is being supplied with year round (YR) irrigation water. It is estimated that existing irrigation systems are the basis for approximately 33 per cent of the current agricultural production of the country (WECS, 2001).

Percentage of irrigated area receiving irrigation service vary over cropping season, which in turn depends on operational status of irrigation infrastructure and intensification of management activities deployed to manage water. In general, in agency managed irrigation systems (AMISs), coverage of irrigation service for irrigating monsoon paddy varies between 52 and 77 per cent, while for winter crops it varies between 20 and 40 per cent.

1.2 Irrigation sector issues

Development of irrigation is a complex socio-technical phenomenon. It involves collective action by the people and includes multiple activities including the maintenance of irrigation

¹ WECS (2001) 'Water Resources Strategy', Draft, Water and Energy Commission Secretariat, HMG, Nepal

infrastructure, organizing local community, and delivering water to users for meeting crop water requirement. Varying demand and supply of irrigation water over time and space has further increased complexity in managing irrigation systems.

Despite the development of large number of irrigation systems, above-mentioned socio-technical complexities in managing irrigation systems led Nepal's agricultural growth rate unsatisfactory. Once a food grain exporting country, Nepal has turned into net importer of food grain since the beginning of 1980s (DOI, 1990)². What is alarming is the fact that the country's population is increasing at a rate of 2.66 per cent (CBS, 1994)³ while the food production is increasing only at the rate of 2.88 per cent. Poor management and unsatisfactory water utilization efficiency of Nepal's irrigation systems are in part some of the causes for the dismal performance of the irrigated agriculture (NPC, 1998)⁴.

1.3 Past policy reforms

Since the mid-1980s, due to dismal performance of Nepal's irrigated agriculture, the government shifted its attention from the construction of large and medium scale irrigation systems to the rehabilitation and improvement of FMISs. Accordingly, the government brought out a new irrigation policy in 1989, which was revised in 1997. The new irrigation policy clearly emphasized the participatory and demand-driven approach. The basic concept of this participatory approach is that greater farmer participation in all stages of irrigation development increases the farmers' sense of ownership and control over the system, which ultimately leads to better use of the scarce water resources and increased agricultural production.

With this notion of participatory approach, since the early 1990s, the government also started management transfer program of AMISs to respective users. The program is continuing at present.

Further, in 1995, the government brought out a 20-year Agricultural Perspective Plan (APP) expecting to accelerate Nepal's agricultural growth rates of the time from 3 to 5 per cent per annum. The APP considers irrigation as one of the prime inputs for agricultural development. The APP emphasizes development of year round irrigation through improvement of existing FMISs and development of shallow tube wells, especially in Terai.

Recently, in order to manage Nepal's available water resources in a sustainable manner, the government also brought out a national strategy for water resources development (National Water Resources Strategy), which is considered as a comprehensive umbrella policy for water sector.

² DOI (1990) 'Master plan for irrigation development in Nepal, Cycle 2, Main report', prepared by Canadian International Water and Energy Consultants in association with East Consult (P) Ltd, Kathmandu, Nepal.

³ CBS (1994) *Population projection for Nepal 1991-2011*, Central Bureau of Statistics, National Planning Commission Secretariat, HMG, Nepal.

⁴ NPC (1997) *Concept paper for the ninth plan 1998-2002*, (*Nawaun yojanako aadharpatra BS 2054-2059, 2054*), National Planning Commission Secretariat, HMG, Nepal.

As development of irrigation is guided by higher level policies such as Agriculture Perspective Plan (APP) and National Water Resources Strategy (NWRS), present irrigation policy needs revision to match these higher level policies.

Challenges of irrigation development

Despite greater emphasis on the development of year round irrigation through participatory and demand driven approach, performance of irrigated agriculture in terms of cropping intensity and crop yield is still not up to the satisfactory level. The reasons are of several folds, which are discussed below.

- There is lack of clear-cut guideline in both the policy and implementation defining whether irrigation water is a social or an economic good. Although the policy hints that irrigation water is an economic good, neither there are mechanisms for collecting water taxes from the users, nor there exist any legal enforcement for this. As a result of this, in practice, irrigation water is treated as a social good. This policy dilemma has hampered effective maintenance of irrigation systems, which in turn is hampering irrigation services to farmers.
- Most of the surface irrigation systems in Nepal are fed by medium or small rivers, with limited water resources available during the lean season insufficient for year round irrigation. Development of year round irrigation through these systems is not possible unless storage reservoirs are developed.
- Although Nepal has ample opportunities in developing year round irrigation by utilizing waters either from the major river systems or through inter basin transfer, actualization of such projects in Nepal has remained a dream so far. Many of these river systems need to be developed as multipurpose projects. Sun Kosi - Kamala diversion, Bheri - Babai diversion, Kankai and West Rapti storage projects are some of the identified projects of this kind. Despite these opportunities, many of the donors are reluctant to fund these projects due to riparian concern. Large amounts of resources required to develop such project combined with long gestation period add another constraint in the process. As a result, vast tracks of country's cultivated lands remain un-irrigated and at the same time country's water resources is flowing downstream unutilized. Over the years, there is a growing concern about the broader water security issue among the Nepalese people.
- People's participation has remained one of the key policy tools in the development of country's irrigated agriculture. Nepal's irrigation policy demand people's participation in planning, design and also in sharing capital cost for infrastructure development. However, past experiences suggest that people's participation in sharing capital cost of infrastructure has not been satisfactory. As poverty alleviation has remained one of the national goal of irrigation development, raising a part of capital cost from the local community who already live below the poverty line does not seem socially justifiable.
- APP emphasizes development of groundwater for year round irrigation, especially in Terai. Despite great effort in this line, the groundwater development has not been very satisfactory. The reasons are two folds. First, removal of subsidy on development of ground water might have de-accelerated the demand for tubewells. Second, the high operating cost of tube well mainly due to the price hike of diesel and electricity has made

the farmers reluctant for its development and extensive use of water for irrigation in developed areas.

Other than the challenges mentioned above, NWRS has also identified several constraints for irrigation development. They are:

- Reorientation of supply-driven approach⁵.
- Lack of effective implementation of APP.
- Farmer's dependency syndromes and sustainability⁶.
- Weak institutional capability
- Symbiotic relationship between agriculture and irrigation (weak linkages)
- Poor participation of users in irrigation development

Unavailability of sufficient fund, stringent covenant associated with donors loan agreement, subsistence farming, and skewed land distributions with very small land holding are also identified as constraints for irrigation development.

2 Introduction to MTEF and its three years targets

This Paper aims at formulating and prioritising plans and programs to meet the sectoral strategy, objectives, vision and goals guided by national objectives and goals, confined within the given budget ceiling. The strategies recommended by NWRS have greatly been taken into consideration. Aspirations of the Tenth Plan (2002-2007) have also been taken into account. The concepts of the Medium Term Expenditure Framework (MTEF) has been adopted while conceiving plans/programs and in allocating budget. The MTEF period covers coming three fiscal years from 2002/03 to 2004/05. The MTEF aims to integrate policy making with economic planning and budgeting in the context of multiyear cycle, and ensure that expenditure programs are driven by strategic priorities and disciplined by hard budget constraints. This framework helps the government to manage the tension between demands for expenditure from various sectors and resources likely to be forthcoming realistically from both domestic and external sources. Linking policy making, planning and budgeting through the MTEF is believed to enhance the probability that the allocation of public funds will achieve strategic objectives and targets in an efficient and effective manner.

2.1 Irrigation development approach through MTEF

Despite of many challenges, the government is committed to continue irrigation development programs through improved approaches. Past experiences suggest that MTEF should focus on following approaches to get better result.

- It has been widely accepted that farmer managed irrigation systems (FMISs) have operated better than agency managed irrigation systems (AMISs). Though these FMISs

⁵ At present, irrigation development is not guided by agricultural development. Thus, it is termed here as supply driven approach of irrigation development. There is a need to promote agriculture driven irrigation development approach, which is termed here as demand driven approach.

⁶ Increasing rate of external intervention on irrigation, especially on FMISs, has raised concerns about the increasing dependency of farmers on the government.

were fairly sustainable in the past, due to worsening scarcity of water resources, declining soil fertility and degradation of natural forest at present, many of these FMISs are incapable of meeting the ever-increasing demands of the people. Recognizing these constraints, the government is supporting them through several programs. Of these programs, rehabilitation of FMISs under NISP⁷, SISP⁸, and IDP⁹ has remained very popular at field level. The large number of requests received by the Department of Irrigation testifies this. Such programs are very successful in drawing people's participation, and thus need to be continued.

- While the irrigation programs with short gestation periods should be given top most priority, at the same time, development of surface irrigation systems from large rivers and from multipurpose storage should be initiated. Although such projects are capital intensive, they are the real solution for long term year round irrigation of the Terai for country's food security.
- The fundamental basis of APP and its strategy for irrigation (emphasis on use of groundwater) has been reconfirmed by recent studies, but some of the implementation actions (like subsidy on shallow tube wells) need revision. Although intensification of agricultural production using ground water appears to be financially viable, greater commercialization of agriculture products is needed to enhance farmer's investment on tube wells. This requires an integrated approach to agriculture.
- Past experiences suggest that people's participation in sharing capital cost of irrigation infrastructure has not been satisfactory. As poverty alleviation has remained one of the national goal (or irrigation development), raising a part of capital cost from the local community already living below the poverty line, does not seem socially justifiable. Thus, there is a need to minimize people's participation in sharing capital cost of irrigation infrastructure, while their active participation in planning and design of irrigation infrastructure need to be further promoted.
- In order to minimize the operating cost of tube wells, ground water needs to be developed along with the present surface irrigation systems by utilizing the existing infrastructures and institutions. By doing so, the operating cost of the tube wells could be reduced to a level acceptable to the farmers, and at the same time year round irrigation can be assured.

3 Sector strategy

In order to meet the proposed objectives and targets of irrigation development, following strategies will be adopted:

- Following APP, improve management of existing FMISs and AMISs through their physical rehabilitation and capacity building of water users associations.
- Maximize development of ground water for year round irrigation along with surface irrigation systems for consumptive use.

⁷ Nepal Irrigation Sector Project (NISP) funded by the World Bank

⁸ Second Irrigation Sector Project (SISP) funded by the Asian Development Bank

⁹ Irrigation Development Project (IDP) funded by the European Union

- Integrate irrigation planning and management with agriculture development.
- Develop country's irrigation water use plan.
- Initiate inter-basin transfer projects, storage projects and ponds (in hills) to develop year round irrigation.
- Strengthen WUA capacity for planning, implementation and management of irrigation system.
- Formulate and Implement effective legal mechanism for recovering the irrigation service fee from the farmers
- Implement the concept of river basin planing for irrigation development

3.1 National goal

Poverty alleviation by expanding the economic opportunities and employment generation through proper utilization of available water resources and means.

3.2 Vision

To enhance the living standard and environment of the people in a sustainable manner by increasing food production thereby ensuring food security of the country and by generating employment through the irrigated agriculture development.

3.3 Sector objectives and goals

The objective and goals of irrigation sector is to develop controlled and year-round irrigation in a sustainable way through proper utilization of available water resources for increasing the agricultural productivity thereby raising livelihood of rural community.

3.4 Key reforms proposed

Following key reforms are proposed for irrigation development programs.

- Re-visit and update APP
- Revise irrigation policy in the context of National Water Resources Strategy
- Formulate National Irrigation Water Plan
- Implement institutional reform of DOI for strengthening its implementation capacity
- Prepare action plan to enhance the participatory approach to maximize the use of surface and ground water irrigation.
- Empower water users associations legally to manage irrigation systems and to collect irrigation service fees (ISF)
- Initiate user-focussed design of irrigation systems for their sustainability
- Initiate involvement of private sector and NGOs in the development of irrigation, especially on ground water and other micro irrigation development.
- Prepare action plan to enhance the capacity of water users associations.

3.5 Main elements of poverty reduction strategy outlined in the I- PRSP

As more than 80 percent of the country's population are engaged in agriculture, I-PRSP targets to increase the agriculture growth by about 4 to 5 per cent. To achieve this target, the

strategy focuses on (i) increased investment from both the private and public sector (ii) streamlining the public expenditure in line with APP investment plan, and (iii) improved modality of implementation by emphasizing polycentric institutional arrangement¹⁰. In order to achieve successful implementation of APP, strong emphasis need to be given on the package program of fertilizer, irrigation, technology, rural agricultural roads, electricity and market access. The strategy and programs suggested in I-PRSP are as follows:

- Develop deep and shallow tube wells with appropriate subsidy support in poverty stricken areas and expand minor irrigation schemes.
- Increase water use efficiency in irrigation system
- Emphasize use of local manpower and inputs in the construction of medium and large irrigation systems
- Intensify water management activities

PERC recommendation

Public Expenditure Review Commission (PERC) has recommended that annual operation and maintenance expenditure of some of the projects should be mentioned through the general operation and maintenance budget of the DOI. These projects include Chanda-Mohana, Rajapur, and Marchwar Irrigation Systems, Bakra and Banganga river training works, and Tilloracot conservation project.

As recommended by PERC, the above mentioned projects are being maintained by utilizing the development budget allocated for the general operation and maintenance budget of the DOI.

3.6 Objectives of the Tenth Five-Year Plan

Followings are the objectives of the Tenth Five-Year Plan.

- Increase the level of year round irrigation from 41 to 45 per cent of the net irrigated area to be developed by the end of 2005.
- Following APP, develop new irrigation facilities in irrigable land covering an area of about 103,100 ha.
- Improve management of existing AMISs (245,910 ha) and FMISs (63,000 ha) for equitable delivery of irrigation water
- Transfer management of a few AMISs covering an area of about 37000 ha. to respective users.

Rationale for sectoral target of MTEF

Under MTEF, it has been proposed to develop 39,000 ha. of new irrigated area which include both the surface and ground water development. Considering the target led down by APP one may propose to fix higher target in the 10th five-year plan. Recent meeting of National Development Council has proposed to develop 300,000 ha of new irrigated areas in the 10th five-year plan. With this ambitious target, an additional area of 2,61,000 need to be developed

¹⁰ Improved modality of implementation also means involvement of private sector and NGOs in the existing programs being implemented by the government.

in the 4th and 5th year of the 10th five year plan. This include development of ground water and surface irrigation systems in about 150,000 and 110,000 ha respectively requiring about NRs. 26 billions (9 billions for ground water and 17 billions for surface irrigation development). Thus, before attempting to fix such an ambitious target, one should look at implementation capabilities of HMGN, relevant policies such as subsidy on shallow tube wells, and budget implications. If at all this target is to be fixed, it must be initiated from the very first year of the Tenth Five-Year Plan and accordingly MTEF needs to be revisited.

3.7 Outputs and outcomes

Based on the proposed activities, outcomes and outputs of the three-year MTEF are tabulated below.

Output 1

Activities/Program	Output	Outcome
Sustainable management of existing irrigation system	<ul style="list-style-type: none"> - Increase the level of year round irrigation by 4 per cent - Increase water use efficiency by 15 per cent - Transfer management of AMISs to users - Uplift management capability of WUA to sustain year round irrigation 	Increased agriculture production by increasing cropping intensity from 160 to 175 per cent

Output 2

Activities/Program	Output	Outcome
Develop new irrigation and drainage infrastructures and provide year round irrigation.	<ul style="list-style-type: none"> - Extend new irrigation facility to cultivated land. - Mitigate flood and land erosion of the cultivated area. - Introduce water harvesting and other appropriate technology to promote year round irrigation - Identify pipeline projects for future development. 	<ul style="list-style-type: none"> - Increased agricultural production - Increased rural employment opportunities - Raised livelihood of rural community - Self-employment opportunities generated through agricultural intensification

4 Key programs and activities

Key programs and activities of the three years MTEF are categorized into two categories, which are further subcategorized as given below.

- (c) Sustainable management of existing irrigation system
- Annual O&M of the existing AMISs covering an area of about 245,910 ha
 - Annual repair/maintenance of major hydraulic structures such as weirs and barrages

- Rehabilitation of existing AMISs and FMISs
 - Management transfer of a few AMISs to respective users covering an area of about 32,2000 ha
- (d) Sustainable development of new irrigation system to provide reliable year round irrigation
- Development of ongoing and new irrigation systems covering an area of about 39,000 ha
 - Implementation of special irrigation projects (water harvesting, conjunctive management of surface and ground water, and micro irrigation such as drip and sprinkler) covering an area of about 500 ha, especially focusing on year round irrigation
 - Research and training
 - Feasibility studies of future projects

Details of these activities are presented in Annex A. Some of these activities will be completed in three-year period while some of them will be continued in the fourth and fifth years of the Tenth Five Year Plan. These activities at a glance are presented below.

S.N.	Activities	Physical targets in ha.			Total
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1	Operation and maintenance of AMISs	245,910	245,910	245,910	
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7	Special irrigation development program			500	500
8	Research, training and monitoring	On going	On going	On going	
9	Feasibility studies	On going	On going	On going	

Operation and maintenance of AMISs

Under this activity, agency managed irrigation systems will be properly maintained and operated to deliver irrigation water in an equitable manner. This activity will be carried out through users participation. This activity will also provide support for the institutional development of WUAs.

Maintenance of major hydraulic structures

Under this activity, major hydraulic structures such as weirs and barrages located throughout the country will be maintained for their proper functioning. As this work requires specialized technical skill, a central project office located at Kathmandu will manage this activity in close coordination with field offices. This activity will also focus on the weirs and barrages constructed on FMISs, as maintenance of such structures are beyond the technical capacity of users.

Management transfer of AMIS

Under this activity, irrigation infrastructure whose management is to be transferred to users will be first rehabilitated to match the user focused operational objective. In the mean time, institutional capability of all stakeholders benefiting from the schemes will be enhanced to assume management responsibility of the system. This will create environment for equitable water distribution and higher irrigation water utilization efficiency.

Rehabilitation of FMISs

This program focuses on those FMISs, which need external help to enhance the present level of irrigation service by constructing essential structural improvement and by upgrading the management capability of users. Such projects will be linked with APP package program in the district. In this program, the local community will be implementers and agency personnel will act as facilitator.

Renovation of AMISs

This program will focus on bringing the systems back into normal operation of those AMISs, which need large financial resources due to accumulated deferred maintenance.

Ongoing and new irrigation development

Under this program, several ongoing and new irrigation development activities will be implemented. This includes development of both the ground water and surface irrigation project. List of the proposed projects under this activity is presented in the Annex A. Some of these projects will be completed in three years period, while others will be continued further.

Special irrigation development program

This program aims to promote non-conventional irrigation technology with focus on development of year round irrigation. Such non-conventional technologies include water harvesting in the hills and river valleys, conjunctive management of surface and ground water in Terai, and drip/sprinkler irrigation in the hills. This program will be implemented on a pilot basis.

As this is a new program, a project office located at Kathmandu will manage it. The program will be implemented in close coordination with field offices.

5 Prioritization

In recent years, basically five types of irrigation development programs are continuing. They are: operation and maintenance of completed AMISs; management transfer of AMISs; rehabilitation of FMISs; development of shallow/deep tubewells; and development of new surface irrigation systems for their extension and command area development. These programs are in line with APP.

Under MTEF, although all of these programs will be continued, level of investment in some of them will be reduced. For example, under rehabilitation of FMISs, instead of re-

engineering them, only the bottleneck infrastructure will be rehabilitated. Similarly, in command area development program of AMISs, intensity of irrigation infrastructure at lower level will be minimized. Development of such lower level irrigation infrastructure (such as tertiary canals) will be implemented through mobilizing local community.

Under MTEF, two new programs are proposed to be included. These include maintenance of major hydraulic structure (such as weirs and barrages) and special irrigation development programs. Importances of these programs are described earlier.

Criteria in prioritizing irrigation development program/activities

Table below presents criteria in prioritizing irrigation development programs under MTEF. The table also shows related activities.

Criteria	Activity
To maintain present level of irrigation service	Operation and maintenance of existing AMISs Maintenance of major hydraulic structures such as weirs and barrages
To enhance present level of irrigation service and to minimize government expenditure on regular O&M	Management transfer of AMISs to respective users
To enhance present level of irrigation service of existing irrigation systems	Rehabilitation of FMISs Rehabilitation of AMISs
To develop new irrigation system	Development of ongoing and new irrigation systems
To develop irrigation with special focus on year round irrigation	Special irrigation development programs

Based on the above criteria, irrigation development programs and activities are prioritized as below:

1. Operation and maintenance of AMIS
2. Maintenance of major hydraulic structures (weirs and barrages)
3. Management Transfer of AMIS
4. Rehabilitation of FMIS
5. Renovation of AMIS
6. New and ongoing irrigation projects
7. Special irrigation development program
8. Research, training and monitoring
9. Feasibility studies

Basis of cost estimate

Table below presents unit cost of various irrigation development programs

Programs	Unit cost (Nrs per ha)
Operation and maintenance of AMISs	6,000 to 8,000
Maintenance of major hydraulic structure	Not specifiable
Management transfer of AMISs	20,000 to 25,000
Rehabilitation of FMISs	60,000 to 75,000
Rehabilitation of AMISs	120,000
Development of ground water	
Shallow tube wells	50,000
Medium deep tube wells	75,000
Deep tube wells	100,000
Development of new surface irrigation system	
Large	150,000 to 200,000
Medium	100,000

The cost per ha. has been taken in arriving at the cost of programs and activities as summarized below.

Fiscal year	HMG (Rs. 000)	Foreign Aid (Rs. 000)	Total Budget (Rs. 000)
1.Sustainable management of existing irrigation system			
A. Fiscal year 2002/2003	650,700	952,600	1,603,300
B. Fiscal year 2003/2004	672,100	788,600	1,460,700
C. Fiscal year 2004/2005	623,150	988,600	1,611,750
Sub Total (1)	1,945,950	2,729,800	4,675,750
2. Develop new irrigation and drainage infrastructures			
A. Fiscal year 2002/2003	279,300	657,400	936,700
B. Fiscal year 2003/2004	382,600	1036,400	1419,000
C. Fiscal year 2004/2005	498,660	1250,640	1749,300
Sub Total (2)	1,160,560	2,944,404	4,105,000
Total of Irrigation Sector	3,106,510	5,674,204	8,780,750
3 Water Induced Disaster Prevention			
A. Fiscal year 2002/2003	90,000	390,000	480,000
B. Fiscal year 2003/2004	100,000	420,000	520,000
C. Fiscal year 2004/2005	100,000	440,000	540,000
Sub Total (3)	290,000	1250,000	1,540,000
Total	3,396,510	6,924,204	10320750
HMG Recurrent expenditure	420,000	0	420,000
Grand Total	3,816,510	6924204	10740750

Three Years Budget

Rs. in million

Fiscal Year	HMG	Foreign	Total
02/03	1020.0	2000.0	3020.0
03/04	1154.7	2245.0	3399.7
04/05	1221.81	2679.24	3901.05
Recurrent Expenditure	420	0	420
Total	3816.51	6924.24	10740.75

Risk factors in implementing Programs

- Irrigation development programs heavily rely on external funding and people's participation. Following conditions can jeopardize the proposed irrigation development plan.
 - Non-availability of external financing
 - Non-availability of matching fund from HMG/N
 - Lack of political commitment for people's participation
 - Poor law and order situation in the country
 - Inconsistency in the government policy

6. Arrangements for implementation, monitoring and accountability

Department of Irrigation (DOI) will be responsible for planning, design, implementation and management of large irrigation projects in line with objectives of APP. DOI will translate spirit of irrigation policy and APP into action.

Water users' associations and water users' groups are the primary and crucial grass-root organizations, which require careful nurturing, supervision and support for the sustainable management of irrigation projects. Therefore WUAs and WUGs will be the important copartner for implementation and monitoring of irrigation development programs.

The rules and regulations pertaining to WUAs and WUGs will be rationalized. Government line agencies will work with central level user's and/or individual user's associations to chart the necessary plans and programs. Effective systems for recovery of the ISFs will be put in place to achieve financial and technical sustainability of jointly managed irrigation systems.

7. Donor assistance in irrigation

Irrigation development programs depend heavily on donor assistance. Most of the assistances are in the form of soft loan. The World Bank, Asian Development Bank, JICA, European Union, and Saudi/Kuwati funds for development are the principal donor. In general, the donors contribute about 70-80 per cent of the project costs.

Potential activities to be addressed in case additional resource made available

Followings are the potential activities that can be implemented if additional resources are made available.

- 1 Terai Ground Water Development Project- 4,000 ha
- 2 Jhapa Ground Water Development Project- 4,000 ha
- 3 Special ground water development programs.- 100,000 ha
This program will be implemented in the following areas:
 - In areas covered by surface irrigation systems with inadequate water supply, especially during the dry season
 - In areas having hard geological formation requiring machine drilling.
 - In areas where development of shallow tube wells with manual drilling is not viable
- 4 Irrigation Management Transfer Project
 - Narayani Irrigation System- 28,000 ha
 - Narayani Lift Irrigation System – 9,200 ha
 - Mahakali Irrigation System - 5,200 ha
- 5 Essential Structural Improvement Project for Major FMISs - 25,000 ha
- 6 West Koshi Irrigation project - 40,000 ha
- 7 Medium Irrigation Project - 25,000 ha (several in number)
- 8 Bheri-Babai Multi Purpose Project - 40,000 ha
- 9 Kapilbastu Irrigation Project - 35,000 ha
- 10 Lower Khageri Irrigation Project - 4,000 ha
- 11 Flow augmentation project for Narayani Irrigation System - 8,000 ha (additional area)
- 12 Upper East Rapti Irrigation Project - 6,000 ha
- 13 Lower Banganga Irrigation Project – 6,000 ha

8 Conclusions and Key Recommendations

Despite great effort, irrigation development program in the country has not been very much satisfactory in terms of achieving objective of the 9th five-year plan. Following are the reasons for this, which are also explained earlier.

- Lack of clear-cut guideline in both the policy and implementation defining whether irrigation water is a social or an economic good.
- Non availability of water during lean period in the source river of many irrigation systems, which in turn has affected development of year round irrigation.
- Resource Constraint to develop irrigation systems either from the major rivers or through inter basin transfer for year round irrigation.
- Unsatisfactory people's participation in sharing capital cost of irrigation infrastructure.
- Removal of subsidy on development of shallow tube wells
- High operating cost of tube well mainly due to the price hike of diesel and electricity
- Lack of effective implementation of APP.
- Weak institutional capability
- Symbiotic relationship between agriculture and irrigation (weak linkages)

In addition to the above reasons, there are issues such as effective transformation of policy to the field level, coordination with line agencies related with agriculture, effective monitoring of the programs which are to be addressed in the years to come through necessary policy reforms.

Under MTEF, the level of investment in some of the present irrigation development program will be reduced. For example, under rehabilitation of FMISs, instead of re-engineering them, only the bottleneck infrastructure will be rehabilitated. Similarly, in command area development program of AMISs, intensity of irrigation infrastructure at lower level will be minimized.

For enhancing the present level of irrigation service and to promote year round irrigation, two new irrigation development programs are proposed to be included under MTEF. These include maintenance of major hydraulic structure and special irrigation development programs.

In order to achieve the objective of MTEF, following action programs are recommended:

- Re-visit APP and revise irrigation policy in the context of National Water Resources Strategy
- Formulate National Irrigation Water Plan under the umbrella of National Water Plan
- Implement institutional reform of DOI for strengthening its implementation capacity
- Prepare action plans to enhance capacity of WUAs and participatory approach
- Empower water users associations legally
- Initiate user-focussed design of irrigation systems

With the proposed reforms and optimized programs in place, it is hoped that irrigation sector will take a new direction towards enhancing agriculture growth of the Country.