

**Needs and Gaps Assessment
on Adaptation and Resilience to a Changing Climate in
South Asia**

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**Revitalize Institutions for
Transformation of Irrigation
Services**

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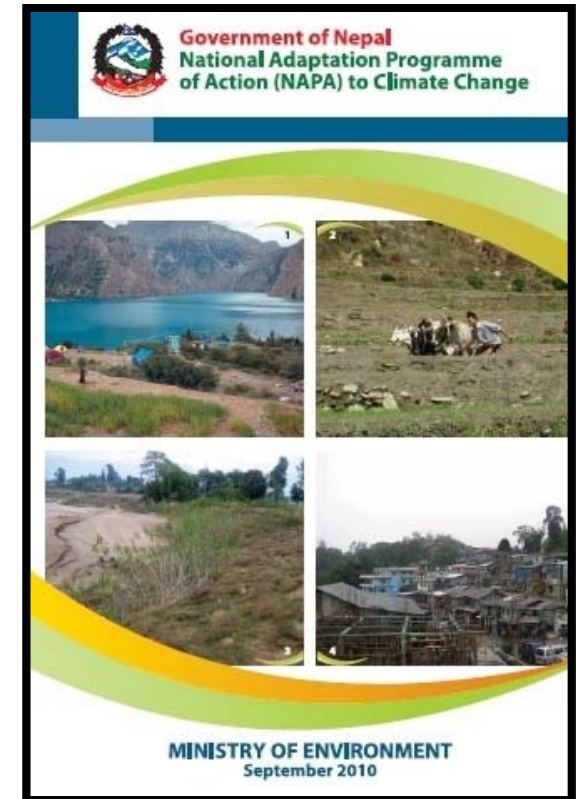
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**Irrigation, Climate Change,
adaptation, resilience,
Revitalize Institutions**

Climate Change and Irrigation

Nepal

- **GHG emissions are negligible on a global scale**
- **But, faces inevitable consequences of Climate Change**
- **Rises in temperature related to global warming**
- **changes in rainfall patterns**
 - **less frequent more intense rainfall events**
 - **increasing frequency and intensity of floods,**
 - **changes in monsoon on-and offset,**
 - **longer dry spells and drought events,**
 - **increasing storms**
 - **growing threat from GLOF**
- **Considered highly vulnerable country**
- **Need to take concrete steps to adapt to its adverse effects.**
- **Nepal is LDC party to UNFCCC and Kyoto Protocol**
- **Developed National Adaptation Programme of Action (NAPA)**



NAPA incorporated National policies:

- **National Water Resources Strategy 2002**
- **National Water Plan 2005**
- **Agriculture Perspective Plan 1990**

Irrigation and Institutions

Irrigated Agriculture = Key adaptation measure to mitigate adverse impact of CC

- Reduces risk by minimizing adverse effects of rainfall variation
- Increases employment opportunity and support poverty alleviation
- Necessary incentive for commercial agriculture (higher value crop)
- Improves rural economy through increase in agricultural income as well as non agricultural activities due to multiplier effect

Issues :

- Improve irrigation performance/efficiency
- Expansion of reliable year round irrigation
- agricultural productivity and profitability
- Commercialization

Irrigation systems/institutions should not only be aimed to perform better in terms of operations, maintenance, and management but also should strive to operate as a viable business

Focus needed to Revitalize Institutions for transformation of irrigation services

Overview of Irrigation Systems in Nepal

Types of Irrigation Systems in Nepal

- **Surface Irrigation (gravity flow)**
 - **Agency Managed Irrigation System (AMIS)**
 - **Farmer Managed Irrigation System (FMIS)**
(70% of the country's irrigated area falls under FMISs)
- **Groundwater Irrigation**
(Supported by Government and other agency, **operated** and **managed** by beneficiary users)
- **Non Conventional Irrigation Technology (NCI)**
(systems other than surface or groundwater)

Recommendations will be based on experience with Farmer Managed Irrigation Systems (FMIS) in Nepal

Overview of Irrigation Institution in Nepal

Agency Managed Irrigation System (AMIS)

General Features

- Developed and managed by Government investment (Mostly Department of Irrigation)
- History of about **90** years, intensified after 1970
- Relatively large systems (>**10,000** Ha)
- Participatory Irrigation Management (operation and maintenance)
 - Diversion /Headworks and main canal by Government
 - **Distribution and water allocation by farmers (WUA)**

Main Issues

- Maintenance=poor (less budget)
- Very low system efficiency (~30%)
- ISF collection= very poor

Farmer Managed Irrigation System (FMIS) in Nepal

FMIS-Institutional Aspect

- Indigenously developed over years and managed collectively by beneficiary farmers (History of > 200 years; some >400 years)
 - Practiced in Mountains, Hills, Valleys and the Terai plains
 - Covers area ranging from 5-10 Ha to even > 10000 Ha
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- Well organized and functional Water User Associations/Committees with hierarchical system
 - mostly functioning as per indigenous traditional practices relying on rules crafted over years
 - Highly suitable and effective operation and maintenance mechanism of irrigation system
 - Participatory and Consensus approach to decision making
 - Management changeovers on annual basis
 - Very strong on defaulters and absentees
 - In some case irrigation institutions also function to address other social issues



Farmer Managed Irrigation System

FMIS-Institutional Aspect

- Based on equity and inclusive approach
- Well blended with local cultural practices
- Strong sense of rule of law and obligation
- Particularly very strong in enforcement of punishment to defaulters

FMIS = Very Strong Institution

Highly successful water managers

In terms of water allocation, distribution, system maintenance, dispute resolution, making irrigation a matter of celebration and passion and social prestige.



Farmer Managed Irrigation Systems in Nepal

General Technicality of FMIS irrigation systems

Intake:

- Temporary brushwood diversion without any control mechanism which gets damaged after every flood (several times annually)
- Flood attracted into canal causing damage
- Problems increased progressively over the years

Conveyance and Distribution:

- Mostly earthen canal with huge seepage losses
- Temporary cross drain structures
- Traditional distribution system is inefficient

Need for Government Support:

- Problem increased over years to limits beyond farmer's ability
- Demand for Government support for modernization



Farmer Managed Irrigation System

FMIS and Modernization

Main Modernization features of FMIS

- Intake with controlling mechanism
- Protection from flood
- Lined canal to minimize seepage loss
- Permanent canal structures for efficient operation

Government has accorded high priority to support Modernization of FMIS since 1990



- Broad based approach covering whole nation (mountains, hill, valley and terai)
- Support by World Bank, ADB, EU, ILO etc
- Considerable achievement in terms of area covered and systems improved



Other Efforts in Irrigation Management and Reliable Year Round Irrigation

Irrigation Management Transfer

Transfer of operation and maintenance responsibility after certain level of AMIS canal system to beneficiary farmers



Groundwater

Significant effort by government as well as by other agencies to develop Shallow Tube Well and Deep Tube Well irrigation particularly in the Terai
Most GW is FMIS



Non Conventional Irrigation (NCI)

Drip, Sprinkler, Treadle Pump, Low cost water storage (Thai jars, soil-cement tanks, Rain water harvesting etc. is promoted by Government, INGOs particularly focused on marginalized people



BUT

despite strong **capable water management institutions** and **modernized FMIS** providing reliable, well controlled year round irrigation, huge **GAPS** still remains in terms of:

- existing and potential **productivity and profitability**
(Paddy in Nepal: present = 2.7 t/ha whereas potential = 4 - 11 t/ha)
- Realization of scope for expansion of reliable year round irrigation
- transformation from **subsistence to commercial** agriculture

Filling up of these gaps

=

**effective means for Adaptation and Resilience
against Climate Change**

The question is:

How should institutions be evolved to fill the gap?

Recommendations for Revitalization

Farmer Institutions:

Advantage of the strong water user associations can be utilized by transforming them to function as **Cooperatives** to manage all services related to agriculture and irrigation:

- Empower and enable the farmer institutions so they can play effective role in the management of other components for **agricultural Productivity**: Management of Inputs: Seeds, Fertilizer, Pesticides
- Concept of **One System One Product**
- Educate and training on application of **appropriate technology**
- Awareness and training on agribusiness and commercialization (quality standards and globalization, insurance and credit)
- Enhance capability to **utilize Information Technology**
- Enhance their ability to access, participate and influence decision in the agricultural market chain
- **Awareness and motivation on secondary agricultural benefits** to local economy due to multiplier effect (employment generation in non agricultural activities at local level)

Recommendations

Government Institutions :

- Formulate appropriate policy to enable to revitalize farmer institutions to perform recommended above
- Vitalize institutional and administrative capabilities to improve efficiency of AMIS and participatory irrigation management
- Effective measures to collect Irrigation Service Fees and make the system sustainable and self reliant
- **Enhance institutional capability** for effective development of following:
 - **Non Conventional Irrigation** and Lift Irrigation system to increase year round irrigation area in hills and mountains
 - **Water Transfer Projects** from water surplus rivers to water deficit rivers (Inter Basin Water Transfer Projects)
 - Groundwater irrigation to utilize vast potential in the terai plain and valley
- Research and development for appropriate technology
- Facilitate market chain mechanism
- Provide subsidy where essential

**Thank
You**