

**Way Forward:
Policy, Institution, and Design of
Small & Medium Irrigation Systems**

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Present policy provisions

- Climate change concern is a cross cutting issue
- It has implications on multi-sectors and multi-institutions.
- Government of Nepal has issued “Climate Change Policy 2011”.
- Ministry of Population & Environment is the focal ministry for Climate change mitigation and adaptation programs
- Accordingly, **NAPA** (National Adaption Plan of Action) and **LAPA** (Local Adaption Plan of Action) **are in place**

Present policy: Irrigation Sector

- Nepal's WRS has recognized likely adverse impact on irrigation due to climate change
- Accordingly, Irrigation Policy 2013 states:
 - Necessary study will be undertaken to assess the adverse impact of climate change on irrigation and appropriate adaptation measures will be undertaken to sustain the irrigation systems.

Study findings

- Climate change does influence irrigation, but it is not the only agents for changes. Other agents are: Increasing population, changing socio-economic situation, and increasing trend of urbanization
- Thus, a host of new measures are to be undertaken in an integrated way through the bottom up and top down approaches
 - Farmers level
 - WUA level, and
 - National level

Policy recommendations

- Impact on irrigation solely due to climate change is difficult to assess.
- Thus, except a couple of new recommendations, most of the recommendations of this study further supports existing policies.

General

- Awareness raising on CC concerns at several levels
- Institutional strengthening and capacity building for water accounting and monitoring
- Research and development on climate change, its impact, and adaptation

- **Planning and design**
 - Mainstream climate change in irrigation planning and design through introduction of vulnerability assessment
 - Revisit hydraulic design parameters
 - River basin based management of water resources
- **Management of existing systems:**
 - Focus on augmentation of irrigation water
 - Demand management
 - Enhance system efficiency
 - Focus on operation of existing infrastructure under extreme conditions
 - Enhance routine and periodic maintenance
 - WUA institutional strengthening at watershed level for intersystem cooperation

Agency involved in irrigation

- A host of agencies are involved in planning, development and management of irrigation
- Central level institution should focus more on research and developing guidelines for addressing changes in irrigation, and
- Provincial and local level institutions , which are yet to be defined, should be involved more in implementing mitigation measures following PAPA (provincial adaption plan of action) and LAPA

Designing climate resilient new IS

- Present design process: No allowances for climate change consideration
- Suggested improvement: Mainstream climate change in irrigation design process

Mainstreaming CC in irrigation design

Irrigation design steps	Suggest allowances for CC
SP Verification	
SP Prioritization	Examine and prioritize subproject based on their resilience to climate change
Feasibility study	Revisit hydrological design parameters (HDP): return periods; assessment of flood flows & low flows; effective rainfall, water way, ET_{crop} ?
Detail design	

Subproject prioritization

- Present criteria:
 - Sources of water
 - Level of technical difficulties
 - Main canal
 - Command areas
 - Environmental considerations
 - Accessibility
 - Farmers commitment, and
 - Pattern of land holding
- Suggested allowances: Introduce a couple of criteria that take into account CC considerations

Revisit hydrological design parameters

HDP	Present situation	CC consideration
Return periods	<ul style="list-style-type: none">• Irrigation reliability: 4 in 5 years• Floods: 25-100 years	Re-assess their appropriateness
Flood flows / low flows (Q_{20} & Q_{80})	Presently used methods: <ul style="list-style-type: none">• Frequency analysis (PDSP manual)• WECS method• MIP methods• Regional method• US Soil Conservation Service (SCS) method• Flood estimation from trash	<ul style="list-style-type: none">• Re-assess appropriateness of these methods• Initiate use of forecasted data

Revisit hydrological design parameters

HDP	Present situation	CC consideration
Effective rainfall	<ul style="list-style-type: none">• PDSP prescribed methods	Not effective for erratic rainfall
ET ₀	PDSP manual	<ul style="list-style-type: none">• Initiate use of anticipated climatic data
Water way	Lacey's regime condition	<ul style="list-style-type: none">• Is this appropriate?

Thank you