Innovation Brief

on International Development Services

Helping water sectors adapt pro-actively to climate change

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"We are the first generation in the world to knowingly compromise the survival of humanity due to global climate change." Peter Guthrie, Professor of Sustainable Development, Cambridge University

The problem of Global Climate Change

Despite lingering doubts among many, there is consensus among nearly all scientists that **Global Climate Change** is happening and is mainly caused by humans. Climate change will have profound and accelerating effects on increasingly scarce and polluted water resources. Appropriate actions should be taken quickly—even pro-actively–to adapt before it becomes too late.

Effects of Global Climate Change on water resources, habitat, livelihoods and food security

The Intergovernmental Panel on Climate Change and the Stern Report have recently reached dramatic conclusions about the impending effects of climate change on water supply and demand, human habitats and livelihoods, and food security. These findings are summarized in the 15 points below.

1. Historically sharp increases in intensity, variability, seasonality and unpredictability of precipitation. The magnitude and frequency of flooding and drought are escalating.
2. Water supplies are decreasing rapidly in arid and semi-arid areas, especially in the tropics.
3. Less snowfall, earlier snowmelt, and glacier melt will cause higher flows earlier in the season, lower flows later and decreases in annual flow. Shrinking glaciers will cause severe flooding followed by long-term drying.
4. Vulnerability to climate change is highest where precipitation and stream flow are concentrated in a few months and water supply varies a lot.
5. Infrastructure design based on historical water supply averages becomes less important than extreme conditions.
6. Because of lower water flows, warmer water and lower water quality, there is a growing need to recycle water. This will require major improvements in water treatment, which is likely to make water become more expensive.
7. Climate change reduces groundwater recharge and lowers water tables.
8. Sea level rise will extend coastal salinisation inland.
9. GCC is reducing the area of wetlands. This results in losses of bio-diversity and disruption of environmental functions previously provided.
10. Climate change will intensify competition and conflict between water users in river basins and aquifers from local to international levels.
11. The number of people at risk from inland flooding will be 4 to 5 times higher than the number of those at risk from rising sea levels.
12. Crop yields from rain-fed agriculture could reduce 50% by 2020 in Central and South Asia.
13. The worst effects of GCC will happen in Africa, where peoples' ability to adapt is most limited.
14. Extreme weather is most likely to severely affect poor people in tropical, less developed countries due to their dependence on climate-sensitive natural resources for food and livelihoods and their limited ability to adapt to climate change.
15. Climate change will amplify other stresses related to water, such as changes in land use, population, urbanization, and deforestation.

Challenges

Major challenges brought about by Global Climate Change require increasingly rapid and cross-sectoral production of information and responses. To develop

a strategy to adapt to climate change, governments will need to go through a process of identifying vulnerabilities to climate change, selecting options for adaptation, and implementing and evaluating an adaptation strategy. This is a five-step process.

Step 1: Assess vulnerability

There is an urgent need for each country to better understand how severe will be the coming effects of climate change. There is a need to assess human and environmental vulnerability in different geographical settings to such things as marginality, risk, sensitivity, adaptability, resilience and fragility. The challenge is to understand what is happening and what will be likely to happen in specific countries as a basis for preparing action plans.

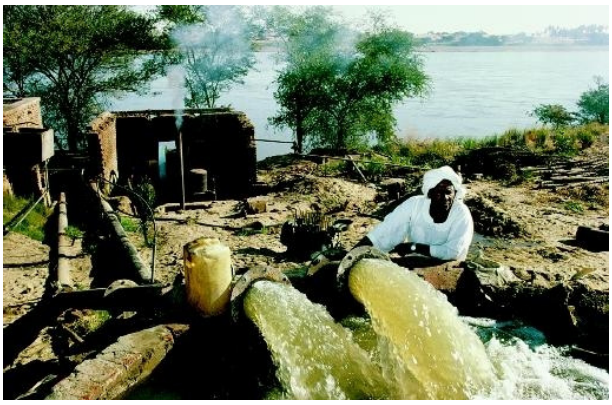
Assessing vulnerability requires:

1. Identifying what information is needed;
2. Identifying climate-related vulnerabilities for water, the socio-economy and health;
3. Estimating the effects of climate change scenarios on water supply and demand;
4. Determining needs and capabilities of stakeholder groups.

Step 2: Prepare institutional framework

Countries need to assess the extent to which their policy, legal, regulatory and organizational framework is suitable for identifying and responding to vulnerabilities to climate change. This should include all sectors with water-related vulnerabilities and roles to help. And it should include setting up a framework to enable effective development and implementation of an adaptation strategy.

This may include such things as enabling cross-sectoral problem solving and negotiation, developing alternative dispute resolution processes, having organisations and procedures that can deal with climate change problems, such as water users associations, river basin organizations, water supply commissions, and drainage boards that involve stakeholders in governance matters. And it will include setting up effective and timely processes of decision making, implementation and adjustment.



Step 3: Identify, assess and select elements of adaptation strategy

In this step the adaptation strategy is formulated. The objective is to find all necessary and feasible means to reduce vulnerability to climate change. This can be done in five ways, by:

1. Preventing negative effects,
2. Strengthening resilience,
3. Preparing to reduce negative effects,
4. Responding quickly to extreme events,
5. Facilitating recovery after extreme events.

After all pertinent elements of an adaptation strategy have been identified, stakeholders prioritise, operationalise how elements will be implemented, and schedule implementation. Special attention will be needed to ensure protection of the poor and most vulnerable members of society.

Step 5: Monitor, evaluate & adjust the strategy
Step 4: Implement adaptation strategy
Step 3: Identify, assess & select elements of adaptation strategy
Step 2: Prepare institutional framework
Step 1: Assess vulnerability

Steps toward adapting water management to anticipated climate change

Step 4: Implement the adaptation strategy

With coordination between sectors, high-level political commitment, and direction and representative participation of stakeholders, the adaptation strategy is implemented. Public awareness and capacity building will be essential.

Step 5: Monitor, evaluate and adjust the strategy

Successful implementation will require a comprehensive and timely monitoring and evaluation of implementation of the adaptation strategy. This must be well connected to an authoritative decision-making body that is able to make rapid decisions about revising the adaptation strategy.

Facilitating Innovation

The advent of climate change brings many challenges that require urgent action. Euroconsult Mott MacDonald and its partners are ready to provide practical solutions for addressing these problems.

Table 1 below displays a list of 24 potential actions that could be taken pro-actively to adapt water sectors to the impending effects of GCC. The column on the right indicates how Euroconsult Mott MacDonald is ready to support clients to work out effective methods to implement these actions. Euroconsult Mott MacDonald (EMM) can help governments, stakeholders, donors and other technical assistance organizations to implement adaptation to global climate change.

Table 1 Potential elements of a climate change adaptation strategy for water management

#	Actions	Support to facilitate actions
	-- STEP 1: ASSESS VULNERABILITY --	
1	**Collect & analyze geophysical, hydro-meteorological, environmental, socio-economic, institutional data for vulnerability assessment & early warning system**	Assist governments to design, introduce & build capacity for disaster response by setting up monitoring & early warning systems
2	**Identify areas where need for adaptation is significant**	Assess priority areas of vulnerability
3	**Set up an early warning system to enable rapid adaptation to emergency or extreme events**	Assist governments & institutes to prepare an early warning system
	-- STEP 2: PREPARE INSTITUTIONAL FRAMEWORK --	
4	**Adopt new laws, regulations and guidelines that are needed to support an adaptation strategy**	Assist governments to prepare & adopt legal & regulatory framework needed for adaptation
5	**Establish viable IWRM organizations to manage water for multiple types of users under increasing water supply extremes and variability** [This may include basin, watershed aquifer & water users associations.]	Help design & introduce IWRM organizations & procedures that are appropriate for adapting to climate change
6	**Build capacity of new IWRM organizations to enable them to implement effectively the country's adaptation strategy**	Assist in preparation and implementation of capacity building strategy & events
7	**Expand water markets to uses with high economic & social value** [*For short-term (drought emergencies) & long-term (urbanization), but do not sacrifice social values*]	Help develop institutions that enable water markets to develop consistent with agreed social values
8	**Increase use of economic incentives & disincentives to motivate water conservation (metering, pricing, credits)** [*Pricing & disincentives may be difficult to impose*.]	Help design & apply new economic & institutional incentives & disincentives to encourage water conservation & efficient use
9	**Facilitate establishing forums to negotiate & resolve disputes over water & adaptation strategies** [*Can provide more rapid & frequent resolution of water disputes*]	Help design, introduce & build capacity in institutions, support negotiation & conflict resolution among stakeholders
10	**Enhancement of negotiated water access or use rights among stakeholders**	Help develop an effective process for negotiation of water use rights among water users
	-- STEP 3: IDENTIFY, ASSESS & SELECT ELEMENTS OF ADAPTATION STRATEGY --	
11	**Raise awareness & enhance advocacy of stakeholders (especially the vulnerable poor) about climate change**	Help design & implement awareness & stakeholder consultations
12	**Research on options for adaptation, including identifying tools to facilitate appraisal of options**	Help governments develop & implement water sector strategies to adapt to climate change

#	Actions	Support to facilitate actions
13	**Prepare adaptation strategies to be adjusted periodically, with sustained support of donors & experts**	Assess needs & options for timely adaptation, including developing tools to assess options
14	**Preparation of contingency plans for multiple new risks**	Help clients develop contingency plans
	-- STEP 4: IMPLEMENT ADAPTATION STRATEGY --	
15	**Reduce water demand with changes in tillage & drought-tolerant crops, crop calendars, new irrigation & on-farm water management methods, reduce areas planted** [*Has high potential but is difficult due to multiple stakeholders*.]	Developing institutions & management systems for water delivery systems. Improve water use efficiencies at irrigation system & on-farm levels
16	**Promote traditional practices for sustainable water use** [*Potential exists, need receptive government & groups*]	Help promote re-adoption of traditional water management practices that ensure sustainability
17	**Introduce participatory methods for IWRM for water re-allocation, adaptation & trans-boundary management** [*Need to develop risk mitigation, flexibility & adaptability*]	Help governments develop & adopt methods for applying IWRM to adapt to climate change
18	**Develop micro-irrigation, water harvesting & small-scale water systems for multiple uses (rather than large-scale systems** [*Need to invest in small systems*]	Help design, introduce & build capacity to operate, maintain & finance small-scale household & neighbourhood water systems
19	**Increase storage capacity with additional reservoirs & dams** [*Locations are increasingly few & costly*]	Feasibility assessments, environmental & social impact assessments & studies on storage
20	**Expand water storage for rain, runoff & fog** [*Small scale*]	Introduce small water storage technologies
21	**Develop strategy to recycle water supplies to reduce amount of water going to sewer.**	Improve wastewater treatment, with recycling and reuse for agriculture, etc.
22	**Limit exposure to flood damage with early warning forecasting, regulations, zoning, insurance & relocation**	Limit flood damage through regulations, management, information & response measures
23	**Improve disaster response through new organizations & procedures, disaster services, seed & grain storage, credit & sale of capital** [*Pro-active approach needed*]	Help clients identify probabilities, locations & timing of disasters & build disaster mitigation capacity & assistance
24	**Build capacity of LDCs at national & sub-national levels to carry out environmental & social impact assessments**	Do environmental/social impact assessments of adaptation strategies & build capacities for these
	-- STEP 5: MONITOR, EVALUATE & ADJUST THE STRATEGY --	
25	**Set up monitoring & evaluation system for adaptation strategy**	Assist governments & institutes to design a comprehensive but practical M&E system
26	**Set up procedure to review findings of M&E & procedure to make rapid adjustments in adaptation strategy**	Help arrange inter-ministerial arrangement to enable rapid adjustments in adaptation strategy

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