

# Water and Climate Change Adaptation

Key Messages for the  
15<sup>th</sup> Conference of Parties (COP-15)  
of the United Nations Framework  
Convention on Climate Change (UNFCCC)

**Presented by the Global Public Policy Network  
on Water Management**

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# Executive Summary

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The Global Public Policy Network on Water Management would like to communicate the following key messages on Water and Climate Change Adaptation to COP-15:

## 1. Good Governance

**Develop national and cross-sectoral Climate Change Adaptation Plans with Water Management as a cross-cutting consideration:** Cross-sectoral, integrated and system-wide approaches to climate change adaptation must be developed, with water management recognized as a central to any plans

**Strengthen Institutional Capacity for integrating climate change adaptation into Water Management Policies and Plans:** Strengthened water management institutions are required to deal with regulation, frameworks and infrastructure development that seek to build climate resilience.

**Empower local communities and stakeholders to participate in water resources planning and management for climate change adaptation:** Local communities and stakeholders should be consulted in the development and implementation of climate change adaptation plans. Local coping strategies and techniques, as well as traditional knowledge should be identified, employed and scaled-up.

**Strengthen mechanisms for effective transboundary water management arrangements:** Capacity must be enhanced especially in developing countries to agree legal frameworks for transboundary water management in response to climate change. The role of international treaties and Conventions such as the UN Watercourses Convention should be acknowledged. Existing transboundary water management agreements that are deficient in dealing with the impacts of climate change must be re-negotiated.

## 2. Effective Water Resources Management

**IWRM:** Recognize IWRM principles as an effective framework through which to address climate change adaptation in the water sector and strengthen links between water and other sectors. IWRM tools and methods should be applied taking full account of climate variability and change.

**Use methodologies for assessing water usage:** Conduct studies into sectoral water footprints, making use of existing water footprint assessment methodologies. Resources should be mobilized for conducting such assessments in all regions, and for further research into refining methodologies.

**Take an ecosystem approach:** Adaptation planning must integrate the preservation and restoration of ecosystems as part of an investment in natural and environmental infrastructure for climate resilience. Natural ecosystems must be recognized as water 'customers' in their own right.

**Demand Management and Water Allocation:** Effective water demand management arrangements must be engaged across sectors, including enhancing water storage capacity; investing in new generation irrigation technologies, changing crop varieties to more water-efficient strains, upgrading infrastructure to enhance water-use efficiency and productivity, and re-designing tariff structures. This must be in the context of flexible water allocation systems that protect social and environmental interests, whilst permitting flexibility in economic use of water

**Address future uncertainty to avoid 'Maladaptation':** It is critical not to make assumptions about future water supply, or to justify developments under 'adaptation' that lead to enhanced water supply in the short term, but increased water consumption or 'maladaptation' in the long-term.

### 3. Enhanced Information, Observation, Monitoring and Impact Assessment

**Enhance capacity for data collection, observation, monitoring and impact assessment:** Invest in improved meteorological information, systematic observation and forecasting services; enhance collection of localised data; enhance capacity for data analysis and transfer relevant technology for doing so.

**Enhance availability of and access to data:** Make existing data more widely available, especially to poor and vulnerable communities; Share hydrological data in and among regions in accordance with WMO Resolution 25 on free and open exchange of hydrological data.

**Identify Hotspots:** Regional, country and community level 'vulnerability' hotspots must be identified so that resources might be channelled accordingly. Further assessment must also be made to identify priority countries and communities.

### 4. Fair and Equitable Finance

**Funding for Climate Change Adaptation must be new and additional to Official Development Assistance (ODA):** More funding must be made available if adaptation is to be sustained and sustainable. As such, any adaptation funds must be new and additional to existing Official Development Assistance (ODA) in recognition of the compensatory nature of such funds.

**Integrate and Mainstream Climate Change Adaptation into Existing Funds for Water Management:** In assessing the requirements for additional funds it is also important that climate change adaptation is integrated into existing funding streams for water management, and that in turn adaptive water management is considered as a funding priority for other water-reliant sectors and that financial resources are mobilized accordingly.

**Prioritize the water sector in Adaptation Funding:** The UNFCCC Adaptation Fund should prioritise water management for the spending of funds for climate change adaptation, due to the cross-cutting nature of water as a transmitter of climate change impacts.

**Create a well-governed and coherent adaptation architecture:** Effective governance structures must be developed for adaptation funds with guiding principles of broad and equitable representation and transparency in decision-making. Efforts must be made to ensure coherence and complementarity of the multiple multi-lateral and bilateral adaptation funds emerging. Roles, responsibilities and remits of Global Environment Facility (GEF) Funds, the Adaptation Fund, and various other bilateral and multi-lateral adaptation funds must be assessed.

## About Us

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The Global Public Policy Network on Water Management (GPPN) is a partnership of Stakeholder Forum for a Sustainable Future and Stockholm International Water Institute.

The GPPN works with global stakeholders to identify key priorities for the international water and sanitation agenda and communicate those priorities to decision-makers. The GPPN works specifically to promote progressive and informed policy on water and sanitation, and identify international and intergovernmental fora where stakeholders can leverage change.

The GPPN is composed of a Secretariat, consisting of Stakeholder Forum and SIWI, and an international Steering Committee, including UN Water, World Business Council for Sustainable Development, UNISON and Freshwater Action Network among others.

The GPPN was originally conceived to provide a mechanism to help global stakeholders prepare for and provide input to the water and sanitation review at the 16<sup>th</sup> session of the UN Commission on Sustainable Development in 2008. It has since then broadened its scope and is focussing in 2009 on the following areas:

- Water as a Cross-Cutting Issue: Preparing for the 17<sup>th</sup> session of the Commission on Sustainable Development
- Water and Climate Change Adaptation: Preparing for COP-15 climate negotiations in Copenhagen
- Water Security in a Fragile Environment – Identifying Priorities

The GPPN has conducted consultations with global stakeholders in each of the above areas, with NGOs large and small, community-based organisations, UN agencies, farmers associations and trade unions. We have where possible attempted to include all Major Groups in the consultations.<sup>1</sup> Below, the GPPN presents the findings from our consultation with global stakeholders on Water and Climate Change Adaptation. A full list of those who were included in this consultation is in Annex 1.

*As a disclaimer, the findings and recommendations below represent a collection of inputs from those consulted, and do not necessarily represent the views of Stakeholder Forum or Stockholm International Water Institute. Furthermore, as stakeholders may have commented on one area but not others, each recommendation does not necessarily reflect the views of all of those consulted, though we have attempted where possible to identify consensus, and avoid reference to issues upon which there did not appear to be consensus. The intention is to give an overview of some of the key priorities as identified by a broad range of stakeholders*

For more information on the GPPN and for updates please visit <http://gppn.stakeholderforum.org>

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<sup>1</sup> Major Groups as defined by Agenda 21, the outcome document of the Rio Summit in 1992: Business and Industry, Children and Youth, Farmers, Indigenous Peoples, Local Authorities, NGOs, Scientific and Technological Community, Women, Workers and Trade Unions

# Background

## UNFCCC Articles on Climate Change Adaptation in relation to Water

All Parties shall “Cooperate in preparing for adaptation to the impacts of climate change; develop and elaborate appropriate and integrated plans for coastal zone management, water resources and agriculture, and for the protection and rehabilitation of areas, particularly in Africa, affected by drought and desertification, as well as floods”. Article 4.1(e)

## References to Water in UNFCCC Decisions and Resolutions since 2007

Decisions and Resolutions	References to Water
UNFCCC Conference of Parties 13 (COP-13)	o
UNFCCC Conference of Parties 14 (COP-14)	o
UNFCCC Conference of Parties serving as Meeting of Parties to the Kyoto Protocol 3 (CMP-3)	o
UNFCCC Conference of Parties serving as Meeting of Parties to the Kyoto Protocol 4 (CMP-4)	o

## UNFCCC Programmes on Climate Change Adaptation

There are two main UNFCCC Work Programmes dealing more broadly with adaptation as it relates to several different sectors: coastal zones, agriculture, public health, infrastructure and water resources.

- **Buenos Aires Programme of Work on Adaptation and Response Measures**  
This describes the best ways to respond to the adverse effects of climate change, and conducts further scientific assessments of vulnerabilities and options for adaptation
- **Nairobi Work Programme**  
The programme centres around nine areas of work: methods and tools; data and observations; climate-related risks and; Climate related risks and extreme events; Socio-economic information; Adaptation planning and practices; Research; Technologies for adaptation; Economic diversification

Both programmes facilitate countries sharing resources and expertise on adaptation and water, including workshops to share best practice and tools; research; and disseminating information. However, it is important to note that the outcomes of these programmes, whilst extremely valuable and welcome from a capacity-building perspective, do not constitute binding political agreements.

## Global Snapshot

As the IPCC makes clear, ‘The challenges related to freshwater are: having too much water, having too little water, and having too much pollution. Each of these problems may be exacerbated by climate change.’

In a recent study co-ordinated by the UNFCCC<sup>2</sup> on *Impacts, Vulnerability and Adaptation in Developing Countries*<sup>2</sup>, an overview is provided of the projected impacts of climate change on water resources in developing country regions. The results are summarized below:

Region	Climate Change Impact on Water Resources
Africa	<ul style="list-style-type: none"> <li>Increasing water stress for many countries.</li> <li>75–220 million people face more severe water shortages by 2020.</li> </ul>
Asia	<ul style="list-style-type: none"> <li>Increasing water stress to over a hundred million people due to decrease of freshwater availability in Central, South, East and Southeast Asia, particularly in large river basins such as Changjiang.</li> <li>Increase in the number and severity of glacial melt-related floods, slope destabilization followed by decrease in river flows as glaciers disappear.</li> </ul>
Latin America	<ul style="list-style-type: none"> <li>Increase in the number of people experiencing water stress – likely to be 7–77 million by the 2020s.</li> <li>Runoff and water supply in many areas compromised due to loss and retreat of glaciers.</li> <li>Reduction in water quality in some areas due to an increase in floods and droughts.</li> </ul>
SIDS	<ul style="list-style-type: none"> <li>Water sources seriously compromised due to rising sea level, changes in rainfall and increased evapotranspiration, e.g. in the Pacific, a ten percent reduction in average rainfall (by 2050) would lead to a twenty percent reduction in the size of the freshwater lens on the Tarawa Atoll, Kiribati.</li> </ul>

In order to deal with some of these effects, this report provides a series of recommendations for actions that should be considered at the COP-15 negotiations on Climate Change Adaptation, so that negotiators might see how urgent it is to refer to the water sector as a priority for adaptation at the highest political level.

<sup>2</sup> Climate Change: Impacts, Adaptation and Vulnerabilities in Developing Countries: <http://unfccc.int/resource/docs/publications/impacts.pdf>

# Key Messages

## The Problem

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### Water is the primary transmitter of climate change impacts on societies and the environment

Water and its availability and quality, will be the main pressures on, and issues for, societies and the environment under climate change<sup>3</sup>.

The hydrological cycle stands to be considerably affected by climate change, through changed rainfall patterns, falling water tables, increased glacial melt, floods, droughts and sea-level rise. The IPCC stresses that, so far, water resource issues have not been adequately addressed in climate change analyses and climate policy formulations, and that in most cases, these problems have not been adequately dealt with in water resources analyses, management and policy formulation.<sup>4</sup>

The lack of integration between water resources and climate change issues is reflected on an international level through the limited focus on water in relation to climate change adaptation in the negotiations of the UNFCCC. Though water will be one of the key transmitters of climate change effects there is not one single mention of water in any of the outcome documents from COP-13 and COP-14.

Whilst the efforts to address water issues through the Nairobi Programme of Action and other initiatives are welcome, raising the profile of water in the negotiations at COP-15 and ensuring its inclusion in the text is critical in generating the political will globally to focus on water management in efforts to adapt to climate change.

Water must be seen as an entry point through which to assess adaptation needs.

### Climate Change Impacts on Water stand to stall progress towards achieving the Millennium Development Goals

Climate change impacts on water resources stand to have a significant effect on human development and security if not managed properly, due to reduced water availability, flooding, lower food production and extreme weather events. Such impacts will significantly affect access to water, health, food security, energy and sanitation and by extension stand to stall progress towards the achievement of the Millennium Development Goals. Furthermore, the risk of conflict between countries and regions and between sectors will increase, and thus the risk of increased migration and displacement, will rise if appropriate adaptation plans are not implemented with consideration of the need for climate resilience in the water sector.

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3 Introduction to Climate Change and Water (IPCC, June 2008) <http://www.ipcc.ch/pdf/technical-papers/ccw/chapter1.pdf>

# The Solutions

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## 1. Good Governance

### Develop national and cross-sectoral Climate Change Adaptation Plans with Water Management as a cross-cutting consideration

Climate change is not just an environmental issue. Neither is it just about carbon. It stands to have significant impacts on a range of sectors, including agriculture, business and industry, energy and fisheries. Water is the cross-cutting transmitter of climate change impacts on each of these sectors. However many decisions taken by governments in relation to these sectors, supported by social and economic justifications, make assumptions about the future availability of water and associated freshwater ecosystem services.

As such, if long-term climate resilience is to be built across all sectors, not only must each sector individually consider water-related climate impacts and adaptation in planning, but there must also be cross-sectoral, integrated and system-wide approaches, with water recognized as central to this cross-cutting approach. Adaptation planning and practices need to be comprehensive, cross-sectoral and consistent across sectors with regard to the sharing and conservation of water resources. Otherwise, climate change adaptation in sectors such as agriculture, energy and food production may ultimately have negative impacts on the water sector. Comprehensive national Climate Change Adaptation strategies are required to ensure this integrated and cross-sectoral approach. Well formulated cross-sectoral adaptation actions are likely also to be more cost-effective.

### Strengthen Institutional Capacity for integrating climate change adaptation into Water Management Policies and Plans

Adapting effectively to climate change in the water sector not only requires that water is at the heart of national climate change adaptation strategies, but also that existing national water policies, plans and funds mainstream climate change adaptation. This will require strengthened water management institutions, as they increasingly have to deal with control and monitoring of water use across sectors, the assessment and monitoring of hydrological changes, the application of pollution-control and prevention measures, and the regulation of water infrastructure development that takes into account future climate impacts and seeks to build climate resilience. Improved governance of national, regional and local water management institutions is therefore critical.

### Empower local communities and stakeholders to participate in water resources planning and management for climate change adaptation

National frameworks and strategies for climate change adaptation in the water sector should ensure that local communities and stakeholders are consulted and engaged in the implementation of such plans. This requires a two-way flow of information between government and communities that takes into account gender sensitivities and balance, and ensures that political discussions and decisions relating to adaptive water management are conducted inclusively so that subsequent arrangements best reflect the needs of a range of stakeholders. This is especially critical regarding discussions relating to the allocation of water rights, where governments should commit to providing resources to explain and interpret legal issues relating to water and ensure that there is equal representation of social, economic and environmental interests on a local, regional and national level. Empowering local communities to assume a larger role in climate change adaptation efforts is not only about decentralizing responsibilities; such efforts must also entail resources distribution, both human and financial, in order to provide them with the necessary capacities to take action.

## Identify local knowledge and needs: build on locally-specific adaptation and coping mechanisms

Though enabling frameworks may be established on a national and global level, water resources management remains fundamentally a local issue. As such, local coping strategies are an important element of water-related climate change adaptation. Traditional knowledge and coping mechanisms for extreme weather events can be harnessed to respond to climate impacts on water. Such approaches and methods can be employed irrespective of data availability and precise modelling of possible climate impacts. A particular challenge in this regard is the down-scaling of climate change-related information and assessments to the level of planners and decision makers. Uncertainties remain high at the more local to regional levels.

However, although climate and hydrological data and climate impact assessment methodologies are critical for scenarios-based planning and capacity building, adopting a 'no-regrets' precautionary approach of employing and expanding existing techniques should be part of any climate change adaptation portfolio in the water sector. This would make communities more resilient to whatever changes will eventually take place. Success stories of local coping measures should be identified, and strategies developed on how to support and finance such measures in the long term. Micro-credit must be made more widely available through increased adaptation funds.

## Strengthen mechanisms for effective transboundary water management arrangements

As the pressures on water resources increase in some regions as a result of climate change, the need for effective transboundary water management arrangements becomes yet more critical. Where climate change will decrease water availability in certain transboundary river basins, legal agreements must be developed that provide the framework for effective benefit-sharing of a scarce resource. Where climate change may lead to increased flows, and the risk of flooding becomes more acute, transboundary arrangements for managing and controlling water flow are also imperative. However, at present around 60% of international watercourses are not governed by agreements and 80% of the existing agreements are bilateral, even though other states may also share the resource (UNEP 2006). In developing countries in particular, capacity to implement any such agreements is limited by a lack of knowledge or familiarity of the fundamental principles of international, national and transnational law. As such, capacity must be enhanced on a developing country level to develop and broker legal frameworks for transboundary water management, so that climate resilience of transboundary water resources might be enhanced. In this context, supporting 'weaker states' in negotiating fair and equitable agreements is also critical. The role of international treaties and conventions, such as the UN Watercourses Convention, in enhancing transboundary water management arrangements should also be acknowledged.

Where transboundary water arrangements do exist, it is also critical to assess the sustainability and flexibility of such arrangements in light of changed environmental circumstances due to climate change. At present most existing transboundary water arrangements are not flexible enough to deal with a decrease in water flow, which will be a widespread manifestation of climate change impacts on water resources. As such, countries should address the deficiencies of existing transboundary water management arrangements in good time, so that legal provisions may be re-negotiated where necessary to integrate climate change considerations and impact assessments.

## Ensure linkages between Disaster Risk Reduction (DRR) and Climate Change Adaptation Processes

Climate change adaptation does not always fall easily within existing risk management frameworks and processes, despite the potential impacts of climate change on the frequency and severity of disasters. Through encouraging greater integration of climate change adaptation and DRR strategies, effectiveness of both approaches may be enhanced and climate-related losses reduced, whilst simultaneously streamlining financial and human resources through more joined-up thinking.

Systematic dialogue, information exchange and joint-working should be encouraged between climate change adaptation and disaster risk reduction bodies, including the joint development of DRR plans and adaptation strategies, as well as the inclusion of climate change adaptation experts and policy-makers into National Platforms for DRR, so that long-term climate-risks may be more effectively assessed.

## 2. Effective Water Management

### Enhance Integrated Water Resources Management

Integrated Water Resources Management promotes co-ordinated development and management of water, land and related resources to maximize the resultant economic and social welfare in an equitable manner, without compromising the sustainability of vital ecosystems.<sup>4</sup>

Integrated Water Resources Management, where implemented effectively, provides an ideal framework by which to adapt to climate impacts on water resources. Climate change will exacerbate water-related management challenges, but the principles already exist in IWRM for responding to more adverse situations: flexible and resilient freshwater management systems, with policies incentivizing supply-side innovation and effectively controlling demand across competing users. Strengthening effective water governance, involving stakeholders in decision-making, improving transboundary water arrangements and adapting and restoring 'natural infrastructure' and ecosystem services are existing approaches that will prove transferable in areas affected adversely by climate change.

IWRM plans and principles must be recognized as an effective framework through which to address climate change adaptation in the water sector – critical to IWRM effectiveness will be the ability to apply IWRM tools and methods taking full account of climate variability and change, incorporating an assessment of how future changes will impact on water resources management.

The application of IWRM principles for climate change adaptation will require capacity building and increased financial resources in many developing countries where IWRM remains a technical, complex and under-resourced process. Moving from IWRM planning, to IWRM implementation for climate change adaptation remains a significant challenge for a number of countries, and as such priority must be given to enhancing IWRM implementation. IWRM could also, if properly implemented, offer an opportunity to strengthen the links to other key sectors such as agriculture and energy.

<sup>4</sup> International Union for the Conservation of Nature, International Water Association, Cooperative Programme on Water and Climate, World Water Council: *Perspectives on Water and Climate Change Adaptation: Don't stick your head in the sand! Towards a framework for Climate Proofing*, March 2009

## Use Methodologies for Assessing Water Usage

With the global population at 6.5 billion and increasing to 8.5/9.0 billion we are testing the capacity of global hydrological systems to meet our water demands. Climate Change stands to exacerbate the pressures on our hydrological systems further.

Water conservation and water-use efficiency will be critical to a cross-sectoral approach to water and climate change adaptation. In all sectors, understanding the water intensity of production and products through using methodologies to assess water-footprints helps to identify areas where savings must be made and informs decisions about modes of production.

Water footprinting is highly valuable as an awareness-raising, educational and advocacy tool that leads to better understanding of water impacts and can demonstrate the case for better water management. As part of a framework of climate impact assessment it can help all sectors to assess risk by calculating the sustainability of certain levels of water usage in light of a changing climate and changing hydrological patterns. This helps to assess the ability of hydrological systems to meet the demands being placed upon them.

Water footprint assessments should be recognized as the basis upon which water adaptation policies can be formulated – changing crop varieties, providing incentives for production and consumption with lower water demands, developing robust Integrated Water Resources Management plans that manage the competing demands on water resources within environmental constraints.

All countries should conduct studies into sectoral water footprints and make use of existing methodologies for assessing water footprints. Knowledge-sharing initiatives such as the Nairobi Programme of Action should include capacity development for water-footprint assessment as a tool for climate change adaptation through water management. Resources should be mobilized for conducting such assessments in all regions, and for further research into refining methodologies.

## Take an Ecosystem Approach: enhance natural infrastructure

Ecosystem-based adaptation is an economically and environmentally sensible response to the effects of climate change on water resources. Adaptation planning must seek to integrate an awareness of the benefits accrued from preserving and restoring ecosystems as part of an investment in natural and environmental infrastructure for climate resilience.

There is a risk that the adverse effects of climate change on water resources lead to further depletion of freshwater ecosystems as a short-term response. This is exemplified by the trend of intensifying irrigation in response to reduced rainfall – short-term gains from such measures may actually limit future options for climate adaptation, as freshwater ecosystems are put under increased pressure and stress, and concomitant degradation of the ecosystem leads to a reduction in the services that it provides, decreasing its capacity to offer natural infrastructure for climate resilience.

Degraded ecosystems and reduction in their services is just one example of ‘maladaptation’ and reinforces the need for considered climate change adaptation strategies that consider the long-term climate-resilience potential of freshwater ecosystems. In order to provide valuable services such as freshwater, natural ecosystems must be recognized as water ‘customers’ in their own right. Technological alternatives may partially imitate but cannot provide as effectively as eco-hydrology – as such, the presence of a water allocation systems that protect essential environmental flows and freshwater ecosystems helps to respond in a sustainable manner to climate-driven changes in water availability. As such, ecosystems should be prioritized in water allocation systems as a way of building climate resilience for social, environmental and economic uses of water.

## Develop effective Demand Management and flexible Water Allocation Measures

Coping with the effects of climate change on water will require demand management measures to enhance efficiency of water usage. There are a range of demand management techniques that can be employed to reduce water usage and encourage greater productivity of water where it is used.

In the agriculture sector, which typically uses up to 70% of water resources, options include enhancing water storage capacity; investing in new generation irrigation technologies that improve efficiency; changing technical specifications and requirements to promote technologies that reduce wastage and leakage; changing crop varieties to more water-efficient strains; efforts to minimize food wastage throughout the entire production-consumption chain.

In the industrial and energy sectors, there also exist a range of options, including upgrading infrastructure to enhance water-use efficiency and productivity, enhancing storage capacity, investing in water recycling and closed loop schemes.

Urban areas also put huge demands on water resources and, as such, international and national frameworks must be developed for reducing water loss in city networks, and subsidies and incentives must be provided for retrofitting urban buildings for water efficiency. Re-designing tariff structures can also provide incentives across sectors to reduce water usage, and such methods should be applied as part of adaptation planning. However, it is also important to recognize that water pricing is not always effective to the point of scarcity, as water is a relatively price inelastic resource.

All such demand management must be in the context of well developed and flexible water allocation systems that protect social and environmental interests, whilst permitting flexibility in economic use of water. Where rigid water rights arrangements exist, based on historical precipitation patterns, and measurements of water availability that do not take climate change into account, the ability to respond to and plan for climate change impacts on water resources is challenged. Effective climate change adaptation in the water sector means prioritizing social and environmental rights to water resources in times of scarcity, and developing regulatory structures that prevent over-withdrawal of water resources by one particular sector or set of users when availability is limited.

## Address Future Uncertainty to avoid 'Maladaptation'

In developing water management infrastructure designed to address water needs, there may be a significant risk of authorising developments that ultimately lead to 'maladaptation'. Many such developments, such as hydropower projects and increased irrigation may deliver adaptation benefits in the short-term as pressure on water resources increases under climate change. However, such developments must be authorised with a clear understanding of future impacts of climate change on water resources so as to ensure that water availability may not ultimately be decreased by such measures. Where hydropower projects or irrigation projects are developed to increase supply, this may have a net effect of increasing hydrological vulnerability due to increasing water-consuming activities rather than more effectively managing demand. As such, climate change adaptation in the water sector means being careful not to make assumptions about future water supply, or justifying developments under 'adaptation' that lead to enhanced water supply in the short term, but 'maladaptation' in the long-term.

### 3. Enhanced Information, Observation, Monitoring and Impact Assessment

#### Enhance capacity for data collection, observation, monitoring and impact assessment

Understanding and assessing the impacts of climate change on water resources requires access to reliable climatic and non-climatic data so that adaptation needs can be identified. At present, such data in many regions, especially in developing country regions, is lacking.<sup>5</sup> This is caused by:

- Weak capacity of systematic observation and forecasting services, compromising the quality of climatic data
- Access and availability issues – difficulties encountered in obtaining existing data
- Lack of agreement and co-operation on data sharing

As such, the efficacy of climate change impact assessments is challenged. This is compounded by a lack of technical expertise regarding the appropriate and available models, tools and methodologies for assessing climate change impacts. Better monitoring leads to improved modelling techniques that allow more effective prediction of climate change impacts on water availability, in turn enhancing understanding of an appropriate response. Only through better, more thorough monitoring can we develop modelling techniques that will allow us to more effectively predict and slow climate change impacts on global water availability.

In response to this situation, efforts must be made and resources committed to:

- Invest in improved meteorological and hydrological information
- Build capacity in systematic observation and forecasting services to improve data quality
- Ensure that national meteorological and hydrological services make existing datasets available on their websites
- Make climate data and information available to poor and vulnerable communities, accompanied with appropriate capacity building on how to use it
- Enhance collection of and/or access to localized data so that rural and urban areas may be able to identify appropriate responses
- Share hydrological data in and among regions in accordance with WMO Resolution 25 on free and open exchange of hydrological data
- Build capacity in analyzing climatic and non climatic information for improved climate change impact assessment
- Transferring relevant technologies

Developed country parties should assist developing country parties with the costs of improving data quality, access and assessment, and should support the transfer of the relevant technologies to meet these ends.

<sup>5</sup> This point was emphasized in the feedback from a range of stakeholders to the consultation. It was also identified by participants in the regional workshop programme co-ordinated by the Global Climate Observing System (GCOS) in 2000, and shared in the report 'Climate Change: Impacts, Adaptation and Vulnerabilities in Developing Countries: <http://unfccc.int/resource/docs/publications/impacts.pdf>

## Identify Vulnerability Hotspots

Regional hotspots that require attention when formulating commitments include: mountains and rivers, due to glacial retreat and altered snow-fall patterns; small islands sensitive to coastal erosion and salt water intrusion, arid regions susceptible to more severe or frequent water scarcity, deltas and low-lying cities where flood risk is enhanced.

The IPCC has already taken important steps to identify regional 'hotspots' in terms of vulnerability to climate change. However, ensuring appropriate allocation of financial means for adaptation in the water sector requires further assessment of priority countries and communities. Such assessment should make use of the approach used in National Adaptation Programmes of Action to identify key problems and the measures and financial needs for adapting to climate change. This implies the widening of NAPAs not only to cover Least Development Countries, but those which are most vulnerable that may sit outside this category.

## 4. Fair and Equitable Finance

One of the most critical factors in achieving climate change adaptation is a global agreement on the amount of funding required, how funds will be generated and disbursed, and how they will be allocated according to sector.

Climate change will affect water resources globally, and as such responsibility to initiate climate change adaptation strategies in the water sector will fall to developed and developing countries alike. However, developing countries are ill-equipped with the financial means to implement the kinds of adaptation requirements that correspond to their vulnerability – many of the most vulnerable countries are by extension also least developed.

### Funding for Climate Change Adaptation must be new and additional to Official Development Assistance (ODA)

Predictions differ on the amount required for adaptation. The UNFCCC Secretariat recommends USD28–67 billion per year by 2030; UNDP has estimated that USD 86-109 billion per year will be required by 2015; the World Bank USD9–41 billion per year, and Oxfam International more than USD50 billion per year.<sup>6</sup> All funding predictions make it clear that more funding must be made available if adaptation is to be sustained and sustainable, involving the building of climate resilience through infrastructure and technology reform and development, rather than relying on short-term and costly emergency relief. As such any adaptation funds must be new and additional to existing Official Development Assistance (ODA) in recognition of the compensatory nature of such funds.

<sup>6</sup> Figures made available in Stockholm Environment Institute Policy Brief on Financing for Climate Change Adaptation: [http://www.sei.se/mediamanager/documents/Publications/Climate/financing\\_adaptation\\_climate\\_change.pdf](http://www.sei.se/mediamanager/documents/Publications/Climate/financing_adaptation_climate_change.pdf)

## Prioritize the water sector in Adaptation Funding

The UNFCCC Adaptation Fund should prioritise water management for the spending of funds for climate change adaptation, due to the cross-cutting nature of water as a transmitter of climate change impacts. Clear assessments must be made of the level of funding required globally for climate change adaptation in the water sector, and these figures must be disaggregated according to country needs so that the most vulnerable areas might be identified. Research from the UNFCCC estimates that the amount required for climate change adaptation in the water sector in 2030 will be USD 11 billion. It has simultaneously estimated that the Adaptation Fund could receive 80 – 300 million per year for the period 2008 – 2012, and has found that there is USD 275 millions in the adaptation funds operated by the GEF as of August 2007. It is clear that overall funding for adaptation currently exists as a fraction of what is required solely in the water sector. This funding shortfall must be urgently addressed so that required adaptation in the water sector may be possible in the long-term.

## Ensure effective governance and flexible delivery mechanisms for adaptation funds

Efforts must be made to create effective governance structures for adaptation funds that fit into a wider and coherent adaptation architecture. Guiding principles of funds should include broad and equitable representation on the governing body and transparency in decision-making. Funds must have processes for prioritizing the most vulnerable countries in the delivery of financial assistance for adaptation. The Adaptation Fund offers a good model, and should incorporate a sectoral assessment of the level of funding required, with particular emphasis on the water sector.

## Ensure complementarity of multiple bilateral and multi-lateral funds for climate change adaptation

As multiple funds emerge to deal with climate change adaptation, concerted efforts must be made to ensure coherence and complementarity. Roles, responsibilities and remits of Global Environment Facility EF Funds, the Adaptation Funds, and various other bilateral and multi-lateral adaptation funds must be assessed both to enhance efficiency and to avoid confusion among developing countries on how to access which funds for which kinds of initiatives and projects.

## Integrate and Mainstream Climate Change Adaptation into Existing Funds for Water Management

In assessing the requirements for additional funds it is also important that commitments are made to integrate climate change adaptation into existing project or sector funding streams for water management. It will also be critical to identify how funds may be leveraged for other water-reliant sectors (e.g. energy, agriculture, industry) to address climate impacts on water resources in their adaptation strategies. It is critical that the climate-proofing of existing funding streams in the water sector is not ignored in favour of creating new adaptation projects. It may prove complex to assess how the integration of climate change adaptation into existing project and sector funds may be identified as ‘new and additional’ funding. However, as integration into existing funds also has cost implications, methods should be agreed whereby additional costs incurred by mainstreaming climate change adaptation into existing funding streams and projects may be identified and recorded as a way of justifying and securing additional funds.

## Annex 1: Stakeholders involved in GPPN consultation on Water and Climate Change Adaptation

### Organisations

Bremen Overseas Research and Development Agency (BORDA)  
CAZALAC – Centro del Agua para Zonas Aridas y Semi Aridas de America Latina y el Caribe  
Chartered Institute of Water and Environmental Management (CIWEM)  
Ecumenical Association for Sustainable Agriculture and Rural Development, Ghana (ECASARD)  
ICLEI – Local Governments for Sustainability  
International Federation of Agricultural Producers (IFAP)  
Confederación Nacional Agraria, Peru  
Cooperativas Agrarias Federadas – CAF. Uruguay  
Confederación de Porcicultores Mexicanos  
Jordan Farmers Union  
Uganda National Farmers Federation  
Friends of the Earth Canada  
Friends of Ozone  
Freshwater Action Network  
Gender and Water Alliance  
Global Water Partnership (GWP)  
IPCC – authors of Water and Climate chapters  
Stockholm International Water Institute (specialist departments)  
Tearfund  
Uganda Water and Sanitation NGO Network  
UN Convention to Combat Desertification  
UNDP Water Governance Facility  
UNEP DHI Water and Environment Centre  
UNESCO IHE  
UNISON  
UN Water  
WaterAid Ghana  
World Business Council for Sustainable Development  
World Development Movement  
WWF/WWF International

### Individuals

Dr Peter Johnston, University of Capetown  
Professor Tony Allan

