

# 1st International Environment Forum for Basin Organizations

## Issue Paper No. 2

### Theme 2: Adapting to Climate Change<sup>1</sup>

#### **Background:**

River basins are central to climate change adaptation. Climate change will strongly negatively affect basins and the ecosystem services they provide. At the same time, these ecosystem services will be essential to climate change adaptation. Because of the interconnectedness of transboundary basins and the transboundary nature of climate change effects, adaptation measures must be developed and coordinated on a regional level. However, current adaptation plans are largely national and unilateral.

The deterioration of basins' resources and services will lead to serious impacts on human health, economies, food supply and lifestyle. Climate change will most likely lead to increased frequency and severity of floods and droughts. It will likely cause changes in runoff and flow patterns leading to changes in soil erosion and distribution of soil nutrients, as well as changes in groundwater recharge and discharge. Extreme rainfall and floods could contribute to groundwater contamination. Rising sealevel together with changes in flow patterns may lead to saltwater intrusion in coastal floodplains and aquifers. Changes in water temperature and salinity will affect physiology and reproduction and growth of aquatic species. These changes will impact biodiversity and food supply, water availability and quality, agricultural productivity, and human safety and security. Water scarcity will cause health hazards by limiting access to water for sanitation, contributing to higher pollution levels, and reducing the ability of freshwater ecosystems to naturally purify water.

Climate change pressures affect resources already under stress from other causes, including over-abstraction, pollution, and change in flow driven by population growth, urbanization, and development. Climate change will also impact demand for freshwater services. Higher temperatures and increased evapotranspiration may cause an increase in demand for irrigation, while making traditional irrigation methods less efficient. Industrial and household demand for water may also rise. Increased shift to non-fossil fuel energy sources, such as hydropower may also affect the uses of freshwater systems.

Improving and maintaining river basins and their ecosystems and resources is central to climate change adaptation. Healthier freshwater ecosystems will be more resilient to the effects of climate change. Healthy freshwater ecosystems are also integral to increasing community resilience to climate change, through securing a supply of the necessary ecosystem services provided by freshwater basins, such as water, food, and local climate regulation. These ecosystems can best be managed and protected on the basin level.

The need for water management adaptation is urgent. Already, climate change related water disasters are costing billions of dollars and affecting millions of people. *[Example of basin]* However, freshwater adaptation to climate change is relatively low on national and international political agendas. Basin organizations must play a central role in bringing this problem to the attention of decision makers to motivate effective and immediate action.

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<sup>1</sup> This Issue Paper was developed by UNEP in cooperation with... [insert Partners].

## **Main Issues:**

### ▪ **Adapting to Climate Change on the Basin Level:**

The effects of climate change will be felt at the basin level. Changes in water flow, quality and temperature will affect ecosystem services throughout the basin, including services such as flood regulation and local climate regulation which in turn affect other parts of the basin.

Climate change adaptation must consider the basin-wide effects of climate change, and the complex interactions within the basin which determine climate change effects. Where basins cross national boundaries, adaptation planning must be developed and coordinated in this transboundary context.

### ▪ **Consideration of Ecosystem Services in Adaptation:**

River basin ecosystem services play an important role in climate change adaptation. Healthy freshwater ecosystems contribute to local climate regulation, and can reduce the magnitude and impact of floods. Freshwater ecosystems contribute to water purification and promote groundwater recharge, supporting maintenance of a sustainable supply of usable water in the face of increased pollution and climate variability. Freshwater ecosystems play an important role in nutrient cycling and soil formation, which together with support for fish and other wildlife can secure a supply of food to address increasing problems of food shortages. The role of natural infrastructure in mitigating the impacts of climate change and enabling effective responses to those impacts is not well recognized in adaptation planning.

Adaptation strategies should be developed to support rather than conflict with ecosystem services. Where adaptation measures are implemented without regard for ecosystem services, they may cause more harm than benefit. Investments in natural infrastructure and adaptation measures which support and reinforce ecosystem services can produce substantially more beneficial results. *[Example]*

The effects of adaptation measures on ecosystem services will involve the entire basin. Therefore, planning should take place at the basin level. Where basins cross national boundaries, this requires cooperation between countries in developing adaptation strategies. Currently there is little transboundary cooperation in this area. Instead, unilateral adaptation measures are taken without complete information on the relevant ecosystem services involved. These can cause extensive harm to other countries, and to the health of the basin system as a whole.

### ▪ **Uncertainty about the Nature and Degree of the Effects of Climate Change:**

Uncertainty about climate change can stand in the way of effective and timely action. At the river basin level, projections of changes in runoff, precipitation, and water flow are uncertain due to large local variability. Temporal variability in freshwater ecosystems makes it difficult to define impacts which are caused by climate change. The effect of climate change is likely to vary significantly between basins, making it difficult to abstract from global measurements to a specific situation. This has made it hard to predict exactly what the effects of climate change will be on specific basins in the long term.

Despite this, there is significant evidence that immediate action is needed. Although the nature and effects are not precisely known, it is very certain that climate change will negatively impact the provision of ecosystem services.<sup>2</sup> There is high certainty that there will be some negative effects in the short and long term. There is also high certainty that immediate investment in adaptation is necessary

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<sup>2</sup> Millennium Ecosystem Assessment, Ecosystems and Human Well Being, p. 513 (2005)

to avoid higher costs in the future.<sup>3</sup> Basin organizations can play a crucial role in formulating, implementing and coordinating adaptation measures at the basin level.

It is important to address uncertainty-based arguments against adaptation in order to motivate immediate action by decision-makers. It is also necessary to craft adaptation strategies and measures which can deal with different possible scenarios, and which can adapt to address changing needs and scientific understanding.

#### **Possible Responses:<sup>4</sup>**

- Basin organizations as advocates of immediate action. Basin organizations can raise awareness about the potential problems of climate change and the necessity of immediate action. Basin organizations are ideally placed to gather and disseminate basin-specific information on the state and trends of freshwater systems and the likely impacts of climate change on these systems, as well as information on the interests and needs of affected communities and other stakeholders. Basins can use this information to bring their specific issues to the attention of national and international decision-makers to serve as the impetus for necessary adaptation measures.
- Adaptive adaptation. In order to deal with uncertainty and changing interests and needs, climate change adaptation must be able to adapt. The adaptation measures must be flexible enough to allow for adjustments in response to this monitoring, which should include social and economic changes and effects as well as ecological changes. Non-structural, or soft measures, focusing on continuous planning and revision will be more flexible than substantive legislation.
- Continued monitoring and scientific research should run parallel to implementation of adaptation measures, in order to resolve uncertainty as well as assess the effectiveness of adaptation measures. Basin organizations are ideally placed to conduct this monitoring and dissemination of the resulting information.
- Basin level management. Water resources should be managed at the basin level, through a cross-sectoral approach which engages stakeholders and considers all affected ecosystem services and a variety of management strategies. These strategies might include finding ways to manage land resources to mitigate water scarcity and enhance adaptation, as through changing agricultural and urban development practices to use water more efficiently, manage pollution and runoff more effectively, and interfere less with water flow and permeation. Basin organizations can play a central role in promoting and facilitating this management. Basin organizations are important vehicles for development, coordination and implementation of adaptation measures. *[Example from basins, such as Zambezi]*
- International information exchange. Although specific effects of climate change may be basin-specific, methods for adapting to water scarcity, quality degradation, and increased disease and water-related disasters may be common across basins and countries. An international forum such as this one can provide opportunities for exchange of information, knowledge and experience between countries and organizations on adaptation tools and experiences. Such a

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<sup>3</sup> During the period 2000 to 2008, 1.6 billion people were affected by extreme climate events, representing a 187% increase over the previous decade. Floods and heavy storms cost an estimated 25 billion USD globally over the same time period. UNECE Watercourses Convention, Guidance on Water and Adaptation to Climate Change 7 (2009).

<sup>4</sup> This list is not exhaustive. It is merely intended to guide the discussions and point towards possible avenues for action which, if implemented, could assist and benefit basin organizations in their work around the world and strengthen freshwater governance overall.

forum can also allow for free exchange of scientific information on the effects of climate change as research progresses and understanding improves.

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