How to Bring Ecological Services into Integrated Water Resources Management

The objective of the Global Water Partnership (GWP)—a global independent partnership of institutions launched by UNDP and the World Bank in 1995—is to provide practical advice on Integrated Water Resources Management (IWRM). This involves coordinated development and management of water, land and related resources by maximizing economic and social welfare without compromising the sustainability of vital ecosystems. GWP activities should help provide the base needed to secure due attention to crucial ecological services in catchment areas. To avoid undermining of the life-support systems on which human welfare is built, fundamental components of the environmental resource base have to be secured. What has to be secured; what ecosystems, what ecological services? How that can be achieved; criteria to be satisfied. Why the legitimacy aspect? What is needed is, in other words, to clarify the compromises involved and how to arrive at them, and how maintenance of the capacity of ecosystems to supply key ecological services, both aquatic and terrestrial, may best be incorporated in IWRM.

THE STOCKHOLM SEMINAR

In order to identify fundamental gaps and the need for GWP activities a seminar was organized by the Stockholm University Centre for Research on Natural Resources and the Environment, held at the Beijer Institute 15–17 November 1999, with participants from science, UN organisations and NGOs. The seminar had 4 major purposes:

- to clarify key linkages between water and crucial ecological services and their policy implications;
- to clarify how securing key ecological services linked to terrestrial and aquatic ecosystems can be made part of the IWRM process and which are the main tools;
- to identify the key actors in the field, i.e. who has done what and what needs to be done;
- to produce the terms of reference for a GWP Associated Programme as a step towards inviting institutions around the world to join in a GWP-related network.

WATER-RELATED ECOSYSTEM DETERMINANTS

The Seminar stressed that there is an ongoing paradigm shift from an impact-oriented view to a true systems approach. In particular, the role of freshwater for terrestrial ecosystem services was highlighted from a catchment perspective. In order to address and manage ecosystem services the dynamics of complex adaptive systems behind the services, their interrelations, resilience and dependence on freshwater flows have to be highlighted. Such an eco-hydrological perspective creates a new, more constructive way to look at the important issues facing humanity.

It was also stressed that fundamental ecological services for society are the water cycle with its feedback loops to plant cover, soil, atmosphere; the plant cover as requisite for all heterotrophic organisms; the soil with its fertility as the dynamic interface between the minerogenic substrate and the living plant cover; and the atmosphere with all its processes. These functions form the backbone for all living structures. To achieve a sustainable use of ecosystems and their services, including biodiversity, a set of water-related determinants have to be clarified since they indicate the way in which the ecosystems may be disturbed by water management or mismanagement: i.e. water flow, water pathways, flow seasonality, water table, and water quality/chemical compositions. These phenomena may be impacted by both direct and indirect water-related activities: by land use, by introduced pollution load, and by flow control and management measures. Two types of landscape manipulations have to be kept in mind. On the one hand, direct manipulations of water flows and quality (flow control, water withdrawals) and on the other hand, manipulation of land and vegetation, thereby influencing soil permeability and rainwater partitioning and consequently also water flow changes.

There is also an important upstream/downstream dimension between water and ecosystems and the various conflicts of interest involved, which need to be considered in the trade offs that have to be arrived at in an IWRM. The upstream part of a catchment or river basin hosts a number of water-impacting activities; land-use conversions, flow modifications, and pollution load added. Together they influence the river flow, seasonality and quality of the water flowing into the downstream part of the area. The downstream stakeholders are involved in a number of water-dependent activities; i.e. direct water use for households and municipalities, industry, irrigated agriculture, etc, and ecological services within riparian wetlands, aquatic ecosystems and coastal ecosystems.

The challenge is to manage our interconnected environmental assets in a fashion that secures their capacity to support societal development for a long time into the future. This requires that conflicts of interest are highlighted and that trade-offs be made between the use of water and land in river basins build on a proper understanding of the eco-hydrological landscape.

FROM REACTIVE TO PROACTIVE APPROACH

Moreover, the challenge for GWP is evidently to move from a reactive to a proactive approach to freshwater and ecosystem management in order to foster sustainable use of the life-support system on which social and economic development depends. One way of seeing the IWRM-ecological service linkages is to manage catchments as an asset that delivers a bundle of water and ecological goods and services. Some of these services work in synergy, others are in conflict. Hence, intentional trade-offs need to be made, based on the view of humans as embedded in the ecohydrological landscape.

In terms of goals, the Seminar group stressed the importance of clarifying linkages between water processes and ecosystem services to empower stakeholders to manage environmental assets in an informed way. GWP should encourage a new way of looking at IWRM linkages, free of preconceptions. Demonstration projects and case studies should be favored, building global linkages to share and compare lessons. The contrasting role of trees in water processes was found interesting, e.g. promoting trees as a way to increase infiltration in India as opposed to trees as water consumers causing decreasing water tables in Australia.

Operationalizing eco-hydrological basin management requires action at different time scales: short-term (5–10 years), medium term (10–15 years) and long term (> 15 years). Crucial in the short term is societal, economic, and technical capacity, in the medium term planning, legislation and other institutional frameworks, and in the long term education to reduce the ecological illiteracy trap and to promote understanding of fundamental values for societal development. The overarching goal for eco-hydrological basin management is accomplishing an optimal allocation of water that ensures the provision of fundamental ecosystem services. Such an allocation has to be adaptive towards the complex dynamics of living systems as well as take uncertainty and surprise into account. In the long run, one crucial key