ENVIRONMENTAL FLOWS

Environmental Perspectives on River Basin Management in Asia

Vol.1 Issue 1 **July 2004**

WHY THIS NEWSLETTER?

Water is an important part of any ecosystem, both in qualitative and quantitative terms. Reduced water quantity and deteriorated water quality both have serious negative impacts on ecosystems. The environment has a natural self-cleaning capacity and resilience to water shortages. But when these are exceeded, biodiversity is lost, livelihoods are affected, natural food sources (e.g. fish) are damaged and high clean-up and rehabilitation costs result. Two important concepts are important to realize. First, is that ecosystems not only have their own intrinsic value, but also provide humans with essential services. Second, is that sustainability of water resources requires participatory, environmental (ecosystem-based) management. An integral part of environmental water resources management is the assessment and maintenance of *environmental flows.*

Environmental flow assessment and maintenance are relatively new practices for the water sector, particularly in developing countries. There is a lack of awareness throughout the sector and among the general public about this concept and its application. Most countries in Latin America, Africa and Asia do not have at present either clear environmental flow legislation, or accepted approaches for assessment of these flows. Existing assessment methods, developed elsewhere, are either not known, or seldom being applied. The data for developing such methods and expertise required to implement them are limited and the relevant ad-hoc studies and initiatives are poorly documented. At the same time initiatives related to environmental water management and ecosystem restoration are emerging in the world.

To promote the concept to a wider audience and to bring to light the recent events and experiences in this field, a more systematic information exchange is necessary. Realizing this need, the International Water Management Institute (IWMI) and the Global Water Partnership (GWP) Advisory Center at IWMI initiated this Newsletter under the title "Environmental Flows" (EF). EF Newsletter will focus on the issues of environmental water management and tradeoffs between ecosystem needs and other users. In the immediate future, EF will have its primary focus on Asia, in many parts of which the water environment is in critical stage and where the issue of balancing environmental water requirements with those of other users is particularly critical. The EF will, however, publish the relevant news from other parts of the world, promoting the global exchange of information and experiences in this field.

Three different types of material are envisaged: 1) essays: stories about the recent initiatives/activities/studies in environmental water assessment and management from around Asia and the rest of the world; 2) invited articles by leading experts, policy and decision makers; 3) news in brief (information about relevant events). The first two categories are envisaged to be under 1000 words and the third – under 200 words. To publish in EF, please send your information to the contacts indicated in the end of this letter. EF will be sent initially to the list of IWMI and GWP news subscribers through the e-mail. All issues of the EF will also be published on the IWMI and GWP Advisory Center websites. Hardcopies of EF may be supplied on request. The intention is to publish at least three issues of EF per year.

FREQUENTLY ASKED QUESTIONS ABOUT ENVIRONMENTAL FLOWS

What are Environmental Flows?

There is no universally agreed definition of environmental flows. In very general terms, environmental flows represent the flow regime which should be provided within a river, wetland or coastal zone to maintain the integrity, productivity and services of freshwater dependent ecosystems. This maintenance may be necessary in cases when such rivers and wetlands are subject to flow regulation and competition from multiple water users. But establishing environmental flows is also required prior to water resources development, as part of the pro-active integrated river basin management. Environmental flow regime is composed of discharges of particular magnitude, frequency and timing necessary to ensure a healthy river system from environmental, economic and social perspectives.

Environmental flows are always a compromise between water for "development" and water for nature.

How to evaluate Environmental Flows?

Evaluating environmental flows may be perceived as the assessment of environmental water demand, similarly to the water demand of other users. Environmental flows are evaluated through a process known as Environmental Flow Assessment (EFA). During EFA, a number of scenarios with different flow regimes resulting in different environmental and social benefits and costs are formulated and evaluated. The stakeholders decide on the best scenario based on a compromise between the multiple needs of the community. Different EFA methodologies are used in evaluation. They range from quick, low-confidence, desktop type assessments to detailed comprehensive multi-disciplinary assessments. The first are suitable for initial planning, the second – for detailed studies, particularly in stressed water systems. Ideally, both types of EFA approaches should be present in national environmental water policies.

Are EF established for rivers only?

No. Although rivers had more emphasis in this regard so far, the EF are also established for wetlands, estuaries and aquifers. In the context of the latter, it is also possible to talk about environmentally acceptable limits of exploitation expressed in terms of groundwater levels or recharge.

Are EF and "minimum flow" the same thing?

Not necessarily. Minimum flows are often used in water quality management and in this sense can be part of EF. But EF have a broader definition, as mentioned above. EF regime takes into account natural variability of river flows and therefore is not a constant.

How large EF should be?

It all depends upon the hydrology and ecology of a particular river and on a condition in which it is agreed to be maintained in. If the river is to be maintained close to its pristine state, as much as 60-80% of the total annual natural river flow may be required. In highly developed river basins, where water re-allocation is difficult, the EF component may be as low as 15-20%. Allocating 1 to 10 % of the total natural flow to EF is unlikely to ensure a healthy river ecosystem.

How can EF be ensured?

The flow may be regulated through dams, channels, viaducts, pumping, changing management practices to make better use of available water for river health. Environmental releases from dams may include 'low flow' bypass mechanisms, mechanisms to allow the first seasonal flood to go to the environment, or to release flows to enhance a natural flood. Infrastructure may be used to prevent flows to wetlands to mimic periodic natural drying out or to simulate the natural flushing of a lagoon from a season flood. Environmental flows can also be ensured through specific allocation policies and through land-use management (e.g. in unregulated river basins).

Who should be involved?

The provision of environmental flows is not only a scientific question, although the science of environmental flows is an important component of EFA and is constantly developing. The provision of environmental flows is also a social and political issue. Therefore, establishing EF regime will involve many different actors, from the highest levels of government right through to local communities. Researchers and experts can only provide the technical advice and possible alternatives but politicians, decision makers and communities need to accept the need for environmental flows for it to be enacted. In an ideal situation environmental flow requirements will be a dynamic process written into legislation, provided by water managers and monitored by a government body or river basin organisation with assistance from research organisations.

How does the concept of EF relevant to Integrated Water Resources Management (IWRM)?

IWRM is a process which promotes the coordinated development and management of water, land and related resources in order to maximize the resultant economic and social welfare in an equitable manner *without compromising the sustainability of vital ecosystems*. IWRM process by its nature addresses natural resources degradation as a result of unsustainable exploitation owing to fragmented approaches, often for short-term gains. The degraded ecosystems can no longer retain their productivity and essential goods and services. The way to maintain these services for freshwater dependent ecosystems is through establishment and maintenance of Environmental Flows. Benefiting from the shared dependence of human and ecosystems on water, IWRM can integrate land, water and ecosystems and promote social equity, economic efficiency and environmental sustainability, the three "E-pillars" of IWRM.

Are there any examples of EF legislation?

There is no global or regional conventions at present that deal specifically with environmental flows. There are however a number of examples of relevant national legislation, which deal with the EF issue ether directly or indirectly. The best recent examples of good legislation are from Australia and South Africa. In South Africa, environmental flows (called

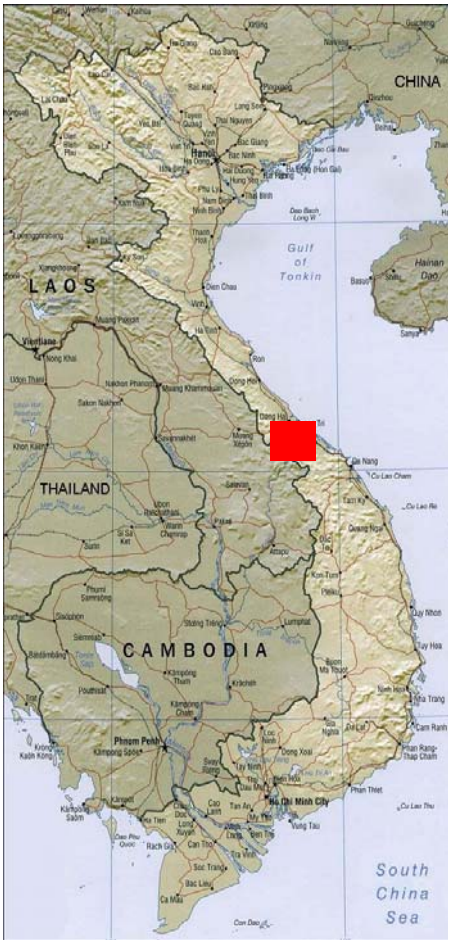
"ecological reserve") have the priority over other water users.

Where to get more information on EF?

IUCN has recently produced the first international guide on EF – "Flow: the essentials of environmental flows". It can be downloaded from http://www.waterandnature.org/flowlaunch.html, where several useful links to other sites can also be found.
GWP toolbox http://gwpforum.netmasters05.netmasters.nl/en/ has a few relevant examples of experiences of environmental water management under the "nature and environment" section.
Details of the multiple EFA methodologies may be found on IWMI eco-hydrological databases' web site http://www.lk.iwmi.org/ehdb/EFM/efm.asp.

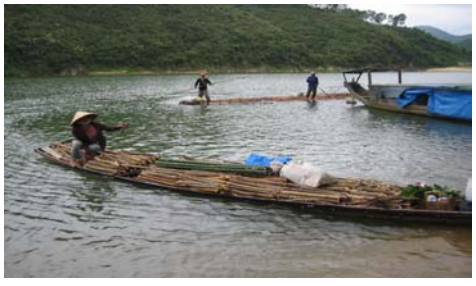
ENVIRONMENTAL FLOW ASSESMENT IN THE HUONG RIVER BASIN, VIET NAM

The Huong River Basin is situated in central Viet Nam and falls entirely within the Hue Province (Figure). The region belongs to the climatic zone of tropical monsoon and the annual rainfall of 3,500 mm is the highest in the country. The river is characterized by a steep gradient that opens up into a relatively flat flood plain. This lower coastal reaches of the river has the highest population density and the historic UNESCO World Heritage City of Hue. The river culminates in an extremely productive lagoon system that supports a number of livelihood activities and a lucrative aquaculture industry. Due to this sudden change in geo-morphology, frequent downstream flooding occurs in the rainy season (September to November) every year resulting in large losses to crops, regional infrastructure, and life. The dry season (February to May) is characterized by greatly reduced flows and salinity intrusion jeopardizing irrigation and domestic uses of the river water. The immediate responses to these challenges have been structural interventions, including flood protection dams and a salinity barrage to prevent salinity intrusion.



IUCN - The World Conservation Union in partnership with the Huong River Projects Management Board and International Water management Institute is currently assisting the Provincial Peoples' Council of the province to develop a management system for the Huong River Basin. This involves developing an institutional framework by supporting the establishment of a River Basin Organization. During 2003 and 2004 several workshops were held in Hue city to assess possible models for a river basin organization and to discuss the implementation of the EFA process in Huong River. It is anticipated that this assessment will also be the forerunner for a comprehensive national environmental flows program in Viet Nam.

The discussion *during the Inception EF Workshops held in Hue in 2003* was centered on the concept of environmental flows and selection of appropriate methodology and institutional and legal framework. The issue of previously assessed minimum constant flow, estimated to prevent the salinity intrusion into lagoon has gained precedence as the dominant figure that guides related thinking among basin managers. The initial understanding was that this project will seek to revisethis number and bring variability into the picture. It was argued that once the environmental flow regime is agreed upon, its provision should be task of the dam authority and the irrigation authorities - under the purview of the intended River Basin Organization. From a legislation perspective, the workshop was informed that the Viet Nam Ministry of Natural Resources and Environment is formulating a legal document related to water resources management and through the Huong River EFA project the attempt should be made to influence this document. After discussion of various EFA methodologies, it was agreed that an intermediate EFA will be carried out over a period of approximately six months. This level of assessment implies the involvement of a multidisciplinary team of experts, field work and analysis, which culminates at the final specialist workshop, where EF are actually being set for different months of the year.



Huong River in Viet Nam. Photo by Rebecca Tharme

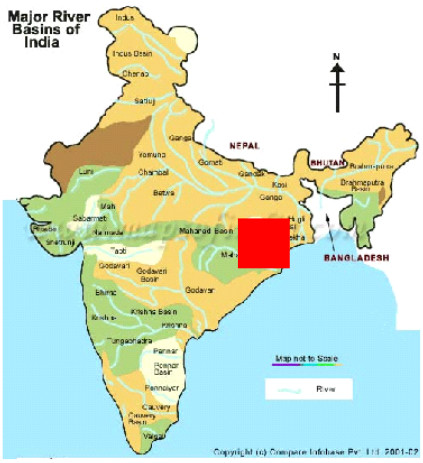
During the *second Environmental Flows Workshops held in Hue during March 2004*, the multidisciplinary te am was composed and the methodology on intermediate EFA was discussed in detail. Different specialist presented the results of their previous studies in the Huong basin. The Workshop then went further to discuss the plan of assessment and developed detailed briefs for each discipline, including hydrology, aquatic ecology, salinity studies, fisheries, socio-economics etc. The participants also identified the location of sites in the basin, where EFA is to be conducted and complimented the discussion with a one-day field visit. The Huong River EFA Project has moved into the phase of filed work, data collection and analysis. It is envisaged that the final specialist workshop will hold during the latter part of the 2004 and will establish the first EF regime in Viet Nam. Further details are available from Richard Friend (richard.mwbp@iucnlao.org)

NEWS IN BRIEF

Sri-Lanka. IUCN and Mahaweli Authority of Sri Lanka (MASL) organized a half-day Workshop on EFs with the intention of introducing the concept to officials involved in river basin management. The Workshop also intended to initiate a process of institutionalizing EFs in Sri Lanka. Speakers at the workshop were Mr Chaminda Rajapakse (IUCN-SEA), Dr John Scanlon (IUCN, Bonn) and Dr Vladimir Smakhtin (IWMI –Colombo). Mahaweli Authority intends to implement EF concepts in a small river basin of Kala Oya in the north-west part of the country.

Sweden. In a joint effort between the Stockholm International Water Institute (SIWI), the International Water Management Institute (IWMI), the World Conservation Union (IUCN), and the Department of Water and Environmental Studies at Linköping University, the concept of environmental flows is being explored through a questionnaire study. This study attempts to provide an up-to-date picture of how well the environmental flows concept is known, how it is interpreted and the extent to which it is being applied in water resource planning and policy. At present the environmental flows concept is not universally recognized or applied around the world, but it is central to a growing field of research dedicated to finding a balance between the competing human needs for water (e.g. irrigation, industry, households, drinking water) and water required to sustain natural ecosystems. The main aims for this study on the environmental flows concept are i) to determine the extent to which the concept is currently being used in different parts of the world, ii) to determine in those areas that do not recognize the concept what the major difficulties or obstacles are for application; and iii) to identify to what extent other similar environmental considerations are otherwise taken into account in water management decisions. The questionnaire will continue to be circulated until July 2004. It can also be filled out online at: www.siwi.org/survey.asp. For more details contact Prof Jan Lundqvist: Jan.Lundqvist@stockholmvatten.se.

India. National Institute of Hydrology (NIH, Roorkey, India) has initiated a three-year project on the assessment of EF in the Brahmani and Baitarani Rivers in the eastern state of Orissa (*Figure*). The project is at the very beginning, but has a challenging objective of developing an appropriate methodology for EF assessment of Indian Rivers. For more details contact Dr Ramakar Jha of NIH: rjha_1965@yahoo.co.uk.



Acknowledgements

This letter is produced with the support of the GWP Advisory Center (AC) at IWMI, Colombo, Sri Lanka.

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