ENVIRONMENTAL FLOWS

Newsletter of the Global Environmental Flows' Network

Vol. 4 Issue 1 **March 2007**

10-TH INTERNATIONAL RIVERSYMPOSIUM AND ENVIRONMENTAL FLOWS CONFERENCE: A TIMELY EVENT IN THE RIGHT PLACE – THE WORLD'S DRIEST CONTINENT DURING SEVERE DROUGHT

The 10th International River*symposium* and Environmental Flows Conference (a partnership between River*symposium* and The Nature Conservancy) to be held in Brisbane, Queensland in September 2007 could not be held at a more important time or in a more fitting place.

Much of eastern Australia is in the grip of the worst drought in 100 years. Our citizens and governments face a water crisis that has brought critical water shortages to major cities, industry and agricultural systems. At the same time our northern rivers are in flood, causing havoc for tourists, farmers and urban populations. Australians are used to these dramatic natural events and have learned to cope with them. We also recognize that riverine and coastal biota and ecosystems have adapted to ebb and flow of river discharge and need occasional extreme flow events such as floods and dry periods interspersed with more benign but variable flow conditions. The importance of the "natural flow regime paradigm" is widely accepted and deeply engrained in Australian water legislation, policy and management practice. Australian river ecologists and water managers have engaged vigorously in the science and management of environmental flows. We have contributed to the global arsenal of hydrological methods and models, techniques for hydraulic analysis and modeling, "holistic" (ecosystem) environmental flow methods and frameworks, protocols for monitoring the benefits of environmental water provisions, economic assessments of those benefits, and the development of legislation, policies and practices to ensure aquatic biodiversity protection and sustainable river management. In response to national water policy, every State and Territory has reviewed the ecological condition of its river systems, identified the most stressed rivers, set limits to surface and ground water use and established river flow restoration projects. It is now common practice for scientific and community panels to engage in building conceptual models of the water requirements of rivers and wetlands based on best understanding of the ecological roles of natural flow variability – the magnitudes, temporal patterns, timing and frequency of events and overall predictability patterns of river flows. Yet despite enormous effort the challenge of providing environmental flow prescriptions for every individual river system, every estuary, remains. The scientific challenge is to be able to predict how a river system in all its complexity might respond over time to new water abstractions, or to the restoration of flow events and sequences that mimic aspects of the natural flow regime. These problems are universal and will become even more difficult as human demands for freshwater and pressures on water resources increase with population growth, climatic variability and climate change.

One approach to the first type of prediction problem (response to future flow regulation) has been to seek evidence of the ecological impacts of flow alteration in the many examples that surround us in regulated rivers. By benchmarking the ecological impacts of existing flow regulation along gradients of flow regime change, expert panels have developed a means of estimating the risk of future flow regulation in the same or similar rivers. The concept of "benchmarking" ecological responses along flow alteration gradients has recently been elaborated into an environmental flow methodology

likely to be called ELOHA – *Ecological Limits of Hydrological Alteration*. This new approach involves quantification of stress-response relationships and environmental flow guidelines for different classes of rivers with contrasting flow regime types (see Arthington, Bunn, Poff and Naiman, *Ecological Applications* 16 [4], 2006). A debate on the underlying concepts and feasibility of this approach is scheduled as part of the environmental flows conference.

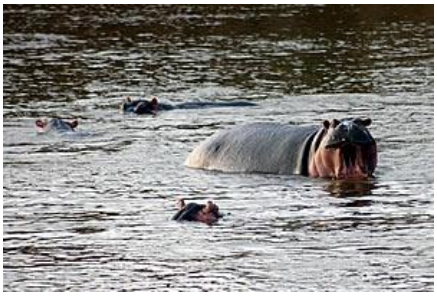
Contributions to the practice of e-flows will be supported by sharing our understanding of how river ecosystems work under the extremes of flow variability that characterize many of our rivers, ranging from the more predictable tropical systems of the Wet Tropics to the wildly variable arid-zone rivers of the dry interior, such as Cooper Creek in the Lake Eyre Basin. Research on these naturally "boom and bust" floodplain rivers has shed light on the importance of extreme hydrological variability for maintenance of biological assemblages, recruitment processes and aquatic biodiversity in one of the harshest and least predictable flow environments on earth. Similar multi-disciplinary research is getting underway in Australia's northern rivers where there is still a marvelous opportunity to understand the drivers of biodiversity and ecosystem processes in large free-flowing rivers. The importance of groundwater processes and environmental flows to estuaries and coastal systems are also major themes to be explored at the conference.

Australians have much to learn from the community of scholars and managers who will converge on Brisbane in September 2007 to discuss these wide-ranging themes and celebrate the success of environmental flow studies and river management projects around the world. Our hopes and prayers for rain will be on hold during the conference and social events focused along the city reaches of the Brisbane River. After this timely conference we should all return to our normal lives invigorated, better informed and ready to apply our shared insights and knowledge to the cause of protecting the world's rivers.

Angela H. Arthington, Australian Rivers Institute and eWater Co-operative Research Centre, Griffith University,
a.arthington@griffith.edu.au

DETERMINING AND PROTECTING ENVIRONMENTAL FLOWS FOR THE MARA-SERENGETI ECOREGION OF KENYA AND TANZANIA

The Mara-Serengeti Ecoregion is home to two of the most renowned wildlife conservation areas in Africa - Masai-Mara National Reserve of Kenya and Serengeti National Park of Tanzania. These protected areas were established to conserve the annual migration route of more than 2 million ungulates, including wildebeest, zebra, gazelle, and many other species. Animals spend the rainy season (Dec-May) on the verdant Serengeti plains of Tanzania, but when the rains end, a lack of water drives animals 100-200 km northward to Kenya along the Mara River.



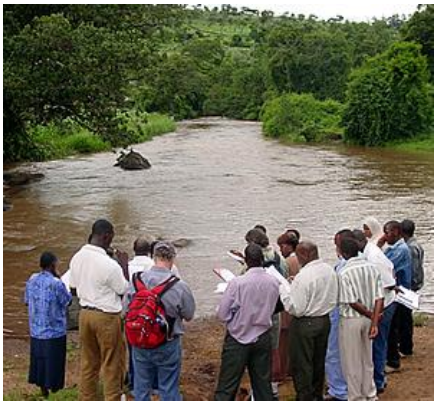
Hippos in the middle section of the Mara River in Serengeti National Park, Tanzania. [photo: Christina Hoffman]

The Mara is the only perennial source of surface water in the ecoregion, but its flows are increasingly threatened by water withdrawals to support a growing population of 500,000+ people living upstream of the reserves in Kenya and recent forest excisions in the headwaters region. Irrigated agriculture for foreign export is also expanding. If unchecked, these increasing abstractions could tap 100% of dry season flows in the coming years, causing an ecological and economic disaster of unprecedented proportions in both countries.

The situation is made more fragile by the fact that the Mara is a modest-sized river, draining a catchment of 13,600 km^2 and sustaining a mean annual flow near 30 m^3s^{-1}. Seasonal flows in the river are highly variable; major floods can approach 1000 m^3s^{-1} and severe drought flows can drop to 1 m^3s^{-1}, but in the last 50 years during which gauging data exist the river has never run dry.

Government authorities in Kenya and Tanzania are now pursuing a coordinated effort to protect the flow regime necessary to meet the ecological needs of animals in

Masai-Mara National Reserve and Serengeti National Park. Recent reforms to the national water policies of Kenya and Tanzania provide legal legitimacy to the effort, and the new national water rules in Kenya define a clear mechanism for determining and enforcing reserve flows for the environment in the context of larger integrated water resource management (IWRM) programs.



Mara EFA workshop participants examining a potential EFA field site on the Amala River near the headwaters of the Mara River System. [photo: Michael McClain]

Today, with financial support from USAID and technical support from a team of local and international specialists, authorities in Kenya and Tanzania are conducting an assessment of the environmental flow requirements of the reserves. This effort in the Mara River Basin is the first attempt to apply a holistic methodology to determine the environmental flow requirements of a river in Kenya and only the second such effort in Tanzania.

The Building Block Methodology was selected, and the assessment is currently in the midst of an 8-month field study focused on three ecologically sensitive sites, each selected from a different geomorphological macro-reach of the river. Results of this assessment will also feed into a number of parallel and complimentary activities within the larger Mara River Basin Initiative directed at securing a sustainable water future for people and wildlife in the ecoregion. The results will also aid in establishing a trans-boundary framework for coordinated water resource management between Kenya and Tanzania under the auspices of the East African Community. For more information visit http://www.globalwaters.net.

WWF-EARPO Mara Project Executant, Doris Ombara leading a discussion during the Mara EFAA training workshop. [photo: Michael McClain]

Joseph M. Muthike, Centre for Tropical Conservation and Research, Nairobi – Kenya jmuthike@yahoo.com
Emmanuel J. Gereta, Tanzania National Parks, Arusha, Tanzania emmanuel_gereta@hotmail.com and
Michael E. McClain, Florida International University, Miami – USA michael.mcclain@fiu.edu

ANNOUNCEMENTS

International Conference on Environmental Flows 2008 in South Africa

The Water Research Commission and the Department of Water Affairs and Forestry in South Africa, together with other stakeholders, are planning to hold an international conference on environmental flows in South Africa during August 2008.

Environmental flows are important in South Africa because much of the country is dry and the rainfall is highly variable, but it is necessary to provide water security for socio-economic stability. In addition, national policy requires that environmental water requirement, termed 'The Ecological Reserve' in South Africa, be determined before licenses may be issued for any water use.

For more information please contact: Stanley Liphadzi at stanleyl@wrc.org.za

Cluster Group on Environmental Flows Launched

In February, the Swedish Water House initiated a cluster group on Environmental Flows. Specific objectives of this group are to:

- Identify and bring together Swedish experts and competence in relation to environmental flows
- Increase and facilitate Swedish engagement in international processes, initiatives and programmes related to environmental flows

- Strengthen the link between research and development and policy processes on environmental flows

If you are interested in interaction with this group, please contact:
Anna.forslund@wwf.se
Birgitta.renofalt@emg.umu.se

CMOS-CGU-AMS Congress

2007, St. John's, Newfoundland, Canada

May 28 – June 1 2007

The scientific program of the Canadian Meteorological and Oceanographical Society, the Canadian Geophysical Union and the American Meteorological Society (CMOS-CGU-AMS) features the following hydrology session (H05):

Ecological Flow Needs: Understanding Stream Processes and the Effects of Altered Flow Regimes on Aquatic Ecosystems

Conveners:
Daniel Peters, Environment Canada Daniel.Peters@ec.g.ca
Robert Metcalfe, Ontario Ministry of Natural Resources
robert.metcalfe@mnr.gov.on.ca

The hydrological regime of many streams in North America has been altered with dams, diversions, and water withdrawals (e.g., irrigation, hydroelectric power production, and municipal/industrial uses), as well as via landscape alterations (e.g., agriculture and urbanization). Modifications to the magnitude, timing, frequency, duration, and rate-of-change of flow can adversely affect associated sediment, biogeochemical and thermal regimes to the detriment of a stream's ecology. Despite a large scientific effort in the last three decades to improve our understanding of the relationship between streamflow and the ecological integrity and function of riverine ecosystems, more research is needed to advance and validate scientifically-based holistic ecological flow methods. Also, development of ecological flow standards are required that would be applicable to the wide-ranging eco-hydrological regions of Canada. This session invites papers that advance our understanding of stream processes and the effects of altered flow regimes on aquatic ecosystems.

The deadline for submission of abstracts was February 28, 2007.

For enquiries on scientific programs, please contact the co-chairs of the Scientific Program Committee Guoqi Han (CMOS) at HanG@dfo-mpo.gc.ca, Rod Blais (CGU) at blais@ucalgary.ca, or Taneil Uttal (AMS) at Taneil.Uttal@noaa.gov. For other enquiries on the Congress, please contact Local Arrangement Committee chair Fraser Davidson at DavidsonF@dfo-mpo.gc.ca.

Mini-symposium Environmental Flows & Human Well-Being

April 12 2007 – Delft

How to quantify the importance of wetlands and river ecosystems for people to include this in the balancing of interests in Integrated Water Resources Management, is the question that will be central in this symposium. Presenters from various disciplines and countries will give their view on this urgent issue. The program for the symposium is now available at: http://www.wldelft.nl/other/enflows.pdf .

For more information please contact:
karen.meijer@wldelft.nl

CONTACT US

If you wish to join the EF network or have any general comments and suggestions, please contact
Katharine Cross (IUCN, Switzerland)
katharine.cross@iucn.org,

Comments and suggestions to this Newsletter, as well as essays for publication in the future issues of EF may be directed to
Karen Meijer (Delft Hydraulics, The Netherlands)
karen.meijer@wldelft.nl

Previous issues of this Newsletter are available on
http://www.iwmi.cgiar.org/health/ef_news/index.htm