



'Environmental Flows – The Essentials'

'Making environmental flows part of the mainstream'

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River and groundwater systems need water to maintain themselves and their functions, uses and benefits. The consequences of neglecting this need are increasingly evident and the costs of restoring environmental flows are exceeded only by the costs of delaying the restoration of flow.

'*Environmental flows – The Essentials*' has been written for the wide range of people who will need to form a coalition for action to provide environmental flows. These people are the politicians and policy makers, the environmental and consumptive water use lobby groups and other non-government organisations, the river communities and individual naturalists, and the engineers, hydrologists, planners, economists and lawyers.

The guide sets out in accessible language and format what must be done to restore environmental flows to a river or groundwater system. A 'hands on' approach is taken to explaining the what, when, where and how of environmental flows.

What is an environmental flow?

There is no universally agreed definition of environmental flows. The following definition has been adopted in '*Environmental Flows – The Essentials*':

"An 'environmental flow' is the provision of water within rivers and groundwater systems to maintain downstream ecosystems and their benefits, where the river or groundwater system is subject to competing water uses and flow regulation. Since regulation of flow can occur through direct infrastructure (like on-stream dams) as well as through diversions of water from the system (for example by pumping water away), there are different ways in which environmental flows can be provided."

Why provide environmental flows?

The articulation of why we need environmental flows is critical. '*Environmental Flows – The Essentials*' puts it this way: "Environmental flows are vital for healthy functioning river systems, which in turn are critical for attracting investment, achieving long term economic prosperity and the conservation of biodiversity. Environmental flows work for people as much as for plants and animals."

Water resource managers are coming to terms with the need to look after aquatic systems and the resources they provide in order to ensure long-term economic viability. Environmental flows need to operate within an integrated catchment management system: just providing the flow will not ensure a healthy river if other aspects such as water quality are not also taken care of. Environmental flows need to be provided in the context of a broader package of measures, such as managing salinity and other pollutants, and protecting and restoring habitat.

When environmental flows should be considered

Different challenges will arise at the various stages at which providing environmental flows might be tackled. Creating political impetus and availability of relevant scientific information will present particular difficulties when environmental flows are addressed early. But if environmental flows are left until later, when problems in the condition of the system have become apparent, solutions (for example, physical modifications to major storages, or compensation for loss of access rights where an individual property rights system has evolved) become more expensive, and the economic and social costs of wresting entitlements from existing users are potentially very high.

A variety of environmental flow assessment methods, financing opportunities, and methods for raising and maintaining political and social impetus, suitable for use at different stages of developing an environmental flows program, are all discussed in '*Environmental Flows – The Essentials*'.



What environmental flows might look like

Environmental flows are flows of a particular quantity, quality and timing necessary to ensure a healthy river system, from environmental, economic and social (including cultural) perspectives. Although the goal for environmental flows is to provide flows sufficient to sustain the river in the long term, the degree of 'good health' at which the river will be sustained is a judgement that will vary according to the environmental, social, economic and political imperatives of each country or region. What is an appropriate environmental flow for a particular river will depend on the values for which the river system is to be managed.

Some examples from *'Environmental Flows – The Essentials'* are:

- q In the Murray-Darling Basin in Australia, a 1-in-5 year flood event in the Barmah-Millewa Forest is enhanced through releases made from a major storage in the Basin. Following the enhanced releases the great egret bred for the first time since 1979, nine species of frog bred, as did native fish.
- q The Mowamba Aqueduct in the massive Snowy Mountains Hydro-Electric Scheme in Australia has been closed after a hundred years, doubling flows in the river from 3% of natural flows to 6%, and marking the beginning of a long commitment to raise flows in the Snowy River to 28% of natural flows.
- q In South Africa, irrigator entitlements may be reduced to provide water to the 'Reserve', which is held and managed on behalf of the public to sustain basic human and ecological requirements.
- q In the mountains of Lesotho, the Mole Dam is designed to release flows of variable quantity and quality, to provide, amongst other things, occasional flooding downstream.

How might environmental flows be provided for

'Environmental Flows – The Essentials' describes different ways in which natural flows can be regulated, and this is reflected in the different methods for providing environmental flows. The flow of water may be regulated through on-stream storages (dams) or other regulating structures (for example locks and weirs) including diversion infrastructure such as channels and viaducts. Flows may also be regulated through individual abstractions by users pumping, flooding or channelling water from the system direct to crops or to off-stream storages.

In many cases, environmental flows may be provided by manipulating infrastructure or changing management practices to make better use of available water for river health. *'Environmental Flows – The Essentials'* explores the options for environmental releases from dams, which 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. Providing flows through manipulating structures may be termed 'active' flow management, and is relevant both in assessing environmental flow requirements and implementing them.

Environmental flows can also be achieved through specific allocation policies for consumptive use which regulate the times and quantities of water that may be taken, or through regulating instream use in a manner compatible with flow requirements. Providing flows in this way may be termed 'restrictive' flow management.

How environmental flows might be paid for

The role played by economic instruments and policy devices in providing environmental flows by regulating the use of water is addressed directly in *'Environmental Flows – The Essentials'*. Policy mechanisms may include 'capping' the total quantity that may be taken from a river system, and including provisions for 'clawing back' entitlements from existing users, whether through market mechanisms such as trade, or compulsory mechanisms with or without some form of compensation. Other approaches include requiring licences to be held for 'instream' water uses (for example, allocations of flow for hydroelectric purposes) and providing a formal licence entitlement to be held by nominated bodies and managed on behalf of 'the environment'.

Gaining the political momentum

Developing a regime of environmental flows will evolve in a different way in each country. *'Environmental Flows – The Essentials'* makes it clear that there is no 'formula' for getting environmental flows on the agenda, just as there is no model legislation for establishing environmental flows.

What is universal is that developing such a regime is never going to be easy! It is however absolutely necessary to maintaining healthy river systems. Those who are committed to achieving environmental flows must be prepared for a long and sustained effort.

Gaining the necessary momentum for establishing a regime for environmental flows will involve many different actors, from the highest levels of government right through to local communities. Pressure for change and the ultimate catalyst for change can take many different forms and these are all explored in *'Environmental Flows – The Essentials'*.

Global conventions on environmental flows

There is no global convention or soft law instrument that deals specifically with environmental flows. There are however many examples of where environmental flows are addressed in international instruments dealing with other issues. *'Environmental Flows – The Essentials'* explores the concept of environmental flows as part of the broader concept of taking an ecosystem approach to water resources management. As such, the relevant international instruments are not only those directly dealing with water resources, but also those that have a primary focus on the protection of nature and ecosystems (ie the Ramsar and Biodiversity Conventions). So called 'soft law' agreements like Agenda 21 and the WSSD Plan of Implementation also address environmental flows as did the World Commission on Dams Report: Dams and Development each of which are addressed in *'Environmental Flows – The Essentials'*.

Regional conventions on environmental flows

There is no regional convention that deals specifically with environmental flows. However there are treaties that are explored in *'Environmental Flows – The Essentials'*, such as the Mekong River Agreement, that specifically requires minimum stream flows for the protection of ecosystems. Sub national agreements, such as the Murray Darling Basin Initiative in Australia, have made provision for environmental flows within the framework of the Agreement that created the Initiative.

National legislation for environmental flows

There are a number of examples of national and sub national legislation. Some deal with the issue directly and others more indirectly. *'Environmental Flows – The Essentials'* provides examples of legislation that requires minimum flow requirements, declares wild and scenic rivers, requires statutory management plans setting aside environmental flow requirements, or requires the creation of a 'reserve'. The best recent examples of good legislation from Australia and South Africa are specifically highlighted in *'Environmental Flows – The Essentials'*.

A question of values

'Environmental Flows – The Essentials' does not see the provision of environmental flows as primarily being a scientific question. The science is readily available, and our knowledge and understanding of what systems require to function, and ways in which those requirements can be provided in what is essentially a compromise, grows steadily.

The provision of environmental flows is a social issue. It is essentially about changing our thinking about the way water is used and managed, and shifting rights away from existing users back to the community, to be held in trust for the environment.

It is for this reason that the question of values is fundamental to identifying environmental flow requirements, and quantifying and providing for the costs of providing such flows. A large part of *'Environmental Flows – The Essentials'* has focused on methods for articulating those values and thus determining the environmental flow program.

How to get started

You can start by sending your order for the book to IUCN so you are provided with your own copy of *'Environmental Flows – The Essentials'*. This will guide you, step by step, through the process of developing and implementing a successful program for environmental flows. Achieving this will however be dependant on commitment and action from many different sectors of the community – governments, user groups, non-government groups including both representatives of river users and environmental interest groups.

'Environmental Flows – The Essentials' highlights the importance of raising understanding of and commitment to environmental flows, by negotiating through existing government structures, and developing appropriate rules, laws, policies and potentially new government and inter-government structures are essential elements of the process. A certain amount of 'critical mass' in terms of people, commitment, knowledge and influence, is required before concrete processes can be put into place, and a clear future mapped out. *'Environmental Flows – The Essentials'* shows how to get started in forming networks of useful players who will contribute to that critical mass.

This is the world's first guide on environmental flows and it has been prepared by acknowledged experts in the field. A guide alone will however never be enough and IUCN can assist in co-ordinating the necessary technical assistance that might be required in all areas to help apply these principles 'on the ground' in a given situation.

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‘Environmental Flows – The Essentials’

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Chapter 1. *What Is An Environmental Flow, And When And Why Are Environmental Flows Important?* - Lead author: Megan Dyson, *Environmental Law and Policy Consultant, Australia*

Chapter 2. *How To Establish Environmental Flow Requirements.* - Lead author: Dr Mike Acreman, *Head of Hydro-ecology and Wetlands Centre for Ecology and Hydrology Crowmarsh Gifford, UK* and Dr Jackie King

Chapter 3. *How Can New And Existing Water Resources Infrastructure Be Modified To Improve Environmental Flows?* - Lead author: Larry Haas, *Canada*

Chapter 4. *Financing Environmental Flows.* - Lead author: Dr Bruce Aylward, *Manager, Deschutes Water Exchange Deschutes Resources Conservancy, USA* and Lucy Emerton IUCN

Chapter 5. *The Policy, Institutional And Regulatory Context For Establishing Environmental Flows:* - Lead author: Dr Alejandro Iza, *IUCN* and John Scanlon

Chapter 6. *Generating The Political Momentum.* - Lead author: John Scanlon, *IUCN*

Chapter 7. *Capacity Building For Designing And Implementing Environmental Flows.* - Lead author: Dr Jackie King *Southern Waters Ecological Research and Consulting, University of Cape Town, South Africa* and Dr Mike Acreman

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