



Environmental Flows: Harmony between Humans and Nature

Vossevangen, Norway © Freepik

KEY POLICY MESSAGES

- Water management and economic development plans should fully consider environmental flows.
- Policy-makers should explicitly consider trade-offs in costs and benefits of environmental flow regimes for different groups of people.
- Developing environmental flows requires consideration of the local socio-cultural environment and existing rules and regulations.
- Environmental flow recommendations should include specific criteria linked to ecological functions and processes.

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Rivers are one of the most disturbed ecosystems in the world due to dam construction, water diversions, and other flow alterations. This disruption of the fundamental processes and functions of healthy rivers has led to the rapid decline of biodiversity and essential ecosystem services.

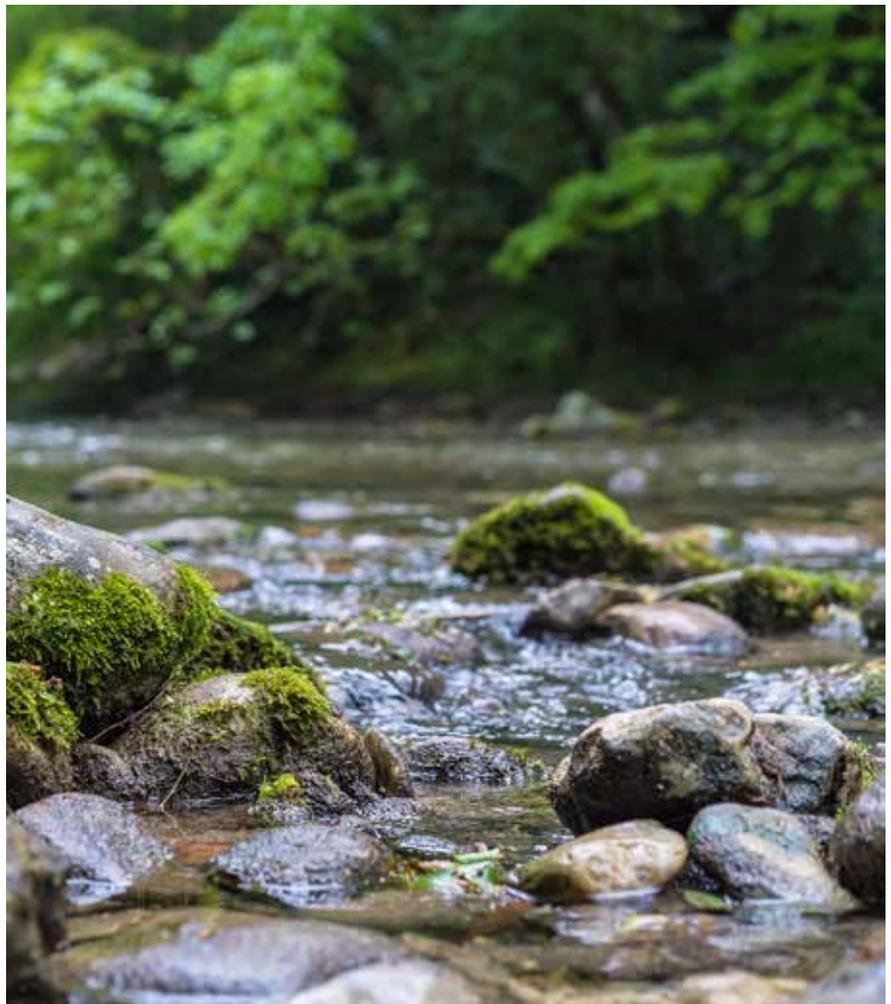
INTEGRATE ENVIRONMENTAL FLOWS INTO INTEGRATED MANAGEMENT

Since 1970, the abundance of freshwater species across the globe has declined by 84% (WWF, 2020). Sustaining environmental flows (e-flows) – the quantity, timing, and quality of freshwater flows necessary to sustain aquatic ecosystems – is the only way to effectively ease the ecological stress resulting from flow alteration. However, e-flows are only one of many tools needed to address the freshwater crisis, which lies within the interconnected challenges related to economic development, social justice, environmental sustainability, and climate change. Too often environmental flows have not been properly considered in IWRM plans, resulting in programs falling short of their goals (McClain).

LISTEN TO THE RIVER; USE APPROPRIATE METHODOLOGIES

A growing body of research has focused on developing environmental flow assessment methodologies. These range from complex modeling efforts with high data requirements to more organic assessments using local knowledge gathered through informal surveys. It is most important that the chosen methodology is appropriate for the given context.

Environmental flow assessment should be as simple as possible to meet a basin's needs. For example, in the Maasai Mara Serengeti (Kenya), the key challenge from



Mountain river © Garry Killian

an ecosystem perspective is ensuring rivers remain flowing through the dry season. The exact flow rate does not matter—what matters is that water flows (Tickner).

On the other hand, some systems require more complex analysis to evaluate hydrologic alteration and design an e-flow regime that balances human and ecosystem needs. For example, to understand how flow alteration affects the health of the Huai River (China), researchers assessed the sensitivity of macroinvertebrate species richness, diversity, and composition to indicators of hydrologic alteration (Qu). The researchers are now using this data along with information regarding social values to develop e-flow recommendations.

No matter the assessment methodology, e-flow recommendations should be spatially and temporally specific, with each component having a specific ecological objective. Some environmental flow requirements also allow for adaptively managing the system for variable conditions based on the type of water year (i.e., dry, normal, wet).

Sustaining environmental flows is the only way to effectively ease the ecological stress resulting from flow alteration.

Environmental flow assessment should be:

- Appropriate for the context
- As simple as possible

Environmental flow regimes should be:

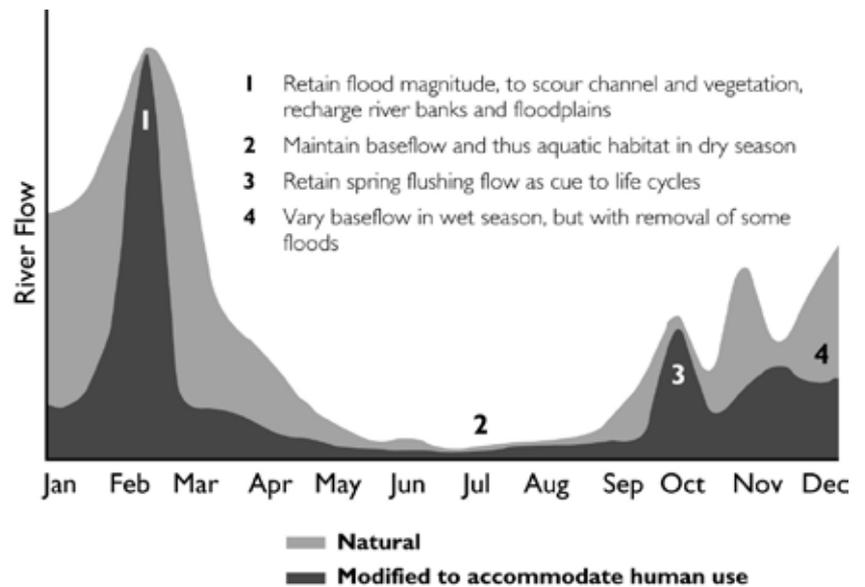
- Spatially and temporally specific
- Connected to ecological processes/functions
- Adaptive to changing conditions

ENSURE RIVERS PROVIDE FOR ALL

In addition to eco-hydrological assessments, e- flows should include a social assessment informed by the policy context, stakeholder interests, and management practices (Tharme). Rivers supply water for household and industrial consumption, food supply, power production, and spiritual ceremonies. Hence allocating flows to the environment is a value-based decision that entails tradeoffs in costs and benefits to different users.

By accounting for trade-offs and placing environmental flows within the context of social and economic priorities we can minimize costs and ensure that rivers support sustainable livelihoods, the economy, cultures, and human well-being. For example, the e- flow assessment for the Rufiji River (Tanzania) paid particular attention to protecting the ecological functions that support subsistence livelihoods and local economic activities that depend on a functionally intact flow regime, such as flood recession agriculture, fishing, and livestock keeping (Tharme).

Models and tools can assist in analyzing trade-offs and implications, designing environmental flow regimes, and exploring scenarios. Ultimately these can help to optimize, monitor, and adaptively manage environmental flows. In the Rufiji, analysis of the trade-offs in jointly meeting the needs of the environmental flow requirement and a future irrigation scenario led to a more efficient redesign of the irrigation scheme. Further, water allocation models allow for the assessment of how future changes in different users' water demands may affect environmental flows.



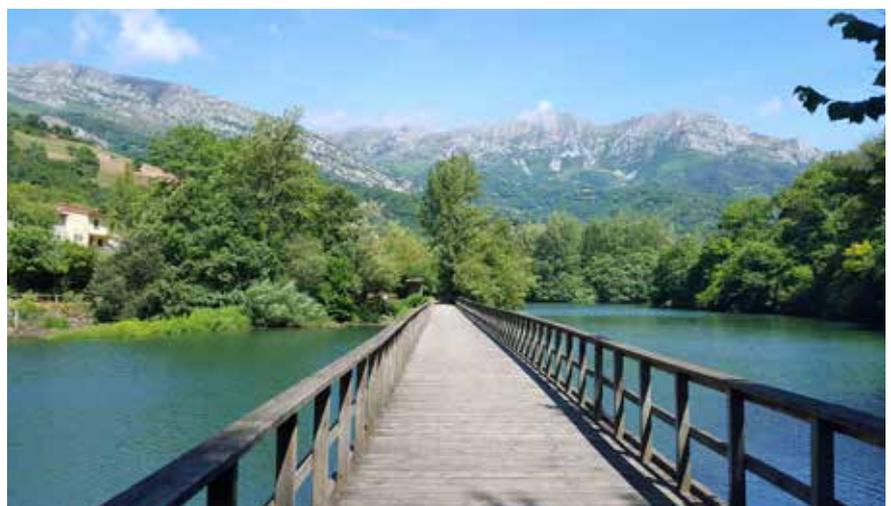
Example environmental flow regime (dark) that maintains components of the natural flow regime (light) to meet specific ecological objectives (Postel & Richter, 2012). Printed with permission of the authors.

SEIZE THE OPPORTUNITY OF CRISES

The interconnected crises facing freshwater ecosystems offer an opportunity to rethink the way we approach development challenges. All too often humans have equated development with their ability to conquer and control nature, including rivers. While building dams, rerouting streams, and diverting water from distant watersheds has made a significant contribution to human development, it has come at great costs (World Commission on Dams, 2000). Environmental flows offer an opportunity to work with, rather than against nature, to sustainably manage resources while overcoming development challenges.

Environmental flow assessment should be as simple as possible to meet a basin's needs.

Asturias, Spain © freepik





Orkhon river in Mongolia © freepik

Practitioners should consider making the case for the environment as a supporting mechanism for social and economic development. “Hot moments” – droughts, water supply shortages, environmental crises, human health scares, political or institutional changes, significant cultural or social events, and climate change – all offer opportunities to introduce environmental flows into the water management and development planning processes. “Hot People” – community leaders, policy entrepreneurs, uniting figures – can help garner the support needed to advance and mainstream environmental flow efforts (Tickner).

MAKE RIVERS FLOW LIKE RIVERS AGAIN

A variety of measures and instruments exist for operationalizing e-flows and decisions regarding which measures to use depend on the source and extent of hydrologic alteration, along with the political setting. When the alteration stems from dams, these structures can be re-operated to release e-flows at specific times of year and at specific points in the river. In basins with large consumptive use, regulators can set a cap on total water diversions to help ensure enough water remains instream for the environment. One method to strengthen

instream flow requirements is to legally allocate water rights to the environment, giving the environment the same legal rights as other water rights holders. Relatedly, southern and eastern Africa use an environmental reserve system that sets aside the amount of water needed for the aquatic ecosystem and basic human needs in a reserve before allocating water to other users. These represent just a few of the tried and proven water allocation mechanisms used to get environmental flows into rivers.

Case studies from throughout the world provide lessons for moving beyond research to implementing environmental flows and getting water in rivers when the ecosystem needs it, but mainstreaming e-flows on the global level requires political will and “hot people” to take advantage of “hot moments”.

FOR FURTHER INFORMATION

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WATCH THE WEBINAR

- The IWRA Environmental Flows webinar, held 22 July 2020, can be viewed online here: www.iwra.org/environmentalflores-webinar

IWRA would like to thank the following:

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ACKNOWLEDGEMENTS

Editor: **Kara DiFrancesco**
 Policy Briefs Coordinator: **James E. Nickum**
 Layout: **Nathalie Lyon-Caen**