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Strategies to manage stream flow to benefit people and nature: a non-government conservation organisation's perspective.

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Abstract

More than for any other biome, freshwater biodiversity is increasingly imperiled, particularly due to poor stream flow management and increasing demand for water diversions. The adoption by the world's governments of targets to extend water services to the poor and at the same time to conserve biodiversity increase the need to better direct investments in freshwater management. In this paper WWF draws on examples from its work to identify areas where investment can be focused to assure efficient water use and improve stream flow management, namely:

- Prioritize and target those river basins and sub-catchments that are most critical for conservation of freshwater biodiversity to maintain stream flows;
- Link strategic field, policy and market interventions at different scales in river basins to maximize the impact of interventions;
- Implement the World Commission on Dams guidelines to minimize investment in large scale and costly infrastructure projects;
- Apply market mechanisms and incentives for more sustainable production of the world's most water consuming crops.
- Enhance statutory river basin management organizations to draw on their regulatory and financial powers;
- Implement international agreements, such as the Convention on Wetlands;
- Integrate environment and development policies.

Key words

Agriculture, biodiversity, conservation, convention, dams, Ramsar, river, stream flow, sustainable, trade

Introduction

Globally the diversion of water for human consumption is growing at a rapid rate (Fig. 1) such that a growing number of the world's rivers no longer regularly reach the sea. It has been estimated that 54% of accessible runoff is now appropriated by humans (WWAP 2003:10). In response to the 1.1 billion people who cannot reach or afford safe drinking water, and 2.4 billion people who lack access to basic sanitation (WWAP 2003:10), the 2002 World Summit for Sustainable Development adopted targets to halve the number of people without access to these water services by 2015, to be operationalized through the development of integrated water resource management and water efficiency plans by 2005 (UN 2002:20-21 (clauses 25 & 26)). Even then it has been estimated that by 2050

at least one in four people are likely to be living in countries affected by chronic or recurring shortages of water (WWAP 2003:10).

The changes to stream flow and diversion of water is disastrous for biological diversity. WWF's Living Planet Index indicates that freshwater biodiversity has declined at a much greater rate than in either the forest or marine biomes, declining by 50% from 1970-2000 (Fig. 2). This is also a catastrophe for people as millions of the world's rural poor depend on the fisheries and other natural resources that have declined or are at risk of decline with changes in stream flow (Anon. 2003).

Figure 1: (From Loh 2002:16)

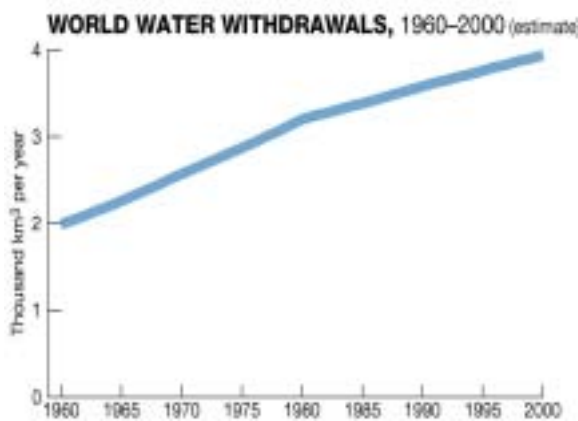
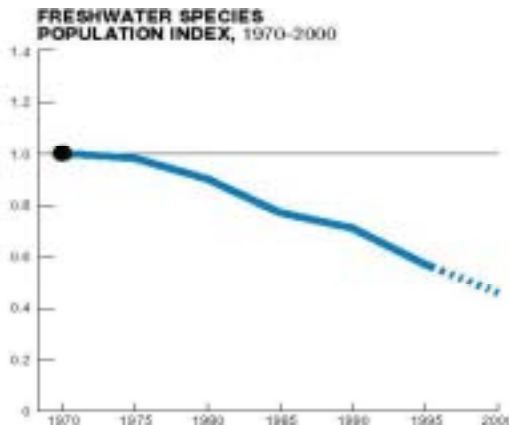


Figure 2: (From Loh 2002:3)



The February 2002 2nd International Symposium on the Management of Large Rivers for Fisheries (part sponsored by WWF) discussed data from 96 rivers in 61 river basins globally and noted (Anon. 2003) dramatic declines in many of the world's inland fisheries due to “a general decline in the physical, chemical and ecological quality of rivers from source to mouth”, and “altering the timing and magnitude of flow regimes” in particular. It concluded in part that “Inland fisheries are generally undervalued in terms of their contribution to food security, income generation and ecosystem functioning.”

Many international agreements, like the Ramsar Convention on Wetlands and the European Union's Water Framework Directive (WFD), promote wise use of freshwater resources, however others do not. Water has become an issue in trade agreements, such as the debate over expanding the application of the General Agreement on Trade in Services ('GATS') under the World Trade Organisation (WTO), to water services. While the consequences of the GATS for the 'privatization' of water services is being debated, far less attention has been paid to the potential for GATS to stifle reforms to domestic water laws for sustainable water management (Tuerk in prep.).

The 2002 World Summit also adopted a target to achieve by 2010 “a significant reduction in the current rate of loss of biological diversity” (UN 2002:33 (clause 44)). How then can the world implement these conflicting Millenium Development Goals (UNGA 2000, WWAP 2003:9) and World Summit targets (UN 2002) to supply more water services to people while maintaining freshwater biodiversity world wide?

Methods

This paper outlines the stream flow management work of WWF, the global conservation organization, to promote investments in environmental health of rivers as the source of water for people and nature. The paper draws conclusions as to where investments can be directed to maximize benefits for conservation and sustainable development.

WWF's mission (Davis 2001:1) is "*to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature*". WWF has selected six thematic global priorities for its work one of which is conservation of freshwater ecosystems (Davis 2001). It has also identified 238 of the most valuable and vulnerable ecoregions world wide that represent the breadth of biodiversity and ecological process in which to focus its work, of which more than 53 are substantially freshwater ecoregions (Davis 2001, Abell *et al.* 2002). WWF works in over 96 countries and invests around CHF40 million per year in freshwater conservation works. The freshwater work involves:

1. Assessing the state of freshwater biodiversity through its Living Planet Index (Loh 2002);
2. Prioritizing the freshwater ecoregions and within them the sub-catchments most important for conservation of the world's freshwater biodiversity using the "freshwater ecoregion approach" (Abell *et al.* 2002, Thieme *et al.* 2003);
3. Interventions with our community, government and business partners in 34 major river basins globally at different scales to demonstrate how investing in stream flow health can benefit both people and nature, namely:
 - Immediate site or species based work;
 - Strategic, large scale field work at the sub-catchment or landscape scale aimed at maintaining or restoring ecological processes, especially stream flow;
 - Application of field solutions to the river basin as a whole through establishing or enhancing river basin management organizations and programmes (Anon. 2002), laws and markets that promote conservation of rivers and sustainable development.
4. Developing market based solutions to increase efficiency of water use and maintenance of stream flows by major businesses and irrigated agriculture;
5. Seeking reform of a range of financial and trade instruments that provide perverse incentives for sustainable water management;
6. Drawing lessons from this field work and promoting their application globally, for example, through the Ramsar Convention on Wetlands.

This work is summarized as: promoting designation and management of freshwater protected areas; conserving river and lake basins; and promoting sustainable water use.

Results and discussion

Prioritizing the geographic units for intervention has proven essential for WWF to focus resources and establish partnerships necessary to establish long term mechanisms for conservation of freshwater ecosystems.

Focusing on particular species or wetland sites can be important to demonstrate opportunities for progress and generate partnerships and resources. For example WWF worked with private land managers in the Gwydir River valley in New South Wales, Australia, to designate parts of their wetlands on the Register of Wetlands of International Importance under the Ramsar Convention on Wetlands, which increased the stature of these wetlands and resulted in greater environmental flows being allocated to these rivers through a multi-stakeholder dialogue process beginning in 1995. As a result livestock production partially recovered after declines on some farms of around 70% due to loss of beneficial flooding for irrigation diversions, and colonial water bird colonies returned to breed after an absence of two decades (Jones *et al.* in prep.).

Strategic, large scale field work at the sub-catchment scale to maintain or restore ecological processes is critical to demonstrating that investing in the health of rivers can contribute substantially to poverty reduction and sustainable development. For example, restoration of parts of Dongting Lake in the Yangtze River basin, China, has reduced flood risk, improved livelihoods of villagers (500% increase in income in three years in one village) and helped conserve threatened wildlife species. The Chinese Government is now considering a major new programme based on this model, which involves modifying or removing water infrastructure to improve stream flow (Jones *et al.* in prep.). Another example in Poland is WWF's application of the World Commission on Dams (WCD) "needs and options assessments" methodology. The Nieszawa Dam was proposed to solve the problems of ice rafting, blocked sediment transport and safety caused by the Wloclawek Dam on the Vistula River. Application of the WCD approach demonstrated that the cheapest solution is to remove the existing dam (WWF Poland 2001) and in December 2002 the Polish Parliament voted not to allocate funds to build the proposed dam.

Yet the world's extensive stream flow management problems will only be addressed if we can apply field solutions to whole river basins through river basin management organizations and programmes, laws and markets. For example, WWF worked for many years to restore small parts of the Danube River floodplain then achieved greater results by persuading the 2001 Danube Heads of State Summit to commit to restoration programme for a 900,000 ha Lower Danube Green Corridor in Eastern Europe (Jones *et al.* in prep.). Among the benefits from this corridor will be a reduction in flood risk, restoration of fisheries, and improved water quality.

Government sponsored river basin management organizations are critical to improving stream flow management due to their potential regulatory and financial powers. WWF's experience (Pittock in prep.) suggests that to be most effective these should have:

- A high level political body that can take major decisions and direct different government agencies to cooperate;
- A respected, independent chair who can mediate between competing governments and interests;
- Representatives from each basin government and their different conservation and resource use agencies;

- Representative stakeholder and also expert participatory mechanisms that enable these groups to assess and advise on politically contentious issues;
- A river basin organization secretariat independent of any member government;
- Power to raise income and help distribute benefits more equitably between downstream and upstream stakeholders;
- A common vision and programme that includes costed, annual output indicators for work required to meet programme targets.

In WWF's view sustainable stream flow management cannot be imposed by governments alone and will only be achieved when markets create incentives for landowners, major businesses and irrigated agricultural producers to use water more efficiently and improve water quality. For example, our work in Guatemala at Sierra de las Minas aims to show how developing countries can apply a payment for environmental water services scheme so that downstream water users compensate upstream landowners for measures to maintain water quality and quantity (Flores, C. 2003). WWF's assessment of the 70% of human water diverted to irrigated agriculture suggests that the greatest water consuming crops are rice, cotton, irrigated wheat, sugar cane and fodder for feedlot cattle production (de Nooy 2003). WWF has started work on the cotton and sugar sectors to see how a combination of best practices by investors, growers, processors, and consumer pressure, can favour the most environmentally efficient producers.

WWF campaigns for new standards of stream flow management emerging from field work by WWF and others to be mainstreamed through intergovernmental agreements and treaties. The Ramsar Convention on Wetlands is often ignored as a treaty that only considers wetland site conservation, when in fact its 137 contracting parties have also committed themselves to 'wise use' of all wetlands on their territory (including rivers) and to cooperate internationally to manage shared wetlands (Ramsar Convention 1971). As such the Convention on Wetlands is arguably the most global of all treaties that focus on freshwater management.

In 1999 the Convention adopted guidelines for integrating wetlands and river basin management (Ramsar Convention 1999). In 2002 Ramsar's focus on stream flow management was strengthened by the adoption of resolutions on "*guidelines for the allocation and management of water for maintaining the ecological function of wetlands*" (Ramsar Convention 2002a) and application of the report of the World Commission on Dams (Ramsar Convention 2002b). The Convention's Memorandum of Cooperation and 3rd Joint Work Plan with the Convention on Biological Diversity (CBD) (Ramsar 2002b) give Ramsar's decisions even greater stature, for example, in the revision of the CBD's inland waters workplan scheduled for discussion in February 2004.

Despite progress, such as the EU Water Framework Directive (WFD) championed by WWF (WWF 2003a), the failure of our governments to better manage shared water bodies remains an impediment to better freshwater management. The WFD sets new standards for water management across European Union (EU) members and adjacent countries. However other EU policies, such as on regional development, or agriculture

work against the WFD's objectives. The Spanish National Hydrological Plan provides such a test case where nearly 8 billion Euros of EU funds has been requested by the Spanish Government to part fund several hundred dams and diversions to take water from the north of Spain to the south (WWF 2003b). The plan contravenes EU laws, including the WFD, and yet is still being seriously considered for EU funding.

Further, the development of global trade instruments such as the GATS threaten to constrain the ability of regulators, local governments, or river basin organisations to implement new measures for integrated river basin management. Water policy makers rely on flexibility and adaptive management to meet changes in society's expectations, and environmental quality. GATS obligations however, aim to achieve market access, legal security and predictability for service providers by locking in domestic policies. Once a WTO Member has agreed to be bound by a certain commitment it is virtually impossible to reverse this. For example, a water allocation for stream flow may appear adequate at one point in time, but may require supplementation by reallocating water from commercial users if it later proves inadequate. Changing water property rights or licences for sustainable use under such circumstances may be unlawful or require significant compensation payments to service providers under the sorts of provisions being negotiated for inclusion in the GATS (Tuerk in prep.). Water and environmental policy makers need to become more involved in these types of trade to avoid being faced with trade law constraints to implementing sound stream flow management.

Conclusions

The adoption by the world governments of World Summit targets to extend water services to the poor and at the same time to conserve biodiversity increases the need to better target investments in freshwater management. Hence WWF recommends focusing investment in the following aspects of stream flow and other water management:

1. River basins and sub-catchments that are most critical for conservation of freshwater biodiversity need to be prioritized for work on maintaining their ecological processes, like stream flows, by the application of the 'ecoregion conservation' approach.
2. Field, policy and market interventions at different scales need to be strategic, linked, and draw strength from each other. Interventions at a site or species specific scale can be important to generate support and resources for larger scale work. Most field work should be targeted at the sub-catchment scale to demonstrate successful models for maintaining ecological processes like stream flows. The lessons from these projects must be leveraged in integrated river basin management programmes through broader application by river basin organizations, governments and markets. Government sponsored river basin management organizations are critical to improving stream flow management due to their potential regulatory and financial powers.
3. Investment in maintaining healthy stream flows can deliver many of the desired water supply, sanitation, flood management and biodiversity conservation benefits without recourse to large scale and costly infrastructure projects. Application of

- the World Commission on Dams guidelines can help governments reach better decisions on infrastructure investments (WWF 2003c).
4. In many rivers there will not be enough water left to sustain the environment and share between different users unless the 70% of water diverted for agricultural production world wide is much better managed. Progress can be made by application of market mechanisms, such as payment for water environmental service schemes, and through incentives for more sustainable production of the world most water consuming crops.
 5. Application of international agreements can improve water management. The Ramsar Convention on Wetlands has often been undervalued yet has wide, practical application to improving stream flow management, including for watercourses shared by more than one country.
 6. Finally we also see the need for more integration among environment and development policies, especially trade and financial instruments for agriculture, trade, and regional development.

With these reforms progress can be made to manage and sustain rivers over time to benefit both people and nature.

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