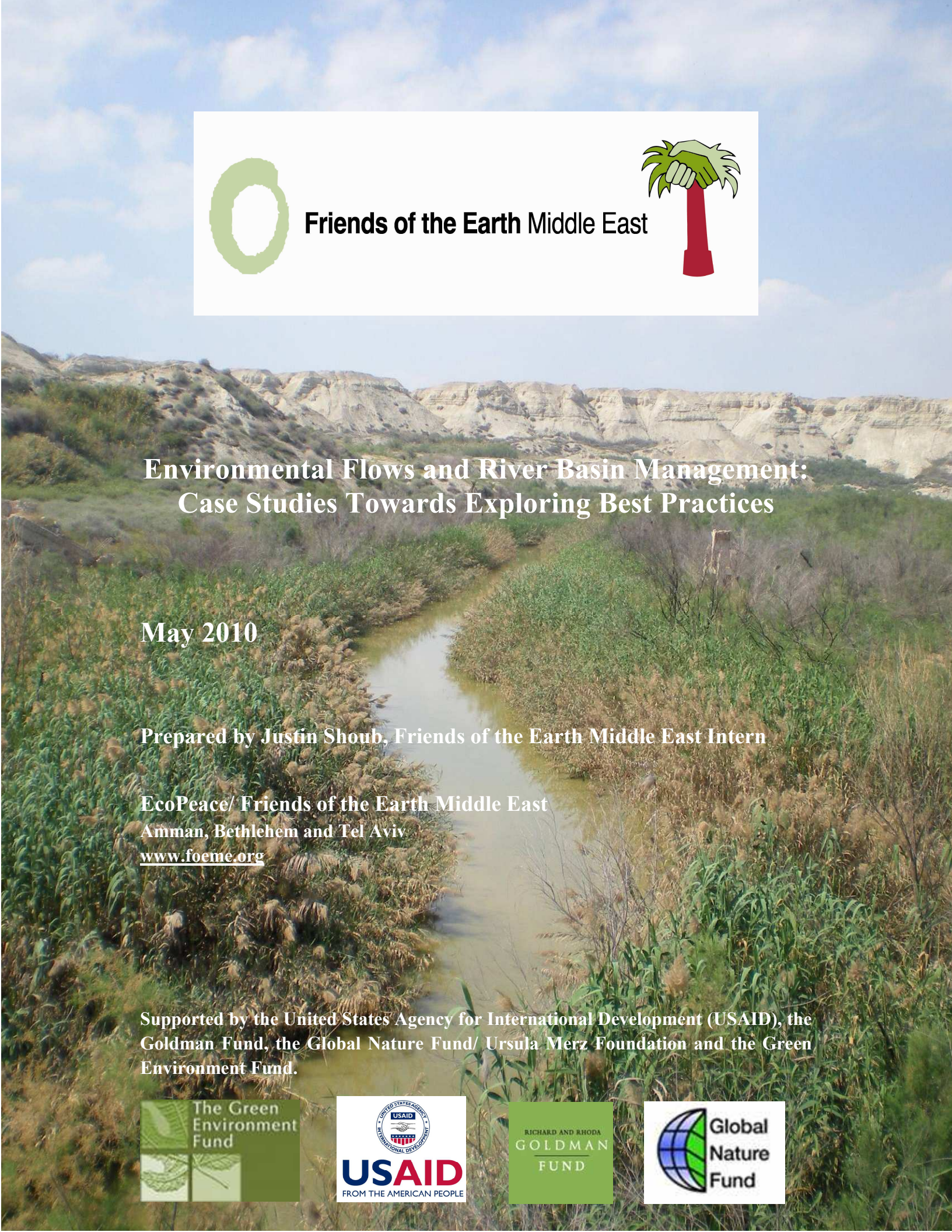

Friends of the Earth Middle East

Environmental Flows and River Basin Management: Case Studies Towards Exploring Best Practices

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EcoPeace/ Friends of the Earth Middle East (FoEME) is a unique organization at the forefront of the environmental peacemaking movement. As a tri-lateral organization that brings together Jordanian, Palestinian, and Israeli environmentalists, our primary objective is the promotion of cooperative efforts to protect our shared environmental heritage. In so doing, we seek to advance both sustainable regional development and the creation of necessary conditions for lasting peace in our region. FoEME has offices in Amman, Bethlehem, and Tel-Aviv. FoEME is a member of Friends of the Earth International, the largest grassroots environmental organization in the world.

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Introduction

An environmental flow is the water allocated to a given managed watercourse to maintain a healthy ecosystem when unsustainable usage of water resources has strained them beyond their capacity to function, or is projected to in the future. This paper will outline best practice approaches for providing environmental flows to regulated river water systems in order to maintain their ecological health. To accomplish this, several case studies will be examined that draw on different political contexts and institutional arrangements.

This is of particular relevance to Middle East policymakers in light of the urgent need for transboundary cooperation towards riverine ecological health in the region. This need is elucidated by the alarming findings of FoEME's recently published Environmental Flows Report on the Rehabilitation of the Lower Jordan River[1], which concluded (amongst other findings) that the Lower Jordan has been reduced to just 2% of its historic flows, lost over 50% of its biodiversity, and will likely run dry by the end of 2011 if action is not taken. In this context, it is of the utmost importance that we draw on examples of transboundary management arrangements that have faced similar challenges.

While environmental flows are sometimes described as the amount of water needed to maintain the 'natural flow' of a watercourse, this is misleading because it implies that the aim is to enforce a system that would revert the ecosystem to a pristine, untouched state. In actuality, environmental flows are the waters allocated to a river or groundwater source following an assessment process of economic, social, and environmental needs. The basic approach of environmental flow planning is that while ecosystems like rivers provide a massive benefit to humanity, we need to manage our resources and strike a sustainable balance between competing usages, or else we risk over-allocating our water resources and causing permanent damage to them.

In economic terms, river basins can be thought of as common-pool resources. A common-pool resource is defined as one for which it is costly or difficult to exclude potential users from reaping the benefits of use because of scale or complexity. As well, common-pool resources are said to be 'subtractable'; the resource is susceptible to overuse because each usage leaves less for the next consumer.[2] Without a cooperative approach to managing these types of resources, they are left with a 'tragedy of the commons'[3] in which a group of people seek to maximize their self-interest by exploiting a shared resource as much as possible without considering the destructive consequences over the long term for the whole.

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[1] Gafny, S., Talozi, S. & Al Shiekh, B. (2010) Towards a Living Jordan River: An Environmental Flows Report on the Rehabilitation of the Lower Jordan River. In Ya'ari, E (Ed.). Tel Aviv, Amman, Bethlehem, EcoPeace/FoEME. Retrieved at http://www.foeme.org/index_images/dinamicas/publications/publ117_1.pdf on May 31, 2010.

[2] Borgerhoff Mulder and Copolillo 2005, 130

[3] Hardin 1968

Ecosystems are very complex mechanisms, and a best-practice approach to sustaining ecosystems for our continued benefit needs to consider the relationships between all living and non-living resources within them, as opposed to considering one resource in isolation. The latter approach, which focuses only on the supply element of a resource, fails to take into account the interconnected nature of different ecosystem processes and their relationship to our usage. Therefore, in a best-practice scenario regarding environmental flows, the approach needs to be part of a broader management strategy at a scale that can also address pollution threats, soil protection, and habitat restoration. The release of environmental flows could even be harmful if done without attention to other elements of the water system in question.

In order to take into consideration the interdependent nature of different elements that effect finite water resources, ecologists have formulated the Integrated Water Resource Management (IWRM) approach. Israeli professor Eugene Levner outlined a useful definition of IWRM's objectives:[4]

- To balance competing uses of water and to efficiently allocate water resources through thorough coordination of social values, environmental costs, factors and benefits.
- To coordinate and resolve conflicts by including all units of government, agencies and water stakeholders in the decision-making process.
- To promote water conservation, reuse, source protection, and enhance good water quality.
- To foster public health and safety.
- To mitigate the environmental risks caused by water misbalance and pollution.

Because of the complexity of any given river basin, ecologically effective planning is extremely site-specific and context-dependent. There are significant limitations in terms of being able to transfer general ecological knowledge to a specific water system.[5] Therefore in order to achieve effective environmental flow planning, a broad analysis of the true costs and benefits of water resource allocation needs to take place. This process needs to push beyond the traditional economic sense of the terms 'cost' and 'benefit' to include economic, social, and ecological factors. Once the costs and benefits of water resource usage have been thoroughly examined, planners can establish an objective-based course of action. The reality of environmental flow planning is that what exactly constitutes acceptable health of a river becomes a societal judgement that is influenced by politics, priorities, and power structures. Given this context, it is important that management of water resources is inclusive and meaningfully enfranchises all stakeholders in the process. This approach can ensure that the true costs and benefits of water usage are understood so that the economic and social benefits of water allocation can be balanced against the broad societal costs of unsustainable overuse in a democratic fashion.

[4] Levner 2006, 272
[5] Poff et al. 1997, 770

The benefit of an inclusive and objective-based approach to water resource management is that it lays out the priorities through which hard decisions will need to be made. Once water users have had the opportunity to juxtapose their aspirations with the costs and benefits of their actions, priorities can be established and objectives can be formulated to guide management policy. Alternatively, management regimes can create and examine a set of different water allocation scenarios in order to establish a way forward and negotiate between stakeholders that have differing priorities. In either approach, when situations involve destructive resource over-allocation, sustainability will require the specific provision of water for nature (or environmental flows) to maintain healthy economies, communities, and quality of life.

US-Mexico: The Rio Grande/ Rio Bravo

Context

The Rio Grande (known as the Rio Bravo in Mexico) is one of the most environmentally degraded rivers on the North American continent,[6] and as such it may seem strange to use it as a case study for best practices. This study takes a look at the Rio Grande because it elucidates several important factors vis-à-vis environmental flows. First of all, political will and priorities matter. Secondly, the Rio Grande's scale and complexity exemplifies how intergovernmental and trans-boundary cooperation is necessary to manage resources effectively – because of their interconnected nature, efficient resource usage will only come about when ecosystems are considered as a whole.

The Rio Grande Basin spans 3 American and 4 Mexican states. Its water resources are over-appropriated, and have been the source of tension between the different polities that share it. Currently, 88% percent of the demand on the basin's resources is from agriculture.[7] Historical and contemporary management of the resources is fragmented and revolves mainly around supply; in 1938 Colorado, New Mexico, and Texas signed the Rio Grande Compact, an agreement on water sharing between the three states. The Rio Grande Compact Commission oversees this water distribution, but this is the extent of its management functionality.

In this classic 'tragedy of the commons', 25 municipalities and 42 irrigation districts strained the Rio Grande past its capacity to provide, and in 2001 the river failed to reach the open water for the first time in history.[8]

Actors

Naturally, this caused significant alarm, with ecologists and environmentalists alike calling for action to save the Rio Grande from extinction. Given the expansive size of the

[6] Natural Heritage Institute, 2009
[7] Mckinney, D and Aparicio, J. 2006
[8] Ibid

basin and fragmented nature of different stakeholders involved, it has been difficult for state actors to leverage effective cooperation for transboundary management of the basin. This is because in general, the river's problems span beyond the area of influence of any one set of institutions of policymakers. It has been hypothesized that because of the limited scope of planning that happens for the Rio Grande, water managers are not implementing efficient policies because the wider scope of the basin as a whole is not being taken into account. As such, in 2005, a project began called 'Rio Grande/Rio Bravo: A Common Future' which seeks to build a basin-wide model for resource management as well as a set of management scenarios in consultation with the relevant stakeholder groups in the basin area. The project partners include government and non-government actors including the Natural Heritage Institute, WWF Mexico, as well as several Mexican and American Universities.[9]

Action

The planning model being built by this group seeks to illuminate water usage in the context of physical viability, stakeholder benefits, and the tradeoffs associated with different strategies.[10] The idea is to build a system through which cooperation will create mutual benefits to all stakeholders; the project excludes scenarios that achieve gains at the expense of current water beneficiaries. The project is largely based on the idea that the simple act of cooperation between different basin users can produce positive changes without having to change priorities; the group is "particularly interested in those broad-scale opportunities that have the potential to produce the largest benefits, but which have escaped the more regionalized water planning that characterized the basin because they would require cooperation across jurisdictional or water management boundaries".[11]

The project notes that the altered flow of the river has caused degraded habitat, endangered species (including the Rio Grande Silvery Minnow), and the loss of fluvial and estuarine ecosystem functions. Yet it also suggests that it is possible that improvements can come about through cooperation across political boundaries. This will need to include data sharing, stakeholder consultation and scenario analysis, and continued comprehensive model development that seeks mutual benefits and long-term solutions. Researchers at the University of Texas at Austin have explicitly recommended the establishment of an environmental flow regime and the ability to increase water availability at ecologically critical times.[12]

The case of the Rio Grande is one that serves up useful examples in the theoretical realm of possibilities and approaches as well as strong warnings about what can happen when people worry about water only as it relates to their own needs.

[9] Rio Grande/Rio Bravo: Designing a Common Future. 2009
[10] Rio Grande/Rio Bravo: Designing a Common Future. 2005.
[11] Ibid
[12] Mckinney, D and Aparicio, J. 2006

Water policy & targets in the EU

Context

Recognizing the need for long-term planning and management of its water resources, the EU established its major water policy in 2000 – the EU Water Framework Directive. The framework is modeled around an ecosystem-based approach to management stating: "The best model for a single system of water management is management by river basin - the natural geographical and hydrological unit - instead of according to administrative or political boundaries."[13]

This directive provides a good example of objective-based planning and provides a solid framework upon which policymakers can balance priorities and build policy. It enshrines the need for environmental flows in addressing the quantitative status of rivers: "There is only a certain amount of recharge into a groundwater each year, and of this recharge, some is needed to support connected ecosystems... For good management, only that portion of the overall recharge not needed by the ecology can be abstracted".[14]

Actors

Because of ecological variability and differing needs, specific legislative details are largely left up to each EU state.

Action

The policy sets ambitious water quality standards with an overall obligation upon member states to bring all surface water bodies to 'Good Ecological Status'. Major policy goals include the following:

- By 2007 "complete an analysis of the characteristics of each river basin district, a review of the impact of human activity on the water, an economic analysis of water use and a register of areas requiring special protection." [15]

- Environmental objectives [16]
  - prevent deterioration, protect and enhance surface waters,
  - where surface water bodies are heavily modified, enhance them to a standard with good ecological potential,
  - reduce pollution from toxic substances and phase out 'priority hazardous' substances,[17]
  - limit pollution entering groundwater and prevent deterioration of groundwater,

[13] European Commission. 2009
[14] ibid
[15] Water Information System for Europe. 2009.
[16] Water Information System for Europe. 2000. Article 4
[17] Water Information System for Europe. 2008.

- ensure a balance between groundwater uptake and recharge,
- reverse any significant and sustained upward trend in the concentration of any pollutant in groundwater,
- All water quality standards must meet 'good' chemical and ecological standards[18] by 2015, although provisions are made to extend this timeframe[19].

- By December 2009 a management plan must be produced for each river basin which includes details of the legal controls in place for the following -
  - protecting water bodies used for drinking water and meeting set drinking water quality standards,
  - point source and other forms of pollution,
  - meeting environmental objectives as above,
  - extraction of water. [20]

The EU functions as an effective mechanism for inter-state cooperation and the resulting level of integration between states makes trans-boundary basin-level planning easier to implement. As such, this case indicates that the challenge of creating intergovernmental cooperation between states with a more competitive relationship can be bolstered by objective-based frameworks that are grounded in international law; as such, international commitments and obligations can help to form a basis for cooperation. The 1997 United Nations Convention on the Law of non-Navigational Uses of International Watercourses is the first global treaty that requires states to "preserve and protect the ecosystems of international watercourses".[21]

Australia

Context

The Murray-Darling River Basin in Australia is a very useful example when exploring best practices for environmental flows and basin management. Australia's federal system of governance creates administrative divisions that place the Murray-Darling Basin under the authority of six separate governments, all with differing interests when it comes to water use. Management began in the 1980s and revolved around infrastructure and allocation of flows from the Murray River to the varying regions. Disputes over flows and quality escalated between the different Australian states that share the basin system, and in 1988 The Murray-Darling Basin Commission was formed to take on transboundary water and catchments management issues.[22] By 1998, all the participating states had signed and ratified the Murray-Darling Basin Agreement and the basic instrument for cooperation was created.

[18] Water Information System for Europe. 2000. Annexes IX and V
[19] Ibid, Article 4(4)(5)
[20] Water Information System for Europe. 2000 Annex VIII
[21] Dyson, Megan, Ger Bergkamp and John Scanlon, (eds). 2003
[22] Kemper, Karin et al. (eds). 2005, 8

In 1999 a report was released by the Commission that warned Australia of increasing salinity levels in the water supply of Adelaide. The report asserted that salinity would reach unsafe levels within 20 to 50 years if no steps were taken to address the issue. As well, both natural habitats and irrigation operations were under serious threat.[23] Evidence of the deteriorating condition of the resource base was very well publicized and appears to have played a decisive role in mobilizing both community groups and politicians towards action.[24]

Actors

The Murray-Darling Basin Agreement created the Ministerial Council, which is comprised of ministers from the federal and state governments and forms management policy on the basis of unanimity. The body that implements policy decisions (formerly the Murray Darling Basin Commission) is called the Murray Darling Basin Authority (MDBA), and plays an advisory role to the Ministerial Council. As well, a Basin Community Committee (BCC) represents the interests of stakeholder groups to the Ministerial Council. This includes all water users - civil society, indigenous groups, business, and industry. The BCC has the power to form subcommittees and is obligated to specific subcommittees for irrigation, environment, and indigenous affairs.[25]

This basin-level authority is part of the Federal government's broad management strategy, called 'Water for The Future',[26] which is a long-term planning effort to secure sustainable water resources and ensure healthy ecosystems. Management efforts span from the Federal level down to the state and basin levels, and even as far as down to environmental management planning for specific sites of "high ecological, cultural, recreational, heritage and economic value".[27] This cross-scale integration of planning and management is an excellent example of institutional arrangement towards effective interplay between actors at multiple levels.

As noted by the IUCN, civil society has also been an important part of the MDBA's success: "community groups have played an important role in a difficult process that involves satisfactorily resolving difficult issues of common interest in a federal system".[28] The inclusion of civil society as a stakeholder in the decision making process came about because an active and informed group of concerned citizens demanded it.

[23] Dyson, Megan, Ger Bergkamp and John Scanlon, (eds). 2003, 109
[24] Ibid 107
[25] Murray-Darling Basin Authority, 2009.
[26] Australian Department of the Environment, Water, Heritage, and The Arts, 2009.
[27] Murray-Darling Basin Authority, 2008.
[28] Dyson, Megan, Ger Bergkamp and John Scanlon, (eds). 2003, 109, 107

Action

The MDBA seeks to administer comprehensive integrated management of the river basin. Their activities include:[29]

- Preparing the Basin Plan for adoption by the Minister for Climate Change and Water, including setting sustainable limits on water that can be taken from surface and groundwater systems across the basin
- Advising the minister on the accreditation of state water resource plans
- Developing a water rights information service which facilitates water trading across the Murray–Darling Basin
- Measuring and monitoring water resources in the basin
- Gathering information and undertaking research
- Engaging the community in the management of the basin's resources.

In 2002, the MDBA realized that management efforts were falling short and the Murray River ecosystem was still in decline. The solution was the explicit provision of environmental flows through the 'Living Murray' restoration program. After the process of planning and politicking was completed, the first 5-year phase began in 2004 with efforts focused on "recovering 500 [million cubic metres] of water for the River Murray specifically for the benefit of plants, animals and the millions of Australians it supports".[30]

As of February 2009, more than 167 million cubic metres of water had been recovered and projects ready to be implemented over the course of 2009 have the potential to further recover almost 380 gigalitres.[31]

Many challenges still exist for effective water management in Australia. The overlapping institutional arrangements regarding water aim to coordinate according to the broad National Water Initiative (NWI),[32] but the process of aligning the priorities of actors on different scales has proved challenging, as indicated by the previously mentioned continuing decline of the basin. That said, the institutional arrangements set up to audit the progress of sustainability and the goals of the MDBA and the NWI (such as those provided by the Living Murray program, the Sustainable Rivers Audit,[33] and the MDB Sustainable Yields Project[34]) provide effective mechanisms for feedback that can lead to necessary change and adjustment of approach.

[29] Murray-Darling Basin Authority, 2008 (2).
[30] Murray-Darling Basin Authority, 2008.
[31] Murray-Darling Basin Authority, 2009 (2).
[32] Australian National Water Commission, 2009
[33] Murray-Darling Basin Authority, 2009 (3).
[34] Commonwealth Scientific and Industrial Research Organization 2009

Lesotho Highlands Water Project (LHWP)

Context

The LHWP is a massive water development project taking place between the governments of Lesotho and South Africa. It highlights the ability for innovative solutions to environmental problems caused by development of water resources. The entire project involves numerous dams on 5 river basins (the Vaal, Senqu, Malibamatso, Matsoku, and Senqunyane). Planning for the project started as early as the 1950s, and the project began in 1986 with the construction of the first dam, the Katse, on the Malibamatso River. The initial agreement signed by both governments stipulated a total reduction in annual flows to 3-5% of the natural levels.[35]

The ability to re-negotiate this agreement fortunately coincided with the completion of construction of the Katse dam, and considerable pressure mounted to mitigate the negative social and environmental effects of such drastically reduced river flows. The situation was negatively affecting many thousands of people who depended on the river for their subsistence livelihoods, and ecosystems including certain fish species were being endangered.[36]

Actors

The LHWP is overseen by the Lesotho Highlands Water Commission, which carries our advisory, monitoring, and administrative functions. It is a bi-national entity, and both involved governments are represented. The commission is also responsible for implementation of arrangements and oversees the work of parastatal bodies in each country that run the projects. The commission's steering committees include representatives of identified stakeholder groups, and had the ability to advise and influence the decision making process when it came to the provision of environmental flows.[37] Negotiations to address the negative impacts of the project involved international NGOs, the local governments and development authorities, and the World Bank.

Action

The negotiations resulted in a delay of the project agreement pending an Environmental Flow Assessment (EFA) that would examine the social and environmental needs of the effected areas, economic and biophysical impacts at different flow levels, and design approaches that could be implemented to facilitate environmental flows. Based on 2 years of data collection, the assessment designed a set of scenarios that balanced the various issues in different ways, to be juxtaposed against each other so as to help sort out costs and benefits. The resulting agreement that came out of the assessment set ecological

[35] Davis, Richard and Rafik Hirji (eds). 2003
[36] ibid, 14
[37] ibid, 16

quality targets, mandated monitoring and enforcement procedures, and quadrupled the amount of water prescribed for the waters downstream from the Katse.[38] [39]

The resulting policy sought to manipulate environmental flows through water releases from dams that mimic the patterns of natural flows; this ecosystem-based approach allowed for seasonal variations and attempted to minimize the negative effects of anthropogenic disturbance to the system. While the monitoring process has continued to identify shortfalls in planning and implementation, the overall results have been encouraging: "nine years after the completion of Katse Dam… the rivers downstream of the structures were either in their target ecological condition, or better than their target condition."[40]

The World Bank has also noted that the provision of environmental flows "amounted to only about 0.5% of project costs [and] did not significantly affect the project's Economic Rate of Return".[41] The project is one of the first of its kind that has developed to a stage where the release of environmental flows can be evaluated holistically; it represents a valuable learning tool and also strong evidence that the adoption of environmental flows into river basin management approaches is highly beneficial.

Conclusions

The best approaches to environmental flow provision are those taken in the context of broader, holistic management regimes that address economic, social, and ecological factors in their analysis. Ecosystems must be considered in their own context for their management to be sustainable. What this process requires is comprehensive planning, monitoring, and cooperation at multiple scales, with a variety of linkages between actors so that involvement can take place at as small and large a level as is necessary to take into account all facets of a given management challenge. Informative and critical auditing and monitoring of the progress of institutions is necessary to ensure that work being done on differing scales is effective and in line with broad-scale objectives.

Consultation with all stakeholders and issues of equity and balance in the decision-making process are very important factors if the true costs and benefits of any given policy are to be effectively understood. Having an informed and enfranchised community is as important as adequately addressing the needs of economic actors. This is the only way to gain a fair understanding of the larger situation and gauge the priorities involved. The disproportionate influence of any one actor, sector, or agenda in the policy process can lead to sub-optimal outcomes for ecosystems, economies, and livelihoods. Objective-based approaches are most effective, and the ability to understand and negotiate between multiple water-usage scenarios is also an effective tool to chart a sustainable way forward.

[38] Brown 2008
[39] Davis, Hirji eds. 2003
[40] Brown 2008
[41] ibid

Above all, issues of scarce resource management need to be re-framed in the context of cooperation instead of conflict, or else a 'tragedy of the commons' and ecological decline will be largely inevitable. For Israel, Syria, Jordan, and Palestine this is much more than just an abstract idea; the decline of the Lower Jordan River is a very real challenge. The stakes are high, and the consequences of inaction are immediate. By mustering the necessary political will and taking into account the experiences of other transboundary management arrangements, solid and meaningful progress can be made towards saving the Lower Jordan River.

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