TRANS-BOUNDARY WATER RESOURCES MANAGEMENT

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Summary

Most of the world's freshwater resources occur in river basins that are shared by two or more countries. Integrated management of trans-boundary waters resources requires riparian countries to cooperate. This is not an easy task, since in many basins countries compete over scarce water. The main thrust of the management of shared river basins is to find ways of turning potential conflicts into constructive co-operation, and to turn what is often perceived as a zero-sum predicament - in which one party's gain is another's loss - into a win-win proposition. This article uses the metaphor of the classical temple as a framework. The foundation for the sharing of international rivers is the recognition that the management of water resources should be done in a fully integrated fashion. Upon this foundation, three pillars support the "roof" of the temple: the sharing of international waters. The central pillar is that of technical co-operation, which may also be called the operational pillar. The two side pillars are: the political pillar, responsible for an enabling environment, and the institutional pillar responsible for laws and institutions. All three pillars are necessary to arrive at a balanced and equitable sharing of international waters. This article concludes that a concerted strategy towards the integrated management of shared river basins should incorporate elements of demand-and-supply management, public participation, and regional integration. The basis of an integrated strategy towards the sharing of international waters is the recognition of the principle of "unity in diversity". Because of differences among riparian countries the task is to look for complementarity between countries, and to foster co-operation to their mutual benefit. The sharing of international waters may be a consequence of this co-operation, but also a crucial factor in further strengthening it.

1. Introduction

1.1 The Maseru Conference

More than 40% of the world population live in some 250 river basins that are shared by more than one state. Some countries, such as Botswana, Bulgaria, Cambodia, the Congo, Egypt, Gambia, Netherlands, Sudan, and Syria receive 75% or more of their fresh water from the river flows of upstream neighbors. Sharing international waters is a very important aspect of integrated water resources management. Most countries in the world experience some kind of problem related to international rivers, simply because hydrological boundaries seldom correspond with national boundaries. Even within nations, problems of sharing water among states can be quite contentious. The fashionable talk about "water wars" is also related to the problem of sharing international rivers, with possible conflicts boiling in the Middle East, North and Southern Africa. In 1997, an international ministerial conference was held in Maseru, with representatives from 23 SADC and EU countries on "The management of shared river basins." The present article is based on the material presented during this

conference, which provides some of the latest insights in the management of international waters.

1.2 General Principles and Critical Issues

At a national scale, governments appear to base their policy for resource management on a number of "emerging" principles that have general validity. Such principles are often also underlying international policies. Box 1 provides a brief description of six important management principles. In international law, some more specific principles are used with regard to international river basins. These are further discussed in Section 4.1.

- *sovereignty principle*: each nation has the right to develop its own policies, laws and institutions and their own strategies for natural resources development and utilization
- *trans-boundary principle*: upstream water users have a responsibility towards downstream water users, and vice-versa; this principle is in a sense the extension of the equity and precautionary principles across national borders
- *equity principle*: all people have basic rights of access to resources for their survival and development; no groups in society should be put at a serious disadvantage in this respect
- *intergenerational principle*: future generations should not be deprived from access to an adequate resource base, although the resource base itself may change of composition (e.g., knowledge, technology, infrastructure)
- *user-pays principle*: users should pay the real cost of water services, taking into account the ability to pay. A different, and more contentious, principle is that water is an economic good, and that users should pay the economic value of water, provided that this principle does not conflict with the equity principle
- *polluter-pays principle*: he or she who inflicts damage on the natural resources system should pay for the damage
- *precautionary principle*: governments should provide security to the people, including safety, food security, health care, protection against disasters, risk avoidance, conservation of natural resources, a healthy environment and merit goods

Box 1: Emerging principles of the management of international water resources

In the course of this article, a number of critical issues emerge with respect to the sharing of international watercourse systems, particularly rivers. These include:

- River basins do not respect village, district, provincial, and national boundaries. Too often, we have attempted to fit the water into these administrative and institutional boundaries, rather than to design institutions that fit the (physical and spatial characteristics) of the resource. As a consequence, there often is an administrative/institutional void when dealing with the management of water resources. This is especially true at the transnational level.

- Management of water resources has generally concentrated on surface water, while insufficient attention has been given to groundwater, soil moisture ("green water," see Section 6) and related aspects.
- Perhaps the biggest problem in sharing an international water resources system is its sheer scale and the opaqueness of system interactions over large distances (upstream and downstream). For example, it is difficult to see, let alone quantify, the consequences of upstream land use changes on downstream flood levels. This opaqueness may result in unforeseen negative consequences of human interventions, which are difficult to correct and may give rise to tensions between riparians (countries sharing the basin).
- Within the same international river basin, national interests may differ; thus nations may develop diverging policies and plans which are not compatible. This is the sovereignty dilemma: to what extent may individual countries develop and use resources found within their territories, and to what extent do they have to consider interests of riparian countries, and the "common interest" of the river basin as a whole? Upstream users often are reluctant to take the problems of downstream users at heart. One of the biggest challenges in sharing international rivers is to identify development strategies, whereby all riparians eventually benefit from an equitable allocation of costs and benefits.

1.3 Conceptual Framework

This article uses as a framework the metaphor of the classical temple (Figure 1). The foundation for the sharing of international rivers is the realization that the management of water resources should be done in a fully integrated fashion. This is elaborated on in Section 2. Upon this foundation, three pillars support the "roof" of the temple: the sharing of international waters. The central pillar is that of technical cooperation, which may also be called the operational pillar. The two side pillars are: the political pillar, responsible for an enabling environment, and the institutional pillar, responsible for laws and institutions. All three pillars are necessary to arrive at a balanced and equitable sharing of international waters. If one of the side pillars is weak, meaning either a low political commitment or inadequate legal and institutional arrangements, the sharing of international river basins may not be firmly embedded and is prone to unbalanced management decisions. The metaphor further implies that the operational pillar is central to the success of the management of international river basins. It may support most of the load if one of the outer pillars is weak, cracked or in the process of repair or restructuring. The three pillars as defined here are elaborated in Sections 3, 4 and 5.

When dealing with the three pillars, reference will be made to the critical issues identified above. In the final section (Section 6) of the paper, we look at the "roof" of the temple and attempt to integrate the insights gained from the three supporting pillars. The integrative approach not only implies that each pillar is consistent in itself (regarding inter-sectoral policies, plans and practices), but also that the three are compatible with each other, i.e., are "level" (for example, that legal and institutional arrangements are consistent with, and reinforce, operational strategies, and vice versa).

2. Integrated Water Resources Management as the Foundation

Integrated Water Resources Management should be the foundation supporting the management of shared river basins, taking as a starting point the principles of Dublin and Rio (see Box 2). These principles that are key concepts to integrated water resources management are also the basis of the activities of the Global Water Partnership, which was launched as a response to the human impacts of water scarcity and pollution worldwide.

Dublin principles

- Water is a finite, vulnerable and essential resource which should be managed in an integrated manner
- Water resources development and management should be based on a participatory approach, involving all relevant stakeholders
- Women play a central role in the provision, management and safeguarding of water
- Water has an economic value and should be recognized as an economic good, taking into account affordability and equity criteria.

Associated key concepts

- Integrated water resources management, implying:
  - an inter-sectoral approach
  - representation of all stakeholders
  - all physical aspects of the water resources
  - sustainability and environmental considerations
- Sustainable development: sound socioeconomic development that safeguards the resource base for future generations
- Emphasis on demand driven and demand oriented approaches
- Decision making at the lowest possible level

Box 2: Dublin principles and associated concepts

The concept of integrated water resources management has not been unequivocally defined; in fact it developed over time. Box 3 reflects some recent insights regarding the concept. Here an attempt is made to define the concept in relation to river basin management. It is useful to distinguish the "physical" dimension of the water resource and its "non-physical" dimension. Subsequently, it is important to consider the resource in a time perspective.

2.1 The Physical Dimension

The physical dimension refers to three important aspects of the resource: location, type and quality. The location of the resource has to do with upstream-downstream interaction, basin-wide analysis, inter-basin transfer, etc., determining to a large extent the quantity of water available. The type of the resource points to all relevant stages in the hydrological cycle, and includes groundwater, surface water, rainfall harvesting etc., and the physical behavior of water in these different manifestations. It may also refer to how water, in these various stages, relate to other natural resources. The quality of the resource, finally, deals with physical, biological and chemical attributes; for example, water of bad quality has lost its quality of a "resource" unless it is treated. These three

physical aspects of water resources should not be considered in isolation. "The integration of location, type and quality is a necessary condition for water resources development."

The statement of the *Dublin Conference on Water and the Environment* equates the term "integrated" to "holistic," linking social and economic development with protection of natural ecosystems. The holistic approach implies: "not only to look at the whole water cycle…but also the inter-sectoral needs. It must also include an ecological approach…and consider issues across the whole of a river basin or a groundwater aquifer and also consider the interrelation with other natural resources."

Chapter 18 of Agenda 21, adopted during the Earth Summit in Rio de Janeiro, formulates the first of four objectives of integrated water resources management thus: "To promote a dynamic, interactive, iterative and multi-sectoral approach to water resources management…that integrates technological, socio-economic, environmental and human health considerations."

Box 3: Integrated water resources management: some recent insights

2.2 The Non-physical Dimension

The "non-physical" dimension involves the various ways human beings and society at large attribute meaning and value to the resource water. This may refer to the interests of different water users in all sectors of the national economy (including agriculture, water supply, hydropower, inland transportation, industry, fisheries, recreation, environment, and nature conservation). It also refers to the national objectives to the water resource, as laid down in government policies, action plans, the national budget, the laws of the nation, etc. Furthermore, it points to the institutional framework, within which important decisions are made with regard to allocation, development and protection of the resource, and which defines the roles of government and stakeholders at the various levels of society (local, provincial, national, trans-boundary).

2.3 Sustainability: Incorporating the Time Perspective

If we now wish to incorporate the idea of "sustainability" into the concept of "Integrated Water Resources Management," we have to consider the time dimension. For sustainability directly refers to levels of resource use that can be sustained over time, also for the generations to come. Strategies and action plans should therefore include a long-term view of development, use and protection of the water resources.

In sum, integrated water resources management means that in managing the resource, both the physical and non-physical aspects are considered simultaneously, while taking a long-term perspective. Decision making would then involve the integration of the different objectives where possible, and a trade-off or priority-setting between these objectives where necessary, by carefully weighing these in an informed and transparent manner.

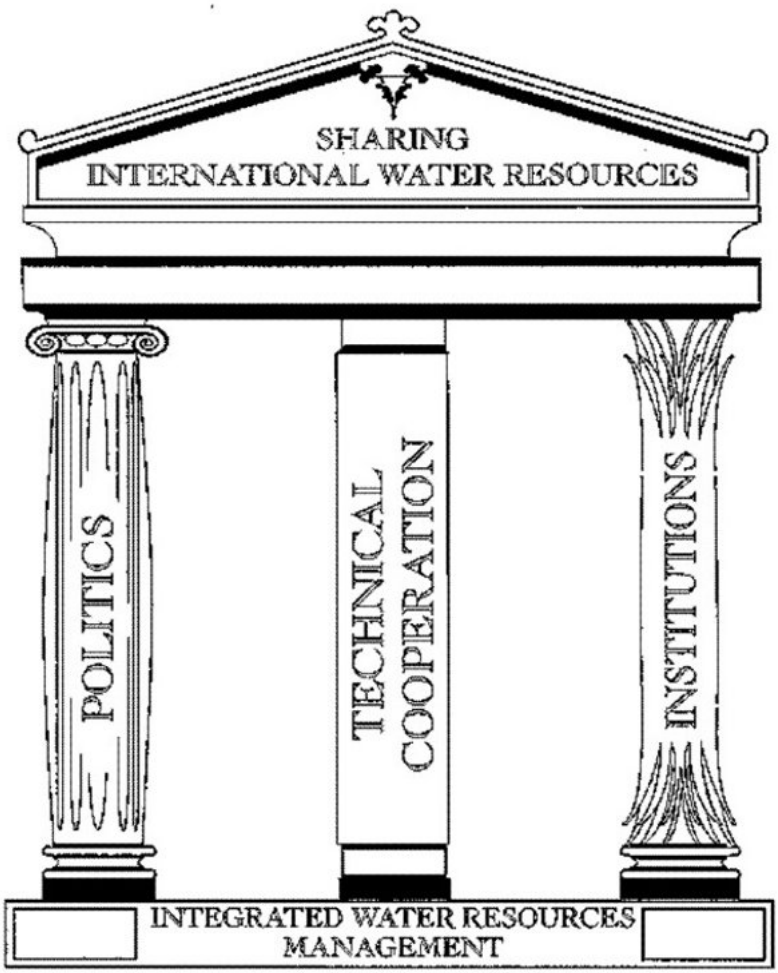

Figure 1. The Classical temple of sharing international water resources

3. The Political Pillar: Creating an Enabling Environment

Countries sharing international rivers face a two-dimensional problematic: the first is to manage the water resource holistically; the second is to share the resource internationally. The management of shared river basin thus requires the riparian countries to transcend both sectoral and geographical boundaries. It is the responsibility of states to create an enabling environment that makes inter-sectoral and international cooperation and planning possible, in such a way that the waters are shared equitably and sustainably. This responsibility is primarily a political one (Figure 2). The first part of this chapter briefly sketches the issue of diverging interests along both axes. The second part explores the basis on which countries attempt to cross the above boundaries.

Figure 2. The Political Pillar may easily Crack!

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Biographical Sketches

Professor dr ir Hubert H. G. Savenije (1952) is professor in water resources management and vice-rector research at IHE Delft. He is a hydrologist and has specialized in river hydraulics and water resources management. He derives his expertise from extensive studies of river systems worldwide, with an emphasis on Southern Africa (such as the Limpopo, Incomati and Zambezi rivers) and South-east Asia. Savenije has taken part in many consultancy assignments. Furthermore, he has extensive international experience in education and training; he has given short courses and guest lectures in many countries of Africa, the Middle East and Asia. He has published widely in scientific journals, sits on the editorial board of two such journals, and has presented papers in a number of international conferences on water resources and hydrology. He is president of Hydrological Sciences in the European Geophysical Society (EGS), for which he acts regularly as convenor of specialist sessions, during the Society's annual conferences. Before Hubert Savenije joined the IHE in 1990, for 5 years he was a consultant hydrologist with Euroconsult, Arnhem. From 1978 to 1985, he was advisor to the Department of Water in Mozambique. Professor Savenije graduated in Hydrology, from Delft University of Technology in 1977. He received his Ph.D. degree from the same university in 1992 on a dissertation entitled "Rapid assessment technique for salt intrusion in alluvial estuaries."

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