River-basin management and organisations : A general overview

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Introduction

Around the world, many developing countries are either discussing the introduction of river-basin management, or beginning to implement it. This is a quite recent development, and in many cases the implementation is at a pilot level, rather than across the whole country. Management models vary, and the amount of direct experience that has been accumulated as yet is relatively small, but increasing.

Nobody can specify a "correct" way of organising river-basin management. Countries vary, and they have different cultural, political and administrative traditions. Within countries, the basins themselves vary. The uses of water vary. For example, river fisheries are highly important in the Mekong River countries, but are not a significant factor in Sri Lanka. Potential pollution of river water by mine wastes is a serious issue in South Africa, but in many countries it is not a matter of concern. So an organisational arrangement that works very well in one context may be unsuitable for another place where the issues to be addressed are different.

There are international river basins, and there are national ones that lie completely within the jurisdiction of single countries. An island nation such as Sri Lanka does not have to feel much concerned about international basins, but for others their management is a constant political and diplomatic issue. Bangladesh has relatively little water that is "its own," in the sense that the basins lie fully inside the country. International basins tend to get more attention from the world in general, partly because they are mostly big, well-known basins. But in this discussion, we will focus mainly on national basins ; because we can see that, if we cannot develop procedures for good management of national basins, under the unified laws and administration of a single country, then we are not likely to achieve good management of international basins which have an added level of political complication.

The countries of South Asia vary enormously in regard to their national river basins. Sri Lanka is a medium-sized island, so it has relatively small, short basins. Bangladesh lies on the joint delta of two of the world's largest rivers. India has basins of every scale. Most of Pakistan lies in one large basin. Upstream countries such as Nepal or Bhutan have a different view of basin management needs from downstream countries such as Bangladesh.

For these reasons, we cannot state rules about the best way of establishing river-basin management. But we can identify some principles, that will be useful guides, and that can be adapted to the needs of specific situations. Such principles can be found by analysing the tasks that we need river-basin management to perform, and also by examining the experiences of countries which already apply basin management.

Our subject is called "River-basin management and organisations." What is the difference, here, between studying management and studying organisations? The difference may not be very great. But in the case of river-basin management (unlike many other kinds of management) we often find that there are already a number of existing organisations, whose activities and whose management decisions have big impacts on our river basins. I will refer to these older existing organisations as the "service-providers," since they have been created in order to supply some kind of service – domestic water supply, irrigation, electrical power generation, industrial water supply – to the public or to multiple users.

Usually, these existing organisations have been performing their functions for a long time, and have developed their own practices and their own attitudes, long before the movement towards river-basin management arrived. The services they provide will continue to be required. It is not at all unusual to

find that the existing organisations dislike the introduction of new modes of management, which may put constraints on their style of operations, and in many cases they may try to defeat it, or to ensure that it remains weak. So, an essential component of the process of arriving at river-basin management is to examine a range of options for the organisational structure that will be applied, and to ensure as far as possible that the existing organisations will co-operate in introducing the selected system.

Experience elsewhere tells us that river-basin management is not normally create swiftly, by a single legislative act or administrative re-organisation. It may take a long time, and often it has to be built up by a series of gradual steps and agreements.

Rationale for basin management

First we should consider the question, why should we want river-basin management? Why has the idea of river-basin management become widespread, apparently quite suddenly? Is there anything wrong with the methods of managing water which we have been familiar with in the past few decades?

One explanation is that we live in times of rapid change – social and economic changes, especially – and our present procedures for managing water resources have been showing many kinds of strain. In particular, the management of water demand is often weak, and in many Asian rivers the hydrological statistics tell us that, if demand continues to increase at its recent rates, we will face growing scarcities in the near future. (When I use the term scarcity, I mean that demand, in the existing price structure, exceeds the available resources.)

Already, in many Asian rivers, there is scarcity in the dry season months. This puts special stress on agricultural users of water. Several of the other types of use (domestic and industrial uses, and power generation) experience demand that varies relatively little during the year ; but agriculture has a demand curve that is often (especially in small basins) opposite to the supply curve. Demand tends to maximise in the months when supply is least. For a couple of decades this problem has been partly concealed by the sudden growth in use of ground-water by farmers, replacing to some extent traditional reliance on surface flows. Now, as we see rapid lowering of water-tables in many aquifers, we are aware that that source of relief is also limited.

But we must not think of basin management in terms of setting up some kind of system that only apportions water quantities among different kinds of uses. There are several other dimensions to consider, and in many cases quantity is not the dominant concern.

The number of different modes of water use has proliferated. We need only think about generation of electrical power. It was insignificant in this region fifty years ago, but has become the dominant factor in many basins now. Industrial uses, and their potential for pollution, have also increased greatly. So we now face many situations where one type of use can cause harm to other people, perhaps quite far away, and these kinds of harm are not necessarily related to scarcity.

On many rivers, people who used to live by fishing have suffered or have lost their livelihoods, because new dams have interrupted flow regimes and fish migration, and fish breeding has reduced greatly ; so projects aimed at bringing benefits to agricultural and power users have hurt other groups. On the Mekong the special ecology of Cambodia's Great Lake is threatened, as the annual pattern of rise and fall of the lake level is reduced due (in part) to retention of water in reservoirs far upstream in China and Laos. On many other rivers, rapid industrialisation has not been accompanied by adequate expansion of monitoring systems and or by adequate legal powers for maintaining water quality, so people in downstream communities receive polluted water.

We can find many examples to illustrate this general theme : that our rivers need to be managed in a more integrated way, trying to harmonise these multiple uses. Meantime, the greatest social change of our time, across all the South and South-east Asian regions, is urbanisation : the enormous movement of people to the cities, and the associated development of industries and other businesses that employ those people. This has huge significance for water management, because it is creating a new, highly focussed pattern of demands ; and these are demands that are difficult for governments to resist.

The cities have grown up, often, without much relationship to the availability of water to support them, so, as they grow relentlessly, we hear of an increasing number of projects for basin transfers, tunnels

through mountains and so forth. But taking water from one basin to feed into another will be, like the modern over-use of aquifers, only a temporary solution, unless we can find ways of enhancing our overall management methods.

However, water policies should not become obstacles to development or to socio-economic and demographic changes. Rather, countries want policies that will facilitate the kinds of change that improve the lives of their people. But it is becoming clear that water will indeed become a constraint on development, if countries cannot adopt more integrated methods of managing their available water resources.

Until recently, the common paradigm of water management, in most Asian countries, has involved a set of state bureaucracies whose essential roles have been to provide specific water services to the people as users. Those services, usually, were (50 to 100 years ago) urban domestic water supply and irrigation water supply, and in recent decades generation of electrical power has been added to these, while industrial water supply has become an increasingly significant element of the urban duties. The departments that have performed these services are often under different ministries. Their internal culture has been focussed on their service-providing role ; therefore, in the increasingly frequent periods when demand for water threatens to exceed the available resources, these organisations tend to be competitors rather than collaborators. This has led to ineffective procedures and an absence of demand management : what we can call "management by crisis," in which temporary rules are suddenly imposed because there is a "drought," even when the hydrological and meteorological statistics can tell us that the rainfall and runoff are within their normal, expected bounds of variation.

In these circumstances, a major social and political goal should be protection of the poorer people. This goal should be one of the central reasons motivating the trend towards river-basin management. If we allow a situation to develop, in which demand for water exceeds the resources that can be supplied, then we can be very sure that the poor will be the losers in the competition for securing control over the resources that actually exist. Already, in many river basins, conditions exist under which the poorer members of society have to pay much more for domestic water, and the water that they receive is of significantly lower quality.

Another essential goal is to arrest the deterioration of the environment, which has accompanied our increasing abstraction of water and our methods of disposing of it after use. This set of problems can be considered in two main groups. There are physical problems, of deteriorating conditions in the basins, lakes and the estuaries : By physical problems I refer to increasing concentrations of unwelcome contaminants like heavy metals, increasing intrusion of salinity into estuaries, declining levels of water-tables, and also aesthetic aspects such as the loss of beautiful landscape features such as waterfalls. And there are also the second group, the biological problems : loss or reduction of species, and of biodiversity generally.

So I may summarise the reasons why river-basin management has assumed great significance, as follows :

Historically, we have managed the delivery of the water <u>services</u> that people want, but we have not managed the water <u>resources</u> themselves. We therefore have (in many countries of this region) sets of government organisations, each with a single-service mandate. Now, as demand has risen, new types of use have become important, and disposal of water after use has led to serious deterioration of water quality, we need to move to integrated, comprehensive management of the available resource.

The logical unit of management in these circumstances is the river basin. It constitutes a natural area within which water flows and is contained.

Major objectives in the overall management of water within a river basin will include :

- Protection of the water resources ;
- Managing the demands for water so that they do not exceed the available supplies ;
- Facilitating socio-economic and demographic changes that the society wants ;
- Protecting the rights of all people to an adequate share of water at a tolerable level of cost ;
- Protecting the state of the environment.

The above list is not complete, and other people may identify other lists, or may give priority to different objectives, but all of the above items will generally be part of the rationale for establishing a river-basin management system.

Tasks for river-basin management

What will should be the functions of river-basin management, in order to achieve sets of objectives like these? We already have, in most parts of the region, organisations that provide water services to users of various types, such as irrigation and domestic water supply. There is not a requirement to duplicate any of those services. We need basin management because modern conditions are creating fresh tasks. Some of these tasks involve managing the water in the basin, some of them involve managing the basin itself, and some of them involve managing the living things that inhabit or use the basin.

A primary task, I believe, is to get the statistics of the water resources of the basin into a condition that is suitable for modern management. It would generally be accepted in business management that a manager cannot be expected to perform well, without an adequate and reasonably accurate data-base on the organisation's main resources. But hydrological data-bases have not been given the finances or the administrative prominence that they need. Data management has not been seen as a good career path for an ambitious person. Consequently, we now suffer serious deficiencies of basic information, about the quantities of water, and more particularly about its quality at different locations in the basins.

Demand management cannot be achieved either, without good data on the consumption and abstraction side of the balance. Here too there is generally a great deal of vagueness about the actual quantities, and especially about the amounts that are returned to the natural system after use.

In due course, I believe, we shall have to move towards some systems of licenses or permits for abstraction of water, as is becoming normal in various richer countries ; and it is hard to see that any licensing system can function unless the major service-providing agencies, of national or local government bodies, also are required to comply with it.

Some people advocate systems of transferable or tradable water rights, and argue that everybody may benefit from such systems. It is often said that in certain countries (Chile and Mexico, especially) the farmers are encouraged to use water efficiently, because if they use less they can sell part of thir water right to a neighbouring town, or to a business. I think that, as far as our region is concerned, that is a prospect that can be deferred for a long time into the future, and I am not convinced that it will ever be adopted in this region. The first steps of basin management are much more basic.

We can think of the analogy of a land registration system, and from this we can work out the stages that are likely to be followed in regard to water. These steps are likely to be :

a. Establish what is the existing situation. This is equivalent to making the basic map tools in regard to land : quantifying the resource, and the existing patterns of usage. But, in regard to water, it is much more difficult than in the case of land. Land is stationary, and it does not expand or contract with the seasons.

b. Establish a clear system of rights to use water. Much is said and written about traditional water rights, especially in agricultural communities. But these traditional rights are usually rights that are recognised within some relatively small communities, sharing often a common source of water abstraction. This does not mean that the community, as a whole, possesses a right that is recognised by others within the basin as a whole. In many countries now, we are seeing protests by such communities, who find that the water that they used to rely on is no longer there when they need it.

c. Set up much better arrangements for controlling the right to dispose of water. Pollutants of many kinds have appeared, as part of our modern life, and the arrangements for controlling their disposal are weak, or weakly enforced. We can see this, to some extent, as a reflection of the system of water management that has been centred on service delivery. The service-providing organisations have not given the necessary attention to monitoring or control of disposals after use.

d. Ensure that the rights to use water, when they have been approved and granted, are secure. Again there is a clear similarity to the way that societies handle the use of land. If a right to use land is not clear and secure, people feel unwilling to make investments in its use and its improvement.

Each of the above steps will take many years to accomplish. Maybe, after these steps have been accomplished, tradable or transferable rights will exist. That seems to be a question that can wait, and does not need to be addressed now. To illustrate that point, we can look at the following check-list of ten features of a clear right to take water :

- Quantity : How much water may the holder of the right take from the natural resource?
- Timing : Are there restrictions on the time when this quantity may be taken?
- Location : Is there a specific place where this water may be taken?
- Quality : Is the holder of the right entitled to expect the water to be at or better than some specific standard of quality, either chemical or biological?
- Conditionality (or priority) : Is the right absolute, or is it subject to any conditions or variations? For example, will it be different in a year of drought?
- Duration : Is the right permanent, or will it expire after a specified time?
- Disposal : How and where will the water be disposed of after use? Are there rules about the quality of used water for disposal?
- Source : From where does this right come? Who awarded the right?
- Security and enforcement : Can anybody guarantee the implementation of the right? If the water in the river becomes less, or is polluted, who will make sure that enough remains available for implementing this right?
- Ownership and transfer : Can the owner of the right transfer it to another person, or another location? Can it be inherited? Can it be sold?

When we look at all these components, we see that a great deal of effort, and time, will be required to form an adequate system. This is, perhaps, the strongest reason why we should not delay further.

The four steps identified above refer to managing human uses of water. As we noted earlier, a major role of river-basin management is to look after the non-human users of water : plants, animals, fishes, birds. Since everything that lives needs water, and most (like ourselves) need water within a certain range of salinity, we must attend to those needs urgently, or we face future disasters.

There are many issues here, and countries address them in various ways. Inventories, identification of risk situations through compiling “red lists” and mapping “hot spots,” and campaigns of public awareness, especially in the schools, are all becoming familiar tools. Since the non-human users of water are not able to speak for themselves, or to claim their place in any system of water rights, we are seeing numerous non-governmental organisations seeking to occupy that role, and to act as negotiators. River-basin management has to recognise and work with all these trends. We should think of the establishment of river-basin management not as a tool for taking over these activities, but for helping to co-ordinate them, and to integrate these activities properly into the mainstream of water management.

Organisational characteristics

What kind of organisational structures are needed, for implementing river-basin management? Here again, there are many possible answers, that have evolved in response to different conditions, but we can identify some trends.

It is not essential that new organisations should be formed, in order to implement river-basin management. Some countries have done that, creating strong basin-specific organisations, such as the Murray-Darling Commission in Australia. Others have sought ways of developing better collaboration among existing organisations, and assigning additional functions to them.

A major issue is the degree and manner of involvement of stake-holders. There are countries where councils of stake-holders are given a prominent role in basin management, and others where they have no role. South Africa, for example, has gone through an intensive process of examining options, and produced an organisational model that envisages a substantial role for sake-holders. In Asian countries, in modern times, bureaucracies have tended to be powerful, and reluctant to relinquish powers. There is therefore a tendency, at present, for basin management to be done, or planned to be done, by some adjustments to the existing bureaucratic arrangements, rather than by creating entirely fresh arrangements.

However, experience in various countries indicates that it is necessary to involve the general public in the processes of deciding how to design and implement basin management. People know how much they depend on water, and the awareness that the present situation is not working perfectly is widespread, so people grow suspicious if they are not well informed about introduction of new policies and procedures, and this can lead to protests and demonstrations, and other ways of preventing implementation of the policy change. Stake-holder councils are one mechanism that aims at accommodating the views of people from outside the state bureaucracy. But other mechanisms, such as public information campaigns, can also be useful for the same objective, and may reach greater numbers of people.

The concept of stake-holder involvement is attractive, but not may not be easy to implement. Since everybody is a stake-holder in respect of water, who should have the right to be represented on the stake-holder council? This problem can create a need for special legal and political arrangements, and there may still be dissatisfied groups. In Germany, for example, there are such councils for managing drainage basins, and large numbers of organisations seek to be represented on them.

Scale is another difficult problem in organisational design. Can we identify an optimum size for a river-basin organisation? In much of South and South-east Asia, the major river basins are very large indeed. But a large basin contains many smaller tributary basins, and those tributary basins are further sub-divided naturally into yet smaller ones. At which of these levels is it best to initiate basin management?

There are several inter-connected issues in this. If the unit is small, its management will be more aware of local needs and problems, and so it should be more responsive. On the other hand, it may have a lower level of professional skills. If we want to have genuine involvement of stake-holders, it will be difficult to arrange that in large units. South Africa, after its detailed studies in the 1990s, opted for creating twenty basin organisations, with an average area of about 60,000 km^2, but to ensure participation of the representatives of poorer stake-holders there are several sub-basins within each. However, that solution may bring other difficulties, such as the need to clarify the division of roles between these two organisational levels.

An important characteristic of basin organisations is their relationship to new capital developments within the basin. We do not face a static situation, but one that is changing rapidly. Perhaps the great wave of dam-building that we saw in between 1960 and 1990 has now passed its peak ; but other development projects will come, and will pose similar issues and arouse similar controversies. The next wave of capital projects seems likely to be related to large inter-basin transfers. When basin organisations come, should they manage these kinds of capital expenditures directly, or should they have only some kind of approval function?

Legal framework

It seems unlikely that the tasks that are required in river-basin management can be done by adjustments within the bureaucracy alone. Laws are needed too, and these must be effective laws, accompanied by adequate penalties and enforcement. Many countries have laws in this area, but they often suffer from problems of lack of clarity and from ineffective enforcement strategies.

Environmental damage is often – perhaps we should say usually – profitable to somebody. Public awareness programmes in schools and elsewhere are an excellent idea, but they will not stop some people from conducting activities that damage our rivers and our environment. For that we need more : laws, and police forces that are ready to prevent breaches of those laws.

This is not a small matter. Sri Lanka has struggled for many years to find adequate consensus, in its parliamentary and bureaucratic systems, for enacting a new, comprehensive law. It is probably a necessary, even desirable, process, though it may seem frustrating and painful to some of its participants. But water is too central to life, and our existing management frameworks, are not able to respond sufficiently to the new demands people make on the natural water system ; so what we are seeing now is a rebuilding of a fresh consensus for new ways of management, in response to these new pressures. It is not surprising that it takes time.

The need for new water laws to underpin river-basin management is a reason why it is difficult for a country to initiate basin management on a piecemeal or “pilot project” basis. Until there is consensus on the legal framework, it is not likely that successful management can be achieved.

Finance

I leave to last the question of how countries are going to pay for these kinds of activities, but it is one of the issues that tend to come up first when water reforms are discussed. But we have to think about it, because all organisations are strongly influenced, in their internal culture and their behaviour towards their clients, by the processes that provide them with financial resources. This matter raises very strong feelings and emotions. Water has sacred significance : religions have many ceremonies that involve water, there are sacred rivers and sacred lakes in many countries. The idea that water is a commodity, that can be bought or sold like (for example) that other liquid mineral, oil, is resisted by many people.

This is the reason, I believe, why prices for water services are often set at low levels (or even zero), why governments have been very reluctant to bring the private sector into the business of providing water services, and why the amount of such private investment is very much less than in any other type of utility or common service provision. But the statistics of domestic supply connections in all the expanding cities of South and South-east Asia tell us that government agencies have great difficulty to provide services equitably, especially to the poorer communities.

In these circumstances, it seems hard to see a way forward to finance the new activities that undoubtedly are needed, for a river-basin organisation that essentially has regulatory duties, rather than undertaking service-provision directly. There are different possible ways of addressing that problem. The approach that I like to aim for is through an annual licence fee for the right to abstract water from the natural systems, and I believe that in this respect the traditional service-providers should be treated like other abstractors, should be required to apply for licences and pay the relevant fee, and should be subject to the same sort of constraints and enforcement as any other group, company or individual abstractors. I do not think that that kind of arrangement can arrive soon ; but I think we have to aim in this direction.

Some concluding observations

How shall we get from here to there? Can we plan any “road map” towards a future in which our rivers will be managed better? It may be pleasant to have conferences and workshops, but can we change the reality of river conditions? It will not be easy. These are a few thoughts about that problem.

- It will take a lot of time, and we must not imagine that river-basin management will happen because of some single legislative act. It will be a process of many steps, agreements and adjustments.
- Every person, and every living thing, is a stake-holder in water and river management.
- The basic supply of fresh water, from rainfall, is basically similar to what it has always been. Our problem is that there have been too few constraints on demand for water, and too few constraints on its disposal after use. Scarcity, where it occurs, is due to excess demand, and diminishing quality, rather than to changes in the basic resource.
- We need to formulate a vision of the arrangements we would like to see 10 or 20 years from now ; and we need to share and explain that vision as widely as possible, so that people have a good understanding of the risks of continuing without basin management, as well as the benefits that it should deliver.
- We should anticipate that there will often be “bureaucratic resistance,” among the existing service-providers, to the establishment of adequately strong basin management, and we should address that at the earliest stages. Just as in the case of other water reforms, such as irrigation management transfer, there will be fears in the existing agencies that their powers will be less and that staff numbers will shrink. Those fears must be addressed. There will in future be more need, not less, for people with expertise in water management, as the pressures on our available resources continue to increase.
- We need to accelerate the co-operation and mutual comprehension between water technologists and environmental specialists of many kinds.

- We need flexible approaches to managing our rivers. Social changes are not getting slower. The problems of urban, industrial and even recreational uses of water are today quite different from what they were twenty years ago. They will change further, and we do not know what those changes will be. Traditional water management practices are interesting, but there are many areas of our modern societies that have no traditions to guide them.
- It seems likely that inter-basin transfers will be very important in the near future. Engineers like those schemes, for their magnitude and innovations. But we have to remember that any inter-basin transfer, while it provides additional supplies to (for example) growing cities, also reduces the available water of the donor basin. A river-basin management system, especially one with stakeholder participation, is a means to protect the rights of the people who live in donor basins.