Operationalizing IWRM through River Basin Planning and Management

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(*The 1st session on river basin management (RBM) is focused on the teaching manual on "Integrated water resources management for river basin organizations" developed by the CapNet. The manual can be downloaded from www.cap-net.org. This lecture note is based on the materials abstracted from the training manual.*

The 2nd session describes how some of the essentials steps of RBM, given in the lecture notes, are being practiced at the Mahaweli Project in Sri Lanka. The paper by E.R.N.Gunawardena and K.N.Wickramaratne on "Restraining conflicts through institutional interventions: The case of Mahaweli, Sri Lanka" to be published in the reader of "Water Conflicts" by SaciWATERs provides the details)

1. INTRODUCTION

The case for IWRM is strong – many would say incontestable. The problem for most countries is the long history of sectoral development. As the Global Water Partnership puts it:

> *"IWRM is a challenge to conventional practices, attitudes and professional certainties. It confronts entrenched sectoral interests and requires that the water resource is managed holistically for the benefits of all. No one pretends that meeting the IWRM challenge will be easy but it is vital that a start is made now to avert the burgeoning crisis."*

IWRM is, above all, a philosophy. As such it offers a guiding conceptual framework with a goal of sustainable management and development of water resources. What it does demand is that people try to change their working practices to look at the bigger picture that surrounds their actions and to realise that these do not occur independently of the actions of others. It also seeks to introduce an element of decentralised democracy into how water is managed, with its emphasis on stakeholder participation and decision making at the lowest appropriate level.

All of this implies change, which brings threats as well as opportunities. There are threats to people's power and position; and threats to their sense of themselves as professionals. IWRM requires that platforms be developed to allow very different stakeholders, often with apparently irreconcilable differences to somehow work together.

Because of the existing institutional and legislative frameworks, implementing IWRM is likely to require reform at all stages in the water planning and management cycle. **An overall plan is required** to envisage how the transformation can be achieved and this is likely to begin with a new water policy to reflect the principles of sustainable management of water resources. To put the policy into practice is likely to require the

reform of water law and water institutions. This can be a long process and needs to involve extensive consultations with affected agencies and the public.

Implementation of IWRM is best done in a step-by-step process, with some changes taking place immediately and others requiring several years of planning and capacity building.

1.1. Institutional framework

The concept of integrated water resources management has been accompanied by promotion of the river basin as the logical geographical unit for its practical realisation. The river basin offers many advantages for strategic planning, particularly at higher levels of government, though difficulties should not be underestimated. Groundwater aquifers frequently cross catchment boundaries, and more problematically, river basins rarely conform to existing administrative entities or structures.

In order to bring IWRM into effect, institutional arrangements are needed to enable:

- The functioning of a consortium of stakeholders involved in decision making, with representation of all sections of society, and a good gender balance;
- Water resources management based on hydrological boundaries;
- Organisational structures at basin and sub-basin levels to enable decision making at the lowest appropriate level; and
- Government to co-ordinate the national management of water resources across water use sectors.

Water resources management is one part of the overall management of the environment and the preservation of ecosystems, which is a prerequisite for sustainable development. Water resources management therefore needs to be coordinated with other disciplines and sectors that affect the water resources or are affected by how well the water is managed.

On the river basin scale there are thus many actors that have roles and responsibilities for management of the environment and society, which are all linked to the status of the water resources. For successful implementation of IWRM all these actors have to be involved.

It is therefore logical that IWRM on the river basin scale should be focussed on a set of basic **water resources management functions**.

2. BASIC FUNCTIONS FOR WATER RESOURCES MANAGEMENT

The suggested basic functions for water resources management in a river basin are presented in Figure 1.1, and Table 1.1 gives a definition of these functions.

Figure 1.1: Basic functions for water resources management

Table 1.1: Functions of water resources management in a river basin

Function	Example of activities
Stakeholder participation – Implementing stakeholder participation as a basis for decision making that takes into account the best interests of society and the environment in the development and use of water resources in the basin. [Module 4]	• Develop and maintain an active stakeholder participation process through regular consultation activities. • Provide specialist advice and technical assistance to local authorities and other stakeholders in IWRM.
Water allocation – Allocating water to major water users and uses, maintaining minimum levels for social and environmental use while addressing equity and development needs of society. [Module 5]	• License of water uses including enforcement of these.
Pollution control – Managing pollution using polluter pays principles and appropriate incentives to reduce most important pollution problems and minimise environmental and social impact. [Module 6]	• Identify major pollution problems. • License and manage polluters.
Monitoring of water resources, water use and pollution – Implementing effective monitoring systems that provide essential management information and identifying and responding to infringements of laws, regulations and permits. [Module 7]	• Carry out hydrological, geographical and socio-economic surveys for the purposes of planning and development of water resources. • Develop, update and maintain a hydrometric database required for controlling compliance of water use allocation.
Information management – Providing essential data necessary to make informed and transparent decisions for development and	• Define the information outputs that are required by the water managers and different stakeholder groups in a river basin.

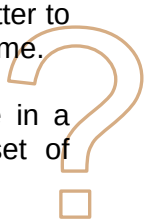
sustainable management of water resources in the basin. [Module 8]	• Organise, co-ordinate and manage the information management activities so that the water managers and stakeholders get the information they require.
Economic and financial management – Applying economic and financial tools for investment, cost recovery and behaviour change to support the goals of equitable access and sustainable benefits to society from water use. [Module 9]	• Set fees and charges for water use and pollution.
River basin planning – Preparing and regularly updating the Basin Plan incorporating stakeholder views on development and management priorities for the basin. [Module 10]	• Conduct situation analysis with stakeholders. • Assess future developments in the basin.

The water resources management functions comprise a general framework for implementing IWRM for any river basin in the world. For any specific country, region or river basin some of the functions may be more relevant than others. However, for an inhabited river basin with competing water demands all these functions need to be performed to achieve sustainable management of the water resource and to improve livelihoods. In most countries the water resource management functions are guided by the national water laws and policies. Typically these are regulatory functions.

3. USING INDICATORS TO MEASURE PROGRESS AND PERFORMANCE

The question that arises very quickly when addressing sustainable management of water resources, whether through an IWRM approach or not, is "how do we know progress is being made?" This is a very important question as it links to the suitability and effectiveness of laws and institutions and also the strategies and approach being used. Given the core principles behind the IWRM approach of *Economic efficiency*, *social equity* and *environmental sustainability* we have no way to make these visible and test them unless there is a method to answer the question posed above.

Indicators are one approach to measure progress. Indicators are used to measure the expected 'outcomes' of water resources management and not the process. It is better to start with a small set of indicators that are feasible to monitor and to improve over time.



An indicator is the **representation of a trend** tracking the measurable change in a system over time. Generally an indicator focuses on a small, manageable set of information that gives a **sense** of the bigger picture.

4, STAKEHOLDER PARTICIPATION

In countries where water reforms have taken place and water laws have been revised it is often found that stakeholders are identified in the water law and have the possibility to contribute to water management through legal stakeholder structures. This provides an important platform for their formal involvement and collaboration with water management organisations of government.

Stakeholders live in the basin and are directly affected by decisions on water resources management either as holders of allocation permits or as water consumers and participants in basin economic and social development. In general stakeholders should

be involved in all parts of the water resource management process. Some functions of water resources management where stakeholders play an essential role are given in Table 1.2.

Table 1.2: Possible stakeholder roles in water resources management

Water Management Function	Stakeholder roles
Basin planning	Problem identification, priority setting, situation analysis, approval.
Water Allocation	Advisory, monitoring and reporting, decision making.
Pollution control	Monitoring, reporting, permitting

4.1 Stakeholder inventory and mobilization

A first step for an River Basin Organization (RBO) is to identify and group the stakeholders in the river basin. The initial identification of stakeholders is not easy. One problem is often to define the system boundaries. Water affects society in many ways and the socio-economic development of a major river basin in a country may affect stakeholders on the national and even international scale.

Getting the right representation of stakeholders is also not easy. It is not possible to consult everyone. However, it is important to assure that there is a proper representation to legitimize the formal stakeholder structures. This requires the categorisation of stakeholders at an early stage. These categories should recognise the different interests and provide the basis for determining representation in water management structures.

One common way to categorise stakeholders is as follows:

1. **Water users** defined as those who need a water-use permit according to the water law and policies. They may be subdivided by competing use such as farmers, utilities, industry, mining, local government, hydropower and so on;
2. **Governmental institutions** that according to their public service role have a stake in water management in the river basin. It is particularly important to identify government institutions that have influence or impact on water management such as agriculture (land use), environment (land use, pollution management, ecosystem health) so as to engage them in policy development; and
3. **Civil society** and its non-governmental organisations.

4.2 Formal stakeholder structures

It is important to clarify early on the **roles and responsibilities** of the stakeholder structures in the water resources management process. The water management objectives for the basic functions of the RBO will give guidance. The objectives on basin planning, water allocation, pollution control and monitoring will determine the need and level of stakeholder involvement. For example the water users may be given the responsibility to do monitoring on the local scale under supervision of the RBO. In this case the structure of the stakeholders must be designed to enable easy communication on the local scale. Another example is that the objectives for basin planning may require consensus among the major stakeholders on water development plans. In this case formal stakeholder structures are invaluable.

In such basin committees an essential issue is **representation**: how are different stakeholder groups represented in the central forum. Procedures and guidelines must be clarified on how different groups are represented and how these representatives are selected and replaced from time to time. Clear and documented rules for this are important to obtain equitable participation.

4.3 Government as a stakeholder

Cross-sectoral coordination deserves a special mention under stakeholder participation. Coordination between different sectors often means the cooperation, or at least exchange of information, between different governmental ministries and departments. It is therefore closely linked to the water management objective of effective cooperation between government agencies with responsibilities for water in the basin.

As indicated in Figure 1.2 inter-ministerial committees are located in between the columns for stakeholders and governmental bodies. This is because many governmental organisations may be managing water resources, users of water resources or have responsibility for programme areas that directly impact on water resources management. Local Governments are in many cases responsible for the water supply and sanitation and are therefore in the category of water user. At the same time Local Government is obviously an important stakeholder when it comes to water resources allocation or basin planning for development.

4.4 Maintaining Active Participation

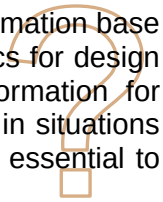
Despite the long and difficult process of mobilising and organising the stakeholders, the largest challenge for an RBO is probably to maintain active stakeholder participation in a river basin. **A key is to ensure that the stakeholders see the benefit of their participation.**

Below are a number of guidelines to keep in mind for promoting active stakeholder participation:

- **Information dissemination** – Information is enormously important to keep up the stakeholders' interest for water resources management and to create a sense of local ownership of the process. A variety of information tools are available (workshops, information leaflets, web pages, visits and consultations on the ground, etc). A particular activity would ensure that stakeholders are kept informed of the status of water resource management in the basin through reports on key indicators.
- **Capacity building of the stakeholders** – Stakeholder participation is often hampered because the capacity of the stakeholders is too low or some stakeholders know much more than others. It is important to recognise that there are stakeholders in every basin that are knowledgeable people but others may need to be brought to a similar level for effective participation. The RBO should have an active capacity building programme for new members to be sure that they have the exposure and support to enable them to perform the responsibilities they are tasked with;
- **Giving responsibility and clear roles** – Without responsibility and clear roles no-one will continue to attend meetings;
- **Parallel development of the water resources** – Concrete development of the water resources and addressing problems in the basin is key for promoting participation. Water resources management basically aims at improving the accessibility to water

which gives socio-economic development and better living conditions for the stakeholders. Development projects are not just a sign of that the water resources management gives something back to the stakeholders, it also gives opportunity to discussion and participation while it is being developed. It is therefore important for RBOs to, as much as possible, coordinate development projects with the participatory process. A long delay between planning and decision and the commencement of actual development on the ground is very de-motivating for stakeholder participation; and

- **Providing services** – The RBO often sits on a large knowledge and information base that is valuable for the stakeholders. Examples may be river flow statistics for design of small weirs or water outtakes, rainfall statistics and soil type information for agriculture planning, groundwater aquifer characteristics, etc. Especially in situations where the RBO needs the stakeholders' participation for monitoring it is essential to offer valuable data in return.



5. WATER ALLOCATION

In river basins where there is water scarcity, or will be in the future, there is a need to regulate the water usage to ensure sustainable, equitable and efficient utilisation of the resource. The regulation of the water resources is normally made through a **permit or licensing system**, which enable the government or state authorities to allocate the resources taking into account all stakeholder interests, including the environment. In countries with abundant water resources this may not be needed but with the increased pressure on the water resources, both in terms of quantity and quality, this is becoming a rare situation.

This allocation system or procedure is also the appropriate vehicle to implement other water management objectives related to equity and efficiency.

5.1 Linkage to other water management functions

Water allocation is, together with pollution management in many ways the centre of the RBO's work (Figure 1.2) supported by other functions.

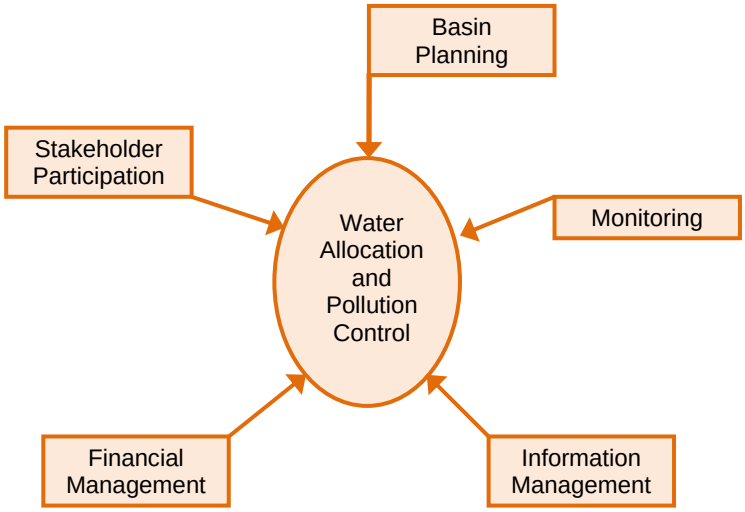
Basin planning provides the setting for water allocation. It provides the naturally available surface and groundwater resources and the environmental flow requirements. It also gives present and projected future socio-economic conditions, water demand and infrastructural development. All this information is the basis for how much water is needed and how much can be allocated in the river basin.

Financial management gives the tools to encourage and, if necessary, force efficient use of water. In especially water-scarce regions this function is fundamental for sustainable water use.

Stakeholder participation and *information management* give transparency and ownership to the decided allocation. This is a prerequisite for the water users to respect the allocation system. Through participatory activities coordination between different water

uses is also made possible. *Monitoring* of water use and water resources is necessary to enforce the water allocation.

Figure 5.1: The water allocation and pollution control functions are dependent on input from the other functions



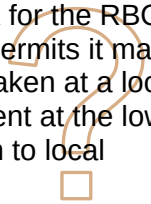
If water policies have been developed, which is normally done on the national scale, and all these other functions are in place, the water resources management function of water allocation boils down to one difficult element: to develop procedures for authorising water licenses or permits.

5.2 Water permits

Considering the difficulties of allocating water by taking everything into account, as described in the previous chapter, the water management objectives may be seen as a guide to priority setting for implementing water allocation. A situation where all major water users are known and are registered at the RBO is a very important first step. **Water allocation is based on the principle that everyone in the river basin is involved.** The existence of water users that by-pass the rules will inevitably mean that the allocation system will fall apart.

The next step is to give all major users a permit to abstract water or build storage. This permit may be with or without limitations. In a river basin with abundant water resources it may be sufficient to allow open permits as long as they are registered and provide monitoring information. In most cases, however, water resources are not abundant and the permit must therefore be conditioned with limitations in use, etc. How this permit system is structured is often controlled by the national water law. In many cases the water law gives a minimum abstraction for which a water permit is needed, what institution has the authority to approve such permit and who has the regulatory responsibilities.

If stakeholder participation in the water allocation process is not, or only partly, directed by the water laws the structuring of stakeholder fora is an essential task for the RBO. Even if the central RBO is the institution assigned with authorising the permits it may be beneficial to create a decentralised organisation where the decision is taken at a local scale and with participation of the stakeholders. To strive for management at the lowest appropriate level, is therefore recommended delegating water allocation to local authorities, water user groups or stakeholder committees.



When the responsibilities and participatory structure of the permit system are in place the next step is to develop general rules and principles for water allocation. These rules should be established in conjunction with the stakeholder structures.

5.3 Allocation Criteria

Besides prioritisation of different sectors, the rules and criteria of water allocation should address major issues such as:

- Acceptable probability of supply for different sectors and users;
- Legal certainty – period of time the permit is valid;
- Public review mechanisms and possibility for stakeholders to challenge new permits or the misuse of permits;
- Conflict resolution or appeal mechanisms;
- Levies and fees for application and abstracted water volumes; and
- Definition of extreme conditions, e.g. droughts when special rules may apply.

The basic information that needs to be included in an application for a water permit and which provides the base for the approving process is:

- Where is the water abstracted and from what source;
- How much and when is water abstracted;
- How is water abstracted; and
- What is the abstracted water used for.

The general rules and principles must guide how this information is analysed. A full system analysis for the entire river basin is in practical terms impossible to conduct for every water permit application. The rules must therefore provide guidance for what procedure to follow depending on the type of abstraction.

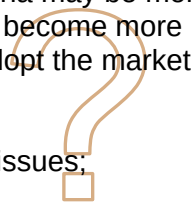
In certain cases, e.g. in parts of the river basin with no water scarcity or if the water abstracted is small in volume, the approval procedure may be simplified. On the other hand if a significant storage is to be built with large outtakes and altering of the river regime a full system analysis must probably be made covering all downstream river reaches.

As a minimum a hydrological assessment must be made for all water permit applications where the abstraction is compared with the available water resources taking into account water use for basic human needs and environment.

The next step involves a comparison with the available water resources taking all other outtakes into account. This analysis involves prioritisation, reliability of supply and

certification issues of water and is therefore much more complicated. This step is where the water management objective of equity and social priorities is addressed.

Allocation mechanisms should be applied that promote efficient use and favour uses that have greater impact on social and economic development. These criteria may be more difficult to apply initially but will become necessary as water resources become more limited. This has been one of the main drivers for some countries to adopt the market approach to water allocation allowing the sale of water permits.



The setting of criteria for water allocation should include all the above issues; prioritisation, reliability of supply and efficiency of use.
At the same time it must be simple enough to be applicable and understandable for the stakeholders.

Many river systems of the world are already over-utilised because of lack of water allocation systems. Experience of water allocation in river basins has also shown that large stakeholders use their power and political influence to favour themselves. Economic instruments for steering the abstractions to more beneficial use of the water are still very rarely applied.

The major lessons therefore are:

- In a water scarce river basin, all major water users should be known and should have a permit.
- Clear guidelines and criteria must exist for how and by whom water allocation decisions are taken.
- These guidelines and criteria shall take into account the fundamental basics water use: sustainability, equity and efficiency.

6. POLLUTION MANAGEMENT

Water resources management entails two closely related elements, i.e. the maintenance and development of adequate *quantities* of water of adequate *quality.* Thus, water resources management cannot be conducted properly without paying due attention to water quality.

Managing water pollution is clearly one of the most critical challenges to sustainable management of water resources. Without urgent and properly directed action, many countries and particularly developing countries face mounting problems as water resources become more contaminated. Pollution is increasing rapidly with urbanisation, industrialisation and population growth, yet many countries have inadequate institutional and legislative systems to address the problem effectively.

7. MONITORING SYSTEM

Monitoring of water resources, water quality, water use and pollution discharges is essential for effective water resources management. Even if it is not given as a direct regulatory responsibility the river basin organisations thus need to address monitoring as one of their basic functions for conducting water resources management at the basin scale.

Monitoring of compliance and acceptance of produced data is difficult without the involvement of the stakeholders. Similarly, financial management tools such as water tariffs and the polluter-pays-principle are essential to find the economical resources for measurements and to motivate self-monitoring. Information management is also important to disseminate the monitored information. Measurements are never meaningful if the results are gathering dust and are not analysed, presented and used.

Monitoring is conducted to assess, average values and conditions, spatial variations within the river basin, temporal variation over time, and trends and development directions.

Monitoring of water resources, water use, water quality and environmental status is very important for enforcing water allocation and pollution control decisions. Ensuring that individual water users or polluters stick to the rules is a fundamental part of building trust for a water allocation and pollution control system. This is essential both for the authorities and stakeholders. Monitoring means that review mechanisms have access to actual observed data so that complaints or challenges can be properly investigated. To conduct monitoring of water resources, the most fundamental step for an RBO with limited human and financial resources is to build up a network based on priority gauging stations. **It is better to have a few carefully selected gauging stations that give reliable results than many stations that give uncertain results.**

8. INFORMATION MANAGEMENT

IWRM, in the context of a river basin, is about management of the limited water resources in a river basin for an optimum outcome among different competing water users. Thus, comprehensive, accurate and timely information is necessary for objective planning, decision-making and for gaining support from competing river basin stakeholders. However, the reality is that most RBO are under-resourced, both in terms of financial and human resources. Thus, there is a need for RBO managers to understand the main IWRM issues in a river basin and prioritise the types of information that they need to collect (separating the essential from the non-essential) to address the identified issues. Deciding on what to report, to whom and how to communicate the report to the relevant stakeholders is the final most important step.

Thus, for effective implementation of IWRM in a river basin there is a need for an information management function to be carried out by an Information Management Unit (IMU) within a relevant RBO.

9. ECONOMIC AND FINANCIAL INSTRUMENTS

With improved water resources management and the creation of new management structures increasing attention is being given to the financial viability of water management systems and the use of subsidies and charges to change the way water is being used. This module addresses the use of financial and economic instruments in water resources management and how they can be used to contribute to more sustainable management and development of water resources.

Economic and financial instruments contribute to sustainability of the water management system and the short term Water Management Objectives may be:

- Water use efficiency is improving through the use of economic and financial instruments; and
- Pollution is being reduced through the use of economic and financial instruments.

10. BASIN PLANNING FOR WATER RESOURCES

While river basins are the natural accounting units for water management, political and administrative decisions are often made according to jurisdictional boundaries that do not coincide with river basins. An immediate dilemma for water managers is then how to bring together the different actors and stakeholders to contribute to basin development and management.

The challenge in river basin management is to achieve the ideals of hydrological and ecologic integration in the context of river basin realities. Basin planning provides an opportunity to address water problems and prioritise development in a strategic and integrated manner.

In a nutshell, river basin plan is an action plan for the integrated management of the water and related land resources in the basin. With reference to figure 10.1 the Basin Plan is in the area of strategic planning. It will have details of actions and broad budgets as well as strategic elements. The plan will normally be relevant for several years. It will be brought into an operational plan only when the **River Basin Organisation or other agencies take up the plan for actual implementation and incorporate it into their annual work plans accompanied by specified actions and detailed budgets.**

The most powerful reason for planning at the basin level is to address priority water problems affecting society and to stimulate growth and development. Basin plans for water resources are therefore set within the realities of water availability, within the geographical and political context and will take into account all activities and developments requiring water or influencing the water resources, which include ecological requirements, water supply and sanitation, irrigation, land use and forestry, fisheries, hydropower and industrial use.

This approach appreciates the shared opportunities and impacts for water resources within the basin and the need for transparent negotiation, cooperation and concerted actions for sustainability. Often the planning process leads to recognition that water problems are symptomatic of a deeper failure of the water management systems. The role of water in development and as a key factor in poverty reduction and sustainable development also drives river basin planning for water resources.