Integrated River Basin Management
From Concepts to Good Practice

Briefing Note 7
River Basin Planning and Management
Participatory approaches to planning and managing a sustainable river basin

This note is one in a series explaining the attributes and practical application of integrated river basin management. The purpose of the Briefing Note series and the issues and aspects that are covered are outlined in the mini-guide.

This note discusses:
• Recent approaches to water resources planning
• How to integrate top down and bottom up approaches
• How to incorporate the participation of all basin partners and the basin community.
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Introduction

River basin planning has existed in one form or another for decades. Until recently, however, basin organizations or government agencies designated to do this type of work were set up only to execute particular functions. Single-purpose planning was often undertaken, or the development of a single project with multiple purposes, such as hydropower, irrigation, flood control, navigation, major urban supply, or a combination of some of these uses. The responsible organization or agency had a limited development role. The water resource planning that was undertaken related to this role placed little, if any, emphasis on the overall sustainable management of the basin.

Water-related ministries in many developing countries have undertaken another type of development-focused planning: master planning. Such planning was comprehensive in that it involved rigorous analysis of hydrologic, social, and economic issues and the impacts of a range of structural development options. However, some key deficiencies remained.

First, other water-related ministries were not consulted about their needs. As a result, single-purpose projects tended to dominate. Second, the planning rarely considered the capacity of the natural resource base of a river basin to sustain an acceptable level of resource health or condition, should a particular development package proceed. The concept of an acceptable balance or trade-off among economic, environmental, and social issues for sustainable basin management was not widely recognized. Third, the basin stakeholders and the overall community were not consulted in any meaningful way, nor did they participate in the planning process.

Integrated river basin management (IRBM), as it is known today, tries to achieve an acceptable and agreed balance or trade-off among economic, environmental, and social issues, with the input of all the governments or relevant government agencies operating in the basin and with the
effective contribution and input of the basin community. Integrated water resources management can be achieved through the efforts of a river basin organization or those of a government agency.

The trade-offs always prove to be very difficult. The objective is for water management decision making to address each of the three categories of policy interest—economy, environment, and society—in a manner that is considered to be fair. Representatives or lobby groups of each policy area will naturally push strongly for their views to take precedence. The better the quality of the information they can provide and the more comprehensive the policy agenda of a government, the smaller will be the scope for debate and argument. In developing countries where data and information are not comprehensive, the margins within which decisions are made tend to be quite large and the emphasis given to the three policy areas varies significantly.

It is therefore the responsibility of the water and natural resource managers to consult all the stakeholders and listen to the various viewpoints before arriving at a list of reasonable options to present to the government for consideration. In other words, they are to provide the governments with the best information and process outcomes so that well-informed, principled, and pragmatic decisions can be made. In the end, the governments are the ones who make the decisions.
Integrated river basin planning involves evaluating all factors relating to the economic, environmental, and social needs of a basin and then widely debating a range of options that provide various balances or trade-offs among these factors. This process is concerned with finding the solution that is an acceptable compromise as to how best to utilize scarce resources, based on open and honest discussion of the competing uses.

A comprehensive planning process consists of several sequential processes that involve:

» Developing and agreeing to the planning process and procedures. This would be done by the basin organization (if one exists) with active participation of all member-governments or groups within the organization, or by the agency responsible for undertaking river basin planning. In the latter case, it is essential that the lead agency immediately establish a steering committee made up of senior persons from all the water-related agencies to ensure coordination and a participative approach for the planning studies.

» Developing a dialogue with the public, stakeholders, and politicians to ensure that all stakeholders have an opportunity to contribute to the process. In the past, this public participation process was not done well. Even now, there is a tendency merely to keep the community informed, as opposed to establishing a genuine participatory approach where the community is actually involved in the debate on issues, options, and solutions.

» Undertaking the planning process. This may be done either by the organization leading the studies or by external professionals and technical experts that work under the control of the organization.

For developing countries, another process is critical:

» Building knowledge and capacity within the basin organization or within the relevant government agencies, to ensure sustainability of the planning processes.
In general, planning involves the following nine tasks:

1. Understanding the condition of the basin. This can be done through:
   - A study of the historical context of basin, status and trends
   - Collection and analysis of water-related data
   - Analysis of the data to create an environmental inventory of the basin
   - Identification of the key natural resource problems from these data and this information
   - Development of the knowledge on behavioral trends and the degree of stress that the key resource areas can withstand as a result of any increased water development.

2. Identifying the national, regional, and sub-national goals and objectives for water and related resources development.

3. Developing specific water and natural resource policies, procedures, goals, and strategies consistent with the national and regional goals, to guide how and when the resources can be utilized within the agreed stress or impact limits.

4. Analyzing the various water sector requirements and the development of a broad basin-wide water and related resources framework that best meets the overall basin needs. The framework should be comprehensive, considering conjunctive use of surface water and groundwater, transferable water rights, reuse, and conventional supply management options, as well as demand management instruments.

5. Undertaking bottom up planning at the sub-basin or catchment level, often called land and water management planning (or sub-basin planning, micro-planning, village development planning, or water user association planning, depending on the level and community institution involved). This will involve significant community participation.

6. Obtaining broad input from relevant groups and people in the basin as to the appropriateness of both the higher-level framework plan and the lower-level land and water management plans.

7. Incorporating the best portfolio of proposals that balance economic, environmental, and social issues at both higher and lower levels into the first basin development plan. Parts of the plan will likely change as more data become available and more planning occurs at the lower levels. It is common for the initial plan mainly to include major projects and broad management improvements from the top-down management, as the lower-level planning often takes longer to complete.

8. Developing investment plans on both a sub-basin and whole-basin basis to fund and implement the basin water plan.

9. Developing and implementing a monitoring plan to ensure that the contents and approaches expressed in the basin plan are being followed.

These tasks must be undertaken in a participatory manner, involving as many stakeholders as is possible and sensible. It is also very important for the basin organization or the inter-agency steering committee to own the planning process. Depending on the analysis of the monitoring results or if there are changes in policy, then the planning process may start again.

The major differences between the process discussed above and the more traditional form of master water
planning are that the approach above takes into account:  
> The need to adequately consider the health and capacities of the basin’s natural resources before any planning scenarios are attempted (step 1)  
> The need to fully consider any previously developed regional/national water-related policies and plans (steps 3 and 4)  
> A technical and economic framework for analyzing both water supply and demand  
> The bottom-up planning component (steps 5 and 6)  
> The need to meaningfully involve the basin stakeholders and community throughout the planning process in a way that best meets with local political and social aspirations (community involvement in water resources planning and management is covered in detail in Note 12)  
> A technical and economic framework for analyzing both water supply and demand.

Tension and disagreements can arise among many of the organizations, in particular the water-using agencies that oversee navigation, irrigation, and hydropower. These organizations all have individual planning agendas and may have already expended considerable effort to produce their own single-purpose plans, which will invariably need to change under the overall river basin planning process. A framework plan is shown in figure 7.1.
In this case, it has been assumed that all water-related agencies have already developed either plans or policies and each of these will need to be taken into account when developing the basin-wide approach to planning and management. It may appear as though too many plans need to be developed. This is not the case, however, as it is only a framework, which allows each agency to develop specific plans and at the same time ensures that these all fit or align with basin-wide policies and priorities.

Bottom-up Planning

It must be stressed that bottom-up planning, as is described below, in no way replaces the more expansive framework or master planning. It complements it and helps to form a more comprehensive overall plan to meet the needs of all the stakeholders.

In addition, although the planning efforts at the local (bottom) level and the government agency (top) level have quite different approaches, they are not totally separate. Community planning at the sub-basin level should feed into the broad basin-wide planning. Bottom-up input should also occur throughout the planning process.

The incorporation of an appropriate form of bottom-up input into the process is largely a new concept to developing countries. Traditionally, planning (including water resources planning) has been a centralized function, with the local-level governments and agencies closely following the framework plans given to them by senior management. Thus the best way to introduce bottom-up input is often by undertaking some pilot studies at the local level, where the benefits can be clearly seen. Often, some specific local-level planning – for example, for a small irrigation system or improved drainage in a particular area – has already been undertaken in many developing countries, but this needs to be extended to consider improvements in productivity, crop technology, water use efficiency, and resource rehabilitation under one coordinated plan that is owned by the landholders of the area.
The overriding objectives of land and water management plans (LWMPs) are:

- To improve regional/sub-basin/catchment-level productivity through increased farm productivity, improved land and water management efficiencies, and improved farmer education and awareness.

- To at least maintain the sustainability of the land and water resources - but where possible, to improve it - by addressing problems at a sub-basin, catchment, or county level in an integrated way and through local ownership and input.

- To achieve an acceptable balance of economic, environmental, and social outcomes in accordance with community values and expectations through close collaboration between the government agencies and those individuals involved with and/or affected by the LWMP.

The land and water management plan provides the stakeholders at the lower levels - often the ones directly affected by planning decisions - the opportunity to have an input in, and in some cases, to own, the planning process at sub-basin/catchment/irrigation area or district level. Such local ownership is proving to be the most positive feature of bottom-up planning. It is leading to greater farmer commitment in regard to long-term farm management practices.

What Are Some of the Elements of LWMPs?

LWMPs cover smaller sub-catchments and address the land, vegetation, and water-related problems affecting both farm productivity and natural resources health, as well as impacts on urban areas within the catchment. They may cover the area of a single water user association or landcare group (such as a group with dryland farms) or many such groups. They consider a large range of works and measures to better achieve sustainable use and protection of the resources. These may include:

- Improved on-farm water supply and storage, drainage works, surface water and groundwater conjunctive use policies, channel lining.
- Farm planning (new technology, laser leveling), new crop types better suited to local conditions, more salt-tolerant crops.
- Improved water management, water use efficiency, reuse of water, smarter irrigation scheduling.
- Improved management of vegetation, forest areas, wetlands, river banks.

LWMPs may cover a relatively long time period (say, 10 to 20 years) so that works and activities can be phased to suit resources available. They link all elements of land and water management together, such that a solution in one area does not cause problems in another. For example, poor quality drainage water would not be allowed downstream into another area. They are developed in partnership between the government agencies (providing technical input and advice) and the stakeholders representative of the local people. Stakeholders share the costs. Often in developing countries, farmers are unable to make any significant financial contributions, so they provide the labor for the on-farm or within-irrigation area improvements.

LWMPs can overcome a variety of problems:

- High levels of non-beneficial evapo-transpiration (ET) due to rising groundwater levels resulting from inefficient irrigation practices, poor drainage, and heavy clearing of native vegetation.
- Soil waterlogging and salinization due to poor natural drainage.
- Downstream environmental damage from saline/nutrient-rich drainage and runoff.
- Degradation of rivers and wetlands, loss of native vegetation, and consequent impacts on fauna.
- Single-use policies for groundwater and surface water.
- Poor urban planning and uncoordinated urban expansion.
- Poor farming techniques and old technology, low farmer education and awareness.
- Inappropriate crop types and low yields.

Of What Value are Land and Water Management Plans?
How Are LWMPs Developed?

First, the local community and the government jointly identify and define the problems and decide on the areas to be included in the plan. Second, a format for community input is agreed. In mature river basins where farmer education levels are higher, the planning is controlled by the community with some technical help from the experts. In less developed basins, experts undertake the planning, with input from a community-based advisory committee. For each sub-basin, the process will need to be customized, as the awareness levels of the stakeholders will vary over the range and complexity of basin issues.

Third, a range of options or a mix of measures is investigated. The positive and negative impacts are assessed, taking into account the economic, environmental and social aspects before selecting the preferred option. Questions to be addressed include:

- What will the impacts be of the options proposed?
- What actions and projects need to be done in the preferred option, by whom, and in what order?
- How long will the selected option take to implement? Is the time frame too long or insufficient?
- Are other changes needed to ensure that the expected benefits occur?
- Who will be responsible for the various parts of the plan? Who will pay for various parts?
- Are there adequate skills, knowledge, and capacity to undertake a participative planning process? Do the farmer representatives need some training? If so, for how long?
- How will the training costs be covered?

Cost sharing is another important issue. The costs are normally shared based on the levels of benefits to be received by the various stakeholder groups. In developing countries, funds may come only from government or donors that are supportive of this type of local level sustainability planning. Nevertheless, in-kind contributions from the participating farmers and their ownership and commitment to the planning process are equally valuable.

A participatory approach demonstrates that the government wants to partner with the community to address the basin issues jointly, rather than impose directives upon them. Positive impacts are:

- Greater stakeholder awareness and knowledge of the resource problems in the sub-basin and greater opportunity for farms to use modern technology and plant a larger range of crops.
- A formal agreement/partnership that spells out the specific commitments and benefits for all parties.

The government agencies or river basin organization must ensure that the selected mix of works complies with the policies and directions already established under any existing basin-wide planning scenario. The basin organization should also be responsible for monitoring the implementation of the plan, assessing whether the expected benefits are being achieved, determining whether any changes to the content of the plan should be made, and ensuring that funds are being used appropriately and as agreed.
Arrangements to provide for a participatory form of integrated river basin river management vary. There is no single specific roadmap that is applicable to all cases of river basin planning. However, a standard set of principles can be used to develop a framework that can be tailored to suit the particular needs and circumstances of the basin.

Australia, Canada, France, Mexico, the Netherlands, South Africa, Spain, the United Kingdom, and the United States are just some of the countries that are following a participatory path in river basin planning. Australia and Canada probably have the most developed form of participation. Both countries have the advantage of having highly educated basin communities that can participate at all levels of basin planning and management.

Any number of basin organizations or countries could have been chosen as case studies for this Briefing Note. The two described below were selected because of their marked differences in adopted approaches.

The Mekong River Commission is a relatively new international basin organization in Southeast Asia with little community involvement to date and with a new planning process under development. The Murray-Darling Basin Commission is a mature national basin organization in Australia with a high level of community awareness and participation.

What Are Some Approaches to Participatory IRBM?

The Mekong River Commission

The Mekong River Commission (MRC) has a very clear mandate to oversee a comprehensive and integrated form of basin water resources planning. The MRC must prepare a Basin Development Plan (BDP), which is one of the three core program areas for the first five years of MRC operations. The BDP process has been developed after extensive consultation among all four member-countries. It consists of two parallel processes:

> Procedural and technical processes and actions for undertaking the water resources planning, and
> Participation and decision-making processes to define the roles that all member-countries will play and the contributions of stakeholder groups.
Underpinning both processes is a capacity building and institutional strengthening component. Improving the skills of staff at the MRC Secretariat and in the member-countries in all aspects of river basin planning and management is an essential requirement for successful implementation of the BDP.

The BDP is an incremental planning exercise. Any version of the BDP is based on the data and knowledge existing at that time. The plan will be incrementally upgraded and updated as the knowledge of the basin’s natural resources improves.

A planning horizon of 20 years is proposed, divided into the following periods: a short-term (5-year) plan, a medium-term (6- to 10-year) plan during which most of the implementation of projects would take place, and a long-term plan from years 11 to 20.

Most importantly, this process is closely aligned with the national planning initiatives in each country. The projects included in the BDP will not solely reflect the country priorities, as the overarching MRC mandate and other transboundary issues will also be considered.

In addition, in line with MRC’s recently endorsed public participation policy, a bottom-up planning component will be integrated with the more traditional top-down planning, which concentrates on major works. This will be put into effect by considering the planning needs of some 10 or more sub-basins and by developing a format for community participation for each sub-basin to ensure that local needs and objectives are addressed. This is very challenging for the MRC, as a similar form of participative planning has not occurred in any of the four member-countries.

This planning process therefore clearly and logically gives basin communities an opportunity - through an appropriate form of sub-basin advisory groups, committees, or forums - to provide information and to comment on the planning process in conjunction with the primary technical agencies or institutes.

The Technical Aspects of the Process. The four member-countries have agreed on eight related sectors and four cross-cutting themes to be considered as components of the integrated water resources planning process. These are as follows:

- **Sectors:** Irrigated agriculture; watershed management; fisheries; hydropower; navigation and river works; tourism and recreation (water-related); water supplies (domestic and industrial uses); flood control and flood management
- **Cross-cutting themes:** Environment (including specific ecosystems and their water demands); human resources development; socioeconomics (including poverty reduction, cultural and gender aspects); and public participation.

It was decided to base the planning on a series of sub-basins within the Mekong Basin, rather than treat the basin as a whole unit. The planning process is therefore as follows:

**Stage 1: Identification and analysis of sub-areas**

- Identify sub-areas - that is, the clusters of catchment areas - preferably with a hydrological station to monitor water flow and for planning simulations
- Develop planning objectives in accordance with the national targets for the socioeconomic development of the region/province
- Assess and analyze sector issues and potential natural resources problems
- Develop an appropriate community participation process at the sub-basin level.

**Stage 2: Compilation of development scenarios:**

- Water demands for current and future development (crops, industries, hydropower, water supply, navigation, fisheries, environment, and others)
Water balances to assess surplus and shortage of water resources
Possible effects on various dimensions in the basin: economy, environment (water diversions and natural resource health), and social (gender and poverty)

Stage 3: Formulation of an overall management and development strategy

> Specify the roles that the water-related sectors should play with respect to key parameters such as socioeconomics, environmental limits, water availability, and technology, based on the sub-basin scenarios and in line with the national strategies
> Identify management and development strategies for each sub-area, covering all aspects from large water conservation plans to capacity building at the village or water user association level
> Consult sub-basin stakeholders and obtain public input on the strategies.

Stage 4: List proposed projects / programs

> List specific projects and programs that best achieve the strategies previously identified.

Stage 5: Identification of high priority projects and programs

> Develop agreed criteria for selection of high priority projects and programs
> Short list projects and programs in terms of their socio-economic, environmental, and financial implications
> Develop a funding strategy

The Participatory Aspects of the Process. In integrated water resources management today, the term “stakeholders” covers all political, technical, business, and community participants. An appropriate level of input from all stakeholders to the planning process should be therefore be ensured.

As such, an approach is being developed early in the BDP process to allow people in the communities to convey their views on resource problems and their goals to the planners. The format for community participation need not be the same in each sub-basin, but should reflect the administrative procedures and the social and cultural values of each sub-basin.

The MRC Ministerial Council obtained early agreement to the BDP process. A protocol that ensures adequate exchange of all types of data relevant to basin planning had also been put in place. In many respects, the latter served as the catalyst to build trust and confidence; these, in turn, have led to the comprehensive participatory basin planning approach among the four countries.

The Murray-Darling Basin Commission

There are approximately 14 sub-basins within the Murray-Darling Basin. The Ministerial Council of the Commission has agreed that specific water resource use and protection plans will be developed by the member-state(s) in which the sub-basin is located, but in accordance with the overall natural resource policy and planning approach. Therefore, a single Murray-Darling Basin Sustainability Plan does not exist. There are 14 sub-basin plans, which collectively achieve the same purpose with a much greater local focus.

The Murray-Darling Basin Commission (MDBC) is principally a coordinating basin agency that oversees planning and management activities to ensure the realization of basin objectives. Thus it does not do any of the planning itself. This is the responsibility of the member-states. Since the level of community awareness regarding natural resource issues is very high, the states have all adopted very participative forms of water resource planning centered around the sub-basins.

Each of the 14 sub-basins has a Catchment Management Committee or Board; in this context, catchment means...
the same as sub-basin. The Committees or Boards are comprised of community or stakeholders representatives, as well as technical experts from the various agencies operating in the sub-basins. The role of these boards is to prepare a natural resources sub-basin strategic plan and a set of priority action plans to implement the overall sub-basin plan. The Boards also prepare investment scenarios for the implementation of the action plans and negotiate with governments for the acquisition of the necessary funds. Major works, such as dams, weirs, or field reservoirs, are usually still funded directly by the government. Funds can also be obtained for these and other works from donors.

The planning process followed by the sub-basin Boards is very similar to that described above. The steps are as follows:

- Review data and analyze the condition or health of the basin’s resources
- Develop knowledge on the degree of stress or impact that the key resource areas can withstand due to any increases in water development
- Identify the national, regional, and sub-basin goals and objectives
- Develop specific water and natural resource policies, procedures, plans, and strategies to guide how and when the resources can be utilized within the agreed stress limits (these policies may already exist from higher-level decisions at the national or state government level, or by the MDBC)
- Identify and then undertake the range of planning that needs to be done to respond to the higher-level policy decisions – at the sub-basin level and also at specific lower levels
- Obtain input from relevant groups and people in the sub-basin as to the appropriateness of the recommendations from all the plans
- Finalize the best mix of proposals at both the higher and lower planning levels and develop an investment plan for the priority projects
- Develop and implement a monitoring plan to ensure that the sub-basin plan is being followed.

Until about 10 years ago, sub-basin planning initiatives still included some projects for increasing the diversion of water for productive use. However, subsequent scientific information suggested that the rivers of the Murray-Darling Basin were over-committed and suffering declining health from increases in salinity, turbidity, nutrient runoff, and unnaturally low flows. Considerable advances have since occurred to arrest the degradation of the basin’s resources. Despite these efforts, it became apparent that a broader approach was needed to accelerate sub-basin planning initiatives and achieve a better balance between resource health and economic productivity.

To this end, caps or quotas have been imposed on the diversions in each sub-basin and the MDBC has adopted new policies to manage the basin’s natural resources. A sustainable level of catchment health has been defined for each sub-basin and a range of targets and corresponding timeframes set to achieve these. Using a regular monitoring program, MDBC assesses how the states are managing each of the 14 sub-basins and seeks to establish whether the reductions in water diversions and the changes in land use practices and water use efficiencies are in fact achieving the improvements and the sustainability targets.

A set of policies has been agreed to by all members of the MDBC for four key resource areas or components. These are considered to be the best indicators of catchment health. These are:

- Water quality (salinity and nutrients)
- Water sharing (for both consumptive use and in-stream environmental flow requirements)
- Riverine ecosystem health (recognizing the essential needs of aquatic life)
- Catchment/sub-basin biodiversity (flora and fauna).

Compliance targets have been set for these in each catchment or sub-basin.

The views of the different stakeholders often conflict,
which inevitably means that the basin organization, the minister, or the agency responsible for river basin management must decide on a workable compromise after an appropriate level of consultation with all the stakeholders.

Issues to be debated include economic assets (such as those for supplying water for urban uses, irrigation, and hydropower), environmental issues (such as protection of wetlands, fish, birds, native vegetation), and social issues (such as poverty reduction, gender issues, community improvements, cultural sites and requirements, recreation use of water).

The Sub-basin (or Catchment) Management Committees/Boards, with expert help from the agencies working in the sub-basin, prepares the sub-basin plan. This plan includes a range of higher-level projects and programs that should be considered to move the health of the sub-basin resources in the direction identified by the MDBC. Many lower level land and water management plans that cover the smaller sub-catchments or integrated irrigation areas are also included.

Each LWMP covers an area of some 50 to 200 square kilometers. It may include works and measures aimed at increasing water use efficiency, farm productivity levels, and environmental health at the small catchment or water user association level. These lower-level plans are undertaken progressively and are ongoing. One important purpose of the LWMP is to offset the social and economic impacts by any water reallocations back to the environment mandated by the higher-level sub-basin plans.

This lower-level planning is best overseen or coordinated by those persons or groups that are directly affected by any changes in water allocation volumes, such as farmer groups (or Water User Associations), towns, and local industry.

Water balances are crucial to the development of works and measures to improve on-farm efficiencies in LWMPs. These plans may seek to increase or maximize consumptive use (ET) and this can be achieved through the reclamation of non-beneficial ET (NBET) that goes to wastelands. Care must therefore be taken, as such on-farm efficiency improvements can result in reduced return flows to the river system.

Detailed water balance studies must be conducted to assess levels of ET and NBET and to propose options for improvements, while ensuring that the return flows are maintained or other compensatory mechanisms are put in place to offset any negative downstream effects. If these measures are not taken, improved efficiencies will lead substantial decreases in the amount of water delivered downstream – even though the users stay within their gross water rights as specified on their licenses. Overall caps or quotes will then need to be reduced, which is very difficult to achieve politically.
How to Move Forward with River Basin Planning and Management: A Few Key Questions

- Has the basin organization or the responsible water resources agency developed a river basin or water resources planning process? Have senior policy makers endorsed it?

- Are there adequate data and information – economic, environmental, and social – for the planning process to be effective? Is more targeted research needed?

- Does the planning process include genuine participatory processes for the basin community to provide input and make contributions?

- Does the planning process include bottom-up planning to address the water-related problems and needs of local communities?
### Abbreviations and Acronyms

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<tr>
<td>BDP</td>
<td>Basin Development Plan</td>
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<tr>
<td>BET</td>
<td>Beneficial Evapo-transpiration (ET)</td>
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<td>CU</td>
<td>Consumptive Use</td>
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<td>DSF</td>
<td>Decision Support Framework</td>
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<td>ERS</td>
<td>Environmental Resources Study</td>
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<td>ET</td>
<td>Evapo-transpiration</td>
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<td>Groundwater</td>
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<td>Integrated river basin management</td>
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<td>Key Result Areas</td>
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<td>LWMP</td>
<td>Land and Water Management Plans</td>
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<td>MDBC</td>
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<td>MRC</td>
<td>Mekong River Commission</td>
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<td>NBET</td>
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<td>O&amp;M</td>
<td>Operation and maintenance</td>
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<td>OMVS</td>
<td>Organisation pour la Mise en Valeur du Fleuve Senegal</td>
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<td>RBO</td>
<td>River basin organization</td>
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<td>SMART goals</td>
<td>Goal that are S (Specific), M (Measurable), A (Achievable), R (Realistic), and T (Time-based)</td>
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<td>SW</td>
<td>Surface water</td>
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<td>SWOT analysis</td>
<td>Analysis of Strengths, Weaknesses, Opportunities, and Threats</td>
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<td>TBWRC</td>
<td>Tarim Basin Water Resources Commission</td>
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<td>TQM</td>
<td>Total Quality Management</td>
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<td>WSC</td>
<td>Water supply corporation</td>
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<td>WUA</td>
<td>Water user association</td>
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<td>WUP</td>
<td>Water Utilization Program</td>
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The Murray-Darling Initiative

Heartlands Initiative

Toolkits
Benchmarking, Rural Water Supply and Sanitation for Multi-Sector Projects, Gender, Hygiene and Sanitation, Private Sector Participation, Small Towns

Global Water Partnership IWRM Toolbox

Water Demand Management
Building Awareness and Overcoming Obstacles to Water Demand Management, Guideline for River Basin and Catchment Management Organizations, IUCN

Water Resources and Environment Technical Notes
The overall structure of the series is as follows:
A. Environmental Issues and Lessons
B. Institutional and Regulatory Issues
C. Environmental Flow Assessment
D. Water Quality Management
E. Irrigation and Drainage
F. Water Conservation and Demand Management
G. Waterbody Management
H. Selected Topics

Water Supply and Sanitation

OTHER SOURCES


Integrated river basin Management