

Integrated Water Information Management (IWIM) System - DFID Theme W1 Water Resource Management

KAR Project R7135

**Framework for incorporating water demand
management principles and practice into water
resource management and development projects**

Final Report

**Report ODTN 117
April 2003**

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Address and Registered Office: HR Wallingford Ltd. Howbery Park, Wallingford, OXON OX10 8BA
Tel: +44 (0) 1491 835381 Fax: +44 (0) 1491 832233

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Contract - Research

This technical report is an output from the Knowledge and Research (KAR) Contract R7135, Integrated Water Information Management (IWIM) system. This project has been carried out by the International Development Group of HR Wallingford in collaboration with the Department for Water Development in Zimbabwe for the British Government's Department for International Development (DFID). One of the objectives of the research was to produce a framework for incorporating water demand principles and practice into water resource management and development projects.

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Prepared by

(name)

.....

(Title)

Approved by

(name)

.....

(Title)

Authorised by

(name)

.....

(Title)

Date

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Contract – Research continued

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Abstract

Integrated Water Information Management (IWIM) System - DFID Theme W1
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This framework describes a potential format for a Guideline (or tool) to help ensure water demand management principles and practice are encapsulated in water resource management and development projects. The starting-point for the Guidelines would be the emergence of the growing consensus that Water Demand Management (WDM) is an essential component of sustainable development and environmental protection.

The Guidelines would accept the pre-existence of a consensus around the core principles to be applied in water policy and practice and provide users with a strong understanding of the rationale for these. Building on the WDM principles, a checklist approach would be presented under the various principle categories that would alert users to key issues and potential responses when formulating or reviewing project proposals. The final part of the Guideline would provide support information and references to further information.

Included as part of this framework are examples of what may be included in the various chapters. It is not intended to be a comprehensive nor final document but merely a skeletal draft to prompt discussion.

The work was led by HR Wallingford as part of a Knowledge and Research project (Contract KaR R7135) funded by the British Government's Department for International Development (DFID).

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PART I: WATER DEMAND MANAGEMENT: RATIONALE AND KEY CONCEPTS

Part I of the Guidelines sets out the rationale for water demand management as a key component of water-related activities, and the key concepts it embraces. It sets out the guiding principles and indicates the typical 'actions' which are implied.

1. WATER DEMAND MANAGEMENT: THE CHALLENGES

This chapter could emphasise the main drivers for WDM, e.g. as identified by IUCN (2000) for the southern African region, and highlight issues such as:

- Growing divergence between demand and supply;
- Increasing supply costs;
- Cost recovery;
- Increased potential for WDM;
- Regional water security and risk aversion.

This chapter could also draw extensively from WDM work in the region including the IUCN work. It could emphasise that:

- Sustainable water resources management has been elevated up the political agenda
- WDM became a central issue at Dublin and Rio, and more recently at the 2nd World Water Forum in the Hague via the global and regional Visions and the Framework for Action
- Many countries are taking positive steps to realign policies and update practices
- At Dublin many countries have been re-examining water management policies and practices.

The continuation of current demand patterns cannot be sustained in the region. Considerable scope exists for increased availability of water through more efficient allocation and water use patterns and as such WDM has a central role to play and needs to be fully integrated into development planning, catchment management and water management practices.

2. THE BENEFITS OF WDM

The reasons for promoting WDM should also be emphasised and include:

- Excessive water use leads to over capitalisation of infrastructure;
- Additional infrastructure brings high debt and high fixed water costs;
- WDM measures often have benefit : cost ratios in excess of 10 : 1 in urban situations;
- WDM measures can be introduced flexibly and incrementally;
- WDM can be a vehicle for socio-political objectives such as equity and gender issues;
- WDM only succeeds with community participation (especially with overseeing of the community approaches to ensure they are succeeding);
- Water saving technologies are not usually capital intensive or high technology;
- WDM requires measurement of all components of the water cycle and good management;
- Realistic water charges support sustainable water services.

3. WDM GUIDING PRINCIPLES

The major challenge for water resources policy makers and professionals is to work out practical implications of WDM within integrated water resources planning, development and management. The following is a set of guiding principles that aim to support clear thinking on how to attain this integration.

The principles should aim to emphasise the need for clear policies, legal framework and effective strategies as prerequisites for adoption and implementation of WDM. They should recognise the different roles various stakeholders play in successful implementation of WDM measures. The principles should recognise water as a finite resource and as having an economic value. Allocating water according to value of use and full cost pricing are means to encourage rational use. Although important concepts, it should be noted that water pricing alone is not sufficient to ensure socially efficient water use but without it it is unlikely that the goals of WDM will be met. Other key aspects should therefore also be emphasised looking the role of communication, training, etc. alongside more technological solutions.

A suggested set of ‘principles’ is given below as a first iteration for discussion.

Legislation and policy principles

1. The operational legal framework governing the use and management of water resources should provide an enabling environment for effective implementation of WDM and pay sufficient attention to issues on: water rights; legal status of new institutes; authorisation for pricing and tariff setting; and regulations.
2. Water policies will need to make specific reference to WDM and water conservation.
3. Water policies will need to be translated into regional, national and local strategies including guidelines for the implementation of WDM in all sectors.

Institutional and management principles

1. Institutional structures and responsibilities need to be adjusted to support decentralisation of responsibilities for water resources management.
2. Roles of regional and national organisations and institutes dealing with water need to be clearly defined.
3. Co-ordination and integration of regional and national organisations and institutes dealing with water is necessary.
4. Institutions need the power to uphold and enforce policy and legislation not only within each sector, but also in a manner that promotes integrated water management.
5. Democratic methods of managing resources ensure that the needs and views of all stakeholders are taken into account.
6. Capacity building for staff of these new organisations and institutes is required to enable them to cope with their new roles and responsibilities.
7. Encouragement of involvement of user organisation and private sector.

Economic, commercial and financial principles

1. Water pricing is a strong instrument to influence consumers’ demand.
2. Attaching an economic value to water use may lead to reallocation of water from low value users of the resource to high value uses.
3. Improved cost recovery will lead to a better financial viability of water supply authorities putting them in a better position to efficiently operate and maintain the water supply infrastructure.

4. Commercialisation of water supply authorities entailing principles of cost recovery and provision of water services based on service agreements with the users will enhance WDM efforts and thus reducing water losses.

Social principles

1. Promote stakeholder and community participation and involvement in WDM.
2. Equal gender representation should be encouraged in WDM management and implementation to ensure that gender implications are addressed.
3. Ensure access to water resources for all social groups for basic human needs and ensure minimum access to water for those people whose livelihoods depend on access to water and have no alternative strategies to sustain their livelihoods.

Environmental principles

1. The allocation and consumption of water for the environment should be recognised.
2. After supplying water for basic human needs, sufficient water of appropriate quality should be set aside to protect vital ecosystems now and into the future.

Promotion, communication and training principles

1. Raising awareness on the value of water and sustainable water management helps to create a culture of water conservation and demand management in suppliers and users.
2. Appropriate presentation levels of information are required for different users, to take account of their different capacities to assimilate and handle information.
3. All levels of stakeholders involved in water management from policy-makers to water users need training in WDM knowledge and practical skills at an appropriate level focussing on existing knowledge and skill gaps.

Technological principles

1. Introduction of alternative technology is an instrument, not a driver, of water demand reduction.
2. Technical standards, methodologies and guidelines are useful tools when implementing water use and demand management strategies at all levels.

Information management principles

1. Information on current and historical water use and demand is needed to perform demand analysis and to understand the drivers of future demand.
2. Strategies for information management – collection, processing and analysis – need to be simple and workable.

4. OVERVIEW OF ACTIONS IMPLIED BY WDM

This chapter could highlight some of the typical actions which are implied by WDM approaches but also try to link them to broader objectives such as:

- Continuing water pricing reforms
- Getting the institutional framework right
- Roles and responsibilities
- Protecting the poor
- Tackling major water uses such as agriculture/irrigation
- Mainstreaming gender and water management
- Obtaining adequate information
- Introducing water metering and monitoring
- Improving water quality and the link to WDM measures
- Tackling rural/urban differences
- Embedding WDM as an integral part of IWRM

The actions should also appear under the ‘possible response’ columns of the checklists in Part II and further detail be given in Part III.

PART II: TRANSLATING WDM PRINCIPLES INTO PRACTICE

Part II of the Guidelines contains practical suggestions to equip the user to incorporate WDM practices in to actual planning and implementation of water-related activities. Checklists of issues and responses are grouped according to the principles established in the Part I and where appropriate actions are linked to further information in Part III.

5. OVERVIEW OF THE APPLICATION AND USE OF THE CHECKLISTS

Part I of the Guidelines was intended to provide a framework of policy principles for water demand management interventions. Part II consists of **checklists** to assist users to put into practice the policy principles set out in Part I. Users are likely to be planners, officials, and development workers making decisions related to project design and implementation.

The checklists entail identifying problem areas and appropriate responses. The user should bear in mind at all times that this is not a manual and that the checklists are not meant to be exhaustive, but merely to act as pointers. The aim should be to avoid prescription, and instead to facilitate a questioning mode of project development, in which sensitivity to WDM can be reflected. It is anticipated that the issues identified, and the possible responses described, will lead the user to pursue the most appropriate line of enquiry.

This chapter would guide the user to the application and use of the checklists and to ensure the points above are understood.

6. CHECKLISTS OF WDM ISSUES AND RESPONSES

As a first iteration in to looking at how the checklist may look and what sort of detail they may contain is given in an example below. This example is based on an agricultural water use and management (AWUM) project. It is further assumed that the checklists are being utilised during the identification and formulation stages of a projects development

It would need further thought as to whether a common set of checklists could be developed for all sectoral and sub-sectoral activities (eg rural water supply, urban water supply, agriculture, hydropower, etc.) or whether different checklists would be required for each type of water use.

Legislation and policy principles

WDM activities must be consistent with the operational legal and policy framework for water resources management.

KEY ISSUES	POSSIBLE RESPONSES
<ul style="list-style-type: none">• Does existing policy and legislation make specific reference to WDM?• Are there any existing or potential obstacles within existing policy and legislation that may impede WDM (with regard to e.g. water rights, legal status of water-related institutions, water pricing and tariff setting)?• Do regulatory instruments exist within the existing legislation?	<ul style="list-style-type: none">• Assist government in developing or updating its policies and legal framework for water resources management.• Identify potential conflicts and obstacles and initiate discussions to resolve issues.• If non-existent regulatory instruments need to be developed to support WDM and at the same time safeguard water rights for the poor.

Policies, norms and standards must be ‘implementable’ and easily accessible.

KEY ISSUES	POSSIBLE RESPONSES
<ul style="list-style-type: none"> • Are policies, norms and standards ‘implementable’? • Are policies, norms and standards easily accessible for stakeholders and the general public? 	<ul style="list-style-type: none"> • Involve all stakeholders in the development of policies, norms and standards. • Policies will need to be written clearly, free of jargon, and disseminated within the public domain.

Institutional and management principles

Revised institutional structures and responsibilities are necessary to support decentralisation of responsibility for AWUM.

KEY ISSUES	POSSIBLE RESPONSES
<ul style="list-style-type: none"> • Which governmental and non-governmental agencies are or could be involved in AWUM? • Are water users adequately organised to look after their interests? • What mechanisms exist for inter-sectoral co-operation? • Do the mandates of AWUM agencies foster duplication or competition rather than co-operation? 	<ul style="list-style-type: none"> • Draw-up a comprehensive list of agencies and review past (project) experiences. • Do WUA exist, what are their tasks and responsibilities and what is their legal status? • Strengthen existing WAU or if WUA do not exist, set-up WAU based on experiences in the region with various models. • Assist agencies responsible for agricultural sector development to integrate water use planning with other sectors. • Recommend procedures to enhance inter-agency collaboration.

Modernisation and Irrigation Management Transfer (IMT) entailing principles of cost recovery and provision of water services based on service agreements with the users will enhance WDM efforts in AWUM.

KEY ISSUES	POSSIBLE RESPONSES
<ul style="list-style-type: none"> • What is the legal status of WUA and what water use rights do they have? • What is the status of the irrigation infrastructure and technology? • What are the possibilities for the irrigation agency to reorient its relationship with farmers from top-down to new partnership with service agreements? • What are the possible new cost-sharing arrangements for management and O&M? 	<ul style="list-style-type: none"> • Help define a legal framework to ensure a strong legal position and anchored water use right for WUA. • Ensure that the irrigation infrastructure and technology is functional and compatible with water right and service objectives and management capacity of water users. • Assist the government to carry out an institutional review and advise on appropriate re-structuring and, if applicable, privatisation. • Identify the funding structure for post-project management and O&M.

Democratic and decentralised methods of managing resources ensure that the needs and views of all stakeholders are taken into account.

KEY ISSUES

- Who are the stakeholders and what are their interests and concerns?
- Are planning and management decisions devolved to the lowest appropriate level?
- Are representatives and managers at the various stakeholder levels democratically elected?

POSSIBLE RESPONSES

- Undertake a Stakeholder analysis.
- Assess the feasibility of devolving power from national to regional to local level institutions.
- Introduce a system of democratically elected office bearers and trustees.

Capacity building for staff of new or reorganised institutes and agencies as well as water users to enable them to fill new roles and responsibilities is necessary.

KEY ISSUES

- Do implementing agencies have the human resources to address issues of WDM in AWUM?
- Are appropriate training facilities and programmes available?

POSSIBLE RESPONSES

- Review technical and managerial resources of all agencies and organisations and identify where capacity building is necessary.
- Undertake Training Needs Assessment within the principal agencies and organisations.
- Assess the available training facilities, courses and programmes and identify the need to develop tailor-made training programmes and develop necessary training capacity.

Economic, commercial and financial principles

Attaching an economic value to water use may lead to reallocation of water from low value agricultural use to high value uses.

KEY ISSUES

- What is the opportunity cost of water used for agricultural purposes and how can this information be used for planning purposes?
- Are economic costs for water use reflected in government policy towards irrigation?

POSSIBLE RESPONSES

- In calculating the opportunity cost of water used for agriculture also social and environmental costs and benefits need to be incorporated.
- Based on opportunity costs, assist the government in prioritising water allocation within agriculture and between this and other water uses.
- Governments may want to take the political decision to forgo domestic self-sufficiency and instead aiming for food security through trade, thereby recognising the value of virtual water.
- Policies will need to focus on increasing the crop productivity per drop and crop productivity per unit of investment.

Water pricing is a strong instrument to influence demand and putting water supply authorities in a better position to efficiently operate and maintain the infrastructure.

KEY ISSUES

- What price should be charged for water?
- How to set a water tariff if cost recovery is the major objective?
- If WDM is the major objective, the response of different consumer classes to changes in the price should be known.
- Is water pricing alone enough to change water demand in agriculture?

POSSIBLE RESPONSES

- Clearly define the objectives for the introduction of water charging policies i.e. cost recovery versus demand management.
- Decide what costs will need to be recovered. Water tariffs can be made up of fixed and recurrent costs together covering the capital, operation and maintenance costs. They may also include long run marginal costs.
- Make price elasticities of demand of various consumer classes to assist in the assessment of water demand savings.
- Explore if water pricing may need to be combined with improved extension, regulations or improved technologies to be fully effective.

Economics play a pivotal role in the management of water use and demand.

KEY ISSUES

- What WDM measures or strategy is most beneficial to society?

POSSIBLE RESPONSES

- Implement a social cost-benefits analysis of WDM measures.

Social principles

WDM initiatives must be integrated with the social development goals of the region.

KEY ISSUES

- What are the social development goals in the region in relation to AWUM?
- What are the potential social impacts of the introduction WDM principles in AWUM?
- What will be the impact of water pricing on poor farm households?

POSSIBLE RESPONSES

- Review social development strategy for the region and determine its compatibility with possible WDM strategies.
- Conduct a preliminary Social Impact Assessment.
- Make a preliminary Sustainable Livelihood Analysis and explore alternative pricing and subsidy mechanisms to overcome any detrimental impacts.

Women play a major role in AWUM. Measures are required to ensure that women are involved in planning and decision making around WDM at all level from national policy to the farm level.

KEY ISSUES

- Do implementing agencies fully recognise the role of women in AWUM at all levels?
- Do implementing agencies use procedures that are sensitive to the needs of women?

POSSIBLE RESPONSES

- If necessary include gender awareness raising and gender planning in the staff-training programme.
- Ensure that gender sensitive methods of stakeholder and livelihood analysis are deployed.

Environmental principles

The allocation and consumption of water for the environment need to be recognised.

KEY ISSUES

- Is the value of the environment sufficient recognised within the water resource planning policies of the government?
- What environmental baseline data are required and available before project formulation can proceed?

POSSIBLE RESPONSES

- Discuss with the government the need to incorporate water for the environment in the water resource planning policies.
- Make an inventory of the available environmental data and make adequate provision for upgrading data collection.

WDM in AWUM may have potential impacts – positive and negative – on water availability for the environment.

KEY ISSUES

- What changes in water use are anticipated as a result of the project on local and river basin scale?
- What changes in water quantity and quality may result from the project activities?
- How will these changes affect sensitive aquatic ecosystems in the short and long term?

POSSIBLE RESPONSES

- Under take an Initial Environmental Evaluation and decide whether a full Environmental Impact Assessment is necessary.
- Define major issues and undertake a full Environmental Impact Assessment if necessary.
- Identify impacts and propose mitigation measures.
- Ensure that predicted impacts are compatible with wider river basin plans with regard to environmental protection.

Promotion, communication and training principles

Raising awareness on the value of water and sustainable water management helps to create a culture of water conservation and demand management in suppliers and users.

KEY ISSUES

- What is the level of awareness of the value of water and sustainable water use from government to farmers?
- Are their regional best demand management practices?
- What are the best media to reach various stakeholder groups with targeted information?
- Appropriate presentation levels of information are required for different users, to take account of their different capacities to assimilate and handle information.

POSSIBLE RESPONSES

- Undertake a Rapid Appraisal to assess the current level of awareness of various stakeholder groups.
- Dissemination of best demand management practices may help to raise awareness.
- To reach various groups of stakeholders, suitable media to transfer messages need to be explored i.e. use of mass media, workshops, discussion groups, leaflets, posters, etc.
- Target various groups of stakeholders individually using a procedure known as 'discrete targeting'.
- Recommend an awareness raising campaign.

All levels of stakeholders involved in water management from policy-makers to water users need training in WDM knowledge and practical skills.

KEY ISSUES

- What knowledge and practical skills are required?
- What knowledge and practical skills are lacking among the various stakeholders groups?
- Is water conservation taught in schools?

POSSIBLE RESPONSES

- Identify, based on the proposed WDM measures, what knowledge and practical skills are required of the various stakeholders groups.
- Undertake a Training Needs Assessment.
- Assess possibilities to incorporate curricula on water conservation in school syllabuses.

Technological principles

Introduction of alternative technology can have a large impact on water use efficiencies however it needs to be driven by appropriate incentives.

KEY ISSUES

- Are their sufficient incentives for the introduction of water saving technology?
- What are the potential costs and benefits of the proposed technologies?
- Do initial investment costs form a barrier to the introduction of improved technologies?
- Is their awareness and knowledge on alternative technologies and their advantages?

POSSIBLE RESPONSES

- Explore what appropriate incentives may need to be introduced to instigate technological change.
- Study existing designs and experiences with proposed technologies and make accurate cost and benefit estimates.
- Investigate farmers and other stakeholders access to capital and explore possibilities to surmount financial barriers through subsidies, tax breaks or access to cheap credit.
- Incorporate technology options in the awareness raising campaign and training programmes for various stakeholder groups.

The emphasis should be on the use of modern but appropriate technology.

KEY ISSUES

- Can water saving be brought about by minor changes to present practices and technologies?
- Have indigenous practices and technologies been identified and evaluated?
- Are physical and social conditions suited to the proposed initiatives?
- Do proposed technologies fit with available skills and resources?

POSSIBLE RESPONSES

- Evaluate present practices and technologies.
- Evaluate the scope for using indigenous practices and technologies.
- Identify possible mismatches between technology proposed and project context and identify the need for detailed physical and social investigations.
- Review resources and identify gaps in knowledge and skills.

Information on current and historical water use and demand is needed to perform demand analysis and to understand the drivers of future demand.

KEY ISSUES

- How useful are the existing baseline data to perform demand analysis?
- Is there a current information strategy and is it suitable for intended purposes?

POSSIBLE RESPONSES

- Evaluate existing data and identify data need including demographic information that is required to understand water use patterns and to make realistic forecasts.
- Develop an information strategy with the participation of stakeholders that is simple and flexible.
- Ensure that the quality of data is validated.
- As data need is continuously changing make a maintenance design.

PART III: TOOLS AND SKILLS FOR APPLICATION OF THE APPROACH

Part III of the Guidelines could contains supporting material to gain common understanding of terminology and to aid users who are putting into action the WDM principles described in Parts I and II.

7. GLOSSARY OF KEY CONCEPTS

This chapter could include definitions for various key concepts which underlay WDM principles and practice, for example:

- Appropriate modern technology
- Awareness raising
- Capacity building
- Economic and financial analysis
- Gender
-
- etc.
- etc.
-
- Willingness-to-pay

8. TOOLS AND SKILLS

This chapter could include more detailed explanations about tools and skills which need to utilised in bringing WDM in to practice. A brief description of these together with references to more detailed descriptions would seem appropriate. Examples may include:

- Communication strategies
-
- Cost and benefit analysis
-
- Data management and information systems
-
- Economic analysis
-
- Forecasting demand
-
- Managing public consultations
-
- Policy development
-
- Water audits
-
- Water balance models
-
- Etc.
- Etc.

9. STANDARD FORMATS FOR TERMS OF REFERENCE WDM STUDIES

This chapter could include standard terms of reference for typical studies associated with WDM and may include high-level studies to assess the opportunities and constraints toward implementing WDM measures across sectors through to specific WDM studies for incorporation as part of larger sector-based activities.

10. SELECTED BIBLIOGRAPHY

This chapter could present key references for further information and study. The references should be backed with accompanying short texts (6-10 lines) so as to give the reader greater insight in to the overall content of the references. For example:

ICID (1997) Water: Economics, Management and Demand. Kay, M., Franks, T., Smith, L., Proceedings of the 18th European Regional ICID Conference, E & FN Spon (pub), UK.

The papers presented at this International Commission on Irrigation and Drainage (ICID) conference focus primarily on the role of irrigation and drainage in the debate on water use as an economic good. They highlight experiences in both developed and developing countries in six areas: the value of water for irrigation; the value of drainage and flood control; the social and environmental value of water; paying for services; management systems; and policy, legal and institutional issues.

OECD (1987) Pricing of Water Services. Paris, France

The report assesses the contribution of economic techniques, in particular water pricing, for developing practical options for the efficient management of demand and supply of appropriate quality of water. The report presents guidelines for promoting conservation, reallocation and re-use of water resources through the combination of regulatory and economic instruments.

World Bank (1993) Balancing Water Demands with Supplies. The Role of Management in a World of Increasing Scarcity. World Bank Technical Paper No. 189, Frederick, K.D., Washington, USA.

This paper deals with the increasingly important topic of how to balance water demands with supplies. It examines the experience of OECD countries in influencing the behaviour of water users, and draws lessons from attempts to manage demand by imposing water use regulations and employing economic incentives.

