Water Demand Management

UNIT 4

IUCN
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Sida

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VERSION 1.1

WDM plan

notes

course map

Unit 1: WDM in context

Unit 2: Municipal WDM

Unit 3: WDM options and benefits

Unit 4: WDM plan

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outcomes

After working through this unit you should be able to…

- complete the WDM plan of your own MWSA by developing IWRM and WDM objectives and targets;
- review your course notes and improve on your plan where necessary, and
- make a list of further information you need to acquire to add to your plan.

Most of the aspects surrounding WDM have been discussed. But all would be in vain if we did not get to the essence of the course, and that is the compilation of a WDM plan for your MWSA. In this unit, we will be looking at important aspects of developing and implementing a WDM plan, as well as monitoring and evaluating it. Reference is made to the Johannesburg Water Conservation and Demand Management Strategy document developed by Water Resource Planning and Conservation (WRP), a consulting company based in Pretoria, South Africa. This report provides an example of what a WDM Plan could contain (see the activity towards the end of this unit).

4.1 DEVELOPING A WDM PLAN

Experience has shown that the best success is obtained when MWSAs develop WDM plans or programmes in conjunction with local authorities. Experiences in Windhoek, Bulawayo, and Hermanus have shown that such a plan can boost local WDM and lead to substantial water savings, whether there is a supportive national environment or not. If there is no supportive environment, WDM plans can still succeed through local championing of WDM, and may in fact accelerate the establishment of a supportive macro-environment.

The development of a WDM plan involves the following steps (also summarised in Figure 1):

- Undertaking an IWRM analysis of the resource situation of the MWSA
- Identifying critical water use, supply, and management issues, as well as constraints and opportunities.
- Identifying IWRM options
- Formulating IWRM and WDM objectives and targets
- Developing options and evaluating benefits and costs
- Selecting and prioritising options

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- Identifying funding
- Developing the plan

Source: Adapted from IUCN WDM Guideline for municipal water suppliers (2004)

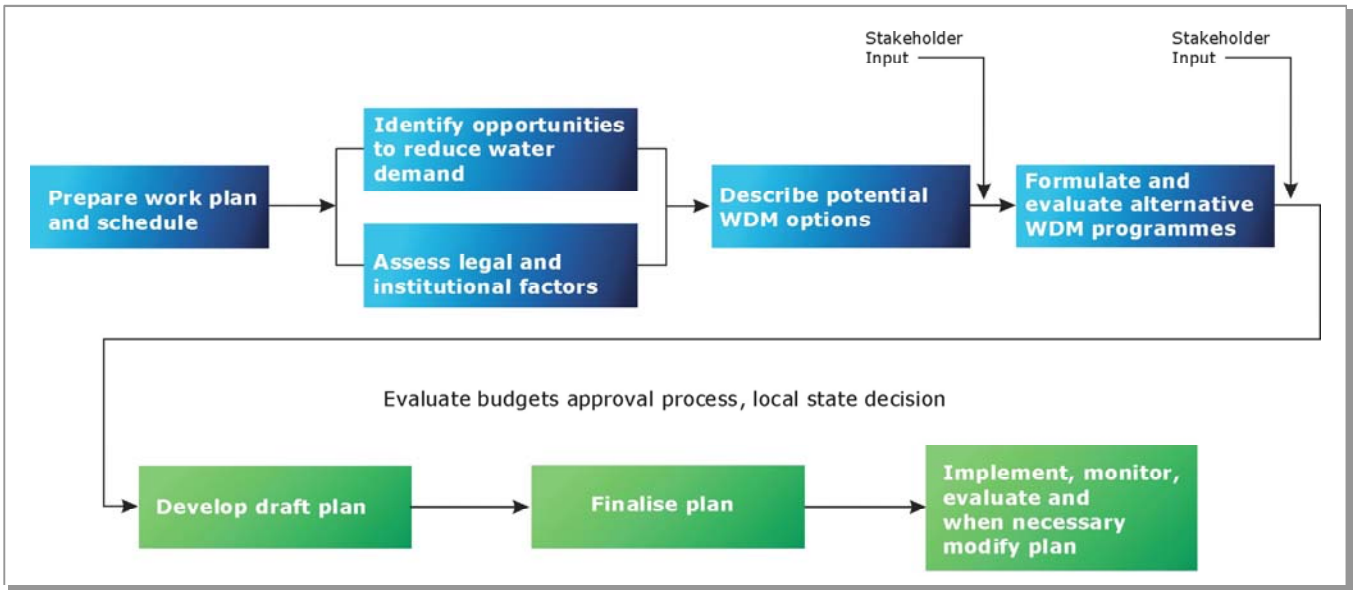
Step 1: Undertaking an IWRM analysis of the resource situation of the MWSA

This step, which was discussed in the foundational unit, involves the review of the most important supply and demand factors, and any changes they undergo over time. These factors include:

- The type and nature of the resources (see Unit 1), including fresh water (ground/surface) and treated return flows (refer to Unit 2, section 4)
- The main user groups and relevant determinants of use by category

The analysis should examine the past (e.g. 15 years ago), the present, and the future (15 to 20 years from now).

Figure 1: Preparing an implementation plan



Source: Adapted from WRP (2001)

The following questions need to answered:

- Which institutions are involved in the water chain, and what are their responsibilities (refer to Unit 2, section 3)?
- What changes have occurred in the supply sources (quantity and quality)?
- How sustainable/renewable are the current fresh water resources?

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- Is the MWSA dependent on shared or international water resources? What are the implications for their management and use?
- How have the costs of water supply developed in time with the different augmentation schemes?
- How is the growing amount of return flow used?
- What are the future perspectives, bearing in mind the impact of global climate change on water resources?

The analysis should also cover the:

- Extent to which end-users are likely to participate in water planning
- Extent to which water is treated as an economic good
- Attention given to gender in water planning and management

The IWRM analysis needs to determine the degree of water scarcity and stress, and to review past water supply interventions (foundational unit). Have there been any prematurely built traditional augmentation schemes? Refer to Unit 2, section 1.

Step 2: Identifying critical water use, supply, and management issues, constraints and opportunities

This step includes four activities:

- **Review:**
  - The national, regional, and local water policies, programmes, and regulations, including by-laws
  - Supply measures, trends, and options, including supply during drought periods
- **Establish:**
  - The past trends and forecasts for water demand by the main category of water user (domestic, business, public sector) – normally, the demand forecasts will involve different scenarios based on variations in population growth, income levels, and economic growth (refer to Unit 2, section 5)
  - Water intervention options, such as augmentation of traditional supplies, WDM, and increase of non-traditional supplies
  - Costs and benefits of past and future water interventions – with growing water scarcity, supply costs normally increase, and often WDM measures are cheaper per m^3 than supply augmentation schemes

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- Regional aspects, such as conforming to SADC conventions, and regional norms and standards

- **Identify:**
  - WDM reasons (economic, social, and environmental) and WDM niche in IWRM (refer to Unit 3)

- **Identify:**
  - WDM constraints and possible solutions/measures (refer to Unit 3)

Step 3: Identifying IWRM options

This step includes the identification of:

- Options to augment traditional supplies such as more dams, well fields and water transfer schemes
- WDM measures in water resource management, water distribution, water consumption, and return-flow manipulation
- Options to increase non-traditional supplies, including desalination and rainwater harvesting

The technical feasibility and details of each option need to be described and documented. The WDM plans and programmes of other villages and towns may give you important ideas about possible WDM options. So, remember to use your contacts and the Internet. Also make use of the checklists in HR Wallingford (2003), contained in the activities in Unit 2.

activity

In groups, review the contents of the Johannesburg Water *Water Conservation and Demand Management Strategy* compiled by WRP (2001) under the Managing Water for African Cities programme. Make notes on whether the plan is sound and achievable, and if it incorporates all useful aspects of a WDM plan. If you were to make changes to the strategy, what would you include or exclude? Comment on the extent to which the strategy does or does not match the theories, concepts, and processes developed in the preceding three Units.

Step 4: Formulating IWRM and WDM objectives and targets

Formulating the IWRM and WDM objectives and targets is the start of a comprehensive approach towards a WDM plan. Targets (i.e. detailed, time-bound goals) must be appropriate for the local situation, and should be developed with public involvement and consultation. Targets should also refer to overcoming WDM constraints.

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Examples:

- The overall WDM objective could be to increase the efficiency of water consumption to serve a larger part of the population, and to boost sustainable economic production.
- WDM targets need to be set for the MWSA itself and for other stakeholders, such as end-users and policy makers. Targets could be similar to the following:
  - Reduce NRW by 50% in a five-year period.
  - Reduce the water consumption of high-income groups by 30% in three years.
  - Create a WDM unit within one year to establish sufficient WDM implementation capacity.
  - Establish WDM training opportunities to sensitise all MWSA staff to WDM.

Step 5: Developing WDM options and evaluating benefits and costs

This step involves the establishing the net merits of WDM measures vis-à-vis traditional augmentation schemes, and selecting the most suitable WDM interventions using Multi-Criteria Analysis (MCA), Cost-Benefit Analysis (CBA), or the 80:20 principle (refer to Unit 3, section 3).

Unit 3 provides details about WDM options as well as their possible benefits and costs/impacts. The types of options include:

- Technical measures
- Financial and economic measures
- Legislative/policy measures
- Education, public awareness and consultation

For CBA, the financial and social costs and benefits need to be known or estimated. This permits the calculation of the efficiency in the form of the NPV, the internal rate of return or the cost-benefit ratio. As costs and benefits are spread over time, a discount rate needs to be used to transform future costs and benefits into current ones. Normally, central government specifies a range for the discount rate, (for example in Botswana it is 8–12%). In other cases, local governments can adopt their own discount rate. The higher the discount rate, the less future benefits and costs count. Therefore, for interventions with mostly long-term benefits, a high discount rate is disadvantageous.

For MCA, the criteria need to be made explicit and given weights. Normally, social, economic, and environmental criteria are used. Scores

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need to be calculated for each impact on a criterion. Scores can be absolute figures or ranked scores. The MCA will rank the WDM options in terms of their suitability.

A potential implementation programme should be defined for the option or combination of options that will achieve the objective and meet the desired target. Projected costs for each potential option should be determined. This should be followed by the determination of what benefits would be realised by the implementation of each option. In addition to monetary impacts, benefits should include environmental, technical, social, cultural, and political impacts.

Step 6: Selecting and prioritising options

Whilst step 5 offers the basis for selection (e.g. through BCA or MCA), the final selection of options is a process of thorough consultation with stakeholders, including politicians, at all levels. This will then provide a sound basis for success in implementation, as the plan will have been accepted by the relevant sectors of society.

Step 7: Identifying funding

The identification of funding will be made easier once options have been chosen through the consultative process. It will be easier to identify what can be done within a given period of time. Possible sources of funding include a small WDM levy, a small portion of the marginal water price, savings from WDM measures, and/or earmarking of part of the water sector budget.

Step 8: Developing the WDM plan

The plan would include the objective, targets, and major WDM interventions and measures (economic, technical, educational, awareness-raising, regulatory, or policy-based) to be implemented.

Financial requirements and anticipated funding would be indicated. The plan should also have a monitoring and evaluation component that would allow for regular modification of the WDM plan.

Normally, the WDM plan would cover the areas of water resource planning, water distribution systems, end-users and return flows.

According to the guidelines for bulk potable water suppliers, MWSAs must do the following:

- Adopt progressive service delivery arrangements, including leakage detection systems, yard and house connections, and ensure the reliability of supply, water metering and billing

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- Adopt and implement specified standards (e.g. for NRW, water quality, and return flows)
- Agree on a tariff model, which includes cost recovery, lifeline allowances, waste penalties, and the management of peak factors
- Review all current water-care works and bulk reticulation in terms of WDM initiatives

The same guidelines propose that local authorities pledge WDM targets and undertake the following functions:

- Establish their real losses and set revised WDM targets
- Agree on appropriate response measures if the above targets are not met
- Establish own funding mechanisms to undertake WDM initiatives within their own area of influence or, elect to join a WDM fund and combine their scarce resources to undertake WDM initiatives
- Implement agreed standard practices and policies on service payments
- Adopt and implement progressive service delivery arrangements
- Adopt and enforce relevant standards for materials and the implementation of services

Refer to the checklists in Unit 2.

4.2 IMPLEMENTING THE WDM PLAN

The implementation of the plan is facilitated by:

- An enabling instrument environment
- An efficient institutional support structure
- Sufficient funding and manpower

For the successful implementation of the WDM plan, it is absolutely necessary to have a champion. This should ideally be someone who is at a sufficiently high level to command respect and influence, coupled with credibility and an appreciation of WDM.

Given the challenges associated with costs, and the process of obtaining the commitment from others to implement WDM, it would be better to begin with a pilot scheme, or to select areas for demonstration that would result in clearly visible immediate and/or short-term benefits. This would help to allay any fears, apprehensions or misconceptions that any of the stakeholders may have regarding the implementation of WDM.

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The results obtained from this pilot scheme would help to demonstrate the viability of implementing a WDM programme, that would then be extended to other areas. The desired implementation plan should have both long- and short-term benefits.

4.3 ASSESSING THE RESULTS OF THE PLAN

Assessing the success or failure of a WDM plan requires monitoring and evaluation (M&E). Monitoring is a process of continuous assessment throughout the implementation period while evaluation is carried out periodically. Different institutions involved with the implementation process will perceive the outputs of a WDM programme differently. It is therefore necessary to have clear indicators that measure the implementation progress/outcomes in quantitative terms. Possible performance indicators could include:

For WDM measures within MWSA

- Trends in leakage reduction
- Average of and variation in response times to leak reports
- Trend in unit cost of water supply
- Percentage of population served with water
- Water production
- Total water consumption
- Metered water consumption
- Non-revenue water (NRW)
- Levels of metering
- Unit operational costs
- Staff per '000' connections
- Staff per '000' population served
- Continuity of and complaints about service
- Average tariff
- Investments in WDM
- Average system pressure
- Percentage of reused treated effluent

For end-users

- Value added/productively used water unit
- Per capita domestic water use

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- Water consumption/civil servant
- Cost recovery percentage
- Sales of WDM appliances and technologies

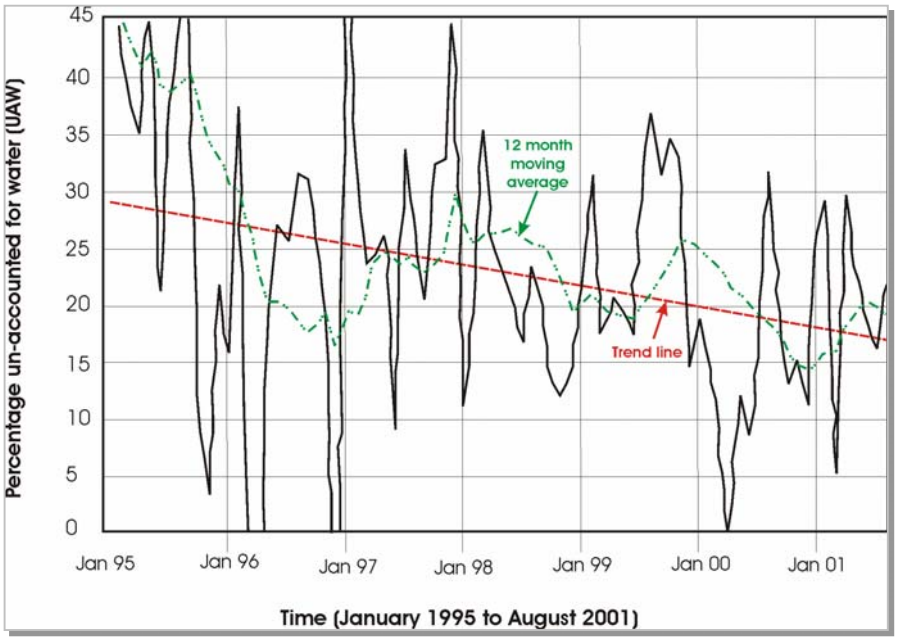
Detailed performance indicators would need to be developed that take local conditions into account.

Monitoring should involve the collection of data and information before and during the implementation of WDM. When the data and information have been analysed, progress, constraints, or benefits can be pinpointed as early as possible. This will provide the basis for an evaluation of the achievement of the WDM targets that have been set in the plan, and an assessment of the level of performance can be made.

Assessment maintains focus on the identified options, and allows implementers to make adjustments to the implementation of the WDM plan if required.

A very useful way of presenting many key performance indicators (KPIs) in evaluation reports is to use graphs with time as the x-axis, such as Figures 2 and 3.

Figure 2: NRW for Mogale City; January 1995 to August 2001



Source: IUCN WDM Guideline on monitoring and evaluation of WDM programmes (2004)

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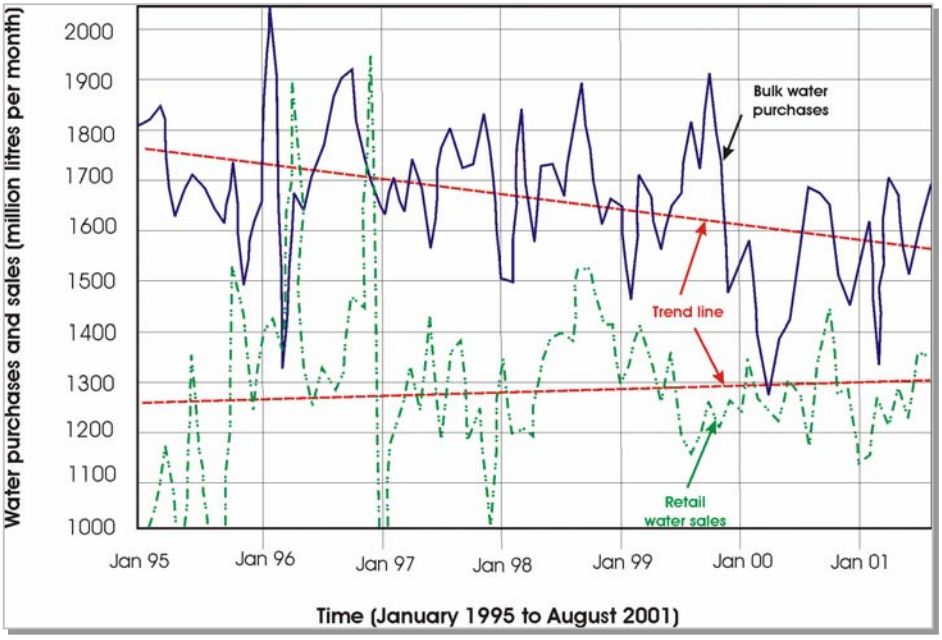
Figure 3: Water purchases and sales for Mogale City; January 1995 to August 2001



Source: IUCN WDM Guideline on monitoring and evaluation of WDM programmes (2004)

The y-axis can include one or more KPIs, the KPI trend lines, and/or moving averages. Figures 2 and 3 use adapted figures from a WDM programme for an urban municipality with some peri-urban customers, which supplies an estimated 60 000 households and other non-domestic users through over 40 000 delivery points.

Figures 2 and 3 illustrate three important facets of WDM monitoring:

- More than one KPI can be developed from the same data: The production of Figures 2 and 3 require identical monitoring. However, producing both is beneficial, as utility staff members will have a better understanding of what is happening both from a WDM and a general management viewpoint.
- An apparent initial success requires perseverance to maintain: Comprehensive monitoring of the WDM programme began when the 12 months NRW moving average had reverted to 30% in January 1998. It took a further 36 months to maintain the NRW level at 15 – 20%.

  Besides increasing water sales, the programme aimed at reducing NRW by:

  - Ensuring that all meters were read
  - Replacing faulty meters
  - Reinstating customers whose details were not on the billing system database

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- Removing illegal bypasses installed around meters by customers
- Stopping other tampering with meters by customers
- Adjusting previous low estimates, and zero or low consumptions caused by missing customer details, illegal bypasses, and tampering
- Repairing leaks in the distribution infrastructure

After a period of 24 months, the NRW moving average had fallen from 45% to a respectable 16%. However, much of this fall was due to measures such as adjusting previous low water sales estimates, after new meters had been installed.

Although the last eight months show the NRW tending to rise again, with continued determination, motivation, and alertness, a new NRW moving average low of approximately 11% should be achievable. On the other hand, without the WDM programme becoming an integral part of the utility's general good water supply management programme, the NRW moving average could easily reach to well over 30% and perhaps even revert to its original 45%.

Progress is often difficult to monitor and evaluate. The actual figures recorded for each day or month may vary and therefore extreme caution has to be applied when calculations and deductions are being made. Experience in the management and operation of water supply utility infrastructure is important.

Reasons for variations in figures may include:

- A major pipe burst
- A reservoir inlet control valve failure
- A change in actual consumption
- Months having different numbers of days
- Meters being read early or late
- The quantity of water stored in the distribution reservoirs varying at the time the meter readings are taken

Actual water sales figures will vary, even if the monitoring and meter maintenance is carried out perfectly

These fluctuating variables mean that short-term targets, such as short-term cash flow reduction, are often not attained. However, long-term commitment and perseverance will still sort out the winners from the losers.

In general, a WDM M&E programme helps institutions to:

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- Become more innovative, flexible, adaptive and responsive
- Develop a sense of accountability in staff towards the beneficiaries and towards their own development needs
- Learn from experience
- Facilitate change within projects, local institutions and government agencies
- Solve problems through better identification and analysis, and through better communication of the causes and appropriate solutions
- Improve planning and corrective action skills
- Improve effectiveness and sustainability
- Provide continuity of information and knowledge in situations where high staff turnover affects institutional memory and project implementation
- Empower communities by linking the efficiency and appropriateness of the project to community needs and demands

The need to integrate the monitoring, evaluation and maintenance of WDM programmes into the routine management of water services highlights the need for each water supply utility to have an overall information management system, no matter how rudimentary, for simple stand-alone schemes.

In turn, if national policies are to be monitored and regulated as they should be, each country should introduce a standardised but flexible management information system for institutions to report on how they are managing to achieve national goals. These goals should be in line with IWRM and overall sustainable development goals.

activity

Present your WDM plans in groups. The other participants are to comment on and criticise the plans presented for different MWSAs and suggest improvements. Final WDM plans are due three months after the training. This gives an opportunity for you to reflect on the practicality of the draft WDM plan, and also to allow for discussions with your colleagues within your workplace and outside.

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4.4 WHAT NEXT?

While the main outcome of this training is the development of a WDM plan for an MWSA, the approach used as described in Units 1 to 4 encourages and prompts discussion. It is important to note that the planning process — the exercise of reviewing supply, demand, and water issues — is at the heart of this training intervention. The final WDM plan must be the outcome of serious discussions, public involvement, review, and analysis, in order to be effective for your MWSA and community.

The WDM plan is not an end in itself, but the beginning of a dedicated, continuous, and concerted effort to ensure that your MWSA provides a service which is economically, financially, environmentally, and socially sustainable.

Remember that your WDM plan looks at the entire urban water cycle, including rainwater harvesting, desalination, ground and surface water, as well as storage and distribution, treatment, recycling and disposal, and the protection, conservation, and exploitation of water resources at their origins. It also covers empowering local communities to decide on the level of access to safe water and hygienic living conditions, the need to create more sustainable livelihoods per unit of water (for poverty reduction and reaching out to unserved communities), and the need to manage human water use to conserve the quantity and quality of freshwater and terrestrial ecosystems that provide services to humans and all living things.

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