

Part I

Reaping the Benefits –
How Local Governments Gain from IWRM



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The set of materials entitled “Local Government and Integrated Water Resources Management (IWRM)” aims to assist Local Governments with active participation in IWRM. The information provided addresses both the theory and practice of developing and implementing a process through which the IWRM principles of social equity, economic efficiency and environmental sustainability can be applied.

The materials are primarily targeted at Local Government officials, but are considered equally useful for individuals and organisations that work with Local Governments in the management of water resources.

The IWRM set of materials consists of the following four parts:

Part I: Reaping the Benefits – How Local Governments Gain from IWRM

Part II: Understanding the Context – The Role of Local Government in IWRM

Part III: Engaging in IWRM – Practical Steps and Tools for Local Governments

Part IV: Making Water Work for Local Governments – Ten Top Tips for Integration in Water Management

The materials are an output of LoGo Water¹, a research project aimed at improving the capacity of Local Governments to implement IWRM, thus contributing to the achievement of water-related Millennium Development Goals (MDGs).

The complete set is available to download from www.iclei-europe.org/logowater.

¹LoGo Water: Towards effective involvement of Local Government in Integrated Water Resources Management (IWRM) in river basins of the Southern African Development Community (SADC) region, EC Contract 003717



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Local Government and Integrated Water Resources Management (IWRM) Part I: Reaping the Benefits – How Local Governments Gain from IWRM

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Introduction

Water is a vital and limited resource which is under increasing demand from a growing number of water users in the Southern African Development Community (SADC) region. Competing claims for sufficient good quality water and the benefits derived from it are leading to conflict between users at a river basin, national, catchment and local level. Integrated Water Resources Management (IWRM) is widely promoted as the approach best suited to deal with the complex relationships between water users and water resources and to achieve the efficient use and equitable allocation of water on a sustainable basis.



Local Government does not have a specific mandate to manage water resources, but it is dependent on the availability of sufficient good quality water to undertake mandated functions. Local Government also influences the state (quantity and quality) of water available to downstream users through the disposal of wastewater and other functions such as land-use planning. It therefore has a significant role to play in implementing IWRM policy and meeting targets such as the Millennium Development Goals (MDGs) set by higher IWRM level institutions.

This booklet examines the relationship between Local Government mandates and water resources, highlighting the influence that Local Government has on the resources and the need for an integrated approach to water resources management. It illustrates ‘why’ Local Government should adopt and apply an IWRM approach. The potential benefits of IWRM for Local Government are discussed with examples provided to illustrate how municipalities in the SADC region have benefited from adopting and applying IWRM principles in every day decision making and operations. The examples also show the benefits of an integrated approach in these Local Government actions for the water resources and other water users.

The booklet therefore aims to stimulate interest and enthusiasm within Local Government to become involved and to start practising IWRM. It covers the ‘what’ and ‘why’ of IWRM and briefly mentions how Local Government can better engage in IWRM. Further examples, guidance and tools on the ‘how ‘ are provided in parts II and III of this ‘Local Government and IWRM’ set of materials.



“Local Government needs IWRM and IWRM needs Local Government”

Local Government in the Water Cycle

Water is a limited and variable resource

Water enters a catchment in the form of rain, snow or mist as shown in Figure 1. This water is captured, stored and transported through river catchments in various water resources. These include surface resources such as rivers, streams, lakes and wetlands which are linked to groundwater flow and aquifers. Climatic conditions determine how much water is available in a catchment. A catchment area can be likened to the bucket in Figure 2. In dry areas the bucket will be smaller than in areas with a wet climate. Major climatic events also cause variations in the amount of water in the catchment. These events range between too much water (floods) where the bucket may overflow and extreme scarcity (droughts) which result in a near empty bucket.

By 2025 almost half of SADC countries will be categorised as 'water stressed' or facing absolute scarcity.

Lack of infrastructure impacts on access to water in many SADC countries resulting in 'apparent scarcity'.

Currently 40% of people in SADC lack access to clean water.

Hirji, R., Mackay, H., Maro, P. (2002)

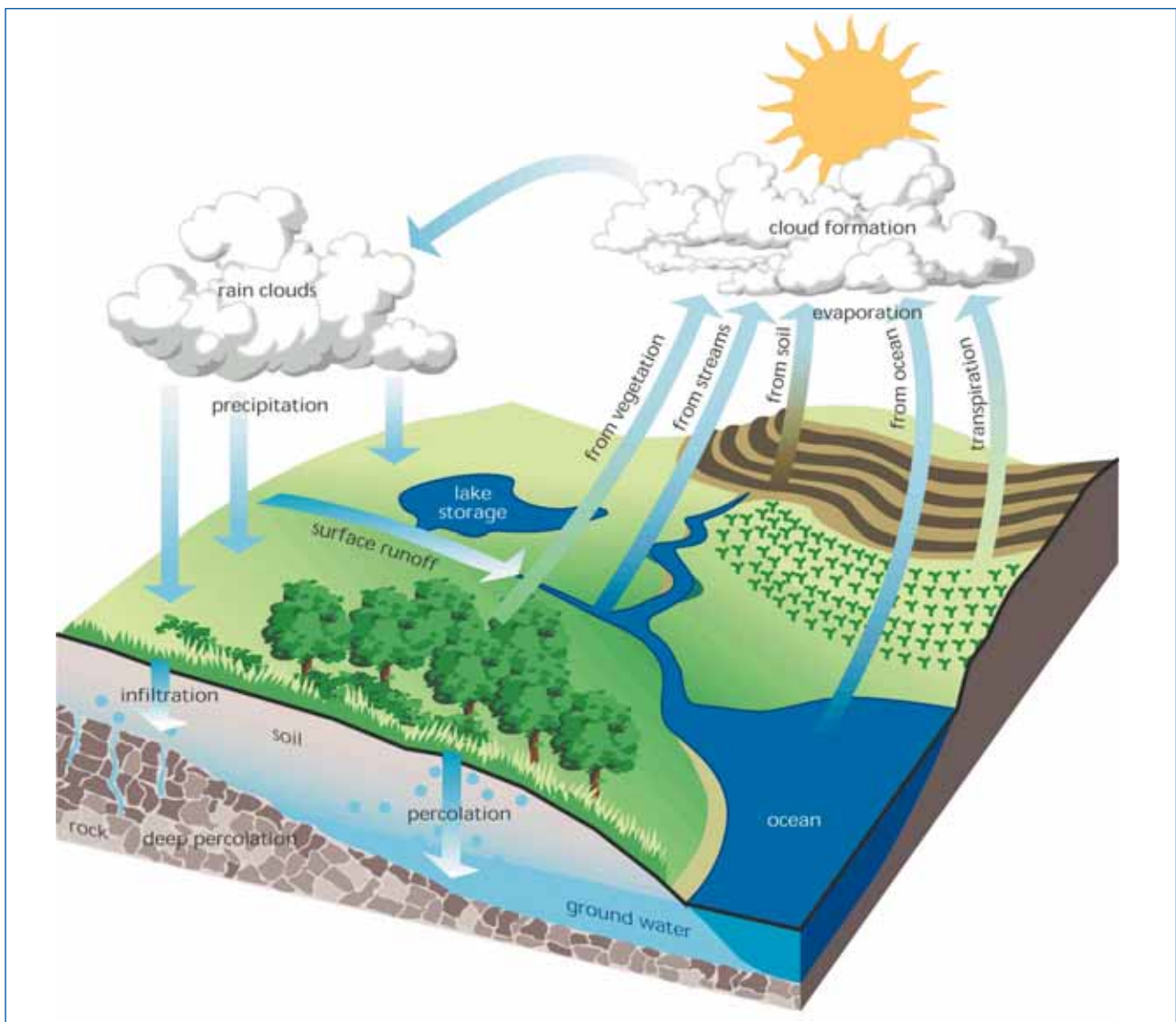


Figure 1 – The water cycle

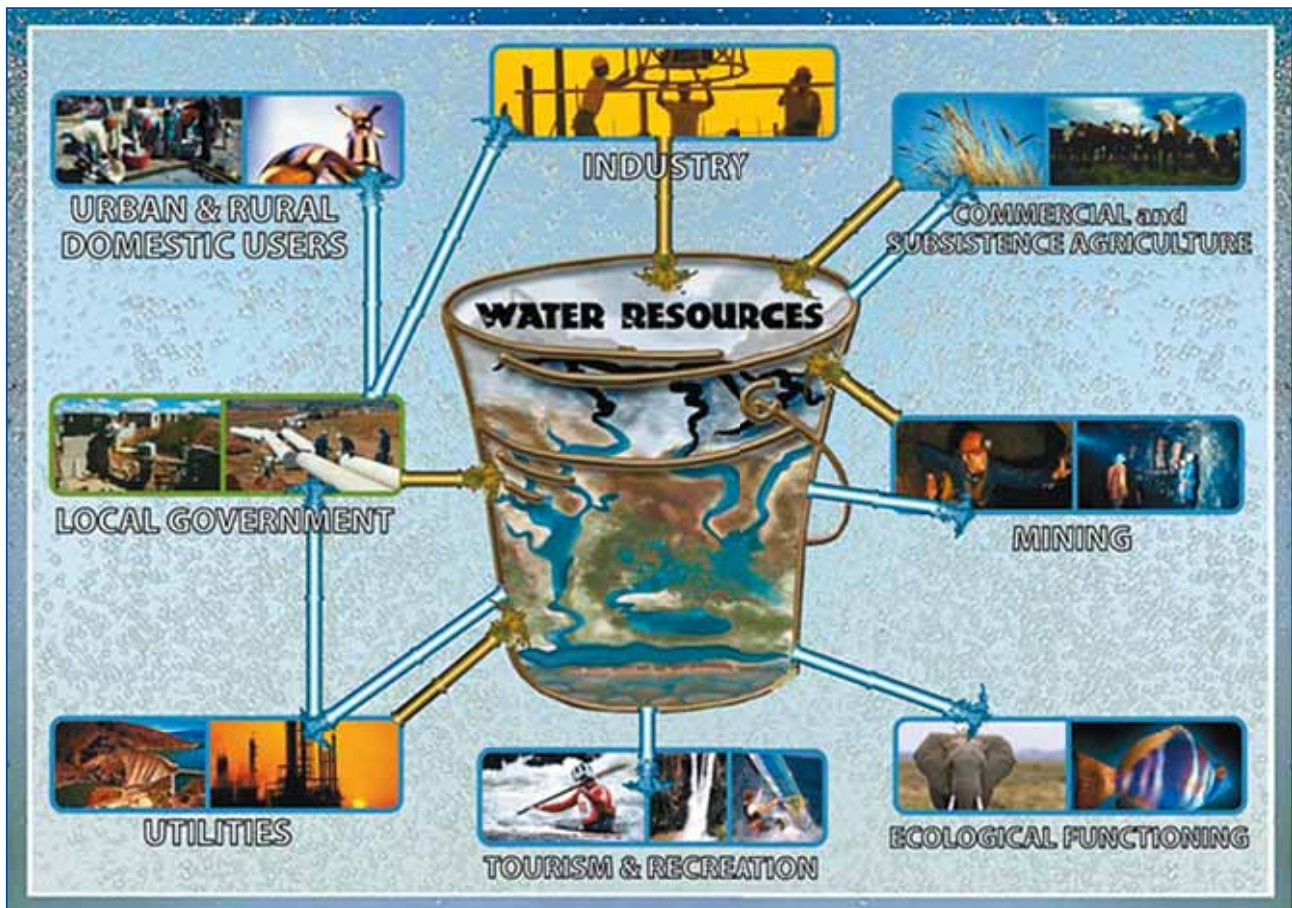


Figure 2 –The relationship between water resources and water users (Key: blue pipes indicate abstraction of water from resources, brown pipes indicate disposal of water back into resources)

Design: Purple Boa Creations

There are competing demands on water resources

Local Government is one of the many water users which depend on the water in a catchment (Figure 2). The quantity and quality of water required by these users differs and there is often not enough water in the bucket to meet the needs of all users. As a result there is competition for water between countries at a river basin level and between different economic sectors and local users at the catchment and local levels.

Users are linked to the water cycle and influence the state of water resources

Water users extract, store and utilise water through infrastructure such as dams, wells, pumps, pipes, treatment plants and boreholes. This infrastructure supports the provision of water services and it links users directly to water resources and the water cycle. For example, water supply involves the abstraction of water (blue pipes in Figure 2) from the resources by water users. The treatment and disposal of wastewater is another water service (illustrated by the brown pipes in Figure 2). Over abstraction decreases the amount of water available in a system and poor treatment of wastewater results in pollution of water resources. These are direct impacts to the state (quantity and quality) of water in a system.

Different land-uses within a catchment also cause various indirect impacts. For example, urban development results in the removal of natural vegetation which increases the rate of runoff from the land. This causes erosion of river systems and increases the intensity of flood events. By changing the quantity and quality of water within resources, different water and land-uses also change the

habitat and ecological processes in natural systems. This negatively affects the biodiversity (plant and animal life) that depend on the maintenance of systems in a natural state. It also limits the capacity of natural systems to provide the ecological goods, such as fish, and services (for example flood attenuation function of wetlands) which society depends on.

Impacts to water resources affect other users

Water resources in a catchment are linked to form one system (Figure 1). Rain that falls in a catchment flows from wetlands to streams and rivers and groundwater flow feeds back into surface resources. The impacts on water quantity and quality from actions of users are therefore transferred to downstream users. For example, pollution from a poorly managed wastewater treatment works increases the treatment costs and incidents of water related illnesses within a downstream municipality. Users at the bottom of a catchment have to contend with the combined impacts from all upstream users. Not only can the actions of a user/group limit access of downstream users to sufficient good quality water for basic uses (drinking, sanitation). Such actions may also affect the accessibility for downstream users to the benefits of water use (water for agriculture, industry, tourism).

Local Government is one of the many water users that is both dependant on water resources and also affects the state of water resources. The following section examines more closely the relationship between Local Government mandates and water resources.

Local Government Mandates and Water Resources

Depending on the size, capacity or institutional structures in a country, Local Government in the SADC region is commonly responsible for the functions or mandates summarised in the adjacent table. In terms of water resources management there are two categories of Local Government mandates. There are mandates where water is the direct focus or an essential requirement for performing the mandate such as water supply, and stormwater management. The other category is where water is not the key focus of the mandate but is an input, or is indirectly affected by the mandate.

Information provided in each of the following text boxes shows the relationship between the different Local Government mandates and water resources. Some of the implications for other users (including aquatic ecosystems) of Local Government mandates are also discussed. The interactions between Local Government mandates, water services, resources and other water users within a catchment situation are illustrated on the double page graphic entitled ‘Local Government in the Water Cycle’.

Local Government mandates *directly* related to water

- ◆ Water supply
- ◆ Sanitation and waste water management
- ◆ Storm water management

Local Government mandates *indirectly* related to water

- ◆ Solid waste
- ◆ Land-use planning
- ◆ Housing
- ◆ Parks and recreation
- ◆ Roads and transport
- ◆ Health services
- ◆ Disaster management
- ◆ Local economic development

The state of water resources affects Local Government performance

The state (quantity and quality) of water within a catchment directly influences the ability and costs for Local Government of providing mandated services and functions. The supply of water and sanitation services requires that Local Government constantly has access to enough water to meet demand within the municipality. Water for drinking, domestic and other uses also needs to be of a certain quality.

Water Supply

In many systems water is scarce. Poorly designed and maintained water services infrastructure results in the unnecessary loss or waste of water:

- ◆ Poor maintenance of infrastructure results in water leaks and losses. Lost water increases the costs of water to consumers. This in turn increases in the level of non-payment which is one of the main threats to the financial sustainability of municipalities.
- ◆ Maintenance and repair of the existing supply networks can reduce losses from the system and increase availability to meet new demand without the need to develop costly infrastructure projects such as dams and pumping facilities.
- ◆ Impoundments result in unnatural (lake type) hydrological systems. This impacts the natural flow and sediment regime and creates barriers for migration of species.
- ◆ Infrastructure (pipelines, pumps etc) disturbs riverbeds.
- ◆ Communities without access to safe or adequate volumes of drinking water may be exposed to the risk of water borne diseases such as cholera and diarrhoea.

A recent study of 62 municipalities in South Africa found that losses accounted for approximately 29% of the total volume supplied per annum.
(WRC Report No TT 300/07)

It is estimated that in Sub-Saharan Africa some 800,000 children a year die from diarrhoea and associated dehydration.
(World Health Organization)

Sanitation and Wastewater Management

- ◆ The installation of on site sanitation is required to avoid pollution of surface resources.
- ◆ Inappropriate sanitation systems can lead to the pollution of groundwater resources – for example seepage from pit latrines where the geology is pervious.
- ◆ Sewer spills due to blockages in the sewer system and overloading of sewage works pollute natural resources.
- ◆ Sub-surface leaks from sewerage pipes pollute groundwater.
- ◆ Pollution from uncollected or inadequately treated wastewater can result in increased illness amongst downstream users.
- ◆ Like humans, fish and other forms of aquatic life need oxygen to survive. Raw sewage discharges remove oxygen, causing fish kills, habitat loss, decreased tourism, and loss of recreational opportunities within a system.



Costs associated with sewer overflows	
Response	Prevention
Cleanup	Sewage system upgrades
Emergency repair	Maintenance
Medical care	Data collection and reporting
Reduced tourism / commerce / property values	
Lost productivity from ill workforce	
Increased costs of drinking water	
Loss of natural resource (fish kills)	
Fines (legal fees)	
Reporting requirements	

Stormwater Management

The alteration of catchments from natural (soft) to urban (hardened) surfaces changes stormwater flow. It increases the velocity, volume and intensity of peak flows. This results in various impacts which are summarised in the table below.

In addition to the impact on the resource, poorly designed and managed stormwater management facilities such as culverts at road crossings cause upstream flooding and downstream erosion. The impact for the municipality and its constituents is increased costs of flood damages.



Impact of urbanisation (Impervious services) on stormwater runoff	Consequences of the impact on the water resource				
	Flooding	Habitat Loss*	Erosion	Channel Widening	Streambed Alteration
Increased volume	●	●	●	●	●
Increased peak flow	●	●	●	●	●
Increased peak duration	●	●	●	●	●
Increased stream temperature		●			
Decreased recharge causing decreased base flow		●			
Changes in sediment loading	●	●	●	●	●

*(Inadequate substrate, loss of riparian vegetation)

Poor water quality increases treatment costs. It may also result in more cases of water-related illness, which affects the living standards of people and increases the costs of health services.

Local Government activities that impact on water resources

Most Local Government mandates influence the state of water resources, regardless of whether they are directly related to water or not. In cases such as pollution from a poorly managed wastewater treatment plant the impact on the resource and other users is direct and obvious. However in the case of mandates such as town planning, the impacts are indirect in nature – a planning decision to allow high density housing in the catchment of a wetland system will change the natural flow to the wetland, thereby affecting the naturally functioning of the resource. Certain impacts are common to different Local Government mandates which highlights the combined influence of Local Government actions on water resources.

Housing

- ◆ Housing schemes result in the conversion of natural groundcover to hardened surfaces. This reduces infiltration and raises the intensity and volume of run-off which increases risk of flooding and erosion of water courses.
- ◆ Housing concentrates sewage - depending on the geology in an area certain sewage systems can lead to groundwater pollution.
- ◆ Informal housing in peri-urban areas is often located alongside water courses as these settlements lack access to basic services. These situations also pose a risk to residents from flooding and to the resource due to pollution from solid and human waste.



Solid Waste Management

- ◆ Inadequate collection services in urban informal settlements and rural areas results in direct pollution of adjacent systems.
- ◆ Street litter enters streams and rivers via stormwater and overflows.
- ◆ Landfill activities have the potential to alter the quantity and quality of ground and surface water. Potential impacts on surface waters include:
 - Reduction of surface infiltration and an increase in run-off and sediment from soil compaction by vehicles and removal of vegetation
 - Diversion of surface watercourses.
- ◆ The release of uncontrolled discharges into nearby water courses. Potential impacts on groundwater include:
 - Reduced infiltration due to the removal of vegetation and compaction of top soil, and during operation because of artificial.
 - Contamination from leaching of spilled oil and hydraulic fluid chemicals during construction and breakout of chemical leachate during operation.



Land-use Planning

Different land-use types or zonings have different impacts on water resources.

- ◆ Conversion of catchments to hardened surfaces through urban development increases the intensity and volumes of flood peaks - thereby increasing the risk and impact of flooding and erosion of the receiving river and stream banks.
- ◆ Areas along rivers are used for different land-uses. The scenic value of river banks makes them choice locations for residential settlement. Informal settlements also develop alongside rivers as they provide direct access to water. Floodplains are often flat, productive areas with direct access to water and therefore suitable for agriculture. However, land-use adjacent to and in floodplains results in:
 - Loss of riparian vegetation, which destroys habitat and reduces river bank stability
 - Increased flood damage and loss during flood events
- ◆ High-income golf estates may generate income for municipalities, but they also utilise large volumes of water inefficiently. Given that only a minority of the population use these facilities, water use for such development may be considered inequitable use of the resource.



Parks and Recreation

- ◆ Vegetation along stream banks is removed to improve access or views of water features - this results in the destruction of riparian vegetation which is important habitat and also stabilises river banks.
- ◆ Use of alien plant species can result in invasion of natural plant communities.
- ◆ Watering of gardens via inefficient methods like hosepipes wastes water.
- ◆ Wasteful irrigation practices, such as irrigating parks and gardens during the middle of the day and during high winds when evaporation rates are greater, results in water losses.
- ◆ Poorly maintained footpaths and biking trails can lead to erosion in steep areas with erodible soils causing increased siltation of water resources.

Roads and Transport

Roads and transportation networks are essential infrastructure. The potential impacts listed below need to be considered when planning and constructing roads, rail and bridges.

- ◆ In rural areas roads constructed by municipalities are primarily gravel based surfaces. They are the cause of high run-off and sedimentation of streams and rivers if no control measures are included in the design.
- ◆ Bridges not designed to accommodate high flows increase the impacts of localised flooding.
- ◆ Roads concentrate water flow - where water is channelled off the road into water courses it results in erosion of wetlands and river banks.
- ◆ Run-off from paved surfaces carries pollutants such as oils from vehicles and any litter into water resources.
- ◆ Bridges and causeways change the sediment and flow patterns, through wetlands and streams.



Local Economic Development



Local economic development (LED) can involve projects related to different sectors such as agriculture and tourism. These sectors all have specific demands on water resources and also create particular impacts. The nature of the demands and impacts varies within sectors, such as between small scale and commercial agriculture. Another distinct difference would be between irrigated and dry-land agriculture, with irrigated agriculture requiring much larger volumes of water. LED initiatives may in certain instances be mutually exclusive, for example, investment in intensive irrigated agriculture may reduce the volume and quality of water necessary to maintain tourism and recreation activities. The costs and benefits of each option need to be considered in making an informed decision.

If adequately treated, wastewater can be used to irrigate certain crops, thereby avoiding the use of potable water or the use of polluted water from rivers for irrigating food crops which can lead to disease.

Health Care

Local Government is responsible for providing municipal health services. Effective health care demands access to clean water. If the mandates of water supply, sanitation and wastewater treatment are not properly taken care of it has negative consequences in terms of health care, including:

- ◆ Higher costs for health care (higher incidences of water borne illness)
- ◆ Reduced quality of life for sectors of the population that don't have access to potable water
- ◆ Loss of productivity due to ill labour force
- ◆ Reduced use of the resource for recreation

Education

Education is normally a mandate of national and provincial government who are responsible for schools, curricula etc. Local Government however has a role to play in ensuring the provision of potable water and sanitation facilities. The supply of safe drinking water to schools is an important requirement for ensuring the attendance and health of learners at schools, especially in rural areas where learners may travel long distances to attend schools. The provision of gender separate and appropriate sanitation facilities is also important particularly for female learners – evidence has shown that a lack of appropriate facilities clearly affects their attendance.

Disaster Management

Drought and floods are the major water related disasters that affect Local Government and its constituents in the SADC region. The costs of flooding can be reduced by putting in place measures to reduce risks, for example, removal of development activities, people and infrastructure from floodplains – a large undertaking or cost upfront, but major saving in long term. Other options include the involvement of stakeholders in early warning systems.



LOCAL GOVERNMENT



Natural Springs

Rural Municipalities

Tourism & Recreation

Streams

Rural Users

Health Services

Storage Dams

GroundWater

Commercial Agriculture

Boreholes and Pumps

Power Plant

Roads & Transport

Water Supply

Rivers

Domestic Users

Emergency Services

Stormwater Management

Estuaries

Local Government Mandates

Water Resources

Water Services Infrastructure

Water Users

IN THE WATER CYCLE



LoGo Water - Towards effective involvement of local government in Integrated Water Resources Management (IWRM) in river basins of the Southern African Development Community (SADC) region. LoGoWater is funded by the European Commission Research Directorate General. Contract Number 003717.

The Principles of Integrated Water Resources Management (IWRM)

IWRM provides a holistic approach to water resources management that seeks to take account of the complex relationships between water resources and users.

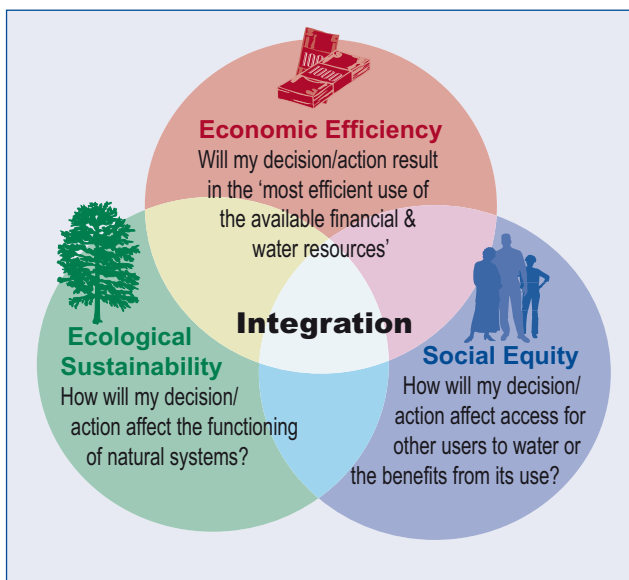
One of the most commonly used definitions of IWRM is that provided by the Global Water Partnership (2000): *“IWRM is a process which promotes the coordinated development and management of water, land and related resources, in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital eco-systems”*

A simple way to consider IWRM is by applying the phrase:

“In Water Remember Much”

- ◆ Remember the water resources
- ◆ Remember ecological functioning
- ◆ Remember other users
- ◆ Remember the costs

Remember, remember ...



IWRM is based on the three principles discussed below. These principles help analyse, and subsequently manage water resources in a way that leads to a co-ordinated outcome. By asking the questions in Figure 3, water users are prompted to consider the IWRM principles in their every day discussions, decisions and actions. Other stakeholders will need to be engaged to assist in answering these questions. It is the communication and effective participation of stakeholders that form the basis for achieving integration in water resources management.

Figure 3 – The IWRM principles and how they interact

Social Equity means ensuring equal access for all users (particularly marginalised and poorer user groups) to an adequate quantity and quality of water necessary to sustain human well being. The right of all users to the benefits gained from the use of water also needs to be considered when making water allocations. Benefits may include enjoyment of resources through recreational use or the financial benefits generated from the use of water for economic purposes.

Economic Efficiency means bringing the greatest benefit to the greatest number of users possible with the available financial and water resources. This requires that the most economically efficient option is selected. The economic value is not only about price – it should consider current and future social and environmental costs and benefits.

Ecological Sustainability requires that aquatic ecosystems are acknowledged as users and that adequate allocation is made to sustain their natural functioning. Achieving this criterion also requires that land uses and developments that negatively impact these systems are avoided or limited.

Local Government's role in IWRM

There are various institutional levels within the water governance framework. These are organised according to administrative and hydrological boundaries. They include international organisations such as SADC, river basin commissions at the transboundary river basin level, national and provincial government departments at the country level and catchment councils or agencies. These institutions are responsible for the development of the policy, legislation and institutional framework within which IWRM is undertaken. Local Government is seldom represented at these levels and does not have a direct mandate for water resources management.

Local Government is however in a unique position because it is responsible for many mandates that are directly and indirectly related to water resources. Local government also interacts directly with constituents and water users in their municipality. Local Government therefore has a key role to play in IWRM by:

- ◆ Broadening stakeholder involvement in decision making thereby enabling a more participatory approach to water resources management at the local level.
- ◆ Giving effect to IWRM policy and legislation developed by higher level institutions and achieving goals related to specific local mandates such as water supply and sanitation.
- ◆ Limiting negative impacts to water resources by being a responsible water 'user' and, by ensuring appropriate development through mandates such as land-use planning, local economic development and solid waste management and through infrastructural projects.

Further insights into the IWRM concept and its implications for Local Government is provided in Part II of this set of materials entitled "Understanding the Context – The Role of Local Government in IWRM".

Twin track approach

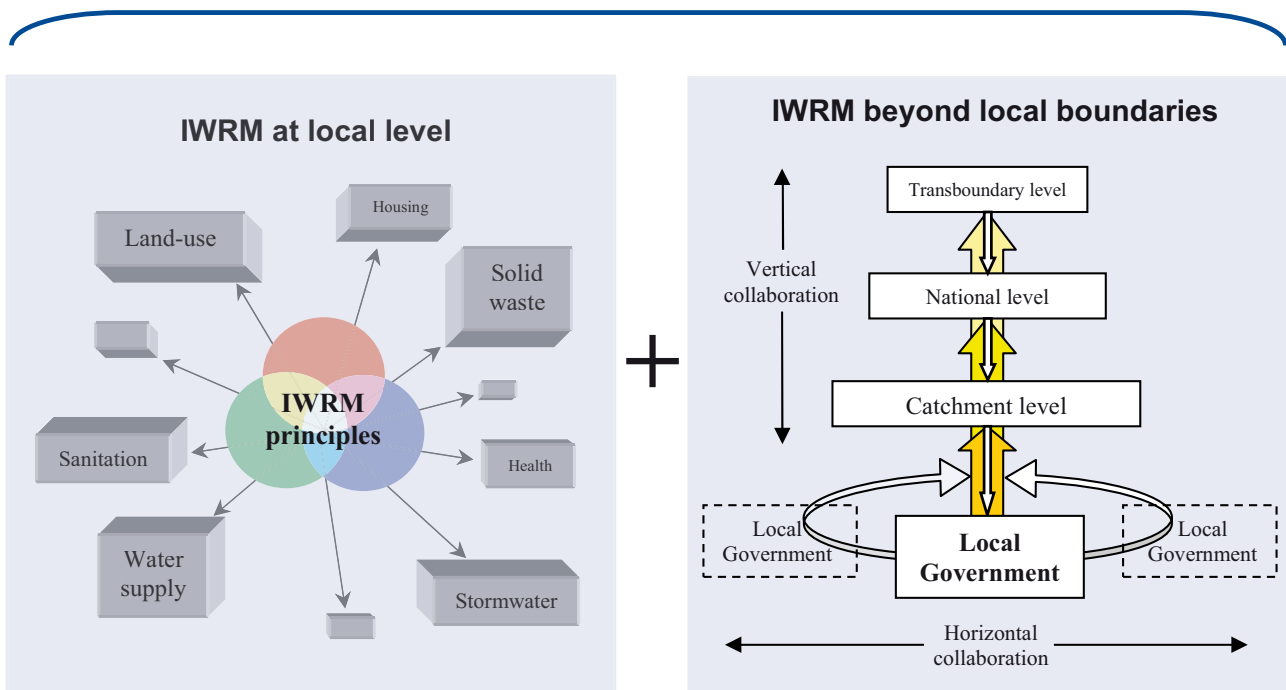


Figure 4 – Options for Local Government engagement in IWRM

Options for engaging in IWRM

Local Government can engage in 'IWRM at the local level' and also become involved in 'IWRM beyond local boundaries'. The local level option can be anything from a manager applying IWRM principles to a particular function within a single department to the municipal manager promoting the adoption of an IWRM approach across all departments within a municipality. Local Government can also become represented in catchment level institutions and engage vertically with IWRM institutions above it such as National Government departments and river basin commissions.

Ideally, Local Government should adopt the 'twin track' approach illustrated in Figure 4 which involves Local Government applying IWRM principles 'locally' and engaging "beyond local boundaries". The Lake Victoria case study below is a good example of the twin track approach being applied. What is significant about this case is that it was Local Government driven and involves integration between municipalities across international boundaries. The approach adopted will depend on several factors such as the size, capacity and responsibilities held by a Local

Lake Victoria Region Local Authorities Co-operation

Challenge

To ensure the sustainable use of Lake Victoria's resources. Lake Victoria is the second largest freshwater lake in the world. The basin spans the countries of Kenya, Tanzania and Uganda and is home to some 33 million people. Over the years the basin has faced various economic, social and environmental challenges. Scientists have expressed concern at the decreasing water levels in the lake and the associated environmental degradation along the shores of the lake.





Action

To address these challenges, the Lake Victoria Region Authorities Co-operation (LVRLAC), an initiative of the mayors of Entebbe (Uganda), Mwanza (Tanzania) and Kisumu (Kenya), was founded in April 1997.

The LVRLAC provides a forum for local authorities to discuss and deal with any issues affecting the basin. The LVRLAC membership totals 62 Local Authorities from the three countries and contact has also been made with the governments of Burundi and Rwanda. The LVRLAC has developed and adopted a strategic plan 2005-2008 which recognises that these challenges cannot be faced by local authorities acting in isolation and promotes sustainable and coordinated development within the Lake Region. The LVRLAC interacts with a range of partners including national government departments and association of Local Governments, international funders and agencies such as UNHABITAT. The most significant aspect of the integration achieved is the collaboration between such large numbers of local authorities across international boundaries.

Results and Benefits

 **Sustainability** – Environmental management and ecological improvement has been achieved through awareness campaigns, advocacy for harmonisation of policies, seeking partnerships for strategic interventions and initiating regional campaigns.

 **Equity** – Improved health and sanitation through HIV/AIDS programmes, partnerships with the Swedish International Development Cooperation Agency (SIDA) / UN-HABITAT on reduction and control measures, supporting voluntary counselling and testing centres. Contributions to poverty reduction and livelihood improvement have also been made through promotion of micro and small enterprises, tourism and culture, and via an improved investment climate in the local authorities of the Lake Victoria Region.

References: <http://www.lvrlac.net/> on the 2 January 2008 and LVRLAC Quarterly Bulletin July- September 2006

Government. The water resources situation and management issues will also determine what approach is adopted. Even if the policy, legislation and institutional structures necessary to engage vertically in IWRM are not in place, Local Government can make a difference by adopting IWRM as their approach to local action.

The key **message for Local Government** is therefore **to start engaging in IWRM as extensively as capacities allow**. Even if all municipalities merely adopt IWRM in those mandates which have the greatest influence on water resources - probably water supply, sanitation and wastewater treatment, and land-use planning - the combined benefits for water resources, other users and Local Government themselves will be substantial.

When to apply IWRM principles

IWRM principles can be applied to existing water management issues such as decreasing supply. It can also be applied when considering a new project such as planning for a solid waste disposal site. The sooner that IWRM principles are applied the sooner decision makers are able to understand who the stakeholders are and can start involving them to establish the implications of different management options. The IWRM principles should be applied at all times, from planning through to implementation and monitoring of a project.

What is needed to apply IWRM

IWRM is not a single tool or an end in itself. Rather, it is a means to an end which depending on the management issue in question will require various tools to achieve an integrated solution. Part III of the IWRM set of materials entitled 'Engaging in IWRM' includes practical steps and tools that are aimed at assisting Local Government staff to implement IWRM in their mandated roles and responsibilities. Local Government should consult with stakeholders when selecting the appropriate tools needed to apply IWRM, as overall requirements will only be known through effective participation and communication. Part IV of the Local Government and IWRM set of the materials provides the 'Ten Top Tips' – summarising the approach and important points discussed in detail in Parts I to III.

The Benefits of IWRM for Local Government

So why should Local Government engage in IWRM? Local Government is accountable to National Government and the constituents in their jurisdiction to meet service delivery targets. Local Government also need to be financially sustainable and ensure that they comply with the legislative framework within which they operate. IWRM is able to assist in meeting these objectives and realising some of the real benefits discussed below and illustrated through the examples provided.

Costs savings

In South Africa the current municipal debt is estimated to be R28 billion (Water Wheel, May 2007). Much of this is due to the inability of consumers to pay for services and wasted resources such as paying ‘twice’ for water due to losses caused by leaking infrastructure. Adopting an IWRM approach can assist in reducing

- ◆ leakage (don’t pay twice for water)
- ◆ operational costs
- ◆ public expenditure on water related health issues
- ◆ costs for clean up of pollution events
- ◆ costs from flood damage
- ◆ the need for infrastructure development, e.g. storage dams, because of improved Water Demand Management (WDM)
- ◆ costs associated with non compliance, e.g. fines

Financial sustainability can also be improved through increased revenue through:

- ◆ Improved payment for reliable services
- ◆ Better access to water for productive uses and increased opportunities for economic development
- ◆ Reduced unaccounted for water

The cases of Windhoek and Bulawayo are good examples of how WDM measures resulted in significant savings of water and costs for these cities.

Demand Management in Water-stressed Windhoek, Namibia

Challenge

To efficiently manage fluctuating and limited water resources for a growing population in a water stressed region. Namibia is the most arid country in sub-Saharan Africa with a mean annual rainfall of 330mm. All natural sources of water for the City of Windhoek have been completely utilised and at times evaporation accounts for more than twice as much water as that used by consumers.



Action

In 1994, Windhoek introduced Water Demand Management (WDM) which included a number of physical and non-physical measures (See table). The success had much to do with the multi prong approach. Several innovative approaches were adopted, including ‘banking water’ by pumping water in times of excess into the aquifers below the city.

Results and Benefits



Sustainability – The saving in water consumption was 3,2 Mm³ (15%) and reduced demand on the overall system which is ultimately more sustainable.



Equity – Improved surety of supply to users.



Efficiency – Unaccounted for water reduced to less than 10% with net revenue saving in 1996 estimated at N\$ 3.38 million for the City of Windhoek and Department of Water Affairs. This allows for continued economic development and growth in the city.

Reference: Hayes (2007)

Policy measures

1. Raising block tariff system
2. Maximum reuse of water
3. Smaller plot sizes and densification
4. Urbanisation guidelines
5. Guidelines on “wet” industries
6. Reduction of municipal water use

Legislation

1. Prevention of undue water consumption on private properties
2. Use of water efficient equipment
3. Set time for watering gardens and requirement to cover swimming pools.
4. Control of groundwater abstraction
5. Prevention of surface and groundwater pollution

Technical measures

1. Lowering of non-revenue water
2. Efficient watering of gardens
3. Artificial recharge of Windhoek aquifer
4. Rainwater harvesting
5. Re-use of waste water

Public campaign

1. Educational programmes
2. Consumer advisory services
3. Advice on water efficient gardening
4. Community empowerment

Reducing Water Demand - Bulawayo, Zimbabwe

Challenge

Bulawayo is the second largest city in Zimbabwe and is located in a semi-arid region prone to droughts. The low rainfall of the region (approximately 460 millimetres per annum) has caused the need for water conservation and augmentation measures. The city has endured several periods of water rationing, initially imposed in 1992 at the height of a severe drought. In the same year the city council introduced a rising block tariff structure for residential water users to discourage excessive water consumption.

Water losses in the distribution system totalled to 22 000m³ per day or 23% of water supplied from water treatment works.

Action



The City assumed that this unaccounted water was lost to leakages and consequently established the Leakage Control Unit. This Unit is responsible for implementing leak detection systems, controlling water pressure and replacing old pipes and valves. The final liquid effluent from four of the city's eight wastewater treatment plants is sold to schools, hospitals, parks and a eucalyptus plantation for irrigation purposes. The final effluent from the largest plant is used to irrigate crops and pastures and the sludge is used as fertilizer.

Results and Benefits



Sustainability – The implementation of a range of water conservation methods has assisted in water conservation becoming part of the City's culture and has contributed to the sustainable use of the resource. An example of this is the rising block tariff structure which has reduced average water consumption by approximately 23%.



Equity – The WCDM measures secured and increased supply to the people of Bulawayo.



Efficiency – An investment of Z\$5 million per year has contributed to the efficient use of water with a reduction in water loss equating to approximately Z\$28 million per year. The re-use helped to stimulate other economic uses such as the irrigated crops and plantations.

Reference: ICLEI (2004)., UN-Water/Africa (2006)

There are also costs associated with un-coordinated water resource management, as illustrated in the press extract below. The municipality stood to lose significant revenue generated by a major sporting event due to pollution resulting from poor management of the city's sewage systems. Other costs included potential fines for pollution and costs of treating downstream users for illness caused by poor quality.

'Dusi Guts' threatens annual canoe race

Kim Robinson

THE INDEPENDENT
on Saturday

With less than three weeks to go, KwaZulu-Natal's premier canoe marathon, the Hansa Powerade Dusi, is under threat because the poor water quality has become a health risk. Three weeks ago, more than 100 paddlers who practiced on the river ended up with severe diarrhoea. Officials are very concerned. "We believe we another record entry this year- and the economic

impact of this race is estimated to be about R20-million," When the last testing was done just above the sewerage farms results yielded 29 000 e-coli per 100ml. The bacterium comes from leaking sewerage pumps and pump stations higher up towards the city. Further rainfall will add to the problem, washing debris and bacteria from the river banks into the water.

Improved compliance

Local Government operates in an increasingly complex policy and legislative framework. When Local Government actions result in water quality standards to be exceeded or where they cause environmental degradation Local Government are liable for the associated fines and other costs – such as rehabilitation and clean up. An IWRM approach requires that Local Government interacts more often and effectively with the government departments and agencies responsible for setting and enforcing this framework. This leads to increased awareness and understanding of this framework and cooperation with the different stakeholders in achieving compliance.

Improved trust and working relationships

A need for an integrated solution is often linked to a conflict situation that arises because not all stakeholders were consulted. An IWRM approach avoids this through early identification and inclusion of stakeholders. Pro-active participation by stakeholders in a decision making process forms the basis for improved understanding trust and the development of relationships and forums that can be used by Local Government to improve participation by stakeholders in local decision making. Other benefits include:

- ◆ Improved accountability to constituents
- ◆ Increased co-ordination between departments
- ◆ More effective strategic planning
- ◆ Prevention and mitigation of conflicts
- ◆ Pro-active identification of competing demands
- ◆ Increased empowerment of local stakeholders

The sewage disposal education programme undertaken in eThekweni (see box below) illustrates the benefits of empowering users through effective communication and partnering with other stakeholders such as industry.

Sewage Disposal Education Programme, Ethekwini, South Africa

Challenge

Historical imbalances resulted in many communities placing little value on the proper use and maintenance of sewage systems, resulting in blockages. The abuse and misuse of sewage facilities was costing the city about R6-million per annum.



Action

In an effort to curb these costs and the high levels of pollution, Durban Metro Water Services launched the Sewage Disposal Education Programme. The programme involves public/ private partnerships and aims to create a better understanding of the workings of the sewage system particularly for first time users. This is achieved through innovative educational interventions including educational campaigns delivered to schools and communities, a curriculum guide for learners, a road show and theatre performances at informal settings such as clinics, taxi ranks and shopping centres and a Wastewater Education Awareness Centre.

Results and Benefits



Sustainability – The high levels of pollution were reduced.



Equity – Consultation with the users has assisted in attaining equity. The Education Campaign has reached 141,646 learners and 212,104 adults. A further 35 600 adults and 40 000 school children were reached through 550 street performances in one year. The Programme has been introduced to 226 schools and many clinics. Rewarding public-private partnerships have been formed with buy-in from industries in the Durban Metro.



Efficiency – A decrease in the number of blockages has facilitated a more efficient use of the resource. In Umlazi, blockages over a 2 year period were reduced from 1300 to between 300 and 400/month. Blockages throughout the Metro area have reduced by one third over a 12 month period equating to a saving of approximately 1.4 million rand.

Reference: Durban Metro Waste Services

Water resources deliver a range of goods and perform various services to society which include:

- ◆ Recreation and tourism
- ◆ Water purification
- ◆ Goods (fish and reeds for craftwork)
- ◆ Flood control
- ◆ Energy (hydro-electric power)
- ◆ Supply of fresh water
- ◆ Biodiversity

Degradation of natural systems reduces the capacity of water resources to deliver goods and services. When a system is degraded, the cost of supplying these goods and services will need to be met by society and in some cases Local Government. As an example, wetlands provide an important water purification service. When wetland systems are lost or degraded larger water treatment plants are required to compensate for the lost “purification function” in a catchment. Wastewater treatment is a Local Government mandate and they will be responsible for this cost.

The City of Tshwane recognised the value of wetland systems and the implications of their continued destruction for the municipality, biodiversity and other users such as local communities who harvest the reeds and other goods produced by these systems.

Wetland Assessment and Rehabilitation in Northern Tshwane, South Africa

Challenge

To conserve and promote the sustainable use of wetlands in an urban environment. The Gauteng province is experiencing a tremendous development boom and urban open spaces are under considerable pressure. Wetlands in urban environments are under particular pressure, either from direct development or secondary effects such as stormwater run-off or drainage.



Action

The Tshwane Metropolitan Municipality’s Environmental Management Division in partnership with the Agricultural Research Council set out to assess the distribution, extent and conservation status of wetlands in the City of Tshwane Metropolitan Municipality. The aim of the project was to develop a wetland dataset for the City which would assist town planners, engineers, conservation and environmental managers in decision-making.

In addition, the Municipality together with ‘Working for Wetlands’ (a national poverty alleviation programme) initiated a number of wetland rehabilitation projects aimed not only at conserving water resources and catchment areas within the boundaries of the Municipality but also at poverty alleviation and capacity building.

Results and Benefits



Sustainability – The information could be utilized to sensitise land-use planners and wetland managers on wetland and the rehabilitation of wetlands secured their sustained functioning and health.



Equity – Involvement of various stakeholders including the national government, local municipalities, parastatals and communities. Employment was created and skills development of local people took place through collaboration with ‘Working for Wetlands’.



Efficiency – The mapping, database and rehabilitation can be considered a cost - but also an investment that will avoid future costs associated with degradation of the resource, non compliance due to poor planning decisions etc.

The cases provided have shown how an IWRM approach can assist Local Government not only to achieve direct and obvious benefits such as cost savings and improved service delivery but also assist in promoting their strategic objectives which include:

- ◆ Poverty alleviation
- ◆ Sustainable economic development
- ◆ Creating a healthy living environment
- ◆ Improving equitable access to basic services.
- ◆ Improved understanding of constituents needs and better working relationship.

It also contributes to National Government meeting obligations to international conventions, transboundary agreements and targets such as the Millennium Development Goals.

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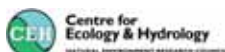


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Integrated Water Resources Management (IWRM) is a hot topic. It is everywhere – in the media, on the internet, at conferences – and is a buzzword amongst governments, water institutions and NGOs. Is it just a current trend that will soon be forgotten or is it here to stay? More importantly, as an official of a Local Government – is it worth exploring further?

The 'Local Government and IWRM' set of materials has been produced by African and European water and Local Government specialists. They are convinced that IWRM in the long-term is both possible and the best way forward. It can only work with Local Government involvement, and Local Governments themselves need IWRM to optimise the performance of their mandates in the local community.

The 'Local Government and IWRM' set of materials consists of:

- Part I: **Reaping the Benefits –
How Local Governments Gain from IWRM**
- Part II: **Understanding the Context –
The Role of Local Government in IWRM**
- Part III: **Engaging in IWRM –
Practical Steps and Tools for Local Governments**
- Part IV: **Making Water Work for Local Governments –
Ten Top Tips for Integration in Water Management**

This publication is Part I of the series and aims to stimulate Local Government to engage in IWRM by illustrating the benefits of doing so.

Make your Local Government a pioneer in water sustainability – adopt IWRM!

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