SARW
Southern Africa Resource Watch

Resource Insight
Issue No 9 July 2010

The State of Water Resources in Malawi and its Impact on the Citizens

Southern Africa
Resource Watch

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Resource Insight is published by the Southern Africa Resource Watch. Southern Africa Resource Watch (SARW) is a project of the Open Society Initiative for Southern Africa (OSISA).

ISSN: 1994-5604
Key title: Resource Insight

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Abstract

Malawi is endowed with a variety of natural resources which include expanses of water systems. Malawi is generally considered to be relatively rich in water resources, which are stored in the form of lakes, rivers and aquifers (FAO, 2007). Malawi's total renewable water resources are estimated at 17.28 cubic kilometers per year (Ng'ongo'la, 1999:9). Various institutions are responsible for water resources allocations, regulation, policy implementation and provision to the users. The roles of each of the agencies are outlined in the Water Policy of 2005, Water Resources Act of 1969 as well as the National Sanitation Policy of 2007.

This article investigated water and sanitation backlogs and the fact that Malawi is off track in meeting water and sanitation MDGs despite the fact that it is endowed with water resources. Investigation looked at the mass use of boreholes in water provision in rural and peri urban areas, un improved and unhygienic pit latrines in both urban and rural areas in the context water and sanitation management vision, lack of financing of the sector by government and donor agencies, availability of progressive policies that are not translated into increase of water and sanitation coverages, but waterborne diseases killing people even in the commercial capital city of Blantyre, obstacles to provision of safe water and adequate sanitation such as weak leadership in the sector, poor sustainability of services, limited capacity in the sector are some of the issues that shaped arguments about a country with has abundant water resources that consistently experiencing water shortages.


Malawi
International boundary
Region boundary
National capital
Region capital
Railroad
Road
0 50 100 Kilometers
0 50 100 Miles
Lake Nyasa
NORTHERN
CENTRAL
SOUTHERN
TANZANIA
MOZAMBIQUE
Mbeya
Njombe
Itungi Port
Chitipa
Karonga
Isoka
Rumphi
Mzuzu
Nkhata Bay
Mzimba
Luwawa
Lundazi
Mpika
Chisamula I. (Malawi)
Likoma I. (Malawi)
Augusto Cardoso
Kasungu
Nkhota Kota
Lichinga
Marrupa
Chipata
Mchinji
Lilongwe
Senga
Salima
Monkey Bay
Catur
Katete
Petauke
Dedza
Mangochi
Lake Malombe
Furancungo
Nchew
Lake Chilwa
Cuamba
Zomba
Blantyre
Limbe
Chikwawa
Mulanje
Thyolo
Milange
Nsanje
Vila de Mocuba
Pebane
Vila de Sena
Inhaminga
Quelimane
Mozambique Channel
Tunduru

Source: FAO

Malawi is a landlocked country, lying in Southern Africa between latitudes 9°22S and 17°03S and longitudes 33°40E and 35°55E. It is bordered by the United Republic of Tanzania to the north and northeast, Mozambique to the east, south and southwest, and Zambia to the west. The country has a total area of 118,480 square kilometers (km^2) with a total length of about 900 kilometers (km) and a maximum width of about 250 km. About 20 percent of its total area is covered by surface water bodies.

Malawi's topography is characterized by extremely diverse physical features. It is divided into four major physiographic zones:

- The highlands of Mulanje, Zomba, and Dedza in the southern part of the country
- The plateau of the central and northern regions
- The rift valley escarpment
- The rift valley plains along the lakeshores of Lake Malawi, the Upper Shire, and Lower Shire Valleys (Ng'ong'ola, 1999:10, FAO, 2007)

The soils of Malawi have been grouped into 28 classes, predominated by three major soil types:

- The Eutric Leptosols, known as Lithosols, which occur in most areas of the country;
- The Chromic Luvisols, generally known as Latosols, which are the red-yellow soils of the Lilongwe plain and some parts of southern region;
- The Haplic Lixisols, which are the alluvial soils of lacustrine and river-line plains, the Vertisols of the lower shire valley and Phalombe plain and the Mopanosols in the Liwonde and Balaka areas.

The climate of Malawi is tropical continental and largely influenced by the huge water mass of Lake Malawi, which defines almost two-thirds of Malawi's eastern border. There are two distinct seasons: the rainy season from November to April and

the dry season from May to October. The dry season may be divided into the cool dry period from May to July and the hot dry period from August to October.

Annual rainfall in Malawi ranges from 700 to 2,400 millimeters (mm) with mean annual rainfall being 1,180 mm. Its distribution is mostly influenced by the topography and proximity to Lake Malawi. The highest rainfall is experienced in the high altitude and mountainous areas of Mulanje, Zomba, Dedza and the plateaus of Viphya and Nyika while the lowest rainfall is experienced in the low lying areas of the Lower Shire Valley and other rain shadow areas.

The main rain bearing system in Malawi is the Inter-Tropical Convergence Zone (ITCZ). This is a broad zone in the equatorial low-pressure belt, towards which the north easterly and south easterly trade winds converge. This system is responsible for most of the rain received in the country. Other rain bearing systems affecting Malawi are:

- Tropical cyclones, which are essentially intense low-pressure cells that originate in the Indian Ocean and move from east to west, bringing widespread heavy rainfall mostly in southern Malawi, which can cause serious flooding.
- The Convergence Ahead of Pressure Surges (CAPS) system, which develops as high-pressure cells continue to move over the southern tip of the sub-continent. This leads to the convergence ahead of the pressure surges causing isolated but locally heavy rains that normally precede the onset of the rainy season.
- The easterly waves system, which is mostly active towards the end of the rainy season (March/April). The existence of easterly waves in the atmosphere causes isolated but locally heavy rains in some parts of the country.

Temperatures are greatly influenced by the topography and decreases with increasing altitude. The mean maximum and minimum temperatures are 28°C and 10°C respectively in the plateau areas, and 32°C and 14°C respectively in the rift valley plains. The highest temperatures occur in October/November while the lowest temperatures are experienced in June/July.

Table 1. Basic statistics and population

Physical areas			
Area of the country	2002	11,848,000	ha
Cultivated area (arable land and area under permanent crops)	2002	2,440,000	ha
-as % of the total area of the country	2002	21	%
-arable land (annual crops + temp fallow + temp meadows)	2002	2,300,000	ha
-area under permanent crops	2002	140,000	ha
Population			
Total population	2002	12,337,000	inhabitants
-of which rural	2004	83	%
Population density	2004	104	inhabitants/km^2
Economically active population	2004	5,876,000	inhabitants
-as % of total population	2004	48	%
-female	2004	49	%
-male	2004	51	%
Population economically active in agriculture	2004	4,777,000	inhabitants
-as % of total economically active population	2004	81	%
-female	2004	56	%
-male	2004	44	%
Economy and development			
Gross Domestic Product(GDP) (current US$)	2003	1,700	million US$/yr
-value added in agriculture (% of GDP)	2003	37.6	%
-GDP per capita	2003	140	US$/yr
Human Development Index (highest=1)	2002	0.388	
Access to improved drinking water sources			
Total population	2002	67	%
Urban population	2002	96	%
Rural population	2002	62	%

In 2004, Malawi's population was about 12.3 million with an annual growth rate of 2.1 percent (Table 1). About 83 percent of the total population was rural. Malawi is the most densely populated country in the SADC region, with a population density of 104 inhabitants/km^2. The population is not evenly distributed throughout the country, and the Southern Region has some of the highest population densities in the country. In 2002, 96 percent of the urban population and 62 percent of the rural population were using improved drinking water sources (Table 1).

Though Malawi's fertility rate of 6.7 births per woman in the period 1990-1992 has dropped to 6.3 births per woman in 1998-2000, it still remains one of the highest in the world. This high rate is attributed to several reasons such as early marriages, early-age pregnancies, relatively short birth intervals and still little knowledge of and access to modern contraceptive practices.

Malawi still remains one of the poorest countries in the world. Its Human Development Index (HDI) of 0.464 ranked the country 163rd out of 174 countries in 2000.

The rapid increase in population has resulted in great pressure on land. Fallow periods for restoring soil fertility have been reduced greatly in the smallholder farming systems, and cultivation is expanding to marginal and less fertile areas. This is leading to severe deforestation, soil erosion, and a general degradation of the natural resource base. This problem is most serious in southern Malawi as compared to central and northern Malawi.

Water Resources and Use

Water Resources

Malawi is endowed with a variety of natural resources which include expanses of water systems(MIWD, 2005:1) Malawi is generally considered to be relatively rich in water resources, which are stored in the form of lakes, rivers, and aquifers (FAO, 2007).

The country is divided into 17 Water Resources Areas (WRAs), which are subdivided into 78 Water Resources Units (WRUs). There are two major drainage systems:

- The Lake Malawi system, which is part of the Zambezi River basin. The Shire River is the only outlet of the lake with an average flow of 400 cubic meters per second (m^3/s). About 91 percent of the country is located in the Zambezi River basin.
- The Lake Chilwa system, which is shared with Mozambique. Lake Chilwa is an endorheic basin draining rivers originating from the eastern slopes of the Shire Highlands, the Zomba Plateau and the northern slopes of the Mulanje Massif.

These water systems cover 21% of the country's territorial area. There are also widespread groundwater sources whose occurrences are associated with two aquifers namely the basement complex aquifers which are extensive but low yielding from 0.2 to 4 litres per second and covering the plateau areas, Shire Highlands, the Upper Shire Valley, Lilongwe to Kasungu Plain and the South Rukuru River catchment (MIWD, 2005:1, Ng'ong'ola,1999:9).

There are two main aquifers in Malawi:

- The Precambrian weathered basement complex, which is extensive but low yielding (up to 2 litres per second (L/s)). According to Ng'ong'ola(1999:9) the basement aquifers are low yielding and discontinuous but widely distributed throughout the extensive pre-cambrian basement gneiss complex formations which make up approximately 85% of Malawi's geology. The aquifers can yield

up to 2 litres / second and are found in the weathered or fracture zones of the basement complex. The quality of groundwater in the weathered basement complex aquifer is generally acceptable although, localized groundwater quality problems do occur due to high concentrations of salts.

- The quaternary alluvial aquifers of the lakeshore plains and the Lower Shire valley, which are high yielding (up to 20 L/s). The alluvial aquifers are high yielding with recorded yields in excess of 10 litres per second. In the alluvial aquifer, groundwater is more mineralized. The main agents affecting groundwater are Iron, Fluoride, Sulphate, Nitrate, Chloride and total dissolved solids (FAO, 2007, Ng'ong'ola,1999:9).

Malawi's total renewable water resources are estimated at 17.28 cubic kilometers per year (km^3/yr) (Table 2). From this, 16.14 km^3/yr are produced internally, while about 1 km^3/yr comes from Mozambique via the Ruo River and 0.14 km^3/yr is from a lake shared with Mozambique along the course of the Shire River. Almost all of the internal groundwater resources of 1.4 km<suyp>3</sup>/yr are thought to be drained by the rivers, as Malawi is a humid, enclosed country. Water resource distribution is highly variable both seasonally and geographically, as nearly 90 percent of the runoff in major rivers occurs between December and June (Ng'ongo'la, 1999:9).

Lakes are a main feature of Malawi's water resources and the main ones are:

- Lake Malawi, which is the third largest freshwater lake in Africa and the eleventh largest in the world, has a total surface area of 28,760 km^2 (including the part of the lake belonging to Mozambique). The lake is 570 km long, 16 to 80 km wide, and has a total storage of 1,000 km^3. Its average depth is 426 m, while its maximum depth is 700 m. It is the most important single water resource and plays a vital role in the socio-economic development of the country (MIWD, 2005:1,FAO,2007). Lake Malawi is the world's cleanest lake, inhabited by more species of fish than Europe and North America combined (WaterAid, 2005:4) However, the lake is in the bottom of the Rift Valley, while most Malawians live up on the plateaux. That means the water is almost unusable for agriculture.
- Lake Malombe covers 303 km^2, and is about 30 km long, 15 km wide and has an average depth of 4 m. It is an inflation of the Shire River which form part of the great East African Rift Valley

- Lake Chilwa lies on the border between Malawi and Mozambique. Being the "sink" of an endorheic basin, its surface area is very variable but is on average 683 km^2, of which 721 km^2 lies in Malawi. It is a shallow, saline lake with an average depth of 2 m.
- Lake Chiuta, separated from Lake Chilwa by a sand bar of 20-25 m height, lies on the border between Malawi and Mozambique. It covers 200 km^2 of which 40 km^2 belong to Mozambique. Its depth is 5 m.

There are nine major dams with a height of more than 12 m and with a total storage of slightly over 43 million m^3. They have been constructed mainly for municipal water supply, except for two that were constructed in the 1950s near Blantyre for hydroelectric purposes. In addition there are 700,750 small dams with a storage capacity of approximately 64 million m^3, most of which were built during the colonial period and are in various states of disrepair. Due to lack of maintenance over a long period, most of these small dams require major rehabilitation. Currently the government has embarked on the rehabilitation of some of these small dams through various programs as part of the national water conservation strategy. According to the Water Resources Board, any dam with a dam height of 4.5 m and above is classified as a large dam; for that reason, dam design reports and drawings have to be available for technical consideration when a water right application is processed.

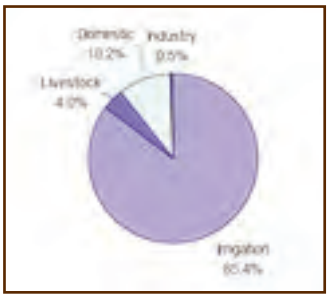
Malawi is rich in wetlands, which include lakes, rivers, many reservoirs spread over the country, and marshes. The most important marshes are the Elephant and Ndindi marshes in the Lower Shire Valley, the Vwaza Marsh in the Rumphi district, and the Chia Lagoon in Nkhotakota. The major wetlands of Lake Malawi and Lake Chilwa are closely monitored under the RAMSAR and UN biodiversity conventions.

The history of groundwater development in Malawi dates back as far as the early 1930s. By 1994, there were about 9,600 boreholes and 5,600 protected shallow wells, the majority of which were constructed by the government. However, since then the increase in boreholes drilled by the government, non-governmental organizations, and the private sector has been dramatic, and according to the Ministry of Water Development there were about 19,000 boreholes drilled in 2001. This trend is continuing and the number of boreholes is continually increasing as a result of the pro-

liferation of drilling contractors in the country. Furthermore, due to the recent frequent occurrence of droughts, the number of hand-dug shallow wells has considerably decreased because they are highly vulnerable and prone to drying up, and therefore people have opted for boreholes instead of shallow wells.

According to the Ministry of Irrigation and Water Development (2005:1) the intensity and methods of utilization of these resources can, if not properly managed and regulated, result in their serious deterioration and / or depletion. Although the country is endowed with relatively vast amount of water resources, it is currently encountering a number of growing competing demands and challenges. Some of these demands and challenges include the high population growth resulting in increase for demand for water for domestic, industrial and municipal uses, agriculture and irrigation, tourism, mining, manufacturing, water transport or navigation, energy or hydropower, and ecological sustenance.

Figure 1. Water withdrawal



Source: FAO

Water Use

Major water users in the country are the domestic sector, irrigation, hydropower, industry, navigation, recreation and tourism, fisheries, and biodiversity. Water withdrawal for agricultural and domestic purposes has increased over the last decade as a result of socio-economic development and population growth. Agriculture/irrigation is still by far the major water-withdrawing sector, followed by the domestic and municipal water supply and industry (Table 2 and Figure 1). However, an updated and comprehensive water resources and water use information database is not available in the country.

International Water Issues

A great part of Malawi's water resources, such as Lake Malawi, Lake Chilwa, Lake Chiuta, and Shire, Ruo and Songwe Rivers are shared with the neighboring countries of Mozambique and the United Republic of Tanzania as trans-boundary and cross-boundary waters. So far, no major conflicts have arisen over the utilization of these resources. However, in order to avoid potential conflicts, Malawi is signatory to a number of international treaties and conventions, including the SADC Protocol on Shared Watercourses and the 1997 UN convention of non-navigational uses of international waters.

At a bilateral level, Malawi is implementing a project for the stabilization of the Songwe River course jointly with the United Republic of Tanzania, through the Malawi/the United Republic of Tanzania Joint Permanent Commission of Cooperation (JPCC). The agreement on the establishment of a Joint Water Commission between Malawi and Mozambique has been signed in November, 2003. With Lake Malawi and the Shire River system being a sub-basin of the Zambezi watercourse, Malawi actively participates in the Zambezi Watercourse Commission (ZAMCOM), which was signed by the eight riparian member states of the Zambezi River Basin in July 2004 in Kasanne, Botswana. Within the SADC region, Malawi is part of other initiatives such as the SIDA initiative and the FAO-supported Convention on the Management of Lake Malawi/Nyasa for Sustainable Development.

Water Management, Policies, and Legislation Related to Water Supply and Sanitation

Storage Dams

Malawi heavily depends on run-of-the river water, whether the use is for hydropower, irrigation, water supply, navigation, etc. There are no major storage dams despite existing potential and need. However, there are small reservoirs with storage capacity ranging from a few thousand cubic metres to about 5 million cubic metres, which have been constructed for water supply, irrigation and conservation purposes. These dams total about 700 in number, with total storage of less than 100 million cubic metres or 0.1 km^3. Despite the potential and economic viability of multi purpose water resources developments and management schemes, where a dam can be developed for water storage and raw water can be sold in bulk and used in irrigation, water supply, fisheries and electricity generation for example. Malawi has not exploited the opportunities. The multi purpose approach would make water relatively more available and less costly to the investor. The approach would also promote investments in water dependent industries, and contribute to poverty alleviation and realization of maximum benefits from utilization of the water resources. It could also facilitate mitigation of conflict of interest among various users using the same river as source of water. There are no favourable policy and legal environment for such multipurpose developments (Ng'ong'ola, 1999:11)

Institutions established to provide water and sanitation

The management of water resources requires an integrated approach involving a number of stakeholders, which include Ministry responsible for Water Affairs, National Water Resources Authority, Water Utilities, Local Governments, Ministry responsible for Agriculture, Ministry responsible for Irrigation, Ministry responsible for Natural Resources, Ministry responsible for Health, Ministries responsible for Gender, Youth and Community Services, Ministry responsible for Education,

Ministries responsible for Lands, Physical Planning and Human settlements, other public holders, NGOs, Civil Society, private sector, Universities and other training institutions. The following shall be the institutional roles, responsibilities and linkages for these stakeholders' institutions:

Ministry Responsible for Water Affairs

The roles of the Ministry shall be to:

- Provide policy direction and coordinate water sector programmes;
- Monitor (in terms of quality and quantity), assess, plan, develop, conserve, allocate and protect water resources for utilization in the social and economic sectors of production and services;
- Manage and disseminate water resources and sanitation information;
- Invest in sectoral planning, development and construction of water infrastructure, including multi-purpose dams;
- Promote and adhere to regional and international obligations and agreements without compromising the country's sovereignty, security and territorial integrity;
- Develop systems for early warnings on floods and droughts and pollution;
- Undertake policy formulation reviews, and enforcement;
- Establish standards, guidelines and inspectorate;
- Develop and regulate water utilities in terms of tariffs and financing; and
- Undertake training and capacity building within the water and sanitation sector (National Water Policy 2005).

National Water Resources Authority

The Authority's roles shall be to:

- Co-ordinate and harmonize the activities of Catchment Management Authorities and all other stakeholders;
- Advise on prescribing and determining the establishment of water users associations, especially for rural supply schemes and any other schemes (for domestic, irrigation or fisheries) owned and operated, maintained and managed by rural communities or required by entrepreneurs;
- Determine and collect fees related to water abstractions and discharges;
- Approves any developments and or improvements related to water resources;
- Ensure that water resources buffer zones are properly managed;
- Declare water catchments as water controlled areas;

- Control and apportion water use in the country; and
- Issue water abstraction and discharge licenses (National Water Policy 2005)

Water Utilities

The roles of water utilities shall be to:

- Operate and manage waterworks for delivery, distribution and management of potable water supply;
- Develop and implement minor water-works infrastructures;
- Collect, transport, treat and dispose of or recycle and re-use waste water and promote sanitation services;
- Enforce Waterworks by-laws related to the construction of delivery and connection facilities of services for water supply and water borne sanitation in declared water areas;
- Implement investment programmes, tariffs and compensations related to the development and management of water supply and water borne facilities and services;
- Monitor water quality within the water supply systems and promote catchment management and pollution control;
- Collect, process, analyse and disseminate relevant data and information to all stakeholders within the water sector; and
- Promote private sector participation in the delivery of water supply and sanitation services (National Water Policy 2005)

Local Governments

The roles of the local governments shall be to:

- Plan and co-ordinate the implementation of water and sanitation programmes at local assembly level;
- Solicit funding for implementation of water, sanitation and environment programmes;
- Collect, process, analyse and disseminate relevant data and information to all stakeholders within the water sector; and
- Promote private sector and NGO's participation in the delivery of water supply and sanitation services

Ministry responsible for Agriculture Services

The roles of the Ministry shall be to:

- Promote and ensure that good land husbandry practices are followed in all use and cultivation endeavours to prevent water resources degradation and pollution from soil erosion and agrochemicals;
- Promote collaboration with NWRA so that good watershed management and catchment protection practices are followed in controlled areas and along river banks;
- Promote agriculture practices that improve food security and poverty reduction;
- Encourage and promote on-the farm water harvesting and conservation;
- Collect, process, analyse and disseminate relevant data and information to all stakeholders within the water sector; and
- Provide water demand requirements for agricultural development to the Ministry responsible for Water Affairs.

Ministry Responsible for Irrigation Services

The roles of the Ministry shall be to:

- Promote collaboration with NWRA so that good watershed management and catchment protection practices are followed in controlled areas and along river banks;
- Promote irrigation practices that improve food security and poverty reduction;
- Encourage and promote on-the-farm water harvesting and conservation;
- Promote and regulate irrigation development and practices to ensure poverty reduction, efficient utilization of water and prevention of pollution and water related diseases in irrigation fields;
- Promote water resources development for irrigation in order to increase food security and enhance economic welfare while taking due consideration of mitigating environmental damage;
- Collect, process, analyse and disseminate relevant data and information to all stakeholders within the water sector; and
- Provide water demand management requirements for irrigation developments to the Ministry responsible for Water Affairs (National Water Policy, 2005)

Ministries Responsible for Natural Resources (Mines, Forestry, Fisheries, Lands, Environment, and Parks and Wildlife

The roles of these institutions shall be to:

- Facilitating the delineation of regulating areas, planning, zoning and developments in controlled water areas;
- Control land allocation and ensure fragile and marginal areas are not used for agriculture activities and that there are no permanent settlements in areas planned for reservoir and dam developments
- Improve conservation and protection of catchment areas of all public water bodies;
- Promote the protection and rehabilitation of river catchment so as to restore favourable ecosystem environment and its development;
- Contribute to eradication of noxious aquatic weeds and control their spread;
- Co-ordinate all cross cutting environmental activities required for water resources management and water services;
- Facilitate identification of water resources issues to be included in the state of the environment report;
- Enforce pieces of legislation and implement policies on natural resources management; and
- Provide water demand requirements on natural resources developments to the Ministry responsible for Water Affairs.

Ministry Responsible for Health

The role of the Ministry shall be to:

- Ensure proper management and disposal of clinical and hospital wastes to avoid pollution of environment;
- Promote health and hygiene education in water and sanitation services;
- Monitor and provide guidance concerning the quality of drinking water;
- Provide appropriate intervention to prevent the prevalence of water related diseases;
- Provide research in water-related health issues;
- Provide guidance on HIV and Aids mainstreaming efforts to the water and sanitation sector; and
- Provide water demand requirements for public health institutions.

Ministry Responsible for Meteorological Services

The roles of the Ministry responsible for Meteorological Services shall be to:

- Provide relevant meteorological data for development and management of water resources; and
- Provide information relating to weather and climate forecasts.

Non- Governmental Organizations and the Civil Society

The roles of these institutions shall be to:

- Assist in empowering communities to have community based water services and water resources management in planning, implementation, operation and maintenance;
- Encourage communities to manage their rural water supply systems, community dams and catchment protection;
- Participate in the provision and investment in rural water supplies and community dam development consistent with the prevailing Government policies and guidelines on such investments;
- Assist in mobilization and securing funding for rural and low income communities for water and sanitation projects;
- Assist in community sensitization on water, sanitation, catchment management and conservation;
- Liaise between rural low-income communities and government and donors and other cooperating partners through Local Governments;
- Assist in the provision of water supply and sanitation services in rural areas and to low income groups within urban centres;
- Collect, process, analyse and disseminate relevant data and information to all stakeholders within the water sector in accordance with national statistics guidelines and standards;
- Consult the Ministry responsible for Water Affairs on issues related to water and sanitation developments; and
- Ensure compliance with national policies and regulations governing water and sanitation activities, including registration with the Ministry responsible for Water and Sanitation and other relevant authorities.

Private Sector

The roles of the Private Sector shall be to:

- Invest in water resources development and water supply and sanitation services;
- Assist community based water management activities by providing, on commercial basis, necessary inputs to CBM like sale of spare parts and skilled maintenance services for water supply systems;
- Provide capacity for consulting and contracting services in the water, sanitation and related industries;
- Conduct research, develop and promote local manufacturing capacity for water and sanitation related services;
- Collect, process, analyze and disseminate relevant data and information to all stakeholders within the water sector in accordance with national statistics guidelines and standards;
- Ensure compliance with national policies and regulations governing water and sanitation activities, including registration with the Ministry responsible for Water Affairs and other relevant authorities;
- Consult with the Ministry responsible for Water Affairs on issues related to water and sanitation development; and
- Provide capital for investment in water and sanitation developments.

Other Public Stakeholders

- Ministries responsible for Commerce, Industry, Science and Technology shall regulate the development and operations of industries and trade that can contribute to over-exploitation and pollution of public waters, through conditional licensing of industries and trading operations;
- Ministry responsible for Transport shall control and regulate navigation, roads, railways and airport development plans and protect water from pollution. It shall also co-ordinate its navigational plans and development with the Ministry responsible for Water Affairs to ensure the operations are accommodated in the water resources development and management plans;
- Ministries responsible for Lands, Physical Planning and Human Settlements shall coordinate and provide policy and regulatory environment to promote sustainable human settlements and development in both urban and rural areas in relation to water and sanitation;
- Ministries responsible for Gender, Youth and Community Services shall liaise

with the Ministry responsible for Water Affairs in community mobilization for community based management training, advocacy, awareness and gender mainstreaming;

- Ministry responsible for Education shall liaise with Ministry responsible for Water Affairs in curriculum development and capacity building programmes that would support efforts in water resources management, development and utilization and should also provide water demand requirements for its institutions;
- Malawi Bureau of Standards shall liaise with the Ministry responsible for Water Affairs in setting standards of treated and untreated water supply services, and effluent that can be discharged into the environment
- Local universities and other local training institutions shall promote research and undertake capacity building in the water and sanitation fields; and
- Malawi Energy Regulatory Authority (MERA) shall liaise with the Ministry responsible for Water Affairs on issues relating to the development of hydropower (National Water policy, 2005).

The central function of the MWD is to facilitate the development and management of water resources in the country. Among its responsibilities are ensuring access to safe water and related sanitation services, the provision of safe drinking water to rural communities, the collection of hydrological data and catchment protection. It has been noted that the link between the DoI and the MWD is very weak and needs to be strengthened.

Mpira Water Authority

This Catchment Management Agency is established by water users of Balaka, Ntcheu, Mangochi and Neno Districts, members of the Catchment Management Committees around Mpira Dam, Ministry Responsible for Irrigation and Water Development and Ministry of Local Government and Rural Development. It is managed by the Chief Executive Officer who is an ex officio member of the Board of Trustees. The Members of the Board of Trustees are nominated by the Ministry responsible for Irrigation and Water Development, Ministry responsible for Local Government and Rural Development, Traditional Authorities of Mpando, Kwataine, Makwangwala, Champiti, Nsamala, Symon-Likongwe and Kalembo, and District Commissioners from Ntcheu, Balaka, Mangochi and Neno Districts. The District Commissioners shall be ex-officio

members of the Board by virtue of being District Commissioners of the above districts. The Authority has been established to achieve the following objects:

- To take over from the Government of the Republic of Malawi the ownership, control, management and operations of Mpira / Balaka Rural Water Supply Scheme.
- To provide safe drinking water to the communities set out in the schedule hereto in some parts of Balaka, Ntcheu, Mangochi and Neno Districts.
- To ensure proper operation and maintenance of the water equipment and machinery.
- To ensure good health to the said communities by providing safe and potable drinking water and promotion of proper sanitation and hygiene practices.
- To resolve and mediate disputes which may arise amongst members of the said communities in relation to accessibility of safe and potable drinking water or incidental thereto.
- To provide capacity building for improvement of required knowledge, talents, skills and management practices to run the operations of the sustainability of the Authority.
- To ensure that members pay all dues in order to cover the full cost of operating and maintaining the water supply.
- To solicit other sources of funding for specialized activities of the Authority.
- To promote the advancement and recognition of gender equality through the inclusion of responsive approaches within rural socio-political and economic setup and affirmative action.
- To ensure that the operations of the Authority are conducted and managed in accordance with sound environmental practices (Constitution of Mpira Water Authority, 2007:3)

The Water Resources Board is an institution within the MWD and is responsible for the granting of water rights for abstractions and discharge of effluents, as well as for monitoring the adherence to the water rights. For the development of irrigation schemes, water rights for abstraction and discharge of wastewater drained from irrigation schemes have to be granted by the Board.

The primary function of the Department of Environmental Affairs is to ensure that the implementation of projects does not result in the degradation of the environ-

ment. For all irrigation schemes of more than 10 ha, environmental impact assessments are conducted.

The Department of National Parks and Wildlife and the Department of Forestry are responsible for the protection of catchment areas that fall within their jurisdiction. Some of the rivers that are diverted for irrigation purposes arise from areas designated as national parks/game reserves or forest reserves and therefore, there is a need for collaboration between these departments and the Department of Irrigation

Water and Sanitation Management

Both the Irrigation Act 2001 and the Water Resources Act of 1969 provide for the formation of water user associations or irrigation management authorities to promote local community or farmers' participation in the development and management of irrigation and drainage, and proper utilization of the available water resources.

Water resources management is in its infancy in Malawi. Designed water storage capacity is $9m^3$ per person, one of the lowest figures in the world and a quarter of that of Ethiopia. Irrigation is minimal. Catchments are inadequately protected from deforestation and pollution. Over 90% of Malawians use firewood or charcoal for cooking, leading to what is said to be the highest rate of deforestation in Africa. The non-enforcement of bylaws has resulted in huge erosion along river banks that were previously thickly wooded, and consequently the country's water resources problems are multiplying (WaterAid, 2005:4)

Finances

Government policy on financing irrigation developments in the country is that such developments are only minimally subsidized. The government aims to optimize its investment in irrigation development through the application of the principles of cost sharing and cost recovery.

For 2004/05, the Malawi government's budget for water supply and sanitation was approximately US$ 23 million, representing 3% of total government expenditure. This figure has been constant over the last two years. Of this money, only 12% comes from the Government's own revenues, while the remainder is loan or grant finance from external support agencies. Some 97.5% of the water and sanitation

budget is allocated to water, and 2.5% to sanitation. The urban / rural subdivision is not recorded.

Approximately 10% of the money allocated to water sector was classified by the government as 'pro poor expenditure' (PPE). PPE is not additional money coming into the sector, but a system of re-defining parts of the existing budget. The Government's PPE expenditure is widely publicized, for example through newspaper announcements. But within the PPE budget, the proportion allocated to water fell by 37% over the last two years.

Financial information from non government sources is not collected, but it can be estimated from the water point mapping work because the water points installed by the various types of agency are counted. These figures indicate that three quarters of all water points in the country were installed by unknown or unmonitored organizations. Allowing for their lower unit costs and for their predominantly rural focus, this suggests funding from non-government sources might be in the range of $30-50 million per year (WaterAid, 2005:8)

Policies and Legislation

Water is a finite resource. Its conservation, allocation, and utilization must therefore be guided by a strong policy framework and strategies to achieve the policy objectives (Ng'ong'ola:1999:8). To this end, in May 1994 the Government of Malawi developed the first coherent Water Resources Management Policy and Strategies to guide the country in the sustainable use of water and sanitation. However, the 1994 Policy largely focused on the water service delivery whose major outcome was among other things, the creation of the Ministry responsible for Water and three regional water boards, namely; Northern, Central and Southern Region Water Boards and the reconstitution of the Water Resources Board, Blantyre and Lilongwe Water Boards. The 1994 Water Resources Management Policy and Strategies was therefore revised and approved by Government in 2000, to strengthen the management aspect of the water resources, which was considered weak in the 1994 Policy (MIWD, 2005:1)

Policy issues are addressed by the National Irrigation Policy and Development Strategy (2000) developed by the DoI, the Water Policy (1996), the Water Resources

Management Policy and Strategy (2000) developed by the MWD, and the Environmental Management Policy (1996). Main legislation concerned with issues of water resources and irrigation are the Water Resources Act of 1969 and the Irrigation Act of 2001.

According to the Irrigation Policy and Development Strategy, the mission of the DoI is to manage and develop water and land resources for diversified, economically sound and sustainable irrigation and drainage systems under organized smallholder and estate management institutions and to maintain an effective advisory service. Following this policy, an Irrigation Act (No. 16 of 2001) was passed by Parliament in November 2001. The Act makes provision for the sustainable development and management of irrigation, protection of the environment from irrigation related degradations, establishment of a National Irrigation Board and for matters connected therewith or incidental thereto.

National Water Policy of 2005

The overall policy goal of the Water Resources Management Policy and Strategy is sustainable management and utilization of water resources in order to provide water of acceptable quality in sufficient quantities, and ensure availability of efficient and effective water and sanitation services that satisfy the basic requirements of every Malawian at all times(MIWD, 2007:24). The Policy is currently being revised to include a number of issues that were not clearly addressed in the previous policy documents. The National Water Policy of 2005 is meant to address all aspects of water including resource management, development and service delivery. The policy has articulated a new water sector vision of "water and sanitation for all, always". The policy comprehensively covers areas of water resource management and development, water quality and pollution control, water utilization, disaster management and institutional roles and linkages. The policy also advocates an integrated approach to the management of water resources in the country and thereby recognizes the importance of other policies and acts for achieving goals. The policy aims at:

- Achieving sustainable and integrated water resources management and development that make water readily available and equitably accessible by all Malawians in pursuit of their socio-economic development and for environmental sustenance
- To ensure water of acceptable quality for all the needs in Malawi;

- Achieving sustainable provision of water supply and sanitation services that are equitably accessible and used by individuals and entrepreneurs for socio-economic development at affordable cost;
- Promoting efficient and effective utilization, conservation and protection of water resources for sustainable agriculture and irrigation, fisheries, navigation, eco-tourism, forestry, hydropower and disaster management and environmental protection;
- Undertaking the rehabilitation, upgrading, extension and construction of water infrastructure;
- Promoting international cooperation in the management of transboundary and cross-boundary waters without compromising the country's sovereignty, security and territorial integrity;
- Dealing with challenges facing water resources management which include the need to adopt Integrated Water Resources Management (IWRM) Principles, the need to conform to current regional and international agreements and protocols on shared water resources, catchment protection and management, and water resources monitoring;
- Promoting the participation of the private sector in water resources development, management and service delivery;
- Strengthen and building capacity in the water sector; and
- Clarifying the roles of the Ministry for Water Affairs and other stakeholders in the water sector (MIWD, 2005:3).

Water Resources Act ,1969

The Water Resources act of 1969 deals with control, conservation, apportionment and use of water resources of Malawi. Section 16 of the Act states that it is an offense for any person to interfere with, alter the flow of, or pollute, or foul any public water. This act requires that water projects avoid water degradation and depletion when developing new water supply schemes and rehabilitating or upgrading the existing ones. Projects must also ensure that waste water from water supply points is properly treated so that it does not pollute the environment (MIWD, 2007: 24).

Under the Water Resources Act of 1969 all water abstractions must be licensed, except for general household domestic use, as well as all industrial effluent discharges into public water bodies, including human sewage. Annual permits are required for

abstractions greater than 1,000 L/day, except for domestic use. The charging system is based on the water source and type of usage; however, the collection of revenue is severely limited by lack of staff. Together with the efforts to revise the above policy there are attempts to revise and amend the Water Resources Act of 1969. The process of the revision of the Act has been very slow. In fact efforts to revise the Act started in the mid 1980s but they never materialized due to a number of factors. However, following recent revision of the policy, efforts are underway to finally amend the Act. The existing Act makes provision for the control, apportionment and use of the country's water resources. Ng'ong,ola (1999:17) summarized the Water Resources Act of 1969 using the following 6 points:

- Ownership of water resources which rests with the State President and the inherent right for the use of water for domestic purposes by every person, without a permit.
- Recording of the existing water rights that existed before the Act of 1969.
- Grant of water rights for use, development, conservation, diversions, etc. of water resources from a river, stream, lake or underground or consents to discharge wastes into public waters to an applicant.
- Revision, variation, determination of water rights, pollution of public water.
- Miscellaneous powers to declare controlled areas for the purpose of natural resources management of the area, or creation of an easement.
- Schedules for the establishment, composition and mode operandi of the Water Resources Board that assists the Minister Responsible for Water Resources in the implementation of the act and administration of water resources.

Water Works Act of 1995

The Water Works Act of 1995 repealed all previous water works acts in Malawi, including the Blantyre Water Works Act, 1971 and the Lilongwe Water Works, 1987 which gave legal status to the Blantyre and Lilongwe Water Boards, respectively. All Water Boards are now established and operate under the Water Works Act (1995). This act essentially provide the legal framework for implementing the 1994 Water Resources Policy in the provision of water supply and water borne sanitation services to urban and semi-urban centres of Malawi. It has the following 6 main parts:

- Establishment, membership, powers and duties of Water Boards to deliver water supply and water borne sanitation services, own and control water works in

designated urban water areas. The Board's contribution and its functional procedures are further elaborated in this section.

- Operational powers to enter land and trespass, compensate, install and suspend services, construct fountains in and outside a declared water-area for the purpose of providing water supply and water borne sanitation services or works associated and related there from.
- Services and supply of water upon request and thorough construction and connection of services whose cost shall be borne by the owner of the premises where such works have been performed and where such works are for re-adjustment of existing facilities, cost shall be borne by the Board.
- Operation of waterborne sewerage and sanitation services by the Board where it shall provide public sewers and sewerage disposal works, and keep the maps of public sewers. At the same time, have power to alter or close a public sewer, restrict certain matters from being discharged, while observing the rights of residents within and outside water area to drain, into public sewer.
- Financial provisions, where the Boards shall fix the rates and make changes for supply of water. Charge costs to the premises where such costs have accrued, set revenue schedules and have powers and regulations for disposal of funds, investments, government advances, borrowing and make rules for accounting, auditing and financial management of its funds, with the approval of the minister.
- Miscellaneous sections that give the Board obligations to respond on inquiries from the Minister Responsible for water supply and sanitation of failure to reform its duties. They also set offences under the act and their penalties; powers to make by-laws, powers to recover penalties and moneys, limit time for prosecution and repealing of the previous Water Works Acts , with Schedule establishing or re-establishing Blantyre, Lilongwe, Northern Region, Central Region and Southern Region Water Boards

The National Sanitation Policy of 2005

The Government of Malawi (2007:3) is in the process of legislating its National Sanitation policy. The aim of the National Sanitation Policy is to provide a frame-work for development of programmes and initiatives that shall address hygiene and sanitation problems .These programmes will contribute to improving the health and quality of life, a better environment and a new way for sustainable

wealth creation. The National Sanitation Policy makes provision for institutional framework, role clarification among sector stakeholders, will be effected after enacting and creating a legislative framework, leverage financial support for a sector wide approach, establishment of a sanitation directorate within the Ministry of Irrigation and Water Development to coordinate other sector partners and provide human resource to implement the National Sanitation strategy and ensure that infrastructure backlogs are addressed as per the provisions of the policy (GOM,2007:6).

The vision of the Sanitation policy is "Sanitation for All, always, in Malawi" and it is based on the following guiding principles:

- Every person has a basic right to information on improved sanitation and has a responsibility to own and maintain sanitation facilities.
- It is an obligation of every person to take measures to promote sustainable utilization and management of sanitation facilities.
- Children shall be given early exposure to hygiene and sanitation information.
- Women and men shall effectively participate in policy, programme and project design and implementation to enhance their role in hygiene and sanitation management activities.
- Recycling of liquid and solid wastes wherever possible and appropriate shall be promoted.
- Appropriate re-use of by-products, shall be encouraged.
- The participation of the private sector, NGOs and Community Based Organizations (CBOs) shall be promoted.
- Regulations shall be complemented by social and economic incentives to influence behavioural change for individuals, institutions and industries to invest in improved sanitation facilities.
- Hygiene and sanitation information shall regularly be disseminated.
- Every person shall be encouraged to wash hands with clean running water and soap.
- Capacity building in hygiene and sanitation promotion shall be undertaken at all levels.
- Provision of water supply shall be integrated with hygiene and sanitation promotion.
- Adequate sanitation and hygiene promotion shall be a norm.

- There shall be an appropriate organizational framework and capacity building for hygiene and sanitation promotion.
- Hygiene and sanitation research activities of various stakeholders shall be encouraged but subject to monitoring and regulation.
- Industrial developments shall incorporate appropriate sanitation measures.
- Irresponsible disposal of litter, human excreta or urine in public places shall be prohibited.
- Appropriate sanitary facilities shall be provided and safe hygiene practices promoted at all public gatherings.
- Health care waste shall not be mixed with other public waste and shall be disposed of separately.
- Adequate investment shall be made for hygiene and sanitation promotion.
- Provision of targeted subsidies for improved sanitation facilities for vulnerable and disadvantaged persons shall be promoted (National Sanitation Policy, 2007:8)

The National Sanitation Policy has an implementation plan which has the following components:

- Hygiene and sanitation at national level
- Hygiene and sanitation in rural areas
- Hygiene and sanitation promotion and delivery of services in cities, municipalities, towns and market centres.
- Hygiene and sanitation in schools
- Hygiene and sanitation promotion in health care facilities

The timeframe for the implementation of the plan is projected to commence in 2008 and evaluated in 2012 and completed by 2020.

Decentralization Policy of 1998

The decentralization policy, developed in 1998 devolves administration and political authority to the District level in order to promote popular participation. The decentralization policy assigns certain responsibilities to District Assemblies. One of the key is to assist the government in the management and preservation of the environment and natural resources. This policy is useful for the water resources management, as it supports the creation of different sectoral committees at all levels of the District, to promote participation of different stakeholders (MIWD, 2007:23)

Environment and Health

The quality of the water resources in Malawi is dependent on three major factors:

- Chemical composition of the parent rocks existing in the area;
- Extent of agricultural activities (application of agrochemicals, farming practices, land husbandry);
- Disposal of industrial waste products as well as human sewage, particularly in urban areas.

Generally both surface water and groundwater are acceptable for human consumption. The absence of industries and the small size of the cities means that chemical pollution of water sources from industrial activity is not a major problem in Malawi However, due to recently increased agricultural activities, there has been considerable degradation of water resources as a result of increased siltation in rivers and reservoirs. This is most severe in areas that are under immense population pressure, resulting in serious deforestation and cultivation of marginal and other fragile areas. Groundwater is more mineralized in alluvial aquifers than in the weathered basement aquifers. Areas such as the lower Shire Valley, eastern Bwanje valley and around Lake Chilwa have saline waters. As such the utilization of groundwater in such areas is limited due to high contents of iron, fluoride, sulphates, nitrates, and Total Dissolved Solids (TDS). There are known occurrences of fluorides and sulphides in groundwater in some areas along the lakeshore plains, and in the Lower Shire. Water quality problems such as arsenic contamination, which cause such as difficulties elsewhere, are not a problem (WaterAid, 2005:5)

Irrigation development in Malawi has not had any very serious negative environmental impacts. Most of the areas that have been developed for irrigation have for as long as people can remember been considered waterlogged areas for most of the year. As a result the impact of irrigation development in terms of waterlogging is minimal.

Water-related vector-borne diseases such as malaria, typhoid, cholera, and bilharzia have infected most people around the irrigation schemes in Malawi. Malaria continues to kill as many people as Aids but is far less publicized, perhaps because most victims are infants. Drug- resistant strains are spreading fast. Public interventions such as drainage and spraying are much less effective than a generation ago, though

use of bed nets treated with insecticide is increasing. Cholera is endemic in this part of Africa, and flares up in Malawi during rainy season in most years. It attracts the media and frightens the politicians, who allocate money to curative work while neglecting preventative measures, such as better sanitation and hygiene promotion that could subdue the threat in longer term. Actual cholera deaths are few compared to the ongoing toll of other diarrhoeal diseases that attract minimal publicity or political interest (WaterAid, 2005:3).

In order to reduce the spread and intensification of such diseases, most of the schemes, and particularly those operated by the government, include a water supply and sanitation component to provide for potable water through sinking of boreholes, and proper sanitation facilities. In addition, health clinic facilities are provided to provide treatment for the affected population as well as health hygiene and education. However, there are quite a number of schemes, and especially self-help schemes, where such facilities are lacking.

Challenge of Meeting the MDG and Ensuring Sustainability

According to recent assessment, only about three percent of Malawi's population has piped water supply outside the dwelling unit. Nearly 46 percent of the population obtains water from communal hand pumps followed by 23 percent from communal, unprotected wells. The remaining 28 percent of the population obtains water from communal standpipes, wells, springs, and rivers. This means that about 15,000 new communal water points will be required to meet the water MDG and 1.2 million improved latrines would be required to meet the sanitation MDG target by 2015.

In urban centers and towns where water is supplied by the two city water boards and three regional water boards, average coverage level is estimated to be at around 70-80%. However, there is a significant challenge in maintaining these aging systems to ensure sustainability as the urban population, especially in the low income and peri-urban areas keeps growing. The market centers and small rural towns also require special attention to provide new and appropriate water infrastructure to exploit the economic growth potential of many of these centers. Currently most of these centers are served by communal water points or traditional water sources that are inadequate and unsuitable for the concentrated population (World Bank, 2007:4).

Water and Sanitation Coverage

Water and sanitation coverage statistics for Malawi are uncertain. The WHO / UNICEF Joint Monitoring Programme's (JMP) figures for 2006 are as follows:

	Population			Water Supply Coverage (%)					
				Total		Urban		Rural	
	Total (x1000)	% Urban	% Rural	Total	HC	Total	HC	Total	HC
1990	9'459	12	88	40	7	90	44	33	2
1995	10'111	13	87	52	7	93	39	46	2
2000	11'512	15	85	64	7	96	34	58	2
2004	12'608	17	83	73	7	98	29	68	2

Although the JMP has changed from using supply-side data to household surveys, which resulted in these figures decreasing, even these may be over estimates.

The apparently high urban water figure masks the situation in unplanned per-urban settlements where public tap stands serve large numbers of people with a paltry and unreliable supply. The rural water figure has increased significantly since 1990, and it may fail to account properly for the significant percentage of constructed facilities that are not actually working. An ongoing national water point mapping project, in which WaterAid has been involved, is indicating rural water coverage of 57%.

The usefulness of the sanitation figures depend on the definition of adequate sanitation. Almost all facilities in Malawi are pit latrines, the majority of which are merely holes in the ground. With some sort of squatting arrangement, they are inadequate

	Population			Sanitation Coverage (%)					
				Total		Urban		Rural	
	Total (x1000)	% Urban	% Rural	Total	HC	Total	HC	Total	HC
1990	9'459	12	88	47	0	64	4	45	0
1995	10'111	13	87	53	0	63	3	51	0
2000	11'512	15	85	58	1	63	2	57	1
2004	12'608	17	83	61	1	62	1	61	1

to prevent faeco-oral disease transmission. The JMP recognises this and halved its previous estimates to arrive at the above figures. But some sector agencies estimate only 15 – 30% rural coverage for adequate sanitation. Meanwhile some documents continue to quote the previous official figures of over 70% coverage. This uncertainty in coverage figures is very significant because, if external support agencies rely on the official sanitation figures, they may not see Malawi as a priority country. Awareness of personal hygiene issues is low, probably linked to low literacy rates, but the government and other agencies are trying to improve hygiene promotion work in communities and schools.

Obstacles to Access to Safe Water, Adequate Sanitation and Hygiene

The People who Lack Access, and where they live

Despite the coverage figures described in the section above, the number of Malawians without access to safe water and sanitation are vast.

Four million Malawians (40%) living in rural areas lack access to safe water. In this subsistence rural economy, these people are not necessarily the poorest but may be those with least political or social influence (including woman- and child- headed households), or those living furthest away from motorable roads. Over seven million Malawians (70-80%) living in rural areas lack adequate sanitation and hygiene. They are the vast majority of rural dwellers, not any particular subgroup. Up to half a million Malawians (25%) living in urban and peri urban areas lack sufficient access to affordable safe water. They may be nominally served by public tap-stands, but constrained by distance, queues, tariffs or being cut-off by the utility. In the cash-based urban economy, people who lack water are generally the poorest section of the urban population, Ironically, though, they are the most reliable customers, paying cash for water as they use it. Up to one million Malawians (50%) living in urban and peri-urban areas lack adequate sanitation and hygiene. They too are the poorest people in the cities and unplanned urban settlements.

The reasons why they lack access

Weak Sectoral Leadership and Coordination

Leadership in the sector is weak and national level water coordination mechanisms only function intermittently. They do not encompass all organizations working in the sector. Sector leaders have not succeeded in placing water prominently in the Malawi PRSP, and a s a result external financing agencies, have either withdrawn their support or do not invest much money in the sector. There is no lead ministry and no

national policy on sanitation, although the MoIWD has recently been designated to lead in sanitation policy development. Consequently, each agency follows its guidelines and practices. Even where policies exist, for example in water supply and resources management, they are weakly disseminated and enforced.

Poor Sustainability of Services

Historically people were dependent on the government for maintenance. Latterly, the government has ceased this responsibility, and the people feel disillusioned and unwilling to exercise ownership and maintenance of water services. Agencies offer communities a limited choice of technology, typically only one or two types of technical solutions to their water or sanitation needs. Wrong techn ologies are used; most commonly boreholes are installed where shallow wells would be cheaper and more sustainable. Equipment such as pumps and pipes are used, for which spare parts are only intermittently available because of ureliable distribution mechanism across the country. At the local level, powerful people may affect sustainability by abusing their power. For example, leaders allocate facilities such as water points for political purposes and not according to need. Secondly, water point committee members and traditional leaders misuse the maintenance funds that have been raised from community contributions, and fail to account for it, so people stop contributing money.

Poverty Information

Official water and sanitation coverage figures are erroneously high and mask the true extent of need. Definitions of access to safe water and adequate sanitation are not agreed. People who lack water, sanitation and hygiene services simply do not know what to request, or from whom. Many people are illiterate and unable to learn about the importance of water, sanitation and hygiene, or learn about and participate in community based water resources management. Further, sanitation and hygiene are not subjects that are traditionally discussed or known within most people's culture or way of life. Other cultural barriers persist: pregnant women may fear to use latrines, and daughters-in-law may be forbidden to use the same latrines as their fathers-in –law. People steal whole borehole pumps, taps or parts of a pump to sell or for other use. They may also vandalize their own or other people's facilities, for reasons that are difficult to understand but are probably due to lack of awareness of community needs.

Financial Poverty of the People

People cannot afford the capital contributions that most agencies request for water supplies, the material costs for sanitation, or the water tariffs in urban areas. People living with chronic conditions such as HIV and the relatives who provide care for them are unable to work to relieve their poverty.

Limited Capacity in the Water Sector

There are inadequate numbers of trained experienced professional people to fill the posts in the sector agencies. Due to shortage of skilled supervisors, the quality of construction work is variable or poor. Boreholes are not built to correct depths or specifications, and hence fail quickly. Geographical and Physical Problems

Malawi's climate is dry and increasingly unpredictable, with surface and groundwater resources becoming depleted. Catchments are degraded, typically by uncontrolled deforestation for cultivation, firewood and timber. Spring and stream sources for gravity-flow supplies dry up. Persistent drought over past years has caused low recharge in groundwater aquifers leading to the lowering of water tables necessitating rehabilitation and re-deepening of boreholes. Consequently, sustainability of water supplies is threatened as sources dry up during the dry season in some areas. There is very poor road access in many rural areas, so field workers and construction vehicles and equipment cannot travel to the communities who need water. Sandy soils along the heavily-populated lakeshore areas cause latrine pits to collapse while rocky conditions in many hill areas prevent pit digging. Unplanned urban settlements have neither legal land tenure nor provision for water supply reticulation networks, drainage systems and safe sanitation (Wateraid Malawi, 2005: 11).

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