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Broadening Access and Strengthening Input Market Systems

Water Resources Management Policy and Strategies
Ministry of Water Development

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MALAWI

POLICIES INFLUENCING PATTERNS OF USE OF WATER RESOURCES IN MALAWI

by

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ACRONYMS

BWB	Blantyre Water Board
CBM	Community Based Management
DDC	District Development Committee
ESCOM	Electricity Supply Commission of Malawi
LWB	Lilongwe Water Board
MOAI	Ministry of Agriculture and Irrigation
MWD	Ministry of Water Development
NGO	Non-Governmental Organisation
NWRB	National Water Resources Board
PSIP	Public Sector Investment Programme
RBA	River Basin Authority
SADC	Southern Africa Development Community

EXECUTIVE SUMMARY

Malawi is endowed with vast expanses of water systems. The water resources are used in various social and economic activities including water supply and sanitation, hydropower, irrigation, navigation, commerce, fisheries, and wildlife. Although water is a renewable resource, it is limited, seasonally distributed and increasingly becoming scarce and competed for by individuals and various social and economic sectors.

Policies of the water dependent sectors of the economy should create an enabling environment for maximum contribution of the water resources in poverty alleviation, social and economic growth and prosperity of the country.

Water Resources Management Framework

The Malawi Government launched and adopted a Water Resources Management Policy and Strategies document in 1994. This is the document currently guiding water resources management in Malawi. The focus has been to improve potable water supply and sanitation services through decentralisation and commercialisation of the services.

The legal instrument for regulation of water resources management is the Water Resources Act of 1969 and its subsequent amendments. The Water Works Act (1995) provides the legal framework for implementing the 1994 Water Resources Management Policy and Strategies.

The Ministry of Water Development is responsible for development and implementation of water policy and legal framework. It is also responsible for spearheading and co-ordinating the development and implementation of water resources planning, development and management and delivery of water services. These responsibilities are split between the Water Resources and Water Supply Divisions respectively. The water legislation, however, established the Water Resources Board and the Water Boards. The Water Resources Board acts as an advisory body to the Minister. It has no management unit, hence acts as an ad hoc committee and cannot perform its responsibilities on water resources management. The Water Works Act (1995) has established five Water Boards. Each Board has a management established to run its day-to-day operations.

Water Resources Issues

The following are the main water resources issues in Malawi that must be addressed if the water sector has to contribute to poverty alleviation, economic growth and prosperity:

- deforestation, coupled with poor agricultural practices and environmental degradation in most river basins, has resulted in rivers and streams silting up, being flashy, drying up or receding faster in the dry season;
- there are no major storage dams and no policy and legislation for multipurpose developments despite the potential and need;

- irrigation development is hampered by lack of readily available water;
- hydropower is constantly threatened by low Lake Malawi levels and Shire River flows;
- navigation capacity is significantly reduced by the low Lake Malawi levels;
- fish production is dwindling partly because of water availability problems;
- there is increasing water pollution from human waste, suspended solids, nitrogen and phosphorus, and heavy metals;
- there is weak co-ordination among stakeholders in the water sector;
- the water sector remains low on the priorities of the Government public sector investment; and
- international and regional conventions and agreements require that water development should be based on participatory, value-based management and consultative approaches, and that a river basin be used as a unit for water resources management.

The Need for Revised Policy, Legislation and Institutional Roles

The 1994 Water Resources Management Policy and Strategies document is silent on a number of major issues affecting water resources management. These gaps include:

- The vision and policy objectives for water resources management are not included;
- International and regional conventions and agreements are not incorporated;
- Strategic plans for water conservation and mitigation of the effects of water scarcity and flooding are not included;
- Rural water supply schemes are implemented without agreed policy and legal framework; and
- Policies of other relevant sectors developed/revised after 1994 are not taken into account.

Recommendations

From the above review of the 1994 Water Resources Management Policy and Strategies, the following recommendations are made to enhance the contribution of the water sector to poverty alleviation, economic growth and prosperity of the country:

- Revising the existing Water Resources Management Policies and Strategies, Legislation and Institutional Roles;
- Restructuring the Water Resources Board into a National Water Resources Board;
- Adopting a *river basin* as a unit for water resources management and establishing River Basin Authorities;
- Formulating strategic plans for national and river basin development;

- Promoting rural community organisations;
- Improving urban and peri-urban water supply and sanitation;
- Improving rural potable water supply and sanitation;
- Enhancing catchment conservation and river bank protection;
- Safeguarding the water quality;
- Enhancing hydropower development and multi-purpose use water storage;
- Capacity building and developing research in water resources;
- Improving water resources data collection, analysis, storage and dissemination; and
- Enhancing participation of NGOs and the private sector.

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1.0 BACKGROUND

1.1 Introduction

Malawi is endowed with a variety of natural resources, which include vast expanses of water systems. The water resources are used in various social and economic sectors of the economy including water supply and sanitation, energy and hydropower, agriculture and irrigation, transport and navigation, commerce and industry, tourism and recreation, fisheries and aquatic life, and wildlife and ecosystem. Water resources management is defined as the monitoring, assessment, planning, development, conservation, allocation and protection of water resources for use by all sectors that depend on water.

The water resources management policy, legislation and institutional roles should create an enabling environment for maximum contribution of water resources in poverty alleviation, social and economic growth and prosperity. This report reviews the current water resources management policy, legislation and institutional roles. In conducting the review, consultations were made with various stakeholders including relevant government ministries, parastatals, non-governmental organisations (NGOs) and the private sector. Reference was also made to relevant documents.

The review starts by giving background information on the nature of water resources in Malawi (Chapter 1.0). Chapter 2.0 presents the main water resources issues in Malawi, followed by a description of the existing water resources management framework in Chapter 3.0. Chapters 4.0 argues for the need for a revised water resources management policy, legislation and institutional roles. Chapter 5.0 contains the study?s summary, conclusions and recommendations. Annex A contains the proposed revised Water Resources Management Policy and Strategies, while Annex B contains the proposed revised Water Resources Act. Annex C gives the proposed set of Institutional Roles for water resources management for Ministry of Water Development (MWD) and other line institutions, and Annex D contains the Operational Plan for the implementation of the proposed recommendations.

1.2 Nature of Water Resources in Malawi

Water, although a renewable resource, is limited, seasonally distributed and increasingly becoming scarce and competed for by individuals and various social and economic sectors of production and services. About 3,000 cubic metres of water per capita are renewed in rivers and lakes, annually. However, only 300 cubic metres per capita are available in the dry season due to seasonal variable distribution of rainfall and water resources occurrence. There are obviously imbalances in accessibility to usable water from these available resources and the access is also quite variable and limited. This observation can be attributed to the very limited water resources developments, that can conserve and regulate water during wet years or seasons to guarantee availability of water in dry seasons or during droughts. Consequently, there is widespread water scarcity for various social and economic activities during periods when natural water supply in rivers and lakes is deficient.

1.2.1 Surface Water Resources

The surface water resources are extensively available throughout the country (particularly during wet season). These waters are mainly in the country's densely distributed network of river systems and lakes. These water bodies in the country cover over 20% of the country?s territorial area of 118,480 km^2. Lake Malawi takes up much of this water area with a water surface area of 24,210 km^2 (the other lake area of 4,540 km^2 is in Mozambique while the total lake area is 28,750 km^2 with an estimated volume of 7,730 km^3). There are also Lake Chilwa with a water surface area of 680 km^2, Lake Malombe and the Lakes? sole outlet, the Shire River.

Some 30 km^3 of fresh water are renewed every year, 13 km^3 of this is generated from land while the rest comes from Lake Malawi. The distribution of this run-off, however, is very variable with about 80 - 90 % of it occurring in the wet season months of December to April. This acute variation in occurrence of water resources is further exacerbated by almost chronic and persistent droughts and occasional floods that disrupt the operations of related industries, damage properties and cause loss of lives.

Replenishment of surface water resources is dependent on rainfall, which is seasonal and highly variable from year to year. Consequently, the rivers and lakes display seasonal flow and water level patterns, and often a number of these rivers dry up during the months of July through November. Deforestation is considered to be the major threat to depletion of surface water resources as it causes reduced base flows and persistent drought conditions.

1.2.2 Groundwater Resources

Groundwater sources are widespread throughout the country. Its occurrence is associated with two major aquifers; the basement and alluvial aquifers. 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. These aquifers can yield up to 2 litres/second and are found in the weathered or fracture zones of the basement complex.

The alluvial aquifers are relatively high yielding and occur in quaternary alluvial deposits occurring in the lakeshore plains and the Lower Shire Valley. Yields of up to 20 litres/second can be achieved. The quality of ground water in the weathered basement complex aquifer, is generally acceptable although localised groundwater quality problems do occur due to high concentrations of salts. In the alluvial aquifer, however, groundwater is more mineralised. The main agents affecting groundwater quality are iron, fluoride, sulphate, nitrate, chloride and total dissolved solids. On a national scale, groundwater quality is generally acceptable for human consumption.

2.0 WATER RESOURCES ISSUES IN MALAWI

This chapter discusses the issues that are of fundamental importance in addressing the question of adequacy, improvement and optimising the contribution of water resources in poverty alleviation, economic growth and prosperity. These issues are conveniently classified into Water and Natural Resources Management; Water Resources Developments; Water Pollution; Co-ordination among Stakeholders; Public Sector Investment; Trends in International Water Resources Management Practices; and National Priorities.

2.1. Water and Natural Resources Management

The Government of Malawi recognises that water, like any other natural resource, should be developed and managed to satisfy the present social and economic needs without sacrificing the aspiration of the future generations. The high population density in some rural areas has contributed to increased demand and pressure on natural resources and environment. The environmental assessment and evaluation that lead to development of the National Environmental Action Plan in 1994 showed that the high deforestation (67 % of forest cover in 1967 to less than 49 % in 1992) have had a negative impact on the country?s water resources. This rapid deforestation, compounded by poor agricultural practices and environmental degradation in most river basins, has lead to rivers and streams silting up, being flashy, drying up or receding faster in the dry season. Soil erosion and sediment transportation result in: habitat alteration and cause adverse effects on aquatic lives including fish; filling of water courses and reservoirs; increase in cost and difficulty of water treatment; and reduction in the recreational quality of water bodies. The demands of sustainable development, the socio-economic interactions of riparian population and other stakeholders and the nature of land resources utilisation within river basins, dictate that a river basin should now be the unit for water resources management in Malawi.

Land allocation and related land use practices are controlled by Ministry of Lands, Housing, Physical Planning and Surveys, with the influence of Ministry of Agriculture and Irrigation (MOAI), Office of the President and Cabinet and the traditional chiefs. The practise has also been greatly influenced by the higher population, which is mostly rural and its basic economy is subsistence farming. The physical geography, whose main features are described below, has also influence land use and practices.

Malawi's total land area is about 94,240 km^2, and can be divided into four categories of mountainous, plateau, escarpment and rift valley trough zones. The highlands and escarpment zones range from 900-3,000m above sea level comprising mainly mountainous, plateau areas and rugged terrain of steep slopes. The areas with steep slopes of 12% and more are in highlands and escarpment zones, and these cover about 23,670 km^2, which is more than 25 % of the country?s land area.. The rift valley trough runs along Lake Malawi and Shire River. It fluctuates around 600m above sea level in the upper Shire Valley and the lake area, and between 50 and 100m above sea level in the lower Shire Valley.

The total cultivated and settled land is 45,790 km^2, almost more than 155% of the country?s total arable land of 29,400 km^2. The land under cultivation comprise of about 38,200 km^2 for subsistence farming, 6,400 km^2 of commercial estate farms, 890 km^2 used for human settlements and 300 km^2 of small holder farms. The infrastructure occupies about 570 km^2 which may be identified as permanent settlements or other physical developments, e.g., buildings, roads, railways etc. Besides, 18,150 km^2 are registered forestry reserves, national parks, wild life reserves and forestry plantations, which include about 600 km^2 of arable land. Swamps and flood plains occupy about 6,190 km^2 along the riverbanks.

The country, therefore, has a complex land use system. More than 16,000 km^2 of unsuitable and marginal land, mainly steep slopes, has been settled and is being cultivated, largely by subsistence farmers. Additionally, potential reservoir areas are also being settled or leased. There are no clear policies on conservation of catchment areas and control of development at basin level. Such policies are important for protection and enhancement of water resources and reservation of potential reservoir sites for future dam developments, which would help avoid resettlement and payment of huge compensation funds.

2.2 Water Resources Developments

The status of various water resources developments are presented in this section including storage dams, urban and rural water supply schemes and systems, irrigation, hydropower, navigation and fisheries.

2.2.1 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 multipurpose 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 multipurpose 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 realisation of maximum benefits from utilisation 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.

2.2.2 Urban and Rural Water Supply

The existing urban and rural water supply schemes and systems have potential to provide access to potable water to 54 % of the country?s population. However, the water delivery services in the country are adversely affected by operation and maintenance problems. The population with access to potable water drops from 54% to 32% at any one time due to water scarcity, and operation and maintenance problems in water supply systems.

Urban water supply schemes, except those for Blantyre and Lilongwe, were run by Government but are now decentralised and under the management of commercial Regional Water Boards, established under Waterworks Act (1995), to improve efficiency. The Regional Water Boards are also responsible for all water borne sanitation services in their areas. Water borne sanitation systems exist for a few urban centres. However, the development of both water supply and water borne sanitation services cannot cope with the present demand as it lags behind population growth rate and urbanisation. There are 55 municipal and semi-urban water supply schemes developed and maintained by Government.

Blantyre Water Board (BWB) and Lilongwe Water Board (LWB) are statutory corporations responsible for the provision of water supply to Cities of Blantyre and Lilongwe respectively. They operate on commercial basis and do not receive any financial support from Government apart from policy direction. They were established to supply adequate potable water to the city residents, safeguard the health of the population served and contribute to national development by supplying water for commercial and industrial activities. BWB and LWB abstract water from

Shire and Lilongwe rivers respectively, and the water is conventionally treated before it is supplied for various uses.

The rural water supply schemes and systems still remain the responsibility of MWD. There are more than 12,000 boreholes, 5,000 protected shallow hand dug wells and 56 rural gravity piped water supply schemes developed and maintained mainly by the Government. The Government is a proponent of community based management (CBM), i.e., transferring of ownership to beneficiary communities and empowering them to operate, maintain and manage their own rural water systems. The rural communities have contributed significantly towards the development of rural water supplies through self-help/community participation, especially in the development of gravity piped water schemes and shallow wells.

2.2.3 Irrigation

Only 70,000 ha, against a potential of more than 200,000 ha, have been developed for irrigation, mainly due to lack of readily available water, as water resources are under developed. Despite the potential for providing food security and contributing to poverty alleviation, the exploitation of the potential irrigation areas remain unexploited due to unavailability of reliable and equitably access to water supply for irrigation.

2.2.4 Hydropower

Out of the national hydropower potential of over 800 MW, 200 MW hydropower plants have been installed and provide over 99 % of the country?s electricity supply, which is the main power for industrial use. The low levels of flow of Lake Malawi and the Shire River, however, have constantly threatened the existing hydropower plants. The plants are under high risk of failure since they are all located on the Shire River despite untapped potential elsewhere. The droughts of the mid-1990?s have significantly reduced flows and worsened sediment problems in Shire River forcing hydropower production to go down to 140 MW and the consequent major load shedding and power disruption throughout the country, particularly during dry seasons. These measures adversely affected production of the water-dependent industries.

2.2.5 Navigation

The navigation developments handle more than 100,000 tonnes of cargo and 200,000 passengers per year. However, low levels of Lake Malawi have significantly reduced this capacity as ships have problems docking at shallow docks. The ports were also severed during the lake flooding in the 1980s.

2.2.6 Fisheries

Fish catches (60 % of animal protein in Malawi comes from fish) averages about 70,000 tonnes, annually, but are dwindling due to problems of water resources availability, among other things. This is particularly a major constraint in the promotion of aquaculture, which has a potential for increasing availability of fish protein to rural communities outside the country?s lakes and the Shire River. The drought of the mid-1990s threatened the livelihood of fishermen. The Lake Chilwa system and several rivers completely dried up, adversely affecting the livelihood of those depending on fishing for their income and food (protein). As noted elsewhere, soil erosion and

sediment transportation result in habitat alteration and cause adverse effects on aquatic lives including fish.

2.3 Water pollution

The quality of surface water is affected by the presence of microorganisms, suspended solids and chemicals (ions, nutrients, toxic substances, heavy metals, etc). The *microbiological quality* of most rivers in Malawi is generally poor, with typical bacteria counts of 100 Faecal coliform (FC)/100 ml. Rivers draining the Cities of Blantyre and Lilongwe receive sewage effluent discharges and usually register high faecal bacteria counts. Mudi River in Blantyre, for instance, is heavily polluted with faecal bacteria counts as high as 20,000 FC/100 ml.

Pollution from human waste is increasingly becoming a serious problem. In 1996, an estimated 10% of the urban population in Malawi had no sanitation facilities; while 65%, 15% and 10% relied on pit latrines, piped sewerage systems and septic tanks respectively. Mechanical systems in urban areas suffer from a number of operational problems including lack of spare parts, vandalism, obsolete parts, and old age. Accumulated sludge from pit latrines and septic tanks has often not been removed leading to overflow problems. These pose real health hazard.

High *suspended solids* content is a major water quality problem in Malawi. The condition is aggravated by uncontrolled soil erosion in several catchment areas caused by people settling and cultivating in the catchment areas. Water from such catchment areas tends to be highly turbid with high suspended solid content. Silt loads in surface run-off (caused by soil erosion and deforestation due to high population pressure on land) lead to significant deterioration of down-stream water quality including suspended solids and turbidity, water treatment costs and river flow problems. Virtually, all rivers carry heavy loads of sediments during the rainy season. Most of Malawi?s major rivers used for abstraction of potable water carry suspended solids in excess of World Health Organisation (WHO) guidelines for drinking water.

Most of the surface water resources can be classified as soft ? moderately soft (total hardness < 100mg/l CaCO3). Total dissolved solids (TDS) values are generally less than 100mg/l. Nitrogen and phosphorus released from fertilizers and animal wastes stimulate algal, bacterial and plant growth, leading to eutrophication. The appearance and smell of water from the Mpira/Balaka Dam, which feeds the Mpira/Balaka Water Supply Scheme, has been affected by the algal blooms.

Most rivers that receive treated industrial effluent (e.g., those in Blantyre) contain heavy metals such as zinc, copper and mercury. These metals are used in paints, plumbing, pesticides, etc., and accumulate in food chains, hence are persistent in the ecosystem.

2.4 Co-ordination among Stakeholders

Development and use of water resources (for water supply and sanitation, hydropower, navigation, tourism, wildlife conservation, etc) have been uncoordinated without joint development and management strategies or integrated water resources planning, development and management. It is important to recognise that the population has increased pressure on land and water resources. However, development of land and related resources has not been guided with policies and strategies that protect water resources against physical, biological and chemical degradation and pollution. This has resulted in failure to optimise the benefits from water use, and

has caused conflict of interests, over-exploitation, mis-management, pollution and loss of economic value of the resource. Future exploitation of water resources will continue creating such problems unless appropriate and effective policies, legislation and institutional roles are put in place

2.5 Public Sector Investment

The government Public Sector Investment Programme (PSIP) dictates the level of investment of public funds in the water sector each year. The extent to which the sector is developed, therefore, depends on the priority government accords it on the PSIP, the adequacy of financial allocations on the revenue budget for the operation and maintenance of facilities, and the efficiency of financial management systems in place. Despite the present and potential contribution of water resources to the social and economic advancement of the country, water sector remains low on the priorities of the government public sector investments. This state of affairs does not offer incentives to public and private water related industrial investors, as the water resources developments such as dams, barrages and weirs, which are often costly, have to be part of the investor's development plans. The water sector should have a deliberate policy that would advance public investments in water resources management and attract investors in water dependent industries and services.

The investors in water dependent industries are currently the only ones that develop water resources, a practice that significantly inhibits such investments. Examples are Electricity Supply Commission of Malawi (ESCOM) and the Water Boards. ESCOM has developed barrages and regulation facilities on Shire River that control flows for the benefit of the other uses as well, apart from the actual investments on hydropower generation facilities. Water Boards, too, invest in expensive dams which otherwise may be constructed through other arrangements, with the boards buying raw water in bulk to minimise overhead costs. Additionally, some potential investors (e.g., in pulp and limestone industries) have been discouraged in the past due to need for development of water resources, as well.

2.6 Trends in International Water Resources Management Practises

The traditional concept of international water management has been the development of systems for storage and transportation of water resources. As such, management has been viewed as construction and operation of dams, canal systems and pipe network installations for urban or piped rural water supplies. However, the international community is now concerned with preserving water quality and preventing wastage in water resources improvements and developed river basins. The international community is also advocating pollution control, and ensuring efficient use of the available water resources. The situation in Malawi is far from being ripe to abandon construction of dams or water transfer schemes, as there are no such water resources improvements. However, preservation of water quality, pollution control and wastage management are very important for Malawi as her water resources are being rapidly degraded and polluted and getting scarce.

On the other hand, Malawi?s territorial waters are immediately shared with neighbouring countries of Tanzania and Mozambique and the rest of the Zambezi River riparian states on a wider scale. International communities have adopted principles of equitable allocation of shared water resources and their management. These include the World Bank, UN agencies and

specialised conferences where important agreements and declarations have been made to shape international water resources management practices. These conferences include the World Conference on Water and the Environment (held in Dublin in 1992) and the UNCED Earth Summit (held in Rio de Janeiro in 1992).

Most of the popular current concepts in water resources management include those declared at Dublin and UNCED Summit. They include concepts that state that, for sustainable development, water development and management should be based on participatory, value-based management and stakeholder consultative approaches. These include stakeholder involvement in decision making at the lowest appropriate level, recognition of the dual social and economic values of water, the importance of involving women, the traditional custodians of water, in water management. Further, the international community recognises the coherence of a water resources system?s approach in water resources management. The water resources system may be defined as the physical, sociological, biological, economical, political, legal, geological, and agricultural characteristics, structures and institutions whose interactions and fraternity determine the quantitative and qualitative dimensions of the water resources planning, development and management in a watercourse system or a river basin. This recognition has further necessitated the international community to adopt a river basin as a unit for water resources management.

There is also growing recognition that greater emphasis must be placed on the management of demand for water, as a socio-economic good, and make sure that water utilisation is as efficient as possible, both in terms of the quantities of water used and the impact on water quality. International conventions on use of international or shared water resources have also been adopted.

The direct relevant international conventions include the SADC Protocol on Shared Watercourse Systems and UN Convention on Non-Navigation Use of International Watercourses. These conventions should guide the development, management and utilisation of these waters and the harmonisation of national policies, legislation and management practices. Additionally, the mitigation of the effects of floods, droughts, water scarcity problems and water resources degradation within Lake Malawi and Shire River require harmonisation of and co-operation in water resources management practices, procedures and policies in all the riparian countries. In this regard, Malawi and her neighbours have agreements of co-operation, including those for joint investments in shared water resources and management of common rivers, like that of the Songwe River between Malawi and Tanzania. Further, Malawi is a member state of SADC whose economic integration and co-operation include water management, under the umbrella of Water Sector.

The SADC Water Sector was fully established in 1996, with a vision to achieve sustainable and regional integrated planning, development, utilisation and management of water resources that contribute to the attainment of SADC?s vision. This SADC vision is to establish a southern African economic community through building an integrated regional economy on the basis of balance, equity and mutual benefit for all member States. The objective of the Water Sector is to

> *? promote the sustainable and equitable development, utilisation and management of water resources and contribute towards the up-liftment of the quality of life of the people of the SADC region?.*

The regional strategies for achieving the Water Sector vision and objectives are defined terms of

reference that include:

Facilitate integrated planning, development, management and equitable utilisation of water resources at both the national and regional level;

Mobilise resources (financial, human and institutional) for integrated planning, development, management and equitable utilisation of common water resources and the implementation of approved regional programmes; and,

Promote joint and cross border investments in water resources developments and provide guidance on cost sharing arrangements.

2.7 National Priorities

The 1994 Water Resources Management Policy and Strategies give priority to provision of potable water supply. It states that ?*the Government of Malawi considers the provision of potable water to the people of Malawi as a priority item on the National Development Programme.?* Thus the policy emphasis is on provision of water supply and the subsequent National Water Development Project was designed to implement this policy. Its main projects, therefore, aimed at institutional reorganisation and capacity building for and decentralisation of water supply and water borne sanitation services. It also included projects on provision of such services while minor projects were on water resources management.

3.0 EXISTING WATER RESOURCES MANAGEMENT FRAMEWORK

3.1 Water Resources Management Policy and Strategies

The Government of Malawi, through the then Ministry of Works, Supplies and Water Development, launched and adopted a Water Resources Management Policy and Strategies document in 1994. This is the document that has been guiding water resources management in Malawi. It contains important policy statements that have facilitated the decentralisation and improvement of water supply operations in the country. It has the following main policy statements:

Water should be managed and used efficiently and effectively so as to promote its conservation and future availability in sufficient quantity and acceptable quality;

All programmes related to water should be implemented in a manner that mitigates environmental degradation and at the same time promotes the enjoyment of the asset by all;

The approach to allocation of water should be designed in a way that recognises water not only as a social but also as an economic good, and in a manner that achieves maximum benefit to the country;

In planning and providing water supply services consideration should be given to safe disposal of the resultant waste water;

Investment of public funds in water and water related programmes should be guided by the expected net economic, social, and environmental benefits of the programme to the

country as a whole;

The Government shall facilitate the participation of stakeholders (including users and special target groups) both in the public and private sectors to ensure that the needs of relevant interests are taken into account in the development of water systems; and,

The pricing of water should reflect demand and the costs of water services. Pricing policy should aim at the reduction of government financial support to the sector over time.

The focus of the policy development, at that time, was to improve water supply and sanitation services that had deteriorated and were facing major challenges of sustainability and addressing the needs of the stakeholders. The emphasis was on decentralisation and commercialisation, which have been successfully done with the establishment of three regional water boards from the now defunct District Water Supply Fund of the Ministry of Water Development.

3.2 Water Management Legislation

The legal and regulatory structures for water resources management and water services have been and continue to be framed from the Water Resources Act and Water Works Acts. These are also expected to control the institutional and organisational arrangements under which the water sector operates, the pricing and tariff arrangements, the water supply and water borne sanitation delivery and water resources management practices.

3.2.1 Water Resources Act

The legal instrument currently available for the regulation of water resources management is the Water Resources Act (1969) and its subsequent amendments. As it stands, the Act makes provisions for the control, conservation, apportionment and use of the water resources of Malawi and the purposes incidental thereto and connected with. It consists of six parts:

1. 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.

2. Recording of the existing water rights that existed before the Act of 1969,

3. 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;

4. Revision, variation, determination and diminution of water rights, pollution of public water;

5. Miscellaneous powers to declare controlled areas for the purpose of natural resources management of the area, or creation of an easement; and,

6. Schedules for the establishment, composition and *mode operand* of the Water Resources Board that assists the Minister responsible for water resources in the implementation of the Act and administration of water resources.

3.2.2 Water Works Act

The Water Works Act (1995) repealed all previous Water Works Acts in Malawi, including the Blantyre Water Works Act, 1971 and the Lilongwe Water Works Act, 1987 which gave legal status to the Blantyre and Lilongwe Water Boards, respectively. All Water Boards now are 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 in Malawi. It has the following six main parts:

Establishment, membership, powers and duties of Water Boards to deliver water supply and water borne sanitation services, own and control waterworks in designated urban water areas. The Board?s constitution and its functional procedures are further elaborated in this section;

Operational powers to enter land and tress pass, 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 therefrom;

Services and supply of water upon request and through 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 water borne 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 charges 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; and,

Miscellaneous sections that give the Board obligations to respond on inquiries from the Minister responsible for water supply and sanitation on failure to perform 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.

3.3 Water Management Institutional Set Up

The Ministry of Water Development is responsible for water policy and legal framework development and implementation. It is also responsible for spearheading and co-ordinating the development and implementation of water resources planning, development and management and

delivery of water services. These responsibilities are split between the Water Resources and Water Supply Divisions, respectively. The water legislation, however, established the Water Resources Board and the Water Boards.

3.3.1 Water Resources Board

The Water Resources Act gives legal authority for the management of water resources to the Minister responsible for water resources. The Act further delegates certain functions to the Water Resources Board as an advisory body to the Minister. The Board membership was reconstituted in 1995 to strengthen it and assume the extra role of water resources management. The reconstitution comprises five ex-officials and not more than six independent members. The ex-officials are two representatives of ministry responsible for water; one representative each from Water Resources Department; Office of the President and Cabinet; and, Ministry of Commerce and Industry. The minister appoints the independent members.

Unlike the Water Boards, the Water Resources Board does not have a management unit that can run its day to day operations. Thus, it is an ad hoc committee whose secretarial services and follow up to the issues are being done by the Water Resources Department. Hence, it cannot perform its responsibilities on water resources management.

3.3.2 Water Boards

The Water Works Act (1995) has established five Water Boards of Blantyre for Blantyre City, Lilongwe for Lilongwe City, Southern Region for the South, Northern Region for the North and Central Region for the Centre of Malawi. Each Board has a management establishment to run its day to day operations. The Board has directors representing stakeholders? interest. This membership comprises the Secretary for Education, Secretary for Health and the Minister is entitled to appoint three independent members and six members representing the water rate payers in the water areas served by the Board.

4.0 THE NEED FOR REVISED POLICY, LEGISLATION AND INSTITUTIONAL ROLES

Although the 1994 Water Resources Management Policy and Strategies document contains important policy statements that have facilitated decentralisation and improvement of water supply operations, it is silent on a number of major issues on water resources management. The gaps include:

The vision and policy objectives for water resources management are not included;

International and regional conventions and agreements are not incorporated;

Strategic plans for water conservation and mitigation of the effects of water scarcity and flooding are not included;

Rural water supply schemes are implemented without agreed policy and legal framework; and

Policies of other relevant sectors developed/revised after 1994 are not taken into account.

4.1 Vision and Policy Objectives

The 1994 Water Resources Management Policy and Strategies document does not specify the vision and policy objectives for water resources management that would advance sustainable development and management of the resource for all its uses and advance poverty alleviation. As noted earlier, the document emphasises on provision of water supply and sanitation services and places little emphasis on water resources management. In fact, some stakeholders have dubbed the document the *Water Supply Policy and Strategies*.

Further, the chapter on Water Resources Issues in Malawi has highlighted the main issues that must be addressed if the water sector has to contribute to poverty alleviation, economic growth and prosperity of the country. Among other things, the chapter has demonstrated that

deforestation, coupled with poor agricultural practices and environmental degradation in most river basins, has resulted in rivers and streams silting up, being flashy, drying up or receding faster in the dry season;

there are no major storage dams and no policy and legislation for multipurpose developments despite the potential and need;

irrigation development is hampered by lack of readily available water;

hydropower is constantly threatened by low Lake Malawi levels and Shire River flows;

navigation capacity is significantly reduced by the low Lake Malawi levels;

fish production is dwindling partly because of water availability problems;

there is increasing water pollution from human waste, suspended solids, nitrogen and phosphorus, and heavy metals;

there is weak co-ordination among stakeholders in the water sector; and

the water sector remains low on the priorities of the Government public sector investment.

Addressing these issues also requires that appropriate and effective policies, legislation and institutional roles are put in place. Thus, the water resources management policy should not only emphasise the provision of water supply, but also pay particular attention to other aspects. Indeed, weather problems, over-exploitation, mis-management, pollution and environmental degradation continuously threaten the water resources in Malawi. We are living in a dynamic world and sectoral policies and strategies must be reviewed and revised periodically to take care of the changing situation. Given the above, the 1994 Water Resources Management Policy and Strategies are indeed due for revision.

4.2 International and Regional Convention and Agreements

The 1994 Water Resources Management Policy and Strategies document does not recognise and incorporate the international and regional conventions and agreements on water management that Malawi is a signatory to. According to these conventions and agreements, countries, *inter alia*,

are required to patronise the sustainable development concepts, which state that water development and management should be based on participatory, value-based management and consultative approaches. Countries are also required to adopt a *river basin* as a unit for water resources management, thereby recognising the coherence of the water resources system approach in water resources management.

Although water resources should be based on participatory, value-based management and stakeholder consultative approaches, the institutional set up and hierarchy does not include riparian and interested stakeholders who are affected by the monitoring, assessment, development, conservation and allocation of water resources within the river basin. Malawi must recognise and incorporate into its Water Resources Management Policy and Strategies the international principles and concepts since its waters have regional and international interested partners.

4.3 Water Conservation and Mitigating Effects of Water Scarcity and Flooding

The 1994 Policy and Strategies document fails to direct water resources management, particularly in relation to development and implementation of strategic plans for conservation of water and mitigation of the effects of water scarcity (during dry season and droughts) or address the issues of flooding.

The developed water supply schemes are vulnerable to the effects of droughts and unreliable dry season flows. Very few systems have reservoir storage facilities, which have proved to be of strategic importance during droughts. The Mpira-Balaka rural water supply reservoir is proof of this as demonstrated in the 1991 to 1994/95 droughts. However, most them rely on run-of-the-river water supply schemes, which are susceptible to the effects of hydrological droughts. The existing water legislation equally fails to bridge the gap. The Water Resources Board?s responsibility of water resources management is limited to water resources administration. The control and development of water resources to mitigate droughts and floods nor assurance of availability of water does not fall within the Board?s jurisdiction. The Water Works Act (1995) only gives provisions to the effect that Water Boards should assure and guarantee the availability of potable water and water borne sanitation services to residents of a their declared water areas. The existing legal instruments do not cover the provision of water supply to rural areas.

4.4 Rural Water Supply Schemes

The rural water supply schemes and systems are being developed and managed without adequate policies and legislation. The gravity piped water supply schemes are being planned, developed and managed without agreed policy and legal framework. Although the Government is a proponent of CBM, it is also being done without agreed policy or legal framework.

The existing development, utilisation and management of groundwater lack sustainable strategies, despite its extensive use for rural water supply. The monitoring and assessment of groundwater is almost non-existent. Donors, NGOs and government departments, construct boreholes without agreed and consistent control, co-ordination and regulation policies and legislation for the implementation of boreholes development and construction programmes. The borehole construction industries are equally uncontrolled and unregulated to check compliance with standards and protect the water resources from degradation and the public from malpractice.

4.5 Policies of Other Relevant Sectors

The 1994 Policy and Strategies document does not take into account policies and strategies of other relevant sectors that have been developed or revised after 1994. One such policy is the Poverty Alleviation Policy introduced after 1994. The central policy of the government is that of *poverty alleviation*, prompting the need to make water available for all activities that would contribute to realisation of this central policy.

The Poverty Alleviation Policy is based on a vision that yearn for *a situation where every Malawian has access to basic needs and necessities of life that would enable them attain their fullest human development potential and live a productive, prosperous and dignified life*. Malawi needs to seize the available opportunities for developing its water resources to contribute to the Government?s policy on poverty alleviation, economic growth and prosperity. There are also policies on irrigation, forestry, land and environment that are emerging or have been revised after 1994. These policies must be taken into account since they are linked to the water sector.

5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary and Conclusion

5.1.1 Water Resources in Malawi

Malawi is endowed with vast expanses of water systems. The water resources are used in various social and economic activities including water supply and sanitation, hydropower, irrigation, navigation, commerce, fisheries, and wildlife. Water resources management is defined as the monitoring, assessment, planning, development, conservation, allocation and protection of water resources for use by all sectors that depend on water. Water resources management policy, legislation and institutional roles should create an enabling environment for maximum contribution of the water resources in poverty alleviation, social and economic growth and prosperity.

Water, although a renewable resource is limited, seasonally distributed and increasingly becoming scarce and competed for by individuals and various social and economic sectors of production and services. There are imbalances in accessibility to usable water and the access is also quite variable and limited. There is widespread water scarcity for various social and economic activities during periods when natural water supply in rivers and lakes is deficient.

The surface water resources are extensively available throughout the country (particularly during wet season), covering over 20% of the country?s territorial area of 118,480 km^2. Replenishment of surface water resources is dependent on rainfall, which is seasonal and highly variable from year to year. Deforestation is considered to be the major threat to depletion of surface water resources as it causes reduced base flows and persistent drought conditions.

Groundwater sources are widespread throughout the country. Its occurrence is associated with two major aquifers; the basement and alluvial aquifers. The basement aquifers are low yielding (2 litres/second) and discontinuous, but are widely distributed. The alluvial aquifers are relatively high yielding (up to 20 litres/second), occurring in the lakeshore plains and the Lower Shire Valley. On a national scale, groundwater quality is generally acceptable for human consumption.

5.1.2 Water Resources Management Framework

The Malawi Government launched and adopted a Water Resources Management Policy and Strategies document in 1994. This is the document currently guiding water resources management in Malawi. The policy and strategies document gives priority to provision of potable water supply. The focus has been to improve water supply and sanitation services that had deteriorated and were facing major challenges of sustainability. The main policy objective has been to develop a stronger, more efficient and self-reliant water sector, hence emphasis has been on decentralisation and commercialisation of water supply and water borne sanitation services.

The legal instrument for regulation of water resources management is the Water Resources Act of 1969 and its subsequent amendments: Blantyre Water Works Act (1971) which gave legal status to BWB; Lilongwe Water Works Act (1987) which gave legal status to LWB; Water Resources (Amendment) Act (1990); and Water Works Act (1995) which repealed all previous Water Works Acts. The Water Works Act (1995) provides the legal framework for implementing the 1994 Water Resources Management Policy and Strategies.

The MWD is responsible for development and implementation of water policy and legal framework. It is also responsible for spearheading and co-ordinating the development and implementation of water resources planning, development and management and delivery of water services. These responsibilities are split between the Water Resources and Water Supply Divisions, respectively. The water legislation, however, established the Water Resources Board and the Water Boards. The Water Resources Board acts as an advisory body to the Minister. It has no management unit, hence acts as an ad hoc committee and cannot perform its responsibilities on water resources management. The Water Works Act (1995) has established five Water Boards. Each Board has a management established to run its day-to-day operations.

5.1.3 Water Resources Issues

The following are the main water resources issues in Malawi that must be addressed if the water sector has to contribute to poverty alleviation, economic growth and prosperity of the country: rivers and streams silting up, being flashy, drying up or receding faster in the dry season due to deforestation, coupled with poor agricultural practices and environmental degradation in most river basins; absence of major storage dams and multipurpose developments; irrigation development hampered by lack of readily available water; hydropower constantly threatened by low Lake Malawi levels and Shire River flows; navigation capacity significantly reduced by the low Lake Malawi levels; fish production dwindling partly because of water availability problems; increasing water pollution from human waste, suspended solids, nitrogen and phosphorus, and heavy metals; weak co-ordination among stakeholders in the water sector; water sector remains low on the priorities of the Government public sector investment; and international and regional conventions and agreements require that water development should be based on participatory, value-based management and consultative approaches, and that a river basin be used as a unit for water resources management.

5.1.4 The Need for Revised Policy, Legislation and Institutional Roles

The 1994 Water Resources Management Policy and Strategies document is silent on a number of major issues affecting water resources management. These gaps include:

The vision and policy objectives for water resources management are not included;

International and regional conventions and agreements are not incorporated;

Strategic plans for water conservation and mitigation of the effects of water scarcity and flooding are not included;

Rural water supply schemes are implemented without agreed policy and legal framework; and

Policies of other relevant sectors developed/revised after 1994 are not taken into account.

5.2 Recommendations

From the above review of the 1994 Water Resources Management Policy and Strategies, the following recommendations are made to enhance the contribution of the water sector to poverty alleviation, economic growth and prosperity of the country:

The existing Water Resources Management Policies and Strategies, Legislation and Institutional Roles should be revised to address the major water resources issues and cover the gaps highlighted in the review;

The Water Resources Board should be restructured into a National Water Resources Board;

A *river basin* should be adopted as a unit for water resources management and River Basin Authorities established;

Strategic plans for national and river basin development should be formulated;

Rural community organisations should be promoted;

Urban and peri-urban water supply and sanitation should be improved;

Rural potable water supply and sanitation should be improved;

Catchment conservation and river bank protection should be enhanced;

The water quality should be safeguarded;

Hydropower development and multi-purpose use water storage should be enhanced;

Capacity building and research in water resources should be developed;

Water resources data collection, analysis, storage and dissemination should be improved; and

Participation of NGOs and the private sector should be improved.

5.2.1 Revising the Water Resources Management Policy, Legislation and Institutional Roles

Addressing the major water resources issues and the gaps highlighted in this review, necessitates the revision of the 1994 Water Resources Policy and Strategies as well as the legislation and institutional roles of the relevant line ministries and other stakeholders. The revised policy should clearly indicate the vision and policy objectives for water management in Malawi. There is also need for the policy document to clearly indicate the policies and strategies for the major sections of the water sector, namely: water resources management; and water services covering both urban and rural water supply and sanitation. Strategies for water conservation and mitigation of the effects of droughts and floods should also be included. The policies and strategies should incorporate the principles and concepts sustainable water development adopted at regional and international conventions and agreements to which Malawi is a signatory.

The Water Resources Act needs to be revised to take care of the above issues and identified gaps. Similarly, there is need to revise the institutional roles of relevant stakeholders to minimise overlaps. Capacities of the institutions should also be strengthened for them to perform their roles effectively and efficiently. Annexes A, B and C give the proposed revised Water Resources Management Policy and Strategies, Water Resources Act and Institutional Roles respectively.

5.2.2 Restructuring the Water Resources Board into National Water Resources Board

The Water Resources Board does not have a management unit that can run its day to day operations. It operates as an ad hoc committee and cannot perform its responsibilities on water resources management. The Board should therefore be strengthened so that it can perform its responsibilities properly.

The Board should be restructured into a National Water Resources Board (NWRB) by establishing a Secretariat. The Secretariat should be an autonomous body with legal powers and managed by a Director recruited from water resources professionals on 2-3 year contract basis. Full time staff comprising a Deputy Director for Water Resources Development and Management; a Deputy Director for Water Supply and Sanitation; and a Financial Controller should support the Director. The Director and the Deputy Directors will constitute the Management Team.

At the lower level, the following should support the Secretariat: an officer to deal with Civil Works Contracts; an officer to deal with Legal Matters; an officer to deal with Water Quality and Conservation; two Secretaries; and a Driver. Annex C gives the proposed role of the NWRB. It is proposed that this activity should be undertaken by MWD and starts by July 1999 and be completed by 2000.

5.2.3 Establishing River Basin Authorities

Malawi should adopt a *river basin* as a unit for water resources management, thereby recognising the coherence of the water resources system approach in water resources management. This is in line with the regional and international conventions and agreements. River Basin Authorities (RBA) should be demarcated and be given legal powers in their jurisdiction, but with room for appeal from the lowest level up to the national level. The RBAs will be responsible for the control and development of water resources at the basin level (see Annex C for details on the proposed role of RBAs). The establishment of the RBAs will facilitate the decentralisation of control and development of water resources to the basin level.

The composition of the RBA should comply with its intended mandate and responsibilities. The NWRB, *inter alia*, will be responsible for co-ordinating and harmonising activities of the RBAs. It is thus proposed NWRB undertakes this activity from July 1999 to year 2004.

5.2.4 Formulating Strategic Plans for National and River Basin Development

Strategic plans for development of water resources at national level and at river basin level should be developed. The NWRB should start preparing standards and guidelines for water resources development and management, which will form part of the national water resources strategic plans for water resources. RBAs should isolate all potential areas for water resource development in their basins and then formulate plans for development of these areas. Within the river basin plans, there should be zoned areas to indicate catchment conservation and river bank protection. At this level, there should be very close liaison with the local communities as potential beneficiaries.

These initiatives should start as soon as the NWRB and RBAs are put in place. It is expected the National Water Strategic Plan will be completed earlier than the River Basin Water Strategic

Plan, with a two-year lag period. The initiatives are expected to be completed by year 2006.

5.2.5 Promoting Rural Community Organisations

RBAs will be required to work with potential beneficiaries. Further, rural water supply schemes should involve the participation of potential beneficiaries as part of community based management. The potential beneficiaries should be organised in groups for effective management. This calls for promotion of rural community organisations. Public awareness campaigns should be conducted on the nature of rural organisations (e.g., associations and co-operatives), their advantages and impact on community welfare in terms of water supply and poverty alleviation. For successful implementation, there will be need to initiate the campaign through the District Development Committees (DDCs). This activity should be undertaken by the RBAs by year 2003 and be completed by year 2005.

5.2.6 Improving Urban and Peri-urban Water Supply and Sanitation

Water supply and sanitation in urban and peri-urban areas should be improved. Realistic estimates of current and projected demand for water should be made based on existing population growth trends, industrial demands, and expected urban migration. The NWRB should assist the Water Boards conduct this analysis. Then, water storage facilities that can meet the current and projected demand should be planned and constructed, taking into years of low precipitation in order to minimise the need for water usage restrictions during years of drought. More equitable water supply distribution systems should be planned and implemented. These systems should cater for both low and high density areas, particularly the latter which are normally experience drastic water restrictions during drought years.

Water pricing schedules that provide adequate water for domestic use at affordable prices should be devised. Economic rates should be charged for water that is used for aesthetics and industry. The graduated pricing should be carefully evaluated to isolate that water used for loans and gardens and charge it at economic rates.

Water harvesting at the household level should be encouraged, especially during the rainy season in order to preserve the storage capacity of reservoirs for the dry season. Roof top water harvesting structures and ground collecting tanks can extend water availability to most urban dwellers whose houses are roofed with impervious materials.

All water borne sanitation structures and facilities should be examined and improved to ensure adequacy and availability. Special attention should be paid to discharge of effluent into natural watercourses so that laid standards are not violated.

This is a multi-sectoral undertaking that will require the Water Boards, the NWRB and the Government to participate in the various sections. Much as the construction of improved facilities are long-term, the local initiatives should be instituted by year 2010.

5.2.7 Improving Rural Potable Water Supply and Sanitation

Accessibility to and sanitation of potable water in rural areas should be improved. Local development and ownership of water supply systems should be encouraged using local organisations within the river basins. Contribution in kind during construction should be phased

into a full operation and maintenance responsibility at the end of the construction phase.

Rural households with appropriate roof surfaces should be encouraged to embark on water harvesting during rainy season to minimise water borne diseases, which have high incidence during the rainy season.

VLOM teams for both gravity-fed systems and boreholes should be strengthened in order to have greater reliability of water supply. It is necessary to have a well formulated local training programme for the maintenance teams in order to fully equip them with skills.

NGOs have been active in rural water supply, especially in groundwater supply. What is required now are procedures to ensure equity provision and adherence to engineering standards. All NGOs and Donors offering to provide water to rural communities should use the DDC as the point of consultation and liaison with local communities. The DDC will be responsible for informing the relevant authorities who will in turn ensure adherence to engineering standards.

Together with rural water supply, sanitation initiatives should be enhanced through the Ministry of Health and Population and interested NGOs/Donors. The RBAs should take sanitation as an integral component of water resources development to ensure delivery of good water quality and minimise groundwater pollution.

Each household in the rural areas should have access to potable water and every effort should be made to ensure efficient utilisation of the water resources. The planning for rural water supply should be initiated as the various bodies are put in place. The overall goal of 80% access to potable water in rural areas should be achieved by the year 2020.

5.2.8 Enhancing Catchment Conservation and River Bank Protection

Guidelines for land zoning should be formulated. These will guide RBAs in protecting river banks, and local communities in responsible cultivation along river banks. The RBAs should embark on public awareness campaigns on the dangers of river bank destabilisation through cultivation and overgrazing, and encourage communities to adhere to zoning programmes.

Catchment wide conservation plans should promote good land husbandry and reforestation. This should be done jointly with the Ministry of Agriculture and Irrigation and the Forestry Department. Alternative sources of energy should be introduced in rural areas in order to effectively control deforestation.

RBAs should be responsible for conservation and river bank protection, although some of the initiatives may require the input of the NWRB. These measures are on-going, but are expected to be fully operational by the year 2008.

5.2.9 Safeguarding the Water Quality

Surface run off should be monitored for pollutants from agricultural lands (fertilizers and pesticides) and industrial waste. This will require up-grading of the existing water quality gauging stations as well as establishing new ones. Guidelines for industrial effluent discharge should be reviewed, and mechanisms for monitoring and enforcing the safe discharge levels should be formulated in collaboration with the Environmental Affairs Department.

The water quality should be monitored regularly in urban areas to ensure adherence in the delivery of good water quality to urban residents. The RBAs should devise rural water supply monitoring procedures to keep track of water quality variations, especially in gravity fed water systems which are dependent on conveying surface waters to rural communities.

Nation wide water quality monitoring should form part of the NWRB plans. The Water Boards and the RBAs should take up urban and river basin water quality plans respectively. The whole system is expected to be operational by year 2015.

5.2.10 Enhancing Hydropower Development and Multi-Purpose Use Water Storage

RBAs should identify potential sites for hydropower within their basins, and should make preliminary plans for developing these sites based on the run-of-the-river system or storage reservoirs. The private sector, NGOs and donors should be invited to participate in order to isolate other uses. This will also call for close liaison with relevant Government offices, namely Energy, Agriculture, Forestry, Tourism and Wildlife, and Lands. These offices are likely to have vested interest either in the harvested waters or in the land that is likely to be flooded. It is expected that there will be a hierarchy of analysis, starting the RBAs identifying the potential sites at basin level, and the NWRB giving final approval after liaison at ministerial level.

RBAs are expected to embark on water resources development projects that can facilitate users like irrigation, hydropower and recreation. These users are expected to apply for the water facilities required in their sectors and pay the RBAs for the water. The private sector should also be allowed to develop the water resources using proper contractual arrangements with RBAs, and the water can either be used solely by the entrepreneur or can be sold to other users. The NWRB will be responsible for formulating procedures and standards in water resources infrastructure to ensure safety and reliability. These should be enforced with the assistance of the RBAs.

This is a critical development in the whole water sector that is expected to fuel up private sector interest and establish a water resource industry that is cost effective and equitable. As such, it is a long-term concept but should start as soon as the various bodies are instituted and is expected to be fully operational by the year 2025.

5.2.11 Capacity Building and Developing Research in Water Resources

The Government has placed capacity building as a means to realising sustainable development in all sectors. However, the water sector is still reliant on foreign expertise in a number of undertakings. Large numbers of staff have been trained over the past 35 years, but retention has become a major stumbling block. There is need for an extensive and urgent review of existing skills in the MWD and isolate gaps in order to identify training needs of the Ministry. As a matter of principle, though, there should be a parallel review of existing incentives for various expertise in order to devise a value-for-money incentive scheme, which should recognise rare skills that demand high remuneration. Capacity building will only make sense if there is good retention of staff.

Training options should be devised based on identified gaps. A three-tier training system should be considered; on-the-job training, short courses and formal training either in-country or overseas. Existing capacity in local institutions to provide the required training should be evaluated,

including capacity within MWD for on-the-job training. After identifying weaknesses in existing institutions, plans should be devised to strengthen these institutions.

A Water Resources Institute should be established at one selected institution, preferably at one of the existing University colleges. The Institute will be a water sector skills and technologies development centre, with teaching and research facilities in hydrology, hydrogeology, water quality, water supply and sanitation and civil engineering.

Limited research has so far been conducted in the water sector, especially groundwater research. MWD should collaborate with existing institutions to develop research projects that characterise water resources occurrence and natural distribution in Malawi and the surrounding countries. There is also need for collaborative efforts with scientists from neighbouring countries in order to conduct the research at basin wide level.

This is a major undertaking that underpins the success of the new policy. Hence, a desk officer within the MWD or an expert engaged on short term basis should examine all the above areas and prepare guidelines on training, incentives and research. As the work is very critical, this should start immediately so that it is completed by the end of the year 2000. The whole process of training and institutional arrangements is an on-going process that should be in place by the year 2015.

5.2.12 Improving Water Resources Data Collection, Analysis, Storage and Dissemination

The existing data collection systems should be examined to identify gaps and duplication. The adequacy of the hydrologic network should be assessed in terms of coverage and accuracy. Most gauging stations are silted as revealed by a recent review of streamflow gauging stations within the Lilongwe Plain. Data form such stations are bound to be inaccurate.

A data collection network and effective analysis procedures need to be devised to avoid the current situation of excessive raw data sitting in the archives. Data storage methods that allow easy access for dissemination should also be instituted. The storage system should be part of a national or even regional electronic network that can be accessed by potential users, and efforts should be made to standardise the data using regional guidelines.

Data collection should be the primary responsibility of the RBAs. However, data compilation, analysis, storage and dissemination should be the primary responsibility of the NWRB. These systems are expected to be in place by the year 2010.

5.2.13 Enhancing NGO and Private Sector Participation

The NWRB, *inter alia*, will be charged with the responsibility of formulating procedures and standards to be followed by NGOs and private companies when carrying out construction work for water resources development. The area that has lagged behind and with ad-hoc construction is groundwater. There is urgently need to prescribe procedures for borehole siting, drilling, logging and registering. The registration should be done with the RBAs complete with all the data on aquifer, water table, discharge and water quality.

A definite line of communication should be established where the DDC is the entry point to rural communities for all Government, NGO and donor funded water schemes. This should also form the liaison from communities to RBAs, NWRB, Government, NGOs and donors. The private

sector should be given incentives to invest in water resources development, either through tax rebates or exclusive rights to the water over a fixed period of time.

The NWRB should initiate these arrangements, but all stakeholders have to participate in order to establish a strong partnership with NGOs and donors in water resources development. This is an on-going process, but all procedures are expected to be in place by the year 2006.

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NAMES OF ORGANIZATIONS AND INDIVIDUALS CONTACTED

NAME OF ORGANIZATION	INDIVIDUAL (S) CONTACTED	POSITION
Ministry of Water Development	Mr. O. M. Kankhulungo	Controller
	Mr. O. Shela	Deputy Controller, Water Resources
	Mr. A. B. Chirwa	Chief Hydrologist
	Mr. A. D. Chidzamika	Chief Accountant
	Mr. Devisoni	Principal Hydrogeologist
Blantyre Water Board	Mr. N. Mndala	Water Quality Controller
ESCOM	Mr. O.C. Mandalasi	Deputy Chief Executive & Director of Engineering
	Dr. A.A.W. Chiwaya	Chief Engineer (T)
City of Mzuzu	Mr. A.P. Kayuni	Senior Health & Cleaning Officer
Lilongwe Water Board	Mr. B. Nkhoma	Assistant Planning Engineer
Northern Region Water Board	Mr. T.C. Mtegha	General Manager
Southern Region Water Board	Mr. Mbesa	Projects Manager
Department of Environmental Affairs	Mr. Mwanyongo	Acting Deputy Director
Department of Forestry	Mr. B. Chamba	Deputy Director
Department of Wildlife & Tourism	Mr. Sefu	Deputy Director
Department of Energy	Mr. H.W. Chitenje	Principal Energy Economist
	Mr. Mwangonde	Energy Economist
Meteorological Department	Mr. D. Kamdonyo	Deputy Director
World Vision International	Mr. M. Maoni	Senior Water Engineer