



REPUBLIC OF NAMIBIA

Ministry of Agriculture, Water and Rural Development

NATIONAL WATER POLICY WHITE PAPER



**Policy Framework for Equitable, Efficient, and Sustainable
Water Resources Management and Water Services**

AUGUST 2000

A Policy towards integrated management of Namibia's water resources with the participation of all Namibians!

* An oxbow picture of Kwando River in Caprivi Region, Namibia, on the border with Botswana

“When I was a boy, the ponds and waterholes used to last the whole year through. Now they are dry and empty. When the rains came and filled the Oshanas, we used to take our baskets and go fishing. Now the fish baskets hang from the roof poles as ornaments. They are never used. We walked to school through long grass as high as our arm-pits, as far as you could see. Now the grass has all gone and there is nothing for the cattle to eat.”

Witness to the changing water landscape in the Cuvelai basin Oshakati, October 1999.

FOREWORD

Water gives life to Namibia's people and is essential to the country's social, economic, and environmental security. In the face of increasing demands and rising costs, water has become a commodity of strategic importance in Namibia.

Currently, a large proportion of our rural population and urban population is without safe drinking water, and an even high proportion lack proper sanitation. Thus the poor, who often have the most limited access to water resources, feel the greatest and most immediate impact of this situation.

This Policy Document constitutes a strategy by the government's ongoing Review process to work with all stakeholders in addressing the challenges of Namibia's water resources. It follows the government's resolve to formulate a new water policy as part of a new approach for post-colonial management of water resources and the provision of adequate water in Namibia. The government is committed to implementing the proposed framework in the context of the needs, priorities, and constraints of the country. This Policy Document further recommends that Namibia adopt a systematic approach to water resources management, using an integrated, multisectoral framework that considers issues of decentralization, social equity, ecological protection, and economic growth.

The central message of this Policy Document is one of optimism, because the groundwork already exists for the sustainable management of Namibia's water resources.

I trust that this Policy Document will stimulate dialogue and encourage consultation with all the stakeholders, particularly the rural and urban poor, to develop an effective partnership between government and the private sector as well as between Namibia and its neighbours and the international community. Moreover, this dialogue and consultation is expected to lead to the process of enacting a new Water Bill to replace the outdated Water Act 54 of 1956.

My greatest appreciation and acknowledgements go to all who directly or indirectly contributed to the development of this policy, especially the intersectoral Task Force that had guided the Review process and the work of the Technical Team responsible for producing this document.

I am convinced that this Policy Document is a tool for us to use in order to create the necessary conditions to enable the Namibian water sector to meet the water needs of the Namibian population into the 21st century and beyond.

Hon. Helmut K. Angula

Minister of Agriculture, Water and Rural Development

LIST OF ABBREVIATIONS

CBM	Community Based Management
DWA	Department of Water Affairs
DRWS	Directorate of Rural Water Supply
FAO	Food and Agriculture Organisation
GRN	Government of the Republic of Namibia
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
IWRM	Integrated Water Resources Management
MAWRD	Ministry of Agriculture, Water and Rural Development
NWRMR	Namibia Water Resources Management Review
NGO	Non-Governmental Organisation
SADC	Southern African Development Community
UNDP	United Nations Development Programme
UNCED	United Nations Conference on the Environment and Development
WASP	Water Supply and Sanitation Sector Policy
WASCO	Water and Sanitation Co-ordinating Committee
WRMA	Water Resources Management Agency
ZACPLAN	Zambezi River System Action Plan

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INTRODUCTION

Namibia is the driest country in sub-Saharan Africa and the country's water resources are extremely fragile. The problems associated with the resource base are compounded by the inheritance of a water management regime designed in the pre-independence era to serve the political, economic and social priorities of those then in power, and underpinned by a Water Law suited to a water-rich environment.

In view of these circumstances, the need for a new policy framework for water resources management in Namibia has been recognised at the highest levels of government since Independence in 1990. In 1998, the Government of the Republic of Namibia (GRN) decided to initiate a Water Resources Management Review [See Box on Page 8]. The review was tasked with taking stock of the existing arrangements for managing Namibia's water resources and the services that draw upon them. The Review was then in a position to take a fresh, progressive look at these arrangements. It noted the recent advances and initiatives in water resource management that have been made both in Namibia and elsewhere. On this basis, the Review was able to recommend a set of new approaches and enhancements to address the contemporary challenges Namibia is facing in conserving its limited and vulnerable resource base and extending reliable water services to its people.

In keeping with the thematic areas identified for special examination in the Review, the policy framework is based upon policy principles in key areas. The rationale for the framework is first explored in the context of Namibia's particular physical setting and the legacy of the pre-independence era. In addition, current trends in Namibia's develop-

ment specifically relating to water resources management are examined, including those that apply to the issue of international waters.

The focus on specific themes should not obscure the fact that effective water resources management in Namibia is fundamental to social well being and economic progress. In social terms, there is still a vital need to rectify the injustice and inadequacy of earlier policies, which deprived the country's majority population of access to reliable water supplies and inhibited productive and sustainable use of the resource. It is also important to ensure water security, and to sustain supplies to urban centres while extending services in rural areas.

In economic terms Namibia is highly dependent on its natural resource base for its principal productive activities: mining, agriculture, pastoralism, fishing and wildlife-based tourism as well as urban supplies and manufacturing. Water is therefore the single most important across-the-board contributor to the country's development prospects; conversely, its vulnerability and inadequate management constitute the country's single most important development constraint.

The urgency to develop infrastructure imposed by the rapid expansion in water use in Namibia is of great concern. Already there are signs of environmental degradation and that the country's renewable and non-renewable water supplies are being depleted. In this regard, the sustainable development of the country and consequently the well-being of all Namibians, now and in the future, depend on the development of a new policy of integrated water resources management and the successful implementation of its recommendations.

The Namibian Water Resources Management Review (NWRMR)

The Namibian Water Resources Management Review (NWRMR) was launched in March 1998 by President Sam Nujoma. The Review has been funded by the GRN, the World Bank, Government of Federal Republic of Germany through GTZ, UNDP and FAO. The Review's purpose is to make recommendations that will enable Namibia:

To achieve equitable access to, and the sustainable development of, freshwater resources by all sections of the population especially the rural and urban poor, in order to promote long-term social and economic development.

The Review's underpinning rationale was that water in Namibia is subject to so many pressures that it must in future be regarded as a limited and vulnerable resource whose use must accord with principles of social equity, economic efficiency and environmental sustainability.

In pursuit of its overall objective, the Review has:

- undertaken an examination of current water resources management practices;
- defined key issues and challenges;
- undertaken extensive technical reviews of thematic areas; and
- initiated a process of participatory discussion on possible changes to the current regime with stakeholders throughout Namibia, notably at regional level.

The policy framework proposed by the Review is the product of the entire Review process. It draws substantively upon the thematic reviews in technical areas, which have provided the Review with its own guiding framework. The themes selected for review were as follows:

- *Strategic Water Resources Assessment*
- *Shared Watercourses*
- *Water Use and Conservation,*
- *Economics and Financing,*
- *Legislation and Regulation*
- *Institutions and Community Participation,*
- *Human Resources Development*

In the light of the need for effective implementation of the anticipated changes in the existing water resources management regime, institutional reform and human resources development were given the highest priority, alongside proposals for changes in the laws affecting water ownership, equity and optimal use.

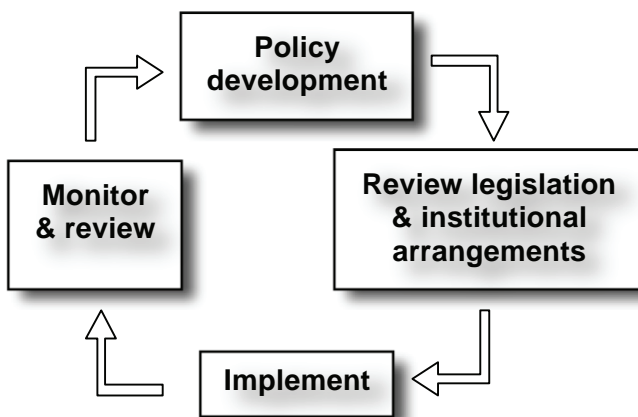
The elaboration of this policy framework owes a great deal to the guidance of the Task Force created to steer the Review process. In keeping with the accepted view that water is a resource on which the entire human family depends for its many social and economic activities, as does the environment itself, the membership of the Task Force is both multisectoral and intersectoral. The Task Force is chaired by the Permanent Secretary of the Ministry of Agriculture, Water and Rural Development (MAWRD). It includes representatives from eight Ministries; nine other government entities including the National Planning Commission and the Office of the Prime Minister; non-governmental entities including unions, churches and mines; academic and professional organisations; and major donors to the Review. During the course of its work, the Review has conducted a number of workshops to which technical experts and other stakeholders, especially those at regional level, have made important contributions.

The development of this Policy Framework, and of other products of the Review, is the work of the Review team. This is a multidisciplinary technical team comprising Namibian specialists, for whom the Review process has itself been a learning and capacity-building exercise. The structure of the Review and its activity has therefore been designed to capture national and local perspectives and build capacity for implementation of whatever new policies and strategies emerge and are approved at Cabinet level. Their work has been supplemented, where appropriate, with international technical expertise and assistance.

Sector Reform Process

Water sector reform should be an ongoing process (**See Cycle below**). Policy development is a dynamic activity that needs to take account of changes in society and technology. The development of policy needs to follow through into a review of current legislation and institutional arrangements if the policy is to be implemented. Legislation and the general regulatory environment must enable the policy to be implemented.

Water sector reform cycle



Following the review of policy and legislation, it is imperative that policy is implemented in order to achieve the development objectives of the government. Lack of implementation leads to disillusionment and an undermining of the status and authority of government. It is therefore important that policy is realistic and implementable.

A continuous process of monitoring and evaluation of policy and the sector in general needs to be undertaken in order to ensure that the government's objectives continue to be

met. If necessary policy should be amended.

Structure of The document

This document is structured in three parts:

Chapter 1 provides background to the Namibian water resources situation. It describes the natural water resources available and how these have been developed and utilised to date.

Chapter 2 sets out the policy of the Namibian Government with regards to water resources development, utilisation, management and protection.

Chapter 3 outlines objectives and strategies for the implementation of the policy.

CHAPTER ONE

1.1 Water: a fragile national resource

Namibia lies along the south-western coast of Africa, and is bordered by Angola and Zambia in the north, Botswana and Zimbabwe to the east, and South Africa to the south. It occupies a vast area of 824,272 square kilometres. With a population of around 1.6 million, Namibia is therefore one of the world's most sparsely populated countries. Namibia as already mentioned is sub-Saharan Africa's driest country because roughly 90% of its area consists of desert, arid and sub-arid land.

In light of the above and given that over 70% of the population are subsistence farmers and their livelihood is thus gained in circumstances of extreme harshness and stress.

Water is fundamental to all social and economic activities, in Namibia as elsewhere. Guaranteeing access to this essential resource to all Namibians, to satisfy both their basic survival and health needs, and to support the whole range of productive activities that contribute to the country's development -- from subsistence agriculture and livestock herding to sophisticated industrial and manufacturing industries -- is highly challenging. There are a number of special constraining characteristics about the natural resource in Namibia, and the unique configuration of these characteristics compounds the social, economic and environmental challenges facing the country.

1.1.1 Constraining characteristics of Namibia's water resources

- The first characteristic is that the only perennial rivers to which Namibia has access lie on its northern and southern borders and are shared with neighbouring countries. More than 70% of the

population lives in the rural areas and a considerable proportion is dependent on the Kunene and Kavango watercourses or on boreholes, which they recharge. The sources of both these rivers lie in Angola. The northern border follows the Kunene River in the extreme north-west, and the Kavango River, Zambezi River and Kwando/Linyanti/Chobe River system along part of its north-eastern stretch. The country's only other perennial source, the Orange River, forms the southern border with South Africa. The capital city and seat of Government, Windhoek, is in the centre of the country, far from these rivers. The fact that all the perennial rivers to which Namibia has access are shared with neighbouring states (see Section 1.2.2 on Page 14) means that international agreements are required regarding their use and management, adding a political and diplomatic dimension to water resources management. Meanwhile the national population is growing at a rate of about 3% a year, whilst urban centres are growing at a rate of over 5% a year, and social and economic development needs and demands are therefore imposing ever greater pressures on these shared water sources.

- The second constraining characteristic is that annual average rainfall is low. It ranges from virtually zero along the coast to a maximum of 700 mm in the extreme north-east. More significantly, it is highly variable, both between climatic zones and within them. In addition, Namibia's high temperatures and clear skies mean that the rate of evaporation is very high. Surface runoff and groundwater recharge are minimal and there can be no certainty that dams designed to store runoff will have filled adequately following the rainy season. Furthermore, drought is common, confront-

ing the country with continuous, year-in, year-out risk to its water security.

- The third characteristic in this category concerns alternative sources of surface water to perennial rivers. Since perennial rivers are far from the main urban centres where demand is highest, Namibia relies heavily on the runoff generated in its internal river basins, all of which flow for only short periods of time following heavy rainfall. These are therefore described as ‘ephemeral’ rivers. Flows in the principal ephemeral rivers – the Fish and the Auob in the south, the Nossob and its tributaries in the south-east, the Omaruru, Kuiseb and Swakop in the west, the Omatako in the north-east – are highly variable. However, these ‘ephemeral’ systems furnish the runoff that fills a key set of public water supply dams in the central area of the country, many small private farm dams and also recharges important alluvial aquifers. The ephemeral rivers therefore constitute an important lifeline for many people throughout the country, providing 22%¹ of the national water supply, and maintaining important plant and animal ecosystems.
- The fourth characteristic is Namibia’s dependency on groundwater, in both shallow alluvial and deeper aquifers. In the recent past, especially since the last period of acute drought in the mid-1990s, increasing dependency has turned into absolute reliance. Groundwater resources are providing the principal buffer against annual drought and in some instances are being progressively overutilized. In addition, with no effective control over pollution to groundwater, strategic aquifers are threatened with degradation. In the more arid, western

part of the country, groundwater held in the alluvial aquifers underlying the ephemeral streams provides the only reliable source of water, but the recharge process related to these alluvial aquifers is still only partially understood. Many alluvial aquifers are at present used beyond their "sustainable/safe yield" limits - abstraction exceeds recharge. In some other parts of the country where groundwater resources are critical to supply, for example in the north-eastern Kalahari area, there is limited understanding of the flow systems. In yet other areas where irrigated agriculture is practised from groundwater sources, there is little effective control or protection of the resources and doubts must be raised about the wisdom of using such a precious resource for water-intensive activities.

- A further constraining feature of Namibian groundwater is that it is highly saline over large areas of the north where the majority of the population lives. Over 400,000 people – one-quarter of the country’s population – are entirely dependent on surface water for domestic and agricultural supplies, and on renewable wetland resources on surface water, because of the high salinity of groundwater. Traditionally, the majority of this population relied on seasonal and ephemeral flows, which until the relatively recent past provided a vulnerable but usually sufficient supply. Today, population growth, apparent climatic change, and environmental degradation have altered the situation to the point where naturally occurring surface supplies are seriously inadequate and vulnerable to pollution.

¹ Source: WCE, 2000

There are therefore many inherent constraints – hydrological and hydrogeological – to utilising Namibia’s water resource base, whose specific configuration presents a unique set of challenges namely the reliance on ephemeral flows and their extreme variability; the limited and erratic annual recharge of groundwater; and persistent threat of drought. The variability and vulnerabilities of rainfall, catchment and aquifer conditions over the whole country therefore present a major challenge to the management of the resource base. Most of these characteristics are fundamental and cannot be negotiated. Within Namibia’s borders, the resource base is definitively limited and finite. The only other possible additional freshwater resource is desalinated seawater, which could be considered as a viable option, solely for supplying to coastal towns in future.

1.1.2 International watercourses: rights and obligations

Namibia’s perennial rivers – the Kunene in the north-west, the Kavango and the Zambezi (including the Kwando / Linyanti / Chobe) in the far north-east, and the Orange in the south – are shared with other states. These rivers, or part of their flow, constitute national boundaries of Namibia and other riparian states i.e. states, which share these international river basins.

The sources of all these rivers lie upstream of Namibia, and ten countries altogether participate in these rivers’ basins: Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, Tanzania, Zambia, Zimbabwe and South Africa. Namibia is therefore dependent on its neighbours for the quantity and quality of these rivers’ flow, particularly on South Africa, Zambia and Angola. The latter is also the source of the seasonal Cuvelai system. Namibia therefore needs to be in a position to negotiate the sharing of water flows and guar-

antee the protection of agreed water quantity and quality for downstream neighbours. These rivers constitute an important source of supply for the relatively high number of population living near or along their banks, especially in the north. It is estimated that shared rivers currently provide 34 percent² of the water consumed in Namibia.

In light of Namibia’s dependence on shared watercourses, good co-operation with riparian neighbours is an extremely important component of water-related policy and its implementation. The work of joint international commissions needs to be supported at the highest political level. Technical and scientific groundwork for proper understanding of the shared water resources needs to be encouraged. Agreement needs to be reached on the obligation of each riparian country to ensure that the water quality and quantity, and the duration and timing of flows, required to meet the domestic and ecological requirements of downstream users and habitats are maintained.

There are six specific international agreements and permanent commissions in place to which Namibia is party. The most important of these are with Angola on the Kunene River (regulating activities such as the construction of dams and other infrastructure), and with Angola and Botswana relating to the entire Okavango River Basin (an environmental assessment and the development of an integrated management plan). A permanent water commission with South Africa regulates ‘matters of mutual concern’; however Namibia has not participated in the negotiations between Lesotho and South Africa, regarding abstraction from the headwaters of the Orange River. There are as yet no formal agreements concerning the Cuvelai and Zambezi River basin systems.

²Source: WCE, 2000

The Namibian Government has signed, ratified and acceded to numerous international protocols and Conventions concerning water, notably those designed to protect the environment. These include:

- the Zambezi River System Action Plan (ZACPLAN);
- the UN Convention on the Law of the Non-Navigable Uses of International Watercourses;
- the International Convention on Wetlands (RAMSAR); and
- the SADC Protocol on Shared Watercourses.

Among the challenges facing any water-related policy component concerning international watercourses is the need to familiarise actual and potential stakeholders at all levels of society, especially at community level, of the rights and responsibilities of Namibia in the context of shared waters. To reach the necessary compromises between human requirements, economic priorities, commercial interests and environmental integrity requires patient, good-spirited and well-informed negotiations. Infrastructural and human resources capacity to carry out these activities in an effective manner need to be created in the country.

1.2. The need for reform

In addition to the issues above, there are social and political issues related to water resources management in Namibia, which need to be urgently addressed as a result of the skewed priorities of the apartheid colonial era.

Namibia inherited an administrative structure designed to serve the overall political, economic and social priorities of the Apartheid State that was in power. The policies pursued by the apartheid era government

created one of the most unequal societies in the world. The richest – predominantly white – 10% of the society earned more than 65% of the income, leaving only 35% for the remaining – mainly black – population. The same biased distribution of the benefits of the country's resources is echoed in water services. Until Independence, the water needs of commercial farmers, key municipal centres, mines and industrial centres were accorded a high priority in public spending. The farming and domestic needs of the country's majority black population, especially the 70% living in rural (communal farming) areas primarily in the north, were largely neglected. In 1990, it was estimated that 50% of the rural population had no access to a reliable source of safe drinking water.

The existing law (namely the South African Water Act No. 54 of 1956) and the regulatory regime it underpinned similarly reflected a policy of support to the same elite social and economic interests. Ownership of land was regarded as conferring exclusive right to the use of water resources located on or under such land. The development of these water resources was largely unregulated by the state with the notable exception of groundwater control areas. The entire institutional framework for the development and management of water resources and the provision of water services, including the functions of licensing, pricing and subsidy provision, served the same set of priorities.

1.2.1 Important changes since independence

Since Independence, various initiatives have been undertaken to address the injustices and inadequacies of past water resources and services policy. The Namibian Constitution, adopted in 1990, paves the way for post-apartheid strategies, policies and laws designed to address fundamental and persistent structural inequities. A parallel process of pub-

lic sector reform is being introduced to promote efficiency, cost-effectiveness and financial sustainability.

The most important new initiative related to water is the Water Supply and Sanitation Sector Policy (WASP), approved by the Cabinet in 1993. The Policy explicitly emphasises that: 'The equitable improvement of services should be a result of the combined efforts of the government and the users based on community involvement, participation and mutual responsibility'. The intention was that implementation would be overseen by an intersectoral Water Supply and Sanitation Co-ordination Committee (WASCO). This committee is comprised of representatives from water-related Ministries.

Since the introduction of WASP, rural water supplies in communal areas have been expanded to meet the domestic and livestock requirements of the majority black farming population. By 1998, access to safe water in rural areas had risen from 51% in 1991 to 65% of the population.

The emphasis on community management of water supplies is in keeping with other public sector reforms currently underway in Namibia. The evolution of the public sector is now guided by the principle of progressive decentralisation of service delivery and management to regional and community level and full stakeholder participation. In future, communities are to be enabled to choose – with due regard for environmental needs and available resources – the type and level of service delivery acceptable to them.

Another major change is the commercialisation of bulk water supply to major urban and industrial centres and some commercial farms especially those that use irrigation. Bulk water supply was transferred by statute in 1998 from the Ministry for Agriculture, Water and Rural Development to a lim-

ited liability state-owned water utility company, Namibia Water Corporation Ltd. (NamWater). Here, too, a key policy principle of public sector reform within Namibia has been advanced, namely the reduction of government involvement in the actual operation and delivery of services where bodies operating on a commercial basis can introduce efficiency and effectiveness, reduce wastage, and extend the use of valuable public funds. However, there remain a number of issues, which require resolution including the ownership of water services assets and the establishment of a suitable framework for the regulation of such bodies as NamWater.

1.2.2 International norms and their implications for the Namibian context

The development of policy in Namibia reflects water resources management principles and ideas, which have emerged internationally during the 1990s. These concepts were first fully articulated internationally at the United Nations Conference on the Environment and Development (UNCED), popularly known as the Earth Summit, held in Rio de Janeiro in 1992.

Chapter 18 of Agenda 21, the key document of the Earth Summit, called for a new approach to water resources management, an approach based on respect for the value of water, and on principles of sustainability, social equity, and environmental integrity.

Since the Earth Summit, international consensus concerning the new approach has been reinforced in various international and regional forums (in which Namibia has participated), for example at the International Conference on Water and the Environment held in Dublin in January 1992.

The Dublin Principles were formulated as follows:

- *Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment;*
- *Water resources development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels;*
- *Women play a central part in the provision, management and safeguarding of water; and*
- *Water has an economic value in all its competing uses and should be recognised as an economic good.*

These principles have been subsequently endorsed at a number of post-Rio Ministerial meetings and in several water-related UN forums. Namibia forms part of the international consensus surrounding these core principles. The Namibian Government regards the ‘Dublin principles’ as an appropriate basis for the development of national policy. This Water Policy has, however, taken the process a step further by developing detailed policy principles to address the different facets of water resources management, development, utilisation and protection. These are fully elaborated in Part II of this document.

1.3 Current management of water resources and water services

1.3.1 Management of the resource base

1.3.1.1 Managing risk

Management of the water resource base has to be effective if overall resource security and sustainability are to be assured. The

main objective of sound resource management is to ensure that freshwater resources, if used, will still be available in the future and if depleted, can be substituted without compromising overall environmental integrity. In Namibia, it is very difficult to ensure sustainability given the uncertainties associated with hydrological and hydrogeological systems. Water resource management in the Namibian context is, above all, an exercise in risk management.

In Namibia, the problems of water resources management are sharpened not only by the inherent variability and vulnerability of the resource base, but also because of the legacy of the Apartheid water regime. Namibia has been successful in mobilising major capital to manage hydrological risk and assure water security in the central area of the country. One question which needs to be addressed is the degree to which there is scope to improve management of the risk, and to extend services to underserved populations, through application of cost effective and appropriate solutions. More effective management and conservation of the resource base and of demand is required as well as better enforcement of pollution regulations.

A primary challenge in Namibia is to anticipate and manage water resources during prolonged periods of drought. It is imperative that there is a holistic approach to water resource management and other sectors effected by drought and floods such as food production, relief and public health.

1.3.1.2 Information requirements

A pre-condition of effective management is an accurate understanding of the entire water environment. This requires specific knowledge of Namibia’s climatic, hydrological and physical environments. An under-

standing of all the processes involved, particularly aquifer recharge, aquatic ecology and groundwater flows, is essential. At present there appear to be imbalances between the information and knowledge available, and the needs of those trying to manage the resource base in the interests of all Namibians.

These imbalances are exacerbated by gaps in understanding the behaviour of some parts of the resource base as a result of lack of integration between data collection systems, the centralised character of water management institutions, and lack of interaction between institutions and other stakeholders at the level of individual catchment or aquifer. Equally, there are gaps in understanding the effects on the resource base of human interactions, such as discharges of effluents from towns, mines and industries, and a lack of understanding of appropriate solutions.

1.3.1.3 Basin management

The identification and integration of all issues relating to the resource base is essential both for reasons of efficiency, and to address the socio-economic and environmental challenges Namibia faces. For this reason, Namibia is moving towards the adoption of an integrated, basin-scale framework for water resources assessment and management. Such a framework will take into account all the variables - physical, climatic, ecological and human - which affect both the quantity and quality of the resource.

Altogether, 24 individual basins can be delimited which fall within seven main groupings. Within this inter-basin framework it is possible to identify and isolate particular water resource management issues. This is important not only in scientific, but in political and economic terms, since the technical tools and administrative structures to address them can

then be more clearly focussed.

1.3.1.4 Water use patterns

It is important to take into account changing patterns of water use. In 1999 total water use in Namibia was close to 297 million cubic metres. Water use patterns need to be factored into decisions regarding the abstraction of raw water and its allocation between different types of users who are competing for the same resources. The **table below** indicates the proportion of water, which is currently used by different sectors and sub-sectors in Namibia.

At present, irrigated agriculture absorbs an extremely high proportion of water.

Table: Water users³

Sector	% water use
Agriculture: Irrigation	45.8
Livestock	26.0
Urban domestic supplies	19.2
Mining	4.5
Industry	1.9
Rural communities	1.9
Tourism	0.8

It is clear that the patterns of use for which water resources were developed in the past continue to predominate. Any changes in allocation between these different types of use has to take into account a wide range of factors. Current information gathering, analysis and dissemination are structured overwhelmingly to serve the industrial, municipal and commercial farming engines of economic development, not the basic survival, health and productive needs of relatively poor rural and

³ These figures were taken from the "Analysis of Present and Future Water Demand" report by Windhoek Consulting Engineers, 2000

urban Namibians who constitute the majority of the population, many of whom are dependent on wetland resources such as fish and reeds to meet basic needs.

1.3.1.5 Institutions managing the resource base

The key institution concerned with assessment and management of the resource base is the Directorate of Resource Management in the Department of Water Affairs of the Ministry of Agriculture Water and Rural Development (MAWRD). The principal water resource divisions in the Directorate are the Hydrology, Geohydrology and Water Environment Divisions. The latter deals with water quality, pollution control, ecological and technical research. The Law Administration Division is responsible for administering the regulatory regime concerning abstraction permits, prospecting, licensing of boreholes where appropriate, and other matters related to abstraction and allocation of the resource. The Planning Division performs *inter alia* strategic planning and is supposed to have been the division responsible for issues of international waters.

However, until 1990 the considerable technical expertise of the Department of Water Affairs, was directed towards servicing the water needs of the Apartheid State, resulting in an inaccessible centralised bureaucracy in which the needs of the people on the ground, particularly the black majority, were not taken into account.

Neither the institutional structure nor the approach of the Department allowed ordinary people to participate in decisions that directly affected their lives. This exclusion was made worse by high levels of illiteracy amongst the majority of the population, which prevented them from gaining access to much of the in-

formation held by DWA.

In the post-Apartheid Namibia it is thus imperative that the institutions with which we work and the framework of rules within which they operate are critical to the achievement of our vision of providing enough water for all while preserving some water for future generations particularly in the face of increasing water scarcity.

The new institutions, as proposed by the Review, will have to be developmental in nature, informed by technical and social considerations, structured to promote the values and intent of the Constitution and able to adopt a flexible approach to water management.

These institutional arrangements are reviewed later in Chapter 3, Section 3 of this Water Policy.

1.3.2 Management of water services

The development and management of water services in Namibia have focused on building and running supply delivery systems to meet water needs of various users. These structures and systems include – at the sophisticated end of the scale – large dams, canals, major pipelines, pumping stations, and water treatment works; and at the community or private commercial farm level, smaller mechanised and non-mechanised installations such as small catchment dams, gravity flow branch pipelines, pumps, and boreholes. These services have been heavily subsidised, on the basis that water is a free natural resource and is fundamental to all areas of social and economic life. Cost recovery and economic efficiency have not been objectives in the past, therefore it is imperative that they (cost recovery and economic efficiency) are accorded corresponding importance by the Government.

1.3.2.1 Water demand management

The danger of the former 'supply side' approach was that it did not adequately recognise water as a finite resource that needs to be conserved. Today there is a growing recognition that in environments where water is scarce, every effort should be made to control utilization. Wastage is costly and environmentally unsound. In Namibia, the supply side approach has been applied until very recently to meet economic development needs – those of towns, mines and industrial centres – while neglecting the small-scale watering needs of subsistence farmers who constitute the majority of the population.

There has been little regard for the resource base and the environment. The application of the riparian principle (where owners of land on which water rises or through which it passes have control over it), has resulted in a weak regulatory regime over a large proportion of the water resources of the country.

The Government advocates a new approach emphasising the management of demand for water and water conservation. Water conservation includes the need to control pollution and minimise water wastage. Demand management uses a range of regulatory, economic and technical measures to achieve its objective of more efficient water utilisation. Effective measures include economic instruments (particularly tariff structures), comprehensive metering, standard setting, public awareness raising, environmental awareness, improved water efficient technology particularly in irrigation techniques, and enabling legislation. The implementation of these approaches will require the adaptation of institutions and legal reform. In Namibia steps have already been taken to initiate these processes.

Implementation of a water demand management strategy began in Windhoek in 1994 and has succeeded in decreasing the total consumption by more than 37%. Through the re-use of water, abstractions from conventional sources were lower in 1997 than in 1987, despite a population increase from 105,000 to 202,000 over the period.

1.3.2.2 Water services institutions

The institutions involved in water services in Namibia include government (as policy maker, regulator and rural service supplier) and private suppliers. Government bodies include various Ministries other than MAWRD, such as the Ministry of Health and Social Services, the Ministry of Environment and Tourism and the Ministry of Works, Transport and Communication. Private suppliers are principally the parastatal NamWater, and privately owned services on some commercial farms and mines.

NamWater supplies bulk water to municipalities, local authorities and many mines. The municipalities supplied by NamWater are responsible for retailing the water through piped systems to consumers, and for maintenance and management of the system and for tariff collection. NamWater also supplies larger irrigation schemes from dams such as Hardap Dam and Naute Dam and from perennial rivers. Irrigation water is at present subsidised, but the trend is towards full cost recovery.

Most commercial farmers rely on their own privately controlled boreholes and small dams. In areas of the country designated Groundwater Control Areas, the sustainable yield of an area is determined by the DWA, and water abstraction is controlled by regula-

tory mechanisms (permits and licenses), and requires regular information feedback from permit holders.

In the communal farming areas, the supplier of water services (any water point which is an improved traditional source) is the DRWS. This includes areas using pipelines in those parts of the north where groundwater is saline. Elsewhere, the predominant source is groundwater (mostly via diesel- or windmill-driven boreholes) and therefore consumers draw directly from the resource. They are only subject to licensed regulation when irrigating more than one hectare in control areas. Nam-Water also directly supplies some rural communities, health clinics and schools.

In 1997, in keeping with the government policy of decentralising management functions to regional and community level, approval was given to implement a policy of Community-Based Management (CBM) of rural water supplies in accordance with WASP. Over a period of 10 years, responsibility for managing and paying for water services will be progressively devolved to Water Associations and Water Point Committees based on discrete installations. Water Point Committees will be recognised in law and will be able to control consumers' access to water points and organise payment for water use.

1.3.3 The existing law and policy framework

The present legal framework for water in Namibia applies the rules of the well-watered countries of Europe to the arid climatic conditions of Namibia. A number of laws have an impact on water resources in Namibia. The primary legislation relating to ownership, allocation, rights to access, and management of the resource is the Water Act 54 of 1956. This legislation was designed for

South Africa and selectively applied to what was then South West Africa. The existing legal regime is therefore not suited to either the country's hydrological conditions or to the political, social and economic realities of the post-apartheid era.

The Act distinguishes between 'public' and 'private' water, vesting '*the sole and exclusive use and enjoyment of private water in the owner of the land on which such water is found*' (Section 5). By basing abstraction rights over 'private' water mainly on land ownership (the riparian principle), the Water Act effectively excludes non-land owners – comprising the majority of the population – from having adequate and equitable access to water. The Act perpetuates discrimination against the black majority since the apartheid era resulted in most of the land belonging to the white minority. The concept of 'private water' is not only inconsistent with the Constitution, but also with Namibia's national developmental goals, especially the achievement of social justice. It is for this reason that the Namibian Government intends to replace this Act, and update its entire regulatory framework for managing water resources.

In 1971, legal provision was made to bring groundwater under state control by establishing 'water control areas' by government declaration. No one may sink, deepen or alter a borehole or well in such an area without a permit. The implementation of this permit system is currently inadequate: there is no mechanism for monitoring the volumes of water abstracted other than the permit requirement for feedback on volumes pumped, nor are inspections carried out on a systematic basis.

A variety of legal instruments cover issues of water quality and pollution control. These include the Water Act, the Public Health Act, Municipal Drainage Regulations,

the Model Sewerage and Drainage Regulations (1996), and the draft Pollution Control and Waste Management Bill (1999).

There are various gaps and shortcomings in the current regulatory framework for water services. For example, water quality standards have not been established and there are no regulations to prevent adverse environmental impacts or health hazards. The "environmental reserve" will determine the quality and quantity of water as well as duration and timing of flow required to ensure that the needs of aquatic ecosystems, are sustainably met. Enforcement needs strengthening as cases against polluters rarely reach the courts. In addition, penalties are low and therefore do not act as effective pollution deterrents.

Other aspects of the legal framework governing the management of the resource base and water services which need review include:

- the licensing system for prospecting for water;
- the law establishing and governing the operations of NamWater;
- the regulations governing irrigation permits and their enforcement;
- the pricing of raw water (raw water is currently regarded as free in law and practice);

CHAPTER TWO

2.1 Guiding water policy principles

2.1.1 The need for an integrated approach

All aspects of water resources management and the provision of water services need to acknowledge the integrity of the hydrological cycle. Water resources and their management impact directly on the national social and economic framework. This notion of 'integration' is a central tenet of the Namibian National Water policy and is consistent with recent international and Southern Africa regional developments.

The key elements of Integrated Water Resources Management (IWRM) are as follows:

2.1.1.1 *Water as an essential resource*

Water is essential to life, and adequate supply of safe drinking water is a basic human need, the provision of which is a key policy imperative. However, concern about water must extend far beyond concerns for survival and health. Water is essential to all food production and agricultural activity including livestock, and plays a part in every industrial process – notably mining, in the case of Namibia. Water is essential to the eco-systems of the natural environment, on which all social and economic activity depends. Of particular importance are surface aquatic ecosystems and wetlands, and their associated natural resources on which so many poor rural people depend.

In order to allocate water effectively between social, economic and environmental uses, especially where resources are fragile as in Namibia, the chain of water management

from source to consumer must be regarded holistically including its natural state, abstraction, allocation and quality. Balancing these demands is a complex and sensitive process, and compromises inevitably have to be made. These compromises are bound to meet with resistance from the champions of different demands as against another. These conflicting demands need to be effectively mediated. It is essential to establish an environmental and basic needs reserve, after which the social and economic development priorities must be determined and the remaining water allocated accordingly.

2.1.1.2 *Functional and effective management units*

A holistic view of the resource base necessitates integration of land- and water-related activities. This view requires that water resources management be carried out across the full range of the resource - including aquifers, catchments, sub-basins and wetlands and be integrated into the administrative and political framework. In Namibia's case, many of its aquifers, basins and sub-basins are shared with neighbouring countries, and within the country between different administrative units.

Lack of hydrological, ecological and hydrogeological data results in progress towards the application of an integrated approach to water resources management within Namibia and jointly with neighbouring countries being progressive but gradual.

2.1.1.3 *Sectoral co-ordination*

Integrated management implies a very strong degree of co-ordination between all the sectors involved in or dependent on the use of water. Water-related activities have been po-

sitioned within specific Ministries: the Ministry of Agriculture, Water and Rural Development, the Ministry of Health and Social Services, the Ministry of Regional, Local Government and Housing, the Ministry of Works, Transport and Communication, the Ministry of Mines and Energy, and the Ministry of Environment and Tourism. Most of the responsibilities for developing and managing the resource have been located in the Department of Water Affairs within the MAWRD. These include the construction and maintenance of dams, pipelines, pumping stations, boreholes, treatment plants, and resource management functions such as hydrology, geohydrology, water quality and pollution control and aquatic ecological research. Various water-associated functions have been distributed between a number of the Ministries mentioned above, as well as to autonomous entities (principally NamWater) and municipal authorities.

Under these circumstances, management of the resource and of water services has tended to be influenced by the interests of the different institutional structures. As the management, conservation and utilisation of the resource in all its applications needs to be planned in a co-ordinated fashion, all sectoral strands should be interwoven. However, integrating the work of all the relevant institutions, both within Namibia and between Namibia and neighbouring countries, remains a challenge.

2.1.1.4 Integration of views and expectations

Integration does not end, however, with the establishment of intersectoral and cross-border co-ordination among water resource professionals and institutions. The principle of equity demands that the views of all potential stakeholders be canvassed and their participation sought in the design and management of services and in decisions affecting the management of water resources.

The means to identify and address demands and expectations at all levels of society and administration, down to community level, also need to be integrated within the management framework. For this to happen, information concerning the resource and its management needs to be made widely available, in an open and transparent way. Public awareness about the variability, scarcity and value of water as well as about aquatic ecosystems needs to be increased and communication channels created between resource managers, service providers and users, large and small.

The assumption behind the commitment to IWRM is that if all these cross-cutting and multisectoral requirements are met and that integration occurs horizontally and vertically within the management framework, a regime which is much more equitable, efficient and sustainable will emerge. This is the ideal to which the Namibian Government is committed.

2.1.2 Basic principles and their implications

At the heart of the policy framework for the equitable, efficient, and sustainable management of water resources is a set of basic principles against which all water-related decisions need to be tested. These basic principles reflect a central core of principles expressed in the Namibian Constitution, and in existing national water-related policies, particularly the Water and Sanitation Sector Policy (WASP). They also reflect core principles agreed at the international level, notably in Agenda 21, the key document of the 1992 Earth Summit, and re-affirmed at subsequent international and regional meetings concerning water in which Namibia has participated.

The principles are as follows:

1. Ownership: Namibia's limited and vulnerable water resources are an indivisible national asset, whose ownership is vested in the state on behalf of the whole society.

2. Equity: All Namibians shall have the right of access to sufficient safe water for a healthy and productive life.

3. Promotion of development: Namibia's water resources should be utilized, developed and managed in such a way as to promote equitable and sustainable socio - economic development, without jeopardising the benefits and opportunities of future generations.

4. Economic value: The scarcity and vulnerability of Namibia's water resources require that their economic value be recognised, and that their abstraction, management, conservation and use is efficient and cost-effective.

5. Awareness and participation: The planning and management of Namibia's water resources and water services shall take place within a framework which facilitates awareness and participation among all stakeholders at all levels.

6. Openness and transparency: Reliable water resource management information systems need to be developed and be accessible to the public. Institutions involved in the resources management and provision of water services must be managed in an open and transparent way.

7. Decentralisation: The operational management of water resources and water services shall be decentralised to the lowest practicable level, focusing the role of the government on policy/standard setting, regulation and facilitation.

tion.

8. Ecosystem values and sustainability: The management of water resources needs to harmonise human and environmental requirements, recognising the role of water in supporting the eco-system.

9. Integrated management and planning: Water resources form part of an interconnected natural system on which society depends. Management and planning of water resources shall be integrated across economic, environmental and social dimensions. As sound planning depends on a thorough knowledge of natural systems, the government is committed to the collection, analysis and management of information and ongoing research.

10. Clarity of institutional roles and accountability: Institutional functions and roles need to be clearly identified with no overlap or conflicts. Policy and regulatory functions will be separated from management and operational functions.

11. Capacity building: Capacity building shall be a continuous process of institutional and human development at all levels of water resources management and will include the participation of public, private, NGO and community structures.

12. Shared watercourses: Namibia shall strive to promote equitable and beneficial use of international water courses, based on generally accepted principles and practices of international law.

These basic principles are intended to provide a framework for the development of all water-related policies. They have implications for all areas of policy, the legal and regulatory regime, the management of the resource itself, and for management of water services.

Some have specific consequences, for example the principle regarding ownership requires changes to the current Namibian water law. However, the principles should be seen as over-arching and generic to all water-related policy decision-making.

THE BASIC PRINCIPLES

Ownership

Equity

Promotion of Development

Economic Value

Awareness and Participation

Openness and Transparency

Decentralization

Ecosystem values and sustainability

Integrated Management and Planning

Clarity of institutional roles and accountability

Capacity Building

Shared Watercourses

2.2. Detailed principles and objectives

The principles above form the foundation of the detailed policy which is divided into the following thematic areas:-

- Water Resources Assessment Principles
- Shared Watercourses Principles
- Water Use and Conservation Principles
- Economic and Financial Principles
- Legislative and Regulatory Principles
- Institutional and Community Participation Principles,
- Human Resources Development Principles,

Both the basic principles and the detailed policy have been subject to a consultative process with key stakeholders, especially with Regional Governors and local councillors, in order to explore their implications and to ensure their smooth implementation on the ground.

The detailed policy is presented below.

2.2.1 Water Resources Assessment Principles

1. **Integrated Information Systems:** The collection and management of water resource information needs to be responsive to the particular needs of all users and consumers of water at local and regional levels and include ecological water requirements. This means not only filling current information gaps, particularly in highly populated regions, but also ensuring that information is geared to meet real needs and is readily accessible to the public as well as to officials and managers. A high

quality of research must be maintained to obtain reliable and up-to-date information.

2. **Public awareness:** Public understanding needs to be developed about the unique constraints on Namibia's water resources and their fragile nature in order to effectively implement policy measures aimed at conserving the resource. Information and education campaigns need to be aimed at politicians, decision-makers, leaders of civil society, opinion-formers including the media, household managers, children, and the public at large. The regular dissemination of high quality information is essential for raising awareness.
3. **Integrated water resources management:** The integrity of the water cycle must be respected in hydrological research and management approaches. Irrespective of who collects water-related information, all information has to be synthesised and analysed at basin/ catchment level. The results of the analysis will be used to inform local, regional and national planning initiatives and water-related decision-making, and for the regulation and use of the resource base.
4. **Hydrological and ecological risk Management:** Resource management systems (monitoring systems, water resource analysis and applied research) will be better geared to dealing with the acute hydrological, ecological and associated environmental risks that Namibia faces. The variability and vulnerability of Namibia's water resource base and the intense use to which it is subjected means that systems of resource management have to be aware of hourly and daily changes as well as to longer-term projections of resource availability and ecological sustainability.

2.2.2 Shared watercourses

1. **Beneficial use:** Rights in shared rivers asserted by Namibia will respect rights of upstream and downstream users in other countries, and the need for shared rivers to produce optimal benefit to all the riparian countries.
2. **Institutional capacity:** Namibia will develop its institutional capacity to participate effectively and pro-actively in multilateral bodies and ongoing initiatives to regulate the development, conservation and management of shared water resources.
3. **Respect for international law:** In all international negotiations regarding shared watercourses, Namibia shall promote respect and adherence to generally accepted principles of international law governing relations between states, particularly with respect to international water law and sovereignty of states.
4. **Harmonisation of international and domestic legislation:** Special effort will be made to harmonise domestic water legislation with the tenets of international water law and obligations in terms of shared rivers.
5. **Stakeholder participation:** The right to consultation and co-ordination between all relevant sectors and stakeholders, including basin communities affected by negotiations and consultations occurring at the international level, will be respected.
6. **Dispute resolution:** Effective institutions are needed for the timely and pro-active settlement of disputes between Namibia and riparian neighbouring states.

2.2.3 Water Use and Conservation Principles

1. **Integration:** Integrated water planning will be adopted with an emphasis on demand management and conservation as alternatives to the construction of new infrastructure. Water conservation planning and decision-making must integrate short- and long-term economic, engineering, social, and environmental objectives of water resources management with a view to protecting a precious resource and its functions.
2. **Sustainable utilisation:** The principle of sustainable utilisation shall be adopted to prevent waste and to ensure efficient utilisation of resources, including protection from depletion and pollution, with a view to contributing to the well-being of present and future generations.
3. **Cost-effectiveness and flexibility:** Cost-effective and flexible policy instruments shall be adopted, such as improved valuation, pricing, technical and incentive mechanisms, to conserve water; however subsidies for the provision of water supplies to the very poor shall not be excluded.
4. **Community participation and awareness:** The management of water resources and services shall provide for broad community involvement at all levels and shall be based on continuous education and awareness-building concerning the benefits of water and wetland conservation practices and behaviour.
5. **Precautionary environmental protection:** The resource base shall be protected against any kind of contamination or pollution which would render any part of it

unfit for human, economic and environmental purposes. The protection regime shall be based on both regulatory and market-based approaches to waste management, applying the 'precautionary' principle (responsibility to take precautionary action when undertaking potentially damaging activities) and the 'polluter pays' principle (polluter pays the cost of remedial action required).

6. **Control of water quality:** The control and monitoring of water quality so as to protect human health and the environment shall be regarded as an integral part of water quality management. Standards, procedures and guidelines will be developed and implemented.
7. **Access to information:** Informed, participatory planning and management of water resources will be optimised by providing access to relevant information (e.g. inventories of water sources and supplies, registers of water uses and effluent discharges, records of water allocations and their utilisation) and acquisition of new information through research.
8. **Development of new resources:** The development of new and alternative sources of water will be promoted, with special emphasis on wastewater re-use, water recycling and rain water harvesting in order to promote water use efficiency and ensure that best-quality water is reserved for human needs.
9. **Conservative approach:** In the light of the limited knowledge currently available concerning the extent and nature of both surface and groundwater resources in Namibia, a conservative approach to further allocation of water shall be adopted until more detailed information on the entire resource base is available.

10. **Research:** Research to build greater understanding of water resources shall be actively promoted.

2.2.4 Economic and Financial Principles

1. **Social equity and sustainable development:** Social equity, sustainable economic development and environmental stewardship will be entrenched in Namibia's water sector through a regulatory framework that will bestow a long-term stream of benefits to Namibia and Namibians, using economic instruments, where appropriate, to foster economic activity, to implement policy actions, and to ensure sustainability.
2. **Financial efficiency:** Water resources management and water services shall be run according to principles of financial efficiency and sustainability.
3. **Allocative efficiency:** Water will be allocated between and within uses so that its value in different uses is recognised and benefits to society maximised. All management and investment decisions will be subject to an economic and social Cost-Benefit Analysis.
4. **Productive efficiency:** Water will be used in the most efficient and productive manner with full consideration of all demand and supply options.
5. **Tariff setting :** Actual costs, environmental degradation and opportunity costs will be taken into account in establishing tariff policies.
6. **Equity:** The pricing regime will take account of the social imperative to facilitate access of all Namibians to a minimum wa-

water supply as a necessity, recognising that ‘ability to pay’ is constrained by low income.

7. **Water demand management:** Water demand management will be given its proper emphasis alongside supply augmentation to maximise efficient use of available water resources.

2.2.5 Legislative and Regulatory Principles

1. **Government as custodian of the nation’s water resources and regulator of resource use:** Consistent with the mandate enshrined in Article 100 of the Constitution, the Government shall be the custodian of the nation’s water resources and shall, as such, have original authority to regulate the abstraction and use of the nation’s water resources and the disposal of wastes in them.
2. **Right to minimum quantity of water:** The right of every citizen to be able to obtain, within reasonable distance from their place of abode, a quantity of water sufficient to maintain life, health and productive activity will be respected in law.
3. **Quality and quantity management:** Regulatory regimes for managing water quality and quantity, and maintaining ecological integrity and service-related standards and systems, will be recognised in law.
4. **Factoring environmental considerations in decision-making:** The need to protect the environment in general, and the aquatic ecosystems in particular, including their bio-diversity and the nation’s wetlands, will be factored into the allocation of water resources for use, including the disposal of waste, through the appropriate mechanisms. These will include the prior assessment of the environmental impacts of proposed water uses, under the circumstances dictated by the relevant legislation.
5. **Basic rights of stakeholders:** The new legislative framework for managing the nation’s water resources will uphold the basic rights of stakeholders to access Government-held information and data on the nation’s water resources, to participate in water-related decision-making, and to have access to water resources as provided for in the law.
6. **Environmental Water Reserve:** The legislation will provide for determining an environmental water reserve for freshwater sources before they can be used to supply any other demand than domestic and subsistence livestock watering. This requirement should be enforceable for any large-scale water withdrawal.
7. **Integrated management of water resources:** The new legislative framework for managing the nation’s water resources including shared domestic and international rivers will ensure that such resources are managed and developed in an integrated manner, i.e., by reflecting the interrelationship between surface water and groundwater, and between allocation of water resources for use and the protection of its quality from pollution.
8. **Balancing equity and efficiency:** In allocating and re-allocating water resources for different and possibly competing uses, the need to ensure equity of access to the resource and, in particular, the need to redress the effects of past racial and gender discrimination, will be given due prominence. At the same time, efficiency of re-

source use will be sought, through the appropriate regulatory and financial mechanisms, including the transferability of water rights under controlled conditions.

9. **Water resources planning:** The new legislative framework for the management of the nation's water resources will provide for the formulation of a National Water Master Plan, which shall constitute the frame of reference for all governmental decision-making in relation to the nation's water resources.
10. **Conservation of water resources:** The recycling of water, the re-use of wastewater and other conservation measures and technologies shall be encouraged through financial support programmes, and regulations required to protect public health and to promote safety.
11. **Control of water pollution:** Pollution of water resources from point-type sources, including the outfalls of municipal sewers, will be prevented or abated through permit and charging mechanisms. Permits will be tied to standards of effluent quality (and/or to water quality objectives for the receiving water resources). Regulatory measures for controlling pollution of water resources and, in particular, groundwater, from agricultural runoff and drainage will also be provided for, by way of phased introduction.
12. **Water demand management:** Demand management will be effected through a combination of measures aimed at promoting efficiency of water use, including charging for the use of water resources. Charging will be phased in gradually, and due regard shall be taken of equity considerations in the setting of tariffs.
13. **Protection of existing water rights:** Existing water rights shall be recognised and protected, to the extent that actual beneficial use is being made of water resources. Such rights shall be brought within the ambit of the new legislation within a reasonable period of time following enactment of the new statute, and the holders of recognised rights will enjoy the full protection of the law.
14. **Water disputes:** The legislative framework will provide mechanisms for appropriate dispute resolution.
15. **Enforcement:** The legislative framework will provide for effective enforcement of laws and policies concerning water.
16. **Incentives:** The role of economic and financial instruments as a means to enhance compliance with water policy objectives must be recognised in the water law and water-related regulations.
17. **Legislative program:** Given the inherent differences between water resources management and service delivery, priority attention will be given to the drafting of a Water Bill for the management of the country's water resources. A separate Water Services Act will be prepared in due course, consistent with the water management principles and approaches enshrined in the future Water Bill. In the *interim*, attention will be given in the Water Bill to the priority requirements of community-level services provision.

2.2.6 Institutions and Community Participation Principles

1. **Accountability:** The management of water resources and water-related institu-

tions responsible for water services will be transparent and accountable.

2. **Clarity of roles:** The distinct roles of institutions involved in water resources management and the provision of water services will be defined and clearly established.
3. **Separation of roles:** The roles of regulatory institutions, water resources management institutions, and institutions for the management of water services will be separated and rationalised.
4. **Stakeholder Participation:** Institutions will be designed to facilitate the participation of all stakeholders relating to water, especially rural communities, and to facilitate feedback to high levels of government.
5. **Cost-efficiency:** Operation and service provision will be commercialised, where appropriate, in such a way as to introduce principles of cost-efficiency and commercial performance, and will be monitored accordingly.
6. **Decentralisation:** Institutions should be structured so as to devolve decision-making to the lowest appropriate administrative level, accompanied by the necessary human and financial resources and training for effective implementation.
7. **Knowledge generation:** Management structures and institutions should be underpinned and informed by effective collection, management and analysis of information. Aquatic research will be actively encouraged.

8. **Integration and co-ordination:** Mechanisms will be created for integration and co-ordination of institutions involved in water resources management and water services provision with all key water-user sectors.

2.2.7 Human Resources Development Principles

1. **Access:** The right to training and development for all those engaged in managing water resources and services is acknowledged, and entry barriers to training will be reduced.
2. **Equal opportunities:** Equal opportunities, and affirmative action towards those formerly disadvantaged by race, gender, disability, lack of previous opportunity for formal qualification, or any other form of discrimination, shall be promoted.
3. **Community Based Management:** Training and development for all those involved in the management of water resources and services must be undertaken in order to promote decentralisation, community based management and sustainability.
4. **Institutional development:** Institutional capacity development shall be implemented at all levels in ways that address the needs of both organisations and individuals.
5. **Capacity-building:** The development of an effective training infrastructure in all water-related occupations is essential for long-term capacity building, leading to a continuous process of Human Resources Development.

6. **Collaboration:** Collaboration between all sectors involved in water resources, water-related services and development is critical to the development of human resources strategies.

7. **Career progression:** The need for career progression is recognised. Namibians entering employment at a basic level must be able to progress through recognised study within the job through regular promotion. Skills acquired through working should form the basis for career progression and/or entrance to further educational and training institutions.

8. **Academic training:** Opportunities need to be provided for water resource professionals to obtain appropriate nationally and internationally recognised academic qualifications.

CHAPTER THREE

Chapter 3 presents objectives and strategies for the implementation of the policies set out in Chapter 2. They are presented in the same categories as Chapter 2, namely:

- Water Resources Assessment,
- Shared Watercourses,
- Water Use and Conservation,
- Economic and Financial Issues,
- Legislation and Regulations,
- Institutional and Community Participation, and
- Human Resources Development.

3.1 Water resources assessment

New approaches to water resources assessment are needed to correct current inadequacies in data management and to set a new strategic agenda for the future management of Namibia's resource base. This will require both a long-term process of institutional strengthening and an immediate commitment to ensuring that information is accessible for use by the technical and scientific community, and by the public in general. Commitment is also needed to focused scientific research to generate reliable and appropriate information needed for proper management.

3.1.1 Implementation of integrated approaches to resource development

Objective

To ensure that efforts in monitoring and assessing the water resources of Namibia are:

- responsive to actual socio-economic de-

mands and trends;

- used for effective regulation;
- open and accessible to all;
- integrated at the level of the hydrological cycle (including surface and groundwater), the natural spatial units (basins and aquifers), and within the fabric of local and national economic activity.

Strategy

This requires a commitment to co-ordinate information at suitable levels and to provide a service to local, regional and national planning initiatives. At the core of this approach is the establishment of a hydro-environmental framework upon which socio-economic data can be overlaid. Geographic Information Systems are going to be key both in analysing spatial distributions – matching resources and needs – and in projecting impacts of economic development.

3.1.2 Managing hydrological risk and vulnerability

Objective

To develop systems of water resource management that can deal effectively with the extreme hydrological risk and natural vulnerability faced by Namibia.

Strategy

Together with a commitment to integrated approaches, this requires the deployment of a number of effective operational tools: real and near real-time monitoring, conjunctive use, enhanced recharge, aquifer-storage-recovery and source protection.

3.1.3 Enhancement of capacities

Objective

To ensure that the responsible institutions are capable of undertaking the information gathering research, management, conservation and analysis functions required.

Strategies

Irrespective of any changes to institutional structures, the current divisions and units within DWA (as a resource manager and regulator) will collaborate on data, applied research and pilot studies with related departments, agencies and the private sector. In addition, the results of DWA's work will be open and available to the public.

Specific enhancements would include the following actions:

- streamlining and standardisation of data collection;
- integration of data through Geographic Information System techniques;
- an enhanced programme of publishing and reporting – including web products;
- the use of multidisciplinary teams in resource assessments;
- key resource management, ecological and baseline studies;
- the preparation of a long-term planning framework;
- strengthening the capacity to regulate resource use.

3.2 Shared watercourses

3.2.1 Consultations and agreements with riparian neighbours

Objective

To ensure that Namibia is able to exercise/advance/advocate/promote/defend its rights and fulfil its responsibilities in shared watercourses towards neighbouring riparian states in a timely, effective and appropriate manner through effective participation in international watercourse bodies and consultative processes.

Strategies

- The establishment of a special institutional home with appropriate expertise devoted to shared watercourse issues and negotiations. The institution will have as its primary purpose the servicing of Namibian negotiators participating in shared watercourse consultations or representing Namibia in the international bodies in SADC and elsewhere which address issues of common interest concerning shared watercourses.
- The development of Namibian capacity for participation in international river basin consultations and organisations; training will be provided by establishing a centre on international law concerning natural resources, or by the use of similar institutions in neighbouring countries.
- Ensuring that stakeholder participation takes place in the development of national negotiating positions.
- The establishment of mechanisms for the prevention, management and resolution of disputes relating to shared water.
- Ensuring that the water quality and quantity required by international agreements

are met.

3.2.2 Strengthen and standardise approaches to international river basin management

Objective

To improve the management of international shared water resources.

Strategies

- Namibia will promote the establishment of a common database with neighbouring riparian states and encourage networking and information sharing across boundaries.
- The development of joint projects with other basin states within SADC in the interests of promoting mutual understanding, economic growth and environmental integrity
- The establishment of structures which allow for interaction and linkages between national river basin organisations and international river basin organisations.

3.3 Water Use And Conservation

3.3.1 Better Water Utilisation and Regulatory Measures

Objective

To conserve, restore where necessary, and avoid depletion of Namibia's water resources. To utilise water resources in a sustainable way and to manage demand for water by creating incentives and encouraging better water utilisation, but also by creating enforcement mechanisms.

Strategies

The strategy will be to implement a variety of measures aimed at sustainable utilisation of water resources and their conservation, including:

- The establishment of economic incentives to save water, including conservation tariffs to enhance efficiency and effectiveness of water use that should be done without compromising equity in priority uses such as supplying basic human needs.
- The introduction of abstraction fees to enforce economic efficiency and create incentives for the most beneficial usage of water. Charging will be phased in gradually with due regard for equity considerations.
- Regulations concerning metering and reporting obligations for large surface and groundwater withdrawals.
- Regulations concerning pollution prevention, including issuing permits for disposal of effluents. Permits will be tied to standards of effluent quality and/or to receiving water quality objectives.
- The introduction of the new legislative framework for managing the nation's water resources which will ensure that they are developed and managed in an integrated manner, *i.e.* by reflecting the interrelationship between surface and groundwater, and between allocation of water resources for use and protection of its quality, as well as making it obligatory that integrated planning principles are followed when planning new water supply schemes or augmenting existing schemes.

3.3.2 Protection of Water Resources

Objective

To protect water resources from depletion and pollution.

Strategies

- Social marketing of water saving devices, and provision of incentives in order to encourage retro-fitting programmes and the use of water-efficient devices.
- The application of cost-effective and affordable technologies appropriate to the various economic, social and environmental settings of rural and urban Namibia.
- The reduction of unaccounted-for-water through proper maintenance of water supply and distribution systems.
- The introduction of effective pollution control mechanisms, especially for municipal and industrial waste discharges, including charges for the discharge of waste.
- The encouragement to reduce pollution by recycling of water and reusing of treated wastewater and beneficial utilisation of waste through financial support programmes.

3.3.3 Public awareness and education

Objective

To raise public awareness and to gain public acceptance of the need for water conservation and promote changes in water-using behaviour. To transfer knowledge concerning water conservation measures in order to facilitate their implementation by Local Authorities, industries, agricultural and tourism sectors.

Strategies:

The primary strategy will be to strengthen the present national water awareness campaign and to ensure that the concerted nation-wide public campaign achieves both saturation and penetration. The campaign should include:

- The enlisting of politicians, decision-makers, leaders of civil society and private sector companies in the campaign to establish role models and give social endorsement to the need for water conservation in homes, offices, shops, and factories.
- The familiarisation of all branches of the media with the urgent need to transform water-using behaviour and to encourage and support their ongoing involvement in the campaign.
- The introduction in schools of water-consciousness, within the context of teaching and learning about society and Namibia's development goals.
- A well-planned programme of public service announcements on television and radio channels, and in newspapers and magazines; participation of the private sector will be sought, where practicable.
- Developing water demand management training programmes for the managers and technical staff of water authorities focusing on demand management alternatives.
- Publishing guidelines for implementing water demand management and water conservation in different sectors such as industry, mining, urban and rural water supply and agriculture.

3.4 Economic and financial issues

3.4.1 Achieving development goals

Objectives

- To ensure resource sustainability and stop the unsustainable exploitation of water as an ‘open access’ resource.
- To enhance social welfare by promoting equitable and efficient economic gains across competing sectors
- To entrench development objectives by creating jobs, devolving ownership and property rights over water, utilizing poverty targeted subsidisation where appropriate and efficient, and enhance social welfare by promoting equitable and efficient gains across competing economic sectors.
- To promote institutional efficiency and financial self-sufficiency (where applicable) by encouraging schemes such as public-private partnership in the sector

Strategies

- Establish economic incentives to save water. These must include: a tariff policy to enhance efficiency in urban areas (e.g.: rising block tariff structure); ensuring that sectoral policies do not promote excessive consumption (e.g. crop subsidies may encourage uneconomic agricultural production and water use) and further investigate the use of water markets and groundwater pricing.
- Send clear economic signals about the true value of the resource to its users and consumers. Where it is cost effective, promote metering and the adoption of volumetric pricing policies (particularly for industry and agriculture) to reflect the marginal costs of water services and discourage low-value high volume uses; monitor

groundwater extraction and its economic uses.

- Strengthen enforcement regimes: economic instruments used must be complemented with the appropriate level of enforcement (be it metering, compliance with regulations, etc)
- Embrace new technologies: embrace appropriate, cost-effective, new technologies for data, operations, management and decision-making. This may include: metering, and water efficient devices, and will differ between regions and for different economic activities.
- The use of regulatory tools and economic instruments in allocating water among priority uses and competing high-use sectors.
- Ensure that water tariffs for industry and agriculture reflect the full social and environmental costs of water abstraction and depletion
- Promote new water': efficient enterprises and discourage those that consume water uneconomically.
- Promote imports of ‘virtual water’ where appropriate.

3.4.4 Environmental and economic sustainability

Objective

To ensure resource sustainability through economic and other regulation that send clear economic signals about the value of the resource to users and consumers.

Strategies

- Undertake a valuation of water resource assets in order to discover the degree of economic scarcity and the degree of inter-generational sustainability.
- Clarify and highlight the ‘critical capital’ nature of water in Namibia – that there is no substitute for water both as an economic good and as an essential natural resource and habitat (ecosystem).
- Remove subsidies that encourage wasteful use of water resources;
- Promote economically responsible disposal of effluents and wastewater – introduce and enforce the ‘polluter pays’ principle.
- Support a comprehensive demand management strategy through the application of appropriate economic instruments (e.g. rising block tariff structures).
- Ensure that in-stream flows are adequate in terms of both quality and quantity to sustain the ecosystem.
- Establish appropriate monitoring and /or payment system to control unsustainable groundwater extraction.

3.4.5 Establish a Financial regime to sustain services

Objective

Ensure the financial sustainability of water services and provision.

Strategies

- Undertake comprehensive analyses of ‘willingness to pay’;
- Establish financial and commercial autonomy of water services as appropriate

- Adopt metering measures (prepaid water metering systems), where cost effective, to monitor volumetric water usage to enable the tariff setting process to take into account the marginal costs of water services;
- Set up a mechanism to establish and regulate prices both to protect consumers and to support cost recovery.

3.4.6 Social Aspects of Water Supply

The supply of a basic minimum quantity of clean water is often seen as a basic human right. Such a stance means that water is not always and everywhere a pure economic good.

Namibia is one of the most unequal societies in the world as illustrated by a Gini Coefficient of 0.70 (UNDP 1998). The richest 10% of the society receive 65% income, leaving only 35% for the remaining 90%. Hand in hand with the inequities of the Namibian economy is the existence of relative and absolute poverty. Low incomes and lack of access or rights to natural resources, such as water, contribute to poverty in Namibia.

Objective

Since water has wider social qualities, such as health related and subsequently productivity related benefits, there is a need to consider the social aspects when addressing the issue of water resources management, water supply and allocation.

Strategies

Ensure Access to water. The social benefits of minimum levels of water consumption and the existence of poverty make the issue of access to water, either physical or economic, of prime

importance in light of current policies of cost recovery and Community Based Management (CBM) of water supply.

3.5 Legislative and regulatory framework

3.5.1 Legal ownership of water resources in accordance with the Constitution

Objective

To facilitate Government ownership and control over the entire national resource base. The State, acting through the Government, will ensure that water resources are protected, developed, managed, and used in an equitable and sustainable manner for the benefit of all, recognising every citizen's right of access to water in sufficient quantity to meet basic human needs and the legitimacy of the environment as a water user.

Strategy

Ownership of the entire resource base will be clearly and irrevocably vested in the State, in accordance with Article 100 of the Namibian Constitution. The power to regulate all uses of water will correspondingly reside in the State and be exercised by the State, acting through the Government. All rights to access and use water will derive from a legislation which will exclude the exercise of ultimate control over water rising in or flowing through private property (the riparian principle), notwithstanding previous interpretations of existing law.

3.5.2 Establishment of an effective regulatory regime

Objective

To underpin the implementation of policies designed to influence the volume of abstractions from the resource base, conservation of the resource, the promotion of human survival, health, and economically productive life, while respecting environmental integrity and the need for sustainability.

Strategies

- **Quantity regulation:** The revision of the existing licensing and permit systems for prospecting for water and abstraction of water, especially in Water Control Areas in such a way as to introduce stringent controls to conserve the resource and allocate its benefits on an equitable basis. The regulatory framework should recognise the unity of the hydrological cycle (i.e. address surface and groundwater together) and the interdependence of water quantity management with water quality management.
- **Quality regulation:** The introduction of a stringent regime for water pollution control, covering water quality standards, the control of discharges of effluents and wastewater; application of the 'precautionary' principle with regard to discharges (responsibility to take precautionary action when undertaking potentially damaging activities) and 'polluter pays' principles (polluter pays the cost of remedial action required).
- **Enforcement:** Current mechanisms for enforcement of regulations will be reviewed, and where these are inadequate,

they will be improved and strengthened.

3.5.3 The resolution of water disputes

Objective

To establish a mechanism for the appropriate management of conflicts over water and resolve disputes, including the hearing of appeals against water management institutions. The dispute resolution mechanism will be empowered to function in a timely and cost-effective manner.

Strategy

The establishment of a multidisciplinary Water Tribunal drawing upon the necessary specialist knowledge (law, engineering, water resources management, management of water services).

3.6 Institutions and Community Participation

3.6.1 General institutional objectives

Objectives

- To enhance efficiency and accountability in water resources management;
- To foster clarity and separation of roles;
- To transform water resource management and water services to match the needs of the independent Namibia
- To ensure participation of broader stakeholders and the communities in water management.

General Strategies

In keeping with the policy and with current international practice, water resource management and service-related institutions will be reconfigured into four separate groups:

1. Institutions responsible for **management of the resource base**, including the control of abstraction, water conservation and environmental protection and in the long-term to set up a Natural Resources and Data Institute for Namibia;
2. Institutions responsible for establishing and implementing **the regulatory regime** with respect to the performance of water services, using both regulatory controls and economic incentives;
3. Institutions responsible for **delivery of services**, whose role is to facilitate and support an enabling environment for the planning, design, and operation of water services at appropriate administrative levels, down to the community.
4. A separate **policy unit** that will develop and co-ordinate policy and strategies; and monitor implementation thereof.

3.6.2 Water Resources Management Institutions

Objective

To ensure integrated water resources management of all Namibia's water resources.

Strategies

Convert the Directorate of Resources Management into an 'agency' under GRN guidelines. This will improve operating efficiency, and provide a much stronger focus on regional customers and the community and on sustainability of our natural resources. The appropriate process should begin immediately.

3.6.4 Service delivery institutions including rural water supply services

3.6.3 Regulatory institutions

Objectives

- The main reason for setting up a regulatory framework in Namibia is to regulate the monopolistic practices of service providers.
- To ensure that price setting for water services is fair, open, transparent and participatory, and to foster consumer representation in negotiations regarding water prices.

Strategies

- It is intended that an **Independent Regulator** be created to regulate all state-run utilities, parastatals and private service providers.
- The establishment of a small independent pricing review group reporting to the proposed Cabinet Committee on Water Resources, which will be empowered to provide independent advice on the water pricing proposals of NamWater and from local authorities. The independent review will set the maximum price for water services and the Cabinet Committee will then recommend to Cabinet the appropriate level of pricing, taking into account social, environmental, and economical considerations. This arrangement will meet current needs for pricing regulation until such time as the new independent regulatory regime is agreed and created by law.

Objective

To ensure that the government's decentralisation and community management policies are progressively implemented.

Strategies

The role of the Directorate of Rural Water Supply will change from that of 'service designer and deliverer' to one of 'facilitator, enabler and advisor for the delivery of services'. At the central level, the role will be to guide and oversee the implementation of WASP over the designated 10-year period. To achieve this efficiently and effectively, technical expertise will be needed to provide 'on-demand' or urgent advice to regional councils responsible for managing services above community level.

The following approach will be adopted:

- The RWS Directorate will be transformed into a '**RWS Project Team**' or '**RWS Task Force**'.
- Detailed planning process is to be undertaken with dated outputs to determine:
 - The number of staff, functions and budgetary provisions to be transferred to the regions;
 - The nature of the functions to be outsourced;
 - The staffing levels and budgetary provision necessary to undertake the functions that remain at the centre.

3.6.5 Policy and Strategy Unit

Objectives

- To ensure the continued development of national policy on all aspects related to water – environmental, social and economic, including national pricing policies, in a co-ordinated fashion between all relevant Ministries.
- To ensure adequate strategic planning across all institutions involved in water resources management and the management of water services at all levels as well as to ensure necessary interdisciplinary co-ordination.
- To serve as a policy analysis, evaluation and re-evaluation on continuous basis.

Strategies

To achieve the above objectives, an independent unit will be created, comprising a small but highly skilled and technically competent group, reporting directly to the Minister to oversee policy development and programme evaluation. This will be called the **Policy and Strategy Unit**. The Unit will also provide an institutional home for responsibilities in relation to Shared Watercourses, dealing with strategic policy, liaison, secretariat functions (technical input would be obtained from the WRM Agency), and other functions as necessary.

3.7 Institutional capacity building and human resources

3.7.1 Training for competence

Objective

To develop training methodologies and qualifications based on **competence** in all technical, managerial and administrative occupations needed to put in place and sustain community-based management of water services. The current formal training system emphasises relatively high entry requirements, rather than emphasising quality of training and output. The majority of people are therefore excluded from entry, and informal training activities do not lead to any recognised qualification. Remediating this situation is regarded as a priority for building institutional and community capacity.

Strategies

The introduction of a training system which allows individuals (extension workers, municipal operatives, Water Point Committee members) to advance by demonstrating competence through performance associated with their job, career aspirations, and local labour market needs. The training programmes and demonstrated competence will be recognised as a qualification at national level and will be open to anyone.

- The re-design of training programmes; a sample of such programmes has already been developed and implemented experimentally, and has been received positively by people working in communities, companies, government and unions.
- The development of systems of skills training using unconventional rather than formal classroom or schooling approaches, such as training workshops and ‘on-the-job’ activities.

- Introduction of the system of training known as 'Fast-Trac', which captures the requirements already outlined. The Fast-Trac training system is focused on meeting the real needs of both individuals and organisations, and their respective developmental aspirations.

3.7.2 Establishment of human resources development standards

Objective

To introduce quality assurance in the area of human resources development in order to promote transformation within Namibian institutions which still tend to manage human resources development in isolation from the management of change. The overall objective is to build capacity relevant for the Namibian world of today, which requires that organisations re-shape themselves into 'learning organisations'.

Strategies

- The development of a set of Institutional Standards for organisations involved in the management of water resources and water services. This is already far advanced; a set of Institutional Standards was introduced in late 1998, and has elicited wide support from the relevant organisations. Further testing and development are required.
- The introduction of incentives to encourage organisations to apply these standards. This will be achieved through a combination by legal enforcement, a voluntary code, and tendering procedures that require contractors to introduce the standards.

3.7.3 Programmes for Professional Development

Development

Objective

To empower senior professionals and managers in Namibia with the knowledge and competence required to implement the many changes introduced through this Water Policy. The enhancement of skills for change management at senior levels is regarded as a priority, especially in the light of the changes envisaged within water related institutions

Strategies

- Expansion of resources for human resources development with regard to water, whose requirements are not adequately reflected in the National Human Resources Development Plan 1998-2010.
- Affirmative action programmes so that those previously excluded from positions in the upper levels of management and administration for reasons unconnected to ability and competence are given the skills and promotional opportunities to redress past inequities based on race, gender, disability or any other form of discrimination.

CHAPTER FOUR

4.1 Conclusion

This document is the fruit of a rigorous process of investigation and discussion lasting more than two years and involving Namibians from all walks of life and the support of many friends in the international water fraternity.

The Government commends the contents of this Water Policy to all the people of Namibia and calls on all concerned to study its contents and assist in its implementation. The new policy places Namibia amongst a small group of nations which have adopted progressive policies to manage, develop and protect their water resources for the benefit of all its citizens, present and future.

Implementation of this policy will require changes to our laws and changes in the way we use water. For some these changes may mean that their water use is restricted - for most it will mean improved access and greater equity.

CHAPTER FIVE

5.1 Glossary of Terms

Aquifer means a geological formation that has structures or textures that hold water or permit appreciable water movement through them;

Basin in relation to a water resource or water resources or part of a watercourse, means the area from which any rainfall will drain into the watercourse or watercourses or part of a watercourse, through surface flow to a common point or common points;

Borehole includes a well, excavation or any artificially constructed or improved underground cavity which can be used for the purpose of intercepting, collecting or storing water in or removing water from an aquifer;

Conservation in relation to a water resource means the efficient use and saving of water, achieved through measures such as water saving devices, water efficient processes, protection from pollution, water demand management and water rationing;

Cost Recovery Fee structures that cover the cost of providing the service.

Decentralization The distribution of responsibilities for decisionmaking and operations to lower levels of government, community organizations, the private sector, and non-governmental organizations.

Demand management The use of price, quantitative restrictions, and other devices to limit the demand for water.

Domestic Use means the household use of water for cooking, bathing, watering a household garden and household animals and fire fighting; 'domestic use' does not include the irrigation of crops for commercial purposes of the use of water in a business.

Environment means the aggregate of surrounding objects, conditions and influences that affect the life and habits of people or any other organism or collection of organisms;

Environmental assessment means a process whereby the likely significant bio-physical and socio-economic effects of land-use and water use are identified, assessed and taken into account in the decision-making process to ensure sustainable land use and water use practices;

Environmental Reserve: The quantity and quality of water as well as duration and timing of flow required to ensure that the needs of aquatic ecosystems are sustainably met.

Hydro-environmental systems: The natural systems (geology, soils, vegetation and freshwater aquatic habitats) that furnish the resource base through a linked series of flows and water quality changes. The integrity of these systems is vital to maintain a flow of environmental services as well as exploitable water.

Integrated Water Resources Management: In the broadest definition this involves consideration of three levels of integration. Integration of hydrological processes (the hydrological cycle), integration across landscapes (basins or aquifers) and integration through the national socio-economic fabric. Management has to have an appreciation of all three levels if it is to be effective and make sustainable use of the resource.

Pollutant means any substance, whether liquid, solid or gaseous which, directly or indirectly, alters the quality of any segment or element of the receiving water environment so as to affect any beneficial use of water adversely, or is hazardous or potentially hazardous to health;

Pollution means the direct or indirect alteration of the physical, chemical or biological properties of a water resource so as to make it less fit for any beneficial purpose for which it may reasonably be expected to be used;

Riparian State A state through or along which a portion of a river flows or a lake lies.

River basin A geographical area determined by the watershed limits of a system of water, including surface and underground water, flowing into a common terminus.

Raw Water is the natural resource occurring as:

- Surface water that is found in a river, lake, sea or other surface impoundment, or
- Groundwater that is trapped beneath the ground

Unaccounted-for water The difference between the volume of water delivered to a supply system and the volume of water accounted for by legitimate consumption, whether metered or not (or the measured volume of supplied water that is consumed legitimately, the difference being what is stolen or lost)

Virtual Water - water used in the production of most goods, whether agricultural or not. Importing goods from other countries could be interpreted as that, water used to produce the goods, has been imported. The domestic water that is 'free' as a result of the importation of

the goods can be put to alternative, more valuable, uses which may previously have been 'crowded out' by lower value and perhaps larger volume uses. The water so freed is termed 'virtual water'.

Vulnerability: The degree to which hydro-environmental systems are degraded by abstraction and pollution. Freshwater systems in semi-arid systems are particularly vulnerable to small changes in water levels.

Wetland Areas of marsh, fen, peat land, or water that include natural, artificial, permanent, and temporary areas with static or flowing water is fresh, brackish, or marine.

Water Use: all water flows that are a result of human intervention within the hydrological cycle.

Water demand management: Water demand management involves measures that improve efficiency by reducing water use or altering patterns of water use. Examples include conservation-oriented pricing, retrofitting, water-efficient landscaping, changes in water-use practices, and public education.

Watercourse A system of surface and underground waters that constitute, by virtue of their physical relationship, a unitary whole and flow into a common terminus.

Watershed An area drained by a river or stream system.

Water resource base: The exploitable volumes of water furnished by surface and groundwater processes in linked hydro-environmental systems.