

**AFRICAN DEVELOPMENT BANK  
AFRICAN DEVELOPMENT FUND**



**POLICY FOR INTEGRATED WATER RESOURCES  
MANAGEMENT**

**OCOD**

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## ABBREVIATIONS

ADF	African Development Fund
ADB	African Development Bank
EIA	Environmental Impact Assessment
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GNP	Gross National Product
GW	Gigawatt
ICWE	International Conference on Water and Environment
IEE	Initial Environmental Examination
ILA	International Law Association
IWRM	Integrated Water Resources Management
MW	Megawatt
NEAP	National Environmental Action Plan
NGO	Non-governmental Organization
O&M	operation and maintenance
OCOD	Central Operations Department
OECD	Organization for Economic Cupertino and Development
OPSD	Private Sector Department
Peta	10 <sup>15</sup>
PPP	Purchasing Power Parity
RMC	Regional Member Country
SADC	Southern African Development Community
SSA	sub-Saharan Africa
UA	Unit of Account
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
WSS	water supply and sanitation
WUA	Water Users Association

## GLOSSARY

<b>Accountability</b>	Refers to criteria and procedures to evaluate whether service providers have availed themselves of their responsibility for operations and management, for quality and quantity of services, and for expenditures and revenue collection.
<b>Annual internal renewable water resources</b>	The average annual flow of rivers and groundwater generated from endogenous precipitation. Annual averages disguise large seasonal, inter-annual and long-term variations.
<b>Aquifer</b>	An underground stratum that is saturated with water and transmits water readily.
<b>Command and control</b>	A system of water management based on administrative allocations.
<b>Comprehensive Water Resources Management (CWRM)</b>	In this concept all potential multipurpose uses of water resources are considered including water supply and sanitation, irrigation, hydropower, mining, aquatic resources, transport, recreation etc
<b>Cost recovery</b>	The extent to which users are charged for goods and/or services to generate revenue to cover the cost of provision.
<b>Cross-subsidy</b>	Part of the cost of providing services to a given group of consumers (usually poor), and paid for by another group of consumers through higher prices.
<b>Decentralization</b>	The distribution of responsibilities for decision making and operations to lower levels of government and community organizations.
<b>Demand management</b>	The use of price, quantitative restrictions and other devices (e.g., leakage detection) to limit the demand for water.
<b>Disability Adjusted Life Years (DALYs)</b>	The DALYs measures the burden of disease or the loss of productivity due to major diseases including water-borne and water-related diseases. It is the main indicator for prioritizing interventions in the health sector.
<b>Economic efficiency</b>	An investment or intervention is economically efficient when it maximizes the value of output from the resources available.

<b>Economic good</b>	An economic good is a scarce resource in the sense that it is limited in quantity in comparison to the desire for the resource. Treating water as an economic good recognizes that water has an opportunity cost.
<b>Ecosystem</b>	A complex system formed by the interaction of a community of organisms with its environment.
<b>Efficient water pricing</b>	From an economic viewpoint, the efficiency-pricing rule in the long run is one that equalizes price to long run marginal costs.
<b>Environmental good</b>	Water as an environmental good has three dimensions: (i) water is part of the natural environment and as such an asset with aesthetic values, (ii) water is required by all living creatures and vital for the survival of ecosystems, and (iii) water is part of natural process of constant change and an essential component in the positional transfer of matter and energy.
<b>Externality</b>	The unintended real (non-monetary) side effect of one party's action on another party, which is ignored in the decisions made by the party causing the effect.
<b>Integrated Water Resources management (IWRM)</b>	A comprehensive approach to water resource management that views water as a single resource with competing uses and inter linkages with the ecological, social and economic systems.
<b>Mitigation measure</b>	Measure taken to offset adverse effects of projects on the environment.
<b>Opportunity cost</b>	The value of goods or services foregone, including environmental goods and services, when a scarce resource is used for one purpose instead of its best alternative use.
<b>Participatory approach</b>	Planning approach in which all stakeholders, and in particular the envisaged beneficiaries, are part of the decision process.
<b>Private sector participation</b>	Involvement of the private sector in water resources management including development and operation. This can take several forms, with different features with respect to asset ownership, operation and maintenance, commercial risk and duration.

<b>Project cycle</b>	A sequence of analytical phases through which a project passes. This includes identification, preparation and analysis, appraisal, implementation, and evaluation.
<b>Riparian state</b>	A state through or along which a portion of a river flows or a lake lies
<b>River basin</b>	A geographical area determined by the watershed limits of a system of water. The watershed limit of the surface water or the sphere of aquifer recharge of underground water or combination of both may define a river basin boundary.
<b>River basin authority</b>	Administrative body involved at the river basin level in water resources management including assessment, development, operation, monitoring, allocation, quality control etc.
<b>Social good</b>	Water as a commodity to which social value is attached. Arising from the fact that water is an essential building block for life, the universal right of all to have access to water is generally accepted. Because water serves basic human needs, lifeline amounts of potable water should be accessible to all socio-economic groups in a given society at affordable prices.
<b>Transboundary water resources</b>	Water resources (surface as well as groundwater) that cross borders of countries, or constitute borders between countries.
<b>Unaccounted-for- water</b>	The difference between the volume of water produced and delivered to a supply system and the volume accounted for by legitimate consumption, the difference being lost through system deficiencies or stolen.
<b>User fee</b>	A charge levied upon users for the services rendered or goods supplied by a project.
<b>Water Resources Development (WRD)</b>	The assessment of resources and needs, planning and preparation of programs and projects and their implementation through institutionalized mechanisms for the purpose of harnessing water for various human uses including drinking, sanitation, agricultural and energy production industrial development, recreation, transport etc,
<b>Water Resources Management (WRM)</b>	The institutionalized activities of water resources development, utilization, allocation conservation and control.
<b>Water scarcity</b>	Situation in which the annual internal renewable water resources are below 1,000 m <sup>3</sup> per capita.
<b>Water sector</b>	All providers and users of water. The sub-sectors of potable water supply, water supply to irrigation and to industries,

sanitation, and hydropower are normally included. But users from other sectors are also important stakeholders, such as agriculture, forestry, fisheries, tourism and transport.

<b>Water stress</b>	Situation in which the annual internal renewable water resources are between 1,000 and 1,667 m <sup>3</sup> per capita.
<b>Watershed</b>	An area drained by a river or stream system.
<b>Watershed Management</b>	The adoption and implementation of Best Management Practices (BMPs) that protect, rehabilitate, and enhance the watershed. The conceptual framework considers the entire hydrographic basin as the unit of management.
<b>Wetlands</b>	Areas of marsh, fen, peat land, or water that include natural, artificial, permanent and temporary areas with static or flowing water that is fresh, brackish, or marine.
<b>Willingness to pay</b>	The maximum amount consumers are prepared to pay for a good or service. The difference between willingness to pay and what people actually have to pay, is called consumer surplus, a direct benefit to the consumer.



## EXECUTIVE SUMMARY

The water sector is expected to fulfil social, environmental and economic needs. In a context of growing water scarcity exacerbated by rapid population growth and urbanization, misallocation of resources, environmental degradation, and mismanagement of water resources, the Bank Group and its Regional Member Countries (RMCs) face new challenges which call for a new approach to water resources management. Water is a single resource with many competing uses. Experience has amply demonstrated that water management is complex and multi-level and requires a comprehensive framework. This analytical framework would facilitate the consideration of interconnections between the ecosystem and socio-economic activities in river basins. A sectoral or sub-sectoral approach should therefore be replaced by an integrated approach, which takes account of social, economic, and environmental objectives, assesses water resources within each basin, evaluates and manages water demand, and seeks stakeholders' participation. This vision is now widely accepted.

In view of this recognition, and to ensure that Bank-supported activities in the water sector adopt the principles of integrated approach, the Bank lending policy encourages borrowers to adopt and implement an integrated approach to water resources management. This led the Bank Group to develop an Integrated Water Resources Management (IWRM) Policy. The objectives of this Policy are to rationalize and strengthen Bank Group interventions in the water sector, and encourage borrowers, in accordance with the **ADF VII** lending policy on water, to develop policies and undertake lending operations based on a comprehensive framework.

Water resources management *should be* performed within three spheres of influence (social, economic and environmental) and seeks to fulfil the needs of these three spheres in a balanced way. This concept is used throughout this document as a framework for integrated water resources management.

The policy rests on the following principles: (i) water should be treated as an economic, social and environmental good; (ii) policies and options that guide water resources management should be analyzed within a comprehensive framework.

Its central objective is to promote efficient, equitable, and sustainable development through integrated water resources management.

In line with these policy principles and objective, a number of strategies have been elaborated. The strategies apply to or stem from the economic, social, and environmental spheres of influence, or to the technical infrastructure and institutional framework.

Taking into consideration rapid population growth and urban expansion, vagaries of the climate, the water resources management context of African countries, and the three dimensions of basic needs, a number of important policy issues, summarized below, have been identified.

### *Water resources availability*

The significant variability in rainfall and runoff conditions coupled with rising demand in many countries in Africa considerably exacerbates the problems of water scarcity and management in the continent. Some areas have shown significantly dryer conditions over the last 30 years as compared to the previous years. In other countries there has been an opposite trend. Strategic action plans, including drought and flood forecasting and management must be developed to address these issues.

### *Institutional issues*

Many countries do not have national water policies. This is a critical handicap because policy is the basis for legislation, strategic planning and operational management. The adoption and continuous updating of national water policies must therefore be high on the agenda of each RMC.

Even when policies exist, they are often inadequate, and water legislation is in many cases poorly developed. This particularly applies to water quality issues, where hardly any legislation exists. Usually there is no clear institutional responsibility for water quality management. This situation can only be improved by developing an appropriate institutional and legal framework. This should take into account customary law and traditional practices.

The scale of management presents a particular problem. For operational reasons it is desirable to decentralize water management to the level of hydrological boundaries, i.e. basins and sub-basins, but these boundaries seldom coincide with the administrative boundaries. Defining the most appropriate boundaries is a key challenge for which there is no simple answer. To ensure its effectiveness and sustainability, *water services* must be decentralized to the lowest appropriate level and spatial scale.

For effective water resources management it is necessary to separate the development and regulatory aspects from water supply and sanitation delivery functions. Failure to separate these two functions compromises regulatory and allocative functions of water resource management that are vital for equitable and efficient allocation among competing uses. An organization that provides water services should not also fulfil or include a regulatory function.

In the absence of financial discipline and accountability in many government agencies and utilities, a vicious circle of problems has emerged. These include inefficient systems operation, inadequate maintenance, poor billing of clients and even poorer collection rates, high unaccounted-for-water, and financial losses. The overall consequence of unreliable services is low willingness to pay. Many RMCs facing these problems recognize the need to urgently restructure and decentralize the water supply sector.

Responsibilities for development and management of water resources can either be fully or partially transferred to restructured public agencies, private agencies or water users associations. To perform their functions effectively, however, these institutions must be accountable and autonomous. As demonstrated elsewhere, government agencies can play a crucial role in the monitoring and evaluation of water quality or mechanisms to control and prevent water and environmental pollution. The

need for decentralization also applies to institutions for the protection of aquatic ecosystems. This implies that agencies have the capacity to set quality standards for drinking water, wastewater effluents and agricultural runoff, and enforce water quality regulation. But, regulation alone is not enough. There is a need to introduce incentives that promote voluntary water and environmental protection. In addition, central government should ensure that activities in the water sectors are coordinated given the broad range of actors in the sector, their area of intervention, and their varying operational policies and procedures. The role of the government should be to facilitate dialogue, broad participation and consensus building among all stakeholders. The Bank will support water resources management activities that promote policy consultation among all stakeholders, and seek broad participation.

There are at least fifty-four water bodies that cross or form international borders in Africa. Only very few are managed jointly. In this context, the dependency of downstream countries on upstream ones for access to and development of water resources is a potential threat to regional stability and peace. An integrated approach to water resources management calls for regional cooperation for the joint management of international watercourses. The effective functioning of transboundary river basin organizations at the regional and international level is a major priority. The Bank will support joint efforts of riparian countries in developing strategies for integrated water resources management and will assist in providing financial resources for multinational and regional organizations and river basin authorities.

### *Technical issues*

Knowledge of available resources, of their quality and variability over time and the state of other physical and socioeconomic conditions are a fundamental prerequisite of sound planning and design of sustainable, economically efficient water projects. It is therefore essential to establish a mechanism for acquiring data, and knowledge of the water system at all institutional levels.

Another key requirement for successful water management is to ensure that technologies that are introduced are well understood and can easily be maintained. Continuity of operations and maintenance must be guaranteed. This will, therefore, be one of the appraisal criteria in each Bank-project. In line with this approach, it is important at an early stage to first evaluate any existing technologies and indigenous practices that are successful. Preserving and building upon those technologies may provide effective alternatives or supplements to imported technologies. Undertaking research in the water sector will be essential for attaining these aspects.

### *Economic issues*

Getting the prices right is at the very core of improving water resources management. In the process of establishing appropriate fees and tariff structures, economic, environmental, financial and social considerations play a crucial role.

Prices provide signals and incentives for efficient use of water, and to producers to supply it at optimum levels. Social welfare and allocative efficiency are

maximized when prices charged for water are equal to the economic cost of producing (and supplying) water. This is the meaning of treating water as an economic good.

It should be recognized, however, that economic costs of water supply differ from the financial costs. Economic costs reflect real resource costs. They are derived from financial costs, by correcting them for (most) government subsidies and taxes, and by incorporating externalities (e.g. the impact on the environment). In this regard, the treatment of water as an economic good includes the polluter pays principle.

Government subsidies on water have often been justified on the basis of considerations of affordability by the poor. In practice, however, direct subsidies have often proven to be ineffective or even counterproductive ways of helping the poor. Inefficient water operations have left little funding for extending services to the poor, while the upper and middle classes benefit from subsidized services originally intended for improving service delivery to the poor. It is widely recognized that a large number of poor depend on water vendors, and pay at least ten times more for water compared to middle-class urban dwellers serviced by piped water supplies. One effective way of assisting the poor is the introduction of cross-subsidization, in which richer consumers cover a part of the cost of providing services to the poor. This can be done by introducing a progressive block tariff schedule, in which a low price is charged for a limited lifeline amount of water, with higher prices for additional levels of consumption. Experiences with community level financing mechanisms involving social funds, access to credit, and cost sharing have also provided effective alternatives to assisting the poor gain access to potable water and adequate sanitation facilities.

When confronted with problems of inadequate water supply, public sector authorities are prone to seek solutions in the direction of increasing supply capacity. In many cases however, application of demand management and conservation measures could have provided a lower cost alternative. In principle, demand management and conservation, because they usually involve relatively lower levels of investment while offering considerable net economic benefits, should be the first options to be evaluated before, or in addition to, capacity additions.

Therefore, the Bank will support programmes aimed at rehabilitating existing infrastructures, including leakage detection in water supply systems, that improve water distribution for irrigation, increase accountability of utilities for deficiencies in their operations, and provide better incentives for efficient management of water resources. The Bank, of course, will continue to support supply capacity augmentation where necessary and feasible.

### *Social issues*

Social analysis at the onset of projects will ensure that appropriate measures are taken to incorporate these issues as an integral part of the project and to mitigate undesirable impacts. A critical assessment of social issues should therefore be a standard component of water projects. However, the methods to be used in social assessment will be determined on a project by project basis.

In this context, a number of key issues will be addressed:

- a. A demand responsive approach is a key ingredient for the successful development of water resources. In contrast to centralized, top-down approaches that were followed in the past, the demand-responsive approach involves the participation of the beneficiaries throughout the project cycle. This process has the advantage that users' preferences for different levels of services, their willingness and ability to pay are investigated from the outset of project design, and their commitment to the monitoring and maintenance of facilities can be obtained.
- b. Education in the form of training and sensitization programs to create awareness among the population on the use and proper management of water resources is a key element to health improvement.
- c. Making water more easily accessible to communities will allow women and girls to devote more time to other activities that will enhance their economic and social empowerment such as literacy programmes, skills development, and promotion of income generating activities to improve the quality of their lives.
- d. Considerations of gender equity entail the involvement of women in the decision-making processes in water resources management.
- e. Cultural and traditional values of people in relation to water resources management should be analyzed in order to develop the appropriate information, education and communication programmes. The goal is to encourage positive behavior by sensitizing users on the benefits and consequences of cultural practices and traditional values on water quality and equity in the use of water resources. Efforts will be made to learn and disseminate lessons on successful application of traditional methods of sustainable water management.

### *Environmental issues*

To eliminate adverse environmental effects on water resources, future actions should include clear environmental policies and strategies to allow the optimum and efficient use of these water resources. The Bank will encourage the RMCs to make environmental considerations an integral part of water resources management, so that adverse environmental impacts are identified early in the project cycle, and thereby avoided, minimized or mitigated. RMCs are encouraged to forge effective cross-linkages between National Environmental Action Plans and IWRMPs.

There is an obvious relationship between environmental degradation of water resources and poverty. Therefore, in addition to policies aimed at achieving physical solutions and mitigation measures, policies, which have indirect impacts, should also be explored. Thus, the Bank will promote the exploration of alternative solutions for the preservation or protection of water resources or water-based ecosystems. RMCs should also target international resources, such as the Global

Environment Fund (GEF) to finance aspects of water development associated with the protection of water-based ecosystems. Africa's external development partners should maintain (if possible, increase) their levels of financial and technical assistance in support of water resources management.

Integrated water resources management requires proper coordination of activities in the water subsectors to effectively address multi-sector, inter-related issues such as water-related health and environmental problems, and multi-purpose hydropower dam projects. In order to achieve these objectives, the policy will address the following inter-related issues:

- water supply, sanitation and health;
- protection of catchment areas and erosion control;
- sustaining biodiversity;
- environmentally sound construction of dams and reservoirs;
- involuntary resettlement;
- sustaining the marine and coastal environment;
- drought and desertification; and
- conservation of water as an environmental resource.

#### ***Implications for the Bank's operations in the water sector***

The Bank will adopt the concept of integrated water resources management in its operations in the water sector, and will support the implementation of this concept throughout the African region.

To achieve these objectives, it will be necessary to create and sustain adequate in-house capacity within the Bank, including:

1. installation of a water resources management focal point, which will take the lead in institutionalizing the IWRM concept in the Bank water-sector operations;
2. creation of a multi-disciplinary Task Force of professionals in the water sector and related areas, from different country departments within the Bank, who will collectively oversee the review and implementation of the IWRM approach in Bank operations and project appraisals;
3. allocation of adequate time to Bank staff to process and supervise water projects, especially during identification missions -- this will ensure proper implementation of the IWRM concept in project formulation;
4. formulation, after approval of this policy, of a detailed checklist and guidelines for water project appraisals, which will thereafter be used by Bank water specialists; and

5. allocation of high priority to water projects that incorporate the concepts of IWRM in accordance with the Bank policy.

In view of the prevailing unsatisfactory situation in the water sector in many RMCs, the Bank policy on water resources focuses on four key issues:

- National policies which emphasize the treatment of water as an economic good;
- Legislation that reflects policy principles, and provide adequate mechanisms for policy implementation;
- Knowledge and data bases of water resources, ecosystems, demographics, water quantity and quality system losses, and water users; and
- Adaptation and/or strengthening of institutions to be more effective in the management of Africa's water resources.

The Bank will engage in collaborative efforts with other development agencies to support RMCs committed to formulating policies and strategies for managing their water resources.

## 1. INTRODUCTION

### 1.1 Background

1.1.1. Water plays a crucial role in the economic development of African countries, and in sustaining natural ecosystems. The various uses of water impinge upon its availability in terms of quantity, quality and time for various economic, social and environmental needs. Regional member countries recognize that water resources are becoming a scarce commodity, and must be used wisely.

1.1.2. Over the past 30 years, activities in the water sector have helped African countries achieve sectoral objectives such as: providing safe drinking water and sanitation services to rural and urban populations; expanding irrigated areas to increase food production; increasing energy supply through hydropower development; supporting families through the development of fisheries and fish farming; and more recently, protecting the environment through conservation programs, and the promotion of tourism. Sectoral policies were developed to guide the implementation of projects.

1.1.3. In many Regional Member Countries (RMCs), government activities are organized so that a single department manages each type of water use with little consideration for other uses. This situation leads to uncoordinated and fragmented decision-making, and mismanagement of water resources. In Africa, as in many parts of the world, the development and management of water resources has been hampered by water scarcity, a weak policy environment, insufficient knowledge and information, and inadequate institutional capacity. These issues reflect the general trend of problems and challenges associated with a fragmented approach to managing water resources.

1.1.4. International concerns about water resources management have led to the global consensus on the need to adopt a new approach to managing water resources. The new agenda calls for a comprehensive water resources management framework that integrates social, economic and environmental considerations. In view of these important changes, the ADF-VII lending policy (Ref. 13) urged the Bank Group to review its activities in the field of water resources management. This provided the immediate impetus for the Bank to develop the new Integrated Water Resources Management (IWRM) policy.

### 1.2 Global context

1.2.1. The development of the international consensus on integrated water resources management (IWRM) has occurred over a number of years, and has been shaped by a number of important events. One of the most significant of these events is the United Nations International Drinking Water Supply and Sanitation Decade (1981-90), also known as the "Water Decade". The aim of the Water Decade was to provide *adequate* and safe water supply and sanitation for all. *The target for adequate water supply was set as between 20 to 40 l/p/d as recommended by WHO even though recent development indicate that the basic water requirement (BWR) for meeting the four domestic basic needs of drinking, sanitation, bathing, and cooking should be 50 l/p/d (ref. 55).* At the beginning of the decade, water and sanitation were considered to be basic needs to be provided through effective central government planning.



1.2.2. During the Water Decade, Africa experienced an increase in water supply coverage from 32% to 46%, while sanitation coverage increased from 28% to 36% (Ref. 50). Since the decade, however, progress has stagnated, and probably more people are without adequate services today than in 1990. In 1994, 381 million people (54 % of the population in Africa) still lacked access to safe water and 464 million (66%) had no access to sanitation facilities (Ref.50). The Water decade mainly focused on water and sanitation at the expense of the development of other water sub-sectors.

1.2.3. Following the Water Decade, the International Conference on Water and the Environment (ICWE) was held in Dublin in 1992. It was the most significant global conference on water since the UN Water Conference held in Mar de Plata in 1977. ICWE provided major inputs on freshwater problems to the United Nations Conference on Environment and Development (UNCED), which was convened in Rio de Janeiro in June 1992. UNCED aimed to elaborate strategies and measures to halt and reverse the effects of environmental degradation and to promote environmentally sound and sustainable development in all countries. A comprehensive action plan for the 1990s and continuing into the 21st century, known as Agenda 21 was developed, as the basis for a new global partnership for sustainable development and environmental protection in an increasingly interdependent world.

1.2.4. Another important development was the establishment of the Global Water Partnership and the World Water Council in 1996 to improve co-ordination of global activities in the water sector. Both institutions aim at the coordination of the worldwide implementation of IWRM principles and practices.

1.2.5. The emerging international consensus on IWRM from these new developments, focuses around the four Dublin principles, which are generally accepted as the key issues in IWRM. These principles are that:

- Fresh water is a finite and vulnerable resource, essential for the sustenance of life, development and the environment.
- Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels.
- Women play a crucial role in the provision, management and safeguarding of water.
- Water has an economic value in all its competing uses and should therefore be recognized as an economic good.

1.2.6. The priority actions recommended by Agenda 21 for the sustainable and efficient use of fresh water resources are:

- Integrated water resources development and management;
- Water resources assessment;
- Protection of water quality and aquatic ecosystems;
- Provision of safe water supply for drinking, food production, rural development and sanitation; and
- Understanding and monitoring the impacts of climate change on water resources.

1.2.7. A significant dimension of the consensus on integrated water resources policy relates to the increasing recognition, during the 1990s, of the potential and wide scope of public and private partnerships (PPP) in the water sector, and consequently the need to reflect these dimensions in policies and strategies. PPP assumes additional significance within an integrated water resources management approach, because it underlines the importance of decentralization and the effective separation of regulatory and service functions.

***1.2.8 Another important milestone in the development of a global consensus on water resources management is the Second World Water Forum and Ministerial Conference (WWF) held in The Hague March 2000. The main objective of the WWF was to create an opportunity for all stakeholders to discuss the impending water crisis in the 21<sup>st</sup> Century and devise the most appropriate mechanism for ensuring water security for all uses in this century. The key documents around which the discussion for a future water security focussed were the World Water Vision and Framework for Action.***

***1.2.9 The main challenges identified under the Vision included water scarcity, lack of affordable access to clean drinking water and adequate hygiene, particularly for the most vulnerable, the poor, women and children and increased water need for food production to provide adequate nutrition. Important causes for these challenges include the deterioration of fresh water quality due to environmental degradation, increased competition and dispute over shared water resources, decline in investment and fragmented water resources management at local, national and regional level.***

***1.2.10 The sets of strategies for the achievement of the goals include Integrated Water Resources Management (IWRM), participatory institutional mechanisms provision of incentives for resources mobilization and technology change, and mobilization of political will. The targets to be achieved during the period relate to the management of water resources so as to reduce extreme poverty, reduce mortality rates of infants and children, reverse the loss of environmental resources, increase access to hygiene education, raise the levels of water productivity, reduce the risk from floods and generally improve the health of fresh water ecosystem.***

1.2.11 Taking into account the issues addressed in ICWE, several multilateral development banks (MDBs) such as the World Bank (Ref. 40), Asian Development Bank (Ref. 15), and bilateral donors including the European Commission (Ref. 20), and various countries have taken steps to develop policies, strategies, and mechanisms for better management of water resources, based on the integrated approach. In line with this approach, the work of developing the IWRP Policy for the Bank Group was conducted in two stages. The first phase was devoted entirely to reviewing the work on developing integrated water management policies that had been undertaken by a number of multilateral development institutions and donor agencies. The objective of that exercise was to learn from their experiences in this respect, and to explore the possibility of adapting their policies for the purpose of developing the Bank IWRM Policy.

1.2.12 In particular, the World Bank Water Policy has considerable relevance for Africa, and has provided useful inputs in the process of developing the IWRMP of the Bank. Important dimensions of the World Bank Policy, which by and large are similar to the policies of other multilateral development institutions, and which have been

adapted for the Bank include: the critical importance of the integrated approach, which involves an analysis of cross-sectoral relationships; the necessity of addressing social, environmental and economic objectives; improving management of international water resources; decentralization of management to river basin levels; use of opportunity cost in setting water prices, and; stakeholder participation.

1.2.13 Despite the existence of these common elements however, the Policy of the Bank, in view of its geographical focus, has to reckon with certain variables which are more germane to Africa, and which necessitate specific nuances and emphases. These variables include institutional weaknesses and human resource constraints which would impose constraints on the extent of management decentralization; generally low levels of cost recovery in water and sanitation services; extensive poverty which might necessitate governments to bear the investment costs component of water services during an interim period; the need to extend poverty alleviation as an over-arching framework not only in relation to water supply (as the World Bank, for example, has done) but to other sub-sectors such as agriculture and irrigation, energy and sanitation; the critical importance of trans-boundary water resources in the region which necessitate greater emphasis on multinational agreements, programmes and projects, and; greater emphasis on issues of climatic variability, drought and desertification.

### **1.3 Bank's experience in the water sector**

1.3.1. The Bank's mission is to contribute to the economic development and social progress of its regional members. Central to this mission is the overarching objective of poverty alleviation. It is self-evident that water issues have considerable relevance for improving and sustaining living standards and human welfare.

1.3.2. In accordance with its mission objective, the Bank Group has financed a wide range of water related projects. The amount lent per year in the water sector has grown steadily since 1968 to a peak of just over 450 million UA<sup>1</sup> in 1991 (Figure 1). There was a sharp decline of new lending in the period 1991-1994, and complete cessation in 1995 due to the unavailability of ADF resources. Since 1995, however, lending in the water sector has resumed.

1.3.3. Bank lending in the water sector as a percentage of the total Bank lending is presented in Figure 2. Over the period 1968-1998, on average, 13.3% of the total loan commitments per year have been provided to the water sector to finance a total of 330 projects (Figure 3). This contribution is approximately the same as that of the Asian Development Bank in the 1990s (14%) (Ref. 15). It should be noted that about 70% of the Bank Group water related projects, representing 41% of the total commitment to the water sector, have been financed with concessional resources from the African Development Fund. A summary of loan amounts is presented in Table 1, and Figures 4 and 5.

1.3.4. With regard to loan percentage per sub-sector, Table 1 shows that the majority of the loans (62%) have been provided for water supply and sanitation, 26% for irrigation, and 12% for hydropower projects. Figure 10 shows that the average amount

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<sup>1</sup> UA is Unit of Account, used by the Bank in their loan operations.

lent per project (in the water sector) has increased steadily since 1968, reaching an all-time high of 40 million UA in 1994. The average amount lent per project over this period (Figure 7) has been just over 10 million UA, and that the three sub-sectors do not differ significantly. The total cost per project has also risen over time, although with considerable fluctuation as shown on Figure 11.

1.3.5. The geographical distribution of the loans in the water sector is presented in Table 2 and Figures 8 and 9. The five countries that have received the bulk of the loans are Nigeria, Morocco, Algeria, Democratic Republic of Congo (Zaire<sup>2</sup>) and Tunisia. Together they account for 51% of the total loan amounts in the water sector during the period 1968-1998. The concentration of investment reflected the demand responsiveness of the Bank arising from the need based water resources development initiatives of these countries.

1.3.6. Some Bank-supported investments in the water sector, especially multipurpose projects, have suffered operational, social, economic, and environmental problems. For example, in the water supply and sanitation sub-sector, the main problems identified have been inadequate planning within an integrated framework; weak institutional structures; poor cost-recovery; inadequately motivated personnel and insufficient stakeholder participation. In irrigation, weak institutions have also been identified as a major problem. In addition there are problems related to: inadequate legislative frameworks particularly in respect of water use and pollution control; lack of end-user participation in the choice of technology; and weak mechanisms for managing conflicts between competing water uses. A recent evaluation of several Bank projects in the water sector, from reviews of Project Completion Reports and the Bank's experience in the financing of dam projects (Ref.53) concluded that the Bank's performance has been insufficient with regard to multipurpose projects involving multiple sectors. At the core of these shortcomings is the lack of an integrated, multi-sectoral approach to the appraisal of complementary components of projects.

1.3.7 The Bank has previously developed a number of sectoral policy documents and guidelines, which are of continuing relevance to integrated water resources management. These documents reflect the increasing importance attached by the Bank to the fundamental role of sustainable development of natural resources and the need to integrate this in the Bank lending operations. Lessons of experience and policy options contained in these policies, and which are deemed relevant, have been appropriately incorporated into the IWRM policy.

1.3.8 The previous policies had been developed within a sub-sectoral framework. The new policy on integrated water resources management on the other hand, provides a conceptual superstructure, which encompasses *activities in* all water sectors. As it applies to decisions at the level of the overall water resource base, the IWRM Policy will serve an umbrella function, and will take precedence over previous sub-sectoral policies if any conflicts arise. However, it does not replace the other policies in the water sector. **The sub-sectoral policies, which will be reviewed to ensure conformity with the IWRM Policy, will continue to guide programmes and projects in their respective sub-sectors.**

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<sup>2</sup> Until 1997 the Democratic Republic of Congo was called Zaire. Loans to the former Zaire have been attributed to the present Democratic Republic of Congo.

**1.3.9** *In line with the prioritization of water issues, the Bank played a major role, in collaboration with the Global Water Partnership, World Water Vision Unit, the World Bank and African water professionals, in developing the African Water Vision as a contribution to the global water vision. The main challenges identified in the African Water Vision include the multiplicity of trans-boundary water basins, extreme spatial and temporal variability of climate and rainfall, growing water scarcity, inadequate human capacity, desertification, inappropriate institutional arrangements, depletion of water resources through pollution, environmental degradation and deforestation, inadequate investment in water protection development and water supply and sanitation. The Vision is for “An Africa where there is an equitable and sustainable use and management of water resources for poverty alleviation, socio-economic development, regional cooperation, and the environment.”*

**1.3.10** *The framework for action to transform the situation defines a number of key steps for implementation. These include using the water basin as the boundary for the implementation of integrated water resources management, institutional reform and capacity building, promoting cooperation in managing shared waters, liberalizing water markets while meeting basic needs of the poor, establishing a sustainable system for data collection, management and dissemination, expanded research, mainstreaming gender and youth concerns, better governance and mobilizing the resources for adequate investment in the sector.*

## **1.4 Priority status of the water sector for the Bank**

In the context of its strategic approach, and considering the circumstances of the RMCs, the Bank would play a major role in the water sector in the region, and this is due to a number of factors. Firstly, as indicated in paragraph 1.8 hereafter, poverty reduction is the over-arching objective of Bank operations. The water sector, due to its linkages with water supply, sanitation, agriculture and irrigation, energy, health and education is regarded as a major instrument in the fight against poverty in the region. Secondly, it is clearly indicated in Chapter 3, and illustrated in the maps in Appendix 1, that Africa is not only the lowest region in terms of access to water and sanitation, but also faces the greatest risk in terms of increasing water stress and scarcity in the next 10 years. This places a big onus on the Bank to respond to the challenge. Thirdly, while it is recognized that other multilateral institutions are also active in providing support for the region, yet there are certain dimensions of the African situation, as explained in section 1.2 above, which require the Bank to develop specific policies and programmes to deal with them, given its specific regional focus. Lastly, the level of support provided to the water sector by the Bank, amounting to more than US\$ 4.6 billion between 1968 and 1999, testifies to the importance attached to it.

## **1.5 Objectives of the Policy**

**1.5.1** The main objective of the Policy is to promote an integrated approach in the management of water resources in order to achieve economic development and attain the goals of poverty reduction in the region.

The integrated approach takes into consideration the increasing scarcity and competition between different uses of water resources in Africa. The main components of this approach are:

- To balance water use between the basic and overlapping needs in the social, economic and environmental spheres.
- To manage water use in agriculture, irrigation, sanitation, domestic and industrial consumption, hydropower, energy and transport in an integrated and holistic way.
- To integrate development of surface and groundwater sources.
- To develop and apply the most appropriate technical infrastructure and institutional framework for water management.
- **To facilitate increased private participation and implementation of cost recovery measures, without jeopardizing access by the poor.**
- To ensure environmental sustainability and gender sensitivity in all aspects of water development and management.

1.5.2 This policy document will serve the following objectives:

- It provides a framework of reference for Bank Group staff throughout the project cycle for water-related projects and programmes in the regional member countries.
- It explains to the Regional Member Countries the contextual framework for Bank Policy requirements within the water sector.
- It aims to stimulate Regional Member Countries to initiate and formulate national policies on integrated water resources management.
- It provides the basis for co-ordination of integrated water resources operations with bilateral, multilateral and non-governmental organizations.

1.5.3 The implementation of the IWRM policy will strengthen the role of the Bank Group in national, regional and sub-regional programmes for public health, poverty reduction and environmental protection from the perspective of water security.

## 1.6 Country focus of the policy

The 53 RMCs show a great variability in physical, political, institutional, and socio-economic characteristics. They also vary on the basis of progress made towards adopting an integrated water resources management approach, in terms of policy framework, legislation, institutional arrangements, and operational activities in the water sector. This Policy document provides a broad strategic framework for water resources management from which country programs and strategies will be designed to reflect country priorities and capacities.

## 1.7 Policy formulation process

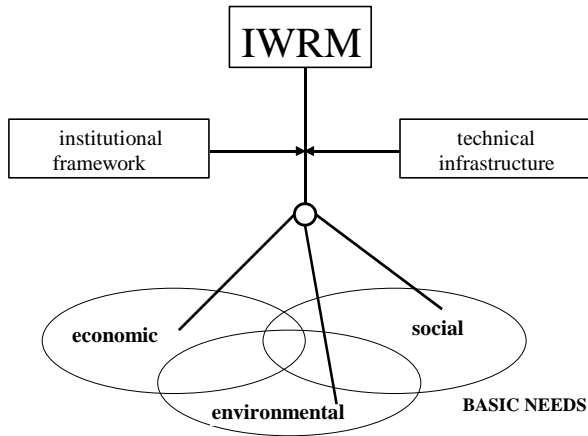
This policy was developed through a process of in-house analysis involving dialogue amongst Bank staff and external water resources professionals. The consultations benefited from the participation of representatives from Regional Member Countries (RMCs), international river basin authorities multi-lateral development institutions and other international organizations.

## 1.8 Conceptual framework

1.8.1 The technical infrastructure and institutional framework provide the enabling facilities for water resources management. To function properly, the technical

infrastructure requires an institutional framework to manage it. This includes institutional rules and legislation.

1.8.2 The need to balance the three basic needs –social, environmental and economic–has a crucial bearing on the management of water resources. These needs interact in a symbiotic and dynamic relationship.



Water resources management should be performed within a framework, which balances these inter-related needs. This is the goal of integrated water resources management. This concept is used throughout this document as a framework to describe the existing situation in the water sector and to formulate policy.

## 1.9 Vision Context

1.9.1 The Bank has defined its vision to be the leading development institution in Africa dedicated to providing quality assistance to RMCs' development effort. In this Vision, the Bank has adopted a development assistance strategy, which effectively promotes accelerated and sustainable economic growth with equity and poverty reduction as its central goal. The operational activities and programmes of the Bank focus on agriculture and rural development complemented by health and education, human resource development, private sector development, governance, and economic integration and co-operation. Gender issues and environmental sustainability are also central concerns in all Bank programmes.

1.9.2 The IWRM Policy will function as an important instrument for the fulfilment of the Vision by enabling the sustainable development of water resources for the purpose of attaining the main objective of poverty reduction directly, and also through its congruence with other sub-sectoral and cross-cutting themes of the Vision, in the following ways:

- The use of water resources for the purposes of household consumption, agricultural production, including irrigation and fisheries, energy, fulfils critical dimensions of basic human needs for survival, food security, and nutritional requirements.
- The Policy advocates for the use of minimal prices for lifeline water supplies where required, to enable the poor in rural and peri-urban areas to have access to water services, even when measures for full financial cost recovery are being implemented.
- It also provides for the use of transfer pricing between rural and urban water supply services as a strategy for mobilizing capital investment for rural water supply and sanitation systems. This approach could also be applied to hydropower development to enable the supply of electric energy for low-income groups in the rural and urban areas.

- The important linkages and complementarities between water resources management and health and education are strongly emphasised in the Policy. Projects in the water sector would be reviewed for their health impact and particularly in the case of malaria, this would signal a new emphasis on the linkages between water resources development and basic and community health programmes.
- Concerns for environmental sustainability are given priority attention in the Policy.
- **By delineating the critical importance of shared waters in Africa, and providing a suitable institutional framework for their management, the Policy gives a pointer to the bright prospects for mutually benefiting regional co-operation and integration through the proper management of transboundary water resources.**
- The Policy emphasises the positive beneficial impact of effective rural and urban water supply systems, as well as the provision of small scale hydropower in rural areas, on the reduction of burdens for women, girls and children, whose opportunities for gainful employment and school attendance would then be significantly raised, with multiplier effects for the societies.

### **1.10 Structure of the document**

Following this introductory Chapter, Chapter 2 discusses existing management problems and constraints. Chapter 3 outlines strategies for improving water resources management. Chapter 4 draws implications for the Bank Group. Data on Bank Group operations in the water sector as well as on the water resources situation in the Africa region are presented in the Appendix.



## 2. EXISTING SITUATION, PROBLEMS AND CONSTRAINTS

### 2.1 Water resources variability and scarcity

**2.1.1.** The great variability of rainfall and evaporation over Africa presents a significant problem for sustainable management of water resources. In equatorial latitudes the rainfall distribution is such that there is no clear dry season. Away from the equator, however, the annual rainfall regime has a clear wet and dry period. **Inter-temporal regional and climatic variations, giving rise to alternative periods of floods and drought, will continue to cause uncertainties that need to be addressed through proper assessment, strategic planning and management.**

**2.1.2.** The majority of RMCs share at least one international water basin. In the region there are 55 major watercourses and lakes which cross or constitute international borders (Ref. 31).

2.1.3. The Region's water resources will come under pressure from increased demand created by rapid population growth (Appendix 1a). Fourteen African countries are experiencing water stress or water scarcity and this figure is expected to increase to twenty-five by year 2025, partly due to the high population growth rate experienced by African countries (Ref, 37). The World Bank analysis for trans-boundary river basins (Ref.31) shows that in 1995 eight river basins already faced water stress and four faced scarcity and by 2025 the number of river basins faced with scarcity will increase to sixteen. **The implication of this is that a large and increasing portion of Africans will live in water scarce environments. Moreover water stress or scarcity indicators do not take into consideration the availability of water in time and space. Extreme variability is one of the major characteristics of African rivers and in this situation, water availability could be even more severe than indicated above. This means that expensive water conservation and transfer measures may need to be considered for some countries to alleviate the availability problems.**

### 2.2 Water uses

#### *Categories of Uses*

2.2.1. Utilization of water resources for consumption purposes comes under a number of categories such as: household needs; small-scale productive activities; agricultural production and industrial uses. Agriculture is by far the largest consumer, on average accounting for an estimated 88% of the total volume of utilized water. Other non-consumptive uses include hydropower, transport, fisheries and tourism (Fig 23).

#### *Water Supply*

**2.2.2.** In general, urban dwellers are better off compared to rural dwellers; about 65% of the rural population and 25% of the urban population lack access to safe drinking water (Ref. 31). Country-wise comparisons also indicate significant divergences (see Figure 15). In Mauritius, Seychelles, Egypt, Libya, Tunisia and Côte d'Ivoire, more than 80% of the population already have access to safe drinking water. On the other hand, the situation is much worse in Chad, Comoros, Mozambique, Ethiopia, Guinea-

Bissau, The Democratic Republic of Congo, and Djibouti, with percentages of less than 30%.

### *Agriculture*

2.2.3. In Africa, water in the agricultural sector is mainly used for crop cultivation and livestock needs. The vast majority of land under cultivation is rainfed. An estimated 185 million hectares, or 6% of Africa's land resources, is under cultivation, of which only 12 million hectares are under irrigation (Ref. 31). Figure 19 shows, for selected countries, the magnitude of irrigated areas.

2.2.4. The total area currently under irrigation constitutes just about one-fourth of the potential irrigable arable land, which has been estimated by the FAO at about 45 million hectares (Ref. 21, Appendix 1c, Figures 17, 18 and 19). Given the fact that agricultural water use already accounts for close to 90% of total available water resources, it is obvious that any future expansion in irrigation, particularly in water scarce or water stressed regions, will put considerable pressure on the availability of water for other uses. This calls for higher level of efficiency in water utilization not only in agriculture but in other sectors as well, including augmentation of existing water resources, wastewater recycling and reuse, and land application of wastewater.

2.2.5. The performance of the agricultural sector has in general been poor. Many large-scale irrigation systems need major rehabilitation, for which the financial resources are often lacking. As is the case in the water supply and sanitation sub-sectors, financial cost recovery has been low in many systems. Privatization, establishment of Water Users associations, and different systems of irrigation service fees have been considered as options for improving cost recovery in many areas.

### *Hydropower and Other In-Stream Uses*

2.2.6. Ninety five percent of total energy consumption in the region is supplied by coal-based power production, and about 4% of the demand are covered by hydropower (Figs 20, 21 and 22). The small-scale hydropower potential particularly for rural energy supply is hardly exploited. Apart from hydropower, there are other in-stream users of water, which, in specific situations, may be important stakeholders in water resources development and management, either as beneficiaries, or as adversely affected parties. Such users include tourism, fishing and transportation. Other users, including mining, are polluters of water resources systems. Integrated water resources management policies should therefore take these stakeholders into account.

### *Sanitation*

2.2.7. In general, from the experience of Bank Group operations in RMCs, it appears that sanitation facilities do not receive as much attention as water supply. The scant attention to sanitation is partly due to financial constraints and partly due to lack of awareness of its importance. Figure 15 presents an overview of the percentage of people with access to sanitation facilities. This also applies to waste water treatment plants for industries. Lack of sewage and treatment facilities causes direct hygienic and water quality problems, resulting in diseases and, in many cases, are a major threat to the environment. One of the most severe and widespread of such problems emanates from

the effects of pollution on rivers and coastal systems as a consequence of lack of treatment facilities for municipal and industrial wastewater.

## 2.3 Institutional issues

### *Public sector institutions*

2.3.1. *The practice in water resources management has been one of technocratic interventions in the hydrological cycle undertaken to augment and regulate water supplies for the purpose of meeting specific sets of human needs without due regard for the environment and multi-sectoral use of water.* A wide range of institutions are, directly or indirectly, involved in *this process*. At the highest level, national governments set out the policies and legal frameworks within which water resources are managed. At lower levels, regional water management organizations, public and private water utilities and corporations, local government or community institutions and water user organizations are variously involved in licensing, water allocation, construction, service delivery, operation and maintenance.

2.3.2. A number of government agencies are involved in water resource management. Usually, each has a specific sub-sectoral objective, such as urban water supply, rural water supply, irrigation, hydropower or fisheries. There is usually little integration of water resources management. In addition, national river basin authorities have been established in some countries (e.g. Nigeria, Ethiopia and Kenya) to co-ordinate planning and development of basins within national boundaries. In general, these authorities are charged with water resources planning responsibilities outside the direct jurisdictional ambit of other national government organizations. The Economic Commission for Africa estimated that there are over 50 such organizations in West Africa alone (Ref. 18). While these organizations are useful, the problem of overlap of responsibilities gives rise to conflicting decisions, duplication of effort, waste of scarce financial, human, technical and logistical resources.

2.3.3. Public water agencies have often proved incapable of managing the sector efficiently. This is due to a number of factors, such as:

- centralized, over-extended government agencies;
- top-down approach;
- poor quality of services, high costs and low revenues;
- lack of autonomy;
- human resource constraints;
- difficulty of access to capital investments or to private capital markets;
- Undue influence of politics;
- Inadequate capacities in consultancy service, construction, research, and development.

### *Human resources capacity*

2.3.4. The work environment in government agencies is generally unattractive in terms of salaries, conditions of service, job satisfaction and opportunities for promotion. Coupled with bad governance and mismanagement, it has often led to “brain drain” to the private sector and abroad, or to endemic rent-seeking behavior.

2.3.5. Training programmes usually have focused on technical aspects of water resources management and overlooked training in management. Even at the technical professional level, inadequate attention is paid to training in planning, systems analysis and modeling. Technically qualified and experienced staffs are often promoted to managerial positions, with little formal management training.

#### *Trans-boundary water resources*

2.3.6. **The water resources of many internationally shared river basins are subject to inter-country competing demands for hydropower generation, irrigation, urban and industrial water supply, fisheries and transport. Developments in upstream countries may restrict or pollute the resources available for downstream countries. The equitable sharing of common resources between riparian nations is an important issue in Africa.**

2.3.7. **Numerous international agreements on water resources have been signed between riparian countries. These are not set in international law, but in the Helsinki rules<sup>3</sup>, which have been widely adopted and applied, in international agreements.**

2.3.8. **To develop and manage shared water resources, and to minimize political conflicts, many countries have formed regional river basin organizations (See Table 5 for list). In general, Africa's river basin organizations have experienced severe constraints in terms of poor institutional development, national and external political pressures, inadequate budgets, poor management and technical capability (Ref. 5). Their objectives and strategies sometimes conflict with the political priorities of individual member states.**

2.3.9. **In addition to organizations typically devoted to one river basin, there are regional or multilateral organizations for which transboundary water resources constitute important themes of interest. A good example is the Southern African Development Community (SADC), established in 1992.**

## 2.4. Technical issues

### *Knowledge: information and data, technology, and transfer*

2.4.1. In general, there is inadequate knowledge on physical, technical, and socio-economic aspects of water resources, including the state of watersheds, and factors underlying water demand; such as changing patterns in human settlement and economic growth, willingness and capacity to pay, socio-cultural attitudes towards water resources. Physical data such as topography, soils, geology, land use and cover are scanty or do not exist on the scale necessary for water resources development. In most

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<sup>3</sup> The now well known **Helsinki Rules**, published by the International Law Association (ILA) in 1966, have adopted the geographical concept of a drainage basin as the unit of analysis. A recent augmentation to the Helsinki Rules by the ILA has added the concept of a confined transboundary aquifer, unconnected with the hydraulic system, as an international basin in its own right (Ref. 30).

countries, the water information-base is yet to be developed as a tool to guide planning, development, and monitoring (Appendix 1b). To some extent, African countries have established data and information systems relating to climate, hydrology, hydrogeology, and soils. However many issues remain unresolved. Through the Sub-Saharan Africa Hydrological Assessment (SSAHA), about forty countries conducted hydrological assessments (Ref. 54). The assessment points out that hydrological services are weak, and applied technologies inadequate. This situation impinges upon the availability of continuous data, and the periodic updating of water information. In addition to this, information processing, storage, retrieval and dissemination are neither satisfactory nor conducted on a sustainable basis. Government budget allocation for this purpose and general awareness on information management is low. Data generated from projects financed by donor agencies are not properly managed for long term utilization.

2.4.2. Data and information on surface and groundwater quality are limited. There is a downward trend in the availability of flow and rainfall stations, partly reflecting an insufficient appreciation for the importance of data collection and monitoring. Recommendations for improved monitoring are commonplace in project reports, yet water resources monitoring and assessment fail to receive sufficient political and public attention, and financial support. Few countries have institutions capable of satisfying the enormous and complex data and information requirements of an integrated water resources management approach, which takes both sectoral and crosscutting issues into consideration. In most cases, sub-sectoral data are kept by relevant line ministries, with no mechanisms for pooling or coordination. Yet, such information is critical in order to make plans and informed decisions, including technological choices.

2.4.3. To ensure sustainability, the generation of data and information should be demand responsive. Institutions in charge of data and information generation should have financial and operational autonomy to market their products. There is a need to explore alternative institutional and financing mechanisms to improve data and information availability. Efforts are also required to train personnel, build institutional capacities and acquire appropriate technologies. Stakeholders operating in the private sector should contribute to the costs of collecting, processing, and disseminating data and information. Involvement of communities is also needed to collect data at watershed level and generate valuable information for users downstream. The beneficiaries of such data and information should compensate watershed stewards.

**2.4.4. Country-level limitations in terms of water data and information systems have implications on willingness to cooperate for joint management of international watercourses. Experience has shown that data and information asymmetry between riparian governments leads to mistrust and unwillingness to enter international agreement to share water resources. It is therefore imperative to support activities that level the playing field in data and information availability, and encourage sharing and transfer of knowledge across countries.**

## **2.5 Financial and economic issues**

### *Cost of top-down approach*

2.5.1. It is generally asserted that (i) access to safe water is a basic human right, and (ii) it is the government's responsibility to ensure that all citizens are provided with

access to safe drinking water. In most countries this has resulted in a tradition of excessive reliance on government agencies to develop, operate and maintain water systems, in a top-down approach.

2.5.2. In many cases, this approach has not been successful. Service levels have not matched user preferences (i.e. willingness to pay); projects have been oversized; and consumers have insufficiently contributed to the recovery of the cost of operations, maintenance and capital costs of the systems, because they have not been encouraged to develop a sense of ownership. In the irrigation sub-sector also, governments have often pursued similar approaches leading to similar outcomes. Many governments facing this problem have come to recognize the need to restructure the sector, and facilitate the participation of communities and the private sector in water resources development and management.

### *Cost of fragmented approach*

2.5.3. A fragmented approach to planning and management of water resources often leads to a sub-optimal situation involving additional costs in terms of lost opportunities, externalities, and unused capacity. When water is scarce, competition between users is heightened. Development opportunities are lost if water is locked-up in low-value uses, foreclosing its use in higher-value applications.

2.5.4. Uncoordinated or fragmented approaches may lead to a situation whereby untreated wastewater disposal upstream of a river may severely impact on the health situation and increase the cost of raw-water treatment downstream. The negative externalities of medical treatment (claiming scarce foreign exchange reserves), loss of productive workdays, higher water treatment costs, and other economic costs may by far outweigh the cost of upstream wastewater treatment.

2.5.5. In addition, downstream water resources development plans that fail to take upstream water resources development plans into account, and vice-versa, pose the risks of over-development of water resources. This may mean, for example, that reservoirs are only partly filled and irrigation systems are partly left idle. In this case, valuable capital ends up being locked up in unproductive use.

### *Pricing*

2.5.6. Pricing in the water sector has rarely been efficient. In most countries, user charges cover only a portion of operation and maintenance cost, and none of capital investment costs. Charging a realistic price has often proven difficult for political or moral reasons. Even when water tariffs are adequate, public-sector water utilities and sewerage corporations often are unable to establish efficient billing and collection systems.

2.5.7. In the absence of efficient pricing mechanisms, water tends to be wasted through inadequate maintenance of taps and pipelines, unauthorized connections, and inefficient irrigation practices. Thus, in the water supply sector in Africa, aggregate unaccounted-for water is estimated at between 40 and 60 percent.

2.5.8. It must be noted, however, that market and pricing mechanisms alone are not sufficient to ensure sound financial management of water resources. The high

variability in water availability in Africa results in numerous externalities, which require additional interventions in the form of incentives, regulations, and taxes.

### **Private Sector Participation**

*2.5.9. The role of the private sector in water resources management in Africa is considered to be minimal due to the lack of an enabling environment of appropriate regulation and incentives. The African Water Vision, referred to in 1.3.9, addressed key challenges to be met by RMCs by 2025 in the areas of water and sanitation, food security and the environment. Preliminary estimates indicate that a minimum amount of US\$ 20 billion per annum is required to adequately respond to these challenges. It is clear that the financial requirements are much higher than can be mustered by governments in the Region and from donor assistance. The effective mobilization of the private sector at both the local and international levels is therefore essential if the targets specified are to be approached. In addition to financial resources, the private sector may also help provide technical and/or managerial expertise, greater economic efficiency with less political influence, and better consumer responsiveness.*

## **2.6 Environmental issues**

### *Link between water resources and environment*

2.6.1. There is a strong relationship between water management, health, and the environment. Poor management of water could lead to a shortage of potable water and contamination of surface and ground water resources which could in turn lead to a rise in the incidence of water-related and water-borne diseases, salt-water intrusion into aquifers, land degradation, floods, soil erosion, degradation of ecosystems and loss of biodiversity. Generally, the poor are hit hardest by these adverse impacts.

2.6.2. In many RMCs, fragmented management of water resources has caused over-exploitation of scarce water resources, environmental degradation and excessive production costs. This situation is expected to worsen with rapid population growth and urbanization, higher incidence of poverty, and growing water scarcity.

### *Water supply, sanitation and health*

2.6.3. The environmental problems facing the marine and terrestrial environments, and the inadequate sanitation facilities and waste disposal systems, have negative impacts on public health in Africa. In RMCs, water supply and sanitation infrastructures still lag far behind. Current utilization of sanitation facilities far exceeds their intended capacities. In addition to developing new and alternative systems, most of the existing sanitary infrastructures need major rehabilitation. The poor state of sanitary facilities, and the lack of pollution regulation have resulted in raw discharges into rivers, lagoons and bays, leading to environmental degradation including reduced dissolved oxygen (DO), change in fish population and species, and groundwater pollution.

### *Watershed degradation*

**2.6.4.** Degradation of catchment areas and river basins arising from intensive cultivated agriculture and deforestation for energy and construction purposes is a widespread environmental problem, adversely affecting the quality and quantity of water resources. Unsustainable land use practices, such as deforestation, overgrazing, application of agricultural chemicals, improper soil management resulting in salinity and uncontrolled urbanization negatively affect the state of water resources occurrences and the natural drainage systems. **The results are poor water quality, land degradation, increasing incidence and severity of floods, soil and gully erosion and reduced retention of water in river basins.**

*Degradation of ecosystems and bio-diversity*

2.6.5 The preservation of biological diversity is essential to maintaining ecosystems. Unfortunately, in many places, ecosystems have become endangered or destroyed by cutting forests and mangroves, expanding agricultural land use and urban sprawl, construction of dams and reservoirs, or splitting up of animal habitats by roads and railway lines.

*Drought and desertification*

**2.6.6 Some of Africa's drought-prone areas are undergoing increasing desertification. The primary causes of desertification are, besides climatic effects: high population pressure (human and livestock); migration into fragile semi-arid regions; unsustainable land use patterns leading to deforestation, overgrazing and soil erosion; and excessive exploitation of aquifers in arid areas (lowering the water table, which reduces the capacity of soils to support vegetation). Thus, desertification has obvious linkages to water resources management practices.**

*Solid waste management*

2.6.7 Poor management of solid waste disposal leads to water pollution and environmental degradation, and causes drainage problems. Large solid waste dumpsites are often found in the vicinity of surface waters or above important groundwater aquifers. Leachates of harmful chemicals from these dumpsites to surface water and groundwater aquifers pose a serious threat to human health because of the toxic chemical compounds they may carry.

## **2.7 Social issues**

2.7.1. Social issues have a cause-and-effect relationship with water resources management. While the development and management of water resources exert impacts on social factors, social factors also affect the development of water resources and its management.

*Poverty and access to water and sanitation*

2.7.2. In many RMCs, poverty is widespread. Figure 14 presents for selected countries the percentages of population living in poverty, using the criterion of purchasing power parity per-capita income of less than US\$ 1 per day. Large proportions of the urban and



rural populations in Africa do not have access to safe drinking water and sanitation facilities. The rural-urban gap in access to water and sanitation is widening. Figure 13 presents an overview of the percentages of the population that have access to safe drinking water, in relation to GNP per capita. Although data relating poverty directly with access to safe water, sanitation facilities, or irrigation are not available, this Figure suggests that there is a strong correlation between the two.

### ***Population pressure and urbanization***

2.7.3. The rates of population growth and urbanization in many African countries are among the highest in the world- estimated at 2.7% and 5% per annum respectively in 1998. This has resulted in cities that have grown several folds over the last few decades. In the rural areas high population growth has contributed to land degradation arising from increased demand for agricultural land and energy supply.

2.7.4. There is a general lack of basic infrastructure and public services or the deterioration of existing facilities, especially for the lower-income urban and rural dwellers. A significant proportion of inhabitants in the cities (e.g. 60% in Nairobi) live in high-density, poorly serviced peri-urban slums where land is cheaper, and shelter is built with locally available materials. Inadequate and insecure water supply services and lack of access to hygienic sanitation systems are perhaps the most critical infrastructural deficiencies in African cities today. This has contributed to the deteriorating health situation of the urban poor. On the other hand poor soil conditions, lack of water for crop production and overcrowding on limited productive areas has contributed to low food availability and general poverty in the rural areas.

### ***Health and education***

2.7.5. The use and management of water has a direct influence on the health situation of the population and, therefore, on the development of human capital. Health is adversely affected by contaminated drinking and bathing water, raw wastewater, solid waste, air pollution, low level of nutrition and inadequate energy supply.

2.7.6. The health situation in Africa is possibly the worst in the world today, as indicated by life years lost in sub-Saharan Africa through infectious and parasitic diseases. ***In 1990, the disability adjusted life days lost per person in sub-Saharan Africa due to such diseases amounted to 106 days- of which 21.7 days were lost through diarrhea and 22.6 through malaria. For comparison, global averages amounted to 25.8, 6.9 and 2.5 days respectively (Ref 51). These are only two of a host of water-related diseases to which people in Africa are habitually exposed.***

2.7.7. The relationship between water and education is clearly visible in the African context, where the responsibility for the laborious task of fetching water for the household falls largely on women and female children. There is also the additional burden of providing household energy needs by fetching wood, animal dung and crop residues. The time taken up by such chores is a factor in the lower enrolment rates, poorer performance, and high early dropout rates of African girls. It is also a factor in diminishing the leisure time which adult women could have used for self-improvement activities such as participation in adult literacy programmes and other women's activities. The lack of basic education and training in hygiene, and safe handling and storage of water contributes greatly to the spread of water-related diseases, to

mishandling of public wastewater infrastructures by the populations, and to mismanagement of water. The provision of literacy and basic education to women is therefore essential to building their capacity as water managers.

### ***Involuntary resettlement***

2.7.8. Involuntary resettlement is a typical adverse impact, particularly of large-scale dams and reservoir projects, which generally give rise to socio-economic problems. But, there are other water resources projects, which often give rise to involuntary resettlement. These include large-scale irrigation and sanitation projects, river diversion projects and canal construction. Involuntary resettlement generally results in loss of homes and property, deprivation of agricultural land, and loss of established livelihoods. Furthermore, it can lead to the weakening of community structures and loss of cultural identity. Poor planning without comprehensive social impact assessment and mitigation measures magnifies the negative impacts.

### ***Gender***

2.7.9. In contrast with their role as primary caretakers in the welfare of their societies, the role of African women in decision-making processes in the development and management of water resources has most often been neglected. In general, women have largely been excluded from institutional structures responsible for, or involved in, the planning and implementation of water-sector projects. Thus, in the past, projects have been formulated and implemented without taking into account the preferences and capacities of women. Furthermore, women also suffer from discriminatory land tenure systems, and inadequate access to credit which place them at a distinct disadvantage when it comes to allocation of resources for socio-economic activities. Policies to equip and empower women to participate at all levels in water resources management programmes are rare.

### ***Labor Issues***

2.7.10. Core labour standards (CLS) are gaining increasing acceptance as a basis for establishing criteria to which countries, all over the world are held accountable. The main elements of the CLS as developed by the ILO include the freedom of association and collective bargaining, elimination of forced or compulsory labour, abolition of child labour and the elimination of discrimination in employment. In the context of regional member countries, the greatest concerns in this respect relate to the freedom of association and the right to collective bargaining, which also tie up with governance issues. Gender discrimination in employment and child labour are also problems in some countries. In water resources management, some of the potential issues include the rights of workers involved in construction, the potentials of water sector projects in freeing young children to go to school, the relationship between water availability and health/environment of workers. Some initiatives clearly need to be taken by the Bank to address these issues in country programmes and projects.

### ***Other social issues***

2.7.11. Culture and tradition affect the behavior of people towards water as a social and economic good. Certain aspects of cultures and traditions may be incompatible with rational allocation and use of water resources or the preservation of

water quality. On a positive note, however, in practically all African cultures and traditions, water is a most hallowed, treasured, and respected resource – revered for its mystical role in sustaining life on Earth. As an important aspect of good governance in traditional Africa, communities everywhere have evolved institutional arrangements for developing and protecting water resources and allocating it among rich and poor families alike. It is true that these traditional institutions, which were not designed to mediate the problems that societies face today, have come under increasing strain, and some have even broken down altogether, resulting in the degradation or depletion of resources and heightened societal conflicts over dwindling supplies. The challenge for integrated water resource management in Africa, therefore, is to guarantee water security and equity for the African people in the 21st Century. In the quest for this objective, modern IWRM should learn from, adapt and incorporate relevant aspects of African cultures and traditions in water policies and strategies.

2.7.12 Similarly, the role and contribution of modern civil society organizations such as consumer groups, cooperatives, professional associations and other similar institutions, has not been significant in water resources management. These groups, if empowered and supported, could play important roles in terms of setting development goals, objectives and standards, participating in programme and project implementation, undertaking technology adaptation and research, and bridging the gap between the public sector and the benefiting communities.

***2.7.13 In addition to women, children and youth, as well as the poor, in general, bear a considerable burden of fetching water for families, particularly in rural areas. As has been pointed out earlier, this role is often performed at the expense of school enrolment and attendance. In formulating visions and plans on water resources management, it would be useful to incorporate the view of youth, so that they can be encouraged to imbibe the prerogatives and priorities of management in a water-scarce world.***

### 3. INTEGRATED WATER RESOURCES MANAGEMENT POLICY

#### 3.1 Basic principles and objective

3.1.1 The Bank Policy on integrated management of water resources has two basic principles and one central objective as follows:

**The basic principles are that water should be treated as an economic, social and environmental good, and; policies and options that guide water resources management should be analyzed within an integrated framework.**

**Its central objective is to promote efficient, equitable, and sustainable development through integrated water resources management.**

3.1.2 These basic principles and the central objective of the policy should guide the development, management and allocation of water resources in RMCs. In accordance with the policy principles and to attain the stated objective, a number of strategies have been elaborated. These strategies apply to or stem from the economic, social, and environmental spheres of influence, or to the technical infrastructure and institutional framework.

#### 3.2 Institutional strategies

##### *National water policies*

3.2.1 National policies are of fundamental importance because they provide the framework for legislation, strategic planning and operational management. The development and updating of national water policies *based on IWRM principles* is therefore of critical importance and should be high on the agenda of each government. Policy is the distillation of current political, economic, social, environmental and technological perspectives in a country. Such perspectives are always changing; therefore, policy should be dynamic and flexible in the medium term in order to adapt to new situations, and should be revised and updated regularly. Despite the need for flexibility, Policy must provide a firm basis for water resources planning, development and management. **Other aspects that should be given important consideration in national policy development are the response strategies in emergency situations arising from natural or man made disasters such as flooding, drought, earthquake etc. National water policies should provide for institutional mechanisms for the mitigation of such disasters when they occur or to take preventive measures to lessen their impact.**

3.2.2 Only a few African countries- Egypt, Malawi, Mozambique, Nigeria, Seychelles, South Africa, Uganda and Zambia- have approved national water policies. But not all of these policies are adequate to ensure effective management of water resources in the country context. Some countries have developed frameworks, which contain elements of policy, in the form of action or master plans, etc, but have not yet developed and ratified full-fledged policies. In general however, African countries are beginning to recognize the importance of a systematic approach to water management,

with policy formulation as the first step in the process. Political will and commitment are key elements that determine the capacity of governments to formulate and implement integrated water resources management policies.

### *Legislation and regulatory framework*

3.2.3 Water legislation is at a very early stage of development. This is not surprising, since, in the majority of countries, as indicated above, national water policies, which provide the basis for legislation, have not yet been formulated. Effective implementation of IWRM requires that stakeholders have a consensus on the legitimacy of decisions and actions of the institutions regulating different aspects of water resources management. Institutions or individuals involved in decision-making should be representative of the larger group of stakeholders, have a clear legal and social basis and, above all, they should be fair.

3.2.4 The improvement of water quality and alleviation of associated problems (e.g. health, the environmental situation, etc) must start with adequate legislation that requires polluters to take actions to prevent contamination of surface and groundwater, and also educate and train users and stakeholders in the prevention of water wastage and pollution. Failure to live up to stringent but reasonable environmental or health standards should be promptly penalized under the principle of “the polluter pays”. This should serve as an effective deterrent as well as defray clean up and/or various compensation costs.

### *Scale of management*

3.2.5 From a policy perspective, three issues should be taken into consideration. First, water resources management is multi-level and multi-sector. Water issues are handled at different levels, ranging from *international*, *regional*, national to household level. As mentioned earlier, river basins also provide a parallel management level, with potential management conflicts between the national and basin levels. Determining the most appropriate level of decentralization and the allocation of functions is a major challenge. Secondly, it is important to ensure that regulatory functions are separate from those of supply. Efforts should be made to establish autonomous institutions with responsibility for sector coordination and overall water resources management, distinct from institutions concerned with specific water sub-sectors. Thirdly, implementation of the integrated approach may prove initially difficult to achieve owing to the large number of institutions with interests in the water sector, the financial requirements, and the relatively long time horizon needed to achieve success.

### *Trans-boundary river basin management and organizations*

3.2.6 **The proper functioning of transboundary river basin organizations in the region is a key concern. The Bank will take a special interest in promoting the joint efforts of riparian countries in developing cost-effective strategies for integrated water resources management on the basis of mutual agreement. Thus, the Bank will support multinational organizations and river basin authorities that span more than one country, and support studies to identify the benefits of collaborative approaches in developing international shared water resources. The key approach is to promote regional cooperation and integration by helping to develop and strengthen institutions for managing shared waters, assisting in the**

**development of appropriate legislation, and supporting infrastructures for generating and sharing data and information. The corollary of this is that the Bank would seek for the co-operation of all riparian countries in respect of project or program proposals from one country, which involves the utilization of shared water resources.**

### *Decentralization*

3.2.7 Decentralization of water management can take several forms. Responsibilities for development and management of water resources can fully or partially be transferred to restructured public agencies, private agencies or water users associations. However, it is important to ensure that those institutions to which responsibility is devolved are strengthened and empowered, so that they can be effective, autonomous and accountable. It is also important to ensure that regulations governing quality standards, pricing, and mechanisms to promote competition and protect consumer interests, are put in place. This also applies to mechanisms to control pollution and protect aquatic ecosystems.

### *Water users associations in irrigation*

3.2.8 A recent trend in decentralization is the emerging role of water users associations (WUAs). An increasing number of governments around the world, including Africa, have adopted programs to delegate responsibility for irrigation management to water users associations. This form of decentralization through user participation helps to promote project success and sustainability, by ensuring that design choices and operational practices are consistent with local conditions, including crop requirements and farmer capacities. Projects involving user participation are more likely to be valued and maintained by the local population – and therefore likely to be more sustainable – than projects that do not incorporate user participation. Thus, projects designed and managed in a participatory way can draw on the capacity of community members to exert peer pressure to ensure that water user charges are paid.

3.2.9 Six elements are considered essential for successful delegation of responsibilities for management to Water Users Associations (Ref. 38). These may be stated as follows:

**Sustainable water rights vested in legally recognized water users associations, with the objective to enhance confidence in the service, and willingness to invest in the long-term viability of the system;**

**Clear and binding irrigation service agreements between governments and WUAs, and between user associations and individual users;**

- Balance between delegated responsibilities and authority, so that WUAs are able to accomplish their responsibilities;
- Delegation of integrated management responsibility, which implies that water users associations must have primary control over the three closely-interconnected roles of financial management, operations and maintenance, and conflict resolution;
- Adequate incentives and sanctions to ensure accountability, which are usually, absent in centrally financed irrigation agencies and development authorities; and,
- Institutional support to ensure that they have the requisite capacity to fulfil the responsibilities delegated to them.

### *Accountability*

3.2.10 Accountable agencies are responsible for the quantity and quality of their services, for the cost of operations and investments, and for effective policies and strategies. This includes readiness to disconnect non-paying customers. In many cases, government-run water supply agencies have lacked the political courage to enforce bill collection. Public agencies that are not required to cover their costs are often poorly motivated to provide good services, collect fees, or pursue cost-efficiency. Ensuring that public sector institutions in the water sector are motivated and accountable can solve this problem.

### *Autonomy and Governance*

3.2.11 An important principle in restructuring public service agencies is to convert them into financially autonomous entities, with effective authority to charge and collect fees, and with freedom to manage their affairs. Autonomous entities should set realistic budget constraints that provide them with adequate incentives to be efficient in their operations. They should also be tasked to efficiently collect user fees for services provided. Capacity to self-finance a significant portion of current operations, maintenance, and capital expenditures is an essential precondition for financial autonomy, accountability and political independence of water entities. Furthermore, clients' willingness to pay is an important gauge of the quality of services rendered.

3.2.12 It should also be recognized that water resources markets operate only imperfectly. It is necessary, therefore, to protect public and consumer interest against natural monopolistic tendencies of autonomous water resource agencies and utility companies. This requires RMCs to develop competent regulatory capacities and to establish independent watchdog institutions.

3.2.13 In addition to creating an enabling legal, institutional and technical environment, governments should play an important role in fostering user participation by providing technical training for water user associations and communities or institutional organizers. The Bank is committed to support governments in this process. NGOs can also provide assistance in organizing water users into effective and responsible associations, and the Bank would be ready to lend technical support in this direction.

3.2.14 Governments also have to make strenuous efforts to promote good governance. This involves the institutionalization of financial and administrative accountability, transparency and fairness; ensuring effective participation and inclusiveness in governance at all levels, allowing the systems of checks and balances to function well; providing for independent audit systems for the public sector etc. Experience in the region has indicated that achieving success in the area of good governance is an important ingredient in the effective functioning of institutions, attracting domestic and foreign investment, achieving sustainability and generally in the fructification of efforts made in other areas of water resources management. Box 1 below delineates policy statements, which provide a framework for Bank intervention on institutional issues.

#### **Box 1: Policy statements on Institutional Issues**

*The Bank :*

1. Considers it essential that national Integrated Water Resources Management Policies (IWRMPs) be developed and implemented.
2. **Will use the Country Strategy Papers as a basis for dialogue with RMCs to encourage the development and implementation of such policies.**
3. Will, in future water projects give financing priority to those projects that comply with national policies that are based on the concept of IWRM.
4. Will support, where possible, countries that wish to develop their national IWRM Policies. A limited amount of financial support from the Technical Assistance Fund (TAF) may be used for such purposes.
5. Notes that water resources development, regulation, and service provision are three distinct functions. Ideally, these functions should be executed by separate organizations. Umbrella organizations should be mandated to exercise responsibilities for integrated water resources management at the national or basin level. Water services utilities should provide services to consumers at a fee, subject to regulation. Water resources management organizations should preferably cover the area of a river basin unit on a scale, which is administratively feasible.
6. Recognizes that inadequate human resources capacity often presents a constraint in the proper functioning of organizations in the water sector. The Bank, therefore, will strengthen its partnership with specialized institutions to promote activities such as training and research.
7. **Will promote and support joint efforts of riparian countries in developing strategies for integrated water resources management on the basis of mutual agreement.**
8. **Will support multinational organizations and river basin authorities that span more than one country.**
9. **Seek broad agreement with riparian countries in respect of project proposals emanating from one country, for the development of shared water resources.**
10. Urges RMC governments to review and sharpen their role in the management of water resources, in order to create an enabling environment for more effective public-private partnerships (PPPs) in the water sector, including the participation of users and community associations, local councils, NGOs, private sector entrepreneurs, and capital markets. Institutional arrangements to guarantee autonomy and accountability as well as to protect service providers need to be carefully thought out, discussed, and evaluated. The sharing of experience and best practices among African countries and from countries in other regions of the world should prove immensely useful in this regard. Promoting good governance is also an important aspect of an enabling environment.



### 3.3 Technical strategies

#### *Better knowledge of the water resources*

3.3.1. Long term strategic planning depends upon knowledge. Programmes to increase capacity in this area, therefore, should be high on the agenda. Water resources development planners need information on the occurrence and distribution of water and natural and physical factors such as topography, soils, geology and land. Water supply companies should have knowledge concerning the changing water demand patterns of households. Sector ministries should have accurate knowledge about water consumption (and pollution) patterns of their sectors. This knowledge is gained through sustained and systematic programmes of data and information gathering, analysis, synthesis and research on the range of issues pertinent to water resources, the environment and social welfare. This will generate real-time series, and facilitate continuous monitoring, evaluation and assessment of water resources. Building such a database, and making it accessible to users would level the playing field among stakeholders, and advance technical knowledge and decision-making at regional level for shared water resources. A major function of water regulation should also be to ensure that consumers are given accurate and timely information, and that prices are a fair reflection of the water market situation.

#### *Appropriate technologies*

3.3.2. A prerequisite for successful water management is to ensure that technologies that are introduced are accessible, socially acceptable, and can easily be maintained. Continuity of operation and maintenance must be guaranteed. Local knowledge in water systems and their utilization should also be tapped. This, therefore, will be one of the appraisal criteria in each Bank-supported project. In line with this approach, existing traditional technologies and practices should be carefully evaluated, adopted or adapted as may be applicable. It must be stressed though, that the notion of appropriate technology does not exclude the utilization of up-to-date sophisticated technologies, provided that sufficient attention is paid to cost effectiveness and maintenance.

#### *Meeting Water Supply Scarcity*

***3.3.3. In response to the anticipated increase in future water demand and scarcity in Africa coupled with the uneven distribution of water in time and space, implementation of technical measures will be required. These measures include, but are not limited to, the construction of water conservation structures such as dams for supply augmentation and use during dry periods and water transfer facilities to take water from surplus areas to deficient areas. On the demand side, water use productivity has to be raised by increasing efficiency through the rehabilitation of existing facilities, building more efficient systems and changing water use patterns. Other innovative approaches such as water harvesting, land management, increased water recycling and reclamation through desalinization should be applied as appropriate.***

#### *Flood and Drought Mitigation Measures*

**3.3.4 Flood mitigation measures such as catchment conservation, creation of storage facilities to attenuate extreme events, river training and regulation, and flood plain management will be required. Water conservation through storage creation and replenishment of underground aquifers should be considered for use in drought conditions. All of the above measures can be planned and implemented in the framework of IWRM.** In Box 2 below, policy statements on technical issues are summarized.

#### **Box 2: Policy Statements on Technical Issues**

*The Bank Will :*

1. Stress, in the course of its interventions, the importance of water resources quantity and quality assessment and monitoring and collection of data on other natural, environmental, economic, social and technical factors necessary for water resources development and management. The Bank would therefore promote the development of adequate data management and water information systems, as a basis for sustainable development and management of water resources. The establishment of Early Warning Systems for drought and flood control would be encouraged.
2. **Support** projects, whose objective is to establish sustainable water assessment and monitoring programs, should be established, as much as possible, on the basis of cost-recovery.
3. Encourage RMCs to give a high priority (i.e. through skilled human resource development, and sustained financing of data and information systems, and research) to the development of capacity to generate and continuously update their knowledge of water resources issues.
4. **Promote and support water conservation and augmentation projects that are aimed at addressing water scarcity problems through increased water productivity and supply development.**
5. **Support the planning and implementation of structural and nonstructural flood and drought mitigation measures in the framework of IWRM approach.**
6. Encourage the **application of appropriate** technologies, which would enhance **water availability and supply**, particularly efficiency in water use in agriculture and irrigation, improve leakage control and detection **and enhance water reclamation and recycling.**
7. Encourage the adoption of **efficient** technologies, particularly **for increasing water productivity** in agriculture and improve leakage control and detection **in water supply systems.**
8. Ensure that rehabilitation is giving priority, where applicable, in project appraisal, as an alternative to costly new capital expenditures.

### 3.4 Economic strategies

#### *Pre-requisites for Economic Policy*

3.4.1 The following facts should be taken into account when economic policies and strategies for water resources management are formulated and implemented:

- Water is a location-specific resource and, for the most part, is not traded between sectors.
- Typically, characteristics of water markets include falling marginal costs in production, physical constraints, high investment costs, information asymmetry, legal constraints, complex institutional structures, vital interests of different user groups, cultural values and traditions, and concerns over resource sustainability.
- Investments in the water sector typically occur over medium-term phases and projects have a long productive life. Economies of scale in water supply projects are moderate in production and transmission but rather low in distribution;
- Water pricing is rarely efficient. Administered tariffs often fall below cost, and governments usually finance the bulk of construction costs and operational deficits. This makes water supply a public well in many countries. Charging prices that are adequate from an economic viewpoint tends to be a politically sensitive issue.
- Water is vital for human life and for the survival of ecosystems, and is, therefore, an essential commodity. Water projects have the potential to produce significant socio-economic benefits of a public good nature, such as improvements in health, and related positive externalities which are not taken into account in the production decisions of private agents.
- Despite the preciousness of water, it is wasted in low value applications or used in excess because water pricing does not accurately transmit to consumers its scarcity value. Similarly, water resources are lost on a large scale through degradation and contamination because consumers are not charged the full cost of restoring quality after water usage, through effective application of the principle of “polluter pays”.

#### *Pricing and its role in IWRM*

3.4.2 Getting the prices right is at the very core of improving water resources management. Within the process of establishing appropriate fees and fee-structures, economic, environmental, financial and social considerations play a crucial role, and these issues are hereby briefly reviewed.

#### *Economic considerations*

3.4.3 Prices should be set to give incentives to users to use water efficiently and sparingly in their various applications, and to producers to supply water at adequate

rates and quality levels. Treating water as an economic good recognizes that water carries an opportunity cost. Welfare is maximized when prices charged for water are equal to its long-term marginal cost of production (distribution and supply). This should include the opportunity cost of the underlying water resources. In this situation, economic or allocative efficiency is achieved.

#### *Environmental considerations*

3.4.4 Treating water as an economic good should include the “polluter pays” principle. In this regard, the Bank will promote the incorporation of environmental costs in water fees through the effective implementation of this principle. It could be applied through several possible approaches. For example, the cost of an adverse impact on the environment could be internalized through the inclusion of the cost of mitigate measures in the life-cycle costs of the investment. Another possible approach is by using the “polluter pays” principle to give incentives to industries to abate pollution and to treat their wastewater on site, in accordance with stipulated standards, before discharging effluents into the wastewater system. This will reduce the burden on wastewater treatment plants. The “polluter pays” principle should also be applied to domestic water consumers, in order to convey the full cost of water consumption – which includes the treatment of wastewater for safe disposal, back into the ecosystem and freshwater resources base. Sewer and sewage treatment costs, for example, could automatically be surcharged on consumers’ water supply bills, preferably on the basis of volumetric rates of consumption.

#### *Financial considerations*

3.4.5 Since the costs of expanding water services and improving water resources management are high, further public and private investments will need to be based on a consensus on improved cost recovery. The Bank recognizes, however, that, although optimal economic efficiency would be achieved by billing users on the basis of the full economic cost of water, a more realistic and immediate objective is to charge users at the (usually lower) price for the recovery of financial costs.

3.4.6 For projects to be financially sustainable without necessitating subsidies from the government, the average unit price to the consumer must be set equal to the financial unit cost of producing and supplying water. If, however, government subsidies should be provided for whatever reasons, they should be determined on a transparent basis – preferably, by an independent regulator, mediating between government and water supply utilities – taking into account cost recovery from consumers through direct charges.

#### *Public and Private Partnerships*

**3.4.7 Private sector participation in the water sector can be an effective way of mobilizing investment funds and increasing the autonomy and accountability of service providers. In principle, private sector participation could be introduced in all water sub-sectors. Private sector participation is best developed and most commonly practiced in water supply and sanitation (WSS) and in irrigation. Governments should encourage private sector participation in the sub-sector**

**3.4.8 There are several options for private sector participation, including service contracts, management contracts, lease, concessions, build-operate-transfer (BOT), build-operate-own (BOO), and divestiture. Their applicability depends on several factors, such as the type of problems governments aim to solve, the legal and regulatory framework, financial and political feasibility, risks that need to be allocated or mitigated, etc. The choice for one specific option should follow a carefully designed and consultative process involving all stakeholders.**

*Social considerations*

3.4.9 Government subsidies on water have often been justified on the basis of catering to the needs of the poor. In practice, however, subsidies have often proven to be ineffective – or even counterproductive – ways of helping the poor. In the irrigation sector, the absence of mechanisms to ensure equitable access to resources has left the poorest of farmers at the tail end of the distribution system, with serious water shortages due to the wasteful consumption of more favored – and better off -- farmers.

3.4.10 If subsidies on drinking water for the poor are required, progressive block tariff schedules should be introduced, in which a floor-price is charged for a limited lifeline amount of water, while a higher price is levied on additional quantities of water. On aggregate, however, the tariff structure should be targeted at achieving full cost recovery to ensure financial sustainability of water provision without relying on budgetary subsidies. The block tariff schedule approach is an effective way of realizing cross-subsidization, with richer consumers paying part of the cost of providing water and sewerage services to the poor. This progressive price structure, however, has additional economic validity. It transmits a signal, through a rise in the marginal cost of water supply to satisfy consumption above the lifeline level and, therefore, serves to restrain excess consumption and to encourage frugality and conservation. Furthermore, the low price at the lifeline level of consumption is justifiable on the basis of the positive externalities of domestic water consumption.

*Transfer pricing*

**3.4.11** Transfer pricing between urban and rural water supply is a special case. When cities and towns obtain raw water from basins shared with rural areas, a levy per cubic meter could be charged and collected by the basin-level or national water management organization. This principle is equitable, because urban households and industries generally enjoy higher income levels relative to rural households and producers. Secondly, urban households and industries have a higher and rising demand for water as compared to rural consumers. The levy on urban water consumption should then be used to finance part of the capital investment for the development of rural water supply and sanitation systems. The same principle could be applied for hydropower development and supply of electric energy to low income groups in urban and rural areas.

3.4.12 Subject to the terms of agreements among riparian states on the management, use and conservation of transboundary water resources, transfer pricing could also be used as an instrument for the equitable allocation of water resources among countries sharing common basins.

*Non-price measures to improve efficiency*

3.4.13 In some countries, implementing water price reforms poses a number of difficulties. Rural or urban dwellers may apply political pressure to resist paying for water. Technical and managerial capacity may be inadequate to assess and enforce charges. Where this is true, non-price measures can be used to encourage consumers to use water more efficiently. Possible approaches include transferring management responsibilities to user groups or promoting the development of water rights and local water markets. The success of these approaches however depend heavily on the extent to which these user groups have been involved in policy formulation and implementation.

*Demand management and conservation*

3.4.14 Demand management and conservation of water resources are low cost alternatives to supply augmentation, often with a higher rate of return than investments in new supply capacity. The viability of using these measures therefore should be explored before more costly alternatives are embarked upon.

3.4.15 Demand management and conservation can take several forms, as outlined below:

- Regulatory or command and control measures, including restriction on certain uses of water, rationing and supply intermittence;
- use of pricing as an instrument of demand management – this is most efficient when prices are low, and the price elasticity of demand is high;
- incentives to encourage use of water saving devices – such as duo-flush cisterns, efficient shower heads and spring-loaded water taps;
- public campaigns to promote frugality and conservation; and
- regular monitoring to control and prevent pipeline leakage in the water distribution system.

3.4.16 Regulatory rather than economic instruments have often been used to allocate water, to encourage conservation, and to protect water quality. Recently, the inefficiencies and high economic costs of regulatory approaches have led many OECD countries to introduce alternative approaches that rely on economic incentives, such as pricing and water markets, to encourage measures for balancing supply and demand (Ref. 24). Efficient pricing also stimulates economic growth since it allocates or reallocates water from low-value uses to high-value uses, such as from irrigation to domestic water supply.

3.4.17 Where water is scarce and locked-up in low-value uses, the Bank will encourage RMCs to investigate market-based reallocation of water as a strategic alternative for expensive supply augmentation. The procedure to be followed will entail a comparison of the foregone net economic benefits through reallocation of water from one source to another, with the economic cost of developing additional water resources. Due attention, of course, will need to be given to sunk-investments, and to the associated transaction cost of reallocating water.

3.4.18 In the irrigation and drinking water sub-sectors, water is lost in huge quantities within the distribution system. This is attributable to deferred maintenance programmes

due to insufficient funds, and inadequate incentives to reduce unaccounted-for water due to distribution losses. Reduction of those losses can yield significant benefits, both to utilities and to the economy. This does not imply that losses should be reduced to a zero level. Instead, losses should be reduced to the point where the marginal benefits justify the marginal costs of implementing the measures.

3.4.19 The Bank will therefore support programmes aimed at reduction of distribution pipe network losses in urban and rural water supply systems, and improvement of water efficiency in the irrigation sector.

3.4.20 The Bank is aware, however, that, in many RMCs, installed capacities in water supply, sanitation, irrigation *and power* have remained static for decades, or even decreased due to lack of maintenance. Yet, there has been a rapid population growth and urbanization. Demand management measures alone are therefore, in some cases, not enough to increase the rate of access to dependable water supplies *or availability for food and energy production* without investing in new supply capacity, expansions of (or wholly new) distribution networks, and wastewater collection and treatment systems. Where required therefore, the Bank will support augmentation of installed capacity *and development of new systems to meet increasing demands*.

#### *Private sector participation*

##### *Scope for Private Participation*

3.4.21 **The promotion of private sector participation however requires an enabling environment, including a favorable framework of incentives and regulations. In many RMCs there is also a need for well-targeted support programmes for building entrepreneurial capacity. The Bank will support RMCs in establishing these conditions to promote private sector participation in the water sector. It will also work in direct partnership with private players to promote ways – including joint ventures with foreign investors and expertise – of financing water resources development on a commercial basis.**

3.4.22 **It is recognized, however, that there are limits to what can be achieved by relying on private sector entrepreneurship. For example, it is a fact that capital markets in most RMCs are not yet developed enough to be able to mobilize the volume of capital required to develop their water resources. Investment costs in water infrastructures tend to be large, while project economic lives are long, and the payback period is usually measured in terms of decades (Ref. 18). On the other hand, the social – and political – nature of water means that there are enormous pressures to keep service prices low. This is exacerbated by the high incidence of poverty in the region, low and highly uncertain household incomes, and domestic consumers' low capacity to pay. All these translate into high political and commercial risks and, potentially, a low rate of return on investment. The transition from public to private provision of water and sanitation services, therefore, will take time, considerable imagination, flexibility, and policy dialogue among all concerned stakeholders.**

##### *The private sector in irrigation*

**3.4.23** A survey of the irrigation sub-sector in Sub-Saharan Africa shows relatively successful records of small-scale private irrigation systems, in contrast with the spotty record of large-scale public schemes. It must be acknowledged, though, that small-scale irrigation schemes have some design and institutional limitations, and may not always provide the right solution. Nevertheless, there is clear evidence that where applicable, the chances of success in irrigation development are greatly enhanced by use of small-scale private systems (Ref. 16).

**3.4.24** Private small- or medium-scale irrigation schemes tend to cost less per hectare than large public schemes. The use of local labor and resources in construction, and the contribution of local beneficiaries to operations and maintenance costs, relieves the government of part of the financial burden. Large-scale irrigation schemes can be jointly implemented with the public sector. In this approach major investments for the main hydraulic infrastructures are allocated from the public sector while other costs for development and operation are taken up by the private sector.

**3.4.25** RMCs should do more to promote the development of such private irrigation schemes – by creating favorable conditions. These include: simplified laws to govern water resources, clearly defining and enforcing legal rights and responsibilities; reform of land tenure systems to strengthen the protection of property rights, and the development of the domestic credit market (particularly micro-credit).

**3.4.26** The Bank will support RMC programmes for the development of small- and medium-scale irrigation schemes, as an integral component of rural development, as spelt out in the Bank's Agricultural and Rural Development Sector Policy (Ref. 11). Assistance will also be provided to resolve the problems and constraints of large public schemes, in order to adequately address problems at policy, managerial, or operational levels, which cause projects to operate sub-optimally. The Bank will, therefore, consider providing technical assistance funds, on a case by case basis, to support key issues such as investigation of approaches to restructure large-scale schemes, including the option of transferring operations and maintenance responsibilities to competent water user associations. The Bank will also consider, on a case by case basis, and in line with the principles of this IWRM Policy, providing financial support towards the rehabilitation of existing irrigation infrastructure as a necessary precondition to successful restructuring.

**3.4.27** Taking into consideration all the issues raised and the strategies outlined, Box 3 encapsulates the main elements of the Policy with respect to economic issues.

#### **Box 3: Policy Statement on Economic Issues**

1. In the context of increasing water scarcity, economic cost pricing, including recognition of opportunity cost should be used as a basis for water allocation decisions.
2. Ultimately, the aim of water pricing should be economic cost recovery, taking into account social equity and capacity to pay by the rural and urban poor. Initially, however, RMCs should target the recovery of full financial costs.



3. The principle of “the polluter pays” is crucial in protecting freshwater resources from pollution and degradation. Its implementation will ensure that consumers and other water users are made aware of the costs of maintaining water resources at a minimum quality level, commensurate with the continued integrity of natural aquatic ecosystems or the safety of surface and ground water resources for human consumption. The Bank will provide support to RMCs in formulating policies, legal instruments and institutional arrangements to monitor and implement this principle.
4. The Bank will support RMCs’ strategies to develop appropriate water pricing policies. In order to balance the interests of different consumer groups, the general public, and service providers (whether public or private) RMCs need to put in place competent regulatory capacities.
5. Due consideration should be given to demand management and conservation as important alternatives to costly supply capacity augmentation in certain situations. In this context, pricing is also a demand management tool, which encourages efficient utilization of water and minimizes wastage, promotes sustainability, conservation and protection of water resources.
6. The Bank will promote public-private partnerships, by: helping to create an enabling environment; ensuring the application of good governance; promoting regional co-operation and facilitating the acquisition and exchange of knowledge and experience in such partnerships.
7. The Bank will facilitate the participation of the private sector and Water User Associations in the water sector of RMCs. The Bank will also be an active partner in finding ways to alleviate the social impacts (e.g. unemployment, increased prices) that are likely to accompany increased private sector participation.
8. The Bank will support the sustainable development of small, medium and –large scale irrigation schemes, where applicable.

### **3.5 Social strategies**

3.5.1 As water is a social good, all dimensions of water resources management should be analyzed adequately from the social perspective, with a view to elucidating social issues which are critical to achieving integrated water resources management as well as maximizing social benefits and mitigating detrimental social impacts. The need for establishing adequate networks for water resources assessment, monitoring water quality, and addressing social and cultural issues associated with sustainable management of water resources is a challenge facing most African countries. Social analysis and identification of critical social issues at the onset of projects will enable the incorporation of appropriate responses for mitigating negative impacts. Thus it is necessary to undertake social impact assessment in integrated water resources management projects. However, methodologies to be applied need to be determined on a project by project basis. The following indicate the strategies corresponding to different social issues in relation to integrated water resources management, and Box 4 provides a summary of the relevant policy statements.

### ***Population pressure and urbanization***

3.5.2 Fresh water resources are scarce and finite. The social aspect of sustainability of water resources deals with the capacity to manage population growth to achieve stability in water demand. In most RMCs, the key strategies used are to lower population growth rates, and ensure balanced spatial distribution of the populations. Successful implementation of these strategies entails awareness raising, sensitization, education and training programs, and the use of incentives. In the urban areas, there is a need for municipal administrators and planners to give due recognition to informal settlements and slums in peri-urban areas, and find practical solutions to the challenge of providing people, especially the poor, with basic adequate amenities, including water supply and sanitation facilities. Their willingness to pay for such services is often higher than is usually assumed as indicated by the high prices paid for water from vendors. RMCs should also make a long term commitment to developing rural and marginal areas by creating the enabling environment for the creation of jobs, and the development of alternative resources such as fisheries, and fish farming to reduce current rapid urbanization.

3.5.3 A comprehensive analysis of the linkages of water resources and human settlement also calls for an examination of the system of land ownership and land use patterns in rural and urban areas, respectively.

### ***Health and education***

3.5.4 Education aimed at creating awareness and a positive change of attitude among the population on the hygienic use and sustainable management of water resources is a key element to health improvement. Health and education programs targeted at improving the operation of domestic water facilities, hygiene in the home, and the proper storage and use of water supplies should be encouraged. ***The preventive and control measures of water related disease such as malaria and schistosomiasis should be taken as integral parts of water resources management practices based on health impact assessment (HIA) of projects.*** Such programs need to be flexible, participatory, and sensitive to complex social and cultural norms and perceptions. For the meaningful involvement of the public, public information sessions, mass-campaign and motivation are most essential.

### ***Involuntary resettlement***

3.5.5 The Bank's policy is to minimize involuntary resettlement and its negative impacts associated with projects. To achieve this objective, an environmental impact assessment (EIA) is conducted in compliance with the Bank's environmental policy to indicate potential negative externalities. However, resettlement cannot always be completely avoided. In such a case, the EIA should always indicate the adverse effects of a project on the socio-economic environment, and include a resettlement plan with adequate mitigation measures. Resettlement should be accompanied with sufficient mitigation measures, which cover compensation for lost properties, and assistance to resettle people and find them alternative employment. The standard of living of people displaced should be maintained. Minimum facilities should be provided for those resettled, which should be made an integral part of the project cost. At any rate,

resettlement programmes should be carried out with the full participation of the target populations.

### *Gender*

3.5.6 Gender equity implies the effective participation of women in the planning, design, implementation, evaluation, and all other decision-making processes in water resources development and management. The role of women as custodians of food and water related issues at household level should be fully taken into account. Women are particularly concerned about family and community issues. They may therefore be better contributors to the establishment and maintenance of project facilities. Experience has shown that women are sometimes better financial managers of water projects. They may also have preferences for different services that could enable them to engage in higher economic value activities.

3.5.7 The Bank will therefore support water resources projects and policies that:

- give due recognition to the role of women, alongside men, as custodians of domestic water consumption and, as agricultural and food producers, who have interests in irrigation;
- improve women's access to and control over production factors, services and infrastructure facilities;
- reduce the domestic workload of women;
- create opportunities for women to improve their knowledge and capacities;
- seek women's active participation in decision-making at domestic, local, national and international levels; and
- Strengthen women's organizations.

### *Participation*

3.5.8 A demand-responsive approach is key to the successful development of water resources. In contrast to centralized, top-down approaches that were generally favored in the past, the demand-responsive approach is participatory and involves beneficiaries at every stage. This process has the advantage that users' preferences for different levels of services, and their willingness and ability to pay can be taken into account in the project design. Experience has shown that projects and programmes that are built on a demand-responsive approach tend to be more successful and have better prospects for sustainability than those, which are supply-driven.

3.5.9. A study conducted under the UNDP-World Bank Water and Sanitation Program (Ref. 25), provides the following useful recommendations for making rural water supply sustainable:

- **Adopting a demand-responsive approach will improve the sustainability of water systems.**  
The study provides evidence that better results are achieved when preferences for service levels, technology and siting are obtained directly from well-informed households, rather than from traditional leaders or water committees.

- **Training for household members and for water committees improves sustainability by building capacity and commitment.**

Training should include the provision of knowledge on how to operate and maintain systems, as well as about the potential health benefits of an improved supply. It was found that the latter affects the way households value the service and thereby their willingness to sustain the system.

- **Designated and accountable community organizations are necessary components of success.**

Giving clear responsibilities for management, operations, maintenance and fee collection to community organizations increases the sustainability of projects. Such organizations should be transparent, accountable, and trusted by community members.

#### *Other social issues*

3.5.10 Cultural and traditional values of people in relation to water resources should be studied to provide a basis for designing an effective information, communication and education programme to deepen community understanding of sustainable utilization and management of water resources. As stakeholders, modern civil organizations such as consumer associations, cooperatives and professional associations should be taken on board, supported and empowered to enable them to participate significantly in water resources management.

#### **Box 4: Policy Statements on Social Issues**

1. As a social good, there is a universal right to water and it should be made available to all at an affordable cost.
2. Gender issues should be taken into account in integrated water resources management. The Bank will strongly support, water resources development projects which show good prospects of reducing the time spent by women and girls in fetching and storing water.
3. The Bank will bring up issues on Core Labour Standards in the process of discussions with RMCs, and appraise programmes and projects in the water sector to ensure that they are in conformity with established criteria on labour.
4. Where involved, the Bank will ensure that stakeholders are effective participants in all decision-making process likely to affect them. Their willingness and capacity to pay for water resources development should be sought and not just assumed.
5. *The Bank will ensure that control and prevention measures of water related disease are integrated as part of the water management practices control and prevention measures based on proper health impact assessment and through effective stakeholder participation.*

### **3.6 Environmental strategies**

#### *Environmental linkages*

3.6.1 The Bank encourages its RMCs to make environmental considerations an integral part of water resources management, so that adverse impacts are avoided or minimized in its investment programmes and projects. Important environmental issues should be identified early in the project cycle of water projects.

3.6.2 There is a close correlation between environmental degradation of water resources and poverty. The poor must often use poor quality water contaminated by sewage, industrial and agricultural pollutants or siltation from soil erosion and suffer from debilitating diseases. In poor societies, a substantial amount of time is taken to search for water and energy supply particularly by women and children. The trees cut, the crop residues and animal dung collected from the agricultural land for household energy supply result in severe soil fertility and land degradation, which will eventually affect water quality and quantity. On the other hand poor societies are incapable in terms of resources, knowledge and organizational skill to undertake measures for mitigating environmental degradation, thus resulting in a continuous spiral of poverty and environmental deterioration. Therefore, policies such as the provision of interest free loans for the mitigation of environmental degradation and poverty reduction in the context of integrated water resources management should be explored. The rich industrialized countries should take a certain responsibility in this field.

3.6.3 Integrated water resources management, with proper co-ordination of the various water sectors, is an effective mechanism for abating water-related health and environmental problems and for enhancing existing water resources conditions. In the following sections, various issues related to environmental strategies and integrated water resources management in Africa are highlighted, while Box 5 at the end of the chapter captures the various dimensions in the form of policy statements.

#### *Conservation of the resource base*

3.6.4 Instead of considering the environment as a “user” of water it should be regarded as a “water reserve”, which should take precedence before the allocation of water resources for other uses. Sustaining the water resource base is essential for maintaining water security and environmental sustainability. In general, international co-operation is required for conservation of the resource base, because Africa’s water resources are predominantly transboundary. Including environment in the “water reserve” guarantees adequate inflows (environmental flows) for the ecological functions of river and wetland systems.

#### *Improving water supply, sanitation and health*

3.6.5 Strategies to abate waste and wastewater pollution, and protect water sources include; improving waste collection, establishment of environmentally proper waste disposal, and the construction of sufficient municipal and industrial wastewater treatment plants.

### ***Protection of catchment areas and erosion control***

3.6.6 An integrated approach to water resources management is also a prerequisite to combating land degradation (soil and gully erosion), floods, and diminished water retention of river basins, as a result of unsustainable land use practices (deforestation, overgrazing, uncoordinated urbanization). Watershed management must be developed so as to cover all major river basins. An essential aspect of this strategy is the involvement of rural communities who are true stewards of watersheds. Watershed management, through the application of best management practices to protect, rehabilitate, and enhance watersheds is an integral aspect of integrated water resources management.

### ***Sustaining bio-diversity***

3.6.7 Future development in agriculture, food production, animal husbandry and related biotechnology, forestry, and medicines will depend on genetic resources in the flora and fauna available in the environment. These are important reasons to preserve biodiversity, especially in vulnerable ecosystems, such as tropical forests and coastal and marine habitats.

3.6.8 A strong incentive for sustainable forest management and conservation, by which biodiversity can be preserved, is that conservation provides a higher rate of return than does conversion of forest to agricultural land. Adequately managed forests also play a major role in water conservation and water resources management. As regards the aquatic environment, for many species of shrimp, fish and waterfowl, the tidal and fresh water marshes and the coastal lagoons and estuaries are of vital importance as breeding grounds as well as staging areas in their migration routes.

3.6.9 When a proposed project causes adverse effects on biological diversity (as shown in an Environmental Impact Assessment), sufficient mitigation measures should be formulated and implemented to compensate the negative impacts. If this is not possible, the proposed project should be rejected. ***The Bank would seek to play an active role in facilitating the access of RMCs to the grants from the Global Environmental Facility (GEF) in respect of projects and programmes in the areas of bio-diversity, land degradation, desertification and shared waters.***

### ***Environmentally sound construction of dams and reservoirs***

3.6.10 ***Dams will be required for water conservation and will play a vital role in providing water for domestic and industrial supply, irrigation, power generation and contribute to flood and drought mitigation.*** A proper feasibility study and environmental impact assessment should indicate whether dam and reservoir construction would be economically, environmentally and socially feasible and acceptable, and whether mitigation measures could compensate for the damage. With dam projects, adequate mitigation measures should be designed and implemented to compensate for physical/biological and socio-economic adverse impacts, including resettlement.

### ***Sustaining the marine and coastal environment***

3.6.11 Coastal ecosystems are not demarcated by physical boundaries, but form one system along the coast of various countries. The approach should be to develop integrated and coordinated environmental protection policies, aiming at the sustainable development of coastal environments. There is a need for coastal zone management policies, providing a balance between the exploitation of natural resources, the conservation of these sources, the preservation of the environment and the promotion of human well being. ***Another important area is the protection of coastal aquifers from over-abstraction and saline intrusion.*** In international conferences, especially since 1972 (Stockholm Conference on the Human Environment), the philosophy of global solidarity has been widely proclaimed (United Nations Law of the Sea Conference, 1982 United Nations Conference on Environment and Development, Rio de Janeiro, 1992).

3.6.12 Currently, actions to control and minimize degradation of the marine environment are based on National Environmental Action Plans (NEAPs). In several countries these NEAPs have already been prepared. Furthermore, national institutions are involved in various aspects of coastal area development and management. Since 1984, several countries have actively participated in the UNEP/WACAF-2 and -3 projects, on the monitoring of pollution and coastal erosion. Another activity is the “Dump Watch Programme” for tracking and reporting export of hazardous waste to the region. A major issue at present is institutional capacity building, human resources development and introduction of clean technologies for industrial production and waste management.

3.6.13 A major step forward to protect and rehabilitate the unique marine ecosystem of the Gulf of Guinea is the recently adopted (10 July 1998) “Accra Declaration on the Environmentally Sustainable Development of the Large Marine Ecosystem of the Gulf of Guinea”. This Declaration has been adopted by the Committee of Ministers of Environment of Benin, Cameroon, Côte d’Ivoire, Ghana, Togo and Nigeria. With the Accra Declaration as a basis, relevant institutions, agencies and NGOs of the concerned countries should co-operate nationally and internationally to support the decisions made in the Declaration. It should help promote economic development, which promotes environmental protection.

### ***Combating drought and desertification***

3.6.14 Integrated Water Resources Management and land use planning at sub-regional or international level, are essential tools for sustainable development in arid and semi-arid regions. The international community has long recognized that desertification is a major economic, social and environmental problem. Since 1977, the United Nations Conference on Desertification adopted a Plan of Action to Combat Desertification. Despite this and other efforts, the United Nations Environment Programme (UNEP) concluded in 1991 that the problem of land degradation in arid, semi-arid, and dry sub-humid areas had intensified. Thus, desertification was still a major concern for the 1992 United Nations Conference on Environment and Development in Rio de Janeiro. As a result of a resolution from the conference, the UN General Assembly adopted the International Convention on Drought and Desertification (CDD), particularly in Africa, in October 1994. The convention entered into force in December 1996, and by December 1998, 144 countries had actually ratified it, including 49 African states.

The articles include:

- commitments and obligations of African Country Parties;
- a strategic planning framework;
- contents of the preparation of national action programmes.

**3.6.15 The Convention encourages countries to give due priority to activities that would combat desertification. The Bank supports this priority and will seek to increase its involvement in providing support for its implementation.**

*Solid waste management*

3.6.16 Analogous with the necessity for treating wastewater, it is equally important to protect surface and groundwater from the detrimental effects of solid waste. Solid waste dumpsites must be located and controlled in such a way that risks for human health is eliminated. The Bank urges countries to incorporate policy on the relation between solid waste management and IWRM into national IWRMPs, and appropriate actions into the National Environmental Action Plans.

*Relationship with National Environmental Action Plans*

3.6.17 National Environmental Action Plans (NEAPs) and similar national frameworks for sustainable development have been developed by many countries, but implemented by only a few. The NEAPs generally promote an integrated approach and could serve as important tools for IWRM and donor collaboration. The Bank highly favors such cross-linkages.

**Box 5: Policy Statements on Environmental Issues**

1. Water is an environmental good with three major dimensions: (1) it is required by all living creatures and it is vital for the survival of ecosystems; (2) as part of the natural environment, it is an asset with aesthetic values; (3) it is an essential component in the positional transfer of matter and energy. Although these environmental dimensions cannot always be assessed in monetary terms, they should be evaluated through the decision-making process.
2. The Bank will only finance water related projects for which adequate environmental impact assessment have been conducted, and where the costs of necessary mitigation measures have been incorporated into the overall project costs.
3. The Bank will promote the treatment of domestic and industrial wastewater as essential to the environment in general and health in particular. In general, the level of capital investment in sanitation and treatment facilities is relatively low compared to that of water supply facilities. The Bank will only finance water supply projects, for which the sanitation and wastewater aspects are adequately covered, if applicable. This means that either treatment facilities have to be installed in parallel, or it must be shown that the self-purification capacity of the water system is sufficient to handle the wastewater effluent.
4. The Bank will also promote the reuse of treated wastewater for suitable irrigation and industrial activities, as a means of water conservation.



5. The Bank will support the sustainable development of coastal environments and internationally coordinated environmental protection policies, in which the global solidarity principle is included (i.e. countries have a common responsibility for not polluting shared coastal environments). *In this context, the Bank will assist RMCs to have access to grants from GEF.*
6. **The Bank supports the envisaged activities set out by the Convention on Drought and Desertification and will seek to increase its involvement in providing support for the implementation of these activities.**
7. The Bank urges countries to incorporate policy on management of solid waste management into national IWRMPs and the National Environmental Action Plans.
8. The Bank highly favors the establishment of cross-linkages between National Environmental Action Plans and Integrated Water Resources Management.
9. The Bank will promote the introduction of clean technologies to reduce industrial waste emissions.

## 4. IMPLICATIONS FOR BANK GROUP WATER OPERATIONS

The principles, objective and strategies, presented in this policy are neither new nor untested. The Bank's approach is to seek effective long-term partnerships with its RMCs and third parties to promote integrated water resources management. This entails recognition of differences in countries' specific circumstances including water endowments, requirements, capacities, problems, and socio-economic profiles, and the design of country-focused reforms to which governments are committed. Whenever appropriate, the Bank will work in collaboration with other national and international agencies to promote integrated water resources management while affirming its comparative advantage in providing support to RMCs. The Bank will take the necessary organizational and operational actions to fulfil these strategic objectives.

### 4.1 Priorities

4.1.1 In view of the present status of water resources management in RMCs, the Bank will focus on the following areas for the purpose of assistance and policy dialogue:

**Development of a comprehensive, integrated analytical approach, which emphasizes the treatment of water as a social, economic and environmental good, as well as an enabling technical and institutional framework.**

- Adaptation and strengthening of institutions that will provide better management, promote cost recovery, financial autonomy and improved knowledge of water resources and its use.
- **Strengthen *co-operation and joint action on transboundary water resources management***

### 4.2 Implementation of the policy

**4.2.1 Priority actions and reforms will be addressed through sector work, technical assistance, and the NEAPs. Identified issues and investment needs will be prioritized in collaboration with governments, and reflected in the country strategy paper (CSP). The resulting reform action plan will guide lending and non-lending operations in the water sector.**

4.2.2 Implementation of the Bank policy will require that analysis of lending operations includes an assessment of the impact of individual water projects on other sources of water, other users, on people, and the environment at basin level, including transboundary waters. The Bank will develop operational instruments that encourage consultation and prevent conflicts among riparian countries. Good practices will be identified and mainstreamed into operational work.

**4.2.3 A critical dimension of the implementation of the IWRM Policy will be to strengthen collaborative arrangements with relevant international, regional and multilateral development institutions. This will involve improved dialogue, joint**

reviews and appraisals, increased scope for co-financing, joint efforts to promote agreements and legal frameworks for riparian countries, etc. Areas where the impact of Bank intervention can be significantly strengthened through collaboration with other institutions include trans-boundary water resources programmes, projects and agreement, desertification, environment, labour, gender, health and education, public/private partnerships, data and information, research etc.

**4.2.4 The imperative for collaboration with other institutions and regional agencies has been amply demonstrated in the process of developing an African Water Vision, in which the Bank has taken a leading role. Implementing the Vision within the context of an integrated water resources management policy will necessitate continuing dialogue and co-operation, not only with our multilateral and bilateral development partners, but also with regional institutions such as the OAU, ECA, sub-regional economic entities, river and lake basin authorities.**

4.2.5 The Bank will monitor progress made in RMCs in implementing reform agenda through existing instruments. The adoption and implementation of a comprehensive analytical framework in sub-sectoral projects will also be monitored.

4.2.6 With respect to the implementation of the Policy, the Bank will:

- Ensure widespread dissemination of the policy among the RMCs.
- **Prepare various Guidelines, as necessary, which will assist Bank staff, as well as RMCs.**
- Encourage greater private sector involvement in supporting water resources development in RMCs, as well as in providing advisory services in the water sector in general to RMCs.

4.2.7 With the introduction of this IWRM Policy, the Bank will adopt a new integrated approach. Professionals from the relevant departments of the Bank will meet on a regular basis to discuss and incorporate the concepts of integrated water resources management into their operations and project appraisal. A Bank-wide focal point for water operations will be maintained, with adequate capacity, resources and appropriate skills.

4.2.8 The Bank will conduct periodic reviews every two years to evaluate its achievements in the water sector in line with the IWRM approach. An in-house review of accomplishments, challenges and opportunities will be prepared by the Bank's focal point on water, supported by staff in other departments who will contribute to these status reports.

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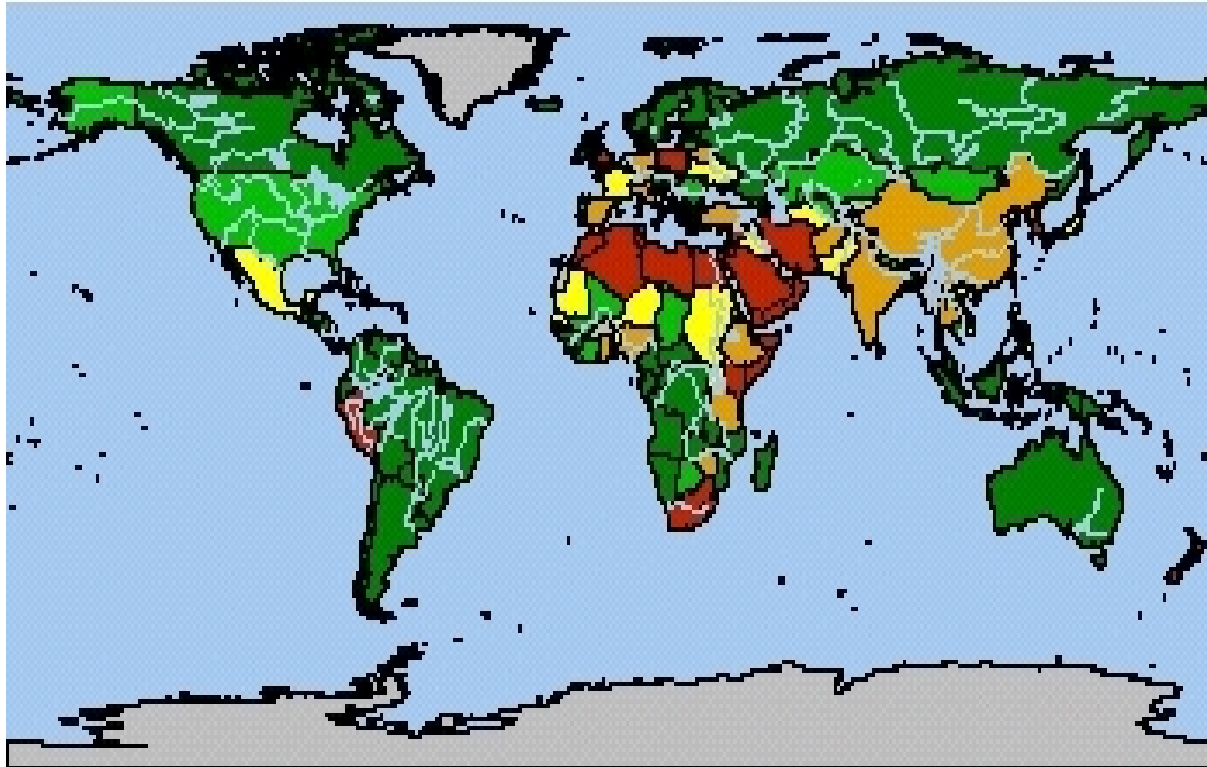
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**APPENDIX 1**

**MAPS**

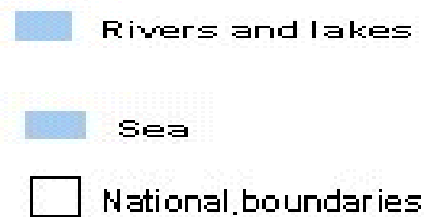


## Appendix 1a: FRESH WATER RESOURCES PER CAPITA (Cu. meter), 1997

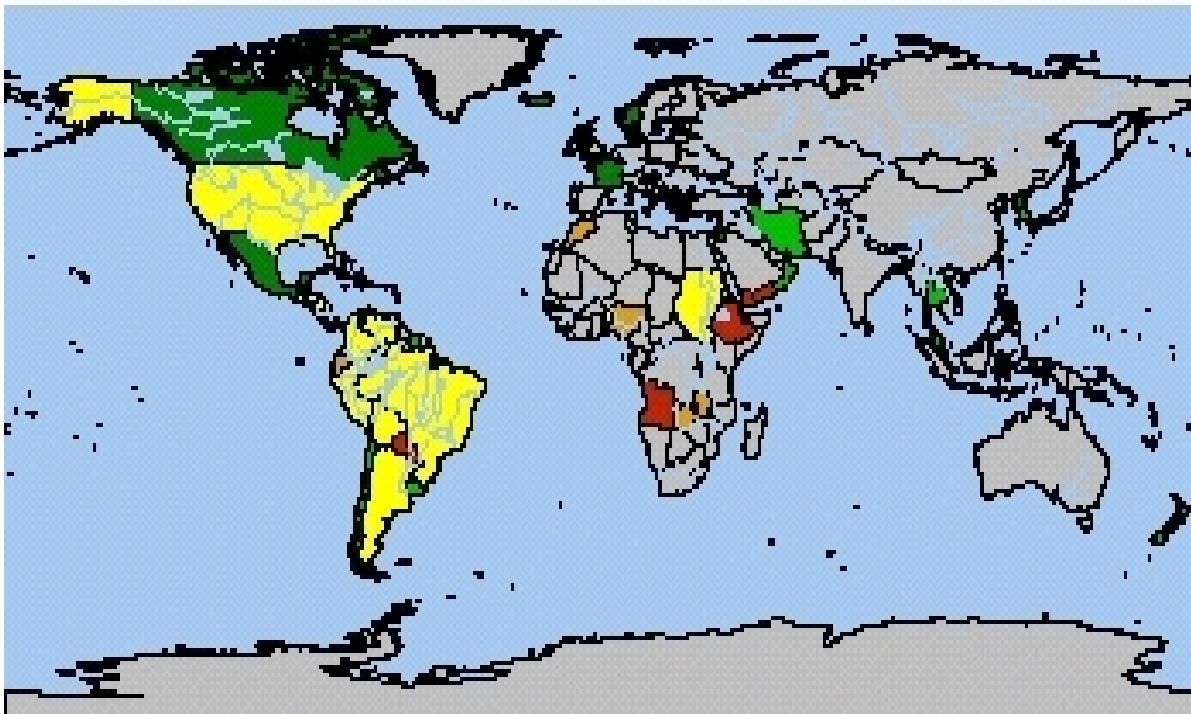


Source: World Bank, Development Data, 1999

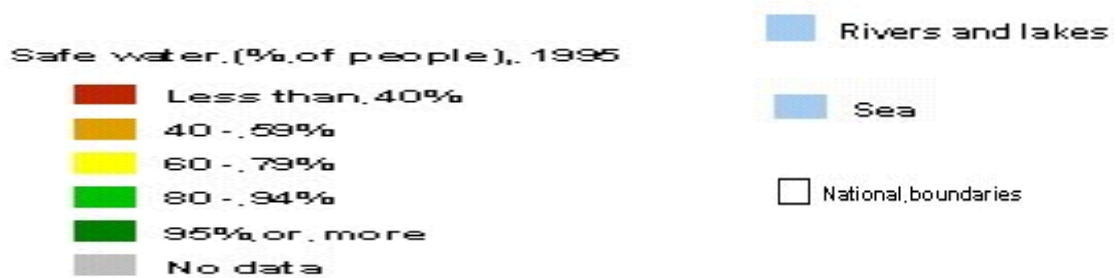
Fresh water resources per capita (cu. meter), 1997



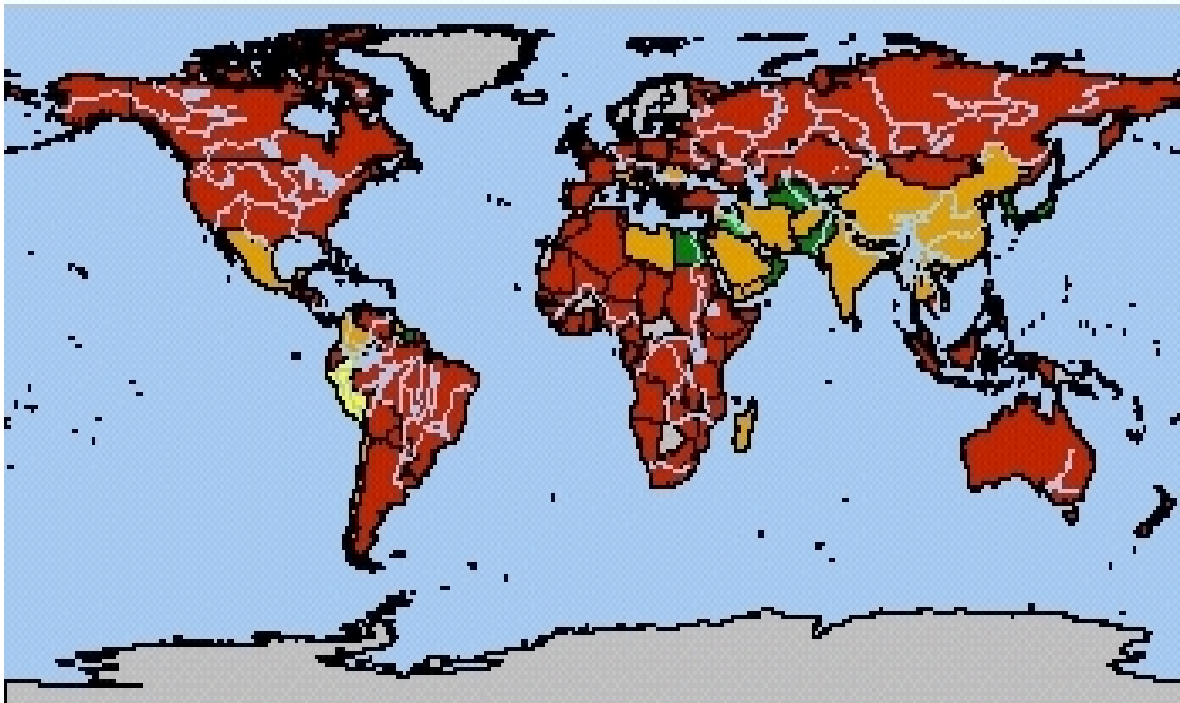
### Appendix 1b: SAFE WATER (% of PEOPLE), 1995



Source: World Bank, Development Data, 1999



### Appendix 1c: IRRIGATED LAND (% of CROP LAND), 1996



Source: World Bank, Development Data, 1999

Irrigated land (% of crop land), 1996

- Less than 20%
- 20 - 39%
- 40 - 59%
- 60 - 79%
- 80 or more
- No data

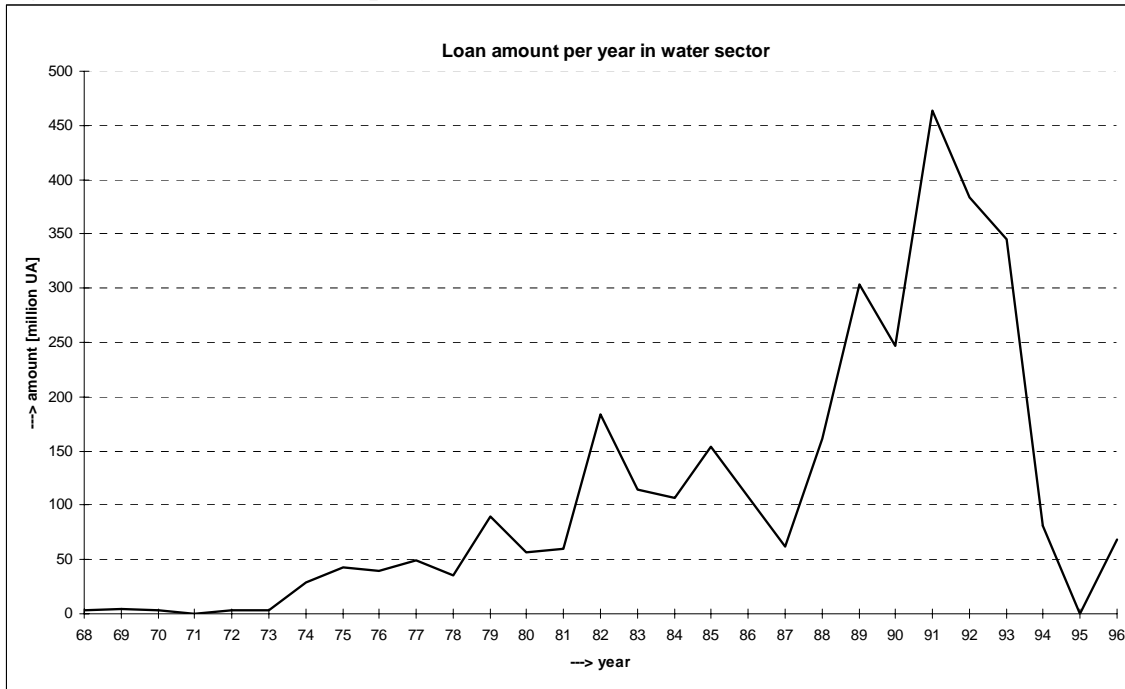
■ Rivers and lakes

■ Sea

National boundaries

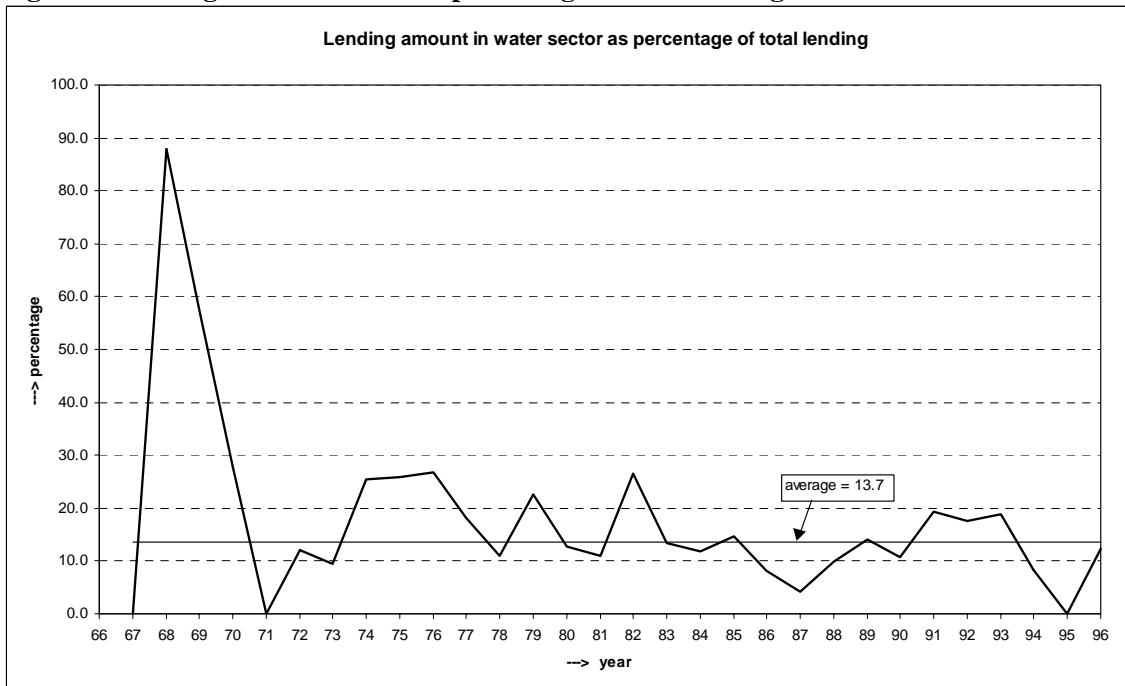
**APPENDIX 2      FIGURES**

**Figure 1** Loan amount per year in water sector



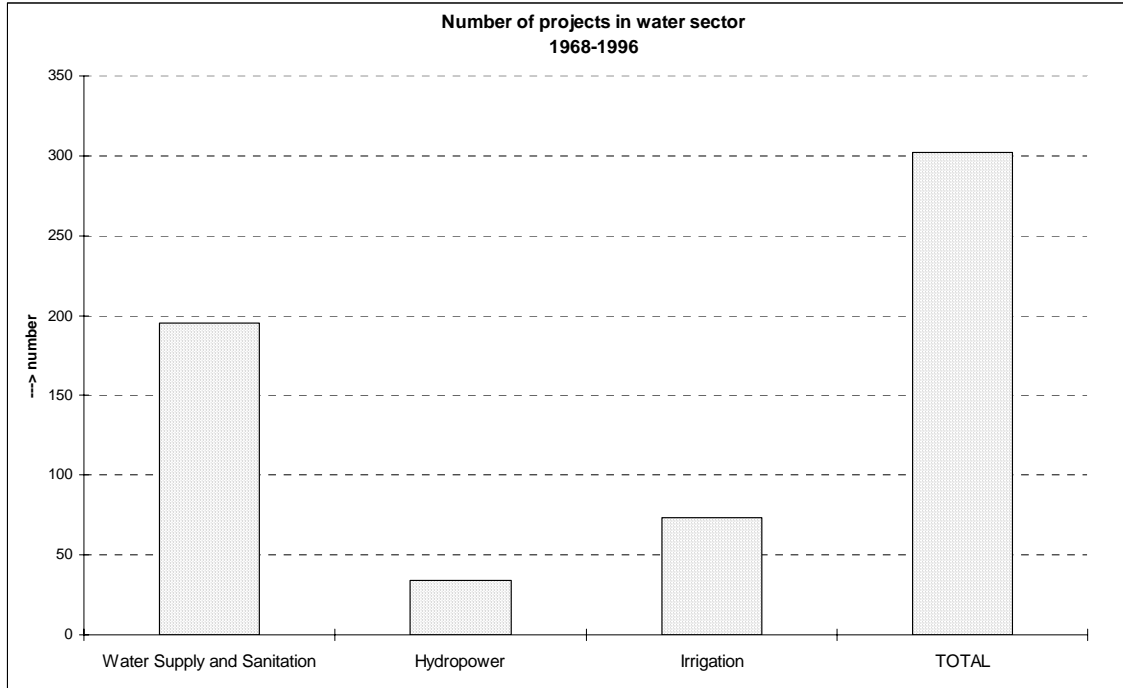
Source: Compiled from ADB statistical data

**Figure 2** Lending in water sector as percentage of total lending



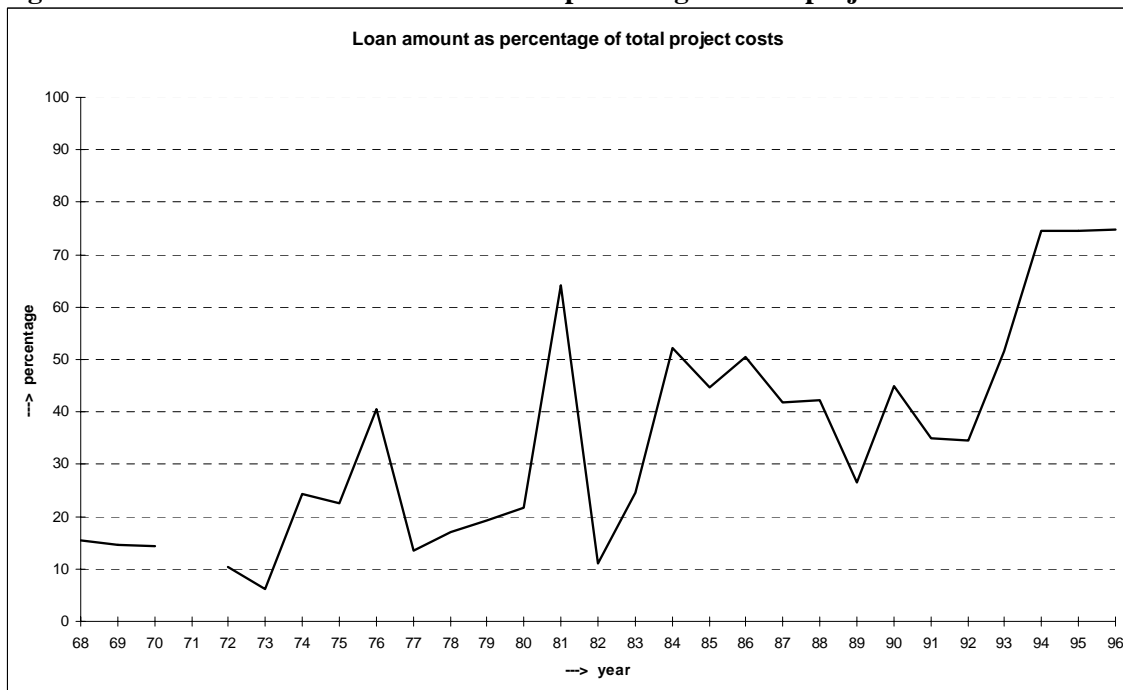
Source: Compiled from ADB statistical data

**Figure 3** Number of projects in water sector, 1968-1996



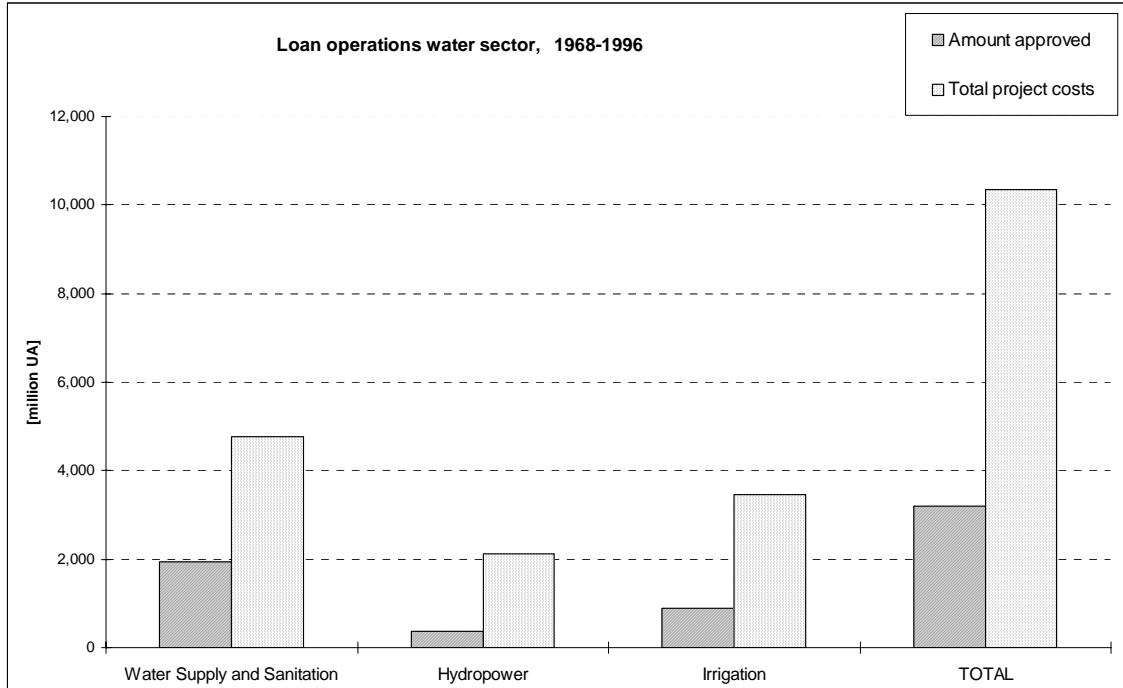
Source: Compiled from ADB statistical data

**Figure 4** Loan amount water sector as percentage of total project costs



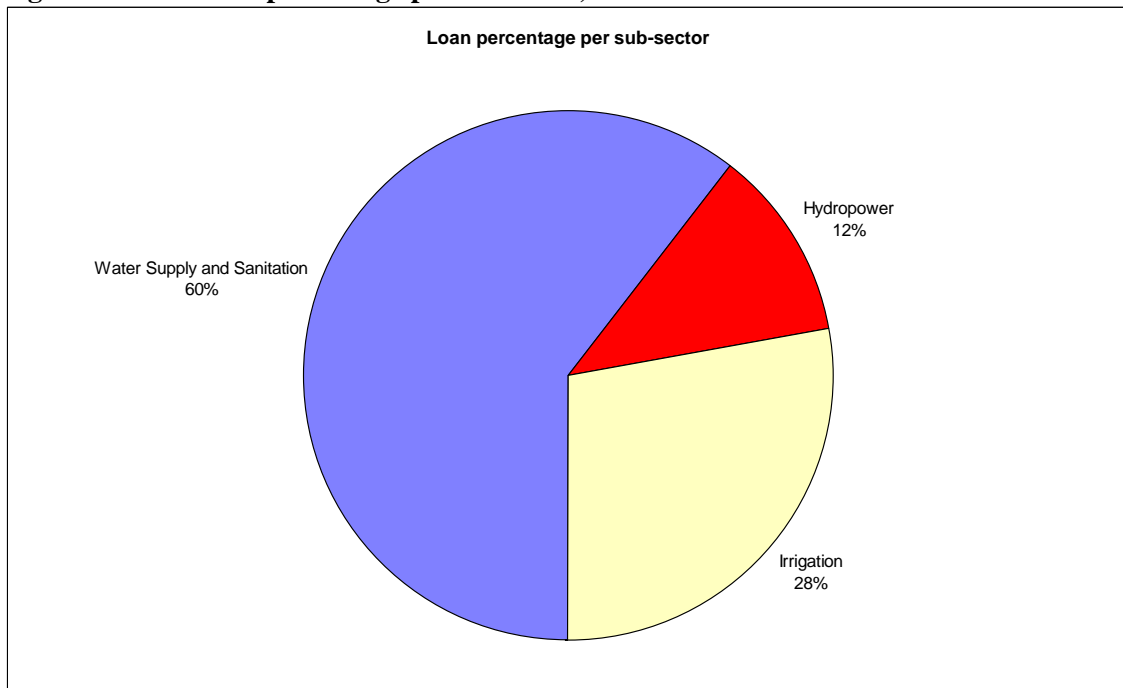
Source: Compiled from ADB statistical data

**Figure 5** Loan operations in the water sector, 1968-1996



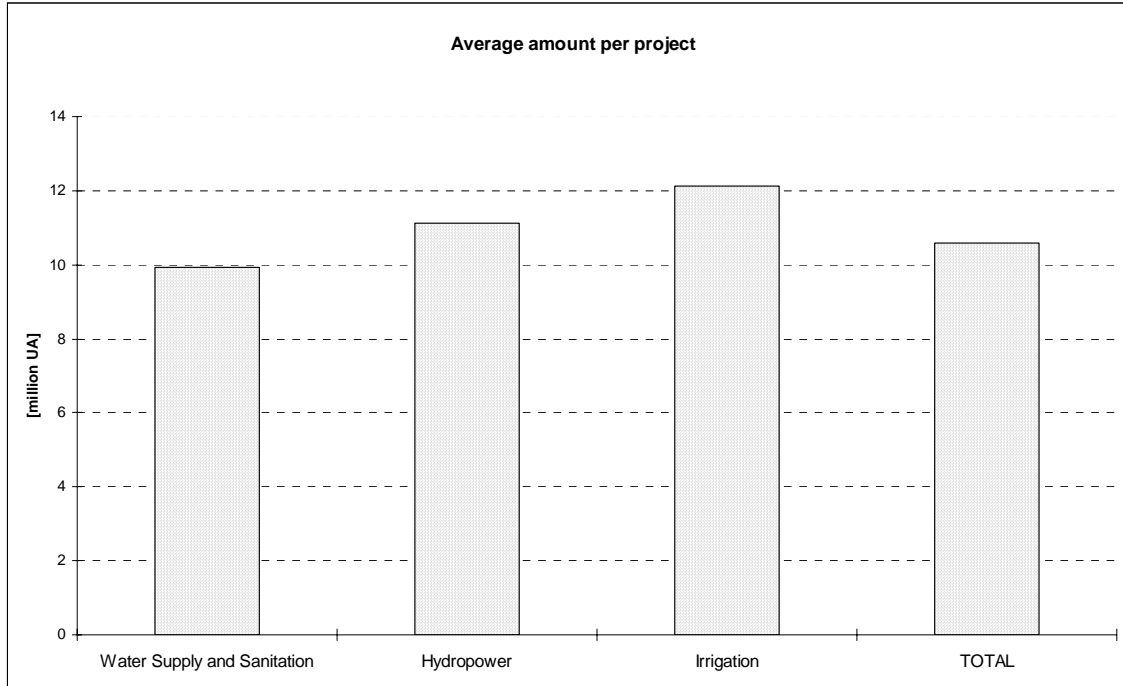
Source: Compiled from ADB statistical data

**Figure 6** Loan percentage per subsector, 1968-1996



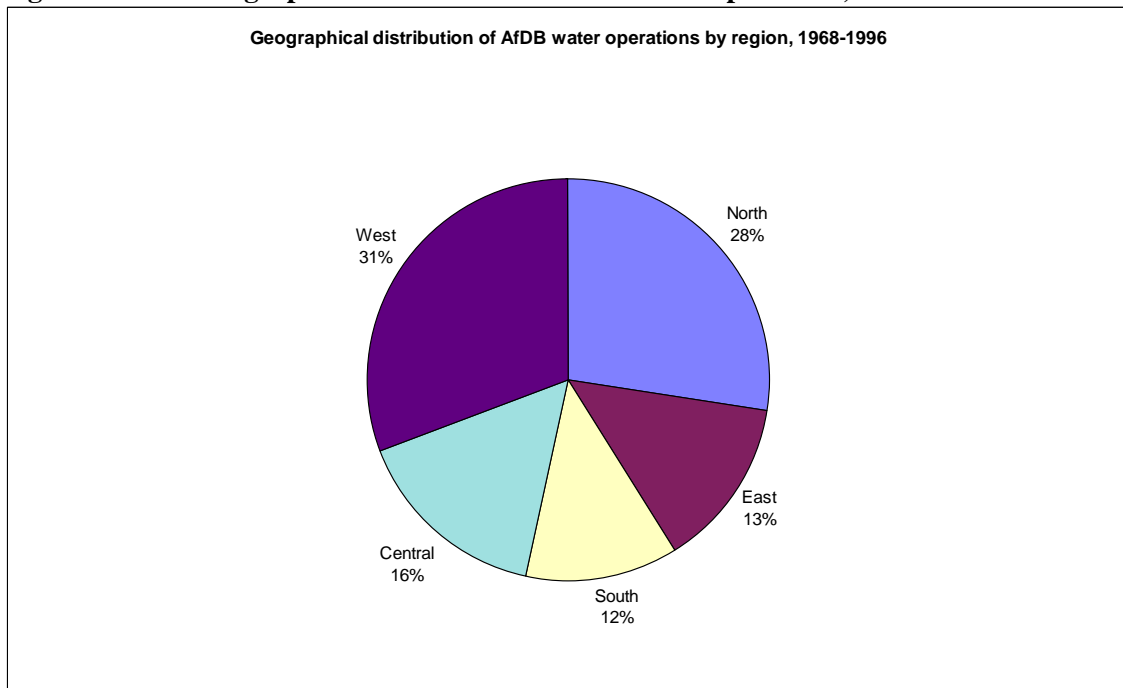
Source: Compiled from ADB statistical data

**Figure 7** Average lending amount approved per project



Source: Compiled from ADB statistical data

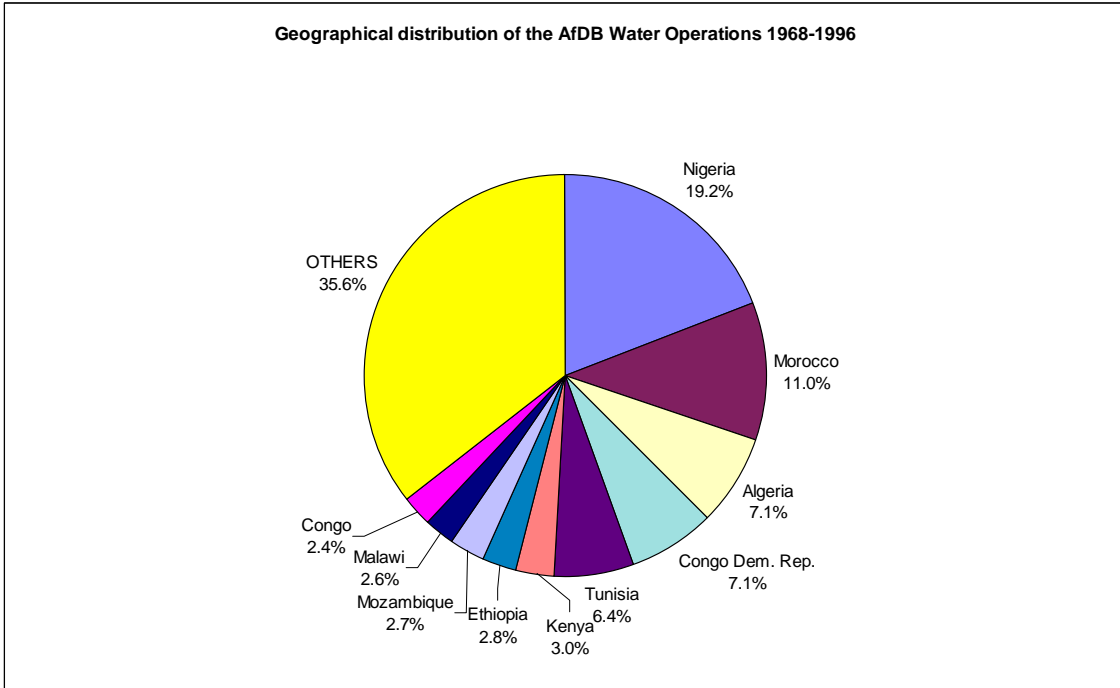
**Figure 8** Geographical distribution of Bank water operations, 1968-1996



Source: Compiled from ADB statistical data



**Figure 9** Distribution of Bank water operations per country, 1968-1996



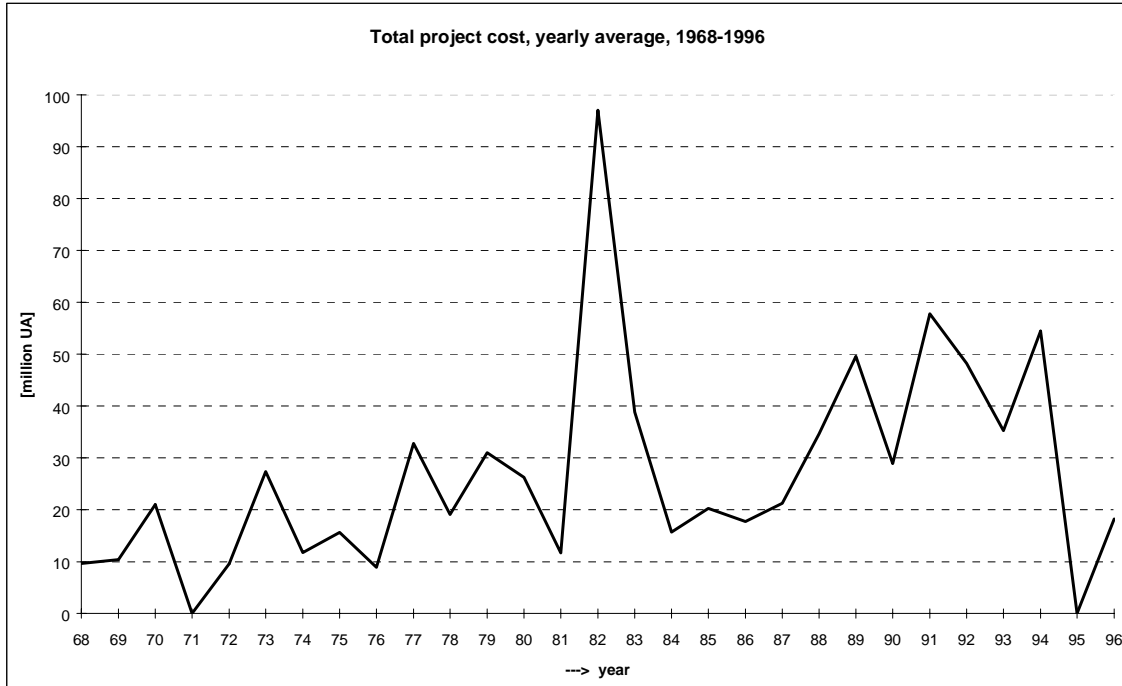
Source: Compiled from ADB statistical data

**Figure 10** Loan amount per project, annual average, 1968-1996



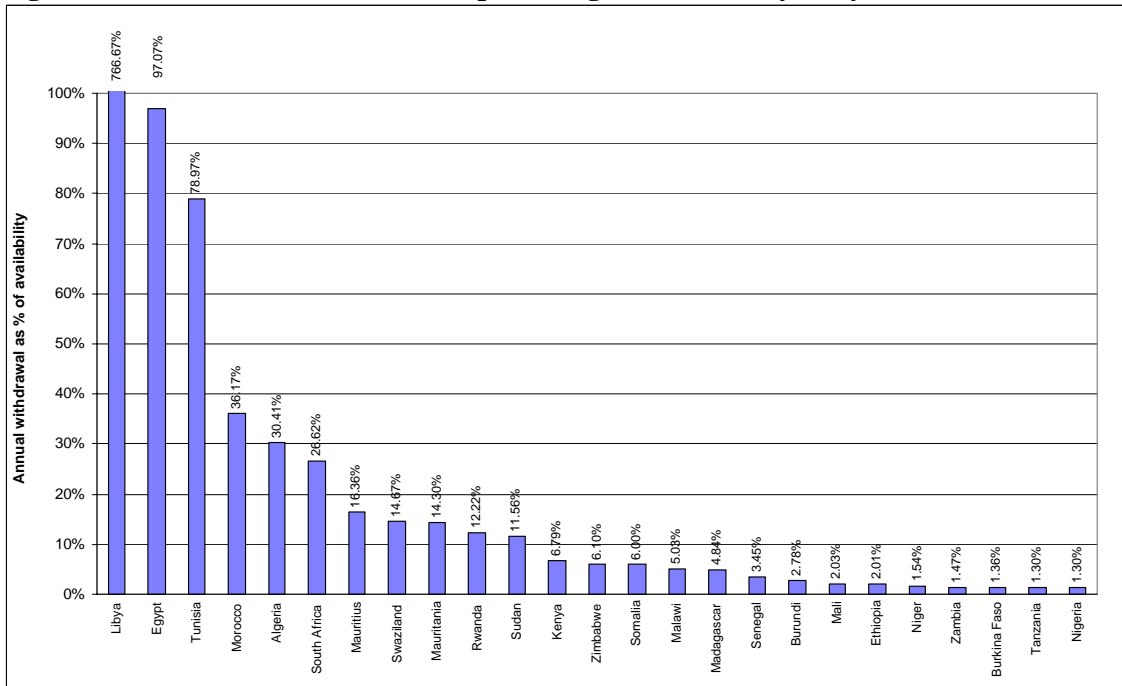
Source: Compiled from ADB statistical data

**Figure 11** Total project cost, yearly average, 1968-1996



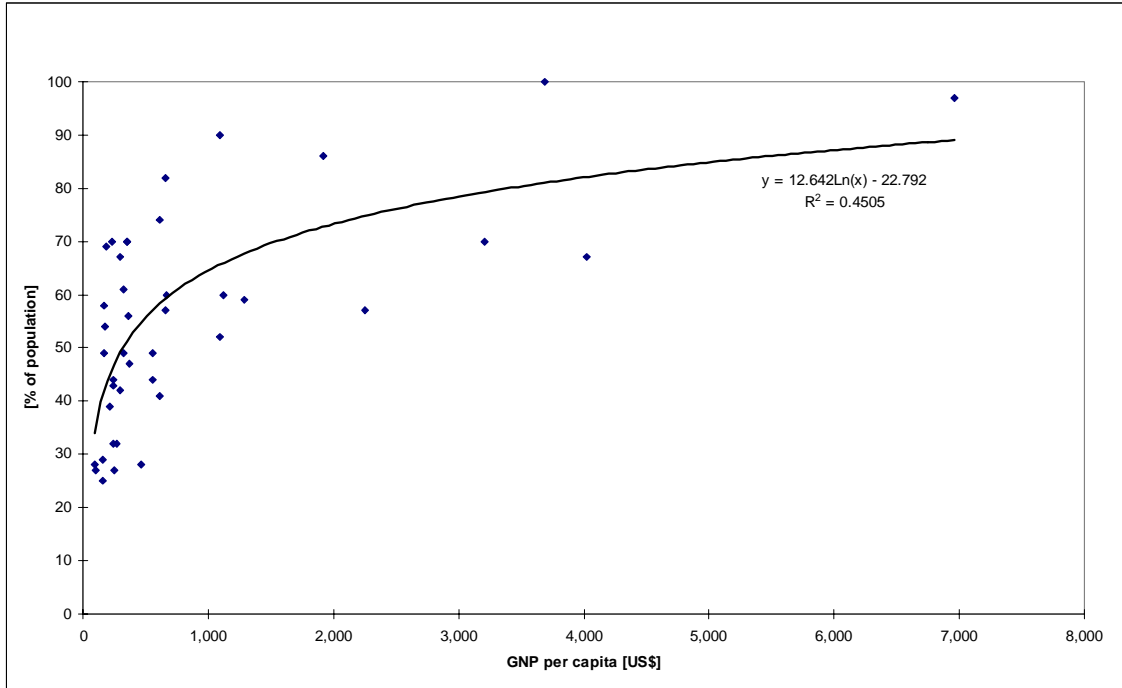
Source: Compiled from ADB statistical data

**Figure 12** Annual withdrawal as percentage of availability (only countries above 1%)



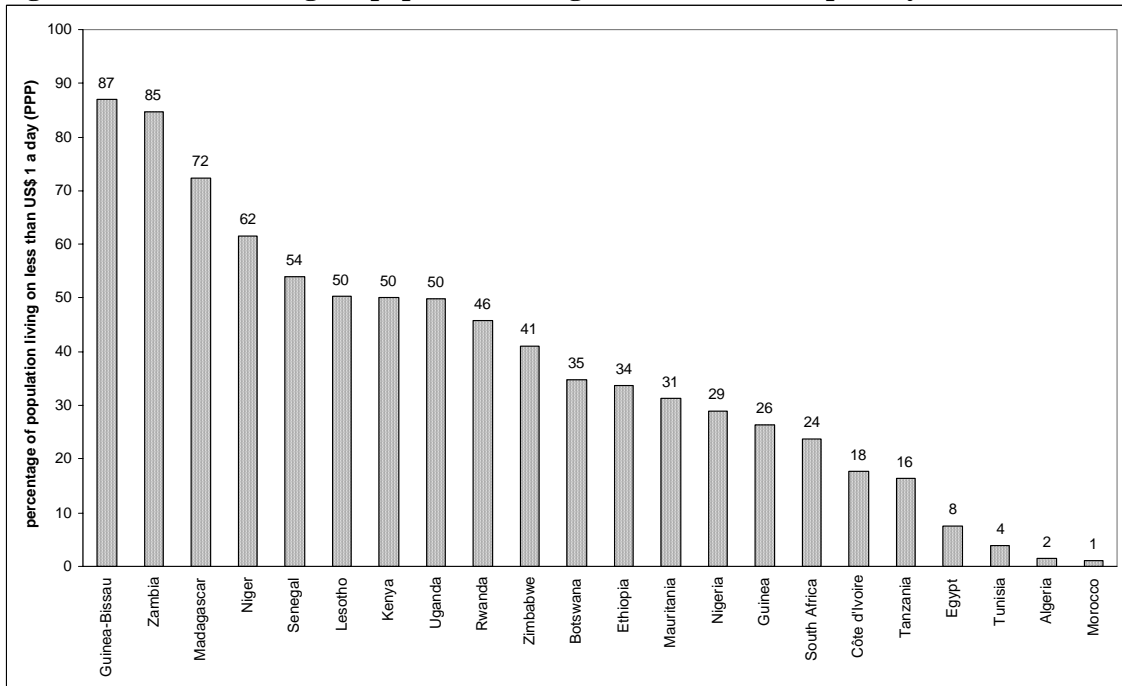
Source: World Resources Institute, 1996

**Figure 13** Population with access to safe water in relation to national income



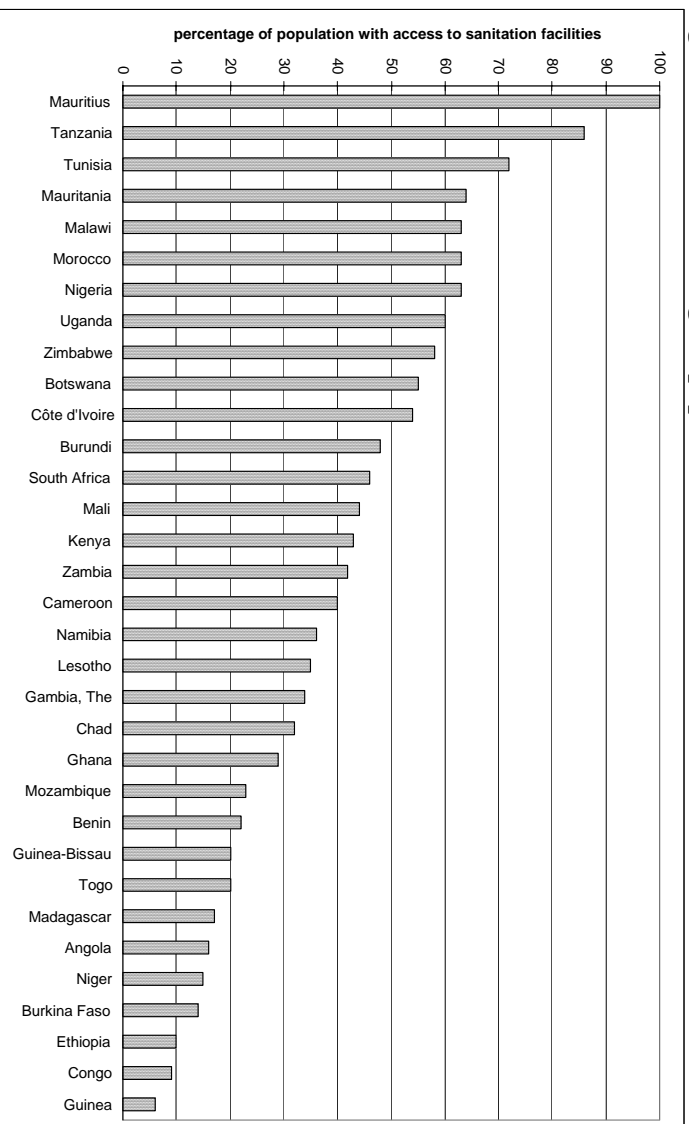
Source: ADB Annual Report, 1997

**Figure 14** Percentage of population living on less than US\$ 1 per day PPP



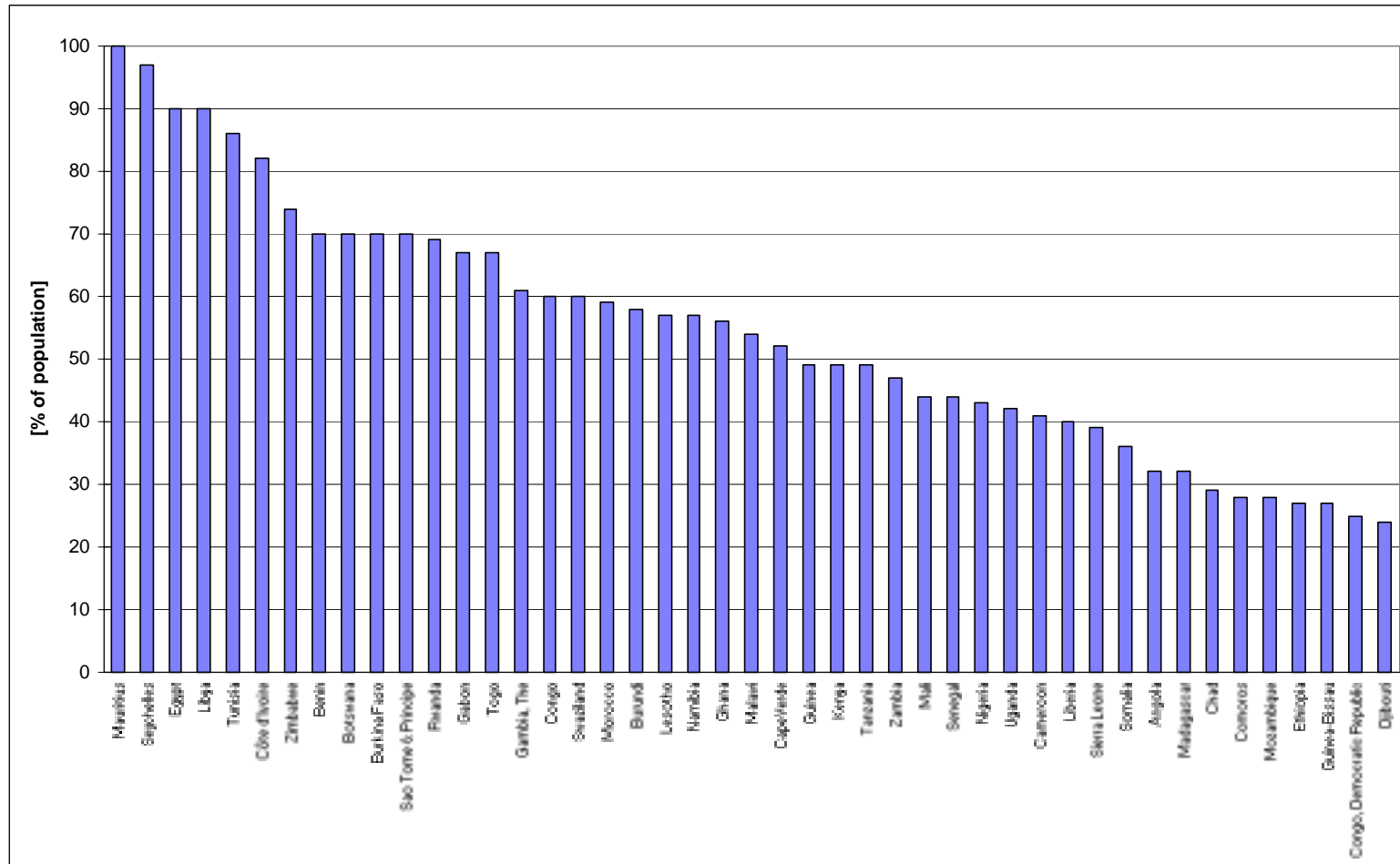
Source: World Bank, 1997

**Figure 15** Percentage of population with access to sanitation facilities



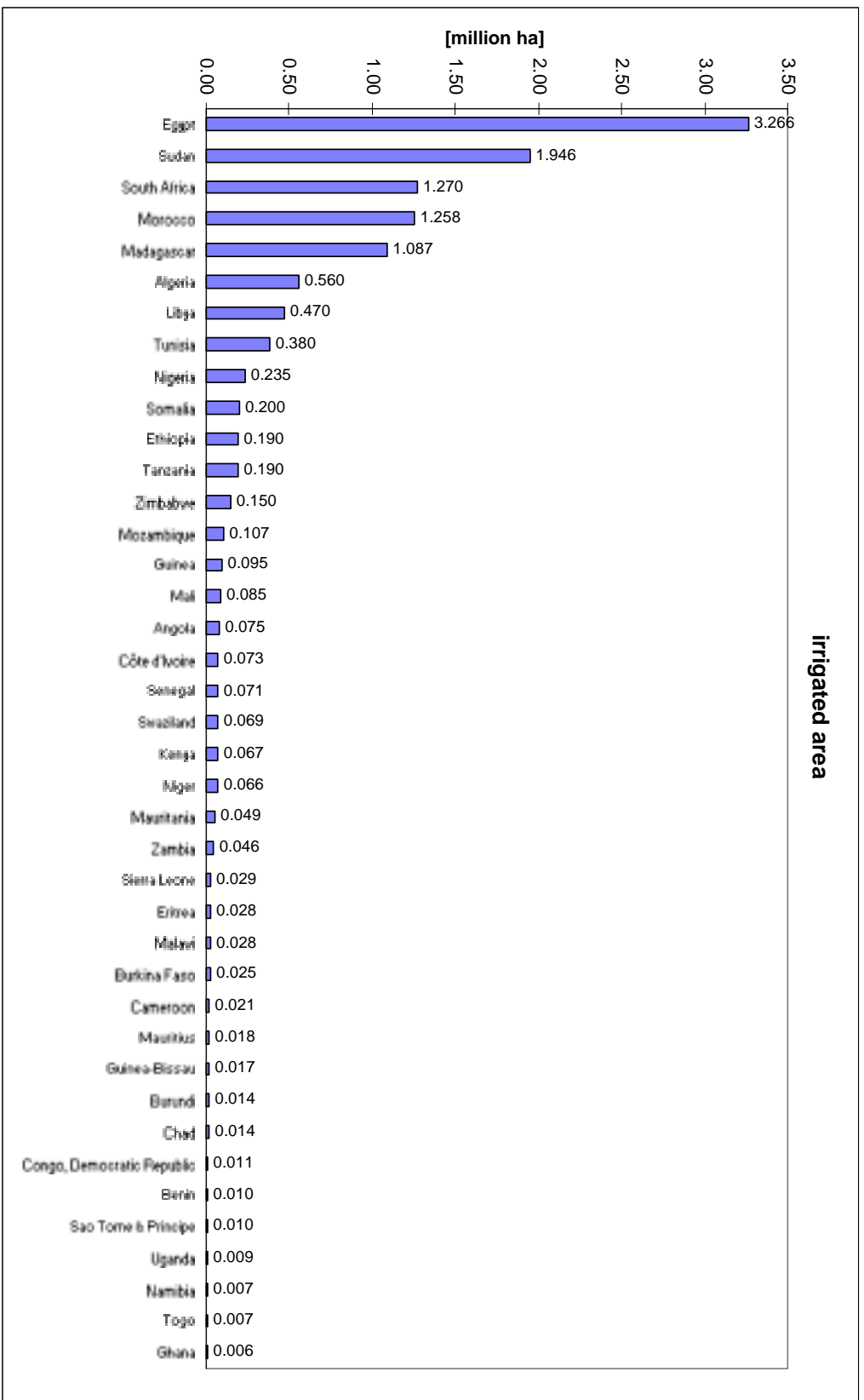
Source: World Bank, 1997

**Figure 16** Percentage of population with access to safe water



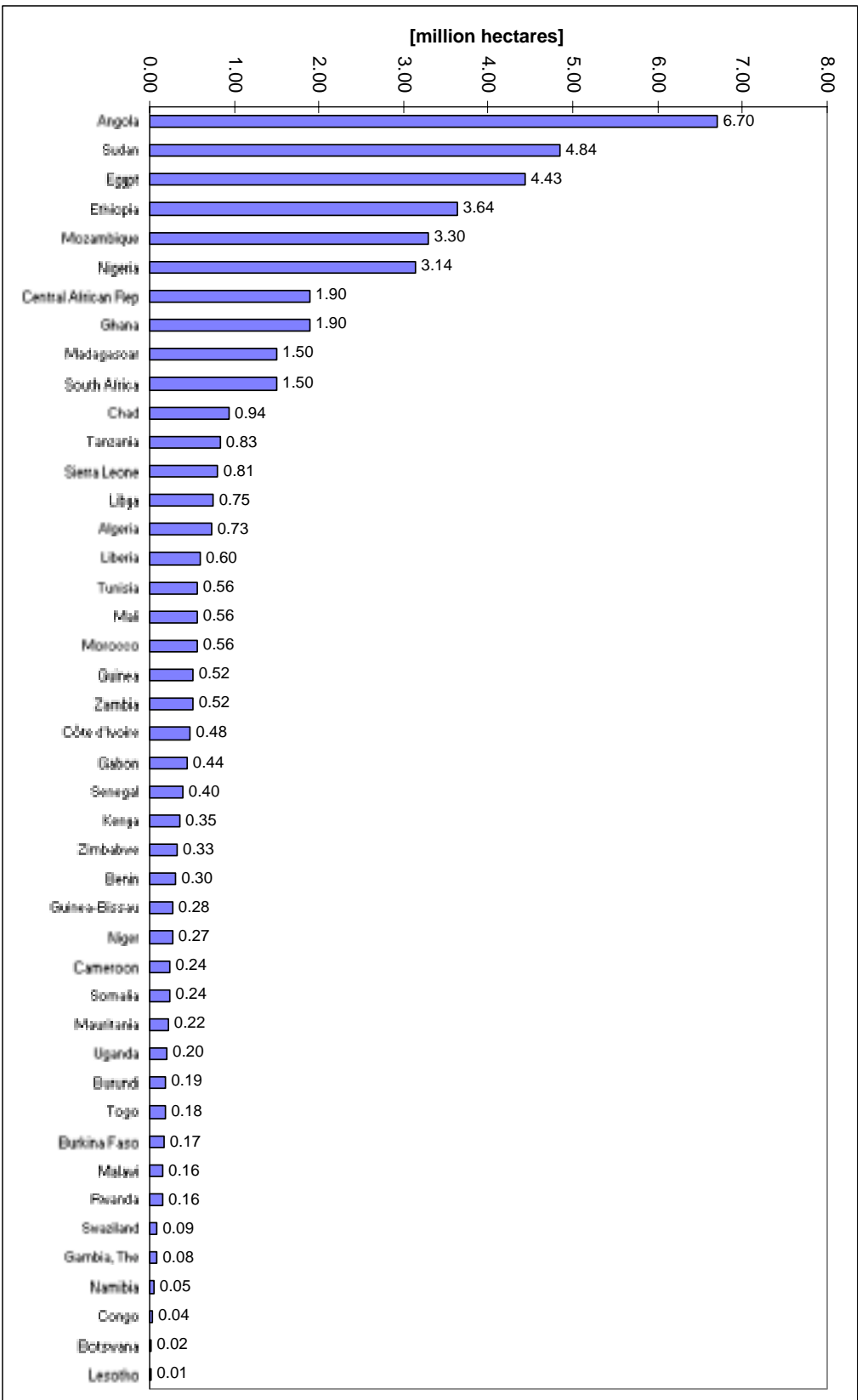
Source: ADB, 1998

Figure 17 Irrigated area



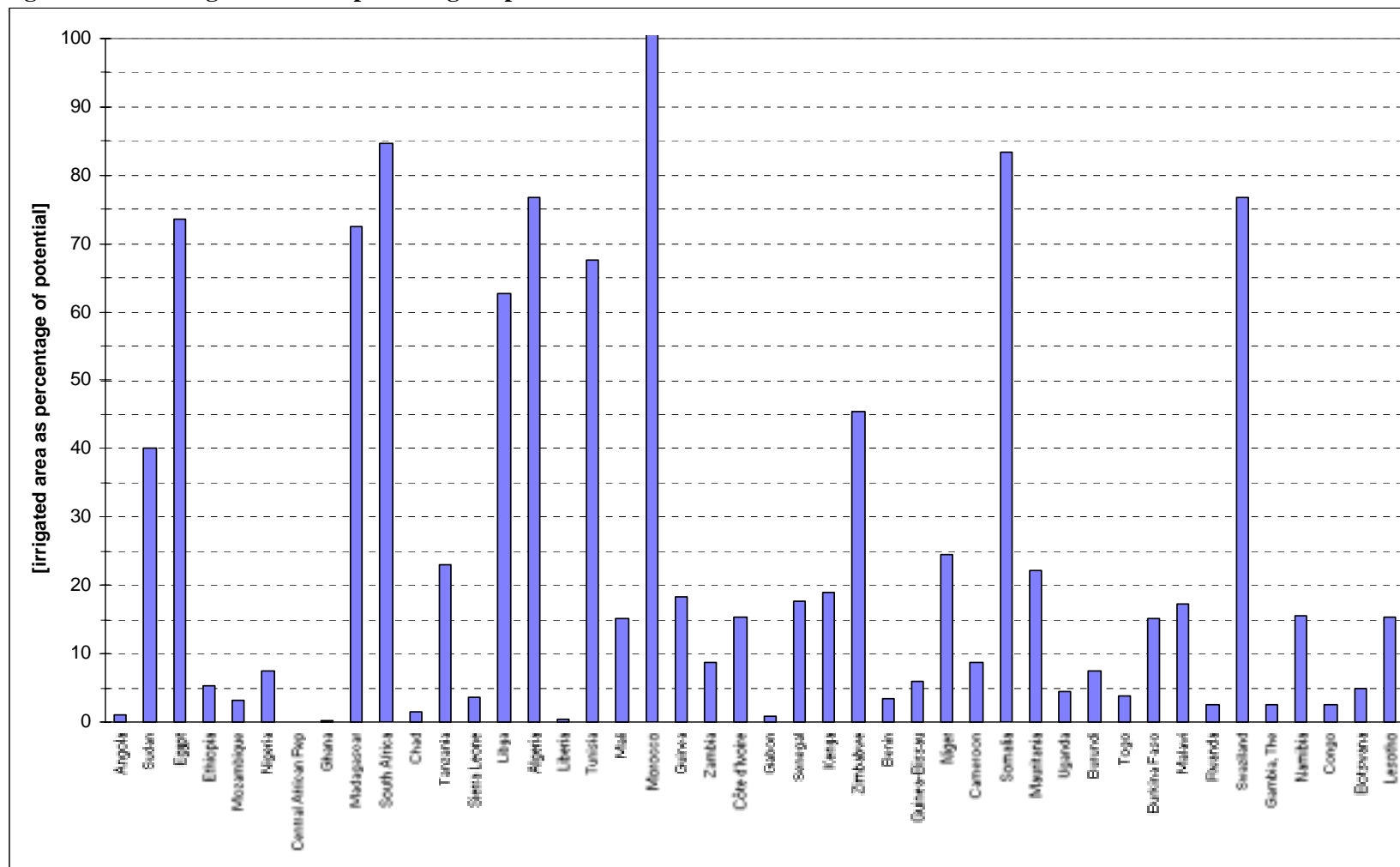
Source: FAO, 1998

**Figure 18 Irrigation potential**



Source: FAO, 1998

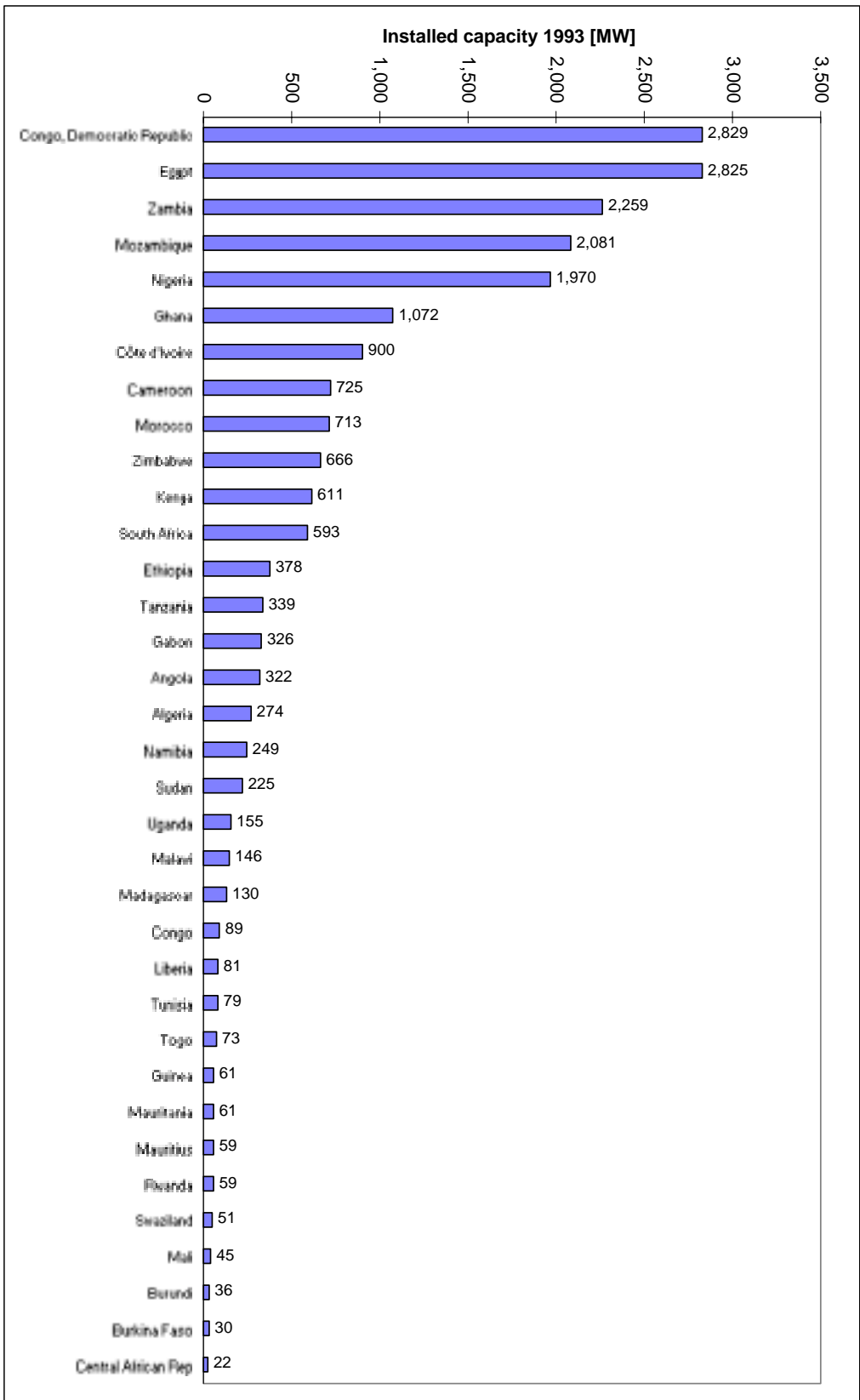
**Figure 19** Irrigated area as percentage of potential



Source: FAO, 1998

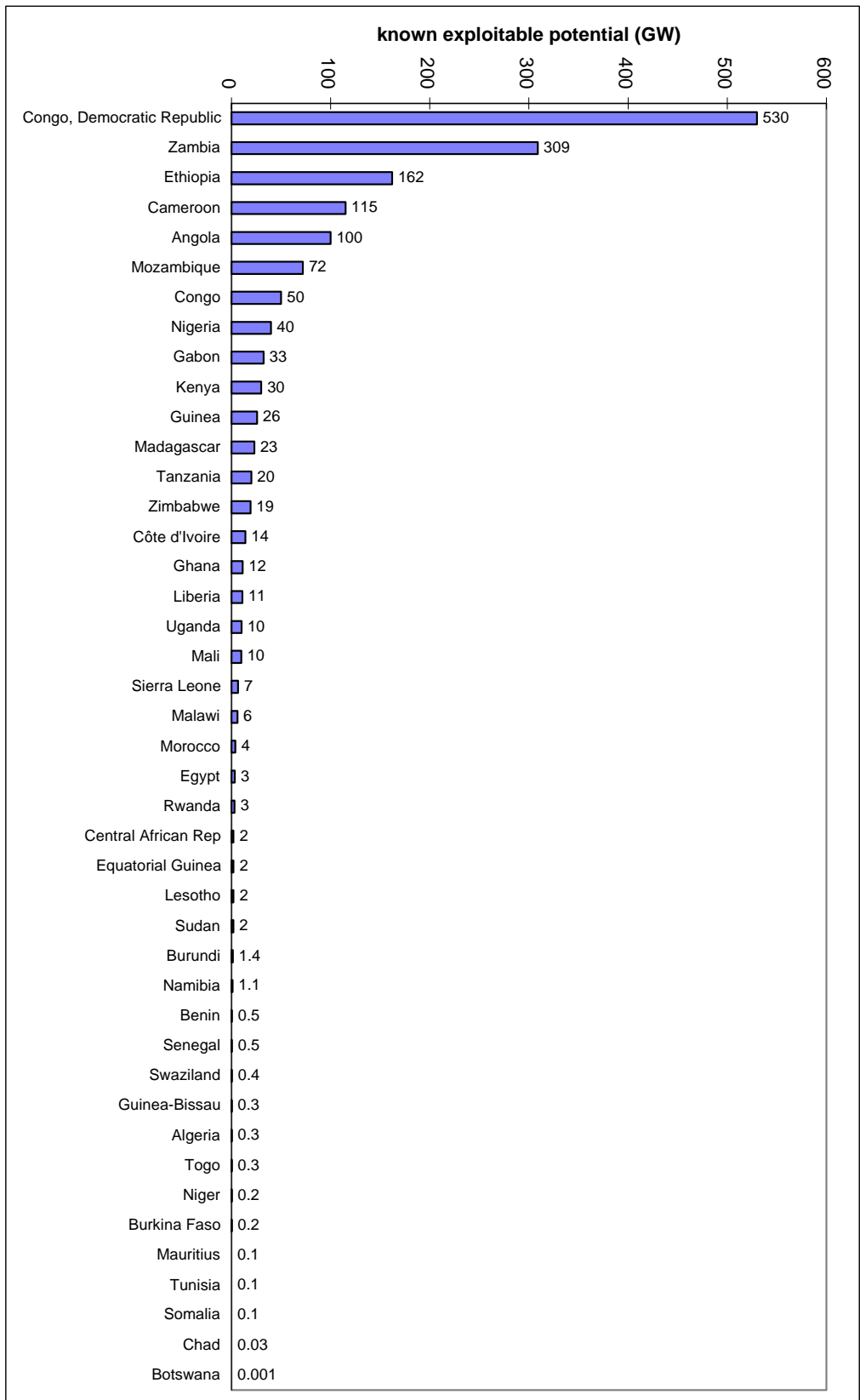


**Figure 20** Installed hydropower capacity (1993)



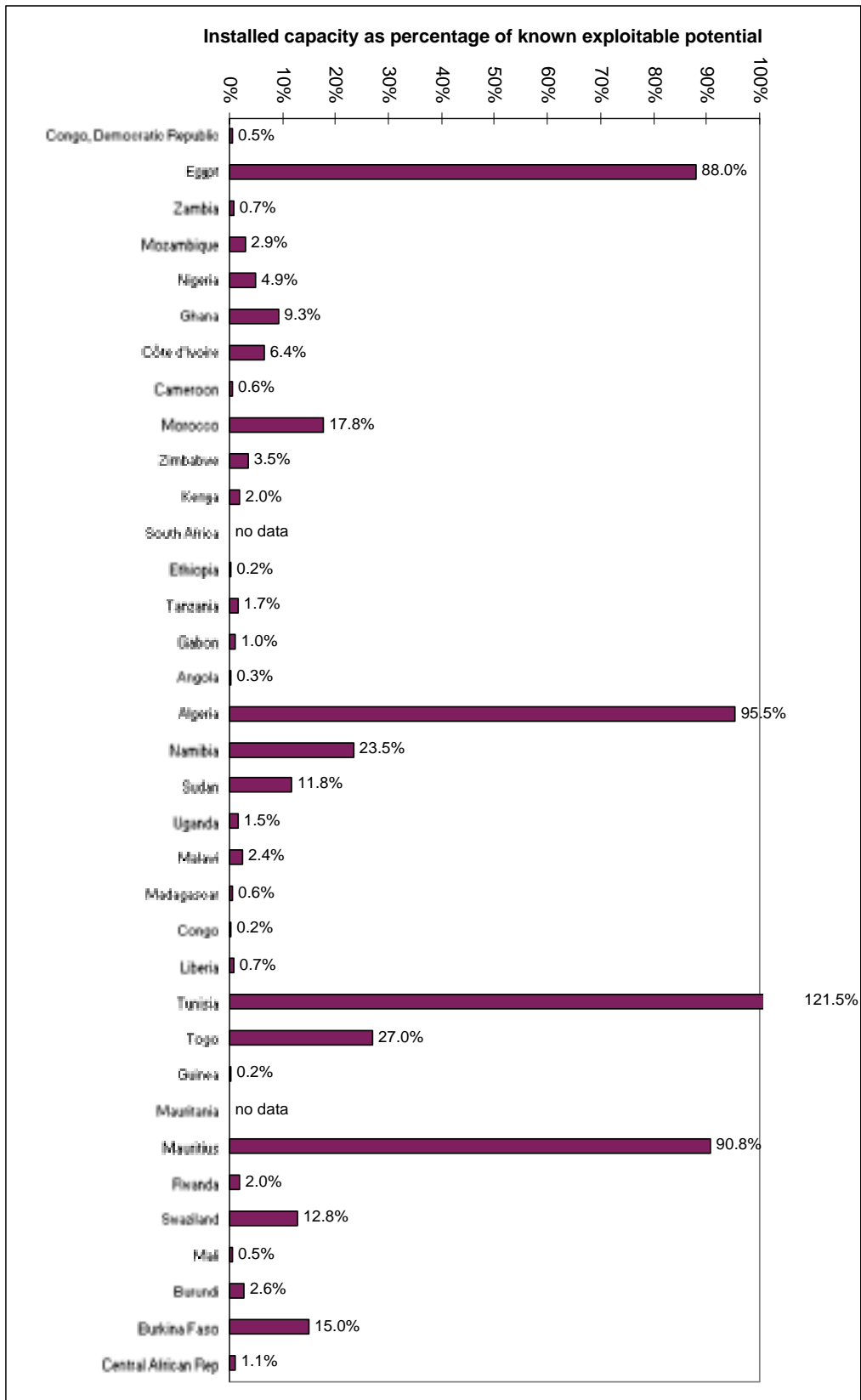
Source: FAO, 1998

Figure 21 Known exploitable hydropower potential



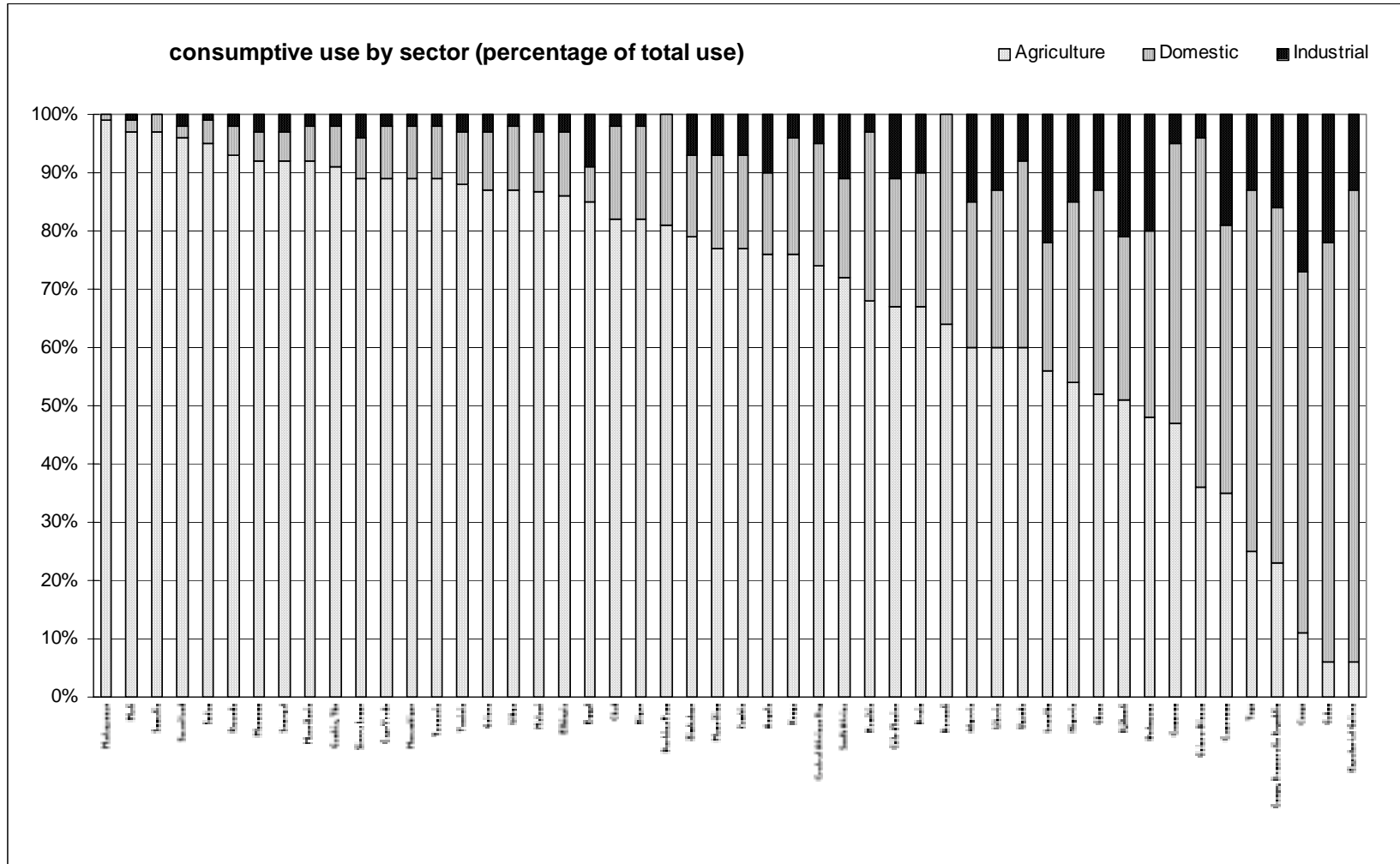
Source: World Resources Institute, 1992

Figure 22 Installed hydropower capacity as percentage of known exploitable potential



Source: World Resources Institute, 1992

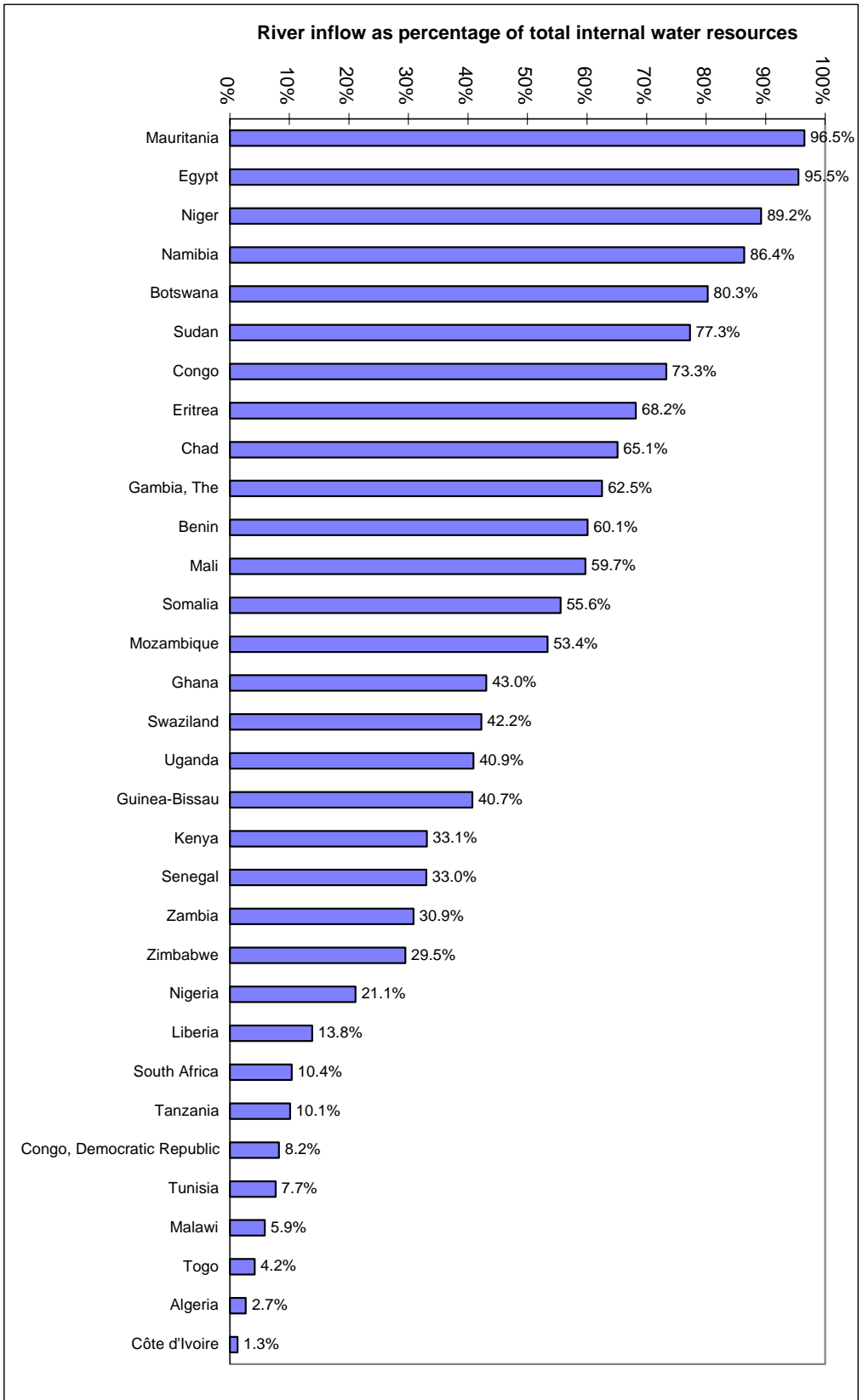
**Figure 23** Consumptive use by sector as a percentage of total use



Source: World Resources Institute, 1998

Figure 24

River inflow as percentage of total internal water resources



Source: World Resources Institute, 1992

**APPENDIX 3 TABLES**

**Table 1: Summary of Lending Operations in the Water Sector, 1967-1999**

Source of Fund	Sub-Sector	Amount Approved (UA million)	Amount Approved (US\$ million)	Number of Projects
ADB	Water Supply & Sanitation	1,326.10	1,818.02	68
ADF	Water Supply & Sanitation	769.97	1,055.59	153
NTF	Water Supply & Sanitation	6.00	8.23	1
<b>SUB-TOTAL</b>	Water Supply & Sanitation	<b>2,102.07</b>	<b>2,881.83</b>	<b>222</b>
ADB	Hydropower	213.15	292.22	15
ADF	Hydropower	176.46	241.92	20
NTF	Hydropower	-	-	0
<b>SUB-TOTAL</b>	Hydropower	<b>389.61</b>	<b>534.14</b>	<b>35</b>
ADB	Irrigation	455.22	624.08	16
ADF	Irrigation	423.48	580.57	56
NTF	Irrigation	6.00	8.23	1
<b>SUB-TOTAL</b>	Irrigation	<b>884.70</b>	<b>1,212.88</b>	<b>73</b>
ADB	Total Water Sector	1,994.47	2,734.32	99
ADF	Total Water Sector	1,369.91	1,878.08	229
NTF	Total Water Sector	12.00	16.45	2
<b>TOTAL</b>	<b>Total Water Sector</b>	<b>3,376.38</b>	<b>4,628.85</b>	<b>330</b>

*Source: Compiled from ADB statistical data*

**Table 2 Geographical distribution of Bank water operations**

	COUNTRY	Loan amount [million UA]	Loan amount [million US\$]	Total project costs [million UA]	Total project costs [million US\$]
1	Nigeria	614.47	862.51	1231.12	1731.64
2	Morocco	353.09	490.82	1173.49	1599.87
3	Algeria	228.25	309.07	420.77	562.05
4	Congo Dem. Rep.	227.20	276.92	673.90	827.89
5	Tunisia	203.78	262.72	564.87	728.15
6	Kenya	96.20	119.15	654.14	790.51
7	Ethiopia	90.11	108.45	164.52	200.81
8	Mozambique	86.08	110.37	332.65	384.54
9	Malawi	84.02	107.89	268.22	346.42
10	Congo Br.	77.53	92.38	115.13	134.34
11	Lesotho	73.16	92.40	378.20	503.82
12	Burkina Faso	70.88	85.05	213.89	252.58
13	Zambia	65.08	85.09	114.46	149.44
14	Ghana	58.62	79.63	159.62	208.08
15	Tanzania	57.76	76.67	76.99	101.76
16	Mali	55.73	65.62	123.88	148.26
17	Uganda	52.00	67.58	506.42	708.33
18	Cameroon	51.84	66.59	105.38	127.63
19	Zimbabwe	44.63	59.79	97.23	128.67
20	Burundi	42.24	49.87	132.67	153.17
21	Senegal	40.41	47.98	79.46	94.98
22	Sierra Leone	39.04	54.34	148.05	204.74
23	Mauritania	37.81	48.97	58.49	73.01
24	Somalia	36.22	42.96	70.11	83.55
25	Rwanda	32.99	41.88	76.97	103.32
26	Djibouti	29.15	34.07	33.01	38.46
27	Cote d'Ivoire	29.00	38.31	130.94	162.32
28	Chad	28.01	33.99	66.47	80.68
29	Guinea	26.41	34.25	316.69	411.78
30	Sudan	21.78	27.60	152.92	194.79
31	Egypt	21.37	29.38	26.55	36.51
32	Niger	20.21	20.96	22.46	23.30
33	Mauritius	19.51	24.72	82.72	103.13
34	Madagascar	17.80	23.76	20.20	26.99
35	Cape Verde	14.95	19.67	24.75	33.42
36	Angola	14.51	20.76	32.90	47.06
37	Gambia	12.99	17.37	27.72	37.15
38	Eritrea	8.50	12.22	9.43	13.56
39	Seychelles	8.47	10.03	12.51	14.74
40	Swaziland	6.82	8.68	45.42	57.91
41	Botswana	6.76	9.06	47.31	63.61
42	Guinea Bissau	5.45	7.34	6.06	8.16
43	Comoros	5.07	4.97	13.88	13.61
44	Gabon	5.00	6.03	40.00	48.25
45	Cent African Rep	4.61	5.56	5.42	6.54
46	Liberia	3.93	4.76	58.85	71.14
47	Equatorial Guinea	2.65	2.91	2.91	3.20
48	Benin	2.29	3.09	4.33	5.35
49	Namibia	2.12	2.91	2.37	3.25
50	Sao T. & Principe	0.85	1.17	0.90	1.23

*Source: Compiled from ADB statistical data*



**Table 3 : Illustrative data for African countries**

Country	GNP per capita 1996 (US\$)	Pop. living on <\$1/day (PPP) (%)	Population				Avg. annual pop. change		
			1950 (millions)	1990 (millions)	1995 (millions)	2025 (millions)	'50-'90 (%)	'90-'95 (%)	'95-'25 (%)
Column	1	2	3	4	5	6	7	8	9
<b>AFRICA</b>			223.2	630.2	726.9	1,490.5	2.6	2.9	2.4
1 Algeria	1,530	1.6	8.8	24.9	27.9	45.5	2.7	2.3	1.6
2 Angola	270	....	4.1	9.2	11.1	26.6	2.0	3.8	3.0
3 Benin	350	....	2.0	4.6	5.4	12.3	2.1	3.1	2.8
4 Botswana	3,210	34.7	0.4	1.3	1.5	3.0	3.0	3.1	2.3
5 Burkina Faso	230	....	3.7	9.0	10.3	21.7	2.3	2.8	2.5
6 Burundi	170	....	2.5	5.5	6.4	13.5	2.0	3.0	2.5
7 Cameroon	610	....	4.5	11.5	13.2	29.2	2.4	2.8	2.7
8 Cape Verde	1,090	....	....	....	0.4	....	....	....	....
9 Central African Rep	310	....	1.3	2.9	3.3	6.4	2.0	2.5	2.2
10 Chad	160	....	2.7	5.6	6.4	12.9	1.9	2.8	2.4
11 Comoros	460	....	....	....	0.7	....	....	....	....
12 Congo, Br.	670	....	0.8	2.2	2.6	5.7	2.6	3.0	2.7
13 Congo, Dem. Rep.	160	....	12.2	37.4	43.9	104.6	2.8	3.2	2.9
14 Côte d'Ivoire	660	17.7	2.8	12.0	14.3	36.8	3.7	3.5	3.2
15 Djibouti	....	....	....	....	0.4	....	....	....	....
16 Egypt	1,090	7.6	21.8	56.3	62.9	97.3	2.4	2.2	1.5
17 Equatorial Guinea	510	....	0.2	0.4	0.4	0.8	1.1	2.6	2.3
18 Eritrea	....	....	1.1	3.1	3.5	7.0	2.5	2.8	2.3
19 Ethiopia	100	33.8	18.4	47.4	55.1	126.9	2.4	3.0	2.8
20 Gabon	4,020	....	0.5	1.1	1.3	2.7	2.3	2.9	2.4
21 Gambia, The	320	....	0.3	0.9	1.1	2.1	2.9	3.9	2.1
22 Ghana	360	....	4.9	15.0	17.5	38.0	2.8	3.0	2.6
23 Guinea	560	26.3	2.6	5.8	6.7	15.1	2.1	3.1	2.7
24 Guinea-Bissau	250	87.0	0.5	1.0	1.1	2.0	1.6	2.2	2.1
25 Kenya	320	50.2	6.3	23.6	28.3	63.4	3.4	3.7	2.7
26 Lesotho	660	50.4	0.7	1.8	2.1	4.2	2.3	2.7	2.4
27 Liberia	....	....	0.8	2.6	3.0	7.2	2.9	3.4	2.9
28 Libya	....	....	1.0	4.5	5.4	12.9	3.8	3.5	2.9
29 Madagascar	240	72.3	4.2	12.6	14.8	34.4	2.8	3.3	2.9
30 Malawi	180	....	2.9	9.4	11.1	22.3	3.0	3.5	2.4
31 Mali	240	....	3.5	9.2	10.8	24.6	2.4	3.2	2.8
32 Mauritania	470	31.4	0.8	2.0	2.3	4.4	2.2	2.6	2.3
33 Mauritius	3,690	....	0.5	1.1	1.1	1.5	1.9	1.1	0.9
34 Morocco	1,290	1.1	9.0	24.3	27.0	40.7	2.5	2.1	1.4
35 Mozambique	90	....	6.2	14.2	16.0	35.1	2.1	2.4	2.7
36 Namibia	2,250	....	0.5	1.3	1.5	3.0	2.5	2.7	2.3
37 Niger	200	61.5	2.4	7.7	9.2	22.4	3.0	3.4	3.0
38 Nigeria	240	28.9	32.9	96.2	111.7	238.4	2.7	3.0	2.6
39 Rwanda	190	45.7	2.1	7.0	8.0	15.8	3.0	2.6	2.3
40 Sao Tome & Principe	350	....	....	....	....	....	....	....	....
41 Senegal	560	54.0	2.5	7.3	8.3	16.9	2.7	2.6	2.4
42 Seychelles	6,960	....	....	....	0.1	....	....	....	....
43 Sierra Leone	210	....	1.9	4.0	4.5	8.7	1.8	2.4	2.2
44 Somalia	....	....	3.1	8.7	9.3	21.3	2.6	1.3	2.8
45 South Africa	3,130	23.7	13.7	37.1	41.5	71.0	2.5	2.3	1.8
46 Sudan	....	....	9.2	24.6	28.1	58.4	2.5	2.7	2.5
47 Swaziland	1,120	....	0.3	0.7	0.9	1.6	2.6	2.8	2.2
48 Tanzania	170	16.4	7.9	25.6	29.7	62.9	3.0	3.0	2.5
49 Togo	300	....	1.3	3.5	4.1	9.4	2.5	3.2	2.8
50 Tunisia	1,920	3.9	3.5	8.1	8.9	13.3	2.1	1.9	1.3
51 Uganda	300	50.0	4.8	17.9	21.3	48.1	3.4	3.5	2.7
52 Zambia	370	84.6	2.4	8.2	9.5	19.1	3.1	3.0	2.4
53 Zimbabwe	610	41.0	2.7	9.9	11.3	19.6	3.3	2.6	1.9

*Source: ADB, 1997*

**Table 3 (cont.) Illustrative data for African countries**

Country	Urban pop. 1995/96 (%)	Population with access to safe water			Pop. With Sanitation Facilities (%)
		Urban (%) (year)	Rural (%) (year)	Total (%) (year)	
Column	10	11	12	13	14
<b>AFRICA</b>	<b>34.5</b>				
1 Algeria	55.8	....	....	....	....
2 Angola	32.0	....	....	32.0 1995	16.0
3 Benin	41.8	82 1993	63.0 1993	70.0 1993	22.0
4 Botswana	30.8	100 1993	53.0 1993	70.0 1993	55.0
5 Burkina Faso	27.2	44 1990	70.0 1990	70.0 1990	14.0
6 Burundi	7.5	....	55.0 1993	58.0 1993	48.0
7 Cameroon	44.9	71 1993	24.0 1993	41.0 1993	40.0
8 Cape Verde	54.3	75 1990	34.0 1990	52.0 1990	....
9 Central African Rep	39.3	....	....	....	....
10 Chad	21.4	....	....	29.0 1995	32.0
11 Comoros	27.8	....	....	28.0 1993	....
12 Congo Br.	58.8	....	8.0 1993	60.0 1993	9.0
13 Congo, Dem.Rep.	29.1	....	....	25.0 1995	....
14 Côte d'Ivoire	43.6	97 1993	73.0 1993	82.0 1993	54.0
15 Djibouti	82.8	27 1990	14.0 1990	24.0 1990	....
16 Egypt	44.8	95 1990	86.0 1990	90.0 1990	....
17 Equatorial Guinea	42.2	....	....	....	....
18 Eritrea	17.2	....	....	....	....
19 Ethiopia	13.4	90 1995	20.0 1995	27.0 1995	10.0
20 Gabon	50.0	80 1995	30.0 1995	67.0 1995	....
21 Gambia, The	25.5	....	....	61.0 1995	34.0
22 Ghana	36.3	....	....	56.0 1995	29.0
23 Guinea	29.6	....	....	49.0 1995	6.0
24 Guinea-Bissau	22.2	18 1993	47.0 1993	27.0 1993	20.0
25 Kenya	27.7	74 1993	43.0 1993	49.0 1993	43.0
26 Lesotho	23.1	....	....	57.0 1995	35.0
27 Liberia	46.0	....	....	40.0 1994	....
28 Libya	86.0	....	....	90.0 1990	....
29 Madagascar	27.1	....	....	32.0 1995	17.0
30 Malawi	13.5	....	....	54.0 1995	63.0
31 Mali	27.0	....	....	44.0 1995	44.0
32 Mauritania	53.8	49 1993	86.0 1993	....	64.0
33 Mauritius	40.6	....	....	100.0 1993	100.0
34 Morocco	49.0	100 1993	18.0 1993	59.0 1993	63.0
35 Mozambique	34.2	....	....	28.0 1995	23.0
36 Namibia	37.4	97 1993	37.0 1993	57.0 1993	36.0
37 Niger	23.1	52 1993	58.0 1993	....	15.0
38 Nigeria	39.3	....	....	43.0 1995	63.0
39 Rwanda	6.1	84 1990	67.0 1990	69.0 1990	....
40 Sao Tome & Principe	46.7	....	....	70.0 1993	....
41 Senegal	42.3	65 1990	26.0 1990	44.0 1990	....
42 Seychelles	55.0	99 1993	80.0 1993	97.0 1993	....
43 Sierra Leone	36.2	80 1990	20.0 1990	39.0 1990	....
44 Somalia	25.7	50 1990	29.0 1990	36.0 1990	....
45 South Africa	50.8	....	....	....	46.0
46 Sudan	24.6	....	73.0 1993	....	....
47 Swaziland	31.2	....	....	60.0 1995	....
48 Tanzania	24.4	....	....	49.0 1995	86.0
49 Togo	30.8	....	....	67.0 1995	20.0
50 Tunisia	57.3	....	....	86.0 1995	72.0
51 Uganda	12.5	....	....	42.0 1993	60.0
52 Zambia	43.1	....	....	47.0 1995	42.0
53 Zimbabwe	32.1	....	....	74.0 1995	58.0

*Source: ADB, 1998*

**Table 3 (cont.) Illustrative data for African countries**

Country	Annual internal renewable water (km3)	Annual river flows		Annual withdrawals (km3) (year)		Sector water allocation		
		from other countries (km3)	to other countries (km3)			Dom. (%)	Ind. (%)	Agr. (%)
Column	15	16	17	18		19		
AFRICA	3,996			145.14	1995	7	5	88
1 Algeria	14.8	0.4	0.7	4.50	1990	25	15	60
2 Angola	184.0	....	....	0.48	1987	14	10	76
3 Benin	25.8	15.5	....	0.15	1994	23	10	67
4 Botswana	14.7	11.8	....	0.11	1992	32	20	48
5 Burkina Faso	28.0	....	....	0.38	1992	19	0	81
6 Burundi	3.6	....	....	0.10	1987	36	0	64
7 Cameroon	268.0	0.0	0.0	0.40	1987	46	19	35
8 Cape Verde	....	....	....	....	....	9	2	89
9 Central African Rep	141.0	....	....	0.07	1987	21	5	74
10 Chad	43.0	28.0	....	0.18	1987	16	2	82
11 Comoros	....	....	....	....	....	48	5	47
12 Congo Br.	832.0	610.0	....	0.04	1987	62	27	11
13 Congo, Dem. Rep.	1,019.0	84.0	....	0.36	1990	61	16	23
14 Côte d'Ivoire	77.7	1.0	....	0.71	1987	22	11	67
15 Djibouti	....	....	....	....	....	28	21	51
16 Egypt	58.1	55.5	0.0	56.40	1992	6	9	85
17 Equatorial Guinea	30.0	0.0	....	0.01	1987	81	13	6
18 Eritrea	8.8	6.0	....	....	....	....	....	....
19 Ethiopia	110.0	0.0	....	2.21	1987	11	3	86
20 Gabon	164.0	0.0	....	0.06	1987	72	22	6
21 Gambia, The	8.0	5.0	....	0.02	1982	7	2	91
22 Ghana	53.2	22.9	....	0.30	1970	35	13	52
23 Guinea	226.0	0.0	....	0.74	1987	10	3	87
24 Guinea-Bissau	27.0	11.0	....	0.02	1991	60	4	36
25 Kenya	30.2	10.0	....	2.05	1990	20	4	76
26 Lesotho	5.2	0.0	....	0.05	1987	22	22	56
27 Liberia	232.0	32.0	....	0.13	1987	27	13	60
28 Libya	0.6	0.0	0.0	4.60	1994	11	2	87
29 Madagascar	337.0	0.0	0.0	16.30	1984	1	0	99
30 Malawi	18.7	1.1	....	0.94	1994	10	3	86
31 Mali	67.0	40.0	....	1.36	1987	2	1	97
32 Mauritania	11.4	11.0	....	1.63	1985	6	2	92
33 Mauritius	2.2	0.0	0.0	0.36	1974	16	7	77
34 Morocco	30.0	0.0	0.3	10.85	1992	5	3	92
35 Mozambique	208.0	111.0	0.0	0.61	1992	9	2	89
36 Namibia	45.5	39.3	....	0.25	1991	29	3	68
37 Niger	32.5	29.0	....	0.50	1988	16	2	82
38 Nigeria	280.0	59.0	....	3.63	1987	31	15	54
39 Rwanda	6.3	....	....	0.77	1993	5	2	94
40 Sao Tome & Principe	....	....	....	....	....	....	....	....
41 Senegal	39.4	13.0	....	1.36	1987	5	3	92
42 Seychelles	....	....	....	....	....	....	....	....
43 Sierra Leone	160.0	0.0	....	0.37	1987	7	4	89
44 Somalia	13.5	7.5	....	0.81	1987	3	0	97
45 South Africa	50.0	5.2	....	13.31	1990	17	11	72
46 Sudan	154.0	119.0	56.5	17.80	1995	4	1	94
47 Swaziland	4.5	1.9	....	0.66	1980	2	2	96
48 Tanzania	89.0	9.0	....	1.16	1994	9	2	89
49 Togo	12.0	0.5	....	0.09	1987	62	13	25
50 Tunisia	3.9	0.3	0.0	3.08	1990	9	3	89
51 Uganda	66.0	27.0	....	0.20	1970	32	8	60
52 Zambia	116.0	35.8	....	1.71	1994	16	7	77
53 Zimbabwe	20.0	5.9	....	1.22	1987	14	7	79

Source: World Resources Institute, 1999

**Table 3 (cont.) Illustrative data for African countries**

Country	Area ( <sup>'000</sup> km <sup>2</sup> )	Arable land ( <sup>000</sup> ha)	Irrigated area ( <sup>000</sup> ha)	Irrigation potential ( <sup>000</sup> ha)	Hydropower	
					Known exploitable potential (MW)	Installed capacity 1993 (MW)
Column	20	21	22	23	24	
<b>AFRICA</b>	<b>30,061</b>					
1 Algeria	2,382	7,521	560	730	287 *)	274
2 Angola	1,247	3,000	75	6,700	100,000	322
3 Benin	113	1,430	10	300	500 *)	0
4 Botswana	600	346	1	20	1 *)	0
5 Burkina Faso	274	3,390	25	165	200 *)	30
6 Burundi	26	770	14	185	1,366	36
7 Cameroon	475	5,960	21	240	115,000	725
8 Cape Verde	4	39	3	3	....	....
9 Central African Rep	623	....	....	1,900	2,000 *)	22
10 Chad	1,284	3,241	14	935	30 *)	0
11 Comoros	2	78	....	0	....	....
12 Congo Br.	342	135	1	40	50,000	89
13 Congo, Dem. Rep.	2,345	6,930	11	....	530,000	2,829
14 Côte d'Ivoire	323	2,900	73	475	14,000	900
15 Djibouti	22	....	1	....	....	....
16 Egypt	1,001	2,800	3,266	4,434	3,210 *)	2,825
17 Equatorial Guinea	28	130	....	....	2,000 *)	....
18 Eritrea	118	....	28	....	....	....
19 Ethiopia	1,104	11,300	190	3,637	162,000	378
20 Gabon	268	325	4	440	32,500	326
21 Gambia, The	11	175	2	80	....	0
22 Ghana	239	2,800	6	1,900	11,550	1,072
23 Guinea	246	595	95	520	26,000	61
24 Guinea-Bissau	36	300	17	281	300	0
25 Kenya	583	4,000	67	352	30,000	611
26 Lesotho	30	320	2	13	2,000	0
27 Liberia	111	127	2	600	11,000	81
28 Libya	1,760	1,815	470	750	....	0
29 Madagascar	587	2,560	1,087	1,500	23,061	130
30 Malawi	119	1,597	28	162	6,000	146
31 Mali	1,240	4,606	85	560	10,000	45
32 Mauritania	1,031	488	49	221	....	61
33 Mauritius	2	100	18	....	65 *)	59
34 Morocco	447	8,806	1,258	560	4,000	713
35 Mozambique	802	2,950	107	3,300	72,000	2,081
36 Namibia	823	816	7	45	1,060	249
37 Niger	1,267	4,994	66	270	235 *)	0
38 Nigeria	924	30,371	235	3,137	40,000	1,970
39 Rwanda	26	850	4	160	3,000	59
40 Sao Tome & Principe	1	2	10	....	....	....
41 Senegal	196	2,245	71	400	500 *)	0
42 Seychelles	0	1	....	....	....	....
43 Sierra Leone	72	486	29	807	6,800	....
44 Somalia	638	1,000	200	240	50 *)	0
45 South Africa	1,220	14,985	1,270	1,500	....	593
46 Sudan	2,506	12,920	1,946	4,843	1,900	225
47 Swaziland	17	169	69	90	400	51
48 Tanzania	945	3,100	190	828	20,000	339
49 Togo	57	2,070	7	180	270 *)	73
50 Tunisia	164	2,842	380	563	65 *)	79
51 Uganda	236	5,060	9	202	10,200	155
52 Zambia	753	5,265	46	520	309,009	2,259
53 Zimbabwe	391	3,080	150	331	19,281	666

*Source: FAO, 1995 and World Bank, 1997*

**Table 4 International drainage basins larger than 30,000 km<sup>2</sup>**

Name of basin	Catchment area [x 1000 km <sup>2</sup> ]	Countries sharing catchment area
Congo	3690	Angola, Burundi, Cameroon, Congo, Central African Republic, Democratic Republic of Congo, Rwanda, Tanzania, Zambia
Nile	2850	Burundi, Egypt, Eritrea, Ethiopia, Kenya, Democratic Republic of Congo, Rwanda, Sudan, Tanzania, Uganda
Niger-Benue	2230	Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Guinea, Mali, Nigeria, Niger
Lake Chad	1900	Cameroon, Central African Republic, Chad, Nigeria, Niger, Sudan
Zambesi	1290	Angola, Botswana, Malawi, Mozambique, Namibia, Tanzania, Zambia, Zimbabwe
Orange Senou	800	Botswana, Lesotho, Namibia, South Africa
Lake Turkana	500	Ethiopia, Kenya, Sudan, Uganda
Juba-Shebelli	450	Somalia, Ethiopia, Kenya
Limpopo	400	Botswana, Mozambique, South Africa, Zimbabwe
Volta	390	Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali, Togo
Senegal	340	Guinea, Mali, Mauritania, Senegal
Okavango	320	Angola, Botswana, Namibia, Zimbabwe
Ogooué	220	Gabon, Democratic Republic of Congo, Equatorial Guinea, Cameroon
Ruvuma	150	Tanzania, Mozambique, Malawi
Awash	120	Ethiopia, Djibouti
Cunene	110	Namibia, Angola
Sabie (Save)	103	Mozambique, Zimbabwe
Gambia	78	Gambia, Guinea, Guinea Bissau, Senegal
Sassandra	78	Guinea, Cote d'Ivoire
Comoé	77	Burkina Fasso, Cote d'Ivoire
Baraka	60	Sudan, Eritrea
Cross	48	Nigeria, Cameroon
Ouemé	48	Benin, Nigeria, Togo
Komati	46	Mozambique, South Africa, Swaziland
Pangani	35	Kenya, Tanzania
Maputo	34	Mozambique, South Africa, Swaziland
Cavally	32	Guinea, Cote d'Ivoire, Liberia
Gash	32	Sudan, Eritrea

*Source: United Nation, 1978*

**Table 5 Major river basin organizations**

River basin	Organization	Date of formation
Gambia	<b>OMVG</b> (Organisation pour la Mise en Valeur du fleuve Gambia)	1967
Kagera	<b>KBO</b> (Kagera Basin Organisation)	1977
Lake Chad	<b>CBLT</b> (Commision du Bassin du Lac Tchad)	1954
Mano	<b>MRU</b> (Mano River Union)	1973
Niger	<b>ABN</b> (Autorité du Bassin du Niger)	1963
Nile	<b>Tecconile</b> (Technical Commission for the Nile)	1993
Senegal	<b>OMVS</b> (Organisation pour la Mise en Valeur du fleuve Sénégal)	1972
Volta	<b>VRA</b> (Volta River Authority)	1961
Zambezi	<b>ZRA</b> (Zambezi River Authority)	

*Source: Compiled from ADB Documents*