

FIRST DRAFT

**AFRICA REGION REPORT
FOR
THE 4TH WORLD WATER FORUM**

This draft report is a work-in-progress, prepared to serve as a working document for the preparation of the African Regional Report to the 4th World Water Forum. The outline and contents of the Report will be reviewed and agreed at the 2nd Regional Preparatory Meeting in Windhoek, Namibia, 8th and 9th December 2005. Comments and contributions are welcome to finalise this document.

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EXECUTIVE SUMMARY

FOREWORD

ACRONYMS

FIRST DRAFT

AFRICA REGION REPORT

FOR THE 4TH WORLD WATER FORUM

1 Introduction

1.1 Historical Perspective on the Water Agenda

The first collective action on water in Africa dates back to 1968. In September 1968, the **African Convention on the Conservation of Nature and Natural Resources** was adopted at Algiers by Organization of African Unity. The Convention gives considerable prominence to water resources. Article II of the Convention declares that the Contracting States “undertake to adopt the measures to ensure conservation, utilization and development of soil, water, flora, and fauna resources in accordance with scientific principles and with due regard to the interests of the people.”

This was followed up by the **UN Conference on the Human Environment** in Stockholm in 1972. This conference resulted in the creation of the United Nations Environment Programme (UNEP). This was followed by the 1977 **UN Conference on Water in Mar del Plata**. The conference provided a platform to discuss water issues and outlined an action plan. Based on Mar del Plata Action Plan, in 1980 the UN proclaimed 1981-1990 as the International Drinking Water Supply and Sanitation Decade.

The aim of the Water Decade was for countries to provide safe drinking water and adequate sanitation for all by 1990. **The New Delhi Statement** of 14 September 1990 highlighted that the goal had not been achieved. However, the Water Decade had contributed considerably to define the problem for future interventions..

A meeting was held in **Dublin in January 1992** in preparation for the **June 1992, United Nations Conference on Environment and Sustainable Development** in Rio de Janeiro. The meeting resulted in formulating the Dublin Principles, which have played - and are playing - a major role in the area of water development. The Dublin Principles were an attempt to concisely explore the main issues relating to water management and state values and attitudes that should underpin an ideal of rational development of water resources. This was followed by Agenda 21 a product of the proceedings of the Earth Summit for Sustainable development held in Rio de Janeiro or simply the Rio conference Chapter 18 of Agenda 21 focuses on Sanitation and Water Management.

In response to the Dublin meeting and Rio Conference, the World Water Council (WWC) was established as an international think-tank for water issues, and the Global Water Partnership (GWP) was formed to promote and operationalize the

Dublin Principles through the Integrated Water Resources Management (IWRM) approach.

In 1997, the **1st World Water Forum** was organized in Marrakech. The Marrakech Declaration re-iterated the importance of recognizing the basic human needs for accessing clean water and sanitation, establishing an effective mechanism for management of shared waters, supporting and preserving ecosystems, and encouraging efficient use of water. The WWC was also given the mandate to develop a vision for Water, Life and the Environment in the 21st Century.

In March 2000, the **2nd World Water Forum** was held at The Hague, The Declaration of Hague was adopted at the Ministerial Conference held during the Forum. It identified seven major challenges: meeting basic needs, securing the food supply, protecting ecosystems, sharing water resources, managing risks, valuing water, and governing water wisely. The Forum also formulated a World Water Vision for 2025. Africa participated in the Forum and developed the Africa Water Vision (AWV) for 2025, along with a Framework for Action (FFA). The AWV was endorsed during the African Caucus meeting at the 2nd World Water Forum and obtained wide support among African countries and their development partners.

Following this, the **55th UN General Assembly** in 2000 adopted the Millennium Development Goals (MDG). Among other goals, the MDGs aim to reduce, by half, by 2015 the proportion of people without access to safe drinking water.

At a **meeting organized by AfDB** in September 2001, it was decided to establish the African Water Task Force to help African water stakeholders focus the world's attention on African water issues at the World Summit on Sustainable Development (WSSD) and the Third World Water Forum. In April 2002, the African Water Task Force (AWTF), with the support of the African Development Bank, organized a **Stakeholders Conference on Water and Sustainable Development** in Accra, Ghana. One of the results of the Accra Stakeholders Conference was to recommend the creation of an African Water Facility (AWF) to be housed within the African Development Bank.

In a meeting organized by UNEP in April 2002 in Abuja, the 45 African ministers responsible for water attending the meeting recommended the establishment of the African Ministers' Council on Water (AMCOW).

In 2002, the **World Summit on Sustainable Development** was organized in Johannesburg. The Summit reaffirmed the Millennium Development Goals and agreed brought prominence to sanitation by agreeing a target for it in the MDGs, The WSSD agreed on the Johannesburg Plan of implementation which included an engagement among others to "Launch a programme of actions, with financial and technical assistance, to achieve the millennium development goal on safe drinking water," and to "Develop integrated water resources management and

water efficiency plans by 2005, with support to developing countries, through actions at all levels”¹

The AWTF prepared the Water Dome as a side event at the WSSD. The Water Dome was a week-long event, used to promote the use of water as a key to sustainable development as well the 45 African ministers attending the meeting as to increase awareness about African water issues and challenges. The Water Dome endorsed the creation of the African Ministers' Council on Water (AMCOW) and the African Water Facility (AWF).

The **3rd World Water Forum** took place in Kyoto in March 2003. Discussions focused on balancing the increasing human requirement for adequate water supplies and improved health and sanitation with food production, transportation, energy, and environmental needs. Also considered key were the issues of effective governance, improved capacity, and adequate financing. The Ministerial Declaration at the Forum was basically a high-level document reasserting global resolve to achieve the water-related Millennium Development Goals and WSSD commitments. The Africa Day was organised at the Forum by the AWTF to ensure African participation and promote African water issues and challenges.

The **Pan-African Conference on Water (PANAFCON)** was organised in December 2003 in Addis Ababa under the auspices of the African Ministers' Council on Water. The purpose of the Conference was to review commitments made by governments, donors and other institutions during previous conferences and meetings on water and to establish/strengthen partnerships to facilitate the implementation of the action programs.

PANAFCON made proposals for concrete actions in nine key areas: meeting basic needs; water, sanitation and human settlements; water for food security; protecting ecosystems and livelihoods; managing risks: water and climate; financing water infrastructure; integrated water resources management / shared water resources; valuing and allocating water; ensuring water wisdom; and governing water wisely.

The Ministers agreed to establish in the individual countries a National Task Force on Water and Sanitation, which would prepare national plans with service delivery targets for achieving water and sanitation goals by 2015. They also signed a joint declaration with the European Commission on the implementation of the African-European Union Strategic Partnership on Water Affairs and Sanitation.

During the Conference, the Ministers launched a number of initiatives, including the African Water Facility with a targeted funding of over US\$600 million for medium-term projects on water and sanitation; the African Water Journal to provide an outlet to disseminate knowledge; the Water and Sanitation for African Cities Programme (Phase II), the Rural Water Supply and Sanitation Initiative and the G8 Action Plan on Water for Africa.

¹ WSSD Plan of Implementation

The **4th World Water Forum** will take place in March 2006 in Mexico. The main theme of the conference is: “**Local Actions For A Global Challenge**” with the idea of exploring thoroughly the barriers and opportunities that local actors face when attempting to address particular sanitation and water issues and constraints, and with the clear objective of generating – from the bottom-up-- policy proposals and political commitment.

The Preparatory Process for the Forum is structured around two main components: Thematic process and Regional processes. The thematic content assembles and circumscribes some of the most important challenges and problems faced by the global water under 5 thematic areas are:

- Water, Growth and Development;
- Implementing Integrated Water Resource Management (IWRM);
- Water Supply and Sanitation for All;
- Water Management for Food and the Environment; and
- Risk Management.

In addition, there are five Cross-Cutting Perspectives:

- New Models for Financing Local Water Initiatives;
- Institutional Development and Political Processes;
- Capacity Building and Social Learning;
- Application of Science, Technology and Knowledge; and
- Targeting, Monitoring and Implementation Assessment.

For each thematic area and cross –cutting perspective a Thematic Beacon is assigned. A Beacon is responsible for the preparation of the base document to guide thematic area and organizing sessions on the thematic areas.

The Regional Process has the objective of enabling dialogue and networking amongst stakeholders from the very start. It is oriented at identifying, from the bottom up, factors that affect the unfolding of local action; the most pressing challenges prevalent in each of the regions, and finding exemplary local projects that can serve as foundations for the development of policy-oriented solutions. Such findings will feed the ministerial process to influence decision-making..

For each Region, a Regional Beacon is assigned A Regional Beacons will coordinate the: (i) identification of local actions that should be promoted, scaled up or duplicated (ii) preparation of a regional report on the difficulties and major actions needed to boost action on the ground for better water services and resource management. The outputs of the Forum will comprise a short ministerial declaration,

2 PRESENTATION OF THE AFRICA REGION REPORT

2.1 Objective of the Africa Region Report

The objective of the Africa Region Report is to present the main challenges and opportunities of water development in Africa the major actions needed to boost water services and resource management and exemplary local actions that should be promoted, scaled up or replicated for enhanced development and achievement of sustainability.

2.2 Development of the Africa Region Report

The actual preparation for the participation of Africa in the 4th World Water Forum started on June 26th 2005 in a meeting convened by the World Water Council (WWC) in cooperation with African Ministers' Council On Water (AMCOW). The meeting proposed the establishment of two committees to provide leadership and guidance in the political and technical arenas.

- a) A Steering Committee that provide overall guidance, chaired by an AMCOW EXCO member and composed of an AMCOW minister and representatives of the AU, AfDB, UN WATER, ECA and NEPAD; and
- b) A Technical Committee co-chaired by AMCOW TAC and AfDB to give technical guidance, composed of members from the GWP, AMCOW, AfDB, UN Water, ANEW, WWC, Municipal Development Partnership (MDP), AWTF, IWMI, FAO, UNEP, UN Habitat, Water Utilities Partnership, ANBO, Water Basins Organizations, etc.

The meeting also proposed AfDB to play the role of a "Regional Beacon", with responsibility for coordinating the preparatory process and providing the Secretariat function. The African Development Bank established a Task Force to assist the regional preparation. The first meeting of the Technical Committee took place in Tunis on 28th and 29th September 2005. A second meeting of the Steering Committee and the Technical Committee took place in Windhoek, Namibia on the 8th and 9th December 2005.

2.3 Structure of the African Regional Report

The African Region Report is organized in eight chapters. The main contents of each Chapter are briefly described below.

Chapter 1: Presents the historical development of the appreciation of water issues in the various forums and the implications of the outcomes for the region.

- Chapter 2 Describes the process of the preparation of the regional document and provides the outline of the Regional Report.
- Chapter 3 Presents the main characteristics of the African region with respect to geography, climate, economic, social and environmental conditions.
- Chapter 4 Presents the main water related challenges faced in Africa.
- Chapter 5: Describes the opportunities and enabling environment which would facilitate better water services and resource management.
- Chapter 6: Describes strategies and instruments that have been implemented or are under implementation to respond to water related challenges.
- Chapter 7: Presents a sample of successful local actions identified by RMCs and other stakeholders in the region.
- Chapter 8: Presents conclusions and recommendations for ministerial declarations.
- Chapter 9: Provides a list of organizations and institutions that have contributed financial and technical assistances to the region in the field of water management.

3 CHARACTERISTICS OF THE REGION

3.1 Socio-Economic Characteristics

Africa's economic growth rate of 3.7 percent in 2003 was higher than the global growth rate and was achieved despite a fragile world output growth². The improved output growth in the Continent was accompanied by a strengthening of economic fundamentals. According to African Economic outlook 2004/2005 the economic activity in Africa is estimated to have risen by over 5 percent in 2004 and inflation to have reached historical lows despite increasing oil prices³.

Aid levels to African countries have increased in the last years. The launching of NEPAD, the Monterrey Concession on financing for development in 2002, and the implementation of the Heavily Indebted Poor Countries (HIPC) Initiative have all played an important role in making Africa the focus of development aid. However the commitments from donors fall short of the amount required to meet the MDGs.

Democracy has started to take root in a number of African countries creating the enabling environment for investment. NEPAD is also playing a key role in promoting good governance through its Peer Review Mechanism.

On the other hand Africa is characterized by high population growth (despite the impact of HIV/AIDS) civil wars, rapid spread of HIV/AIDS and high indebtedness. The Population of Africa in 2004 was 885 million and is estimated to grow to 1,941 million by 2050. Under age 1 infant mortality per 1,000 live births is 90 and Life expectancy at birth is 52 years. Percent of population with HIV/AIDS was 6.3 % in 2003 and is estimated at over 30% in some southern African countries.

The region's total external debt rose to US\$218 billion in 2003 compared to US\$204 billion in 2002 even as 23 countries obtained total debt service relief worth about US\$43 billion. In addition, of a total US\$135 billion in foreign direct investments (FDI) in 2003, net FDI flows to Africa dropped by more than 100 percent compared to 2001 to US\$9 billion in 2003⁴.

In particular the statistics for Sub-Saharan Africa is very worrying. Sub-Saharan Africa is the only region of the world that has got poorer in the last generation. Its share of world trade halved between 1980 and 2002. It makes up 13% of the world's population 28% of world poverty. Percentage of population below US\$ 1 per day was 46.4% in 2001 (313 million). Sub-Saharan Africa also bears the brunt of the world's AIDS epidemic. To date 13 million men, women and children have died of AIDS, and 26 million are now living with the virus.

The statistics in the RMCs is diverse with several countries making remarkable progress, some stagnating and others lagging seriously behind. For example: In

² African Development Report 2004, African Development Bank, 2004

³ African Economic Outlook 2004/2005, OECD, African Development Bank, 2005

⁴ African Development Indicator (ADI) 2005

Sierra Leone, in 2003 the number children who die before the age of five is 175 per 1,000 births whereas, in Mauritius it is 16 per 1,000 births; Liberia has three phone lines per 1,000 inhabitants, while Seychelles has 83 lines per 100 inhabitants. Zimbabwe illiteracy rate is 9 percent; while Niger's is 82 percent. Access to safe source of water in Ethiopia is 22 percent of; while in Mauritius it is 99 percent. GNI in Ethiopia and Burundi is US\$ 100 while in Seychelles it is US\$ 7,050⁵.

A result of analysis of assessing progress towards MDGs for 2015 based on linear interpolation of trends in 1990s shows that out of the 173 countries 26 African countries are classified as exhibiting low human development⁶. This indicates that most African countries are slipping back, far behind, or lagging in the attainment of the MDGs.

3.2 Hydrology

Africa is a large continent comprising 53 countries, with a wide range of hydrological characteristics. The region represents 22.4 percent of the world's land area and 13 percent of the world's population, but has only 9 percent of the world's freshwater. Africa's annual renewable water resources are estimated to be about 5,400 billion m³ per year, of which roughly 15 percent is groundwater. The average per capita water resources are estimated to be about 4,979 m³/inhabitant/year⁷. However, the contributions of the Northern African, Sudano-Sahelian and Southern Africa sub-regions amount to only 1.2 percent, 4.06 percent and 9.0 percent, respectively.

The Region is divided into 24 major hydrological units or basin groups: 8 major river basins draining to the sea (Senegal, Niger, Nile, Shebelli-Juba, Congo, Zambezi, Limpopo and Orange rivers); 9 coastal regions grouping several small rivers, also draining to the sea; and 5 regions grouping several endorheic drainage basins (Lake Chad, Rift Valley, Okavango, South Interior and North Interior).

These freshwater resources are distributed unevenly across Africa, with western Africa and central Africa

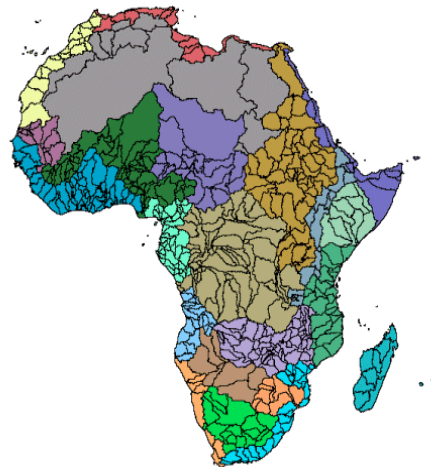


Figure1: Main Hydrological Basins

⁵ African Development Report 2004, African Development Bank, 2004

⁶ Human Development Report 2002, UNDP

⁷ Review of Water Resources by Country, Water Reports 23; FAO UN Rome, 2003.

having significantly greater precipitation than northern Africa, the Horn of Africa and southern Africa.

The Democratic Republic of Congo is the wettest country in the region, and Mauritania is the driest; they contribute 25 percent and 0.001 percent to the overall African water resources, respectively.⁸

African water resources are characterised by extreme temporal and spatial variability. For example, northern Africa and southern Africa receive 9 and 12 percent, respectively of the Region's rainfall. In contrast, the Congo River watershed in the central humid zone, with 10 percent of Africa's population, has over 35 percent of the Regions annual runoff. An illustration of longer term temporal variability is that rainfall in the Sahel region during the period 1961-1990 was 30 percent lower than it was during the period 1931-1960. The availability of water varies considerably even within countries and the situation is further complicated by frequent droughts and floods as well as inappropriate water management programmes. The variability of rainfall is much pronounced in the drier part of the Regions. In some desert areas the coefficient of rainfall variation could be as high as 200 percent, in the semi-arid areas 40 percent and in the humid areas it ranges from 5 to 31 percent.

According to the International Panel on Climate Change (IPCC), the African continent is the most vulnerable to climate change. Runoff and water availability are expected to decline in the northern and southern regions of the continent; the frequency of floods and droughts will increase. As a result, 25 African countries are expected to experience water scarcity or water stress over the next 20–30 years.

3.3 Groundwater

Groundwater resources account for about 15 percent of the African water resources. These resources are crucial for many countries and peoples in Africa, particularly during the dry season and in large arid zones. Because of the lack of rainfall in some countries, large numbers of people are dependent on groundwater as their primary source of freshwater. Groundwater accounts for 60 percent of water use in Algeria (UNEP 2002), 80 percent in Botswana, (Government of Botswana 1993) 40 percent in Namibia (Heyns 1993) and 95 percent in Libya (UNEP 2002).

Like rivers, aquifers cross national borders and can be shared by two or more countries. Unlike rivers, little is known about these shared or trans-boundary aquifers. There are over 38 trans-boundary groundwater aquifers in Africa. The Nubian Sandstone Aquifer System (NSAS) is a huge groundwater resource shared among four countries within the Eastern Sahara in North-East Africa. These countries are Chad, Egypt, Libya and Sudan. The NSAS underlies an area

⁸ African Environment Outlook, UNEP 2002.

in excess of 2.5 million km². It occupies a portion of the great arid zone belt of North Africa, extending northward into the Mediterranean Steppe and merging on the southern side into the subtropics. Groundwater studies in general have been greatly lacking, substantial investment and scientific expertise is required just to identify or map the boundaries of an aquifer before beginning to accurately assess the quantity and quality of water it contains.

4 OVERVIEW OF CONSTRAINING ISSUES

4.1 Introduction

As reiterated in the resolutions and recommendations of the various conferences and workshops held in the region and outside the region the key challenges in the water sector are the following:

- Meeting basic water and sanitation needs,
- Securing food and energy supply,
- Protecting ecosystems,
- Applying IWRM principles and practices,
- Managing risks,
- Governing water wisely,
- Ensuring the knowledge transformation.

While a lot of effort has gone towards meeting the internationally agreed goals and targets relating to water, the outputs fall much below expectations. Various factors have contributed to the failure of water development to match the challenges. Some of the constraining issues that influence this result are briefly discussed below.

4.2 Poverty

Poverty is the single most influential factor related to the sustainable provision of basic water and sanitation services and food and energy security. The lack or availability of basic services is a primary measure of poverty and poverty is the primary obstacle in the provision of basic services. According to the Human Poverty Index published by UNDP in 2002 out 173 countries 48 African countries are among the last 73 countries and the last 28 countries are from Africa⁹. In The regions progress towards achieving the MDG on eradication of extreme poverty and hunger is daunting. Out of 53 countries, 8 are slightly off, 8 are far behind 16 are slipping back and 6 have no data¹⁰.

Poverty affects basic water supply and sanitation in a number of ways, ultimately becoming so pervasive that it challenges the application of even the very best practices incorporating all the lessons learned. Poverty is not confined to the

⁹ Human Development Report 2002, UNDP

¹⁰ Human Development Report 2004, UNDP

circumstances of individuals and families alone, but extends to the institutions responsible for ensuring that services are provided at all levels. On the other hand, the provision of services forms part of the poverty reduction agenda.

4.3 High Spatial and Temporal Variability of Rainfall and Climate Change

Extreme spatial and temporal variability of climate and rainfall on the continent is one of the significant features of water resources in Africa, with far-reaching consequences for water resources management. Year-to-year fluctuations in rainfall over Africa are determined by circulation regimes that alter the preferred location of tropical convection (Harrison 1986) and the Intertropical convergence zone (ITCZ). The apparent disappearance of Lake Chad in West Africa illustrates the influence of climate change in Africa. The lake has shrunk in area by over 95 percent – from 25,000 km² to 1,200 km² – in just the last three decades¹¹. The white cap of Kilimanjaro varies in size by the annual season and may grow and shrink at intervals depending on solar influx, precipitation and other factors. But since 1912 there is clear evidence that the glaciers have shrunk consistently and dramatically. Satellite images confirm these findings measured on the ground¹²

The temporal and spatial variability compounded with unpredictability and climate change is at the heart of resource insecurity, results in vulnerability and strongly impacts economic growth. The base line document for Water for Growth and Development for the 4th WWF states that “The economic cost of hydrological variability in Ethiopia is estimated at over one-third of the Nation’s average annual growth potential. Economy-wide models that incorporate hydrological variability in Ethiopia show that projections of average annual GDP growth rates drop by as much as 38 percent as a consequence of this variability”¹³. Another good example of the impact of variability is that of Mozambique. As a result of the flood in 2000, the projected annual GDP growth rate was lower by 23 percent after the flood and the projected inflation increased by 44 percent.

4.4 Inadequate Data

A key factor which constraints the planning and monitoring of development activities at national, sub-regional and continental levels in Africa is the paucity of data on water resources. Governments have been reluctant to give budgetary priority to water data collection and dissemination. The skills for water resources assessment, which are a prerequisite for IWRM, are not widely available in Africa. There is a strong challenge to establish and maintain the necessary

¹¹ Centre for Sustainability and the Global Environment Nelson Institute for Environmental Studies University of Wisconsin-Madison.

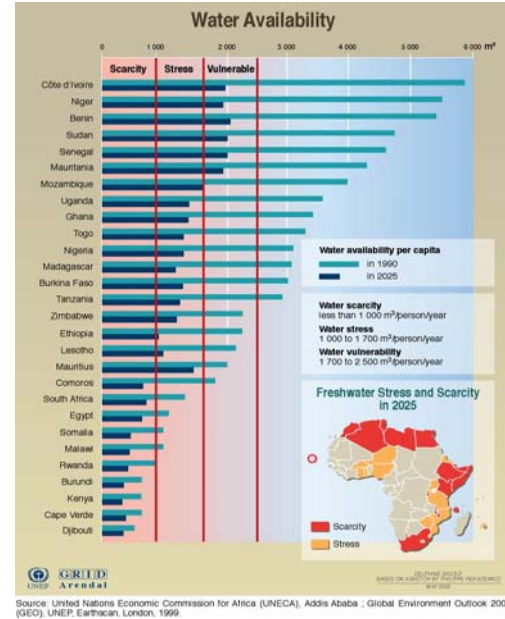
¹² Vital Climate Graphics Africa, UNEP/GRID-Arendal

¹³ Water for Growth and Development: A Framework for Analysis, The World Bank, 2005.

network for data collection and to provide strategic assistance for developing the necessary skills for IWRM.

4.5 Growing Water Scarcity

Availability of water in Africa is highly variable. Only the humid tropical zones in central and West Africa have abundant water. Already 14 countries in Africa are subject to water stress or water scarcity, this situation is getting worse as a consequence of rapid population growth, expanding urbanization, and increased economic development. A report by the Global Environment Outlook (GEO) predicts that by the year 2025, "25 African countries will be subject to water scarcity or water stress" and points out that those countries in Northern Africa will be facing the worst prospects.



4.6 Depletion of water resources through human actions

Available water resources in Africa are being depleted through man-made actions that reduce both their quality and quantity. Water contamination is increasing across the continent. As a consequence, concentrations of waste frequently exceed the ability of rivers to assimilate them, and water-borne and water-based diseases have become widespread. Among the consequences of such quality deterioration are eutrophication and the proliferation of invasive aquatic plants. The water hyacinth has already seriously affected most water bodies including Lake Victoria, and Lake Chivero. Industrial discharge of large quantity of untreated waste into the water systems is another water quality problem. The deterioration of water quality increases the cost of water resources development; and could increase water scarcity.

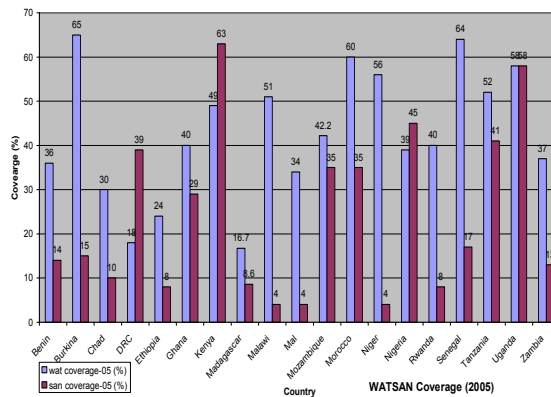
4.7 Under Development of Water Resources

The scarcity of water in Africa is not due entirely to natural phenomena but, in part, to low levels of development and exploitation of water resources, even though there is a growing demand for water in response to population growth and economic development. So far only 3.8 percent of the resources are developed

for the three major water users, namely agriculture, water supply and industries. Sizeable water resources development could have, to some extent, mitigated the impacts of scarcity, and spatial and temporal variability. According to the International Water Management Institute, only 4 of the 20 countries projected to experience absolute water scarcity in the twenty-first century would be in Africa. On the other hand, 22 of the 24 countries projected to experience economic water scarcity would be in Africa¹⁴. Therefore, the challenge for most African countries is to raise funds needed to build sufficient water and sanitation projects.

4.7.1 Lack of access to safe water supply and sanitation services

Africa has the lowest total water supply coverage of any region in the world. About 300 million people in Africa lack access to safe water supply and about 313 million lack access to adequate sanitation. In some sub-Saharan African countries 75 percent of the entire population have no access to safe water supply and nearly 81 percent have no access to sanitary means of excreta disposal. Lack of sustainable access to safe water supply and sanitation has resulted in a high



Water Supply and Sanitation Coverage of Selected Countries in 2005¹⁵

incidence of water-related diseases and loss of valuable productive time-deficiencies contributing to perpetuate poverty on the continent

Rates of urbanization in Africa are the highest in the world. By 2025 more than half of the African population will be urban, and during the next quarter century the urban population will be growing almost twice as the general population, by 2020 Africa will have 11 mega-cities with 5 million or more inhabitants and almost 720 cities with population of more than 100,000. As a result, competing demands from domestic, commercial, industrial and peri-urban agriculture are putting enormous pressure on freshwater resources. In their bid to meet soaring demand, cities are going deeper into ground water sources and farther to surface water sources, at costs - including environmental costs - which are clearly unsustainable. Cities also face the challenge of securing access to safe water for the urban poor, and of cutting down on wasteful and illegal uses.

¹⁴ Future Harvest News Report, March 17, 1977

¹⁵ Water Supply and Sanitation Assessment, ADB, September 2005,

4.7.2 Development of water for food security

During the past three decades, agricultural production in the region has increased by only less than 2 percent per annum, while population has risen at about 3 percent. Under current demand and supply trends, cereal imports are expected to rise from the current 10 million metric tons per annum to 30 million metric tons in 25 years. It has been estimated that a 33 percent increase in agricultural output per annum is needed to achieve food security objectives for the continent.

Agricultural productivity per capita in sub-Saharan Africa has not kept pace with population increase, and the region is now in a worse position nutritionally than it was 30 years ago. In the past, additional food in Africa came from increases in the area cultivated, but as good land becomes less available the region will be forced to increase yields. Both rain-fed and irrigated agriculture will need to be intensified, while rainfed agriculture would benefit from technology inputs on moisture management under conservation agriculture irrigated agriculture has a higher potential for intensification.

Global estimates indicate that irrigated agriculture produces nearly 40 percent of food and agriculture commodities on 17 percent of agricultural land. At present in Africa, about 12.2 million hectares benefit from irrigation¹, which is equal to only about 8.5 percent of the cultivated land [21a]. In sub-Saharan Africa, only about 10 percent of the agricultural production comes from irrigated land. Trends in irrigated land expansion over the last 30 years show that, on average, irrigation in Africa increased at a rate of 1.2 percent per year. However, this rate began to fall in the mid-1980s and is now below 1 percent per year, but varies widely from country to country [8].

4.7.3 Development of water for energy security

The gross theoretical hydropower potential of the Region is estimated to be over 4.0 million GWh/year while the technically feasible hydropower potential is estimated to be about 1.4 million GWh/year of which less than 3 percent is utilized. According to the World Energy Council 2004 survey, at the end of 2002 Africa's installed hydropower capacity was 20,989 MW, generating 84,874 GWh/year (around 3 percent of the world total). Small-scale hydropower potential for rural energy supply is hardly exploited. Sixty seven percent of the total energy consumption is supplied by hydrocarbon based power plants, while only 32 percent is covered by hydropower.. The current distribution of hydropower is 23 percent in north Africa, 25 percent in West Africa and the remaining 51 percent in south/central and eastern Africa.

4.8 Lack of appropriate management and environmental threats

4.8.1 Inefficiency and wastage in water use

The average level of unaccounted-for water in urban water supplies is about 50 percent; and as much as 70 percent of the water used for irrigation is lost and not used by plants. These high levels of water wastage maybe attributed to the existence of perverse incentives or to the use of inefficient technologies. In the case of water supply, a major contributory factor is maintenance neglect of installed equipment. In many African countries, limited resources, and poor water management has led rehabilitation to become a form of delayed maintenance of facilities.

The reuse of recycled water is one method of optimising the use of available water resources and averting the water stress that would be faced otherwise. However, currently reuse of recycled water is limited to few specific areas in the northern and western African countries only. Concentrically useful water is being wasted. However, as more African countries face water scarcity the importance of the reuse of recycled water will grow.

4.8.2 Threats to environmental sustainability

The threats to environmental sustainability are due, in part, to the failure to recognize the life-supporting functions of ecosystems (terrestrial and aquatic). In effect, the water quantity and quality requirements of ecosystems are not normally taken into account in the overall allocation of available water resources in much of Africa nor are they featured in the calculation of cost of production and distribution. Hence the important role played by wetlands in many rural economies (for the provision of highly productive agricultural land, dry season grazing for migrant herds, fish, fuel wood, timber needs, medicines, etc.) has not been sufficiently recognized and reflected in national water policies. As a result, such wetlands are increasingly being endangered by encroachment, poor cultivation, deforestation and overgrazing.

4.8.3 Multiplicity of trans-boundary water basins

A key water resources issue in Africa is the multiplicity of international water basins in a climate of weak international water laws and weak regional cooperation on water quality and quantity issues. Africa has about one-third of the world's major international water basins. There are about 80 international river and lake basins in Africa. Most countries share many water basins and most of the basins in the region are shared. For example, the Nile basin is shared by 10 countries and Guinea shares 12 rivers basins with other countries.

Technical information on the majority of the trans-boundary water basins in Africa is limited and multi-country efforts for integrated development of trans-boundary water basins are not significant. Of the over 80-transboundary water basins in the

region, less than 10 percent have any kind of inter-country mechanism or agreement for the coordination of their integrated development efforts¹⁶

Water interdependency in the region is accentuated by the fact that, for some countries, high percentages of total flows originate outside their borders. For Egypt almost all of its flows originate from outside and for Mauritania 95 percent and Botswana 94 percent originate from outside the countries. Despite this, very few shared waters are jointly managed at present and, in many respects, the issues of water rights and ownership of international waters remain unresolved, resulting in national interests prevailing over shared interests. With so many international water basins in Africa, the use of water basins as a unit for water resources management is impossible without partnership and cooperation between countries sharing a common water basin. Some water basin organizations exist in the Region; however, these cooperation efforts focus on the joint development and use of water basins as sources of freshwater. With a few exceptions, such as the Southern African Development Community (SADC), little attention has been paid to the development of legislative instruments and a common vision for sharing water.

4.8.4 **Political instability and conflict within and between countries**

Some African countries experience instability and conflict, within the countries and between countries, which are caused by a variety of reasons, including political, economic and social reasons or a combination of all or some. Instability and conflict create displacement of people and weak economies. This situation takes the focus away from the development agenda to conflict resolution and discourages investment in the countries and partnership with other countries. Consequentially, the water sector remains underdeveloped.

4.8.5 **Inadequate institutional arrangements and water governance**

In order to achieve the MDGs sound and effective water governance is a prerequisite. Water governance refers to the range of political, social, economic and administrative systems that are in place to regulate the development and management of water resources and provision of water services at different levels of society. However, institutional evolution in the water sector in many African countries, has not kept pace with the requirements. Consequently, resolving the challenges in this area must be a key priority if we are to achieve sustainable water resources development and management

Current institutional arrangements are often [gender are gender insensitive and the financing of the investments is often unsustainable](#).. There is, therefore, a need for institutional reforms to improve performance in the water sector. Such reforms should be underpinned by the adoption of the Dublin Principles. The lack

¹⁶ Transboundary River/Lake Basin Water Development in Africa: Prospects, Problems and Achievements, UNECA, December 2000.

of appropriate management systems for efficient and equitable use of the resource and for managing risks, valuing water, governing water wisely and ensuring the knowledge base are critical elements in the development of water resources. In some societies, the whole notion of putting a price-tag on something as intrinsically valuable as water is unacceptable. Yet services must be paid for. There is also much disagreement about how to balance the costs of provision and wastewater treatment with the goal of equity and meeting the needs of poor (men and women) and vulnerable populations..

Investments in water infrastructure in the last thirty years: approximately US\$600 billion. On the other hand no corresponding investment was made in the capacity to manage such infrastructure. Up to one quarter of the investments made in water-related sectors by developing countries has been ineffective due to lack of governance and management capacity (Alaerts 1999).

4.9 Insufficiency of Investment

For identifying the investment requirements for the transformation of the water sector in Africa, the African Water Vision and the Millennium Development Goals (MDG) provide useful frameworks. A preliminary assessment shows that an average investment of US\$ 20 billion is required each year over the coming 25 years to attain the water related MDG. Even though water investments are perceived as basic needs at the grass-roots level, they do not figure prominently in priority investment plans through the Poverty Reduction Strategy Papers (PRSPs). However, achieving the various targets requires the mobilization of public, private and community resources. A recent assessment made by ADB of the 2007 investment requirement for water supply and sanitation shows a 67 percent investment gap. It requires governments to raise their budgetary expenditure on water and to institute cost-recovery measures without jeopardising access to the poor. It requires creating the necessary environment to make financing investments sustainable for private sector participation and developing specific instruments to facilitate such participation. Official Development Assistance (ODA) levels have to be increased by 2 to 3 times to support water infrastructure development, if the Millennium Development Goals (MDGs) are to be achieved.

5 OPPORTUNITIES AND ENABLING ENVIRONMENT

5.1 Introduction

Water can make an immense difference in Africa's development, if it is managed well **by men and women** and used wisely. According to JMP report water impacts on 7 of the 8 MDGs. Given clear policies and strategies and real commitments to implementation, water can help to eradicate poverty, reduce water-related diseases and achieve sustainable development. The region's untapped resources, the unmet demands for water development as well as the enabling environments created for water development in the region are briefly discussed below.

5.2 Opportunities

5.2.1 Large volume of fresh water resources

Africa has a large volume of renewable freshwater resources, which are unutilised. Only 4 percent of the potential freshwater are utilized, most of the remaining water flows unused to the oceans or is absorbed by deserts. The water systems hold tremendous potential in terms of water supply, hydroelectric power, fisheries, navigation, and irrigation.

5.2.2 Enormous hydropower potential

In Africa, the gross theoretical hydropower potential is estimated to be in excess of 3,892 TWh/year, with a technically exploitable potential in excess of 1,917 TWh/year and an economically exploitable potential of at least 1,100 TWh/year. However, the real figures, in particular the economically exploitable potential, are likely to be somewhat larger as data on hydropower potential are limited or not available for almost half of the countries on the continent¹⁷. The Democratic Republic of Congo alone is reported to have the potential to provide three times as much power as all of Africa presently consumes. This potential, which is enhanced by the current very high price for oil, makes hydropower a more rewarding investment area than ever before. Coupled with these issues, the inevitable environmental considerations are becoming of increasing concern to the continent as governments bring environmental policies in line with the rest of the world. Development of mini- micro and large scale hydropower as renewable resources creates a grand opportunity for water management. .

¹⁷ World Energy Council, 2004 Survey of Energy Resources

5.2.3 Vast areas of irrigable land

The land on which water is used for agricultural production is referred to as water-managed areas while the term irrigated areas is limited to areas with hydraulic structures and equipments. Water-managed areas comprise 14.3 million hectares in Africa, accounting for about **6 percent** of the total cultivated area. Ten countries control more than 80 percent of the water-managed area while 28 countries, covering more than 30 percent of Africa, share a mere 5 percent of water-managed lands¹⁸. These numbers demonstrate that there is a very wide scope for the expansion of water-managed areas in the region by converting the cultivated land to water managed areas. In line with this, a recent FAO projection assumes that in sub-Saharan Africa, 73 percent of the growth expected by 2030 will come from intensification of the cultivate land¹⁹

The land and water management pillar in the NEPAD CAADP framework adequately focuses on the role of management of overland run-off and soil moisture even in rainfed farming in conservation farming and sustainable agriculture..

5.3 Demand for Water Development

5.3.1 The challenges described in chapter 4 can only be faced or met if the public and the private sectors work hand in hand. Governments and technocrats need to address the constraints presented by the negative effects of variability in hydrology, difficulties in geology, leading to water insecurity, while the private sector should take advantage of the opportunity created by unmet demands, to create jobs and facilitate income generation. The areas of demand are describe below:

5.3.2 **Unfulfilled energy requirement:** The development of Africa's power sector is a prerequisite for growth in other industries. A regular, consistent power supply will do much to attract investment. Power shortages and irregularities have forced many countries to look to their neighbours to supplement their own supplies, with regional networks and power pools arising as a result. Africa's electricity consumption is expected to grow at a rate of 3.4 percent per year up to 2020.

5.3.3 **Unmet food requirements:** In the past three decades, agricultural production has increased at an average of less than 2 percent per annum, while the population has risen by about 3 percent. Under current demand and supply trends, cereal imports are expected to rise from the current 10 million metric tons per annum to 30 million metric tons in 25 years. Much of this can be explained by

¹⁸ African Water Development Report, UN-ECA, 2003

¹⁹ Irrigation in Africa south of the Sahara, FAO, Investment Centre Technical Paper 5 Rome

the fact that about one-third of the population in the region lives in drought-prone areas. In much of West Africa, average food supply (2,430 kcal/day/person) is below what is regarded as the optimum level of nutritional supply, namely 2,700 kcal/day/person. In east and southern Africa, the number of food-insecure people almost doubled from 22 million in the early 1980s to 39 million in the early 1990s. It has been estimated that a 3.3 per cent increase in agricultural output per annum is needed to achieve the food security objectives for the continent⁸. New research from IFPRI shows that policy choices and investments made now could substantially improve, or further worse, the prospects of food security in Africa. What IFRI calls a vision scenario, in which national governments and international donors increase investments in education HIV/AIDS prevention and treatment, **water harvesting** technology, female schooling and **clean water access** available kcal/person would increase marked in Africa by 2015. The number of malnourished children in sub-Saharan Africa would decrease by 23.3 million , from 32.7 million in 1997 to 9.4 million in 2025.²⁰,

5.3.4 Unfulfilled water supply and sanitation provision: To meet the RWSSI targets (expand) of 80 percent access rate by 2015, an additional 277 million people have to be provided with safe water supply and 295 million people with improved sanitation. The cumulative investment required to achieve the 2015 RWSSI access targets is about US\$14.2 billion. Investments and additional policy and administrative measures will be required to ensure not only that the coverage levels are truly adequate (ie that minimum walking distances are as prescribed in the criteria for instance), but that benefits are sustainable in that capacities do no decline within a short period of completion of development.

Sanitation and Water supply provision needs also develop in the urban environments to meet the needs of commerce, industry and urban residential consumers. This will be best achieved under conditions where the enabling environment provides adequate incentives for investments and full cost recovery.

5.4 Enabling Environment for Water Development

5.4.1 Adoption of IWRM:

The key lesson that has emerged from water development in the last decades is is the need for a comprehensive and integrated approach to unlock the full benefits of sustainable water management for poverty reduction and economic growth. The IWRM recognizes that water has an ecological, social, and economic use and that water management has to be optimized within these

⁸ African Water Development Report, UN-ECA, 2003

²⁰ IFPRI, *Looking Ahead: long Term Prospects for Africa's Agricultural Development and Food Security*, Augst 2005

systems. The Global Water Partnership (GWP), AfDB and other stakeholders are promoting IWRM in the region. Consequently a number workshops and conferences are being organized to create awareness and build capacity on IWRM. Though implementation of IWRM policy in the African countries would take time and a lot of effort and investment, a number of African countries are on the way to adopt IWRM as part of their water policy. The adoption of IWRM policy will play a significant role in the socio-economic development of the counties. IWRM is a long term process which should be adopted and implemented alongside rather than as a prerequisite for concrete investment programs in the water sector.

5.4.2 Political Support

There is a strong political commitment by the African leaders to confront the water challenges in the Region. The launching of NEPAD and AMCOW, and the support being provided to them, demonstrates this. Their objectives are in line with the objectives of the African Union particularly as elucidated in the 27 February 2004 Sirte Declaration. The prime objective is to contribute to the eradication of poverty and place African countries, individually and collectively, on the path of sustainable growth and development. Brief descriptions of NEPAD and AMCOW are provided below.

- **African Minister's Council on Water (AMCOW):** Ministers responsible for water in 41 African countries decided to form AMCOW at a meeting in Abuja in 2002. AMCOW was established primarily to promote cooperation, security, social and economic development and poverty eradication in member states through the management of water resources and provision of water supply services. The mission of AMCOW is to provide political leadership, policy direction and advocacy in the provision, use and management of water resources for sustainable social and economic development and maintenance of African ecosystems.

AMCOW's functions are:

- Keep the state of Africa's water under review and promote desirable actions of common interest to Africa.;
- Facilitate regional and international co-operation through the co-ordination of policies and actions amongst African countries regarding water resources issues;
- Support transnational co-operation on water-related issues through development of common positions on matters of global concern as well as co-operation in the implementation of relevant conventions and international agreements;
- Encourage mechanisms that will promote best practices in water policy reforms, integrated water resources management, food security, and water supply and sanitation; also assist in delivery in national regional and sub-regional programmes;

- Provide a forum for dialogue with UN agencies and other partners on water programmes;
- Promote participation in regional studies regarding climate changes, develop observation networks, encourage information exchange, set up strategies for the management of water resources in time of drought and floods, and develop policies and strategies of arresting the water crisis in Africa; and
- Keep under review and constantly seek to strengthen the financing of water sector in Africa.

- **The New Partnership for Africa's Development (NEPAD):** NEPAD is an initiative launched by the African Heads of States and Governments in 2001 to address the social, economic and political development of African countries, in a holistic, coherent and integrated manner, with the key objective of enhancing growth, reducing poverty and laying down the foundations for sustainable development. It is also (in its own words) **a *VISION and a STRATEGIC framework for Africa's Renewal*** . It is intended to accelerate the integration of Africa into the global economy. NEPAD plays the role of confidence builder; leader in promoting sound political and economic governance; catalyst, initiator, and facilitator of multi-country programs; risk mitigator; and promoter of resource flows to and within the continent.

5.4.3 **Establishment of trans-boundary water basin authorities:**

A strong effort is being exerted to establish new water basin organizations or strengthen existing organizations. The New Partnership for Africa's Development (NEPAD, with its emphasis on regional cooperation and integration is also creating the opportunity to link national and sub-regional approaches to managing water resources.

Although the existence trans-boundary water basins is often seen as a source of conflict and tension between and among riparian countries, in reality the development of trans-boundary water basins can also serve as a unique vehicle for promoting sub-regional and regional co-operation and, thus, promote peace, harmony, and social and political stability across the region.

A good example of the development of the water basin is the SADC Protocol. In the Southern Africa region, important rivers such as the Zambezi, the Limpopo and the Orange-Senqu are found. Water resources in parts of the region are scarce and unevenly distributed. The 14 SADC member countries have undertaken several important initiatives that are intended to make shared river courses sources of cooperation rather than sources of conflict. They have agreed, in principle, on integrated and cooperative management of trans-boundary river basins.

The general framework for such cooperative endeavours is provided by the (Revised) SADC Protocol on Shared Watercourse Systems (1995/2000) and the establishment of the SADC water sector (established 1996). In addition, sixteen agreements related to trans-boundary water courses are in place, including agreements establishing general watercourse commissions, agreements concerning single watercourses and agreements dealing with specific watercourse projects (e.g. dams). Several bilateral and multilateral general water course commissions, specialized river and lake basin commissions, technical committees and development authorities responsible for the integrated water resources management (IWRM) of transboundary river courses have been set up by the SADC governments.²¹

²¹ Transboundary Rivers and Crisis Prevention, Bonn International Centre for Conversion, BICC water Page 2005.

6 RESPONSES TO THE CHALLENGES FOR WATER DEVELOPMENT

6.1 Introduction

- African water stakeholders have been trying to develop social, institutional, financial, technical tools or mechanisms which would assist in alleviating the constraints enumerated in chapter 4 and to take maximum advantage of the opportunities and the enabling environment described in Chapter 5. Some of these responses to the constraints and opportunities are described in the following sections.

6.2 Regional Water Initiatives

6.2.1 NEPAD Water and Sanitation Infrastructure Program

Because most African economies typically lack the economies of scale that can be found in larger markets, infrastructure development becomes a driver for regional integration, cooperation and trade competitiveness. Regional collaboration is a necessary basis for the development of infrastructure to allow economies of scale through pooling and joint facilities and to overcome the limitation of small markets.

There are eight priority areas in the plan in which water features strongly. For each of these priority areas, strategic objectives and expected actions have been identified. The Water and Sanitation Programme is focused on three main themes, grouped as i) better management and development of Africa's water resources ii) improvement and expansion of basic water supply and sanitation services and iii) enhanced financing for the water sector.

A strategy comprising a Medium to Long-term Strategic Framework (MLTSF) and a Short Term Action Plan (STAP) has been developed for implementing the Water and Sanitation Programme. The STAP projects were limited to those already identified and, thus, could readily be taken up for implementation once funding and necessary preparatory activities were completed. The implementation of STAP, with respect to trans-boundary water resources, has focused on NEPAD's involvement in seven river and lake basins, viz. the Niger and Senegal in West Africa; Congo and Lake Chad in Central Africa; Nile in East Africa; and Zambezi and Okavango in Southern Africa. The overall objectives of the MLTSF are to provide a framework to guide the continuous and consistent development of infrastructure on the continent based on coherent strategic goals, and to define and institute a monitoring framework to track gaps and progress. The MLTSF focuses on three main themes: i) Management and Development of African Water Resources to ensure water security and to strengthen the capacity to manage trans-boundary water resources ii) Expansion and Improvement of

Water and Sanitation Services and iii) Enhancing Finance for Resources Development.

6.2.2 NEPAD: Comprehensive African Agricultural Development Programme (CAADP)

The NEPAD-CAADP initiative is a manifestation of African governments' commitment to address issues of growth in the agricultural sector, rural development and food security. CAADP aims to promote interventions that best respond to the widely recognised crisis in African agriculture. CAADP has been designed to promote investment in four key areas that can make a difference to Africa's food and agriculture situation. These are extending the area under sustainable land management and reliable water control; improving rural infrastructure and trade-related capacities for improved market access; increasing food supply and reducing hunger; and agricultural research, technological dissemination and adoption. CAADP estimates that a total need of US\$ 250 billion could be leveraged, with over half coming from national, public and private, sources and the remaining 45% from external sources.

The Sirte AU Declaration outlines measures to harness water resources in support of agricultural development in Africa. African Ministers of Agriculture have endorsed the establishment of CAADP focal points at the national level to provide impulse for the implementation of CAADP and a Forum of Permanent Secretaries to support the implementation of CAADP at the national, regional and continental level in an effective and coherent manner.

6.2.3 Rural Water Supply and Sanitation Initiative

A Rural Water Supply and Sanitation framework, referred to as Rural Water Supply and Sanitation Initiative (RWSSI), has been developed by the African Development Bank. The initiative was launched during the First AfDB Water Week in 2004 and has the backing of AMCOW as well as regional and international partners. The Initiative aims to accelerate improved and sustainable water supply and sanitation services through increased investment and use of innovative approaches and applying gender mainstreaming in programme implementation, management and operations. The RWSSI targets are set to achieve 50 percent access by 2007, 66 percent access by 2010 and 80 percent access by year 2015. It is estimated that about 277 million additional people would have access to drinking water and 295 million would benefit from sanitation services by the year 2015. The total investment required for achieving 80 percent coverage by 2015 is estimated to be about US\$14.2 billion. It is envisaged that 30 percent of the overall requirements will be obtained through ADF replenishment and Loans from the AfDB, 50 percent from bilateral and multilateral donors, 15 percent from the recipient governments, and 5 percent from the beneficiary communities. International donor conferences will be

organized to mobilize funds and commitments to support the implementation of RWSSI.

Implementation started with the financing of projects in four pilot countries. Situation assessment to establish the status coverage, institutional and policy development, country programmes and resources requirement has been undertaken in 34 countries. The Initiative was accepted at the Paris Conference by African countries, representatives of developed countries, multilateral and bilateral donor agencies, and civil society organizations as a platform to coordinate the efforts of African countries and their partners in accelerating access to water supply and sanitation in rural areas to meet the MDG goal number 7.

6.2.4 The African Water Facility

The AWF is an instrument conceived to facilitate the availability of financial resources to build Africa's water infrastructure institutions and management capacity to meet the targets and goals of the African Water Vision and the Millennium Development Goals (MDG). The objective of the AWF is to improve the enabling environment and strengthen water resources management so as to attract the massive investment necessary to achieve the regional objectives. The AWF is led by the African Minister's Council on water (AMCOW) and is established as a Special Water Fund managed by the African Development Bank. The Facility will operate in three major areas:

- a. Providing Investment Support for water management programs and projects;
- b. Accelerating the development, approval and implementation of integrated water management plans in those countries which lack them; and
- c. Facilitating commitment of additional funds to the water sector in Africa.

As an immediate objective, the facility would seek to raise US\$615.7 million, which would be in the form of concessional development assistance.

6.3 Establishment of CSO Focusing on Water

6.3.1 Establishment of African Network of Basin Organisations:

The initiative towards a better governance of water basins include the establishment of the African Network of Basin Organisations in July 2002, which aims to fill a marked gap in communications and exchanges of experience, expertise and know-how related to IWRM.

The African Network objective is to promote integrated water resource management at the level of water basins, as an essential tool for sustainable development. According to this objective, the African Network endeavours to:

- organize for its members common activities of national, regional and continental interest on the basis of IWRM principles
- to assist the States, riparian of African waters and which have not yet bodies in charge of joint water resources management, with the creation and development of transboundary basin organisations
- facilitate the implementation of tools suitable for institutional and financial management, for knowledge and monitoring of water resources, for the organisation of data bases, for the concerted preparation of master plans and action programmes in the medium and long terms;
- encourage the populations' education on these issues;
- promote these principles in international co-operation programmes.

6.3.2 The Africa Civil Society Network on Water (ANEW): ANEW was established in 2003, during the AMCOW Pan-African Implementation and Partnership Conference on Water in Addis Ababa. The meeting was attended by 40 representatives of African NGO's and networks working on water issues from all over the continent. ANEW was set up to ensure that African civil society voices are represented in international and regional water policy forums and to ensure that their voices are heard during the increasingly political water-related debates. Accordingly, ANEW aims to promote dialogue, learning and cooperation on water issues in the region.

ANEW aims to facilitate and support the participation of African CSOs in water policy formulation as well as the implementation of development plans in the Africa water sector.

6.3.3 The Africa Water Journalists' Network: A network aiming to boost the quality and quantity of reporting on water issues in African countries was launched on 22 March in 2005 in Addis Ababa, Ethiopia. The Africa Water Journalists Network brings together more than 1,000 journalists who will be able to share information and story ideas through a forum on the network's website. The network will begin producing an Internet-based newsletter called the Water Chronicle. It is anticipated that the network will assist the promotion of African Water Issues both in the local and international media, develop a knowledge base about water among the population and promote transparency and accountability.

6.3.4 Water Utility Partnership

The Water Utility Partnership (WUP) is an **African regional** capacity building program with a focus on urban (including the urban poor) **water utilities**. It is a

joint Programme initiated by four institutions; the African Water Association (AfWA), the Regional Centre for Low Cost Water and Sanitation (CREPA), , , the Training, Research and Networking for Development (TREND) and the World Bank. The Programme was launched in July 1996 during an international conference on the reform of the Water Sector in Africa. In addition to these founding agencies and in the broader context of programme implementation, the WUP considers all agencies providing support for the implementation of this programme as Partners.

The goal of the WUP Programme is to facilitate the increase in the coverage of water supply and sanitation services and to improve the quality of this service through increased investments and reform of utilities. For this purpose WUP aims to bring together all utilities, other service providers and support agencies in the water supply and sanitation sector in Africa. It seeks to develop a database of successful experiences (*good practices*) and to provide all partners with methodological, technical and information tools. Participation in its activities is open to all water service providers on the continent (public (including municipalities, parastatals e.t.c.) as well as private utilities).

6.4 UN and other International Organizations Programs

6.4.1 Water for African Cities Programme: In response to the General Assembly Resolution 57/275 of December 2002, NEPAD request and the Governing Council of UN-Habitat resolutions, a reorganisation was undertaken in 2003 of all water and sanitation activities of the UN Habitat into a comprehensive Water and Sanitation Programme.

The goal of UN-Habitat's Water and Sanitation Programme is to contribute to the achievement of the water and sanitation related MDG/WSSD targets in urban areas, with particular focus on Africa, by supporting the creation of an enabling environment for pro-poor investment.

The strategic vision of the UN-Habitat Water for African Cities Programme is to reduce the urban water crisis in cities through efficient and effective water demand management, build capacity to reduce the environmental impact of urbanization on freshwater resources and boost awareness and information exchange on water management and conservation. The Programme is intended to benefit all African cities and is currently being demonstrated in seven African cities.

The new programme has moved away from a traditional project-by-project, donor-by-donor, country-by-country approach to a coordinated programmatic approach that allows donors to improve their aid-effectiveness by contributing to a consolidated Water and Sanitation Trust Fund at country level dedicated to a well-defined goal and a clear set of objectives.

6.4.2 The TIGER Initiative: In response to the resolutions adopted at the 2002 Johannesburg World Summit on Sustainable Development, the European Space Agency (ESA) launched the TIGER Initiative. The objective of the Initiative is to use space technology to improve the knowledge about the water cycle and to develop sustainable Earth observation services for integrated water resource management in Africa as a special contribution to the NEPAD/AMCOW process and the achievement of WSSD goals²². The initiative is supported by the space agencies of Canada, Japan and the United States. Pilot projects focusing on food security, aquifer management epidemiology and wetland monitoring are launched by the European and Canadian space agencies. The TIGER strategic plan for Africa 2005-2015 was developed in TIGER 2004 workshop in Pretoria. TIGER is engaged in building capacities in Africa to utilize space technologies to improve the sustainability of water resources management as well as initiate related projects and to seek funds for future continuation of activities.

6.4.3 UN WATER AFRICA: The UN-Water/Africa is formed to coordinate and harmonize water activities in Africa by various UN and other subregional IGOs. Its other objective is to promote joint collaborative activities in water sector in Africa by these agencies. The UNECA is the Secretariat for UN-Water/Africa.

The UN-Water/Africa (formerly IGWA) comprises many UN agencies, including the Economic Commission for Africa, United Nations Environmental Program, World Meteorological Organization, United Nations Educational, Scientific and Cultural Organization, Food and Agriculture Organization of the United Nations, The United Nations Children's Fund, United Nations Development Programme, United Nations Human Settlements Programme, Water and Sustainable Development Programme in Africa, The New Partnership for Africa's Development, African Development Bank Group.

6.4.4 Establishment of Water Partnership In Africa: Sub-Regional Water Partnership in Eastern, Western, Southern Central and Northern Africa/Mediterranean have been Established as subsidiary organization of the Global Water Partnership Organization. These Sub-Regional Partnerships bring various sectors and interest groups together to identify and discuss their common water problems and to develop action plans based on IWRM. The Sub- Regional Water Partnership Programs have in turn been instrumental in the establishment of Country Water Partnership

The Water Partnership is a working partnership among all those involved in water management: government agencies, public institutions, private companies, professional organizations, multilateral development agencies and others committed to the Dublin-Rio principles..

²² Space and Water for Life, TIGER strategic Plan for Africa 2005-2015, Pretoria, November 2004

The mission of the Global Water Partnership is to "support countries in the sustainable management of their water resources."

The GWP's objectives are to:

- Clearly establish the principles of sustainable water resources management,
- Identify gaps and stimulate partners to meet critical needs within their available human and financial resources,
- Support action at the local, national, regional or river basin level that follows principles of sustainable water resources management,
- Help match needs to available resources.

6.5 None Regional Water Initiatives

6.5.1 The EU Water Initiative (EUWI): The EU Water Initiative, launched at the WSSD in Johannesburg, is a comprehensive partnership designed to help countries achieve water and sanitation targets. The EUWI will support the sustainable delivery of water and sanitation infrastructure and improve water governance and Integrated Water Resources Management (IWRM) practices in ACP (expand) countries by helping to address the financing gap. The EU is already investing over €1.4 billion a year in water-related development aid and scientific co-operation. The European Commission has committed €10 million to promote co-operation as regards the management of water resources, between countries, which share river basins, with primary focus on Africa. In addition, the EU-ACP Water Facility was established in 2004 under the EUWI. The EU Council approved an amount of €250m for the Facility in 2004, and a further €250m is likely to be approved in 2005. The Facility is demand-driven and is designed as an instrument to support and deepen the involvement of actors in ACP States in the design and implementation of water policies.

6.5.2 The Africa Partnership Forum (APF): The Africa Partnership Forum came into being in 2003. APF matches [NEPAD](#) in both its breadth and scope, and has as its objective maintaining international support for NEPAD and monitoring the partnership. It is emerging as the key international venue for the advancement of NEPAD. The Africa Partnership Forum has chosen to focus on economic growth, education, HIV/AIDS, peace and security, and food security.

The Africa Partnership Forum comprises personal representatives of the heads of five key international institutions: the IMF, the OECD, the UN, the World Bank, African Development Bank and the World Trade Organization. It also includes all the 20 African members of the NEPAD Heads of States and Government Implementation Committee (HSGIC).

APF has contributed to the Gleneagles Plan of Action emanating from the 2005 G8 meeting in Scotland, and will be responsible for the allocation of funds, implementation of the plan and monitoring commitments made by the G8 governments. G8 partners contribute 74 percent of the Official Development Assistance (ODA) to Africa. With the addition of 11 other countries the participants in the APF account for some 98 percent of ODA to Africa.

In line with this on 6th October 2005, the African Development Bank was delegated to host the Secretariat and facilitation mechanism of the Africa Infrastructure Consortium.

6.5.3 G8 Africa Action Plan and Trans-boundary Water Management:

As a part of international efforts towards implementing the plan, G8 agreed to support NEPAD and its African partners by two initiatives in the field of transboundary water management. The two initiatives are briefly described:

Initiative 1: Strengthening Cooperation among River Basin Organisations

The overall term of the project is 9 years with project costs of about 8 million EUR. Germany has committed 2 million EUR for the first three years. This first phase will include consultations with all stakeholders and will serve to design the project structure, its mode of delivery and activities.

The project consists of three different components:

- “Capacity Building to AMCOW”:
- Cooperation among river basin organisations:
- Support to an adapted information basis for water management:

Initiative 2: Mapping of donor support in the field of transboundary water management

The survey aims at getting an overview of current activities of G8 member states in the field of trans-boundary water management in Africa.

In 2004, during the Stockholm Water Week, an initial overview of the results was presented. The main results of the survey are:

- G8 member states concentrate on larger river basins with large populations and high population densities.
- Most donors are active in the Nile, Niger, Zambezi, Limpopo and Senegal basins.
- The largest African river basin, the Congo, is not yet receiving direct G8 support,

- Although a new partnership for Integrated Water Resources Management has been established through the Global Water Partnership Minimum structures of organisation among the concerned riparian countries still seem to be a precondition for donor support to a river basin.

6.5.4 The United States Water for the Poor Initiative: This initiative targeted to expand access to clean water and sanitation services, improve watershed management, and increase the efficiency of water in industrial and agricultural activities. The US initiative proposed to invest US\$970 million over three years, with the intention of leveraging private resources to generate more than US\$1.6 billion for water-related activities globally. The investment in Africa would be:

- US\$510 million on projects intended to enhance access to clean water and sanitation services, including water and sanitation projects, to serve the urban poor in South Africa; instigate small-scale potable water supply and sanitation programmes for poor rural communities in Ghana, Mali and Niger through the West Africa Water Initiative; and establish an innovative financing programme that has supported a safe drinking water system in India;
- US\$400 million over three years to provide increased protection of watersheds by integrating management activities for surface water, groundwater and coastal resources, and work within an international alliance to produce a state-of-the-art GIS system to improve watershed management capabilities; and

6.5.5 The West Africa Water Initiative (WAWI): The goals of the Initiative embrace the institutional perspectives of the twelve individual partners. It is based on an effort to provide rural water and sanitation as the entry point for community development. The United States provided US\$5 million to the already committed US\$36 million from other partners. The intention is that WAWI would work with communities and governments in Ghana, Mali and Niger to:

- Increase the level of access to sustainable safe water and environmental sanitation services among poor and vulnerable populations;
- Reduce the prevalence of water-borne diseases, including trachoma, guinea worm and diarrhoeal diseases; and
- Ensure ecologically and financially sustainable management of water quantity and quality.

In addition, WAWI hopes to promote a new and potentially replicable model of partnerships and synergies that encourage technical excellence, programmatic

innovation, and long-term financial, social and environmental sustainability in water resources management.

6.5.6 Canada's Water Initiative: Following the G8 Summit in June 2002, Canada announced a major Canadian initiative to support African development with water management as one of the focus areas. The Canadian International Development Agency (CIDA) was interested in supporting policy/strategy development and building capacity for the implementation of policies and plans for sustainable water resources management in Africa as follows:

- CAD\$10 million were committed towards collaboration with the African Development Bank to develop financially viable water projects;
- CAD\$20 million were committed to support the African Water Facility in partnership with the African Development Bank (AfDB) to provide grant investment support for water resources management and water service provision in Africa;
- CAD\$5 million were directed to the AfDB as part of the Multi donor Water Partnership Program also supported by Netherlands and Denmark to support the application of its IWRM policy, to improve AfDB's capacity in the water sector and to promote good water management practices; and
- A further CAD\$15 million were committed to the UN-Habitat's Water and Sanitation Trust Fund to assist committed African cities and communities to promote investment in water and sanitation with a focus on the very poor.

7 SUCCESSFUL LOCAL ACTIONS

7.1 Introduction

In response to a call made by the organizers of the 4th World Water Forum and the Africa Regional Beacon a total of 230 local actions were registered. Most of the local actions have an interesting message to convey, however given the nature of the Region Report only 40 Local Actions are selected for incorporation. The summaries of these local actions are presented below under each of the thematic headings.

7.2 Theme I: Water for Growth and Development

7.2.1 Regional Solar to improve access to water in the Rural Sahel

The local action shows a case of responding on a massive scale - that is at a regional level, with primarily infrastructure solutions to a problem of water variability in the Sahel region. This follows a realization that although rainfall lasts only a quarter of the year, the availability of groundwater presents an opportunity that can be exploited to respond to the poverty problem and growth needs of the rural population. The availability of abundant solar energy was another opportunity that was exploited through the introduction of solar energy for pumping and other energy needs.

Institutionally, the implementation consisted of national level structures (CILLS National Committees) in each country as well as local management committees. In addition the private sector took an active part in providing the technology.

The programme benefits are given qualitatively as: first greater ACCESS to water supplies by the communities and secondly dissemination of solar technology that has spilled beyond water supply alone to use in the social sectors of education and health in small businesses, homes and other community institutions.

The project is now building on the success of cost recovery which shows community recognition of the benefits of the project and on a stronger supplier chain resulting from more sustainable dissemination of the solar technology as a result of the water development effort.

7.2.2 Performance Contracting Applied to Water in South Africa

The local action documented consists in addressing water (and energy) wastage in low income households using especially a performance-based contract with a private company though sharing of savings benefits.

A Contracting company has provided the initial financing to construct pressure control infrastructure on a BOOT basis, which includes training of staff of the

Municipality over a contract period of five years. The contractor reaps 20% of the savings benefit over the contract period while the Municipality gains over the remainder of the life of the assets.

The key lesson comes from the crosscutting perspective of innovative financing. It is possible that a number of similar opportunities go unnoticed in other municipalities.

7.2.3 The African Water Facility AWF : An instrument for financing Local Actions

The AWF addresses the problems of water development at a small local scale as well as the policy and institutional levels. Since most multi-lateral funding is directed at the sovereign level the fact that AWF is directed at a lower level is of significance.

The Facility has been established to provide financial support for small scale infrastructure project submitted by beneficiaries, provide for IWRM in the regional states through policy and institutional development, effective planning and implementation, and facilitate trans-boundary water resources management by supporting joint development of shared resources. It is intended to leverage additional inflows of funds.

By targeting the civil society organizations (NGOs, CBOs), regional and sub-regional sectoral organizations in addition to Central and Local Government instructions, the Facility seeks to address the problem where the tyre meets the road. For its scale the issue of importance for sharing is not so much in that it is replicable but in the possible views on how best it may reach its stated objectives.

7.2.4 Community based Water Leaks Project

This project which was initiated in the Khayelitsha Area in of Cape Town South Africa is aimed at addressing the problem of leakage and wastage in the households of a poor community. It had been observed that most households are often unaware that they are being billed for water wasted in their homes, and when they are, they do not have access to artisans who can help.

The project which is aimed at being a model for household water leakage and wastage consists of training households in requisite skills such as plumbing and financial literacy, conducting of audits and fixing leakages, undertaking participatory research on awareness and undertaking awareness raising. The project has developed guidelines for replication of the model and is developing recommendations based on the experiences gained.

The project benefits are significant both for the households and the local and central governments, in terms of resources savings, financial savings and greater

empowerment of the community members. The financial savings will also have multiplier effects.

7.2.5 Food Security and Natural Resources Management in the Baidiam District - Mauritania

The local action in Mauritania addressed a critical issue of diminishing natural resources, due in part to human action, which in a typical vicious cycle characteristic of these arid regions led to increasing food insecurity by driving the population towards land of even lower marginal value. The project aimed to improve security of rain-fed cropping as well as recession (spate) irrigation and making available land to the previously landless.

Following a land diagnosis, the action consists of development of land management rules to follow construction of 3 water spreading and three infiltration inducing dams protected by the *Zyzyphus* tree perimeter.

The development outcomes will be measured after the first harvest in January 2006. But the local action has realized the pre-requisite for a better utilization of the natural and other resource with the dams having filled in the first year of operation. Plans are being made to face the new challenges created by the improved situation such as the resolution of land claims, especially in view of the increased value of land in the command areas of the dam, the need for recovery of costs especially for operation and maintenance.

In addition to the physical gains, the commune has gained in knowledge and self confidence. The key innovation is considered to be the **land diagnosis and land agreements**. To avoid the problem of dams that lead into conflict the local action included a thorough diagnosis with the participation of users, using methods validated by them. Using GIS, land surveyors identify cultivable lands and the impact of dams on these lands. Land owners and tenants are identified and mapped. The process facilitates negotiations of participation and participants get to know their rights to access after construction. Owners can define conditions under which the desire to allow access to land, which is validated by a general assembly and authenticated by the regional authorities. The agreement is a point of reference in the event of a post installation conflict.

7.2.6 NEPAD Water and Sanitation Programme

NEPAD's Water and Sanitation Programme falls within the larger framework of the partnership initiative, the aims of which include development of the regional infrastructure, harmonization of sectoral procedures, enhancing financial flows towards investment in infrastructure, and development of skills and knowledge towards the installation, operation and maintenance of infrastructure.

The NEPAD Medium to Long Term Strategic Framework (MLTSF) is under formulation. Its objectives are to constitute a firm foundation for continuous and

consistent development of infrastructure based on coherent goals and to define and institute a monitoring framework for implementation. It will serve to exchange good practices among Regional Economic Commissions (REC) and among sectors.

The Infrastructure Short Term Action Plan (STAP) consists of policy, capacity building and facilitation activities and key infrastructure projects including those in Water and Sanitation. The Programme exemplifies the importance of defining clear-cut mechanisms for consultation and coordination of stakeholder activities relating to regional integration.

7.2.7 South African multi-Stakeholder Initiative on the WCD

A multi-stakeholder initiative was established to contextualize the World Commission on Dam's findings for South Africa. The Initiative has been analyzing SA policy and legislation and making its recommendations addressing social impacts, enhancing governance of water and energy resources development and promoting river health and sustainable livelihoods

The Initiative is run by a Coordinating Committee comprised of representatives of the private sector, the financial sector, central government (the Department of Water Affairs and Forestry) dam-affected communities, NGOs, and water and power utilities. In addition there is a forum of about 120 organizations from sectors represented in the Coordination Committee, which meets annually and includes representatives of neighbouring states with shared stored water resources.

The process is expected to improve national governmental policy and practice in terms of planning (public participation), environmental issues (pristine rivers, impact mitigation) and social impacts (resettlement, reparations) at a national, regional and continental level and to improve channels of communication among stakeholder groups. It has enjoyed the support of the UNEP Dams and Development Project which has used the initiative as an example of a good practice.

Implementation of the first phase recommendations include drafting of a national policy on compensation and review of guidelines for popular participation.

7.2.8 MDGs Capacity strengthening project for Africa

The UNESCO IHE project is directed at strengthening human resource capacity to reach the MDGs, through providing for professionals from Africa to tackle problems in water and sanitation through focused research. 15 Master research students from 6 different countries are undertaking research in various subjects all linked to the MDGs.

Each research addresses a specific problem or constraint within the context of the researcher's institution, studies it in its particular context but analyzes it within

a theoretical framework that is based on relevant international scientific literature. The study will analyze trends and seek to establish underlying causal relationships so as to lift the subject to a higher level of relevance. Solutions can then be applied at a wider scale at the national or international level in terms of theory, methodology, technology and institutional innovation.

Key boundary conditions are efficient water use, environmental sustainability, conflict resolution and the MDGs.

7.3 Theme II: Implementing IWRM

7.3.1 AQUIFER: Tunisia exploiting Space for the management of the transboundary aquifer NWSAS (SASS)

The project AQUIFER is a demonstration project, through which the European Space Agency ESA supports national authorities and international institutions in managing trans-boundary aquifer management through GIS compatible products and services. It is intended to strengthen IWRM practices by providing support with Earth Observation application and to establish a body of independent service providers at the local level to continue support well beyond the project duration. It is targeted at the users managing the lullemeden aquifer as well as the North-Western Sahara aquifer systems, which cross the territories of Tunisia, Algeria, Libya, Niger and Mali.

The project provides products and services such as land use cover and change maps, digital terrain models (DTMs), surface water extent and dynamics, estimates of water abstraction evapo-transpiration maps, maps of irrigated areas and water and vegetative cover over the target area. While Earth Observation does, of necessity, only provide surface information, it provides it in a manner that allows estimation of sub-surface conditions indirectly through for example identification of recharge areas, location of abstraction point, land cover, irrigation management location of fractures in aquifer systems. It does so, on a wider area base than would be possible with discrete observations although these also help in providing ground truths for calibration and modelling.

As shared water resources in general and shared aquifers in particular increasingly become sources of conflict, availability of information of equal credibility to all concerned stakeholders hold a key to resolution of this conflict. The information will be used in assessing risks and possible impacts of actions by participation and assist in joint and shared decision making on the interests of all concerned.

7.3.2 IWRM in the Nakanbe Basin in Burkina Faso.

This local action addresses a problem encountered in the introduction of IWRM in the Nakanbe Basin of Burkina Faso. The Nakanbe, is one of the four basins of

the Country, Its problems of low rainfall, underlying geology of crystalline basement, fast growing demand, more than 400 dams across it, and conflicts in water management had indicated the need for introduction of IWRM. This was indeed undertaken through launching of the IWRM Programme (GIRE 2004-2009) and the Plan of Action as well as the establishment of a River Basin Management Committee. However the RBM Committee suffered a significant starting inertia as its members showed little motivation and they were too many in number thus making progress impossible. As a result there were no concrete initiatives and actions.

The response was to introduce the Local Water Committees to approach the problems bottom up, as presented in this local action.

Experience to share is (i) that introduction of the IWRM approach should include local structures and (ii) that NGOs can be effective in assisting to set up these Local Structures. It has been observed that stakeholders confuse them with the already existing Water Supply Committees which focus only on the supply aspect.

EDITORIAL NOTE: Perhaps a lesson should be that instead of new structures the scope for the existing ones be extended.

7.3.3 Decentralization of WRM in Uganda

The national programme of Decentralization of WRM in Uganda which was piloted in the Local Governments of Mbale , Tororo and Kasese demonstrates that **ultimately IWRM activities need to be implemented at the local level**. Depending on the issue at hand it defines the roles at the four levels as being: **Central Government** provides *financial and technical support as well as stakeholder coordination*, **Local Governments** responsible for ensuring successful implementation through *oversight and supervision*, **Communities** are responsible for the *actual implementation*, while the **Civil Society** are involved in mobilization , awareness raising and capacity building.

Experience from this local action underscores the importance of indigenous knowledge and the role of Civil Society based on its understanding of the local communities and its competences in mobilization.

7.3.4 May Zegzeg Integrated Watershed Management Project

The demonstration programme in the Dogua Tembien area of Tigray addressed the problem that despite improved rainfall conditions in the Ethiopian highlands, drought and famine continue affect the local population due to the low infiltration capacity of the soil.

The Regional Government initiated the programme.. Researchers, from Mekelle University studied water conservation and watershed management in the target area from 1994. Farmers, assisted by the local authorities, used the results of the

research to implement conservation activities on an area of some 400 ha which included physical and biological conservation measures and the stopping of free range grazing. Bye-laws were drawn to describe the rights and duties of users. The programme included capacity building. Field training was given to farmers and student groups.

Despite the fact that this initiative required a major change in land use, key results were obtained in the first year in terms of improved hydrological cycle and crop yields. The enhanced infiltration capacity of the soil has led to increased spring discharges and emergence of new springs; Irrigation has started where it had never been practiced

7.3.5 Pioneering Actions in Managing the Transboundary Nubian Sandstone Groundwater Aquifer

The Nubian Sandstone Aquifer System (NSAS) is a **non-renewable** resource. Under the scarcity conditions of water in the region, there is an enormous risk that the resources could be considered unlimited while only a portion may be physically and economically be exploited through strategies that at once maximize benefits while minimizing negative effects of development and exploitation. The regional aquifer is shared between Chad, Egypt, Libya and Sudan.

It was in this context that the Nubian Sandstone Aquifer System (NSAS) Regional Programme undertook a number of activities that paved the way for the formulation of a regional strategy for the utilization of the NSAS. This strategy was based on principles of rationality and wisdom in the management of the shared resource. The objectives of the Programme were:

- a) **creating an enabling environment for the formulation of a regional strategy** :To this end the Joint Authority for the Study and Development was revitalized and expanded to include Chad and a Regional Programme Steering Committee was formed to oversee the work plan and budget.
- b) **assisting in the capacity-building of the national institutions of the four countries sharing the aquifer**: Following a needs assessment hard ware and soft ware were purchased, training programmes held in key subjects
- c) **formulating a regional strategy for the sustainable utilization of the Nubian Sandstone Aquifer System**: The programme undertook studies to establish a technical information system of the NSAS on some 2100 wells with their attributes, a GIS system with regional, hydro-geological and water quality maps, a mathematical model and simulation of different scenarios of exploitation and draft agreements by the National Coordinators on the protocol for information sharing including development of a website

- d) **tackling the Socio-economic dimensions, to create an equitable balance between population and groundwater resources.** Socio-economic aspects of development were studied in each state and synthesized, and recommendations aimed at enhancing the welfare and economics within a holistic development of the NSAS were made. A system of regional indicators was established.

7.3.6 **1 basin 9 countries, a shared vision**

The Niger Basin Authority (ABN) is in the process of developing a vision shared by its nine member states which consists in an ideal of a comprehensive development of the potential of the basin, negotiated and accepted by all the member countries. It is an ideal of the most rational possible integrated development plan for the optimal development of all the resources in the River Niger basin with a view to generating the highest number of benefits for all the member States. The shared vision translates the political commitment of the member countries for a joint action program which defines the long term objectives (by the year 2025) and which provides the related strategic orientations so that the specific mechanisms and tools developed make it possible to reach those objectives.

The strategic objectives pursued by the Shared Vision consist of:

- development of the shared Vision for the development of the River Niger Basin
- comprehensive and integrated management of all the resources in the basin ;
- Reinforcement of cooperation and joint actions among the riparian countries
- Reinforcement of cooperation between NBA and the international community of development partners.

Detailed operational objectives have been established to enable NBA to achieve the strategic objectives. They include a Sustainable Development Action Plan (SDAP developed on a consensual and strategic basis, a legal and institutional framework propitious to dialogue and consultation for cooperative action among the riparian countries of the River Niger basin, development of water resources in a sustainable and equitable manner, and adoption of a pragmatic and consensus building approach in the development of the shared vision.

In order to ensure participation of stakeholders a dialogue is previewed in addition to the national workshops that would. The process also entails liaison with regional structures for verification of coherence with national and regional plans.

Members of the Niger Basin Authority are Benin, Burkina Faso, Cameroon, Ivory Coast, Guinea, Mali, Niger, Nigeria, Chad.

7.3.7 Promoting IWRM in the Mara Basin of East Africa

The Mara River Basin is a trans-boundary basin shared between Kenya and Tanzania, and is also part of the larger Nile Basin. The basin faces threats of an environmental nature, The situation is exacerbated by a failure of local, national and regional legislation and a lack of institutional structures to address water resource issues. These problems have wide ranging consequences on production, livelihoods. and natural resources and ultimately on the Masai Mara National Reserve and Serengeti National Park conservation areas.

The international NGO GLOWS (Global Water for Sustainability) has initiated a project to support the full scale Integrated Water Resources Management in the Mara River Basin, working with stakeholders on each side of the Kenya-Tanzania border and with the East African Community for trans-boundary issues. Objectives of the project consist of a vision of the Mara Basin in which principle of IWRM are applied in so far as they are relevant to the basin.

Implementation engages a broad spectrum of stakeholders including government agencies, inter-governmental organizations, NGOs all in the roles of implementation, consultation and

The project hopes to impact on sustainability on four fronts: to influence formulation of legal systems especially the trans-boundary agreements between the two riparian states through the Lake Victoria basin commission; to support creation of appropriate institutions for IWRM such as water user groups accepted in both countries as acceptable forms of local participation; strengthen existing ones such as the local offices of the stakeholder ministries; and finally support the efforts of WWF in maintaining a long term presence in the basin.

It employs two innovations of interest: first to promote the payment for environmental services, by illustrating the economic value added by proper management of the environment t the tourist industry and the need to fund these services. The second is the composition of the project participants whereby the local organizations benefit fro support and expertise of a worldwide network of the international participants who in turn learn from the coordinated activities across multiple projects.

7.3.8 Strengthening River Basin Organisations in the SADC Region

Orange-Senqu River Commission (ORASECOM) in southern Africa has adopted a political consultation process to give itself an **executive secretariat**, with mandate and capacity to implement basin level projects. The member countries, Botswana, Lesotho, Namibia and South Africa have achieved this feat through a delicate process given the dependence of political organisations on confidence and trust. Decisions took time but were taken in a consensual manner. Respect and fairness were applied when dealing with controversial issues

The road taken to form the Executive Secretariat serves as a "good practice" that will be followed by other river organizations else where and definitely will be in the region. The Commissioners of the basin organisation and the technical and legal task force prepared the decision for the Ministers of Water to agree on the new structure. Sufficient funds have been made available by member states for recurrent expenses. SADC created an enabling environment, while GTZ supported with technical expertise and facilitation.

The result is that ORASECOM is now equipped to implement commission-level projects through its own efforts and with the participation of all member countries. IWRM plans and, subsequently, appropriate trans-boundary water projects are implemented, which have wide-spread social, economic and environmental impacts for the people in the basin. SADC has captured the outcome as "good practice" and advises its member states accordingly.

7.4 Theme III: Water Supply and Sanitation for All

7.4.1 Siraro Water Supply

The Siraro area is deprived of surface water sources and the groundwater has a very high Fluoride content. The technical problems were solved by developing potable water from a groundwater aquifer high on mountains and distributing it a network of pipes extending as far as 70 km from the source.

For the management of the system also a community managed system was developed. The Siraro Water Supply provide water supply for about 50,000 people spread among 20 villages, 3 small towns in 3 districts in the Oromia region of Ethiopia.

Each village and town is represented by a Water Committee (with 7 members) and each Water Committee is represented by 2 of its members in a 46 member Water Board General Assembly, out of which 9 members are elected to the Water Board Executive Committee which is responsible for the Management of the scheme. All committee and Board members provide their services free of charge.

The Water Board Executive Committee is served by a Board Administrative Office with 86 hired staff consisting of an Administrator, a Technical Head, an Accountant, plumbers, water sellers and pump guards for the operation and maintenance of the scheme.

The water is sold to the consumers at tariffs set in consultation with the Oromia Regional Water Bureau (ORWB) and currently stands at USD 0.58/m³ for house connections and USD 0.47/m³ for public fountains. The tariff covers operation and maintenance costs and permits significant savings. ORWB provides technical support to the Water Board. ORWB oversees about 25 similar Water Board managed large water schemes.

Currently, five years after establishment the Siraro water supply scheme, is a self sustaining, fully community managed water supply scheme. The scheme has proved that given the chance, communities can operate and maintain complex water schemes.

The Oromia Regional Water Bureau has financed the initial capital investment as well as a car and two motorcycles, while the beneficiaries finance the operation and maintenance costs. Such an initiative will work even better with gravity schemes requiring minimal pumping or for borehole sources using solar and wind energy sources. The whole scheme can be replicated in other areas as is currently being done by the ORWB in 24 other schemes.

7.4.2 Oxidation pond with Kaolin bed for sewage treatment, in rural regions, as low-cost technology suitable for rural communities in developing countries

Wastewater treatment in the rural areas lags far behind potable water supply. Conventional sewage treatment works are relatively expensive. Most of low-cost wastewater treatment in villages may cause pollution to groundwater and are not suitable for irrigation of crops and plants

The aim of this action is to develop and design appropriate and suitable concept base for treatment of wastewater in Egyptian village and also suitable for similar villages in developing countries. This technology consists of a biological filter bed of Kaolin ore. Kaolin ore used as adsorbent for the removal of toxic organic compounds as well as heavy and toxic metals

This simple sewage treatment plant consists of three ponds units. The sewage liquor is spread onto the surface of the first bed made up of coke (carbonized coal), rocks or specially fabricated plastic media with high surface areas. The liquor is distributed through perforated rotating arms radiating from a central pivot. The distributed liquor trickles through this bed and is collected in second basin at the base which contains a bed of Kaolin of large surface area (grain size < 100 microns). In this unit Kaolin act as adsorbent for adsorption of toxic organic compounds and heavy and toxic metals. The resulting liquor is moved into a sedimentation pond.

The treated wastewater from this treatment does not have any toxic organic and inorganic pollutants, and will not pollute groundwater and can be used safely for irrigation of crops and plants free from pollutants. This technique will not cost much as kaolin is cheap.

The institutions involved in this program are Social Fund for Development – Universities and institutes- International Organization working in Egypt- Egyptian Environmental Affairs Agency, Local NGOs.

The idea of this simple sewage treatment plant is new and innovative. It is the results of researches on finding natural adsorbents for the removal of toxic metals from sewage and wastewater. This new technology can be applied in villages of rural communities.

7.4.3 Private Sector Management of Simplified water Supply Systems

Operations and maintenance of water supply and sanitation systems (WSSS) in Mauritania are centrally managed with poor results. In order to address this problem a program was developed to devolve management of water supply and sanitation to the community and the private sector.

The initiative encourages local management of WSSS and promotion of cost recovery systems which ensures adequate operations and management in the short term and total financial self sufficiency in the medium and long term. The responsibilities and of the different actors in accordance with the reform are:

- Local population/association: choose the types of installations ensure follow up and pay for services.
- Private operators: operate and maintain the installations.
- Mayors: assume ownership.
- Government: regulate the sector and provide up-front financing for the installations.

Along with the reform program the following is foreseen: (i) reinforcement of the training of maintenance personnel and local water management committees, (ii) better definition of the role of the State in the revision of the water code, (iii) support for the merger of water associations for economies of scale

The reforms are expected to yield the following positive outcomes: (i) reliable supply of drinking water in rural and semi-urban areas, (ii) local capacity reinforcement in the implementation and management of WSSS, (iii) financial equilibrium in the sub-sector, (iv) gradual increase in sub-sector investments by the beneficiaries, (v) permanent employment created in the operation and maintenance of WSSS, (vi) increase in the well-being of the population at the national level.

Direct takeover of the management of WSSS by local communities is an innovation. The setting up of the ANEPA, the financing method of operation and maintenance and the transparency of the system are other innovations. The initiative covers the whole country and has been a success because the population has been willing to pay for the services

7.4.4 Assessing Prepay Water Metering in the Informal Settlements of Windhoek

Namibia faces great challenges with water resource management. The northern area of Windhoek is composed of informal settlements. Post-pay metering and prepay metering exist in the area. The majority of communities use the post-pay system where communal standpipes freely dispense water and one bill is calculated at the end of the month for the consumption of the entire community and divided equally among residents regardless of individual water consumption. A large majority of residents do not pay their portion of the bill leaving the rest of the community to pay extra.

The study focuses on investigating the advantages and disadvantages of both metering systems based upon feedback from their users and records provided by the city. The major stakeholders involved in this study were the City of Windhoek, the communities of the informal settlements, and the Desert Research Foundation of Namibia.

The result of the study indicated the following:

- The prepayment system was the preferred system by both the pre-payment and the monthly payment communities.

- The households in the post-pay communities spend an average of 29 percent of their incomes on water while households in prepay communities spend an average of 5 percent
- The water expenditure per person per month to for post-pay communities is double of that prepay communities.
- 93 percent asserted that payment for water is necessary.
- The capital and maintenance costs associated with prepay meters are prohibitively high.
- The maintenance cost of a prepay meter is about three times that of an average meter in the City.
- The prepay meter need technological improvement to make it affordable by all communities
- Some people cannot afford to pay at all, appropriate subsidy system should be designed for these people in the prepay system

The pre-payment metering scheme, if implemented with caution, will serve to provide affordable access of water in a manner that puts responsibility of the water consumption in the hands of the individual users.

7.4.5 The Kazusabori Technology Transfer and Sustainable Community Water Development

Njukini (Maasai land) in Kenya is a semi-arid area and is faced with severe shortage of safe, reliable water. The project was from January to September 2005. The solution was training community people with the Kazusabori technology to supply safe water and to improve their living and health conditions for their self-reliance.

The Kazusabori System is a unique and original Japanese technology and it is the only technology in the world that can drill deep wells (over 50m) by manual method. The Kazusabori is categorized as a percussion method and it is a precursor of the modern form of boring system by machine. Diameter of this hand-drilled well is about 120mm. In areas where bamboo is available it can be used for drilling and casing as Japanese original method. If bamboo is not available, PVC/iron/steel materials can be used.

Some of the advantages of the technology are:

- It requires neither electricity nor oil
- all equipment and materials are locally available
- Wells are drilled by human power only.
- One set of the equipment costs about US\$2,000.00 and it can be used over and over again.

- The simplified Kazusabori System is easily transferred to local people.

After 8 months training 3 persons were trained to become trainers, and 10 community people learned the technology and can drill wells by themselves and safe reliable water was made available to the community.

The stakeholders involved in the program were, the local community, African Medical and Research Foundation (AMREF), Japan International Cooperation Agency (JICA), Ministry of Gender Sports, Culture and Social Services and Ministry of Water Resource Management and Development of Republic of Kenya.

Kzusabori is a middle-technology that is suitable for sustainable community development and can be adapted for any local circumstances as demand. Training people on the Kazusabori System is ideal means for sustainable water development in rural Africa.

7.4.6 Rural Water Supply and Sanitation Initiative (RWSSI)

In response to the Africa Water Vision and the MDGs, the African Development Bank Group conceived the Rural Water Supply and Sanitation Initiative (RWSSI) in 2002 with the view to accelerating access to water supply and sanitation services in rural Africa. The initiative stipulates intermediate targets of: 66% access by the year 2010 and 80% by 2015. It seeks to help mobilise as well as facilitate the resource flows to accelerate RWSS investments in Africa. Assessments of country water sector situations have been carried for 33 countries and subsequently an RWSS data base has been developed for these countries. Implementation has started in 5 pilot countries and preparations are underway to commence RWSSI Programmes in 22 other countries the latest by the end of 2007.

RWSSI helps to elevate the priority accorded to sanitation and water supply in rural areas of Africa where the majority of the poor live. African Governments are increasing the budget allocations to the sectors. Donors have pledged increased support and have intensified cooperation the African Development Bank on joint programmes, in particular the World Bank has agreed to undertake joint monitoring and evaluation of the sector, reviews at the national and continental level of the progress towards achievement of the MDGs.

Distinctive attributes of the Initiative include its flexibility in implementation based on adopting the best strategy for the situation including SWAs, partnerships, area based interventions; its emphasis on capacity building of decentralized governing institutions, communities, private sector and local artisans; its adoption of fast tracking mechanisms in programme preparation, procurements and disbursements; and overall programmatic approach.

7.4.7 Sanitation for a rural girls school in Uganda

Kalungu is a village in southern Uganda in Masaka District. Its Girls Secondary School has around 350 students. Prior to the project the school used 35 pit latrines and some flush toilets whose sewerage was disposed without treatment in soak pits, while grey water was discharged into ditches outside the school grounds. This situation led to very unhygienic conditions with bad smell, flies and groundwater pollution. The water table was high and space for new pit latrines limited.

The solution project consists in construction of 45 dry diverting pit latrines with urine collected in jerry cans and re-used as fertilizer, solids collected in locally constructed wooden containers, dried in a covered composting area and later reused in a banana (matoke) plantation.

Demonstration dry diverting toilets were constructed for staff. Wastewater was pre-treated in a septic tank with effluent led in a horizontal subsurface flow constructed wetland system.

The project was implemented by local entrepreneurs who gained knowledge of the technology and can use it for their own income generation. There is significant improvement in the quality of groundwater, in the overall living conditions around and beyond the school precincts, while the pupils and teachers are proud of their achievement.

7.4.8 Pioneering the use of strategic communication approaches in Kenya's water sector reform process

Effective communication is an essential component of any important reform or advocacy process. WSP-Africa has been asked to help African Water Ministries and their water sector institutions to improve their currently poor communications capacity. Kenya has been the pioneer, where WSP-AF assisted the Ministry of Water & Irrigation with the production of a comprehensive, research-based, national reform communication strategy. Partners on this project were the World Bank and GTZ. It is the first professional strategy of its kind in the water sector in Africa, and can be used as a reference for other countries embarking on similar pioneering communication strategies.

The use of strategic communication in Kenya is still a new thing, so its too soon to start gauging long term impacts. However, there are a range of impacts that are emerging already, including : increased knowledge on water reform issues amongst stakeholders; an increasing customer orientation amongst institutions; increased use of information dissemination and two way communications (public participation) amongst institutions; improved co-ordination between different players in the sector which means a more efficient and effective sector; improved knowledge sharing etc.

Some of the water utilities e using communication campaigns have seen great impacts. As an example Nairobi Water & Sewerage Company's Bill Bila Bilaa

campaign had within a matter of 3 months facilitated fixing thousands of billing problems, significantly increasing their revenues and seriously improved image.

7.4.9 Project for rehabilitate 50 simplified water supply systems in the regions of Maradi, Tahoua and Zinder

Lessons from the Water Sector Project (PSE), in Niger, show that a management model based on a partnership between water user associations and small scale local private operators can still maintain the local communities *in the driver's seat*, in terms of project objectives as well as in terms of implementation procedures.

The activity consist of rehabilitation of 50 simplified water supply systems (most of them with a small pipe network) in three regions of Niger and to enhance their management system.. This project was initiated by the Ministry in charge of water with the aim of ensuring the effectiveness and sustainability of clean water supply to rural centres of those regions through their rehabilitation and also to promote a model of management based on the delegation of this function to private operators without excluding the local community rights and responsibilities in water supply affairs. It was implemented between July 2002 and July 2005.

The model demonstrates the role of the community in delegated management, namely supervision. The communities were responsible for selecting a technical solution for the rehabilitation of the system, contribute the initial 10% of works cost into a bank account. They received training in water service management and participated in the selection of a management operator and control his work.

It shows delegated management as a response to deficiencies of direct community based management while avoiding those associated with outright divestiture. It is contingent on adequate training of communities by national or international experts. Other prerequisites are unambiguous contractual relationships between the operators and the community and existence of a regulatory framework for the rural water supply sub-sector.

7.4.10 Evolution of Water and Sanitation in Disaster Mitigation (Ethiopia)

Cyclical droughts and floods are serious threats to life and livelihoods. UNICEF's experience in Ethiopia suggest that proactive strategies that combine emergency intervention with development initiatives are more cost effective in economic terms and in humanitarian terms.

The Water Environment and Sanitation emergency task force has responded to the threats with including accelerated development interventions in the emergency appeals, and including capacity building, providing more versatile drilling equipment, pre-positioning supplies and equipment in areas priority areas. Priority areas are those identified through a systematic assessment of impacts

of the drought during 2003. Light weight drilling equipment has been deployed and hands on capacity to undertake accelerated drilling were provided in these regions where conventional rigs and private commercial drillers were unable or unwilling to venture to.

The strategy has been facilitated by the change of stakeholders perspective towards disaster preparedness; the regional bureaux have prioritized drought prone areas for development intervention, donors are giving attention to vulnerable groups and areas, local governments and local civil society in these areas themselves include development intervention targeted at drought prone areas.

The action has significantly increased the populations' resilience to droughts and floods with attendant social and economic consequences. It has decreased costs as interventions are undertaken in a better planned environment than emergency responses and as a result of economies of scale. It will reduce the ration of emergency assistance to development assistance.

7.5 Theme IV: Water Management for Food and the Environment

7.5.1 Integrated Watershed Management through Progressive Terracing Techniques: Wild life Clubs in Rwanda, Frank Habineza, Rwanda

The sedimentation of Lake Burela and Buhondo with soil erosion by runoff water from the areas of Nyangwe and Kagoma in Bukamba district in Rwanda had affected the capacity of hydropower plants due to reduced reservoir capacities. The Nyangwe and Kagoma areas are located within the National park for the endangered mountain gorillas.

In order to achieve soil erosion control and thereby reduce sedimentation in the lakes, an integrated watershed management was used. The techniques used include,

- Training of selected local people as local technicians on matters concerning environmental and wild life conservation, eco-tourism management and agro-forestry;
- Sensitizing local authorities and local population;
- Selecting different shrubs which would be used as fodder for livestock or applied to soil as green manure and trees that can be used as timber or wood biomass as fuel wood, and
- Establishment of progressive terracing system.
- Implementation of the terracing activity

The watershed management was successfully implemented by the community with the technical assistance described above. The implementation of the project has resulted in reducing soil erosion, in creating additional fodder for cattle and

promoting eco-tourism. Following successful completion of the project, donors have recommended the extension of the program to cover the whole area surrounding of the National park.

7.5.2 Nile Dialogue : Nile Basin Society, Nabil El-Khodari, Egypt

IWRM principles require the involvement of all stakeholders in all phase of water projects. In the past NGOs were not involved in the planning, study, design and implementation of projects. In 2005 the Nile Basin Initiative (NBI) established a Confidence Building and Stakeholder Involvement program. Taking this opportunity the Nile Basin Society (NBS) has emerged from a small discussion forum into a true participant in the Nile Basin Initiative.

The participation is managed through an e-conference (<http://dgroups.org/groups/Nile-Dialogue/>). In the beginning the Overseas Development Institution of UK played the role of facilitator and NBS the role of technical administrator, later NBS played both roles. Participating NGOs are selected by local NGOs according to the NGOs experience in water issues and capacity to represent collective NGOs opinion. Through the e-conference the participants will be provided with relevant documents and they are expected to enrich the documents through various comments, alternative ideas and conveying the concerns of the local population affected by the projects.

The e-conference provides a technique for maximizing the participation of NGOs at affordable cost which will lead to sound projects which addresses the needs of the people.

7.5.3 Community Participation as a Tool for Negotiations and Gender Conflict Management into Peace Building: Community Impact Assessment for Eastern Africa, Patricia Kabatabazi, Uganda

Community participation techniques were engaged to resolve a conflict between livestock keeping by men and rice growing by women in Budaka wetlands Pallisa District in Uganda.

Uncontrolled grazing by livestock had led to a number of environmental and social problems. This situation has created the losses of vegetation on communal pastures and rice fields, and contamination of drinking water sources. This gave rise to growing tension between rice growers (who were women) and livestock keepers (mostly men).

The following community participation techniques were used to address the issue:

- Undertaking stakeholder analysis to identify the community, knowledge base, ring leaders and to take stock of the existing social problems;
- Undertaking environmental analysis and developing a land use map with the community;

- Sensitizing the communities to appreciate the problems encountered by rice plantation and livestock keeping;
- Developing with the community, complimentary activities such as limiting the length of grazing time, using crop residue for livestock feeding, compensation for lost vegetation by developing community reforestation program, reduction in agrochemical use, and development of water sources.

Through this participatory process it was possible to ensure equitable access to the environmental resources and to create a safe and harmonious community which was on a brink of fighting.

7.5.4 River to River Project: Great Lakes United Canada, Mrs Sylvie Trudel, Canada

By applying an integrated community participation approach, covering environmental and health education, introduction of innovative technologies and by capitalizing on existing culture the negative aspects of the water hyacinths were changed into beneficial effects.

The project was developed to solve the problem of water hyacinths and other invasive species which have invaded the Niger River in Niger and Mali. Water hyacinths have severely impacted human activities by invading rice paddies, blocking water filtration plants and pumping stations. It had also hosted snails and mosquito larvae which are instrument for spread of schistosomiasis and malaria respectively. The hyacinths tufts also provide shelter for potential harmful species such as snakes and leeches.

Through the project, the communities were able to use the water hyacinths as: compost to enrich sandy soil with organic matter; as a filter media for water treatment; as a major input for manufacturing handicraft products, and as fuel after compacting into briquettes.

Consequentially, the plant was controlled within the community, women doubled their production because of enriched sandy soil, purified water was available, less trees are being cut as briquettes were made available and the income of women was augmented by the increased sale of handicrafts made for the water hyacinths.

7.5.5 Umm Bronga Water Harvesting and spreading Dam: Practical Action, Mohamed Majzoub Fidiel, Sudan

By constructing a multipurpose dam for spate irrigation and for inducing subsurface water storage for domestic water supply, it was possible to reduce the food insecurity in the Umm Bronga village in the North Darfur State of Western Sudan. The North Darfur in Sudan has experienced erratic rainfall and a series of droughts. This had resulted in great loss of livestock, crop production, natural vegetation cover and wild life leading to food insecurity.

The community and the local government were involved in the planning, construction and maintenance and monitoring of the dam. Local elders provided information that helped to locate the site for the dam on the basis of the communities experience on the flooding and water courses of the wadi. The dam is 2.3 km long and has a spillway with gates. The construction of the dam has enabled the impoundment of runoff water for irrigation and the impounded water recharged the groundwater.

The resultant effects of the project are:

- The dam allowed the farmers to grow higher quantities of staple foods and cash crops including sorghum and Snuff tobacco
- The farmers used to migrate during off season to urban areas to work as casual workers or petty traders. After the dam was built, none of them has left the area.
- Fodder from wild grasses and agro-waste were made available for the livestock
- The water stored by the dam has enhanced the subsurface aquifer resulting in natural regeneration of deep rooted tree shrubs. Also the crops grown in winter have helped stabilise the soil from wind erosion. The burden of cultivation on goz soils has also been reduced.
- Subsurface aquifer, water from shallow wells became possible. Umm Bronga people and people from other villages come and collect water from the shallow wells they dug for this purpose.
- The Umm Bronga school remained open throughout the year
- Farmers are able to pay for health and education.
- The Umm Bronga system has been incorporated to the school curriculum.

7.5.6 Integrated Water Resources Management Koga Irrigation Project Ethiopian Ministry of water Resources, Mogesie Worku

The project will address the poverty and food insecurity problems of communities in the area whose livelihoods are at risk due to frequent drought and food shortage caused by moisture stress on their rain fed farming.

In order to achieve the project objectives a holistic approach is used. The project components cover all relevant aspect of the problem as listed below.

- Irrigation infrastructure development
- Agricultural extension, crop development and livestock development
- Soil conservation, forestry development and environmental protection,
- Health, (HIV/AIDS, Malaria, schistomiasis) Water & Sanitation
- Capacity Building Component (gender mainstreaming, microfinance, etc)

The Federal, Regional and Local Administration including the local community are involved in the implementation of the project. A training centre for the community would also be established at the project site to ensure the sustainability of the project.

7.5.7 The Gory Experience

The objective of the exercise is to train children at school about water protection concurrently with the building of a fresh water network in the village. The activity was undertaken by twinning a school in Mali and in Paris. The teacher of the two schools through correspondence organized a twinning arrangement between the two schools. The Teacher of the Malian school at Gory and the teachers at Balanchine school in Paris prepared the teaching material adapted to the local situation. A one week intensified water class was conducted simultaneously in the two schools while the water supply system of the Gory community was being realized.

In the implementation of the project in addition to the teacher the Malian Ministry of Education, National direction of hydraulics, Agence de'eau Seine Normandie in France and Eau de Paris have participated. The process has resulted in

- associating the children with the design of water projects as future adults having responsibilities;
- using the school as an instrument for dialogue within the families;
- building a concept and tools to train trainers themselves; and
- creating awareness among children on the importance and the relations of water supply and hygiene.

In addition, the need to incorporate water education in the education system was realized by the Malian government and consequentially, an intergovernmental committee for water and education was created.

7.5.8 Treated Sewage Water Irrigation Project in Tunisia (JBIC ODA funded project)

Tunisia receives an average annual rainfall of less than 300mm. To cope with this problem the Tunisian government has established a long-term water development plan in order to maximize the quantity of usable water. The government encourages the utilisation of treated sewage water, to irrigate perimeters of fruit trees and fodder crops. In 1997 in Tunisia perimeters irrigated by treated sewage water extended to about 6,000 ha, and the government is now aiming to expand it to 9,200 ha in 2006.

In this context a Treated Sewage Water Irrigation Project was implemented with Japan's ODA loan. Through the Project 1,124 ha of irrigation areas were created to utilise over 1 million cubic meter of treated sewage water. It is expected to contribute to the improvement of agricultural products (mainly olives and fruits)

as well as to introduce cattle raising. It will thus contribute to the food security of the country and to the improvement of farmers' income.

In addition under the framework of this Project, a study for recharging underground water with treated sewage water in the area of Jerba-Aghir was also carried out, which enlarged the possibility of solving the problem of underground water tables whose water level is lowering due to over-exploitation.

Before starting the project, the local government officials visit farmers and encourage them to form a Farmers Association. Once the associations are created, they are registered under the local administration system and receive technical and sometimes even financial assistance from the government. When the project is completed, the constructed irrigation system is transferred to the Associations for operation and maintenance.

7.6 Theme V - Risk Management

7.6.1 Risk Management in the lullemeden aquifer

The lullemeden is a trans-boundary groundwater multi-aquifer basin shared by Mali, Niger and Nigeria and Algeria. The aquifer is confronted with high policy and scientific uncertainty. Hence, its management and development had to be based on a joint risk management under a common consultative mechanism. Countries identify, formulate a common perspective and address the environmental risk and share the consequential socio-economic costs. This common approach facilitates promotion of joint cooperation and minimizes conflict.

International organizations such as the Global Environmental Facility GEF, UNESCO/IHP, FAO and ESA collaborate with the environment and water ministries of the "riparian" states. Establishment of risk and uncertainty is based on consultative mechanisms, legal and socio-economic cooperative framework. Sustainability is anchored on Consensus and commitment building, trans-boundary Diagnostic Analysis and Strategic Action Programming (TDA/SAP)

7.6.2 Contribution to Flood Monitoring and Adaptation Strategies in Zimbabwe

In view of the consequences of floods, especially on the vulnerable populations in Zimbabwe, three Government departments of Civil Protection Unit, Meteorological Department and the Zimbabwe Nation Water Authority ZINWA teamed in partnership with UICN to implement a project aimed at development adaptation strategies to floods. The project is being implemented in the Beitbridge District in the Limpopo Basin (which is shared with Botswana, South Africa, and Mozambique).

The goal of the project is to contribute to the improvement of livelihoods of communities living in flood prone areas in Zimbabwe. The purpose is to reduce the impact of floods on human livelihoods and loss to infrastructure and property. Specific activities include review and improvement of evacuation procedures and engineering standards to adapt to expected flood eventualities.

Surveys undertaken in the project have revealed unfavourable trends in the periodicity of cyclones, decrease in rainfall, increase in temperatures, declining livelihoods as a result of flooding of irrigation infrastructure and effects on population attracted to flood zones by the schemes. It showed weaknesses in communicating early warnings especially with regard to the cyclone Eline. The project has mapped flood prone and safe areas at different recurrence intervals. It has identified building standards for houses and domestic assets (such as granaries) as well as river crossings as targets for improvement in adaptation strategies to reduce impact of floods.

In total the project is expected to improve the quality of lives of local people and render them less vulnerable to floods and flood damage. It also address the phenomenon of climate change

7.6.3 Kenya sand dams

During the last 10 years, a local NGO called 'SASOL' has implemented a methodology to mitigate extreme droughts by developing so called 'sand dams' in the Kitui District of Kenya. These low cost dams are constructed through community inputs.

The dams cost about U\$ 5,000 and are built through community inputs. Labour costs are provided by the farmers who will use and maintain the dam. The dams allow for storing water within an artificial sand aquifer that is created behind the dam. In this way, water loss due to evaporation is reduced to the minimum. Within 10 years, SASOL has developed 435 dams. About 60,000 – 65,000 people have already been provided access to water with an investment of U\$ 34.8 per capita. The average walking distance to water per capita has been reduced dramatically. As a result, economic growth has been increased in the region.

The project has proved that with limited resources and community inputs, droughts can be mitigated without heavy infrastructure investments. Local knowledge and cooperation is the key for success of the sand dams. A thorough participatory process is therefore inherently linked to the development of such dams.

There are two issues that need to be addressed in order to upscale the project methods to other regions:

- The sand dam methodology has not been assessed on its vulnerability to long term effects such as climate change.

- Institutional knowledge must be developed to upscale the methodology to other regions. For example, how must farmers be organized to maintain the dams, and how can the national government facilitate this process.

7.6.4 Floods forecasting system for integrated natural resources management in the Niger Inner Delta in Mali

The inner delta of the Niger in Mali is an important ecosystem with many livelihood activities such that the variations in water resources related to the flooding of the Niger and the Bani rivers leads to issues of sharing of resources.

Within the climate change project of AGRHYMET a pilot project for integrated management of the resources of the delta was initiated in 2004. It identified through a participatory procedure the main needs of uses of the resources under different flood conditions and the flood forecasting system has been created and being implemented.

Its implementation is expected to result in the improved sharing of information among users, creation of a framework of consensus building among stakeholders and technicians involved in the management of the delta, improved management of irrigation activities including optimization of seasonal irrigation, improved planning of fisheries based on prior knowledge of flood levels.

7.6.5 Protection against flooding in Great Tunis

The City of Tunis with its population of more than 2.7 Millions is currently flooded by quantities of runoff flows coming from upper parts of catchment basins. The upper parts of the catchment are steep while the lower parts are almost flat and water accumulates in the streets and in the salt lakes in the city. Rapid urbanization increases impervious areas and shortens the time of concentration increasing the peak flows.

The project is aimed at solving the problems of recent floods which resulted in losses of lives and property when water levels rose up to 4 meters above street levels in parts of the city.

Following the September 2003 floods flooding problems have been studied and the 18 major basins have been analysed, using storm drainage management models and GIS software. An economic study of the financial and social impacts has been carried out and linked to field observations.

The resultant project will benefit all residents of Tunis, through protection of houses in an area of 4,000 hectares, shopping and industrial area the emphasis being on saving of human lives. The method can be generalized for other flood ridden areas.

8 Conclusions and Recommendations

8.1 Conclusions

8.1.1 Introduction

Access to, and utilization of water resources in Africa is very low. The level of exploitation of the water resources of Africa is only about 3% of the total amount. In order to make use of this potential to achieve the MDGs and other development requirements thereafter, a diversified and scaled-up political effort and financial investment is required.

The analysis of the water-related characteristics of the region, the challenges facing the region, the main constraints that hinder water development, and the opportunities and responses made to the water development challenges leads to the following set of conclusions.

The 2002 Africa Water Vision (AWV) and the Framework for Action (FFA) and the 2003 PANAFCON action plans are designed to address the water sector challenges in the region and continue to provide pertinent framework for planning, implementation and continuous dialogue at all levels of water development and service provision in Africa. AMCOW and its organs continue to demonstrate growing commitment to these ideals and to give impetus to their development.

8.1.2 Implementing IWRM

Adoption of IWRM Policy: An assessment made in 2005 by AfDB in 34 African countries for the purpose of RWSSI implementation indicates that only 13 countries have developed - and three are in the process of preparation of - water management policies. However, most of these policies need to be scaled up or adapted to conform to embrace IWRM principles and practices. According to commitments made at international level at the WSSD and reiterated in the PANAFCON, the African countries should have undertaken steps to prepare and adopt national IWRM plans or embark on the process of their preparation by June 2005.

Efforts are being made by the GWP and the ADB to build RMCs capacity to develop their IWRM policies. The AWF also has IWRM implementation as one of its priority areas of activity. With this assistance most countries could develop IWRM policy in the coming two to three years.

However, it should be noted that though IWRM implementation is considered by some experts as a prerequisite for investment recent developments have shown that IWRM is a long term process which should be adopted and implemented

alongside rather than as a prerequisite for concrete investment programs in the water sector.

The Local Actions described in Chapter 7 under *Implementing IWRM* also indicate that IWRM is being implemented at different levels and scale in the Region. The study by SSO on the trans-boundary groundwater basin in Tunisia, Libya and Algeria is a good example of application IWRM principles which will assist in joint and shared decision making on the interests of all concerned as are examples of local implementation such as ...

Strengthening and establishing Water Basin Organizations (WBOs): Even though encouraging measures are being taken in the establishment and strengthen of Water Basin Organizations (WBO) most of them lack the human and financial resources required to meet what is expected of them. Except the SADC WBOs and its Water Coordination Unit which are governed by a Protocol on Shared Watercourse Systems in the Southern African Development Community, the remaining transboundary WBOs are performing in an environment lacking a basin wide accord on the management of water basins. Therefore there is a strong need to build the capacity of the WBOs and for the development and adoption of legal instruments for the utilization of water resources at basin level and region level.

In addition, in order to increase their capability and effectiveness in undertaking more activities there is a need to establish a mechanisms that would enable the WBOs to generate their own financial resources.

A number of African local actions in chapter 7, reiterate the need for a mixture of top-down and bottom operation of national and trans boundary WBOs, mostly in the form of representation of Water User Associations and or local Governments in the Governing Structures of WBOs'

Monitoring and evaluation: Paucity of data and information on water is one of the key factors affecting the planning and monitoring of water development activities. Consequently, there is a compelling need to develop appropriate monitoring and evaluation mechanisms for water supply and sanitation activities as well as water resources data. The growing number of HYCOS installation within the continent is an encouraging piece of news.

8.1.3 Financing Water Initiatives

In co-operation with partner organizations the African countries have made relentless effort to attract funding to the water sector in the form of grant, debt relief and loans. On their part the countries have agreed to allocate at least 5 of their budget for water and sanitation and 10 percent on agriculture and food security. The African Development Bank, the World Bank and EU have made significant commitments to contribute towards meeting the MDGs. Several developed countries are also providing bilateral technical and financial assistance towards meeting the MDGs. The G8 have also agreed to substantial contribution for the Implementation of NEPAD water and sanitation programs. So far with respect to NEPAD water and sanitation infrastructure it is mainly the energy sector which is the most advanced in terms of project funding. The water related pillars of its CAADP are as yet to raise any significant funding pledges.

With respect with the streamlining of financing to the water sector AMCOW has established the African Water Facility (AWF) to facilitate the availability of financial resources to build Africa's water infrastructure institutions and management capacity and to act as catalyst to lever in other financial inflows to the sector. By providing direct financing to NGOs, CBOs, sub-sovereign institutions in addition to Central Government, the Facility seeks to address the problem where the tyre meets the road.

The financial investment required to meet the MDG has been estimated at about US\$20 billion per annum. This estimate should be updated using investment requirements established by countries and water basin organizations. In general some progress has been recoded in securing some grants and debt relief. However this falls far short of what is required and most of it is still in the form of pledges as yet to be realised. Specifically, investment to develop large infrastructure which would leverage development is urgently required. Therefore, high priority should be given to devising financial instruments to attract investment from bilateral, international and private sector for meeting urgent and critical needs in water resources development and providing access to services for drinking water supply and sanitation, agriculture and food security, and environmental sustainability.

It should also be noted that the benefits from investment made in water infrastructure to achieve **basic** water security would accrue (to future generations) in the long term through several indirect ways. Therefore, it would not be entirely appropriate to expect the beneficiaries to pay for all of the investment up front. Hence, the investments required to achieve basic water security should have major but properly targeted subsidy component upfront.

8.1.4 **Water for Growth and Development**

Need for major water Infrastructure: Africa faces enormous task to achieve water security. Major infrastructure are required to be built to mitigate flood, drought, and to provide access to water resources for health, productive uses and protection of control of pollution.

The African countries have developed the NEPAD's Water and Sanitation Programme as well as CAADP which targets, enhancement financial flows towards investment in infrastructure, and development of skills and knowledge towards the installation, operation and maintenance of infrastructure.

So far the RMCs have been using fire fighting strategies trying to meet the daily requirement of the population by engaging themselves in small projects to fill the gap in the short term. Consequentially, most countries have not invested sufficiently in water infrastructure and institutions, thus have not achieved water security. Therefore for development to take place African countries should incorporate in their policy, strategy and programs commitments to invest on water infrastructures up to the level where they can achieve a self sustaining auto –induced growth.

Need for the development of human, social and institutional capacity:

The huge investment envisaged in the water sector would require a significant increase in human resource base. However, the available human resources in the region are inadequate, both in terms of number and skills, to handle the huge investment. In the past the investment in the water sector was mainly focused on investment on infrastructure. However, for investment in water infrastructures to yield the expected returns, it is equally important to invest in water institutions and the capacities required running them. Perhaps even more important is the need to invest effort in developing social capacity, through the education, information and strengthening of local knowledge of communities and community based organizations Therefore concerted efforts by the African countries and partners should be made to develop regional human, social and institutional capacity

Growth also is more likely to be attained when a vibrant private sector is heavily involved in the development of the sector. A level playing, field, optimal sector and micro-economic policies are essential pre-requisites for this. A few local actions have shown how even modest efforts to implicate the small local private sector has made a difference in the provision of public utilities in Niger and Mauritania.

8.1.5 **Water Supply for All**

Africa has the lowest water supply and sanitation coverage of any region in the world. Currently about 300 million people in Africa do not have access to safe

water and about 313 million have no access to sanitation. This situation exacts a heavy toll on the social and economic progress of African countries.

The achievement of full access to water supply and sanitation services by 2025, as stipulated by the Africa Water Vision and the MDG, would be achieved in incremental steps with targets set at: 66% access by the year 2010 and 80% by 2015. According to the UNDP Human Development Reports, 2004 only 50 percent of the RMCs are performing satisfactorily towards achieving the water supply and sanitation MDGs the rest are either far behind or slipping back or have no data.

A concerted effort is being made by the African countries, the African Development Bank, World Bank, bilateral donors, NGOs, UN organizations and other, Regional and international organizations to mobilize resources towards the provision of water supply and sanitation.

The African Development Bank RWSS Initiative is intended to help mobilise as well as facilitate the flow of available and potential resources to accelerate RWSS investments in Africa. Assessments of country water sector situations have been carried for 33 countries and subsequently RWSS data base has been developed for these countries. Implementation has started in 5 Pilot countries and preparations are underway to commence RWSSI Programmes in 22 other countries by the end of 2007. However there is a need for the development of human resources and institutional capacity for the implementation of the initiatives.

From the planning and implementation point of view, PANAFCON has outlined activities for data collection and design of the financing requirements as well as monitoring progress. It has identified the need to study the cost effectiveness of upgrading infrastructure and improvement of future use

FUTURE ACTION ; Clearly a mechanisms for Monitoring and Evaluation need to be developed to monitor attainment of the MDGs goals;

8.1.6 Water development for food and the environment

Although the proportion of malnourished individuals in Sub-Saharan Africa has remained in the range of 33–35 percent since around 1970, the absolute number of malnourished people in Africa has increased substantially from around 88 million in 1970 to an estimate of over 200 million in 1999–2001. According to the UNDP, Human Development Reports, 2004 only 28 percent of the RMCs are performing satisfactorily towards achieving the eradicating extreme poverty and hunger MDG the rest are either far behind or slipping back or have no data.

A comprehensive Africa Agriculture Development Programme (CAADP) has been articulated under NEPAD. CAADP aims to promote interventions that best respond to the widely recognised crisis in African agriculture CAADP has been designed to promote investment in four key areas that can make a difference to

Africa's food and agriculture situation. These are extending the area under sustainable land management and reliable water control; improving rural infrastructure and trade-related capacities for improved market access; increasing food supply and reducing hunger; and agricultural research, technological dissemination and adoption. The Sirte AU Declaration outlines measures to harness water resources in support of agricultural development in Africa.

In order to confront poverty and hunger in Africa an annual investment outlay of USD 4.7 billion would be required. This would be realized if appropriate policy changes which would induce good governance, promote good water resources management practices, attract investment in agriculture and negotiate for better access to markets are put in place at Regional and country level.

When policies incorporate the IWRM policy of water as an environmental good the protection of ecosystems becomes an intrinsic part of the development process. It may however be necessary to make additional investments to reverse existing negative environmental effects, to enhance positive one or simply to enhance capacity for manage water for the environment. Several local actions demonstrate how efforts to recover and in some case create new wetland ecosystems, to engage in soil and water conservation have resulted in windfall benefits to livelihoods.

8.2 Lessons learnt

8.2.1 Introduction

What emerges from the regional local actions as well as the consultations that have taken place is a number of practical considerations that can be captured under each of the forum themes:

Rural communities, CBOs, private sector, all are ready and receptive to the messages of improved WRM management, provided they can see benefits to themselves in these activities. Benefits need not necessarily be material. Having their voices heard, being provided with and sharing own information useful for their development are also other ways.

Local actions vary in the degree to which they involve local stakeholders, with some still selling ready made solutions while other involve participation right from the onset

8.2.2 Water for Growth and Development

Managing water for growth and development as clearly distinct from security livelihoods and poverty reduction, is relevant in areas where production even in agriculture is intended for surplus and trade, and experience in this area has come more from peri-urban community settings, from NGOs with concern at national issues, and from institutions at the national and regional levels as well as educational institution.

The need for financing infrastructure development is emphasized by the NEPAD and AWF local actions. So is the importance of African government's instigation of good governance, which forms the very basis of NEPAD vision, broader capacity building, beyond human resource skills to community empowerment. This includes incorporate a wider stakeholder representation in policy issues such as demonstrated by the Southern African Forum on World Commission on Dams issues,

Local actions that have implemented simple water and soil conservation works that have improve land productivity demonstrate that environmental management is complementary to livelihoods improvement, growth and development.

Finally, two local actions demonstrate that business opportunities can arise out of unexpected situations as demonstrated by a viable private sector investment in water demand management as well as community empowerment to reduce leakages and wastage in homes resulting, on the one hand, in increased potential personal savings and, on the other, delayed investment in capacity expansion for the water service provide.

8.2.3 Implementing IWRM

Lessons under this theme reflect that the very concept of IWRM is synonymous with lateral thinking and with non intuitive solutions, bringing in cross-disciplinary encounters typically considered incompatible. It implies extending water management beyond its pure sectoral and technical attributes. Academic researchers ultimately work with grassroots farmers, under the instigation of local governments, and assisted by NGOs, to get practical solutions to real world problems in a water resource poor region of Ethiopia for example.

But a key lesson under this theme is the need for data, information, and managed knowledge leading ultimately to wisdom in water management and governance. New ways of obtaining information where high technology may well be the "appropriate" technology are demonstrated by the increasing adoption of real time data acquisition attributes of World and other HYCOS systems as well as the use of Earth Observations for other related data in water management.

The need for human resource and overall institutional capacity is evident, not only from the level of sophistication of this technology, but also from the breadth and depth of decisions to be taken in managing large, and in most cases, trans-boundary surface and groundwater basins.

The complexity of reaching consensus against the often competing objectives and criteria from differing perspectives of political, social, technical, economic and scientific view points leads to the need for special skill building in negotiation and joint problem solving. Creating confidence and credibility have been quoted as having been critical in convincing stakeholder to ultimately reach consensus from broadly different points of view. This was the case where a trans-boundary Basin Authority successfully negotiated the authority from its member states to implement regional projects, to quote but one example.

Decentralization, which gives a role to local actors in a basin wide or national level management environment, is considered as a necessity for implementation in at least two of the selected local action. In Uganda, a project aimed at empowering local governments to participate in the National IWRM programme underscores the fact that local actors are ultimately responsible for implementing the detail of the global plans. In Burkina Faso, the difficulties of implementing the Basin-wide programme in one of the four basins of the country was resolved by incorporating representatives of local Water User Associations into the structure.

8.2.4 Water Supply and Sanitation and the MDGs

A number of local actions show the importance of getting the right mix of institutions as the service provision sector is reformed. The need to address regulation of the small private sector is brought up in Mauritania and in Uganda; in the former the emphasis is to maintain a clear role for the water user association. In Ethiopia a hierarchical structure for the governing body is suggested.

The choice of an appropriate technology remains important in being able to achieve the MDGs. Rainwater harvesting directly through construction of dedicated structures or indirectly as part of a larger watershed management programme resulting in increased induced groundwater recharge appears to offer many opportunities. On the sanitation side novel technologies include the use of kaolin for removal of toxic substance in effluent, while the diversion toilet in the EcoSan system seems to be gaining increasing acceptance with its added benefits of protection of groundwater. Prepaid metering is gaining ground as a technology for better cost recovery while in another development a manual drilling method capable of drilling up to fifty meters is being introduced in Africa from its original place of conception in Japan.

Finally the role of communication, and by extension information and water education is given eminence in a local action in Kenya, and in a twinning arrangement between a French and a Malian school. The two cases reinforce the

PANAFCON position on the issue which also recommends stakeholders to strengthen provision of services in poorly served schools and communities. This aspect is demonstrated most poignantly in introduction of EcoSan in a girls school in Uganda.

Commitment of the region to attainment of the MDGs is demonstrated by the RWSS Initiative of the African Development, which is only one of the instances of the international community's resolve to attain this noble objective. Together with the African Cities Programme these initiative are underpinned by the need to address issues not just of infrastructure but building human, social and institutional capacities and creating enabling environments for investment required to meet the MDGs.

8.2.5 Water Development for Food and for Environment

The experience of the **Wild life Clubs in Rwanda demonstrates the benefits of Progressive Terracing** technique in integrated watershed management to reduce sedimentation in the receiving water body. This is one of many ways water development can be designed to have positive impacts on the environment.

The effort of the Nile Basin Initiative in creating a Confidence Building and Stakeholder Involvement program is very encouraging. The e-conference the Nile Basin Society is employing to participate in the Nile Basin Initiative activities provides a technique which will maximizing the participation of NGOs and lead to sound projects which addresses the needs of the people at affordable cost

The community participation techniques engaged to resolve a conflict between livestock keeping by men and rice growing by women in Uganda is a good participatory process which has resulted in ensuring equitable access to the environmental resources and to creation a safe and harmonious community.

An ecosystem based perspective allows looking at resources in different ways. By applying an integrated community participation approach covering environmental and health education, introduction of innovative technologies in the Niger river basin the negative aspects of the water hyacinths have been changed into beneficial effects. The water hyacinth is used as: compost to enrich sandy soil with organic matter; filter media for water treatment; input for manufacturing handicraft products, and for fire wood.

By involving the community and the local government in the planning, construction and maintenance and monitoring of a multipurpose dam for spate irrigation and for inducing subsurface water storage for domestic water supply it was possible to reduce the food insecurity in the Umm Bronga village in the North Darfur State of Western Sudan.

The Koga Irrigation Project in Ethiopian shows the importance of holistic approach in the development of water resources. The project components are:

infrastructure development, agricultural extension, crop development, livestock development, soil conservation, forestry development, environmental protection, health, water & sanitation, capacity building component.

The Tunisian response to water stress is instructive. The country receives an average annual rainfall of less than 300mm. To cope with this problem the government has incorporated into its long-term water development programmes a plan to maximize the quantity of usable water by the utilization of non-conventional resources such as treated sewage water. This is a good example to replicate in similar situations.

8.2.6 Risk Management

Livelihoods are inadequate unless they are secure and sustainable. The effects of steady growth and development can be annulled by a single catastrophic effect. UNICEF's experience in the application of the Martigny principles in Ethiopia teaches a lesson that emergency measures need not be incompatible with development efforts, provided a proactive approach of disaster preparedness is adopted. Thus negative aspects of floods and droughts can be averted at lower cost by applying a "stitch in time" in development programmes that target vulnerable areas with means for coping with the likely hazards.

Disasters can cause significant losses in property and more significantly lives. Careful analysis of the social and economic impacts is required to appropriately design measures for managing these risks. The hydrological and other physical inputs were facilitated in a case study in Tunis by use of high tech systems and field observations following one such disaster in 2003.

Water variability is mitigated by some form of storage. Introduction of solar pumping helped address a bottleneck in the exploitation of existing groundwater in the Sahel. Constructions of small storage structures can help to some extent although problems of evaporation in dry climatic conditions tend to diminish its uses. A Kenyan solution was to use the sand dam technology – an artificial groundwater storage formed by controlled silting of a structure across an ephemeral stream.

Hydrological and meteorological data acquisition, and processing attain their greatest importance in risk management especially in using the strategies of early warning systems. Again the ability to communicate these early warnings to the public is important and brings another dimension of use of appropriate media. A Zimbabwe project aimed at protection of the population in a cyclone prone area is found in diagnostic studies that while warnings had been issued by a national radio some people in the affected area did not hear the message.

8.3 The Way Forward

8.3.1 Introduction

The water related problems of Africa are interlocking creating vicious circles that reinforce one another. On one extreme end there is absolute poverty and on the other end there is great demand to heavily invest on water infrastructures and human, social and institutional capacities. However, water can make an immense difference to Africa's development if it is managed well and used wisely. Given clear policies and strategies and real commitments to implementation, water can help to eradicate poverty, reduce water-related diseases and achieve sustainable development.

8.3.2 Implementation of IWRM

IWRM can be tackled by addressing a specific problem or a challenge as an entry point. Therefore those countries that do not have IWRM policy should try to introduce IWRM through project activities and in the mean time institutions entrusted in providing support for IWRM plans and implementation should upscale their effort.

There is a compelling need to develop an appropriate monitoring and evaluation mechanism for sanitation and water activities hence the efforts started by the AWF to establish a Regional Mechanisms for Sanitation and Water Monitoring and Evaluation and provision of support for the same to be established at country level should be accelerated.

8.3.3 Water for Development and Growth

High priority should be given to secure the pledges made and attract additional investment from bilateral, international and private sector for meeting investment requirements for: capacity building, institutional reform, building knowledge base, and developing water infrastructure and services.

This should start with African governments securing the confidence of the international support agencies and the local investors through good governance and credible institutions. This includes transparency, accountability, equity for men and women, adequate institutions and legal and other mechanisms.

International donors on their part should recognize the efforts of the African countries and increase their assistance to countries to arrive at a critical platform where they can trigger auto-induced development.

8.3.4 **Water Basin Accords**

An accord for the management of water basins between riparian countries at water basin level and at a Regional level is overdue. All efforts to realize this should be strengthened and streamlined. The accord should devise mechanisms that would enable a mechanism by which the water basin organizations can become self-financing bodies.

8.3.5 **Water supply and sanitation**

Upscale all efforts to meet the MDGs the water and sanitation targetes. This should include decentralization of water supply and sanitation services to appropriate administrative levels and creation of transparent, open, accountable, [gender responsive](#), communicative and effective water governance at all levels of water management.

Invest adequately in building [gender balanced](#) institutional capacity, and technical and managerial capacity at all levels of the professional ladder, starting from the artisans to planners and designers.

Give prominence to sanitation including an extensive and intensive health and hygienic education at the community level.

8.3.6 **Water Development for Food and Environment**

One of the ways to increase agricultural products and achieve food security is by intensification of exiting cultivated land. Therefore the development of irrigated agriculture at small scale and large scale level should be promoted urgently. This can be achieved by creating an Irrigation Initiative at a Regional level which will address.

8.3.7 **Risk management**

To avert consequences of variability of rainfall and climate change it is necessary to upscale investment in data acquisition, information processing and rapid dissemination of information to venerable groups.