

No Water No Future:

A Water Focus for Johannesburg



Contribution of HRH the Prince of Orange
to the Panel of the UN Secretary General
in preparation for the Johannesburg Summit

Revised Version: May 2002



Preface

When Secretary-General Kofi Annan invited me to serve on the panel that is helping him prepare for the World Summit on Sustainable Development in Johannesburg later this year, I gladly accepted the invitation. Because of my special interest in water issues, I prepared an initial contribution to Mr. Annan's panel that focused on water in February. The document is available on the Internet in English and French (www.nowaternofuture.org). About three thousand people have now visited the site to read or download the text and provide me with their comments. In addition, I have received valuable comments and suggestions to improve the document from key organizations in the water sector and through a meeting of over two hundred African water stakeholders who met in Accra, Ghana, in April. Most of the feedback I received has been very supportive and has provided me with constructive criticisms that I have used to improve the version of the document that you now have before you. I thank all those who generously provided me with their inputs.

The Accra meeting was opened by President Kufuor of Ghana and attended by water ministers from seven, and representatives of over forty, African countries. The Accra



His Royal Highness the Prince of Orange and His Excellency President Kufuor of Ghana at the Regional Stakeholders' Conference for Priority Setting, Accra, Ghana 15–17 April 2002.

conference, and the subsequent conference of African water ministers in Abuja, Nigeria, emphasized the importance of improved management and development of water resources for sustainable development in Africa and inspired me to add an additional section to this document that deals specifically with Africa. I will also take the messages contained in this document forward to the 4th WSSD PrepCom in Bali and hope to have similar interactions with Asian water ministers on that occasion.

The water crisis that is affecting so many people is mainly a crisis of governance—not of water scarcity. Overcoming the world water crisis—achieving water, food and environmental security simultaneously—is one of the most formidable challenges on the road to sustainable development. More and more people, organizations and governments are becoming aware of this challenge. The World Summit on Sustainable Development should reaffirm the importance of achieving water security and adopt targets and actions that will allow us to meet this challenge jointly. In this context, I would even daresay that if nations cannot manage their water resources, Sustainable Development remains a faraway dream.

Willem-Alexander
Prince of Orange

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1. World Water Crisis

Water is crucial to development. As the world population tripled in the twentieth century, the use of renewable water resources has grown sixfold. The substantial investments in the development of water resources in OECD countries and Asia have made major contributions to food security, to electricity production and economic growth in general. These investments have also succeeded in satisfying the basic needs of much of the world's population. However, this water development has not always been sustainable and many are convinced that there is a world water crisis.

Today's world water crisis is defined by insufficient access to safe drinking water for over a billion people, and inadequate sanitation for half the world's population. Population growth, the increase in GNP in most countries and progressing industrialization combine

to create a demand for water in the urban areas of developing countries, which will continue to increase substantially in the coming decades. At the same time, lakes/ rivers, wetlands and marine waters provide the vast majority of environmental goods and services, including fish. Many of these services depend on the integrity of aquatic ecosystems. This integrity has been affected by (1) the decline in surface area of these ecosystems; (2) widely deteriorating water quality; and (3) reduced quantities of water that are needed to sustain these ecosystems. Large-scale development of river and groundwater resources is less acceptable today, for environmental reasons. It is also less cost-effective than it was in the 1960-1990 period, when the large majority of the world's 45,000 large dams were built. Set against this is the fact that the lack of access to water is expected to be one of the key constraints to achieving food security for all in the coming decades.



We will see continued pressure to develop the world's remaining water resources—a challenge which will have to be met innovatively and sustainably.

Compounding the problem, is the fact that water infrastructure built in recent decades is becoming obsolete, e.g., reservoirs are silting up and irrigation networks are falling into disrepair. Groundwater levels are falling in important aquifers that have contributed substantially to food security in recent years by providing water-on-demand to millions of farmers who tapped them using tube wells to grow their crops. All these developments result in an increasing scarcity of water resources—a scarcity that hits the poor and vulnerable first and hardest. Women and children are among those who suffer the most.

The water sector must also learn to deal adequately with the increasing degree of temporal and spatial climatic variability, accentuated by expected climatic change. The evidence is undeniable: during the decade 1991–2000 more than 90% of the people killed by natural hazards lost their lives as a consequence of extreme hydrological events. And, according to the IPCC, the expected climatic change will further intensify the hydrological cycle. The impacts of floods, droughts, tropical cyclones and extreme events are well known. The social, environmental and economic costs associated with them are overwhelming. This is particularly true for developing countries, where the capacity to cope is weakest, and the risks are highest. The floods of 2000 in Mozambique, for example, lowered the GDP by 23%.

The global analysis presented above hides the enormous differences that exist among regions and nations both in terms of water resources and water infrastructure per capita. Water storage infrastructure per capita in Ethiopia is less than 1% of that of North America and Australia.¹ Hydropower development in Africa is less than 5% of its potential, versus more than 70% in OECD countries. Development of water resources remains a major development opportunity in Africa.

¹A water-storage capacity of over 5,000 cubic meters of water per capita in North America and Australia.

The seven challenges of The Hague Ministerial Declaration, March 2000:

1. **Meeting Basic Needs** to recognize that access to safe and sufficient water and sanitation are basic human needs and are essential to health and well-being, and to empower people, especially women, through a participatory approach of water management.
2. **Securing the Food Supply** to enhance food security, particularly of the poor and vulnerable, through the more efficient mobilization and use, and the more equitable allocation of water for food production.
3. **Protecting Ecosystems** to ensure the integrity of ecosystems through sustainable water-resources management.
4. **Sharing Water Resources** to promote peaceful cooperation and develop synergies between different uses of water at all levels, whenever possible, within and, in the case of boundary and trans-boundary water resources, between states concerned, through sustainable river-basin management or other appropriate approaches.
5. **Managing Risks** to provide security from floods, droughts, pollution and water-related hazards.
6. **Valuing Water** to manage water in a way that reflects its economic, social, environmental and cultural values for all its uses, and to move towards pricing water services to reflect the cost of their provision. This approach should take account of the need for equity and the basic needs of the poor and the vulnerable.
7. **Governing Water Wisely** to ensure good governance, so that the involvement of the public and the interests of all stakeholders are included in the management of water resources.

Some forecasts show that, by 2025, more than 3 billion people will face water scarcity. But this is not because the world lacks water. The world water crisis is a crisis of governance—not one of scarcity. At the global scale, there is enough water to provide “water security” for all, but only if we change the way we manage and develop it. As we focus on the smaller-scale level, looking at regions or watersheds, approaches to water scarcity will require clear policy choices. The scarcity of water is a very relative concept that can only be addressed seriously by taking a cross-sectoral perspective, looking at a basket of factors, including socioeconomic, technical and institutional aspects of water use. This is the emerging concept of integrated water resources management.



2. From the Hague to Johannesburg, via Bonn

Water was not at the top of the agenda in Rio. For the water sector, one of the preparatory conferences for Rio, held in Dublin in January 1992, probably had a greater impact than the Rio Conference itself. The so-called Dublin Principles² have become widely accepted but have been implemented only to a very limited extent. The challenge is bridging the gap between principles and practice.

The 2nd World Water Forum, held in The Hague in March 2000, put the world water crisis squarely on the international agenda. Over 5,000 water stakeholders, including more than 100 ministers and 600 journalists, came together to call the world’s attention to the many urgent water issues. The conference introduced and adopted the idea of “water security,” a goal to be achieved alongside food security and environmental security. A key message of the Forum was that “**Water is Everybody’s Business.**” Water for poverty alleviation means giving poor people access to, and control over, water. Access to water means sharing control. Sharing control implies a seat at the table. This is the underlying obligation of making water *everybody’s* business. Dealing with this issue is fundamentally about good governance. It is about creating a situation where there are institutions and instruments of political power that are open, fair and equal for all, regardless of class, race or gender.

²Dublin principles: (1) Freshwater is a finite and vulnerable resource, essential to sustain life, development and the environment; (2) water development and management should be participatory, involving users, planners and policy makers at all levels; (3) women are central to providing, managing and safeguarding water; and (4) water has an economic value in all its competing uses and should be recognized as an economic good.

The Bonn International Conference on Freshwater,
December 2001, produced “The Bonn Keys”

1. The first key is to meet the water-security needs of the poor.
2. Decentralization is key. The local level is where national policy meets community needs.
3. The key to better water outreach is new partnerships.
4. The key to long-term harmony with nature and neighbor is cooperative arrangements at the water-basin level, including across waters that touch many shores.
5. The essential key is stronger, better-performing governance arrangements.

The most important “water-decision” taken at the global level is possibly the International Development Target set by the UN Millennium Assembly in October 2000. The target is “... to halve, by 2015, the proportion of people living in extreme poverty and to halve the proportion of people who suffer from hunger and are unable to reach or to afford safe drinking water resources.” The recent International Freshwater Conference organized in Bonn by the Government of Germany in December 2001 was appropriately titled *Water, Key to Sustainable*

Development, as many believe that there can be no sustainable development without access to water for drinking *and* access to water for productive purposes—for all people.

More than 50% of people with food insecurity live in areas where food production is based on rain-fed agriculture. In these areas, improved soil and crop productivity—rather than water management—are the real development constraints. In these cases, increased soil and crop productivity through technical and management measures that are taken at the level of farms and “ecological regions” will result in the improved productivity of water.

Clearly, the discussions in Johannesburg should be based on the achievements set out above; these are therefore not repeated in the following sections, but assumed to be the starting point.

3. Positioning Water in Johannesburg

This section lays out key positions and principles concerning water, following the structure chosen by the SG’s Panel, i.e., (1) shared values; (2) public-/private-sector nexus; (3) global governance; and (4) science and technology.

3.1 Shared values

Many cultures and peoples have traditionally shared values of water as a source of life. Water also has a unique spiritual value in many religions. The growing specialization of branches of government, however, has divided the responsibility for various water-related tasks to a wide variety of agencies and institutions. This has led to diverging values for water among sectors and stakeholders, particularly at national levels. The sharp conflicts

over the largest investments in the water sector—large dams—are a case in point. Much more pervasive, however, is the separate planning and management of water for different uses. Water for municipal and industrial use appears to have a separate value from that for agriculture, while water for sustaining valuable ecosystems, or fisheries is often not valued at all. The move towards integrated water resources management can be interpreted as a call to redevelop shared water values.



Two major international exercises have attempted to develop a set of more widely shared values. The *World Water Vision*³ process involved over 15,000 people worldwide, who contributed to the development of “water visions”—at the global, regional and sectoral levels, on the development and use of water in 2025. Those visions were presented at the 2nd World Water Forum in March 2000. The process started by the *World Commission on Dams* attempted to bring together those who were for and against dams, into a rational dialogue. While these two innovative processes were not completely successful in bringing together all stakeholders around a set of shared values, they did increase the awareness of the central issues and the willingness of formerly entrenched interests to participate in open dialogues. In 2001, several dialogue exercises have started that aim to foster cross-sectoral dialogues on shared water values at national and river-basin levels, including the *Dialogue on Water Food and Environment*, the *Dialogue on Water and Climate* and the *Dialogue on Effective Water Governance*.

Recommended Targets:

1. Halve the proportion of people who are unable to reach or to afford safe drinking water resources by 2015.
2. Halve the proportion of people who are unable to reach or to afford sanitation by 2015.
3. Increase water productivity in agriculture (rain-fed and irrigated) to enable food security for all people without increasing water diverted for irrigated agriculture over that used in 2000.

Recommended Action:

Mandate the World Water Assessment Programme of the United Nations to establish a baseline and monitor progress towards these targets and report to the Ministerial Conferences associated with the World Water Forum series or the UN’s Commission on Sustainable Development.

A position that is strongly held by many, particularly in the NGO community, is that access to water is a human right and should be enshrined as a value and shared globally by all governments. Many in government circles argue that current declarations on human rights include basic water needs sufficiently and additional declarations are unnecessary and too complicated politically. Most calls for basic water rights focus only on water for domestic use, and speak only of amounts of the order of 30–50 liters per person per day. The

³Cosgrove and Rijsberman. 2000. *World Water Vision: Making Water Everybody’s Business*. Earthscan Publications, London.

Dialogue on Water, Food and Environment

Ten key stakeholders in the water, agriculture and environment areas have joined hands to form a strategic alliance—known as the Dialogue on Water, Food and Environment—to help bridge the chasm between agriculture and environmental communities over the way water should be managed and developed. These organizations range from UN agencies (FAO, UNEP, WHO) to associations of farmers (IFAP), irrigation engineers (ICID), environmental organizations (IUCN, WWF), water umbrella organizations (GWP, WWC) and water research (IWMI, representing the CGIAR). The Dialogue is organized around three main (groups of) activities:

1. Cross-sectoral dialogues at national and basin levels, aimed at developing shared values related to water for food and environmental security.
2. A “knowledge-base” of credible and authoritative information—acceptable to both agricultural and environmental communities.
3. Local-action activities that aim to provide an information exchange and best-practice identification platform, linking thousands of local, NGO and bilateral projects and activities into the formal knowledge base(s).

The goal of the Dialogue is provide a multi-stakeholder learning framework that will generate a body of knowledge to help answer the question, at river basin level, how to manage and develop water resources to achieve food security as well as environmental security (www.iwmi.org/dialogue).

debate on basic needs often focuses on domestic water use only. But for many poor people, access to water for productive purposes is a crucial basic need as well. This is because water is a key factor of production in agriculture and for most other forms of economic activity that are vital to the livelihoods and opportunities of the poor.

In situations of rapidly increasing demands on water resources and current use levels that are approaching the carrying capacity of the amount of water available, it is important to have institutional mechanisms to (re)allocate water to specific, higher-value uses and more equitable use by all stakeholders. To allocate or reallocate water effectively, efficiently and equitably, the value of water in alternative uses—also referred to as opportunity cost by economists—must be known and this information shared among all stakeholders. One striking example of lack of knowledge is the value of water necessary to sustain

ecosystem services, which in most cases is inadequate. This is an area that urgently requires investments in terms of data collection and research—and in stakeholder processes that foster a consensus on these values—and makes available information in this valuation to the water stakeholders. Whether water is allocated through government institutions or the market, allocation decisions will be improved when the actors have access to information on the value of that water for alternative uses. Strong differences over the value of water for alternative uses among stakeholder groups are a primary source of water conflicts.

3.2 Public-/private-sector nexus

In this past decade, international and national organizations have emphasized private sector provision of municipal water services as a potential solution to the major problems

Recommended Target:

4. Have at least 20% of all water infrastructure investments funded by alternative forms of financing by 2015.

Recommended Action:

Build capacity in local governments to assess alternative forms of financing for infrastructure, including capacity to identify, develop and negotiate sound projects that are financially feasible and environmentally sustainable as alternative solutions to large-scale investments.

in the sector. This recommendation is based on an overall analysis of the disappointing performance of many governments in this particular area, characterized by low coverage rates, high loss rates, low levels of cost recovery and the poor quality of water provided. Consequently, governments in many developing countries have signed long-term contracts for the private provision of these services in major metropolitan areas, often the capital cities. Given the massive scale of the investments and services required, most contracts have been awarded to major consortia with European multinational companies

as partners. Even though 95% of municipal water services are still provided by the public sector, in many countries the possible privatization of municipal water services has led to sharp debates among stakeholders.

Privatization of water-**service provision** does not imply privatization of water **resources**, even though those against private-sector service provision often imply this. Water is a public good, which should be treated as an economic good where it is used for economic purposes. On the other hand, fair access to affordable water for all does not imply that it has to be free. The cost of providing water services should be recovered from all who can afford it, which, again, does not exclude preferential treatment for the poor.

Large private companies can add value by bringing specialized management experience and large-scale financing to situations where these are lacking. Conversely, other models—from public companies to public service provision—can be just as efficient and effective as private-sector service provision. Irrespective of the approach chosen, governments maintain a major responsibility for providing an effective and efficient regulatory framework within which the service providers operate. Also, quite separately from water service provision, it is the government's responsibility to provide a framework of water use rights—respecting the customary rights of traditional water users and indigenous peoples.

The public-private sector debate within the water sector generally focuses on the role of multinational companies and ignores the role and significance of the small-scale private sector in developing countries. In at least two water-related areas, the debate overlooks the crucial role that the domestic private sector can play.



First, where piped municipal water supply is unavailable or of inadequate quality, the provision of bottled drinking water is a very significant economic activity that has seen astronomic growth rates in countries ranging from Mexico to India to Thailand. In fact, the success of this domestic private sector has, in recent years, motivated multinational companies to develop near-global brands of drinking water that compete with local brands. For consumers in developed countries “bottled water” refers to high-priced mineral water. For consumers in developing countries bottled water often refers to reliable, filtered water in 20-litre reusable containers, used for drinking, cooking or other uses that really require drinking water quality. Provision of affordable drinking-quality water in bottles or containers also relieves the piped-water system of the need to produce water of drinking quality that is largely used for lower-grade purposes such as toilet flushing. Innovative public-private partnerships that devise alternative ways of providing water supply and sanitation services at various scales deserve more attention.

Second, in agriculture, private farmers have been largely responsible for the major investments in groundwater development in recent decades. This groundwater use has contributed significantly to food production and the creation of wealth in rural areas. But governments have largely failed to elaborate rules and mechanisms that ensure that groundwater is used in a way that minimizes the risks of overuse and protects groundwater quality.

3.3 Global governance

The most important area of global governance with a substantial potential impact on the water sector is the system of international trade. Globally, agriculture uses as much as 70% of all renewable water resources that are diverted for human use. The proportion is as high as 80–90% in developing countries. Worldwide trade in agricultural products—also referred to as trade in virtual water—has the potential to counteract water scarcity locally. It is evident that the food self-sufficiency targets maintained by many countries are closely linked with the demand for water for agricultural use. A fair and reliable system of international trade in agricultural products that would enable countries to relax national food self-sufficiency targets would have a major impact on the demand for water. In addition, the US\$1 billion a day agriculture subsidies in OECD countries have a major impact on the export of agricultural products from developing countries—and thereby on their demand for water. Changes in the agricultural trade regimes

Dialogue on Effective Water Governance

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. The Dialogue brings stakeholders together to examine political processes and governance systems and provides a platform for communication, negotiation, social learning and collective decision-making. It helps to build trust between concerned actors from the government, the market and civil society and work towards overcoming barriers to change.

Dialogue activities include political roundtables, assessment of governance systems, lesson learning and identification of good practices. It will help to demonstrate how IWRM is a practical and essential process for sustainable water management, and strengthen the IWRM ToolBox that has been developed by the Global Water Partnership (GWP). The ToolBox presents a set of 50 tools and case studies for improved water management. The Dialogue is a joint initiative of the GWP, UNDP and ICLEI together with many other organizations from all over the world.

Recommended Target:

5. Assess virtual water imports and exports through agricultural products for each country, or in other words, analyze the impact of changes in the subsidies in agriculture and the international system of trade in food and fiber, on national and local water demands, by 2015.

Recommended Action:

In the international trade negotiations on agricultural subsidies and trade in agricultural products, the WTO should consider the impact on water use in countries importing and exporting food.

development of water resources in international basins. These agreements have successfully allowed countries to share water benefits, even in situations where bilateral relations have been less than optimal. There is likely to be intense competition and conflict for water among uses and users within countries at the local level. But in the international arena, water has shown to be a good catalyst for cooperation between nations. Investments by the international community to facilitate and support efforts by riparian countries to deal with international water sharing and management through basin-wide initiatives—such as the Nile Basin Initiative—are highly cost-effective and should be expanded.

At the 2nd World Water Forum it was recognized that the water crisis is mainly a crisis of governance. Integrated water resources management (IWRM) has gradually become an accepted framework for “effective water governance.” One important aspect of IWRM is river basin and aquifer management. It has become recognized that the basin has become the appropriate scale to assess and manage water resources. These developments point in the right direction. However,

and subsidies in both the developed and the developing world are therefore going to have a very important impact on the demand for water.

The effort to develop a much-needed institutional framework for international water governance has not only met with resistance but been relatively unsuccessful. The *UN Convention on the non-Navigational Use of International Waters* took several decades to draft and then attracted insufficient ratifications to enter into force. There are, on the other hand, a large number of bilateral and international agreements concerning the use and

The Nile Basin Initiative

The Nile is the world's longest river. It flows 6,600 kilometers, and drains an area of about 3.1 million square kilometres, one-tenth of the African continent. The extraordinary physical and ecological features of the Nile river have supported dramatic evolution and expansion of human activity. The overwhelming majority of people in the basin live in rural areas and depend directly on land and water resources for shelter, income and energy. Despite the extraordinary natural endowments and rich cultural history, its people face considerable challenges. Six of the ten Nile countries are among the world's poorest. The Nile holds great potential to foster regional cooperation. However, the control and use of Nile waters have long been a source of contention and potential conflict among and between riparian countries.

In 1999, the riparians took a historic step by launching the Nile Basin Initiative (NBI). The initiative is a transitional mechanism that includes all the Nile countries in a regional partnership to promote economic development and fight poverty. The NBI is guided by a “shared vision” that is based on consensus among riparians and reinforced by international agreement that the Nile's environmental and development issues are of global concern. To translate the vision into action, a Strategic Action Plan has been initiated. Cooperative management of the Nile river is one of the greatest challenges of the global international waters agenda. The Nile Basin Initiative represents a significant step towards overcoming those challenges.

Source: NBI Transboundary Environmental Analysis.

Water and the Middle East Peace Process

The Jordanians, the Palestinians and the Israelis share most of their water resources, surface water as well as groundwater. Cooperation between these Core Parties on the management of water resources became a vital component of the Middle East Peace Process since its beginning in October 1991. As part of this process, a multilateral working group on water resources was initiated in 1995 with the formation of the Executive Action Team (EXACT), a regional oversight group consisting of two members from each of the participating regional parties and representatives from active donor countries. Financial assistance comes from Australia, Canada, the European Union, France, the Netherlands and the United States. EXACT meets twice a year to oversee implementation of joint activities. Up to now 14 of such meetings have been held at various venues throughout the region or in Europe. EXACT has been very successful in establishing and maintaining effective communication channels among colleagues from the Core Party participating agencies, responsible for water management. These meetings have been held in a positive atmosphere and were concluded successfully, even during difficult periods when other communication channels have ceased to function. Technical activities under EXACT include training and research events that brought Core Party scientists and water managers together to collect and exchange technical water information.

Website: www.wwg-exact.org

implementing IWRM is not easy and requires political will. The Dialogue on Effective Water Governance is one initiative that aims to raise awareness and facilitate practical actions for water governance.

Speaking of sustainable development, it is clear that better water management should be a means to reduce poverty. It is therefore very important that the poverty-reduction strategy papers (PRSPs) that many countries are in the process of preparing address the issues of how water resources development and management can help people break out of poverty. The DAC Poverty Guidelines identify five dimensions of poverty: economic, human, political, sociocultural and protective capabilities. Strategies to address water-poverty relationships need to improve the different capabilities of the poor in their battle against poverty. These strategies will also have to address the pervasive gender issues in water. Those affected by water problems are too often women, while those deciding on

solutions tend to be men. Building gender-equitable capabilities of the poor to manage their water resources should also be at the heart of capacity building in the water sector.

3.4 Science and technology

It is often assumed that increasing the efficiency in irrigated agriculture will result in large water savings. But the results of research done at the river-basin scale show that these conclusions based on irrigation efficiency measured in the farmers' fields are often quite misleading. Basing scale savings can often not be extrapolated from savings at the farm level—one person's water "loss" is another person's recharge. The attention should be focused, instead, on the productivity of water in different uses. The UN Secretary General, for instance, concluded: *We need a Blue Revolution in agriculture that focuses on increasing productivity per unit of water—"more crop per drop" (Report to the Millennium Conference, October, 2000).*



Indeed, at the farm level, the focus on water productivity in physical terms, crop output per unit of water, is a necessary and useful framework. Likewise, appropriate soil fertility and plant-nutrition management is in many places the best way to achieve more crop per unit of water. At the level of watersheds, basins, or country water use, water productivity needs to be understood from a multi-stakeholder perspective, in the broadest possible sense. That is, water productivity at the basin level must be defined to include crop, livestock and fishery yields, wider ecosystem services and social impacts such as health, together with the systems of resource governance that ensure equitable distribution of these benefits.

A focus on the productivity and value of water in all its uses should also help change the thinking, still widely held in agricultural circles, that we should not “waste any water by letting it flow to the sea.” It is only rarely that freshwater flowing to the sea is “lost” or “wasted.” The coastal zone is one of the most productive ecosystems on earth, and depends vitally on the inflow of freshwater in estuaries, deltas, lagoons, mangrove forests, etc. Maintaining fresh-salt water gradients is a key ecosystem service that produces high biodiversity as well as highly productive fisheries.

Scientists and engineers have made significant progress in many areas related to assessing water resources, water flows and water quality. Particularly, advances in remote sensing, remote data collection and geographic information systems provide powerful tools to complement hydrological and hydrographic data-collection systems. Unfortunately, the national systems for collecting water data are declining in many developing countries due to a lack of financial resources to maintain or expand them. This trend needs to be reversed. It is also of major concern that the knowledge of water quality remains fragmented

Dialogue on Water and Climate

WMO, UNESCO, IUCN, UNDP, FAO, WWC, IPCC and WB have initiated the multi-stakeholder Dialogue on Water and Climate. This is a platform designed to bridge the information gaps between the water managers and the climate community to improve the capacity of water managers to cope with the impacts of increasing climate variability and change. The Dialogue is organized to share information on coping strategies and actions between science and water managers and to raise awareness among policy makers and users, including the public. The activities under the Dialogue include:

1. Initiating policy-oriented dialogues at national, regional and basin levels to improve coping capacities and develop physical and structural approaches complemented by acceptable socially defined concepts and feasible economic perspectives.
2. Facilitating and stimulating the sharing of information and supporting the strengthening of capacity to cope through the development of tools including a training package, a methodology for hot spot analysis.
3. Raising awareness that increasing variations in climate and the expected climate change—in addition to land use changes and increasing water withdrawals—will further aggravate the scarcity of water and most likely result in more frequent and more serious floods and droughts.

Ecological Sanitation

Ecological sanitation refers to “dry toilets”—approaches to managing human waste without using water. It must be mentioned as a new and very important approach to safe sanitation. It is an approach that saves water, protects water (aquifers, rivers, pipelines, etc.) prevents pollution and returns valuable nutrients and humus to the soils on which our food security depends. Ecological sanitation will become a crucial component in ensuring urban settlements that are able to have adequate supplies of safe domestic water, and are not overwhelmed and bankrupted by sewage and sewerage systems; and ensure that good supplies of safe organic fertilizer and humus for food production from urban and peri-urban agriculture.

Paul Calvert, ecological sanitation promotor in a reaction to an earlier version of this document.

and practical knowledge of water-related ecosystem services minimal. Efforts to determine and establish the environmental flows required to maintain ecosystem services should be encouraged and reinforced.

There are other areas where daily practice is ahead of scientific progress and interest. While scientists and engineers still debate the wisdom of reusing municipal and industrial wastewater and sludge for agricultural purposes, farmers in the peri-urban areas of Africa and Asia have widely adopted this practice out of sheer necessity. Research on the impact on human

health, wealth and nutrition (as well as soil-fertility) of using wastewater for agricultural production is needed to generate practical advice for farmers and information for consumers, to limit risks and maximize benefits. Certainly, the recycling of wastewater is a high priority area, with important implications for water scarcity, public health and nutrient flows. Even better than recycling wastewater would be the large-scale introduction—technically feasible but socioculturally difficult—of ecological sanitation.

Some scientists and a few practitioners have long questioned the wisdom of providing water of drinking quality at great expense, only to have a large share flushed down toilets, to carry waste, where it is cleaned again for the few that can afford this costly practice. Opinions differ: some water experts advocate ecological sanitation, others dry toilets, some people argue that only bottled water should be of drinking quality and piped water quality should be limited to fit all other uses made of it. All these alternative approaches deserve more attention.

Of potentially major importance to the water sector are the advances in molecular biology, i.e., functional genomics and modern biotechnology. Some of the new techniques simply increase the efficiency of “traditional” plant breeding, while others would lead to genetically modified plants. Plant breeders have already had a major impact on the world’s water demand through the development of the modern high-yielding crop varieties. On the one hand, they require irrigation but, on the other, they drastically increase the

Recommended Target:

6. Develop, by 2010, an agreed strategy for the use of molecular biology to increase drought tolerance and water productivity of crops to achieve water, food and environmental security.

Recommended Action:

Have the CGIAR assess the potential for increased drought tolerance and increased water productivity in agriculture, including the potential of the use of functional genomics and other tools of modern molecular biology.

water productivity of the plant. Recent advances in corn (maize) crop yields, for example, have come in the form of increased drought tolerance of new varieties. Rice breeders are working on improved “dry” (or aerobic) rice. These developments may have a major impact on the water demand of agriculture. Similar advances in breeding for pest control will, indirectly, have the same broad impact on the demand for water in agriculture. Developing countries should be free to make their own

choices on the social acceptability of technologies that involve genetic engineering (while noting, again, that the use of functional genomics per se does not imply the production or use of genetically modified organisms), based on their own internal ethical evaluation. However, the technologies should be developed and (affordably) available to provide these countries with that choice. This is not a plea for high-tech agribusiness in isolation from the environment. If we have learned anything from the Green Revolution, it is that the next wave of successful modernization in agriculture will be through eco-technology, where farming works with, not against, the environment.

Finally, variability is a core characteristic of water. As a consequence of climate change, rainfall variability is likely to increase, particularly in places where people already have a low ability to deal with current weather variability. Enhancing the *protective capabilities* of the poor to cope with the impacts of floods, droughts, storms and other water-related disasters is crucial for improving the livelihoods of poor people in many parts of the world. This is an area that requires considerable added investments in research and capacity building.

4. Conclusion

Overcoming the world water crisis—achieving water, food and environmental security simultaneously—is one of the most formidable challenges to achieve sustainable development. An increasing number of people, organizations and governments are aware of this challenge. The World Summit on Sustainable Development should reconfirm the priority of this issue and adopt targets and actions that will jointly address this challenge.

Breeding for drought tolerance

A recent review of the status of breeding for tolerance of abiotic stresses by John Bennet (International Rice Research Institute), concluded that the advances in genomics, and the development of advanced analytical tools at the molecular level, provide a basis for understanding the mechanisms of stress tolerance. Investments in the new tools for gene discovery will produce breakthroughs in understanding abiotic stress tolerance. Drought is the most important but also the most intractable of abiotic stresses but irrigated and rain-fed crop plants can be developed that are high yielding even when grown under recurrent mild water deficits.



Water-resources development and management in Africa

The water crisis is especially acute in sub-Saharan Africa, where only about 60 percent of the 680 million people have access to safe water supplies. As Chief Precious Nyelale, Minister of State for Water of Nigeria recalled at the Accra conference⁴:



Accra Water Conference (15–17 April 2002)

of State for Water of Nigeria recalled at the Accra conference⁴: “*More Africans lack access to safe water now than in 1992, the year of UNED.*” The infrastructure to collect data on water resources, a prerequisite for all effective interventions, is in serious decline across Africa. People in the 40 poorest countries, more than half of which are in Africa, must try and meet all their water and sanitation needs on an average of 30 liters or less per day, far less than the 50 liters per day that the

United Nations says constitutes the absolute minimum for water needs. Incredibly, people in nine African countries⁵ must try and live on an average of less than 10 liters per day, a truly desperate situation. Poverty and shortages of water are inextricably linked for people in Ethiopia, Eritrea, Djibouti, Gambia, Somalia, Mali, Mozambique, Tanzania and Uganda.

People who live on less than 10 liters of water per day can never escape poverty and achieve sustainable development without first addressing the water scarcity they face.

“Water is key to sustainable development, crucial to economic, human and social development,” said HE Salim A. Salim, Africa’s Water Ambassador. We have seen that no single type of intervention has greater overall impact upon economic development and public health than the provision of safe drinking water and proper sanitation. In the area of health



His Excellency Salim A. Salim, Water Ambassador for Africa (left) at the Regional Stakeholders’ Conference for Priority Setting, Accra, Ghana 15–17 April 2002

⁴Water and Sustainable Development in Africa: Regional Stakeholders’ Conference for Priority Setting, Accra, Ghana, 15–17 April 2002.

⁵Outside Africa there are 4 nations living at less than 10 liters per capita per day: Albania, Bhutan, Cambodia and Haiti.

New Partnership for Africa's Development (NEPAD)

NEPAD is a vision and a program of action for the redevelopment of the African continent. It is also a vision of partnership between Africa and the rest of the world. Conceived and developed by African leaders under the auspices of the Organization for African Unity (OAU), it was endorsed by leaders of the G8 countries on 20 July 2001.

NEPAD provides a platform for a comprehensive integrated development plan designed to address key social, economic and political issues in a coherent and balanced manner. It is also a commitment by African leaders to African people and to the international community that they have resolved to place Africa on a path of sustainable growth and accelerated integration into the global economy. It is a call for support of African development on the basis of Africa's own agenda and program of action.

The eight priority areas in NEPAD include a number of places in which water features strongly.

- | | |
|---|---|
| 1. Infrastructure | 3. Health |
| a. Information and communication | 4. Agriculture |
| b. Energy | 5. Environmental initiative |
| c. Transport, and | 6. Culture |
| d. Water and sanitation | 7. Science and technology initiative |
| 2. Human-resources development initiative | 8. Access to the markets of developed countries for African exports |

alone, improved water and sanitation can reduce morbidity and mortality rates caused by some of the most serious water-related diseases by up to 80%. For Africa's rural poor the escape from poverty will have to come through more productive agriculture —and that will depend in large part on the ability of Africa's farmers to use water more productively. Given the relatively low levels of current development of Africa's water resources it is inescapable that water-resources development and management will be key to Africa's sustainable development.

Africa's Heads of State have responded to the development challenge by unveiling the New Partnership for Africa's Development (NEPAD) which seeks to lay the foundation for sustainable development. As Mike Muller, Director General Water of South Africa, speaking at the Accra

conference of African water stakeholders put it: “*We must ensure that NEPAD succeeds, because through it, we will succeed. We must invest in water, not for its own sake, but as a means to achieve sustainable development.*”

Recommended Target:

7. Have plans for resource allocation and investments, similar to those adopted for the Nile basin, agreed by the riparian countries for all of Africa's international basins by 2015.

Recommended Action:

Establish an African Water Facility to seed the investments in water-resources development and management to increase capacity to assess and manage water, and prepare an investment strategy for water-resources development in Africa, within the framework of NEPAD.

