UN WATER

Report

# Status Report on Integrated Water Resources Management and Water Efficiency Plans

Prepared for the 16th session of the Commission on Sustainable Development - May 2008

**UN Water** is made up of the UN agencies, programmes and funds that have a significant role in tackling global water concerns. It also includes major non-UN partners who cooperate with them in advancing progress towards the water-related goals of the Decade Water for Life and Millennium Declaration. It is the official United Nations mechanism for follow-up of the water-related decisions reached at the 2002 World Summit on Sustainable Development and the Millennium Development Goals and supports Member States in their efforts to achieve water and sanitation goals and targets. Its work encompasses all aspects of freshwater, including surface and groundwater resources and the interface between fresh and sea water.

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# Abbreviations and Acronyms

| | |
|---|---|
| AfDB | African Development Bank |
| CSD | Commission on Sustainable Development |
| DFID | Department for International Development (UK) |
| EU | European Union |
| GWP | Global Water Partnership |
| IWRM | Integrated Water Resources Management |
| JPoI | Johannesburg Plan of Implementation |
| MDG | Millennium Development Goals |
| NGO | Non-governmental Organization |
| OECD | Organisation for Economic Co-operation and Development |
| PRSP | Poverty Reduction Strategy Paper |
| UN | United Nations |
| UN-DESA | United Nations Department for Economic and Social Affairs |
| UCC | United Nations Environment Programme Collaborative Center (Copenhagen) |
| UNESCO | United Nations Educational Scientific and Cultural Programme |
| UNDP | United Nations Development Programme |
| UNEP | United Nations Environment Programme |
| WHO | World Health Organization |
| WSSD | World Summit on Sustainable Development |
| WWAP | World Water Assessment Programme |
| WWDR | World Water Development Report |

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# 1.0 Executive Summary

Managers, whether in the government or private sectors, have to make difficult decisions on water allocation. More and more they have to apportion diminishing supplies between ever-increasing demands. Drivers such as demographic and climatic changes further increase the stress on water resources. The traditional fragmented approach is no longer viable and a more holistic approach to water management is essential.

This is the rationale for the Integrated Water Resources Management (IWRM) approach that has now been accepted internationally as the way forward for efficient, equitable and sustainable development and management of the world's limited water resources and for coping with conflicting demands.

Countries and regions have very different physical characteristics and are at very different stages in economic and social development: hence there is a need for approaches to be tailored to the individual circumstance of country and local region.

This Report, compiled by UN-Water, aims to illustrate progress made on meeting the target to *"Develop integrated water resources management and water efficiency plans by 2005, with support to developing countries, through actions at all levels"* agreed at the World Summit on Sustainable Development (WSSD) in Johannesburg in 2002, through the Johannesburg Plan of Implementation (JPoI).

The Report is based on a survey covering 104 countries of which 77 are developing or countries in transition and 27 are developed (OECD and EU member states) The survey brings together the results of questionnaires by UN-DESA, and UNEP[1] in 2007. Several other members of UN-Water and partner agencies have supported and contributed to the Report including UNDP, UN Statistics, WHO, WWAP and GWP. The survey recognises that countries use different terminology for their water resources management plans. It provides the most objective and comprehensive overview of the current status of water resources management. The Report also includes information gathered by the more informal surveys conducted earlier by the Global Water Partnership and the African Development Bank.

[1] Through the UNEP Collaborating Centre in DHI, Copenhagen

**Key conclusions**:

**Developed countries**: They have advanced on almost all major issues, however, there is still much room for further improvement.

- Of the 27 countries responding to the UN-Water Survey only 6 claim to have fully implemented national IWRM plans; a further 10 of those countries claim to have plans in place and partially implemented.
- The Report indicates that developed countries need to improve on public awareness campaigns and on gender mainstreaming.

**Developing countries**: There has been some recent improvement in the IWRM planning process at national level but much more needs to be done to implement the plans.

- Of the 53 countries for which comparison was made between the GWP and the UN-Water surveys (conducted approximately 18 months apart), the percentage of countries having plans completed or under implementation has risen from 21% to 38%. On this measure the Americas have improved most - from 7% to 43%; the comparable changes for Africa were from 25% to 38% and for Asia from 27% to 33%. However, some of the change may be due to differences in the questionnaires.
- Africa usually lags behind Asia and the Americas on most issues, however it is more advanced on stakeholder participation and on subsidies and micro-credit programs;
- Asia is more advanced on institutional reform and yet lags behind in institutional coordination.

**Case studies**: There are many illustrations of the tangible benefits of implementing plans that have adopted the IWRM approach. There are examples at the national and international levels; of particular significance are the examples at the community and provincial levels for it is at these levels that so many societal gains can be made.

**Water efficiency**: It is clear that many countries consider that plans that follow an IWRM approach automatically also include water efficiency measures. There was considerable ambiguity in the responses concerning water efficiency in large measure reflecting diverse situations. It is recognised that taking actions that make water use more efficient is beneficial for economic and social development

and, although many countries indicated through the questionnaires that water efficiency measures were not relevant to their particular circumstances, it should not be implied that such measures should not be considered necessary. It can be concluded from this survey that much more effort needs to be made to incorporate explicitly water efficiency measures within the framework of IWRM.

**Development of indicators**: A great deal of effort has gone into the development of a set of indictors that meet the requirements of being specific, measurable, attainable, relevant, realistic and timely but more work is required. The Roadmapping initiative, being developed concurrently with this Report and complementary to it, is intended to help countries focus on the steps to be taken towards better water management, drawing inspiration from the IWRM principles and the plans and strategies that they have prepared to help catalyze change. At regional and global levels, the roadmaps could serve as benchmark for monitoring progress in improving water resources management. Indicators and monitoring could provide countries with a better assessment of the needs to advance in their implementation of IWRM.

**Recommendations:**

The survey indicates that more emphasis is needed in the following areas:

- Countries, particularly those that are lagging behind, need to prioritise the development of IWRM and water efficiency measures, with the help of supporting agencies;
- Countries need to prioritise the implementation of policies and plans once they have been developed;
- Countries should establish roadmaps and financing strategies for the implementation of their plans with External Support Agencies (including the UN, donors and NGOs) providing support to countries, based on demand;
- Experiences in implementing IWRM should be evaluated, monitored and shared through global coordination mechanisms. This will require more work on indicators and follow-up processes that do not add an undue reporting burden on countries.
- The UN World Water Assessment Programme and its associated World Water Development Reports should continue to provide an up-to-date global overview of progress on implementing the IWRM approach.

# 2.0 The overall setting

**Water is a key driver of economic and social development while it also has a basic function in maintaining the integrity of the natural environment. However water is only one of a number of vital natural resources and it is imperative that water issues are not considered in isolation.**

## 2.1 WATER AVAILABILITY IN SUFFICIENT QUANTITY AND QUALITY

There are great differences in water availability from region to region - from the extremes of deserts to tropical forests. In addition there is variability of supply through time as a result both of seasonal variation and inter-annual variation. All too often the magnitude of variability and the timing and duration of periods of high and low supply are not predictable; this equates to unreliability of the resource which poses great challenges to water managers in particular and to societies as a whole. Most developed countries have, in large measure, artificially overcome natural variability by supply-side infrastructure to assure reliable supply and reduce risks, albeit at high cost and often with negative impacts on the environment and sometimes on human health and livelihoods. Many less developed countries, and some developed countries, are now finding that supply-side solutions alone are not adequate to address the ever increasing demands from demographic, economic and climatic pressures; waste-water treatment, water recycling and demand management measures are being introduced to counter the challenges of inadequate supply. In addition to problems of water quantity there are also problems of water quality. Pollution of water sources is posing major problems for water users as well as for maintaining natural ecosystems.

In many regions the availability of water in both quantity and quality is being severely affected by climate variability and climate change, with more or less precipitation in different regions and more extreme weather events. In many regions, too, demand is increasing as a result of population growth and other demographic changes (in particular urbanization) and agricultural and industrial expansion following changes in consumption and production patterns. As a result some regions are now in a perpetual state of demand outstripping supply and in many more regions that is the case at critical times of the year or in years of low water availability.

## 2.2 THE MANY USES FOR WATER

**Water for basic human needs and reducing absolute poverty** is directly related to the availability and quality of food and to the prevalence of disease. Clearly water is of fundamental importance for food production, for drinking, for sanitation and for hygiene. Adequate water in both quantity and quality underpins health and basic quality of life.

**Water for social and economic development** is clearly linked to the IWRM focus on the three 'E's - namely: equity, economics and environment. Water for social development includes the provision of education and health care. Without clean water supplies and good sanitation facilities in schools and hospitals social development is stymied. And for education - in schools without sanitation facilities - it is girls who suffer most and are therefore disadvantaged, introducing an important gender element into the equation. Water is of fundamental importance for economic development through energy and industrial production. It is needed for many forms of energy production - hydro power and the water for cooling of thermal and nuclear power stations. And energy in turn is needed for pumping, including extraction of water from underground aquifers. Water is needed for many industries and those industries in turn have effect, through pollution and abstraction, on water quality that affects both downstream users and natural ecosystems. A major water use is non-food agriculture, in particular recent shifts towards growing biofuels. This has significant implications for water resources management.

**Water and natural ecosystems** - Natural ecosystems are of fundamental importance to human well-being and development. Our concern must not remain focused on human development considerations only but it must place the human being, as an individual, as a member of a community and as part of society as a whole in an environmental context, to achieve well-being and harmony with nature. The loss of biodiversity and the degradation of ecosystems mean a loss of ecosystem products and services and undermine the habitat Planet Earth provides for humans. We destroy or degrade these natural systems at our peril, and so social and economic development and basic human betterment must go hand in hand with preservation of the natural environment.

**Water security** - floods, droughts, pollution spills into our water systems is of growing importance. Not only, in

many regions, is there an increase in the frequency and intensity of floods, droughts and, with increasing industrialization, pollution spills, but, with increases in population, more people are living in zones prone to disasters. Also, with increased demand for scarcer resources there is an increased risk of conflict over water: it is already part of the equation in many conflicts such as Darfur and the Middle East. Water security is also intrinsically linked to food security.

## 2.3 DIVERSITY

While the world comprises many very different climatic and hydrological regions, which will be diversely impacted by climate change, there are many other aspects of diversity which affect the ways in which water is managed.

### 2.3.1 The importance of basin management within the context of diversity:

There is agreement among many that water should be managed within natural hydrological units - the river basin, lake basin or aquifer. However, geographic situations are diverse and natural units seldom coincide with administrative units. Some countries, such as Sri Lanka, are single national units in the sense that there are no international land borders with other countries. Indonesia is composed of many separate islands each of which has many river systems; administrative units may span both a number of islands and a large number of river basins. These examples contrast with such international river basins such as the Nile with the challenges associated with sharing the waters between upstream and downstream neighbours. A similar situation can also be seen within many large countries where rivers run through many states (Australia, China, India and USA). In other circumstances, such as those of the Rio Grande separating Mexico from the USA, the major river itself forms the boundary between nation states posing challenges for management of the resource. Some major aquifers also span national boundaries but as they are hidden their management is often neglected.

### 2.3.2 Diversity in demographics

There are major contrasts in demographics between developed and developing countries. Many developing countries have very youthful populations virtually guaranteeing rapid population growth in the future; many developed countries by contrast have aging and diminishing populations. Simple growth or depletion in numbers is complicated by population movements. Urban populations are, in general, growing while rural populations are likely to grow at a much smaller pace or in some places diminish. There are also major migrations of population across international borders, some permanent, some seasonal and some, in the case of tourists, very short term; such population shifts intensify water management problems.

### 2.3.3 Diversity in governance

Societies are organised in different ways from politically centralised to highly dispersed; in some societies, such as federal jurisdictions, responsibilities for management of natural resources, including water, are primarily at provincial rather than at national level. Indeed, the availability of water was a major driver of the way governance structures developed. Currently, responsibilities for particular aspects of water management often are devolved to the community level even though they may have inadequate resources to undertake their responsibilities - this is often the case for drinking water supply, sanitation and hygiene.

Attitudes of societies towards stewardship of water resources reflect cultural and religious beliefs and they differ greatly from country to country and often also within countries where populations are of diverse ethnic and social backgrounds. These differences are also manifested in the effectiveness and efficiency of institutions and of legislation. Financial resources and instruments so necessary especially in critical circumstances are often lacking in poorer societies.

It is not only governments, whether national, provincial or at lower levels of the municipality or community, that have responsibility in water management. Very often the private sector plays vital roles in the provision of water services. In many countries public-private partnerships are being created to better manage supplies. Individual citizens, too have important roles to play, especially at the community level but all too often citizens do not have the means to express their demands and concerns.

All these aspects of governance are critically important and affect the ability of societies to address their water challenges.

## 2.4 FROM FRAGMENTED TO INTEGRATED MANAGEMENT

As a general rule, in the past with smaller populations, less intense economic activity and with less affluent societies demanding much less water, supply of the resource was usually much greater than demand for it. In such circumstances water for agriculture, for industry, for domestic and all other uses could be managed separately there being sufficient water to accommodate all needs and there being little competition between uses and between users. Moreover, water use by humans did not unduly impinge on the natural environment and ecosystems as it does today. Thus it was common (and still is common) that within governments at both national and sub-national levels separate ministries would be set in place for each use for which water was needed.

As populations have grown, as food production has increased, as economic activity has developed and as societies have become more affluent, so demand for water has burgeoned. Climate change adds yet more pressure on our limited water resources. In very many places demand has far outstripped supply - this may be particularly so in seasons when supply may be severely limited or in years of drought, or at times when demand is particularly high, for example when there is great demand for water for irrigation.

**Thus managers, whether in the government the private sector or local communities have to make difficult decisions on water allocation. They find themselves in countries and regions that have very different physical characteristics and are at very different stages in economic and social development: hence there is a need for approaches to be tailored to the individual circumstance of country and local region. More and more often managers have to apportion diminishing supplies between ever-increasing demands taking into account the weaker voices of the poor and of the natural environment. The traditional fragmented or purely sectoral approach is no longer viable and a more holistic approach is essential.**

**This is the rationale for the Integrated Water Resources Management (IWRM) approach that has now been accepted internationally as the way forward for efficient and sustainable development and management of the world's limited water resources and for coping with conflicting demands. The most widely accepted definition of IWRM is that given by the Global Water Partnership: "IWRM is defined as a process that promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems".**

# 3.0 The response of the United Nations system

## 3.1 THE NEED TO SET TARGETS AND TO MONITOR PROGRESS TOWARDS ACHIEVING THOSE TARGETS

There is a well recognized need to undertake comprehensive and objective assessments of the state of global freshwater resources, the uses to which the resources are put, the challenges associated with the resource and the ability of nations and societies to cope with the challenges that water managers must address. To this end, in the year 2000, the United Nations system created the World Water Assessment Programme (WWAP) with UNESCO leading the Programme by hosting its Secretariat. The WWAP has produced two World Water Development Reports (WWDRs) in 2003 and 2006. This process will continue to produce WWDRs every three years and thus provide a reporting mechanism to record the changes taking place in the resource itself and changing management challenges.

It is also well recognized that there is a need to set targets towards which the world must strive if the many water-related challenges are to be resolved. Thus, in 2000, heads of State adopted the Millennium Declaration on the basis of which the UN instituted the Millennium Development Goals (MDGs). It can be argued that, to a greater or lesser degree, all the MDGs are water-related; with Goal one related to growth and the others related to health or social issues. As a follow-up to the MDGs it was further agreed at the World Summit on Sustainable Development (WSSD) in Johannesburg in 2002, through the Johannesburg Plan of Implementation (JPoI), to "Develop integrated water resources management and water efficiency plans by 2005, with support to developing countries, through actions at all levels"; this target is elaborated in Annex 1.

There was further discussion on IWRM and water efficiency plans at the CSD 12 and CSD 13[2] meetings with a decision that at CSD 16 in 2008 there should be an assessment of progress made towards meeting the target.

Comprehensive and systematic monitoring of all aspects of water resources and their management in an integrated fashion is undertaken by UN-Water through the WWAP; the series of WWDRs provide a reporting mechanism for the UN system.

In association with the JPoI an IWRM Roadmapping Initiative has been started, facilitated by the Government of Denmark in collaboration with UN-Water, the Global Water Partnership and representatives of governments. This initiative recognises the need for countries to set out "Roadmaps" that lay out a series of actions to be undertaken to apply an integrated approach to water resources development and management and to help meet the MDGs. It recognizes that different countries will need a set of actions suited to their particular needs and that time schedules for implementation would differ from country to country depending on specific country circumstances. In other words solutions must be "tailor-made" or that "no one size fits all". The Roadmapping Initiative is being developed as a separate but complementary initiative to the current Report.

### Creation of the UN-Water Task Force on IWRM Monitoring and Reporting

In 2006 a Task Force on IWRM Monitoring and Reporting (TF) was created by UN-Water, with members drawn from UN-Water agencies and from partner organizations, with the mandate, *inter alia*, of producing the current **Status Report on IWRM and Water Efficiency Plans for CSD16** (The Report).

The Report has been undertaken by UN-Water. The analyses within the Report draw primarily on the questionnaires undertaken by UN-DESA and UNEP (through the UNEP Collaborating Center), during 2007 and supported by inputs from other members and partners of UN-Water, including UNDP, UN Statistics, WWAP and GWP. The questionnaires are included in Annexes 2, 3 and 4.

The Report also includes information gathered by the more informal surveys conducted by the Global Water Partnership[3] (GWP) and the African Development Bank (AfDB). See Annexes 5 and 6 for questionnaires.

For the purpose of the Report countries have been divided into two groups:

- Group 1 "developing" and "countries with economies in transition" (as defined by UN Statistics) and
- Group 2 "developed" (those belonging to either OECD or the European Union).

Regions and sub-regions are as defined by UN Statistics. Within the analyses more emphasis is placed on the countries with the greatest needs, i.e. those in Group 1.

[2] In addition to the IWRM target, a set of policy actions was adopted during the CSD13 meeting and UNDESA recently embarked on a study to assess the implementation of these actions. For details see: http://www.un.org/esa/sustdev/csd/csd13/csd13_decision_unedited.pdf.

[3] GWP, February 2006, Setting the Stage for Change.

## 3.2 SURVEY OF PROGRESS ON IWRM

TABLE 1:
**Countries responding to the UN-Water Survey (104 in total) and the surveys undertaken by GWP and the AfDB**

| Country<br>* Least Developed Countries<br>(2) Countries in transition | UN-Water Survey Response<br>Y relates to the DESA questionnaire<br>X relates to the UNEP questionnaire | GWP 2006 Survey<br>1=plan in place<br>2=plans in preparation<br>3=only initial steps taken | AfDB Survey |
|---|---|---|---|
| DEVELOPING COUNTRIES | | | |
| AFRICA | | | |
| East Africa | | | |
| Burundi* | | 3 | |
| Djibouti* | | 3 | |
| Eritrea* | Y | 2 | |
| Ethiopia* | | 2 | |
| Kenya | | 2 | X |
| Malawi* | Y | 2 | |
| Mauritius | X | 2 | |
| Mozambique* | X | 2 | |
| Rwanda* | | 3 | X |
| Seychelles | Y | | |
| Tanzania* | X | 2 | |
| Uganda* | Y | 1 | |
| Zambia* | X | 2 | |
| Zimbabwe | X | 1 | |
| Central Africa | | | |
| Angola* | X | 3 | |
| Cameroon | | 2 | X |
| Central African Rep* | | 3 | X |
| Chad* | | 3 | |
| Congo | | 3 | |
| DR Congo* | X | 3 | X |
| Northern Africa | | | |
| Algeria | X | 3 | |
| Egypt | Y | 2 | X |
| Libya | X | 3 | |
| Morocco | X | 2 | |
| Sudan* | | 2 | |
| Tunisia | Y | 2 | X |

| | | | | |
|---|---|---|---|---|
| **Southern Africa** | | | | |
| | Botswana | X | 2 | |
| | Lesotho* | Y | 3 | |
| | Namibia | Y | 1 | |
| | South Africa | X | 1 | |
| | Swaziland | X | 2 | |
| **Western Africa** | | | | |
| | Benin* | | 2 | X |
| | Burkina Faso* | Y | 1 | X |
| | Cape Verde* | Y | 3 | X |
| | Cote d'Ivoire | X | | X |
| | Ghana | Y | 2 | |
| | Guinea* | Y | | X |
| | Liberia* | Y | | X |
| | Mali* | | 2 | |
| | Mauritania* | X | 2 | X |
| | Niger* | | | X |
| | Nigeria | | 2 | |
| | Senegal* | | 2 | X |
| | Sierra Leone* | Y | | |
| | Togo* | Y | | X |
| AMERICAS | | | | |
| **Caribbean** | | | | |
| | Anguilla | X | | |
| | Antigua and Barbuda | X | | |
| | Bahamas | X | | |
| | Barbados | Y | 2 | |
| | Cuba | Y | | |
| | Dominica | X | | |
| | Grenada | X | | |
| | Jamaica | Y | 2 | |
| | Montserrat | X | | |
| | Saint Kitts and Nevis | Y | | |
| | Saint Lucia | X | | |
| | Trinidad and Tobago | | 2 | |

| | | | |
|---|---|---|---|
| Central America | | | |
| | Belize | X | 2 |
| | Costa Rica | Y | 2 |
| | El Salvador | X | 2 |
| | Guatemala | Y | 3 |
| | Honduras | X | 3 |
| | Nicaragua | X | 2 |
| | Panama | X | 2 |
| South America | | | |
| | Argentina | Y | 2 |
| | Bolivia | X | 3 |
| | Brazil | X | 1 |
| | Chile | X | 2 |
| | Colombia | Y | 2 |
| | Ecuador | X | |
| | Paraguay | X | 3 |
| | Peru | X | 2 |
| | Uruguay | X | 2 |
| | Venezuela | X | 3 |
| ASIA | | | |
| Central Asia | | | |
| | Kazakhstan (2) | Y | 1 |
| | Kyrgyzstan (2) | Y | 2 |
| | Tajikistan (2) | Y | 2 |
| | Turkmenistan (2) | Y | 2 |
| | Uzbekistan (2) | Y | 2 |
| Eastern Asia | | | |
| | China | Y | 1 |
| Southern Asia | | | |
| | Bangladesh* | | 1 |
| | India | | 2 |
| | Nepal* | | 2 |
| | Pakistan | | 2 |
| | Sri Lanka | Y*** | 3 |

| | | | |
|---|---|---|---|
| **South-Eastern Asia** | | | |
| | Cambodia* | Y | 3 |
| | Indonesia | X | 2 |
| | Lao People's DR* | X | 2 |
| | Malaysia | | 2 |
| | Myanmar* | | 3 |
| | Philippines | Y | 2 |
| | Thailand | X | 1 |
| | Viet Nam | Y | 3 |
| **Western Asia** | | | |
| | Armenia (2) | Y | 1 |
| | Azerbaijan (2) | Y | 3 |
| | Georgia (2) | Y | 3 |
| | Jordan | Y | |
| | Syrian Arab Republic | Y | |
| OCEANIA | | | |
| Melanesia | | | |
| | Fiji | | 2 |
| | Solomon Islands* | | 3 |
| Micronesia | | | |
| | Kiribati* | | 2 |
| Polynesia | | | |
| | Samoa* | | 1 |
| | Tuvalu* | | 3 |
| EUROPE | | | |
| **Southern Europe** | | | |
| | Croatia (2) | Y | |
| | Serbia (2) | Y | |
| DEVELOPED COUNTRIES | | | |
| **Asia** | | | |
| | Japan | Y | |
| | Republic of Korea | Y | |
| | Turkey | Y | |
| **Northern America** | | | |
| | USA | Y | |

| | | | |
|---|---|---|---|
| **Central America** | | | |
| | Mexico | Y | |
| **Eastern Europe** | | | |
| | Cyprus | Y | |
| | Bulgaria | | 2 |
| | Czech Republic | Y | 1 |
| | Hungary | Y | 1 |
| | Poland | | 1 |
| | Romania | Y | 1 |
| | Slovakia | | 1 |
| **Northern Europe** | | | |
| | Denmark | Y | |
| | Estonia | Y | 1 |
| | Finland | Y | |
| | Ireland | Y | |
| | Latvia | Y | 1 |
| | Lithuania | | 2 |
| | Norway | Y | |
| | Sweden | Y | |
| | Greece | Y | |
| | Malta | Y | |
| | Portugal | Y | |
| | Slovenia | | 2 |
| | Spain | Y | |
| **Western Europe** | | | |
| | Austria | Y | |
| | France | Y | |
| | Germany | Y | |
| | Netherlands | Y | |
| | Switzerland | Y | |
| **Oceania** | | | |
| | Australia | Y | 1 |
| | New Zealand | Y | |

*** Sri Lanka is not included in the analysis as it did not respond to the official UN-DESA questionnaire even though it did respond to a trial run for the questionnaire.

TABLE 2:
**Summary statistics for country surveys**

| Region and Sub-region | UN-Water Survey 2007 | GWP 2006 Survey | AfDB Survey |
|---|---|---|---|
| AFRICA | | | |
| Eastern Africa | 9 | 13 | 2 |
| Middle Africa | 2 | 6 | 3 |
| Northern Africa | 5 | 6 | 2 |
| Southern Africa | 5 | 5 | 0 |
| Western Africa | 9 | 8 | 10 |
| **Totals** | **30** | **38** | **17** |
| AMERICAS | | | |
| Caribbean | 11 | 3 | |
| Central America | 7 | 7 | |
| Southern America | 10 | 9 | |
| **Totals** | **28** | **19** | |
| ASIA | | | |
| Central Asia | 5 | 5 | |
| Eastern Asia | 1 | 1 | |
| Southern Asia | 0 | 5 | |
| South-Eastern Asia | 6 | 8 | |
| Western Asia | 5 | 3 | |
| **Totals** | **17** | **22** | |
| EUROPE | | | |
| Eastern Europe | 0 | 0 | |
| Southern Europe | 2 | 0 | |
| **Totals** | **2** | **0** | |
| OCEANIA | 0 | 5 | |
| Total developing countries | 77 | 84 | |
| developed countries | 27 | 11 | |
| Grand total | 104 | 95 | |

Comments on the surveys:

General comments:
- The questionnaires were addressed to governments at the national level. Therefore they do not reflect responsibilities for management at sub-national levels. The case studies in Section 4.5, below, demonstrate that many management decisions are made at the provincial and community levels.
- The GWP and AfDB surveys were more informal and are useful as they reflect the views of a different set of stakeholders and therefore provide an alternative perspective.

The UN-DESA questionnaire:
- 27 developed countries and 39 developing countries (including countries with economies in transition) responded. Of the 39 developing countries that responded, 7 responded through UNEP (Burkina Faso, Cape Verde, Guinea, Liberia, Sierra Leone, Togo and Uganda).
- A total of 65 questions were posed to be answered in multiple choice fashion; a further 8 questions allowed written answers to elaborate in more detail. The responses to the 65 questions are found in the Database (Annex 8), Worksheet 2: Responses to UN-DESA questionnaire; the responses to the 8 written answers may be accessed directly through the same Worksheet for specific countries or may be found separately in Worksheet 4 (Text Responses).
- There are many cases where countries, in answering the questionnaire, have ticked more than one box on the same line. In such a case UN-DESA, in making the initial compilation of the responses, has elected to select just one answer as the most reasonable choice.
- Many countries have chosen not to answer all the questions. The summary statistics simply ignore these omissions.

The UNEP questionnaire:
- A total of 58 countries responded to the UNEP questionnaire; the complete set of responses is found in the Database (Annex 8) Worksheet 3: Responses to UNEP questionnaire.
- For 17 countries there are responses to both the UN-DESA and the UNEP questionnaires; this allows an inter-comparison of responses which is important in assessing their compatibility. The information for the inter-comparison is found in the Database (Annex 8) Worksheet 5: DESA - UNEP comparison.

Merging of the UN-DESA and UNEP questionnaires:
- The information for the 39 developing countries within the UN-DESA questionnaire has been supplemented for 38 additional countries by partial responses from similar questions in the UNEP questionnaire. Of the 65 questions posed by UN-DESA 26 had exact or very similar counterparts in the UNEP questionnaire. Overall the answers to the UNEP questionnaire are slightly lower than the answers to the UN-DESA (for 18 questions they are lower and for 7 questions they are higher).
- The summary statistics have been prepared from the responses from 77 developing countries plus responses from 27 developed countries.
- There are contrasts in the responses from different regions. Apart from a partial response from Sri Lanka, there are no responses at all from South Asia - a major gap in the survey. In contrast there is a complete set of responses from Central Asia.

The GWP Survey:
- This survey covered 95 countries, 84 developing and 11 developed. For 59 of these countries data from the UN-Water Survey are also available allowing a valuable inter-comparison between these informal and official surveys elaborated in Section 4.2.

The AfDB Survey:
- This survey covered 17 countries in Africa; the survey questions were a direct sub-set of the UNEP questionnaire. This survey is used to supplement the other 3 surveys within the African context.

# 4.0 Status of national IWRM planning and implementation

## 4.1 ANALYSIS OF THE UN-WATER SURVEY

Care must be taken in the analysis of the questionnaires sent out by UN-DESA and UNEP for the following reasons:

- It must be recognized that many of the very poorest countries were unable to respond to the questionnaires through lack of capacity to do so; conversely a larger proportion of developed countries than developing countries did respond to the survey. In this sense the survey is biased towards countries more capable of giving responses.
- Some regions of the world, particularly South Asia, are under-represented as responses from many of the countries concerned were not forthcoming - in this sense there is regional bias.
- In surveys of this type there is always room for differing interpretation of the meaning of questions as a result of cultural and linguistic diversity; indeed this may result in more "optimistic" interpretation of situation and status by some countries than by others.
- This survey was aimed primarily at national governments. In many countries responsibility and authority for water management, especially in federal jurisdictions, is subordinated to sub-national levels; conversely some national governments must manage their water within a broader context of international river basins or of regional jurisdictions, for example in the case of the EU where the European Framework Directive becomes more important than purely national plans and policies.
- Several of the questions are not relevant to all countries; for example transboundary water issues may not be relevant to small island countries, humid regions may not be concerned with questions of aridity and land-locked countries are unlikely to be concerned with desalination.

Despite these caveats it is still possible to discern overall trends and to draw a number of broad conclusions from the survey.

Comparative results between major country groupings and between regions and sub-regions are presented in Tables 3a and 3b. Diagrams showing these comparisons are provided in the Appendix.

TABLE 3a:
**Comparison of developed countries with Africa, the Americas and Asia**

| | |
|---|---|
| **Main National Instruments and other National/Federal Strategies that may contribute to promoting IWRM** | • Developed countries significantly more advanced on main national instruments<br>• Asia and the Americas more advanced on national development plans and national environmental action plans with IWRM components<br>• Of developing countries Africa least advanced with poverty reduction strategies with WRM components |
| **Water Resources Development** | • Developed countries more advanced on most issues, but, as expected, not for rain-water harvesting<br>• Asia more advanced than other developing regions for WR assessment |
| **Water Resources Management** | • Developed countries significantly more advanced except in the less relevant areas of combating desertification and irrigated agriculture<br>• Developing regions very similar except the Americas more advanced in programs and policies for watershed management, groundwater management and drainage and irrigation; Asia more advanced in legislative mechanisms to control pollution |
| **Water Use** | • Developed countries significantly more advanced<br>• Africa consistently less advanced than other regions |
| **Monitoring, Information Management and Dissemination** | • Developed countries significantly more advanced<br>• Asia more advanced than the Americas which in turn are more advanced than Africa on all issues except monitoring and reporting the impacts of IWRM reforms where Africa is more advanced |
| **Capacity Building and Enabling Environment** | • Developed regions significantly more advanced on all issues except Pro-poor policies which are designated not relevant by many developed countries<br>• Similar responses from developing regions with some interesting contrasts - eg Asia more advanced on institutional reforms yet behind on institutional coordination mechanisms |

| | |
|---|---|
| **Stakeholder Participation** | • Developed countries more advanced except on programs for gender mainstreaming and on public awareness campaigns<br>• Africa more advanced than other developing regions on all issues except lower than Asia on mechanisms to resolve transboundary water issues |
| **Financing** | • Developed regions slightly more advanced<br>• Of the developing regions Asia behind on strategies for mobilizing financial resources and on norms and procedures for financial sustainability; Africa significantly more advanced on subsidies and micro-credit programs |

TABLE 3b:
**Sub-regional comparisons**

| | Africa | Americas | Asia |
|---|---|---|---|
| Main National Instruments and other federal strategies that may contribute to promoting IWRM | Countries of N Africa score significantly higher on main national instruments while countries of S Africa score higher on plans with IWRM components and on sustainable development strategies | Major differences between Caribbean countries and countries of S America - Caribbean much higher on main national instruments; S America much higher on other plans contributing to IWRM | W Asia: generally low scores all round.<br>SE Asia high on national/federal IWRM and water efficiency plans in contrast to Central Asia |
| Water resources development | Note: several issues (eg desalination and coastal fog harvesting) not relevant to many countries - otherwise very similar responses | Similar responses except for Caribbean countries which rank high for assessment, regulatory norms and basin studies but low on recycling | Here a definite consistent hierarchy of responses from China with highest scores through SE Asia, W Asia to Central Asia |
| Water resources management | Very similar responses overall except for N Africa which, as would be expected in arid environments, has higher scores on groundwater, desertification and irrigation issues | A consistent hierarchy of scores - Caribbean being consistently highest (except, as expected, in shared management of resources); Central Americas being consistently lowest | A consistent hierarchy of responses with E and SE Asia having high scores and Central Asia having low scores |
| Water use | Northern Africa consistently higher scores than other African regions which display similar responses | Caribbean countries have significantly higher scores than other regions of the Americas | E and SE Asia consistently higher than Central and W Asia |
| Monitoring, information management and dissemination | N Africa consistently higher scores than other African regions which display similar responses | Caribbean highest on most measures | Central Asia generally has lowest scores |
| Capacity building and enabling environment | Similar responses - N Africa highest on some responses | Caribbean generally highest | E and SE Asia generally with highest scores |
| Stakeholder participation | N Africa generally highest, E Africa lowest | Central America generally low scores. | E and SE Asia generally high; Central Asia lower |
| Financing | N Africa generally higher scores; not many differences for other African regions | S America generally with highest scores except for Caribbean with gradual cost-recovery mechanisms and strategies | SE Asia generally with the highest scores |

## 4.2 COMPARATIVE ANALYSIS OF THE UN-WATER SURVEY WITH THOSE OF GWP AND AFDB

The purpose of this comparison of surveys was to attempt to assess progress towards putting IWRM plans in place. The GWP Survey was carried out about 18 months before the UN-Water Survey, therefore only small changes might be expected as this is a relatively short time period.

The GWP Survey was carried out at the end of 2005 specifically to assess the extent to which the WSSD target had been met. Thus it focused on the creation of IWRM plans and did not assess the extent of implementation of plans. The GWP Survey evaluated 95 countries (11 of which were developed countries having high scores) and concluded that:

- 20 countries (21%) had plans/strategies in place or a process well underway, and that incorporated the main elements of an IWRM approach.
- 50 countries (53%) were in the process of preparing national strategies or plans but require further work to live up to the requirements of an IWRM approach.
- 25 countries (26%) had taken only initial steps in the process towards preparing national strategies or plans and had not yet fully embraced the requirements of an IWRM approach.

59 countries (Africa-24; Americas-14; Asia-15; Developed countries-6) are covered by both the GWP and UN-Water Surveys. Although the questionnaires used for the GWP Survey and UN-Water Survey are not completely comparable and use different terminology they are sufficiently similar to enable general comparisons to be made.

To make a comparative analysis of results for the informal GWP Survey and the official UN-Water Survey, the order of the original GWP Survey classification has been reversed so that responses are ranked in ascending order from least to most advanced.

TABLE 4:
**The ranking for the GWP and UN-Water surveys**

| UN Water Survey | GWP Survey (order reversed) | Comments |
|---|---|---|
| 1. Not relevant | 1. Countries that have taken only initial steps in the process towards preparing national strategies/plans and have not yet fully embraced the requirements of an IWRM approach | |
| 2. Under consideration | 2. Countries that are in the process of preparing national strategies/ plans but require further work to live up to the requirements of an IWRM approach; | |
| 3. In place but not yet implemented | 3. Countries that have plans/strategies in place, or a process well underway, and that incorporate the main elements of an IWRM approach. | For comparison purposes all those countries included in categories 3, 4 and 5 of the UN-Water survey also satisfy category 3 of the GWP survey. |
| 4. In place and partially implemented | Not assessed | |
| 5. Fully implemented | Not assessed | |

TABLE 5:
**Summary statistics for GWP and UN-Water surveys**

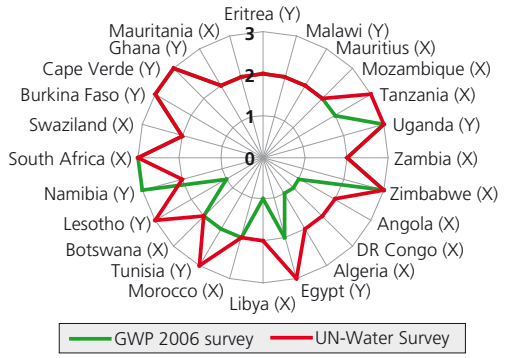
| Region | Number of countries | GWP category 3 | | GWP category 2 | | GWP category 1 | | UN-Water category 3 | | UN-Water category 2 | | UN-Water category 1 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | | % | | % | | % | | % | | % |
| E Africa | 8 | 2 | | 6 | | 0 | | 3 | | 5 | | 0 | |
| Central Africa | 2 | 0 | | 0 | | 2 | | 0 | | 2 | | 0 | |
| N Africa | 5 | 0 | | 3 | | 2 | | 2 | | 3 | | 0 | |
| S Africa | 5 | 2 | | 2 | | 1 | | 2 | | 3 | | 0 | |
| W Africa | 4 | 2 | | 2 | | 0 | | 2 | | 2 | | 0 | |
| Africa total | 24 | 6 | 25.0 | 13 | 54.2 | 5 | 20.8 | 9 | 37.5 | 15 | 62.5 | 0 | 0.0 |
| Caribbean | 2 | 0 | | 2 | | 0 | | 2 | | 0 | | 0 | |
| Central Americas | 5 | 0 | | 3 | | 2 | | 1 | | 4 | | 0 | |
| S America | 7 | 1 | | 4 | | 2 | | 3 | | 4 | | 0 | |
| Americas total | 14 | 1 | 7.1 | 9 | 64.3 | 4 | 28.6 | 6 | 42.9 | 8 | 57.1 | 0 | 0.0 |
| Central Asia | 5 | 1 | | 4 | | 0 | | 0 | | 1 | | 4 | |
| E Asia | 1 | 1 | | 0 | | 0 | | 1 | | 0 | | 0 | |
| SE Asia | 6 | 1 | | 3 | | 2 | | 4 | | 2 | | 0 | |
| W Asia | 3 | 1 | | 0 | | 2 | | 0 | | 1 | | 2 | |
| Asia total | 15 | 4 | 26.7 | 7 | 46.7 | 4 | 26.7 | 5 | 33.3 | 4 | 26.7 | 6 | 40.0 |
| | | | | | | | | | | | | | |
| Developing countries total | 53 | 11 | 20.8 | 29 | 54.7 | 13 | 24.5 | 20 | 37.7 | 27 | 50.9 | 6 | 11.3 |
| | | | | | | | | | | | | | |
| Developed countries | 6 | 6 | 100 | 0 | | 0 | | 6 | 100 | 0 | | 0 | |

The major conclusions from these listings are as follows:

- Developed countries:
  For the six countries considered in this comparison there are no significant differences between the surveys; as a group the developed countries are well advanced in the process of incorporating IWRM principles into their national plans and most are well on their way to implement those plans.
- Developing countries and countries with economies in transition:
  For the 53 countries considered in this comparison there are modest but significant improvements in the summary statistics:

In 22 countries the UN-Water Survey shows a higher level of progress than the GWP Survey;
While in 7 countries there seems to have been a lower level of progress (6 of these being in Asia);
In 24 countries there has been little measurable change;
It is in the Americas that the greatest overall progress has been made.

**GWP UN - Water Comparison for Africa**

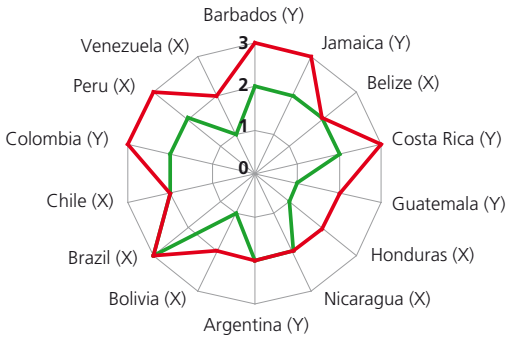



Progress <u>from</u> only initial steps <u>to</u> plans in preparation or in place in Angola, DR Congo, Algeria and Libya
Progress <u>from</u> only initial steps <u>to</u> plans in place in Lesotho

Progress <u>from</u> plans in preparation <u>to</u> plans completed and/or under implementation in Tanzania, Egypt and Tunisia

Decline <u>from</u> plans in place <u>to</u> only in preparation in Namibia

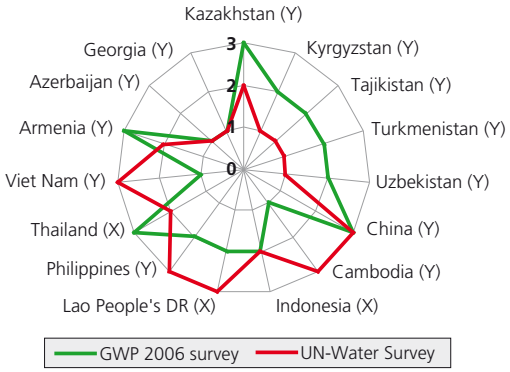
**GWP UN - Water Comparison for Americas**




Progress <u>from</u> only initial steps <u>to</u> plans in preparation or in place in Bolivia, Guatemala, Honduras and Venezuela

Progress <u>from</u> plans in preparation <u>to</u> plans completed and/or under implementation in Costa Rica, Colombia, Peru, Barbados and Jamaica

**GWP UN - Water Comparison for Asia**

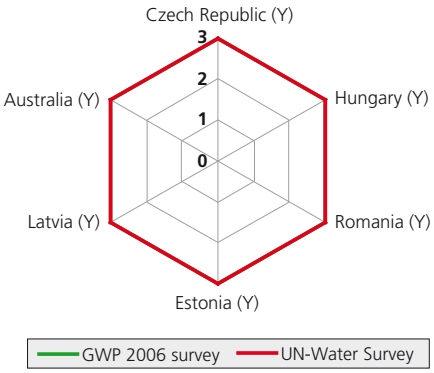



Progress <u>from</u> only initial steps <u>to</u> plans completed and/or under implementation in Cambodia and Vietnam

Progress <u>from</u> plans in preparation <u>to</u> plans completed and/or under implementation in Lao People's Republic and Philippines

Decline <u>from</u> plans in place <u>to</u> only in preparation in Thailand, Kazakhstan and Armenia; <u>from</u> in preparation <u>to</u> no steps taken in Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan

**GWP UN - Water Comparison for Developed Countries**




All developed countries static or making progress

Given the relatively short time between the surveys it would be expected that only some modest progress would be made and this is confirmed by these figures. In individual cases the GWP or UN Water Survey may be more or less optimistic. For example, GWP results seem overly optimistic for Central Asia. The UN-Water results may also be more optimistic as they are completed by officials who may be inclined to give a more positive result. Also, the questionnaires may not be sufficiently robust to capture nuances in understanding by different cultures and language groups and interpretation of the questions may well be subject to individual bias of those filing the answers.

Nevertheless, the results are sufficiently similar overall to conclude that the results from the two surveys are comparable and indicate some progress since 2005.

The AfDB undertook an additional survey in 2007; it covered 17 African countries. Six of these countries were not covered by the UN-Water Survey but were included in the GWP Survey: Benin, Cameroon, Central African Republic, Kenya, Rwanda and Senegal. All these countries fall into the GWP categories of either being in the very initial stages of developing national plans or the plans have yet to properly incorporate IWRM principles. The UN-Water Survey shows no significant progress made in these countries.

## 4.3 IMPLEMENTATION OF IWRM AND WATER EFFICIENCY PLANS AND THE OUTCOMES OF IMPLEMENTATION

The purpose of this section is to attempt to assess the extent to which countries have been able to go beyond simply having plans in place to the stage of implementing those plans and the extent to which tangible outcomes have been forthcoming. This section ties in directly with section 4.4 on examples of ongoing IWRM processes and with section 4.5 on case studies.

Table 6 presents responses to the UN-Water Survey on the questions of the extent to which countries have implemented IWRM and Water Efficiency Plans. It focuses on those countries that have plans in place and which are either partially or fully implemented.

TABLE 6:
**Summary statistics for UN-Water Survey for IWRM and Water Efficiency Plans**

| Region | Number of countries | National/Federal IWRM plan or equivalent strategic plan document | | | National/Federal Water efficiency plan | | |
|---|---|---|---|---|---|---|---|
| | | level 1-3 | level 4 | level 5 | level 1-3 | level 4 | level 5 |
| Developed countries: | 27 | 2 | 10 | 6 | 10 | 9 | 3 |
| Developing countries: | | | | | | | |
| E Africa | 9 | 0 | 3 | 0 | 6 | 1 | 0 |
| Central Africa | 2 | 0 | 0 | 0 | 2 | 0 | 0 |
| N Africa | 5 | 0 | 1 | 1 | 3 | 1 | 1 |
| S Africa | 5 | 0 | 2 | 0 | 3 | 0 | 0 |
| W Africa | 9 | 0 | 2 | 0 | 3 | 1 | 0 |
| Africa total | 30 | 0 | 8 | 1 | 17 | 3 | 1 |
| Caribbean | 11 | 5 | 3 | 0 | 6 | 2 | 0 |
| Central America | 7 | 2 | 0 | 0 | 6 | 0 | 0 |
| S America | 10 | 3 | 2 | 0 | 9 | 1 | 0 |
| Americas total | 28 | 10 | 5 | 0 | 21 | 3 | 0 |
| Central Asia | 5 | 4 | 0 | 0 | 3 | 0 | 0 |
| E Asia | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| SE Asia | 6 | 0 | 2 | 1 | 2 | 3 | 0 |
| W Asia | 5 | 2 | 1 | 0 | 2 | 1 | 0 |
| Asia total | 17 | 6 | 3 | 1 | 7 | 4 | 0 |
| S Europe | 2 | 0 | 1 | 0 | 1 | 0 | 0 |
| Total developing countries | 77 | 16 | 17 | 2 | 46 | 10 | 1 |

Notes: Level 1-3: No entry, not in place or irrelevant
Level 4: In place and partially implemented
Level 5: Fully implemented

A total of 104 countries are analysed (77 developing; 27 developed).

**Developed countries**:

- 10 of the 27 countries (37%) have national IWRM plans in place and partially implemented; a further 6 countries (22%) have these plans fully implemented;
- Less progress has been made in implementing National water efficiency plans - 9 (33%) have plans in place and partially implemented and 3 (11%) have a plan fully implemented; 37% of developed countries considered water efficiency plans not relevant to their circumstances or chose not to answer the question.

**Developing countries**:

- 17 of the 77 countries (22%) have national IWRM plans in place and partially implemented; a further 2 countries (3%) have these plans fully implemented;
- Far less progress has been made in implementing National water efficiency plans - only 10 (13%) have plans in place and partially implemented and only 1 has a plan fully implemented; 60% of developing countries considered water efficiency plans not relevant to their circumstances or chose not to answer the question.

A total of 64 countries (37 developing and 27 developed) provided text responses to the UN-DESA questionnaire. A simple analysis for the responses to questions 6, 8b and 8c is presented in Table 7. The results should be taken as merely indicative of the extent of implementation of the IWRM approach and of results achieved. Many countries provided detailed lists of actions taken and results achieved; many other provided only skeletal information. However, the amount of information given does not necessarily properly reflect reality. Some countries opted to give no responses to questions - but this does not mean that no actions actually have been taken; some countries have simply stated that no assessment of outcomes has been made - again, this is unlikely to mean that no benefits have accrued.

Despite these caveats there is good indication that the IWRM approach is being incorporated into national plans and strategies and that tangible benefits are either evident or are likely to be realised in the near future.

TABLE 7:
**Responses to questions 6, 8b and 8c of the UN-DESA questionnaire**

| | Question 6: If your country is in the stage of implementation, indicate specific actions undertaken | | Question 8b: What are the main water management measures undertaken? | | Question 8c: What are the results achieved? | |
|---|---|---|---|---|---|---|
| Developing countries (37) | | | | | | |
| | Several specific actions taken | 11 | Several measures taken | 10* | Good results achieved | 7* |
| | Some actions taken | 23 | Some measures taken | 21 | Some results achieved | 19 |
| | No actions taken | | No measures taken | 1 | No results achieved | 4 |
| | No response | 3 | No response | 5 | No response | 7 |
| Developed countries (27) | | | | | | |
| | Several specific actions taken | 25 | Several measures taken | 20 | Good results achieved | 10 |
| | Some actions taken | 1 | Some measures taken | 6 | Some results achieved | 13 |
| | No actions taken | | No measures taken | 1 | No results achieved | 2 |
| | No response | 1 | No response | | No response | 2 |

*) See Annex 8 Database, Worksheet 4 for more details on measures undertaken and results achieved.

## 4.4 EXAMPLES OF ONGOING IWRM PROCESSES

Table 8 provides examples of developing countries that have found IWRM a useful framework for management of water resources and have included it as a pivotal concept. The concept has been included in key Government documents that guide and regulate the use, conservation and protection of a nation's water resources and implementation at local level is ongoing. The table is not exhaustive: In addition to what is documented here, there are many ongoing and planned IWRM programmes; as well as numerous national and regional IWRM partnerships and initiatives related to transboundary waters.

TABLE 8:
**Evidence of adoption and use of the IWRM approach**

| | |
|---|---|
| Eritrea | • Integrated Water Resources Management and Water Efficiency Plan (IWRM/WE) - Ministry of Land Water & Environment (draft 2007) |
| Malawi | • National Water Policy - Ministry of Irrigation and Water Development (2005)<br>• Water Resources Act No. 15 of 1969 with later amendments. Government of Malawi<br>• Integrated Water Resources Management/Water Efficiency (IWRM/WE) Plan for Malawi - Ministry of Irrigation and Water Development (draft 2007) |
| Mozambique | • Government of Mozambique - Water Act, Lei de Aguas, 16/91 3 August (1991)<br>• IWRM Plan - Direccao Nacional de Aguas, Ministry of Public Works and Housing (draft 2007) |
| Seychelles | • Water Regulations - Public Utilities Corporation (1988)<br>• Water Supply Development Plan - Public Utilities Corporation (2005)<br>• Water Policy - Public Utilities Corporation |
| Tanzania | • National Water Sector Development Programme 2006-2025 - Ministry of Water (2006)<br>• IWRM Strategy and Action Plan - Ministry of Water (2004)<br>• National Water Policy - Ministry of Water (2002)<br>• National Water Law based on revised Water Act no. 42 of 1974 - Government of Tanzania (draft 2007) |
| Uganda | • A National Water Policy - Ministry of Water, Lands and Environment (1999)<br>• National Water Action Plan - Water Resources Management Department (1994)<br>• Water Resources Management Reform Strategy - Water Resources Management Department (2005)<br>• National Water Quality Management Strategy - Ministry of Water and Environment (2006) |
| Zambia | • IWRM and Water Efficiency Plan - Ministry of Energy and Water Development (2006)<br>• The Revised National Water Policy - Ministry of Energy and Water Development (2007)<br>• Water Resources Management Bill - Ministry of Energy and Water Development (draft 2007)<br>• National Development Plan - Ministry of Energy and Water Development (2007) |
| Angola | • IWRM & Water Efficiency Roadmap - Ministry of Water & Energy (draft 2007) |
| Algeria | • National Plan for Water - Ministry of Water Resources (2003)<br>• National Water Law - Government of Algeria (2005)<br>• Action Plan for implementation of an IWRM Framework - Ministry of Water Resources (draft 2006-7) |
| Egypt | • National Water Resources Plan - Ministry of Water Resources and Irrigation (2004) |
| Morocco | • Master Plans of Integrated Water Resources Development for River Basins - Ministry of Land, Water and Environment (2001)<br>• National Water Plan - Ministry of Land, Water and Environment (2006)<br>• Decree no 2-05-1594 - Development and Revision of Master Plans & National Plans for Integrated Water Resources Management - Government of Morocco |
| Tunisia | • The Water Code (Law no.16) - Ministry of Agriculture and Water Resources (1975)<br>• Water Master Plan for the North of Tunisia - Ministry of Agriculture and Water Resources (1970)<br>• Water Master Plan for the Centre of Tunisia - Ministry of Agriculture and Water Resources (1977)<br>• Water Master Plan for the South of Tunisia - Ministry of Agriculture and Water Resources (1983)<br>• Water Resources Mobilization Strategies - Ministry of Agriculture and Water Resources (1990)<br>• Water Conservation Strategy - Ministry of Agriculture and Water Resources (1995) |
| Botswana | • IWRM Strategy and Action Plan - Ministry of Minerals, Energy and Water Resources (2006) |

| | |
|---|---|
| Lesotho | • Roadmap to completing integrated water resources management and water efficiency planning in Lesotho - Ministry of Natural Resources, Water Commission (April 2007) |
| Namibia | • National Water Policy White Paper - Government of Namibia (2000)<br>• Water Resources Management Act - Government of Namibia (2004)<br>• Integrated Water Resources Management Strategy and Action Plan - Ministry of Agriculture, Water and Rural Development (2006) |
| Swaziland | • Water Policy - Ministry of Natural Resources and Energy (draft 2007)<br>• IWRM and Water Efficiency Plan - Water Resources Branch (draft 2007)<br>• Water Act (2003) - Government of Swaziland |
| Burkina Faso | • Decree No.2003-220: Action Plan for IWRM in Burkina Faso (PAGIRE) - Ministry of Agriculture, Hydraulics & Fishing Resources (2003)<br>• Burkina Faso Water Vision - Ministry of Agriculture, Hydraulics & Fishing Resources (2000)<br>• Water Law No.002-2001- Government of Burkina Faso (2001) |
| Cote d'Ivoire | • IWRM Roadmap 2007-2015 - Ministry of Environment, Water & Forestry (2007) |
| Ghana | • IWRM Component Support programme (2004 - 2008) - Water Resources Commission (2004)<br>• Water Resources Policy - Water Resources Commission (draft 2007) |
| Liberia | • Liberia IWRM Roadmap - Ministry of Lands, Mines and Energy (draft 2007)<br>• National Water Policy - Ministry of Lands, Mines and Energy (draft 2007) |
| Mauritania | • IWRM Action Plan - National Council for Water (2007)<br>• National Development Policy for Water & Energy - Ministries of Water, Energy & Environment (1998)<br>• National Water Act (Article 3) - Government of Mauritania (2005) |
| Togo | • National Water Policy - Directorate of Water and Sewerage (draft 2007)<br>• National Water Law - Directorate of Water and Sewerage (draft 2007)<br>• IWRM Roadmap - Directorate of Water and Sewerage (draft 2007) |
| Barbados | • National Water Resources Management and Development Policy - Government of Barbados (Draft, 2002)<br>• National Water Law - Government of Barbados<br>• Marine Pollution Control Act - Government of Barbados (1998)<br>• Emergency Drought Management Plan - Government of Barbados (1998)<br>• IWRM and Water Efficiency Plan - In place and partially implemented. |
| Cuba | • National Water Policy - Ministry of Science, Technology and Environment (2000)<br>• National Water Strategy - Ministry of Science, Technology and Environment (2000)<br>• Water Conservation & Efficient Use Strategy - Ministry of Science, Technology & Environment (2005)<br>• National Environmental Management Strategy - Government of Cuba (2007) |
| Grenada | • Simultaneous preparation of IWRM Roadmap and National Water Policy - Water Policy Steering Committee (April 2007) |
| Jamaica | • Water Resources Act - Government of Jamaica (1995)<br>• National Water Policy, Strategy and Action Plan - Government of Jamaica (1999)<br>• National Water Resources Development Master Plan - Government of Jamaica (1990)<br>• National IWRM Framework - Water Resources Authority (2001) |
| Costa Rica | • National Strategy for Integrated Water Resources Management - Government of Costa Rica (2006)<br>• National IWRM Action Plan - Government of Costa Rica (2006)<br>• National Water Law (No. 14585) - Government of Costa Rica (draft 2006) |
| Guatemala | • National Water Policy - Ministry of Environment and Natural Resources (2004)<br>• National Water Law (Initiative 3118) - Ministry of Environment and Natural Resources (2005)<br>• Plan for the Sustainable Use and Management of Water Resources (Initiative 3419) - Ministry of Environment and Natural Resources (2005)<br>• National Law for the Protection of River Basins (Initiative 3317) - Ministry of Environment and Natural Resources (2006)<br>• National IWRM Policy - Government of Guatemala (2006)<br>• National IWRM Strategy - Government of Guatemala (2006)<br>• Environment and Natural Resources Protection and Conservation Policy - Government of Guatemala (2007) |

| | |
|---|---|
| Honduras | • IWRM Action Plan - Honduran Water Platform (2006) |
| Nicaragua | • General Law on National Waters - Government of Nicaragua (2007)<br>• Environmental Action Plan - Ministry of Environment (1994)<br>• IWRM Action Plan - Ministry of Environment (1996) |
| Argentina | • IWRM Roadmap - Sub-secretariat of Water Resources (2007) |
| Brazil | • National Water Policy (Law No. 9433) - Government of Brazil (1997)<br>• National Water Resources Plan - Ministry of Environment (SRH/MMA), National Water Council (CNRH) & National Water Agency (ANA) (2007) |
| Colombia | • National Development Plan 2006-10 - National Planning Department (2006) |
| Kazakhstan | • Water Code - Government of Kazakhstan (2003)<br>• Draft National IWRM and WE Plan for Kazakhstan (2005)<br>• IWRM National Roadmap including proposed project outlines - Speed-up of the IWRM 2005 objectives implementation in Central Asia - Government of Kazakhstan (2006) |
| China | • National Water Law - (2002)<br>• Water Pollution Prevention and Control Law - (1996)<br>• National Flood Control Law - (1997)<br>• National Water and Soil Conservation Law - (1991)<br>• IWRM Plan - Planning process initiated in 2002 and still ongoing. |
| Cambodia | • Integrated Water Resources Management (IWRM 2005) and Roadmaps in Cambodia - Department of Water Resources Management and Conservation (2006)<br>• Water Law - Royal Government of Cambodia (Sept 2006) |
| Indonesia | • National Water Law No.7/2004 - Government of Indonesia (2004)<br>• IWRM Roadmap - Directorate General Water Resources of Ministry of Public Works (2006) |
| Lao PDR | • Policy on Water and Water Resources - Government of Lao PDR (draft 2000)<br>• The Law on Water and Water Resources - Government of Lao PDR (1996)<br>• IWRM National Roadmap - Water Resources Coordination Committee Secretariat (2006) |
| Malaysia | • 9th Malaysia Plan - Economic Planning Unit - Prime Minister's Department (2006)<br>• National Study for the Effective Implementation of IWRM in Malaysia - Ministry of Natural Resources and Environment (2006)<br>• Our Vision for Water in the 21st Century - Ministry of Natural Resources and Environment (2000) |
| Philippines | • Medium Term Philippine Development Plan (2004-2010) - Government of Philippines (2004)<br>• Clean Water Act - Government of Philippines (2004)<br>• Integrated Water Resources Management (IWRM) Plan Framework - National Water Resources Board (2007) |
| Thailand | • National Water Law/Code - Government. of Thailand (draft 2007)<br>• National Water Policy - Ministry of Natural Resources and Environment (2000)<br>• IWRM National Roadmap - Department of Water Resources (2007) |
| Vietnam | • Law on Water Resources - Government of Vietnam (1998)<br>• National Water Resources Strategy - Government of Vietnam (2006)<br>• National Strategy on Rural Clean Water Supply and Sanitation - Government of Vietnam (2000)<br>• National Strategic Programme of Action on Desertification Control - Government of Vietnam (2006)<br>• IWRM and Water Efficiency Plan - In place and partially implemented. |
| Armenia | • Water Code - Government of Armenia (2002)<br>• National Water Policy - Government of Armenia (2005)<br>• National Water Programme - Government of Armenia (draft 2007) |
| Azerbaijan | • Law of Azerbaijan Republic on Amelioration and Irrigation - Azerbaijan Republic (1996)<br>• Water Code of Azerbaijan Republic - Azerbaijan Republic (1997)<br>• Law of Azerbaijan Republic on Water Supply and Water Drainage System - Azerbaijan Republic (1999)<br>• Law of Azerbaijan Republic on Municipality Water Resources Management - Azerbaijan Republic (2001)<br>• National Program of Development of Amelioration and Water Resources Management of Azerbaijan (2007 - 2015) - Azerbaijan Republic (2006) |

| | |
|---|---|
| Jordan | • National Water Policy - Ministry of Water and Irrigation<br>• National Water Strategy - Ministry of Water and Irrigation (2003)<br>• National Water Master Plan - Ministry of Water and Irrigation (2004) |
| Syria | • National water Policy - Government of Syria<br>• National Water Law (No.31) - Government of Syria (2005)<br>• IWRM and Water Efficiency Plan - In place but partially implemented |
| Croatia | • Water Act (OG 107/95, 150/05) - Ministry of Agriculture, Forestry and Water Management<br>• Water Management Financing Act (OG 107/95, 19/96, 88/98, 150/05) - Ministry of Agriculture, Forestry and Water Management<br>• National Environmental Strategy with embodied National Action Plan (NEAP) (OG 46/02) - Ministry of Agriculture, Forestry and Water Management<br>• IWRM and Water Efficiency Plan - Under consideration |
| Serbia | • National Water Policy<br>• National Water Law - Ministry of Agriculture, Forestry and Water Management (1991)<br>• Environmental protection Law - Ministry of Agriculture, Forestry and Water Management (2004)<br>• Water Resources Management Master Plan - Ministry of Agriculture, Forestry and Water Management (2002) |

## 4.5 CASE STUDIES FROM SELECTED COUNTRIES

It is instructive to cite specific examples of the implementation of the IWRM approach and the benefits thereby to be derived. While the UN-Water Survey was aimed primarily at the national level, countries sharing river basins must also consider transboundary implications and include them in their planning; conversely many actions must be taken at sub-national and at very local levels to manage water wisely. The examples below cover a range of circumstance and are illustrative of the diversity of situation with a multiplicity of beneficial outcomes.

IWRM in action at the local level, as well as national and international level, is illustrated in detail in more than 200 case studies within the Global Water Partnership's IWRM ToolBox: http://www.gwptoolbox.org. The second WWDR "*Water a Shared Responsibility*" from 2006 also includes various case studies illustrating progress on IWRM, see http://www.unesco.org/water/wwap/wwdr/wwdr2

**China - Provincial level:** Liao River Basin Management

- *Issues:* The province of Liaoning with a 41 mill population has seen a rapid development resulting in water shortages and severe water pollution. In the 1980s water use efficiency was very low both within urban/industrial areas and irrigation. Water pollution was rampant. No fish could be found in 70% of the streams and ecosystem productive functions had ceased in 60% of the streams. Citizens were ignorant of water conservation issues. Urban wastewater was discharged untreated into streams and in some cases infiltrated into the groundwater aquifers. Deforestation took place in the upper parts of the catchments.
- *IWRM Actions:* Establishment of an institutional framework comprising Liaoning Cleaner Water Project Office, Liao River Basin Coordination Commission, EU-Liaoning Water Resource Planning Project Office under which an IWRM Planning Project was developed. Under this project a water resources assessment was carried out, a reform of the policy for water exploitation and utilization was made, water prices adjusted, a monitoring network established and capacity building within IWRM made. In addition, the cleaner water project was creating wastewater infrastructure, low production/high pollution production was discouraged, pollution prevention and control of Liao River Basin was planned and reforestation was implemented.
- *Tangible impacts:* Reduction of pollution loads by 60% and quality of river water considerably improved. Upstream-downstream conflicts were reduced and deforestation practices halted. Drinking water within the basin was safeguarded and ecosystems in several river stretches were restored. Groundwater pollution was reduced and public awareness of demand management and pollution risks was raised.

*Source:* EU Liaoning Integrated Environmental Program - Chief of EU Party Alan Edwards - MWH Environmental Engineering

**Columbia - Local level:** Conserving La Cocha Lagoon

- *Issues:* La Cocha Lagoon is situated in the high Andes in Colombia with the largest wetland system of the Andes. The forests of the basin are exploited for charcoal production being the cause of soil erosion, loss of fertility, faster runoff and greatly reduced biodiversity. Another issue is the planned construction of a major dam system to divert water from the Amazonas Basin to the Pacific side of the Andes. Inundation of 3000 ha of grassland and threatening of the livelihoods of local families are among the negative impacts.

- *IWRM Actions:* Partnership established between the Network of Private Nature Reserves, Peasants' Development Association and various community organization with facilitation from WWF. Promotion of greater participation in decision-making processes. Private forest reserves with sustainable use were encouraged as well as ecotourism. A Lake Defense Committee was formed and plans for establishment of officially protected areas to complement the private reserves were made.
- *Tangible Impacts:* 387 poor families doubled their income and food requirements are met on site. Threats to La Cocha Lagoon and surrounding wetlands were reduced and the Lake Defence Committee worked with Ministry of Environment towards a declaration of the area as a Ramsar Site. The dam system plans were shelved as Ministry of Environment refused an environmental license based on a balancing between downstream benefits and environmental costs.

*Source:* IWRM ToolBox, Case # 225 - www.gwptoolbox.org

**Morocco - National level:** Management of scarce water resources and pilots on pollution control

- *Issues:* Scarce water resources combined with a rapid population increase, urbanization and industrialization makes water a contentious issue with 42% of the rural population lacking access to potable drinking water. Agriculture uses 92% of the country's dwindling water resources. Large variations in water resources in time and space make sustainable management of water resources a key issue. Challenges include the implementation of a water reform decentralizing financial and planning authority for water resources to nine river basin agencies to be created incrementally.
- *IWRM Actions:* Improvement of institutions and policies for water resources management following IWRM principles. Best practices in water resources management developed and disseminated. Non-governmental participation in water resources management increased. Pilots were undertaken among others within wastewater. Actions were undertaken facilitated by USAID.
- *Tangible impacts:* Soussa -Massa River Basin Agency established and operating according to IWRM principles. Multi- agency cooperation and participation of private water user associations in management decisions takes place. National and regional institutional responsibilities have been defined and consolidated. Procedures for allocation of water were established together with technical capacities to allocate and monitor water quantity and quality and mechanisms for communication between sectors and agencies. Pilot projects were undertaken in Fez, Al Attaouia and Draga and included construction of innovative wastewater treatment plants. In Nakhla, watershed soil loss was significantly reduced through soil conservation measures.

*Source:* USAID Water Team - Case Study in Integrated Water Resources Management. USAID/Morocco SO2 Close-Out Report.

**Fergana Valley - International level:** Improving water accessibility through IWRM

- *Issues:* Once the most fertile valley in Central Asia, Fergana valley with its approx 10 mill inhabitants is now subject to high soil salinization and crops no longer suffice to feed the population. State boundaries between Uzbekistan, Kyrgistan and Tajikistan make tranboundary management problematic and cause constant internal and interstate disputes. More than 60% of the inhabitants do not have access to safe drinking water and basic sanitation resulting in widespread water-borne diseases in the rural areas. Irrigation infrastructure is inadequate and the water use is inefficient.
- *IWRM Actions:* Improved management of water resources based on IWRM principles emphasizing higher efficiency and more equity. IWRM capacity building within river basin management among river commissions, provinces, municipalities, companies and water user associations. Demonstration of bottom-up approaches and increases in yields and water productivity by up to 30%. Swiss Agency for Development and Cooperation assisted the Interstate Commission for Water Coordination in the implementation.
- *Tangible impacts:* Partnership between all water management actors across Fergana Valley. Safe drinking water provided to 28 villages with a population of 80,000 people and 320 ecological sanitation toilets have been constructed on a cost-sharing basis. Water-borne diseases have decreased by more than 60% on average and infant mortality has been almost eradicated in all villages despite prevailing poverty. 28 Water Committees have been created operating and maintaining water systems efficiently with more than 30% participation by women. Expansion of improved irrigation practices as well as innovative solutions for irrigation canal management and sustainable water user associations in addition to sustainable financing at canal, water user association and farm level.

*Source:* SDC in Central Asia - IWRM. www.swisscoop.uz/en/Home/Regional_Activities/Integrated_Water_Resources_Management

**Sri Lanka - National level:** IWRM and Water Efficiency Plan

- *Issues:* Inadequate developed water resources to meet the demands; frequent water related disasters (floods, droughts etc associated with climatic changes); low water use efficiency; delay in implementing National Water Resources Policy due to politicization of basic policy issues.
- *IWRM actions:* A baseline assessment of water resources was made under Sri Lanka National Water Development Report (SLNWDR) prepared for WWAP. To address the inadequacy of water development, several diversion and storage projects have been initiated. Some were completed recently. A disaster management plan and institutional setup have been implemented too. Sectoral water use efficiency improvement plans are implemented. A National Water Development Report has been prepared under WWAP and it is planned to update this every 3 years.
- *Tangible impacts:* A considerable number of people living in water scarce areas of the country have benefited through diversions and storage facilities. To bridge the water demand/availability gap, several projects are planned and implemented. Ongoing Menik Ganga Project and Weli Oya Diversion Project are nearing completion. Studies on the impact are continuing. In the case of irrigation sector, several irrigation schemes have improved their water productivity. Similar improvements are experienced in drinking water sector. The disaster management institutional setup contributed to mitigate the impacts and provide warning for recent floods. The SLNWDR has created an awareness of water related challenges among the key stakeholders.

*Source:* Adapted from WWDR number 2 http://www.unesco.org/water/wwap/wwdr/wwdr2

**USA - State level:** NY City Water Supply as a partner in Watershed management

- *Issues:* Faced with deteriorating input water quality NY City had the choice of building a new water supply treatment plant at a cost of USD 6,000 million or taking comprehensive measures to improve and protect the quality of the source water in the Croton and Catskill/Delaware watersheds totalling approx. 5000 km2 delivering water for over 9 mill people in New York City. Dual goals of protecting water quality and preserving economic viability of watershed communities were set out.
- *IWRM Actions:* Development of partnerships between NY City, NY State, Environmental Protection Agency, watershed counties, towns and villages environmental and public interest groups. Programs were developed to balance agriculture, urban and rural wastewater and storm drainage infrastructure, environment and the quality of water in the 19 reservoirs and 3 controlled lakes. A watershed agricultural program was supplemented by land acquisition, watershed regulations, environmental and economic partnership programs, wastewater treatment plant upgrades and protection measures at reservoirs.
- *Tangible impacts:* More than 350 farms within the watershed have embarked on implementation of best management practices reducing pollution loads, acquisition of 280 km2 land for protection, enforcement of effective watershed regulations, remediation of 2000 failing septic systems, upgrading of wastewater treatment plants with tertiary treatment. More than 50% reduction in coliform bacteria, total phosphorus and several other major contaminants were achieved. NY City water supply was exempted from filtration, the population of the watersheds enjoys an improved environmental quality and a total saving of USD 4,400 million was realized.

*Source:* New York City, Department of Environmental Protection, Bureau of Water Supply: "2006 Watershed Protection Program. Summary and Assessment". www.ci.nyc.ny.us/html/dep/html/watershed.html

**Kazakhstan - National level:** Management of scarce water resources and pollution control

- *Issues:* There are plenty of water-ecological problems serving as obstacle, of which the most acute ones are growing water deficit; Pollution of open and underground waters; Enormous over-norm water losses; Exacerbation of the problem of quality drinking water supply to population; Problems of interstate water apportioning; and Deterioration of the technical state of the dams, waterworks facilities and other installations. Actually, the situation with water management is tense throughout the territory of the republic and the environmental ill-being has overtaken all major river basins of the country.
- *IWRM actions:* In accordance with the Water Code of the Republic of Kazakhstan, the Water Resource Committee of the Ministry of Agriculture is assigned to manage, regulate the use and to protect the water resources, including renewable water resources. With the purpose of improving the management of water resources and introduction of international practice, the Committee, as of June 2004, has been carrying out the development of Integrated Water Resource and Water Efficiency Management Plan (IWRM). Legal and organizational conditions for transition to integrated water resource management have also

been established. Basin Councils - basis for IWRM Plan implementation - have been established to increase the involvement of interested parties in water resources management.

- *Tangible impacts:* The necessary legal framework, namely Water Code, Land Code and Forestry Code (2003), The Law "On Sanitary-Epidemic Security of Population" (2003) is established in Kazakhstan. For the implementation of the IWRM Plan, River Basin Organizations, namely Basin Councils are being created. In the sense of territorial division, the basin councils have been created in 8 hydrographic basins of Kazakhstan as well as in separate water objects.

*Source: The Plan of Integrated Management of Water Resources of the Republic of Kazakhstan. A.Y. Nikolayenko and A.K. Kenshimov*

**Mozambique/Zimbabwe - Transboundary level:** The Pungwe River Project

- *Issues:* During spring tide and low river flows, saline water intrusion extends upstream of Pungwe River mouth, which has a negative impacts on sugar cane farming and domestic water for Beira City in Mozambique. The effects of gold mining activities in the Pungwe basin dominate the water quality and increased sediment concentrations of the surface water of the Pungwe River. The gold mining activities in the river basin are mainly poverty-driven, i.e. it is a subsistence activity. The suspended sediments make the water unsuitable for drinking, washing and irrigation, bury the aquatic fauna, prevent photosynthesis and have effects on the fish population. Miners use mercury in the gold mining process causing elevated concentrations of mercury in the suspended sediments. Also other heavy metals, e.g. lead and cadmium, are bound to the suspended sediments since they exist naturally in the soils. Floods cause frequent problems in the lower parts of the Pungwe River basin. Widespread poverty and competing demands for available water resources within and between the countries.

  *IWRM actions:* The Pungwe Project commenced in February 2002 and included three phases, viz: Phase 1 - Monograph Phase, Phase 2 - Scenario Development Phase, and Phase 3 - Joint IWRM Strategy Phase. During the monograph phase a large effort was directed towards improving the knowledge base for the development of the water resources of the basin through a number of sector studies. The scenarios for water resources development were elaborated in the Phase 2. The development scenarios included a number of projects and studies, including e.g. possibilities of medium-large dams on the Pungwe River or its tributaries, flood warning system, local groundwater assessments and measures for improved surface water quality. In Phase 3 implementation plans for the projects adopted by the stakeholders of the Pungwe River basin were elaborated and the Joint Integrated Water Resources Management Water Strategy formulated. In parallel the development of a climate change adaptation strategy for the basin has commenced. Local assessment of climate change impacts were made by feeding GCM scenarios into a regional higher resolution climate models and linking it to the hydrological models of the basin.
- *Tangible Impacts:* Sector studies conducted by the Project describe the present situation in the basin with regards to water resources, environment and pollution, water demand, infrastructure and socio-economy. River basin organisations have been strengthened, water permitting and revenue collection operationalized and stakeholder participation increased through the establishment of a basin committee. A five year joint program between the Governments of Mozambique and Zimbabwe has commenced to strengthen the capacity of key basin IWRM institutions - To strengthen and expand stakeholder participation in Integrated Water Resources Management in the Pungwe Basin; To ensure appropriate, efficient, effective and sustainable technical systems and capacities for the collection, monitoring, management and communication of water resources data; To mobilise resources for sustainable, poverty-oriented, water-related development investments in the Pungwe Basin through establishment of a Pungwe Basin Pre-Investment Facility and launching of the Pungwe Basin Initiative. In addition, seven Critical Development Projects have been developed with their own specific objectives. Large-scale investments such as major hydraulic infrastructure is anticipated to be funded through other sources mobilised through a Pungwe Basin Investment Facility. The Joint Integrated Water Resources Management Strategy for the Pungwe River Basin Pungwe has been able to materialise the vision of a broad and sustainable socio-economic development without environmental harm.

*Source:* www.pungweriver.net

**Chile - National level:** Impact on water and environment due to macro-economic and social development policies

- *Issues:* Chile's macro-economic growth policies boosted exports, but a sharp rise in demand for water was also evident. Much of this demand occurred in relatively water-poor basins, where it was driven by market forces or the availability of other inputs or resources, and not by the area's water endowments. This has led to growing competition for water in some basins. Policy makers and water planners therefore need to be aware that if economic policies continue

to encourage water-dependent exports, then ever-greater quantities of water will need to be found. Development has placed additional pressure on the environment in general, and on water resources in particular. Over the two decades the use of wells in agriculture has increased sixfold, the use of wells for drinking water fourfold, and, during the last decade, 40 aquifers have been closed to new concessions.

- *IWRM actions:* Improvements in water-use efficiency have been considerable, especially in those areas linked to exports. Cleaner production practices triggered by globalization have also benefited the environment. Increased private-sector investment in sanitation has been encouraged by Chile's focus on maintaining its macro-economic equilibrium. This has boosted the development of Chile's sewerage, as well as its water supply sector. New water and environmental laws and regulations have also been put in place. In 2005, reform of the country's Water Code sought to establish a more stable balance between the public interest and the rights of private individuals and among social and productive demands and environmental considerations.
- *Tangible impacts:* Working in water-scarce areas has increased the prices of water rights and forced the mining sector to increase the efficiency of its water use threefold over the last 20 years, while water use in wood pulp production has fallen by 70% per ton produced. Macro-economic policies to improve cost recovery have caused household water consumption to fall by 10%, in reaction to a 38% increase in domestic water supply. Some sectors (such as mining, agriculture and wood pulp production) have gone beyond national requirements and agreed to clean production programs accepted globally. The percentage of sewage treated in Chile leapt from 17% in 1997 to 81% in 2005, and by 2010 almost all the country's sewage is likely to be treated.

*Source:* Water and Sustainable Development: Lessons from Chile, Policy brief prepared by Sandy Williams and Sarah Carriger under the direction of the GWP Technical Committee.

**Uganda - National level: IWRM and Water Efficiency Plan**

- *Issues:* In the 1990's deteriorating quality and quantity of water resources due to poor land use practices and inadequately regulated use of water and discharge of waste water. Inadequate legal and institutional framework for WRM. Reform in the light of decentralization goals. Increased stakeholders' involvement in WRM at both national and local levels is required.
- *IWRM actions:* The National Water Resources Management Strategy is being implemented at both national and local levels. Institutional arrangements at national level involving a 12 member high level Water Policy Committee is being revitalized and the Department of Water Resources Management has been elevated to a Directorate in the Ministry of Water to strengthen the position of water resources management. At local level, catchment management organizations involving a Catchment Advisory Committee, Catchment Secretariat, Stakeholder Forum and Water User Committee are being piloted in one catchment before roll out to a wider part of the country in 2008.
  - Strengthening water resources management framework involving water resources assessment and monitoring networks and regulation of use and pollution of water resources through continued implementation of a water permits system
  - Improvement of the enabling legal and institutional framework for WRM at both national and local levels
  - Decentralisation of management of water resources to catchment management zones.
- *Tangible impacts:* An enabling legal and institutional framework for WRM is in place; Water resources assessment and monitoring networks and a water permits system are fully operational and Piloting of decentralisation of WRM to catchments is almost complete and roll out to a wider part of the country will be done in 2008

*Source:* Adapted from WWDR number 2 http://www.unesco.org/water/wwap/wwdr/wwdr2

## 4.6 THE DEVELOPMENT OF INDICATORS

There is a recognized need to develop a set of indicators which would characterize the status of implementation of the IWRM approach within countries. There have been many attempts to produce indicators which would adequately encompass diverse situations and the very different time scales at which implementation is taking place. The process is highly complicated and challenging. Moreover, this has to be considered in the light of established reporting mechanisms, e.g. UN-Statistics, and avoid adding onerous reporting demands on national governments.

UN-Water, has undertaken a major initiative through the World Water Assessment Programme to develop a comprehensive set of indicators - summary of progress is documented in the Second World Water Development Report.

To further develop suitable indicators UN-Water has established a Task Force on Indicators, Monitoring and Reporting. Many indicators already exist to measure social

progress and the aim is to add value to these and not reinvent the wheel. A summary of progress made to date by the many agencies and organizations involved has been produced by UNEP-UCC and is found in Annex 7. The Roadmapping initiative, being developed concurrently with this Report and complementary to it, lays out a timetable over the next seven years for the development of an achievable set of indicators including those specifically related to IWRM, see http://www.unwater.org.

# 5.0 Key lessons learned and future actions

The UN-Water Survey provides the best and most objective comprehensive overview of the current status of water resources management. Care must be exercised in interpreting the results for the following reasons:

- Many of the very poorest of countries were not able to complete the surveys - in this sense the results are biased;
- There was only one partial response from the South Asia region and the East Asia region was only represented by China - this is a major short-coming of the data set;
- It is not certain that questions were interpreted in exactly the same way by different countries; indeed there may be bias in that the least developed countries may make unreasonably positive interpretations of their achievements while more developed countries may have been more self-critical in their answers;
- From the comparison of answers from the UN-DESA and UNEP questionnaires for those countries that completed both it is clear that in many countries different answers may be given to very similar questions indicating differing interpretations between government departments or between individuals within the same department;
- Several of the questions are simply not relevant to particular countries; for example transboundary issues are of no relevance to countries that share no international borders, countries in non-arid regions are not concerned with desertification, land-locked countries are usually not concerned with desalination etc.

Despite these short-comings, many of which are almost inevitable given the complexity of circumstances, useful conclusions can be reached especially when comparing regions and sub-regions:

**Key conclusions:**

**Developed countries:** They have advanced on almost all major issues, however, there is still much room for further improvement.

- Of the 27 countries responding to the UN-Water Survey only 6 claim to have fully implemented national IWRM plans; a further 10 of those countries claim to have plans in place and partially implemented.
- The Report indicates that developed countries need to improve on public awareness campaigns and on gender mainstreaming.

**Developing countries:** There has been some recent improvement in the IWRM planning process at national level but much more needs to be done to implement the plans.

- Of the 53 countries for which comparison was made between the GWP and the UN-Water surveys (conducted approximately 18 months apart), the percentage of countries having plans completed or under implementation has risen from 21% to 38%. On this measure the Americas have improved most - from 7% to 43%; the comparable changes for Africa were from 25% to 38% and for Asia from 27% to 33%. However, some of the change may be due to differences in the questionnaires.
- Africa usually lags behind Asia and the Americas on most issues, however it is more advanced on stakeholder participation and on subsidies and micro-credit programs;
- Asia is more advanced on institutional reform and yet lags behind in institutional coordination.

**Case studies:** There are many illustrations of the tangible benefits of implementing plans that have adopted the IWRM approach. There are examples at the national and international levels; of particular significance are the examples at the community and provincial levels for it is at these levels that so many societal gains can be made.

**Water efficiency:** It is clear that many countries consider that plans that follow an IWRM approach automatically also include water efficiency measures. There was considerable ambiguity in the responses concerning water efficiency in large measure reflecting diverse situations. It is recognised that taking actions that make water use more efficient is beneficial for economic and social development and, although many countries indicated through the questionnaires that water efficiency measures were not relevant to their particular circumstances, it should not be implied that such measures should not be considered necessary. It can be concluded from this survey that much more effort needs to be made to incorporate explicitly water efficiency measures within the framework of IWRM.

**Development of indicators:** A great deal of effort has gone into the development of a set of indictors that meet the requirements of being specific, measurable, attainable, relevant, realistic and timely but more work is required. The Roadmapping initiative, being developed concurrently

with this Report and complementary to it, is intended to help countries focus on the steps to be taken towards better water management, drawing inspiration from the IWRM principles and the plans and strategies that they have prepared to help catalyze change. At regional and global levels, the roadmaps could serve as benchmark for monitoring progress in improving water resources management. Indicators and monitoring could provide countries with a better assessment of the needs to advance in their implementation of IWRM.

**Recommendations:**

The survey indicates that more emphasis is needed in the following areas:

- Countries, particularly those that are lagging behind, need to prioritise the development of IWRM and water efficiency measures, with the help of supporting agencies;
- Countries need to prioritise the implementation of policies and plans once they have been developed;
- Countries should establish roadmaps and financing strategies for the implementation of their plans with External Support Agencies (including the UN, donors and NGOs) providing support to countries, based on demand;
- Experiences in implementing IWRM should be evaluated, monitored and shared through global coordination mechanisms. This will require more work on indicators and follow-up processes that do not add an undue reporting burden on countries.
- The UN World Water Assessment Programme and its associated World Water Development Reports should continue to provide an up-to-date global overview of progress on implementing the IWRM approach.

# 6.0 List of Annexes

Annexes are to be found on the UN-Water website at: http://www.unwater.org/

Annex 1 Guiding Note and IWRM Questionnaire Sent to Countries to seek information on Implementation of IWRM and Water Efficiency Plans as Part of Their Reporting to CSD-16

Annex 2 Cover letters from UN-DESA regarding UN-DESA Questionnaire

Annex 3 Questionnaire from UN-DESA

Annex 4 Questionnaire from UNEP-Collaborating Centre

Annex 5 Questionnaire from GWP

Annex 6 Questionnaire from African Development Bank

Annex 7 Indicator development for IWRM by UNEP- Collaborating Centre

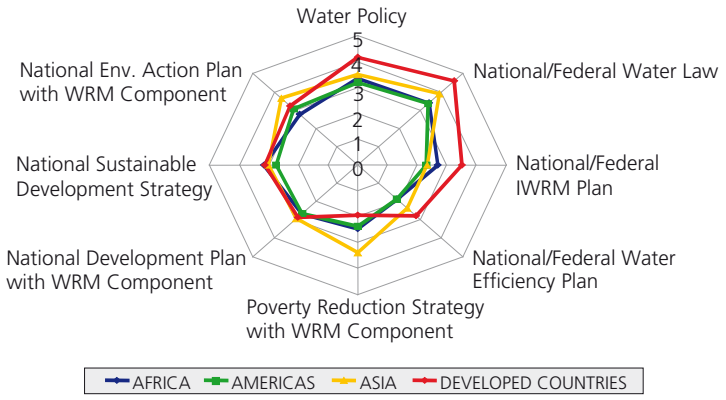
Annex 8 Database comprising the following worksheets:

- Response summary for all surveys
- Responses to UN-Water Survey
- Responses to UNEP questionnaire
- Text responses to UNDESA questionnaire
- UNDESA - UNEP comparison
- GWP and UN-Water comparison

# Appendix
# Diagrams showing Regional and Sub-Regional comparisons

## 1 COMPARISON OF DEVELOPED COUNTRIES WITH THE REGIONS OF AFRICA, THE AMERICAS AND ASIA

**Main National Instruments and other Strategies - All Regions**



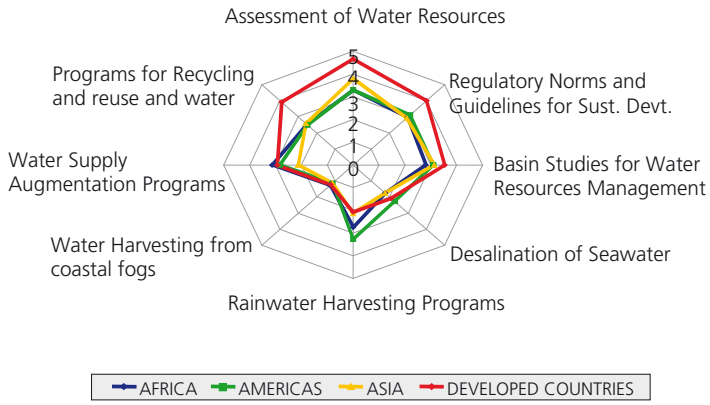

**Main National Instruments and other National/Federal Strategies that may contribute to promoting IWRM - Summary Statistics for all Regions**

Developed countries significantly more advanced on main national instruments

Asia and the Americas more advanced on national development plans and national environmental action plans with IWRM component

Of developing countries Africa least advanced with poverty reduction strategies with WRM component

**Water Resources Development - All Regions**

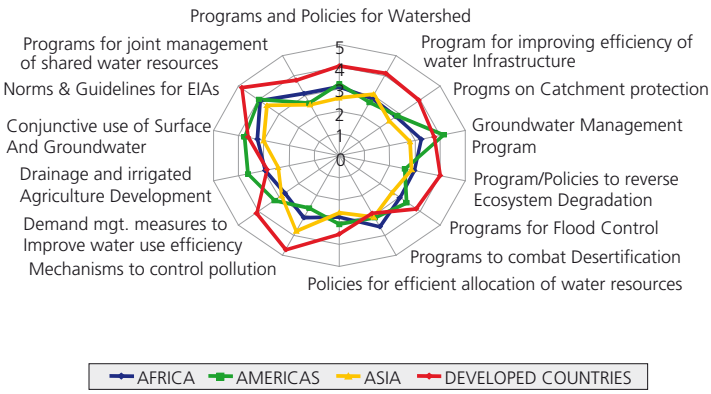



**Water Resources Development - Summary Statistics for all Regions**

Developed countries more advanced on most issues, but, as expected, not for rain-water harvesting

Asia more advanced than other developing regions for WR assessment

**Water Resources Management-Summary Statistics for All Regions**

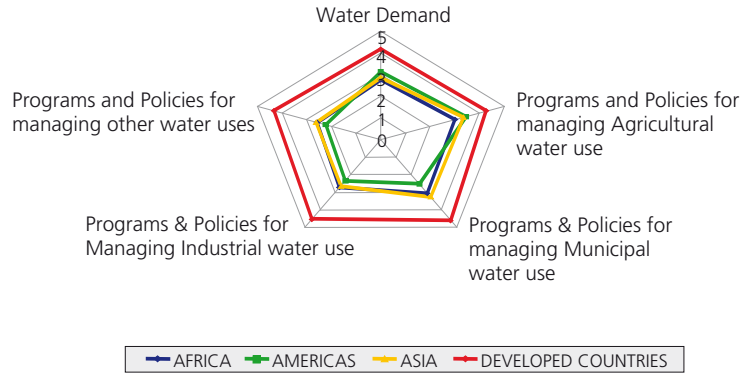



**Water Resources Management - Summary Statistics for all Regions**

Developed countries significantly more advanced except in the less relevant areas of combating desertification and irrigated agriculture

Developing regions very similar except the Americas more advanced in programs and policies for watershed management, groundwater management and drainage and irrigation; Asia more advanced in legislative mechanisms to control pollution

**Water Use-Summary Statistics for All Regions**

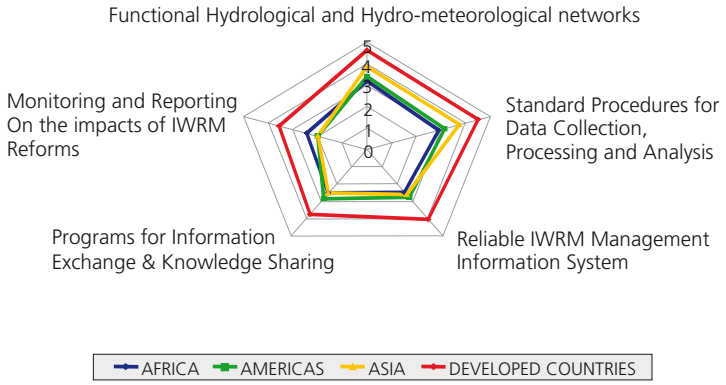



**Water Use - Summary Statistics for all Regions**

Developed countries significantly more advanced

Africa consistently less advanced than other regions

**Monitoring, Information Management & Dissemination - All Regions**

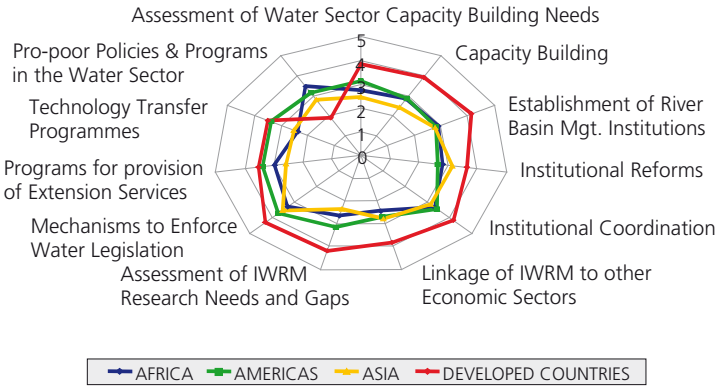



**Monitoring, Information Management and Dissemination - Summary Statistics for all Regions**

Developed countries significantly more advanced

Asia more advanced than the Americas which in turn are more advanced than Africa on all issues except monitoring and reporting the impacts of IWRM reforms where Africa is more advanced

**Capacity Building and Enabling Environment - All Regions**




**Capacity Building and Enabling Environment - Summary Statistics for all Regions**

Developed regions significantly more advanced on all issues except Pro-poor policies which are designated not relevant by many developed countries

Similar responses from developing regions with some interesting contrasts - eg Asia more advanced on institutional reforms yet behind on institutional coordination mechanisms

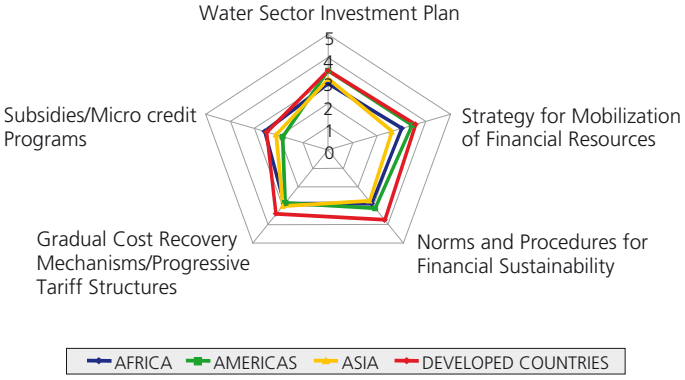
**Stakeholder Participation - Summary Statistics for all Regions**


**Stakeholder Participation - Summary Statistics for all Regions**

Developed countries more advanced except on programs for gender mainstreaming and on public awareness campaigns

Africa more advanced than other developing regions on all issues except lower than Asia on mechanisms to resolve transboundary water issues

**Financing - Summary Statistics for all Regions**




**Financing - Summary Statistics for all Regions**

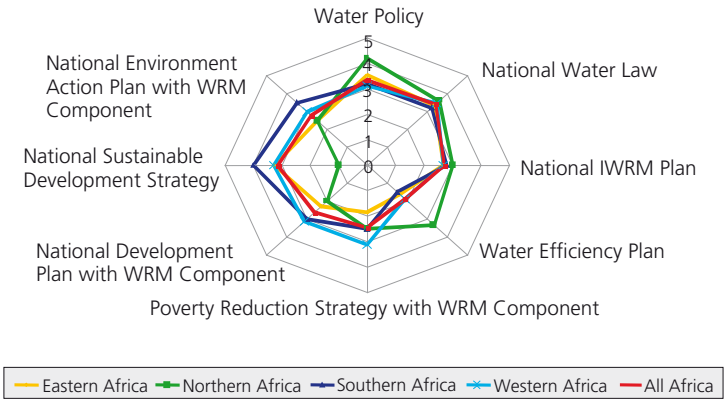
Developed regions slightly more advanced

Of the developing regions Asia behind on strategies for mobilizing financial resources and on norms and procedures for financial sustainability; Africa significantly more advanced on subsidies and micro-credit programs

## 2 REGIONAL ANALYSES AND INTER-COMPARISONS FOR AFRICA, THE AMERICAS AND ASIA

### 2.1 Main National Instruments and other National/Federal Strategies that may contribute to promoting IWRM

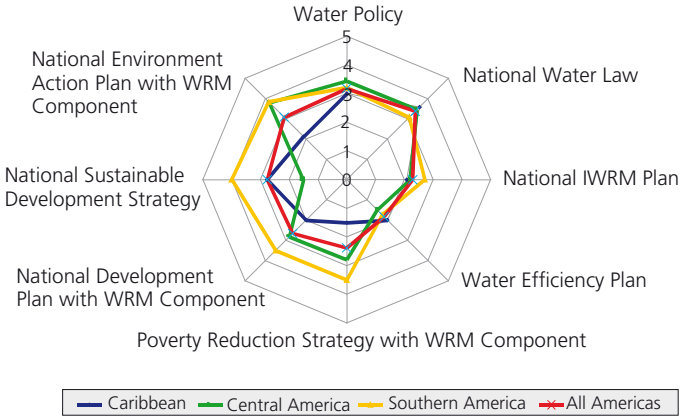
**Main National Instruments & other Strategies - Africa Region**




**Main National Instruments and other Strategies - Summary Statistics for Africa**

Countries of N Africa score significantly higher on main national instruments while countries of S Africa score higher on plans with IWRM components and on sustainable development strategies

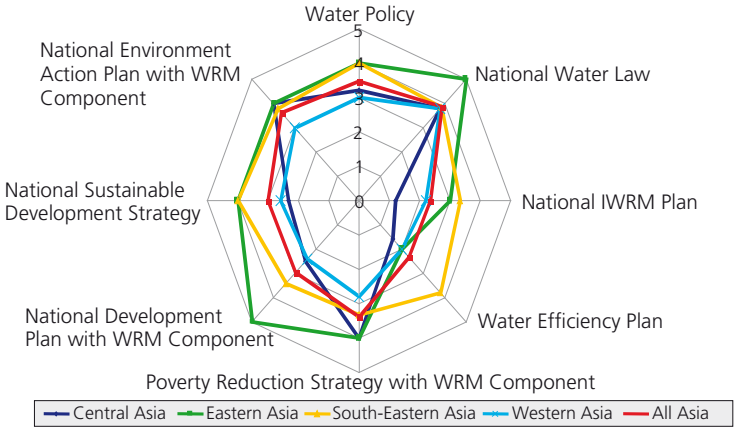
**Main National Instruments and other Strategies - Americas**




**Main National Instruments and other Strategies - Summary Statistics for Americas**

Major differences between Caribbean countries and countries of S America - Caribbean much higher on main national instruments; S America much higher on other plans contributing to IWRM

**Main National Instruments and other Strategies - Asia**




**Main National Instruments and other Strategies - Summary Statistics for Asia**

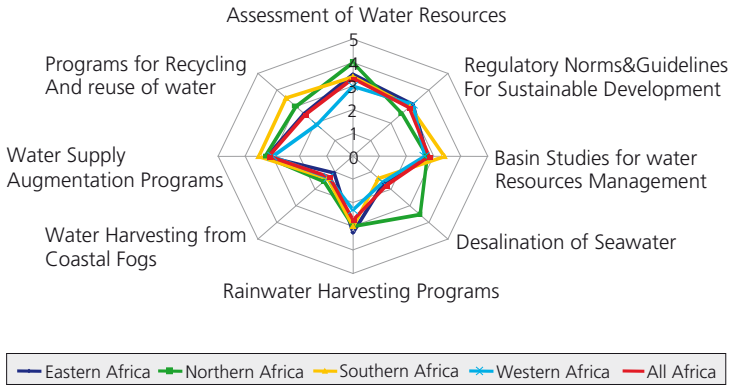
W Asia: generally low scores all round

SE Asia high on national/federal IWRM and water efficiency plans in contrast to Central Asia

Note: countries of S Asia not represented at all; for E Asia only China represented

## 2.2 Water Resources Development

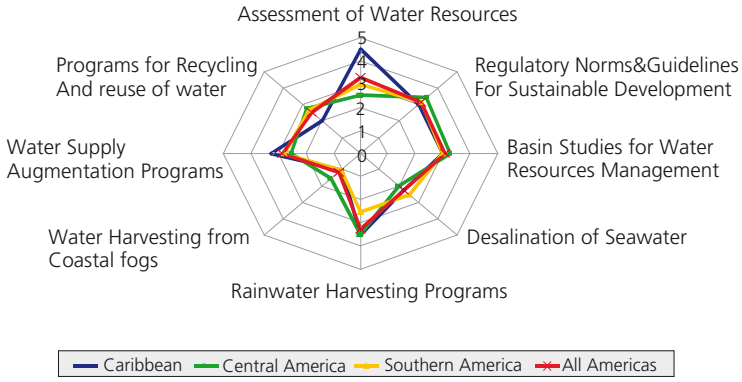
**Water Resources Development - Summary Statistics for Africa**




**Water Resources Development - Summary Statistics for Africa**

Note: several issues (eg desalination and coastal fog harvesting) not relevant to many countries - otherwise very similar responses

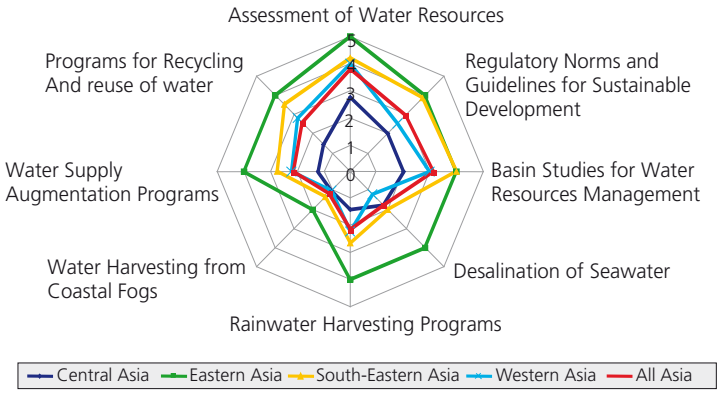
**Water Resources Development - Summary Statistics for Americas**




**Water Resources Development - Summary Statistics for Americas**

Similar responses except for Caribbean countries which rank high for assessment, regulatory norms and basin studies but low on recycling

**Water Resources Development - Summary Statistics for Asia**

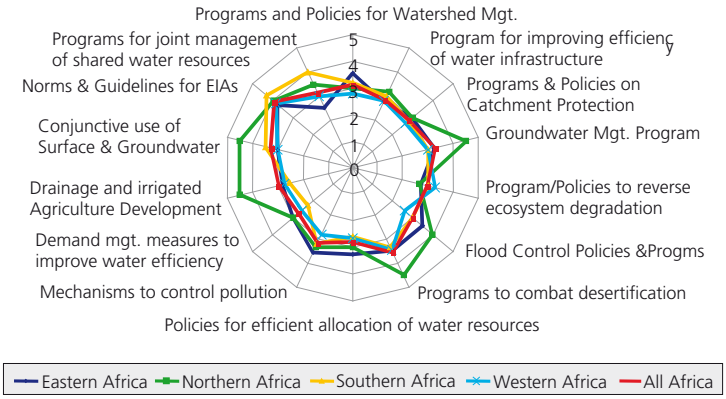



**Water Resources Development - Summary Statistics for Asia**

Here a definite consistent hierarchy of responses from China with highest scores through SE Asia, W Asia to Central Asia with lowest scores

## 2.3 Water Resources Management

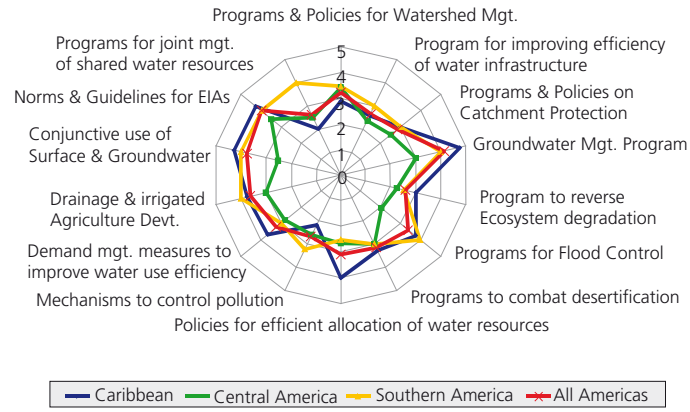
**Water Resources Management - Summary Statistics for Africa**




**Water Resources Management - Summary Statistics for Africa**

Very similar responses overall except for N Africa which, as would be expected in arid environments, has higher scores on groundwater, desertification and irrigation issues

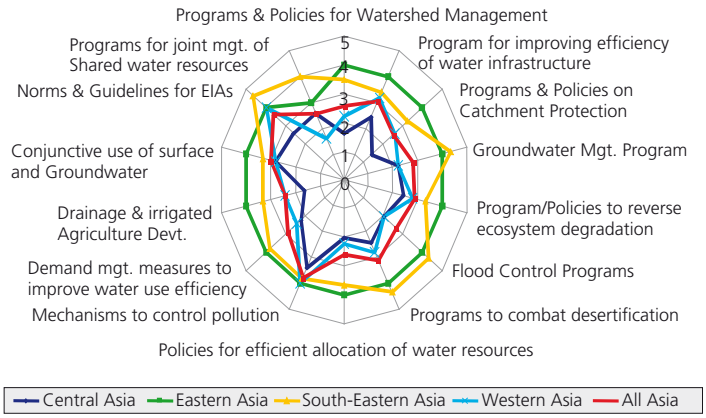
**Water Resources Management - Summary Statistics for Americas**




**Water Resources Management - Summary Statistics for Americas**

A consistent hierarchy of scores - Caribbean being consistently highest (except, as expected, in shared management of resources); Central Americas being consistently lowest

**Water Resources Management - Summary Statistics for Asia**

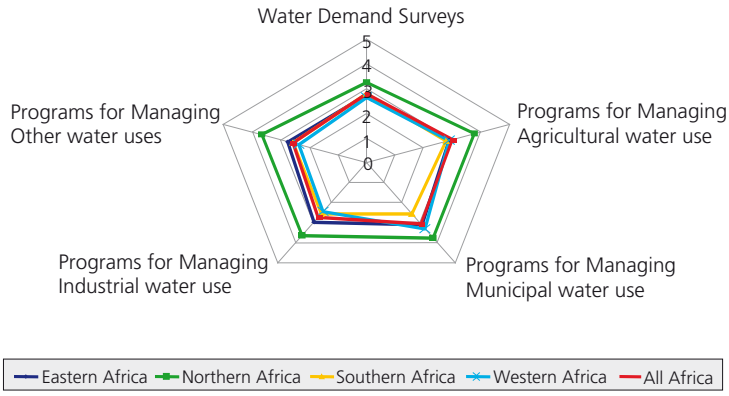



**Water Resources Management - Summary Statistics for Asia**

A consistent hierarchy of responses with E and SE Asia having high scores and Central Asia having low scores

## 2.4 Water Use

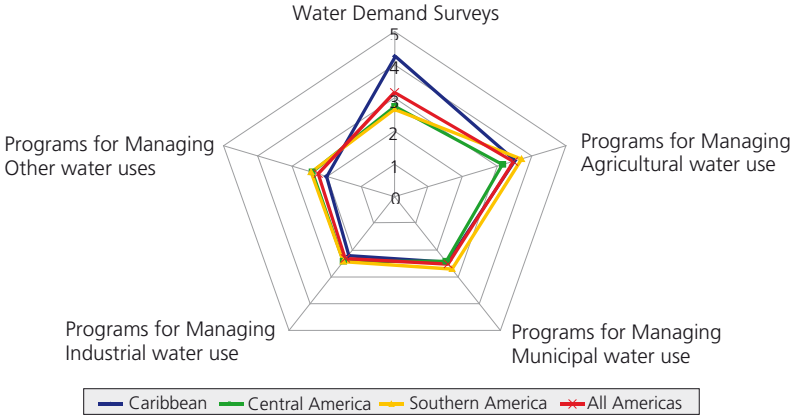
**Water Use - Summary Statistics for Africa**




**Water Use - Summary Statistics for Africa**

Northern Africa consistently higher scores than other African regions which display similar responses

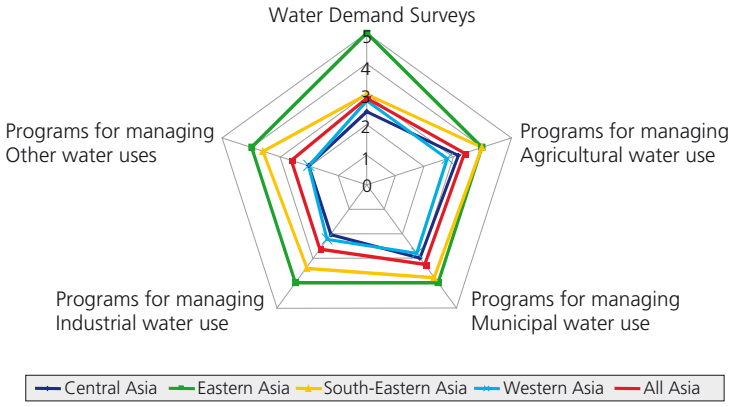
**Water Use - Summary Statistics for Americas**




**Water Use - Summary Statistics for Americas**

Caribbean countries have significantly higher scores than other regions of the Americas

**Water Use - Summary Statistics for Asia**

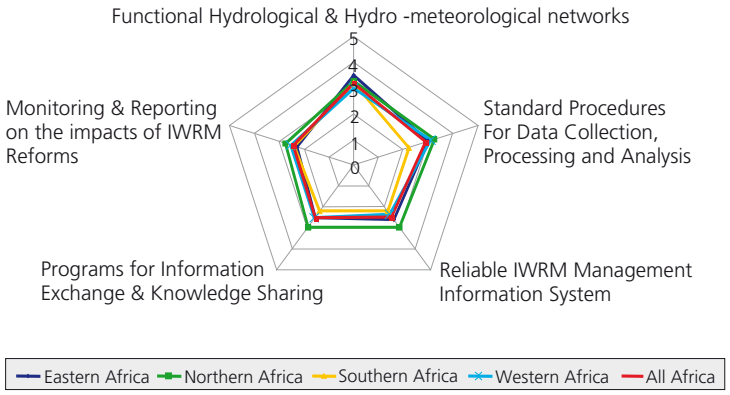



**Water Use - Summary Statistics for Asia**

East and South East Asia consistently higher than Central and West Asia

## 2.5 Monitoring, Information Management and Dissemination

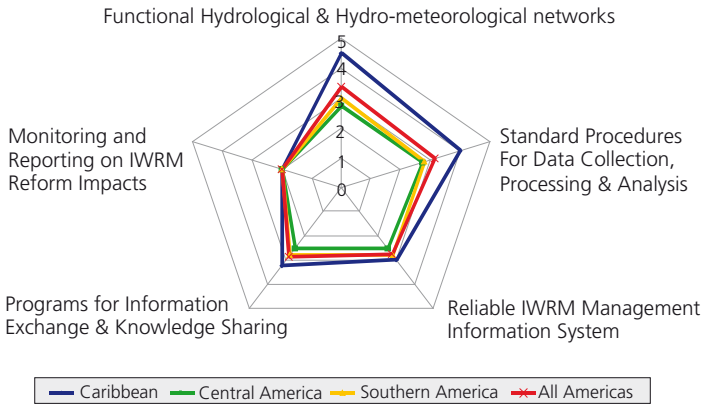
**Monitoring, Information Management and Dissemination - Africa**




**Monitoring, Information Management and Dissemination - Summary Statistics for Africa**

N Africa consistently higher scores than other African regions which display similar responses

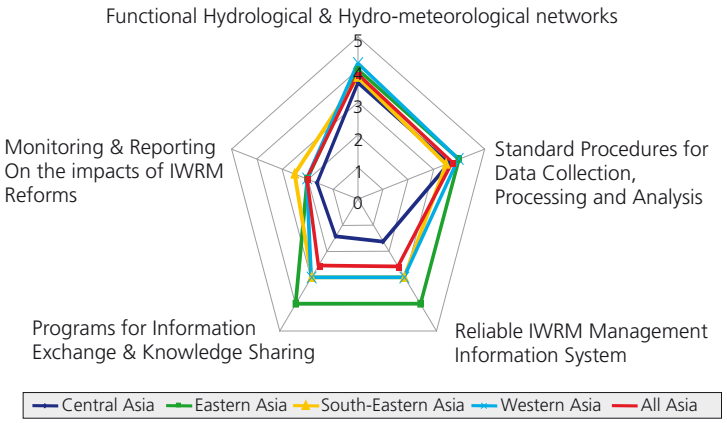
**Monitoring, Information Management and Dissemination - Americas**




**Monitoring, Information Management and Dissemination - Summary Statistics for Americas**

Caribbean highest on most measures

**Monitoring, Information Management and Dissemination - Asia**

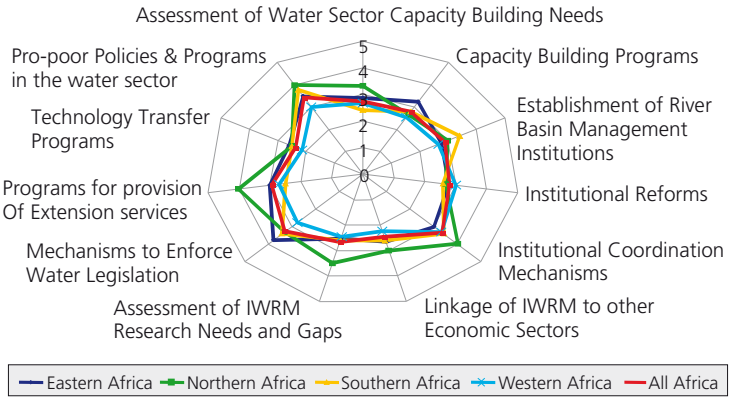



**Monitoring, Information Management and Dissemination - Summary Statistics for Asia**

Central Asia generally has lowest scores

## 2.6 Capacity Building and Enabling Environment

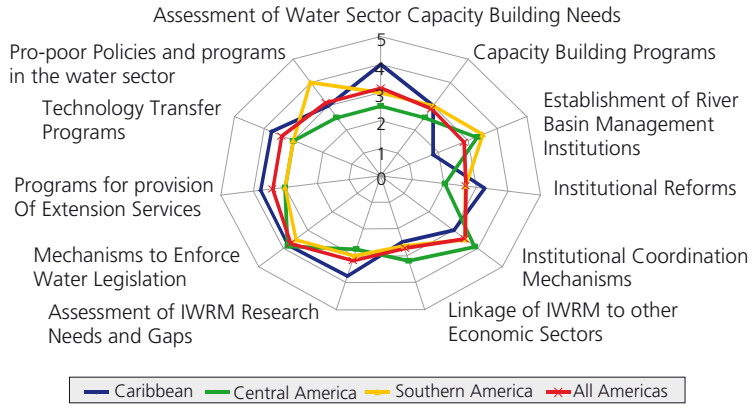
**Capacity Building and Enabling Environment - Summary for Africa**




**Capacity Building and Enabling Environment - Summary Statistics for Africa**

Similar responses - N Africa highest on some responses

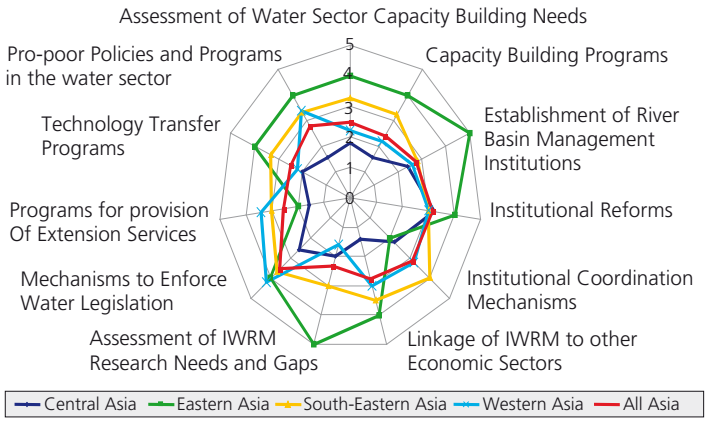
**Capacity Building and Enabling Environment - Americas**




**Capacity Building and Enabling Environment - Summary Statistics for Americas**

Caribbean generally highest

**Capacity Building and Enabling Environment - Summary for Asia**

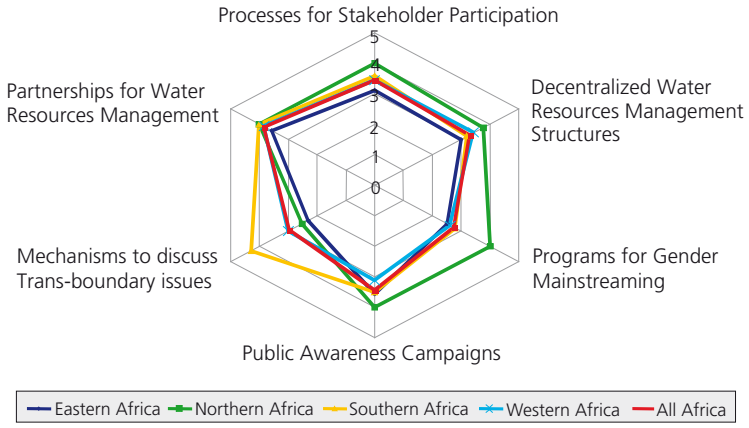



**Capacity Building and Enabling Environment - Summary Statistics for Asia**

E and SE Asia generally with highest scores, Central Asia with lowest

## 2.7 Stakeholder Participation

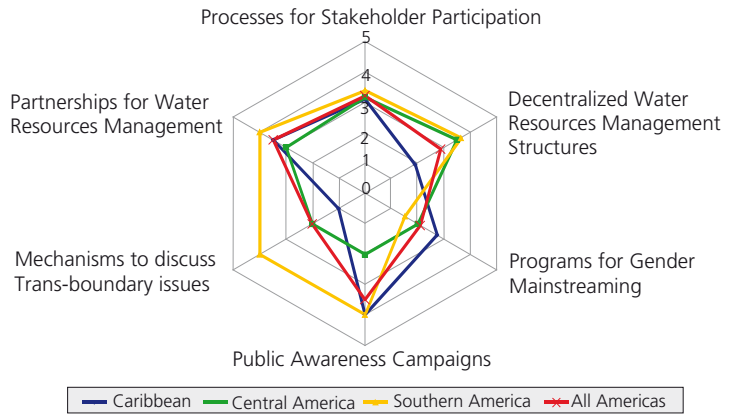
**Stakeholder Participation - Summary Statistics for Africa**




**Stakeholder Participation - Summary Statistics for Africa**

N Africa generally highest, E Africa lowest

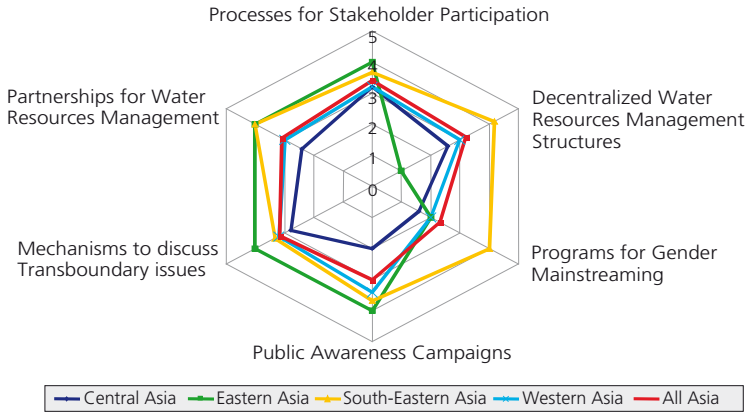
**Stakeholder Participation - Summary Statistics for Americas**




**Stakeholder Participation - Summary Statistics for Americas**

Central America generally low scores. Transboundary and decentralized management structures not so relevant for Caribbean countries

**Stakeholder Participation - Summary Statistics for Asia**



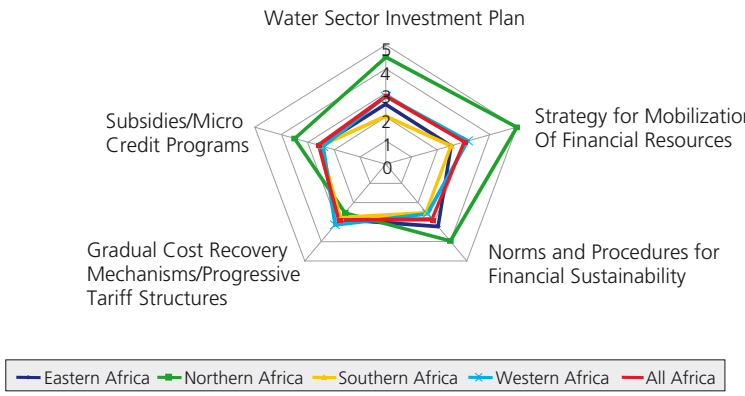

**Stakeholder Participation - Summary Statistics for Asia**

E and SE Asia generally high; Central Asia lowest

Note: low scores in China for decentralized management structures

## 2.8 Financing

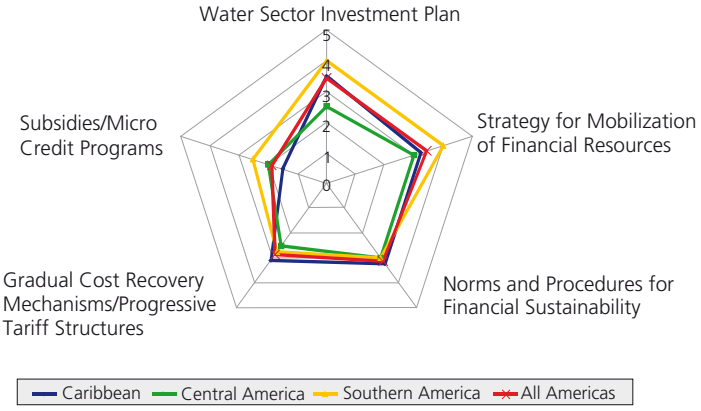
**Financing - Summary Statistics for Africa**




**Financing - Summary Statistics for Africa**

N Africa generally higher scores; not many differences for other African regions

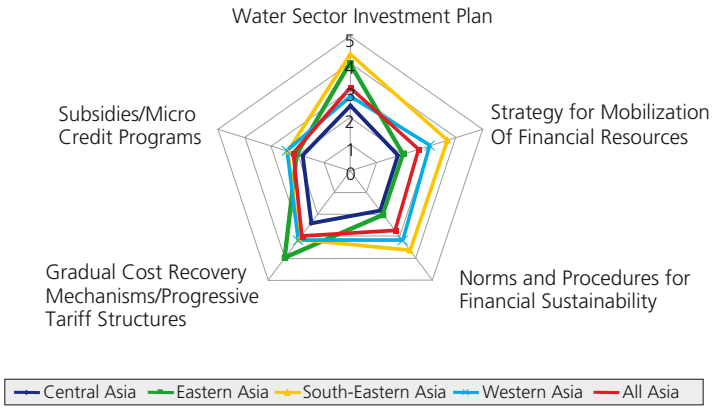
**Financing - Summary Statistics for Americas**




**Financing - Summary Statistics for Americas**

S America generally with highest scores except for Caribbean with gradual cost-recovery mechanisms and strategies

**Financing - Summary Statistics for Asia**




**Financing - Summary Statistics for Asia**

SE Asia generally highest; Central Asia lowest