



5th World Water Forum

Ministerial Process

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Ministerial Conference Discussion Paper

Water Management Adaptation Strategies for Global Changes, including Climate Change/Variability

Turkish Ministry of Foreign Affairs

World Water Council

5th World Water Forum

Ministerial Process

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Water Management Adaptation Strategies for Global Changes, including Climate Change/Variability

Background

1. The Ministerial Declarations of the past World Water Fora have been important contributions in laying down the world's priorities concerning water resources and services. Yet, water-related problems still persist, and are even becoming more significant as a result of global changes affecting, in particular, the economy, the demography and the state of natural resources. There is thus a need to accelerate action by all actors to make progress towards creating a water-safe environment for the world's citizens.

2. This Ministerial Conference Discussion Paper is designed to initiate and promote dialogue during the Preparatory Committee Meeting (PrepComs) series that begins on 11-12 September 2008 at UNESCO Headquarters in Paris. The Ministerial Declarations of the past have focused on higher principles and reinforcing what has been stated in previous Declarations. The goal of this Discussion Paper is to go beyond those statements and create an agenda for action by national governments to address the critical areas of water resources management, governance and finance.

3. This **Ministerial Agenda** intends to set a program for action to prioritize water on the political agenda. It will especially focus on "**Water Management Adaptation Strategies for Global Changes including Climate Change/Variability**". It is not intended to be a binding document for governments but has two major objectives:

- To help and guide governments to adjust their priorities and actions plans according to the difficulties they face; and
- To provide substantive contributions to the intergovernmental processes in place such as the UN-CSD or the various COPs' negotiations.

4. The Discussion Paper is configured to "mirror" the Thematic Programme of the 5th World Water Forum to make the connection between the technical side of the Forum and the political, "Bridging Divides for Water", the over-arching theme of the 5th World Water Forum. Contributions were made directly by the Thematic, Topic and Regional Coordinators of the 5th World Water Forum and other significant international meetings and Regional Summits and consolidated into a single text which outlines the issues the world is facing with regards to water as well as objectives to address those issues. The Ministerial Agenda also takes note of the Istanbul Urban Water Consensus, a voluntary commitment of cities around the world undertaken in connection with the 5th World Water Forum.

¹ This Discussion Paper was prepared by the Political Process Committee of the International Steering Committee of the 5th World Water Forum for submission to the 1st Preparatory Committee Meeting of the Ministerial Conference to take place 11-12 September 2008 at UNESCO Headquarters in Paris, France, based on the outcomes and recommendations of a number of technical and political meetings, such as symposia, conferences, summits and regional water fora held until present ([see list in Annex 1](#)). The outcomes of 5th Forum-related events to be organized later during 2008 will directly be tabled at the subsequent sessions of the PrepCom or will be built in directly to the draft text of the Ministerial Agenda prior to PrepCom III.

The problem

5. The world is facing changes at a faster rate than ever seen before. These changes such as population growth, migration, urbanization, land-use changes and climate variability/change will drive the way in which water resources need to be managed in the future. They also call for concrete contributions from water policies and actions to help the world cope with these changes. While climate change has been the most talked about topic, other changes taking place will likely affect water resources and services and their management to a much greater degree. The population of the planet will increase by 50%, meaning 3 billion additional inhabitants, by 2050. More than half of the world's population now lives in cities, and this increasing urbanization is set to continue. Population will continue to increase as will rural-urban migration, adding difficulty to reach the agreed Millennium Development Goals (MDGs) on water supply and sanitation and increasing pollution at the same time. The demand, and probably prices, of natural resources and energy will increase as the planet's inhabitants grow in number and consumption increases. Humans are altering global systems at a rate not previously experienced.

6. Critical issues have recently been the focus of politicians and media alike. Oil prices, food prices and water-related disasters. **What the world is not talking about is how these are related to, impact on and are affected by water.** There is an inextricable link between all of these issues and water yet the connection is not being made at a higher level, which endangers not only water resources, but humans and their livelihoods as well. It is not well understood within political arenas that water resources are among the important factors that drive the current changes, affecting nations as well as local communities. This adds to the already high impact of polluted water affecting billions of people. With the onset of global changes, the world must confront these issues urgently so as not to let both lives and economic well-being slip through our fingers.

7. These messages have to be taken to those outside of the "water box", which include the highest political levels. The cross-cutting nature of the water sector makes it an important resource for other interests. Often, decisions affecting water are not in the hands of water professionals but in the hands of decision makers in related sectors. The water sector must help inform these decision makers in order for them to make more sound choices about how they utilize water in their activities.

8. Throughout history, water actions have been societies' main activity to adapt to changes in climate and nature. Water actions have been the means by which decision makers create ways to avoid large scale social disruption and violence under the shock of events with too much or too little water. The 5th World Water Forum offers the opportunity to help create a framework for assisting nations and communities to mitigate for and adapt to those global changes. The situation has already been critical for decades, but national and local governments are not prepared for the changes that will occur, potentially making a worse situation. Let us set the agenda now while we have the opportunity.

Theme I: Global Changes and Risk Management

9. Traditionally water management was the art of matching water resources with the present and projected water needs of people, food, economies and environment. The balancing act of water management was performed on the assumptions of stationary variability in total water availability and of a distinct development in water demand.

10. This assumption is proving to be too simple. Water security and water related disasters are linked to global dynamics such as migration, climate change and virtual water flows and that water security is also closely linked to energy security and food security. The theme “global changes” will address the compounding nature of global drivers in particular climate change and migration on water resources management and water services, and will address the management of the increasing risks due to water related disasters.

11. The bottom line message of the theme “global change” is that water management will have to go beyond the “water box” to address the evolving complexities and by developing innovative governance modalities, financing mechanisms and technologies in combination with capacity development and transfer programmes for the vulnerable societies.

Element 1: Adapting to Climate Change

12. Many of the impacts of climate variability and change will be manifested on water resources. The hydrological cycle is part of the earth system and it is that part that will likely be most affected by climate change and, with its ties to development, human security and environmental integrity, will test the resiliency of humans’ institutions, preparedness and survival.

13. The potential impacts of climate change on hydropower, agriculture, livelihoods and human security need to be addressed in order to adapt to the likely future changes the world will witness in water shortage and abundance extremes. The uncertainty that accompanies climate change reinforces the difficulty to take decisions aiming at adapting to situations and tensions expected in the medium and long term, while urgent problems also need to be tackled.

Objectives:

14. **Think outside the “water box”.** Climate change affects not only the hydrological cycle, but areas that are closely related to water. An integrated approach to address how water can play a role in mitigating the impacts of climate change, synergize adaptation mechanisms and bolster disaster preparedness and management on issues such as food security, energy security, economic development and equity is required. Water is more affected by food, energy policies than by water policies themselves. It is recommended that the water community finds ways to help politicians and experts of the other sectors to understand the water dimensions and impact of their policies better. It is also recommended that national governments, including ministries of agriculture, forestry, finance, energy and other sectors “outside the water box”, take into consideration the impacts of their policy choices on the hydrological cycle that affects populated and urban areas in conjunction with the efforts being made by the signatories of the Istanbul Urban Water Consensus.

15. **Increase the flexibility of water management practices.** A three-pronged approach is necessary when addressing water resources in the face of climate change. Traditionally, demand for water resources has been met with increased supply and supply management (1). This has changed recently to include demand-side management (2). Combining the two methods into a “portfolio” approach (3) creates more options for adaptation and increases flexibility.

16. **Develop national and sub-national adaptation strategies.** National and sub-national strategies need to be developed for adaptation to climate change and variability. Assessments of needed infrastructure for adaptation should be carried out and then required infrastructure planned

and financed. Unique approaches besides large-scale infrastructure should be taken into consideration, not only because of potential impacts, but also the long time frame for construction. Groundwater carries a buffering capacity against climate change and variability; therefore groundwater management should be part of the national strategies. Hydropower development and inland navigation needs to be revisited and developed as both mitigation and adaptation measure. Support cities and local authorities as they develop and implement adaptation plans under the Istanbul Urban Water Consensus. Projections of climate change impacts should be downscaled and localized to provide relevant information to policy makers and water managers responsible for major urban areas.

17. Re-design education and training of water professionals. To help the water resources sector adapt to climate change, sector professionals should be educated in probabilistic decision-making tools adapting to changing climatic conditions as well as to transfer both soft and hard technology to lower-level water managers, especially in developing countries. In addition, water practitioners should be trained in climate change risk assessments and be well-advised to ensure that climate information is tailored to their needs on the local, regional and national levels.

18. Scale up investment efforts in storage capacity and IWRM. As water relates to climate change, investment efforts should be scaled up in infrastructure and IWRM. Knowledge of the impacts should be communicated, capacity-building carried out and cooperation at the international, national, regional and local levels, including river basin organizations (RBOs) should be increased. Investments in sustainable integrated water resources management need to be increased to build resilience to climate changes. And all of these require data collection and dissemination to best address the issues.

19. Design infrastructure projects in anticipation of climate change. International and national funding institutions should require the size and design of new or renewed urban infrastructure projects to anticipate the likely effects of climate change and variability, in support of the Istanbul Urban Water Consensus. Infrastructure should be redesigned and re-engineered as necessary to withstand extreme events and to perform under changed circumstances.

20. Develop long-term scenarios and strategies for action in all planning activities. To cope with the impacts of increasing climate variability and climate change on water and livelihoods including the uncertainties, a longer term horizon is required, beyond the planning horizon adopted by the Millennium Development Goals (2015).

21. Incorporate climate change assessments in National Water Plans. At the national level, integrate an assessment of climate change impacts into National Water Plans and create adaptation measures in line with those impacts for sustainable water security in social, environmental and economic needs.

22. Create an international task force. To address many of these levels and bring them to the highest political level, internationally and nationally, a task force is required, which would include relevant intergovernmental institutions and international water institutions. This group would be tasked with advising on national governments long-term strategy and adaptation measures and to develop further and monitor implementation of the Bali action plan on adaptation. Different working groups under the task force would be necessary to address the unique needs of developing countries, Small Island Developing States (SIDS), etc.

Element 2: Water-related Migration, Changing Land Uses, Human Settlements and Water

23. Environmental changes induced by the relative rapidity of current global changes present a new threat to human security and a new situation for migration and settlements. Water-related problems — flooding, intense storms, drought, and more gradual but similarly intense changes in regional climates — place growing stress on livelihoods, including security, poverty and unemployment.

Faced with an unconceivable scale of environmental change and water problems, migration may be an adjustment mechanism of first resort, or a survival mechanism of last resort, especially in developing countries. As a result, land-use changes will occur and there will likely be an increase in urbanization and slum residence.

Objectives:

24. Improve the knowledge base on the change of water-related population dynamics. As the window for identifying appropriate adaptation pathways to global changes narrows, it is imperative to address how changing climatic and environmental conditions affect individual and group decisions to migrate. Assembling data and relevant scientific information on the subject is pertinent in order to develop strategies to manage migration.

25. Strengthen institutions and policies, which bolster resilience in populations. The magnitude of future environmentally induced migration depends in part on longer term environmental and development policies. A failure to meet the Millennium Development Goals and a simultaneous failure to reduce greenhouse gas emissions contributing to climate change could unleash an unprecedented wave of migration which can fuel conflict. In contrast, if both environmental and development policy achieved international targets, a much smaller number could be expected to migrate. Thus policies are needed which strengthen resilience, systematically reduce the incentive structures that drive environmental degradation, improve livelihood opportunities and provide enhanced risk management capacities in regions at risk.

26. Increase awareness about the impact of environmental degradation. Knowledge about degradation of water resources and climate change can prevent governments, migrants, and potential migrants against losses in human security. As some environments become inhospitable to people, people will be pushed to move elsewhere, whether from uncontrolled migration to resettlement programs, where their locally specific knowledge may no longer apply to the places where they migrate. Awareness can help avoid poor adaptation.

27. Develop early monitoring systems. Effective monitoring strategies have proven to be helpful in mitigating some of the effects of environmentally-induced changes. Taking stock of and improving existing monitoring systems and developing new and innovative ones that take into consideration socio-economic, political, cultural factors will reduce the number of displaced persons due to environmental changes.

28. Improve legal frameworks. Debate about including environmentally induced migrants—“climate refugees” or “environmental “refugees” or “environmentally displaced people”—within international treaties should progressively help develop a new international legal instrument or modify existing ones to protect the human rights of individuals and/or communities whose displacement stems mainly from environmental factors.

29. Provide adequate humanitarian response. Environmental changes may result in substantial human movements, which will require sufficient humanitarian efforts to avoid escalating crises. Natural disasters will displace large numbers of people temporarily, while the steady and continuous impact of climatic stressors will permanently displace many more people over an extended period. In the face of environmental stressors, assistance must be in place to prevent crisis and maintain peace among resource-stressed and possibly poverty-stricken groups on the move.

Element 3: Managing Water-related Disasters

30. With over 90% of deaths resulting from natural disasters attributed to water-related disasters, droughts and floods being the primary killers, and millions of people affected, especially among the poorest, these disasters are serious impediments to sustainable development and poverty reduction. Huge economic losses can be ascribed to water-related disasters, including massive impacts to

infrastructure, shelter, health and food production, thereby reducing the human security of the populations affected and threatening the achievement of the Millennium Development Goals. The influence of climate variability/change with the likely increased frequency of droughts and floods will increase the vulnerability of populations. Rapid population growth, urbanization and lack of adequate infrastructure is also putting higher numbers of people at risk than ever before, especially in cases where the poor live in marginalized areas more susceptible to water-related disasters.

Objectives:

31. Integrate water-related Disaster Risk Reduction (DRR) into national development plans. Within this remark, it must be recognized that adaptation to climate change must take on a high priority for national governments and that, while establishing national and local goals targets for water-related DRR, IWRM and the impacts of climate change must be taken into consideration. International and regional strategies and action plans also need afforded priority, especially in cases of transboundary risks.

32. Increase preparedness level of afflicted populations. Through the use of raising public awareness, increasing the human capacities of nations, from local to national levels, to confront water-related disasters, the strengthening and development of early warning systems and the creation preparedness indices, to make nations more prepared to confront water-related disasters.

33. Institute risk management plans/measures. Assist cities in instituting structural and non-structural risk management plans/measures, as laid out in the Istanbul Urban Water Consensus, to reduce damage from water-related disasters. Faulty land management practices exacerbate risks in urban areas. National governments should ensure that urban centers develop and enforce appropriate spatial planning and bylaws that reduce risks of water-related disasters.

34. Strengthen cooperation and build partnerships between national governments, local governments and civil society. While increased cooperation at an international level is desired, it is crucial that there be enhanced cooperation between national governments, local governments, civil society and the scientific community. Through shared experience, knowledge and technology, nations will be more resilient towards the impacts of these disasters.

35. Improve monitoring, assessment, data collection and sharing, and research. With an existing lack of information on water-related disasters, it is critical that an enhanced collection of data be carried out and in a transparent way and shared between and within nations. This data will only be useful if carried out in parallel to robust monitoring and assessment mechanisms. Additionally, developing a process to share this information, horizontally, vertically and between nations will make for more sound decision-making processes.

36. Increase public and private investments in DRR. Both infrastructure and human resources development could reduce adverse effects of water-related disasters. In this vein, there should be an increase in both public and private investments with respect to DRR.

37. Promote, share and develop technologies. While it is necessary to be innovative and create new technologies, and especially information technologies, that are cutting edge, this should be combined with the use of indigenous knowledge. Cooperation between nations and regions in sharing these technologies should be strengthened.

Theme II: Advancing Human Development and the Millennium Development Goals (MDGs)

38. Uncertainty is an important element of any planning and there are many drivers of change that need to be addressed if the Millennium Development Goals (MDGs) are to be attained and exceeded. Many drivers of change will remain the same; others may be partly new and some we are probably not even aware of yet. Ecosystem services are under threat and land-degradation continues to literally drain agricultural land into the sea in order to meet our growing demands for food, freshwater, timber, fibre and fuel. Such changes can offset progress to meet the MDGs, as well as inhibit poverty reduction, if not managed and it will require substantial investments both in mitigation and adaptation measures. The increase in energy costs provides a good example of such a threat and reducing its impacts on access to water and sanitation is a major challenge. The complexity of interlinked drivers associated with the MDG agenda will likely increase.

Element 1: Ensuring Water, Sanitation and Hygiene for All

39. While the total population not using improved drinking water sources has fallen below one billion, the number not having safe access to improved sanitation is only slowly decreasing and remains at the level of about 2,5 billion. With the current trends, the world will not be on track to reach the MDG on sanitation. As a result, millions of people die each year from water-borne diseases, most of which are children under five years old and there are billions of cases each year of diarrhea and other illnesses related to water. The costs for some nations in health and productivity are enormous, limiting their ability to be competitive. Most of all, it takes away a person's sense of dignity and causes additional stress in sometimes already tenuous living situations due to lackluster economies or armed conflict. Without improved governance, institutions, policies, investments and political will, efforts needed towards achieving the MDGs will not be achieved.

Objectives:

40. **Develop national and sub-national plans of action.** Within each country and sub-national government, regional and local, develop a plan of action, along with appropriate policies, to expand access to water, sanitation and hygiene to all, ensuring universal access in the shortest possible time, tailored to their economic, social and environmental needs, to which all relevant ministries and departments are committed, specifying short-, medium- and long-term targets and timelines. The requirements of vulnerable and marginalized groups, such as women, children, residents of arid and semi-arid areas and informal settlements, should be addressed appropriately in the development of these plans while incorporating indigenous knowledge. Priority should be given to schools, health centers, public centers and emergency preparedness.

41. **Build cross-cutting local, regional and international partnerships.** Combine the efforts and means of governments (local, regional and national), civil society, NGOs and the private sector to partner together to assume the costs, risks, results and impacts of investment in water, sanitation and hygiene. Establish regional, North-South and South-South partnerships to build capacity, transfer knowledge and finance projects.

42. **Aid informal settlements.** Develop legal and institutional solutions that can facilitate the provision of sanitation and safe water supply to "informal" settlements and other unserved or underserved urban areas where land tenure and other legal barriers may prevent cities from addressing community needs.

43. **Devote funds for water, sanitation and hygiene.** Establish a requirement that water, sanitation and health institutions devote a sufficient fixed percentage of resources and capacity towards ensuring safe drinking water and sanitation, including hygiene education to all persons and assistance to households relying on small-scale sanitation.

44. **Mobilize resources and build capacity in water and sanitation.** Marshal resources, both technical and financial, from the public and private sectors, including users, and build institutional, technical and managerial capacity at all levels, but especially within local governments. Engage in local funding to leverage more support from development organizations. Utilize the capacity of regional and sub-regional organizations to aid in financing, marketing and organizational assistance. Increase the contributions from international financial institutions (IFIs) and donor countries.

45. **Use appropriate, acceptable technology.** With the full participation of communities, design, implement and evaluate technical solutions to water and sanitation problems using appropriate technology, which is acceptable to the local community.

46. **Raise awareness on sanitation and hygiene.** Inform both the public and decision makers on the benefits of water, sanitation and hygiene to the economy, health and the environment and make them aware of the sense of urgency of the issue. Promote and make available cheap, appropriate technologies to the poor and disadvantaged. Use modern approaches such as community-led total sanitation, marketing for behavior change, educational programs to change behavior towards water, sanitation and hygiene. In addition, using such strategic processes as Poverty Reduction Strategy Papers (PRSPs), raise the profile of water, sanitation and hygiene so development agencies take more robust action towards meeting the needs of those without these services.

47. **Consider the environmental impacts of sanitation.** The environmental impacts of sanitation need to be better taken into consideration as there is more evidence of a direct relationship between lack of sanitation and environmental degradation. Without considering the impacts, health may not be sufficiently improved.

Element 2: Water for Energy, Energy for Water

48. Energy has recently taken center stage at the highest of political levels due to its rising cost. The prices of oil, natural gas and coal have all risen at large rates, impacting the prices of food and commodities all over the world. This is also impacting the water sector as energy and water are interrelated - we use energy for water and water for energy. Primarily driven by population and economic growth, the total demand for energy and water is increasing. As a result, most parts of the world are already challenged in meeting these demands and climate change and other global changes such as urbanization and land-use changes will intensify these challenges. Therefore the impacts of these are affecting both energy and water.

Objectives:

49. **Improve the knowledge of the water-energy nexus.** There is too little thought and planning being introduced to the water-energy nexus in most parts of the world, especially developing countries. With rising costs, rapid decisions have to be made about how these two sectors will be interrelated. It is therefore important to develop a good understanding of the water-energy nexus at the local, national, regional and international levels as both water and energy actions place at the global level all the way down to individual communities where water and energy choices take place on the ground. Wide participation from stakeholders is necessary from both sectors to include users and user associations, professional associations, business and the private sector, regulators, governments, NGOs, civil society, scientists and the academic community.

50. **Enhance the coordination of water and energy policies.** Water and energy policies are rarely well coordinated. Increasingly, agencies are taking a boarder approach to the impacts of water on energy policy and vice-versa. Far better coordination is required to establish markets and investment conditions which optimize water and energy use and re-use.

51. **Conduct water and energy sustainability assessments.** Not enough is known about how water and energy are inter-related and even less about how new trends such as biofuels and climate change will impact the use of both resources. It is important to conduct water and energy resource sustainability assessments and through these define sustainable water and energy resources. Certain sectors have explored performance indicators and assessment tools, such as those developed for hydropower, which can strongly assist in strategic planning and decision making. They should be extended to other sectors, agriculture and food in particular.

52. **Anticipate the increase in energy prices in all aspects of water management.** The increase of the energy costs needed will directly impact water pumping and transport costs, which may have strong consequences on water access especially by the poorest. Compensation mechanisms need to be designed well in advance, changes in design may need to be considered and experiences need to be shared among countries and water institutions in order to reduce these impacts.

53. **Develop new technologies in both water and energy sectors.** There is an extraordinary amount of technological innovation that seeks to reduce interrelated energy and water footprints in the delivery of these essential services. Market incentives and promotion of successful outcomes could create a virtuous circle for continued improvements. Increasing efficiency in energy use in the water sector and water use in the energy sector is crucial for reducing the footprints of both sectors on the other.

54. **Invest in hydropower.** There is an acute lack of infrastructure in some parts of the world for hydropower and storage. Investments in infrastructure need to be made to make energy production greener while at the same time take into consideration the possible advantages these structures have for water-related disaster mitigation and other uses. Hydropower is the largest renewable energy resource; therefore, its application and development should be encouraged as hydropower is both an effective mitigation and an adaptation measure in the context of climate change.

55. **Conduct more research to better evaluate impacts of biofuels on water resources.** Bio-energy may play a significant role during the 21st Century as there has already been a significant shift of growing crops for energy production. Sustainability and socio-economic impact assessments and optimization studies within this sector will be key since the impacts of biofuels on the water sector have not been explored significantly.

Element 3: Water and Food for Ending Poverty and Hunger

56. Water is one of the key elements in agriculture, rural development and food production; however this is not readily recognized amongst policy circles. Increasing food prices that the world is facing have, and will continue to, put rising pressure on the agriculture to produce more with less cost. While the increase in food prices will help some populations with poverty reduction in the rural areas of the least developed and developing countries, there is growing risk of global changes including climate change that will negatively affect the agricultural sector. An increase in biofuels production is just one of the new trends that the world is experiencing to deal with higher oil prices, which impacts food and fiber prices. And while food prices are rising, local markets are almost non-existent and do not allow a proper local food economy.

Objectives:

57. **Research population dynamics and its relation to agriculture.** Before examining the relation between water and agriculture, it is fundamental to understand the dynamics of agricultural development that is related to population dynamics especially between rural areas and urban areas in emerging countries, and low agricultural productivity in least developed countries. It is also fundamental to understand the processes of agrarian change, land-use changes and changing access to water and land, both legal and informal.

58. **Introduce policies to promote the increase of crop yield per unit area.** Increasing the prevailing low yields (below 2T/ha) – in both rain-fed and irrigated crop land - has the largest effect on the reduction of water use per kilogram of produced food. The increase in water use efficiency/productivity is mainly caused by reduction of evaporation from the soil, due to better cover of the plants and the resulting increased interception. Higher food prices will incentivize producing higher yields. Poor farmers generally achieve low yields due to lack of resources and technology, and will especially benefit from support to improve yield per unit area.

59. **Promote small- and medium-scale agricultural development projects.** Governments, especially of least developed countries, promote development of small/medium, affordable and sustainable infrastructure suited to the intended beneficiaries and paying due attention to market access and resilience to natural disasters.

60. **Scale-up the modernization of irrigation and drainage systems.** Development and modernization of irrigation and drainage system schemes in the broad sense (technical, managerial, financial and environmental) will be required at a large-scale to achieve the required increase in food production and eradication of poverty and hunger. Water can then be saved for other uses or money saved to further develop the source of water.

61. **Strengthen and support water-related institutions and associations.** Governments, especially in emerging and least developed countries, accelerate the adoption of participatory management of irrigation/drainage infrastructure, the formation of professionally oriented farmer/water user organizations, enhance legal systems and support financially irrigation/drainage administration. Strengthen the transfer and dissemination of irrigation/drainage technological and management skills from professional experts in governments and international organizations to the farmers' irrigation/drainage management organizations;

62. **Research, monitor and assess the impact of rising energy costs, and biofuels, on food production, water use and the environment (the water-energy-food nexus).** Due to rising food and energy costs, the inter-relationship between food, energy and water has become more important and little is known about these trends on water resources particularly with the threat of climate change on the horizon. In addition, biofuels can contribute to rising food prices, which especially affect the urban poor, in increasing the competition on land and water resources. While biofuels will provide least developed countries and poor farmers with new opportunities for employment to improve their economy and livelihoods, the impacts on the environment are not fully known and could be detrimental.

63. **Understand the changes in nutrition and diets.** With the increase in the standard of living, caloric intake in emerging countries rises along with the type of food consumed. This has a direct affect on water resources as meat and dairy products, which contribute most to the change in diets, are water intensive. Understanding these trends will help develop with the conservation, re-use and allocation of water resources.

64. **Re-engage in the reduction of food losses “from field to fork”.** Food losses along the production-consumption chain are often as high as 50%. They represent by far the greatest losses in water. Developing programmes to reduce these losses would have a tremendous impact on the water consumption and would probably as well facilitate access to food by the poorest.

Element 4: Multiple Use and Functions of Water Services

65. Designing water systems for single services is socially, economically and ecologically costly and does not reflect the reality on the ground. Single use systems do not meet all the needs of the people that use them. People use interchangeably water for different needs whether that is irrigation for drinking water or domestic supply for income generation. Constructing systems for multiple uses would have many positive effects on health, shortages of water and infrastructure.

Objectives:

66. **Recognize and promote multi-functionality.** Water is used for multiple uses whether a system is designed for multiple uses or not. By recognizing that water is used for MUSF, multi-functionality can be promoted as a standard to be attained in future water services practices.

67. **Internalize MUSF in policy and management.** Rather than continue on the same line thinking of single uses of water resources while MUSF remains at the margins, to encourage the internalization of MUSF in policies and management processes and then be supported both technically and financially. The development of such policies and management at the local level should incorporate the users themselves and include traditional and local management practices.

68. **Introduce broader approaches to Service Oriented Management (SOM).** Invariably with using MUSF, other sectors and domains need to be taken into consideration as there will be crossover in managing the multiple uses and functions. SOM will then have to take a broader approach in order to encompass all of the realms and also work towards an integrated way to develop and manage community water resources at the local level according to both women's and men's priorities.

69. **Generate a vision and develop policies of MUSF.** With all stakeholders at the national level, create a vision of Multiple Uses and Functions by starting with a thorough analysis of opportunities and constraints for all possible field configurations, including domestic, agricultural, ecosystem and industrial.

70. **Institutionalize MUSF.** Being in its nascent stages, especially in the policy and legal realms, an enabling environment must be created so technical advances can be made, standards developed, governance applied, and socio-economic structures generated. Issues exist in each of these domains, which will need to be addressed in order to move forward.

71. **Promote a multi-sector approach at the local level.** Empower local governments to overcome sectoral boundaries by integrating elements of long-term technical, financial and cost sharing, and institutional support packages according to people's multiple water needs. Support cities in reorganizing their water services to achieve integration and coordination of groundwater, surface water, rainwater, recycled water, water conservation, and other sources of water supply for urban areas.

72. **Reconsider design and technologies to allow for MUSF.** With single uses dominating the water services landscape, technology needs to be developed in order to make the transition to MUSF. Developments are required both at the larger system level and within households themselves in order to differentiate the quality of water needed for each type of use. Along with new technology, capacity must be built in order to maintain and operate these systems to provide sustainable water management.

73. **Diversify the use of irrigation water.** Develop policies to recognize and promote the multi-functionality of irrigation water. Many rural areas use irrigation water for farmhouses, habitats for fish and other aquatic resources, rural enterprise water supplies, domestic water, hydroelectric power and navigation. Policies that acknowledge these multiple uses, can improve food security, health and sanitation.

Theme III: Managing and Protecting Water Resources and their Supply Systems to Meet Human and Environmental Needs

74. Maintaining a balance between human and environmental needs has never been as critical as it is now. And, with the on-going economic growth in many developing countries, the interaction between these often competing needs will be further stressed. The quality of water resources, both surface and groundwater, has been degraded in many regions and, along with this, the ecosystem services that they support and provide are diminished. In fact competition over water resources does exist and is likely to increase between all sectors, between governments, national and sub-national. Yet cooperation proves to be far more advantageous for competing sides through such mechanisms as benefit-sharing and this has direct dividends not only on governance and political systems, but the environment itself. While global changes will continue to stress water resources around the world, if proper policies are in place to protect ecosystems, establish Integrated Water Resources Management (IWRM), promote cooperation, mitigate and prepare for disasters and create a balance between humans and the environment, then the world's citizens will remain both water safe and secure.

Element 1: Basin management and transboundary water cooperation

75. Water does not stop at national borders. Some 40 percent of the world population lives along more than 260 transboundary rivers and lakes. A total of 145 nations have their land located within transboundary river basins. As potential climate and other global changes increase, competition over transboundary water resources will likely increase in number, intensity and complexity that will require new adaptive strategies to manage water resources, both surface and groundwater. These changes will put at risk food production, social welfare, health, economic well-being as well as political stability. While "water wars" are not expected, there is currently a lack of legal, political and institutional infrastructure that is capable of dealing with the international complexities of transboundary waters.

Objectives:

76. Improve understanding and reinforce cooperation in the transboundary context. Optimal utilization and effective protection of the transboundary water resources are only possible if riparian states cooperate in line with internationally agreed principles. Transboundary water resources present an opportunity for collaboration rather than a source of conflict and a constraint for development. Nevertheless, there exists wide diversity of political, social, economic, cultural and environmental challenges to confront in addition to those arising from hydrological factors. Thus, in order to harness sustainable benefits of transboundary water resources for all riparian countries, joint efforts need to be made. However, this necessitates first the willingness to cooperate which can only come out through extensive dialogue, mutual trust and understanding among riparian states.

77. Improve the legal framework of transboundary waters. In the last 50 years, over 200 bilateral and multilateral agreements have been signed on the use of transboundary water resources. There are also several regional and international conventions in force related to transboundary waters. They often form part of cooperative endeavors and a basis for the definition of principles and responsibilities that are considered in international customary law. National laws should be established to reflect these principles with regards to transboundary waters, where appropriate, in terms of information and data exchange and management and use of transboundary water resources. Regional agreements should be promoted and strengthened and also reflect and reinforce international law.

78. Increase the number of river basin organizations, their strength and capacity. Where river basin organizations do not exist, they are encouraged to be established, especially in the cases of transboundary river basins and aquifers. River basin organizations, on an international and sub-national scale, promote cooperation, mutual understanding and confidence building, as well as improve exchange of data and information, set up fact-finding procedures and support implementation of joint programmes and projects. Where river basin organizations do exist, to strengthen their capacity to confront the complexities of changing circumstances, including global changes.

79. Seek fair, equitable and win-win solutions in negotiations over transboundary water. All parties are not equal in strength yet are in equal need to confront water-related issues for their human and environmental needs. The solution for sustainable water management is to pursue equitable solutions where all parties win, including stakeholders.

80. Develop harmonized water management plans. Water resources ought to be managed at the basin level with a holistic approach considering their natural state and the competing demands. Equitable, reasonable and optimal utilization and effective protection of transboundary water resources is only possible in this way. Development of long-term management plans at the basin level are imperative for reflecting the position and needs of all major stakeholders of a river basin. Riparian states should harmonize both their water supply and water demand management plans for the purpose of making the best possible use of water resources.

81. Promote IWRM. Support the implementation of integrated water resources management into national and sub-national policies on water resources management as well as the management of surface and groundwater basins. Critically analyze cases of IWRM and to evaluate the strengths and weakness of the concept and improve accordingly. In support of the Istanbul Urban Water Consensus, representation of local governments should be included in local river basin processes and IWRM organizations. Cooperation and the inclusion of principles of sustainable development and integrated water resources management helps promote peace and stability at the national and sub-national levels.

82. Take into account the interests of stakeholders. In order to manage basins and build sustainable and equitable agreements when negotiating over water issues, it is very important to include all stakeholders and ensure a participatory process. Stakeholder inclusion can reduce the risk of future disputes.

83. Promote cross-border research, monitoring and data exchange. Through the sharing of technical knowledge and data and information exchange and coupled with joint monitoring/data collection schemes and collaborative research projects, nations can work closer together, build relationships and improve understanding between one another.

84. Share infrastructure and jointly finance. To increase the interdependence of nations on one another and find more benefits that sometimes may not be readily apparent, governments should pursue jointly financing projects and sharing infrastructure to meet basic human needs and create other benefits such as energy production, irrigation and transportation.

85. Encourage research, education and training on transboundary water cooperation. Education on water resources, especially transboundary waters, is lacking among water managers, policymakers and other stakeholders. Increased opportunities for such training should be provided at different scales, from local to international. On local scales, traditional and local systems should be mixed with modern techniques in order to achieve maximum sustainable water management.

Element 2: Ensuring adequate water resources and storage infrastructure to meet agricultural, energy and urban needs

86. Water that is stored and regulated by dams and reservoirs provides water resources and benefits to water supply, irrigation, hydropower, flood mitigation, river navigation, recreation and tourism. Socio-economic analyses show that the stock of infrastructure (for water supply, sanitation, dams and reservoirs, electricity, and hydropower) a country possesses is closely linked to its socio-economic development. Developed countries have a large and varied inventory of water infrastructures. New infrastructure is vital for the socio-economic development of emergent and developing countries in order to have available sufficient supplies of water and energy provided this infrastructure is properly maintained. It needs, however, to be designed, constructed and operated to mitigate its social and environmental impacts.

Objectives:

87. **Encourage a holistic approach within a sustainable development framework.** Decisions to build infrastructure should be made on the basis of an assessment of the full range of options available to meet specific needs, through an informed, transparent and participatory decision-making process. A balance must be struck between environmental and social impacts with dam/reservoir construction. All feasible alternatives should be considered as part of a holistic approach. Storage types have to be adapted to their purposes in size, from small- to large-scale, and type (water harvesting, small dams, large dams, surface and groundwater management).

88. **Develop frameworks and approaches to determine and prioritize needs.** The biggest difficulty of decision makers is to arbitrate between often competing needs. Supporting developing countries in their choices by taking account of their peculiar situations and learning from the experiences of their peers would be very helpful and could be achieved through the development of an appropriate framework or method.

89. **Strengthen the climate change adaptation and storage link.** Due to an increase in climate change variability with extremes of floods and droughts becoming more common, storage space is necessary in order to mitigate excesses and limitations in flows. Therefore investments in climate change adaptation should incorporate water storage as a top priority. This will require novel approaches to consider complementary storage strategies across scales from local water harvesting systems to large scale dams with environmental and social impact assessment being required for all such projects.

90. **Expand storage infrastructure in developing countries.** In many regions of the world, storage infrastructure for both surface and groundwater is lagging behind and therefore putting at risk the populations that depend on water for irrigation as well as protecting them from floods. In particular the needs of Africa must be addressed in the context of lack of infrastructure. This expansion is justified by storage infrastructure's contributions to economic and social development, but must be carried out without compromising environmental integrity and social justice.

91. **Integrate social and ecological sustainability.** Within the framework of IWRM, social and ecological sustainability should be integrated into storage infrastructure projects with a particular focus on building overall water resilience from the local level to regional river basin scales. This will require concentration on water to sustain economic sectors such as energy, agriculture, industry and urban water supply, as well as water to sustain other ecosystem services such as carbon sinks and biodiversity for water flow regulation, which are key for water partitioning and long-term human well-being.

Element 3: Preserving natural ecosystems

92. With the reduction of water quality around the world due to agricultural runoff, domestic and industrial pollution and salinization, the world's water resources are threatened like never before.

Natural ecosystems, including wetlands and other aquatic environments, provide services that both help humans maintain a balance with the earth's environment and protect us from harm. Preserving these ecosystems aids populations with flood control, filtering nutrients/pollutants, mitigating the effects of climate change, sustaining biodiversity, erosion and other benefits. The loss of such ecosystems, in some cases, is irreplaceable due to human's inability to replicate the services these ecosystems provide.

Objectives:

93. **Reduce water footprints.** With more than half the world's population living in urbanized areas, the reduction of the ecological, energy, and water footprints of the urban population is of utmost importance to reduce pressures on ecosystems, and to preserve natural ecosystems. Strengthen urban water demand management, and reduce non-productive water demands in urban areas. Engage stakeholders in the process.

94. **Promote ecological corridors.** In view of global changes including climate change, it is critical to strengthen the resilience of ecosystems for change by reducing and/or undoing their fragmentation and by promoting ecological networks/corridors. Rivers and watercourses could be used as the backbone of these corridors.

95. **Value ecosystem services.** Incorporate the integration of ecosystem management goals in other sectors, including both the non-market value of ecosystems as well as a greater use of economic instruments and market based approaches. Research and development should further elaborate mechanisms for payments for environmental services delivered by natural ecosystems like forest, wetlands and agro-ecological environments.

96. **Rethink the role of ecosystems for agriculture.** Change the way we think about water and agriculture towards managing agriculture in a way that enhances ecosystem services and upgrades rain-fed systems.

97. **Use ecosystems as a buffer to climate change.** Consider the uncertainty climate change may bring to the ecosystem's functioning and acknowledge the value of ecosystems to reduce the risk of non linear changes, hazards, and the exacerbation of poverty.

98. **Balance reduced degradation and increase in ecosystem services.** Create the necessary enabling institutional environment for achieving both reversal of the degradation of ecosystems while meeting the increasing demands for their services.

99. **Empower those who use ecosystem services.** It is clear that the benefits provided by ecosystems services are in some cases not replaceable by human actions, including advances in technology. The poor are often the ones who utilize these services the most and actions of those who utilize and conserve ecosystems in order to receive the advantages of their services should be reinforced.

100. **Support urban programs for biodiversity, stream restoration and ecosystem enhancement.** As provided in the Istanbul Urban Water Consensus, city actions to protect aquatic ecosystems and natural hydraulic processes are a strong element of adapting to climate change, reducing water-related disaster risks, and balancing population pressures.

101. **Preserve environmental flows.** Society's social, cultural and economic well-being depend on freshwater ecosystems to thrive. Managing environmental flows will help humans' needs for agriculture, industry and urban centers to co-exist with aquatic ecosystems. It also has a direct impact on the costs of water treatment to produce drinking water. Altering flows sometimes puts in danger freshwater and other ecosystems that humans receive benefits from. It is therefore necessary to carry out environmental impacts assessments (EIAs) when modifying environmental flows. In order to estimate flow needs, it is crucial to conduct comprehensive inventory studies on environmental flow needs as a large majority of freshwater ecosystems have not been assessed and

then establish, implement and enforce standards on limitations to the reduction or alteration of flows.

Element 4: Managing and protecting surface, ground and rainwater

102. For centuries, water management institutions have concentrated their efforts and mobilized capacities on surface waters. This is despite the fact that the largest water resource available is rainwater and the most reliable is groundwater and that all types are interconnected through the hydrological cycle. Even if all three of these sources are diminishing in quality due to lack of sound management laws and policies, water management primarily focuses on just one source of water. The lack of addressing this issue in policy circles continues to prevent an optimization of the exploitation of these resources.

Objectives:

103. **Integrate water quality management.** Minimizing and treating wastewater reduces the need to maintain unnaturally high stream-flow for dilution purposes. Integrate water quality management of water resources in order to protect all sources of water.

104. **Understand groundwater rights, laws and policies and develop new ones where there are gaps.** Such information, including social forces and incentives that drive present-day water management practices, will help in the formulation of policies and incentives to stimulate socially- and environmentally-sound groundwater management practices. This is particularly relevant in those situations where aquifers cross cultural, political or national boundaries. Many groundwater resources across the globe do not have laws and policies that govern them either because of a lack of institutional capacity or scientific knowledge. Laws and policies should be developed where none are in place, taking into consideration the entire basin, above and below ground.

105. **Develop policies and institutions to integrate management of surface, ground and rainwater.** Manage basins not just with a view towards surface waters, but to integrate each basin's ground and rainwater into management practices taking a holistic approach. All three sources are inter-related and affect one another, so they need to be appropriately addressed in policies governing water management practices.

106. **Incorporate ecological approaches into urban water management.** Such an approach is instrumental in searching for more sustainable solutions, which are increasingly characterized by local approaches with reduced environmental flows, which avoid large imports of water, energy and materials, exports of pollution and minimize ecological disruption. Examples include rainwater harvesting, wastewater reclamation and reuse, which reduce both the need for importation of high-quality water and the discharge of pollution into receiving waters, and can reduce infrastructure costs. The Istanbul Urban Water Consensus is one framework for city adoption of such measures.

107. **Upscale good practices in small and medium-scale water resources management.** Promote, disseminate and upscale successful examples of small and medium-scale water resources management on the national, regional and global scales.

108. **Increase the visibility of green water.** Freshwater assessments, also those addressing climate change impacts, focus on a small fraction of the available resource, i.e. blue water, only. Green water, which is responsible for the majority of food production and also is critical for ecosystems services, carbon sequestration and biofuels production, should be raised on the political and water agendas as an area to be addressed to achieve sustainable water resources management.

109. **Afford more attention to rainwater.** Include rainwater management in national water management plans, where possible, that support social and economic development outcomes and referencing its utility in agriculture and water security in the context of changing rainfall patterns associated with climate change. Builds skills and capacity to share knowledge on rainwater management strategies among all water users.

Theme IV: Governance and Management

110. A lack of governance has been cited as one of the primary problems in confronting water-related issues around the world, both at the national and sub-national levels. Weak, or inexistent, policies, laws, institutions and overall good governance, have helped obstruct the Millennium Development Goals from being achieved, from creating a safe water and sanitation environment for billions and from mitigating water-related disasters, which affect millions every year. Even where governance does exist, the quality can be questioned. Corruption is common, there is a lack of transparency, stakeholders do not always have a say in management policies and practices and there is often a lack of accountability from governments. To enable actors to optimize their activities, good governance must be in place with proper oversight and enforcement mechanisms to ensure progress towards meeting the goals of governments and the water sector. Both the public and private sector must be included to use all the available contributors the world has in order to increase human security by expanding the coverage of basic services and reduce the stress that comes from living in water-insecure environment. With proper governance mechanisms in place, even marginalized populations should have access to safe water and sanitation while balancing the needs of the economy, environment and society.

Element 1: Implementing the Right to Water and Sanitation for Improved Access

111. Noting the above with regards to the number of people lacking safe access to water and sanitation and the amount of deaths and illness that occurs each year as a result, there remains the debate over the actual benefits of implementing the human right to water and sanitation. While there is a background of legal precedent to suggest that this human right already exists, taking into consideration several international Covenants and Conventions, there is still not an explicit human right to water and sanitation in existence and while this is no excuse for non-action, time, money and resources are spent debating the issue.

Objectives:

112. **Recognize the right to water and sanitation in national law.** Ensure that national water and sanitation laws, policy and practice state and reflect the principles of the right to water and sanitation and of the non-discrimination and inclusion of vulnerable and traditionally marginalized groups, access to information, genuine participation of representatives of all groups in decision-making and the accountability of governments to their people for the realization of the right to water and sanitation.

113. **Review national laws and policies.** Review all relevant national laws and policies relating to water supply and sanitation, water resource management, public health and land use and related areas to ensure that they progressively ensure access to sufficient, safe and affordable water for personal and domestic uses within or in the immediate vicinity of each home, educational institution or health centre, as well as access to culturally acceptable, safe and adequate sanitation within each household.

114. **Allocate resources to support the right to water and sanitation.** Allocate sufficient financial resources within national and local budgets, including through cross-subsidies and identify the amount required from international assistance, to implement national water and sanitation access plans. Contribute both technical and human resources to ensure the success of the creation of the water and sanitation plans.

115. **Ensure access to water and sanitation.** At the global level, ensure that there is sufficient financing and capacity to ensure basic access to water and sanitation for all within the shortest possible time, and to this end, supplement national resources through increased international financial and technical assistance to water and sanitation, ensure that such assistance

is appropriate, is aligned with national plans and has particular focus on the needs of groups that lack basic levels of access to water and sanitation.

116. **Incorporate the right to water and sanitation in water resources management plans.** Ensure that water resource management plans and policies prioritize access to essential amounts of water for personal, domestic and subsistence uses and use all necessary methods to ensure the sustainability of water resources.

117. **Establish clear roles, responsibilities and dispute resolution mechanisms.** Ensure that there is a clear division of responsibility between relevant government actors responsible for water and sanitation and ensure that there are effective, independent and easily accessible complaints mechanisms to address denials of, or interferences with, any citizen's right to water and sanitation.

118. **Promote information and training available to all.** Require that all water and sanitation authorities provide all relevant information in an accessible form to the people, including on their rights and duties, and that people are given an opportunity to participate in decision-making affecting their rights. Training, as necessary and requested, should be provided for the representatives of marginalized and vulnerable groups in order to ensure that they can participate on an equal footing with other groups and advocate for their rights.

119. **Ensure water and sanitation to all irrespective of housing and land status.** Review land law and policies to ensure that they are conducive to the realization of the right to water and sanitation, including by mandating the provision of water and sanitation to all persons, irrespective of their housing and land status, ensuring the allocation of public land for the construction of water and sanitation infrastructure, toilets, water points and for low-cost housing, providing for secure tenure and guaranteeing access to traditional sources of water.

Element 2: Water institutions and water reforms

120. Many local and national governments around the world are lacking basic capacity in order to carry out water and sanitation, disaster mitigation, ecosystem protection and other water-related projects as can be seen by the lack of ability to meet the Millennium Development Goals, the numbers of deaths due to water-related disasters and the degrading environment. Reforms are needed in order to enable governments to make progress on ensuring their citizens' water security. Institutions, globally, are particularly deficient and require additional resources, both human and financial in order to be able to confront the challenges they are facing.

Objectives:

121. **Carry out policy, legal and regulatory reform.** Reform is an essential condition for sustainable and effective change. Governments should ensure that a supportive environment exists for sustained efforts in the sector and should clearly define the roles, rights, and responsibilities of all actors. Special attention should be given to defining policies that target the specific needs and opportunities of the poor, for enhancing human security through improved access to water supply and sanitation. Reform efforts should come from both the high political level and the stakeholders as well.

122. **Couple institutional reform with capacity development.** Reform should include capacity building, the introduction of more appropriate management systems, and more effective institutional coordination between all players. This is particularly the case among government agencies, but there is also a need to build better links between government, the private sector, civil society, and community-level organizations

123. **Improve the relationship between national and local water institutions.** Strengthen coordination between national and local water institutions to create a balance in the

oversight and management of these institutions. Harmonize actions between the national and local levels to facilitate effective and efficient management at both levels in order to maximize resources. Incorporate a multi-sectoral approach when necessary.

124. **Promote standards and harmonize with regulatory instruments.** Implement both water quality and technology-based standards in order to maximize opportunities for wastewater management. Establish regulatory instruments in conjunction with these standards for optimal effectiveness.

125. **Recognize the role of small-scale water providers.** Small scale water providers play a large role in extending water supply delivery to poor communities in urban and peri-urban areas. Facilitate regulatory and monitoring mechanisms for these providers. Ensure the poor are not paying excessive prices for water.

126. **Strengthen decentralization efforts.** Empower local and basin-level institutions by carrying out decentralization from central governments as water is best managed at the local level while having a connection with the national level through coordinated activities. Central governments should create an enabling environment for decentralized institutions to ensure that they have financial, technical, legal and human capabilities for effective local management, including coping with rapid urban expansion and changes in climate, in support of the Istanbul Urban Water Consensus.

127. **Develop groundwater regulation.** The lack of science and understanding of groundwater has limited the efforts to regulate its abstraction and use. As both local and national governments become ever more dependent on groundwater, regulatory systems need to be developed in order to protect and better manage the resource.

128. **Institutionalize pollution prevention.** In support of the Istanbul Urban Water Consensus, clear and enforceable regulations should be provided at the central government level to prevent pollution of water resources needed by urban populations. Similarly, Mayors can rely on the regulators to prevent pollution by industries or human waste from the city itself.

129. **Support sub-national governments in confronting global changes.** As sub-sovereign authorities seek to reform their water management to meet the challenges of urban population growth and climate change, they may need political and technical support from national governments. They may seek to reorganize their water services to achieve integration of sanitation, water supply, and drainage systems and coordination of groundwater, surface water, rainwater, recycled water, water conservation and other sources of water supply.

130. **Understand the local context and develop local institutions.** Before decentralization or reform is carried out at a local level, research in order to comprehend the local context under which the reforms will take place. Strengthen existing local institutions with capacity development, adequate financial, human, administrative and technical resources and where local institutions do not exist, establish them while incorporating civil society, user groups and other stakeholders into their functioning.

131. **Create effective regulation and monitoring.** Ensure effective regulation and monitoring of service provision relating to compliance with access targets, tariff structures, regularity of service and water quality, and ensure effective regulation and monitoring of water resource use, including prevention of pollution and limits on abstraction. Informal service provision should be regulated at least in relation to quality and price of service. Establish enforcement mechanisms where necessary to aid with compliance.

Element 3: Ethics, Transparency and Empowerment of Stakeholders

132. It was not until only recently that it was found that part of the problem in the provision of water services, as well as confronting other water-related problems, was in fact due to an issue of a lack of governance. A deficiency in transparency, equity, stakeholder participation and accountability has provided for water management systems that are not as effective, efficient or resilient as they should be. The direct result of this lack of governance is less people with access to water and sanitation, diminishing water quality and degraded ecosystems. Because of this governance issue, corruption is common in the water sector and has compounded the problem.

Objectives:

133. **Engage with a wide range of stakeholders.** Within all decisions that relate to water management, engage with all associated stakeholders in order to achieve sustainable, resilient and effective policies and practices. Include stakeholders in developing indicator development, the production of information, monitoring, reporting and applying these actions to decision-making. Create a “water democracy” where the voice of individuals and groups of citizens may be heard by the decision makers. Establish social accountability in the decisions that are made. Ensure that stakeholders are included in City processes to develop adaptation measures and targets under the Istanbul Urban Water Consensus.

134. **Define stakeholder participation.** In the practice of stakeholder participation, clearly outline the role of stakeholders in their identification, participative procedures, organization, equity, funding their participation, assuring their impact on decision-making processes and mechanisms for resolving conflicts of interest among stakeholders and users.

135. **Promote transparency and prevent corruption.** In all aspects of related to the management of water, support fully transparent processes of decision-making. Open water-related institutions, information and processes to transparency. Reduce corruption in the water sector through transparency, good governance, public accountability and access to justice. Corruption is common amidst the water sector and can be seen in many forms such as diversion of funds, bribing to cover up wastewater and toxic discharges and excessive extractions and decisions made in exchange for personal favors to name a few. Corruption practices affect the poor disproportionately.

136. **Incorporate good governance into water management policies and practices.** Include participation, equality, accountability, transparency, the rule of law and consensus-based decision-making in the governance structure of water resources management.

137. **Promote a water ethic.** Encourage a “water ethic” in policies of water management where there is, for humans, equity in the accessibility to water for generations to follow the current, with long-term planning for all water-related uses. Balance the needs of ecosystems and humans in their industrial and agricultural endeavors. Ensure the right and access of water and sanitation to all.

Element 4: Optimizing Public and Private Roles in Water Services

138. Both public and private sectors are involved in the provision of water and sanitation services to differing degrees around the globe. What is clear, however, in many places, that current practices are not enough as people are still without access to water and sanitation. Much time and resources have been spent debating the pros and cons of public versus private provision when the problem needs to be addressed urgently as people continue to die from water-borne diseases and suffer from illnesses. The tools are available, but need to be applied in the right ways in the right places.

Objectives:

139. **Improve public sector providers/utilities.** Increase the efficiency and reach of public sector providers through capacity building and increased financial and technical resources. Develop, support and expand the public sector water providers and authorities through rational investments. Decentralize the ability to raise funds to the local levels so as not to depend on purely government finances where applicable.

140. **Create adequate legislation.** Create clear legislation that empowers local water authorities to make choices about the provision of water and sanitation services and defines their roles for overseeing operators.

141. **Facilitate the choice of the best service providers, regardless of sector.** The goal is to provide water and sanitation services to all in need. Each sector has strengths and weaknesses in this provision. It is crucial to utilize all available providers, both public and private, including public-private partnerships in order to achieve coverage for all under the supervision of government or public water authorities. Stakeholder involvement in these processes keeps both public and private providers accountable to the greater public.

142. **Clearly define and formalize roles.** For all actors, public or private, delineate roles of water and sanitation service provision and then formalize these roles into contracts, otherwise known as “contractualization”, which is the establishment of an agreement with clear targets, mutual commitments and clear differentiation of respective roles, duties and responsibilities between the authority and each of its operators, public or private.

143. **Raise awareness about public and private roles and public-private partnerships (PPP).** Lack of knowledge and understanding of public and private provision of services has hindered the provision of those services themselves. Efforts much be made to raise awareness about the benefits of the roles of the public and private sector provision of water and sanitation services as well as how public-private partnerships carry out these activities as well.

144. **Ensure public authority efficiency.** Carry out competitive tendering of projects in a transparent, inclusive manner. Perform progressive assessments to chart changes over time between operators in order to monitor compliance with standards and regulations. Create benchmarks to compare operator performance with other operators taking into consideration contextual differences. When the possibility of privatization of water services occurs, conduct socio-political assessments to determine the feasibility of such a change in provider.

145. **Consolidate direction and control of operators.** In order to facilitate comprehensive policies to deliver good quality services to all, place all public bodies and regulators under one entity. This will ensure easier monitoring and optimization of services, while making more efficient the regulation of operators as a whole.

Theme V: Finance

146. Investment into the water sector is an investment into the basic development of a nation. Studies have shown that investment in infrastructure, and its operation and maintenance, is a prerequisite to economic growth. Many investments have been made, but there are not enough as the problems of water and sanitation remain. People continue to die and suffer. The issue is now one of urgency, not just in terms of increasing the coverage of water and sanitation so there are no more water-related deaths due to unsafe water, but in providing multiple-use infrastructures in order to mitigate the impacts of climate change, provide water and energy for people, environment, agriculture and industry and develop the economies both locally and nationally. Finance and access to financing is acutely needed in small and poorer communities across the globe. And while finance is important, strategies and policies that target the poor to elevate their standing are required so as not to maintain the *status quo*. Innovative financing and pricing strategies can be put into place that would not only benefit the poor and increase coverage of water and sanitation, but also enhance efficiency and bolster local water institutions.

Element 1: Sustainable Financing in the Water Sector

147. The water sector is underfinanced, both in terms of infrastructure investment, or “hard” investment, and capacity development, or “soft” investment. The problems the world faces in terms of lack of infrastructure and capacity are causing the loss of the lives of people, decreased human security and large economic losses. Increased and sustained financing are needed in order to meet the gap in water and sanitation services as well as water-related disaster mitigation and climate change adaptation. Developing countries lack the ability and the access to tap into financing and international markets. In these countries, public financing is scarce or sometimes not available at all.

Objectives:

148. **Urgently increase investments and finance.** Water and sanitation, irrigation services, river basin management, flood management and mitigation and wastewater management all require increased investments. Investments in water are crucial to meet the broader MDG targets of reducing poverty, hunger, child and maternal mortality, and the incidence of major diseases, and to improve environmental sustainability. It is highly encouraged for governments, national and sub-national, donors and international financial institutions (IFIs) to act immediately to finance both infrastructure and capacity development in order to prevent further deaths and suffering due to lack of access to water and sanitation.

149. **Connect political will, finance and capacity development.** Increase the political will, financing, both short- and long-term, and capacity development of the water sector, both in its financial and technical capabilities, in parallel in order to optimize the result of coordinated efforts to rectify the water and sanitation situation.

150. **Always couple “hard” investment with “soft” investment.** Infrastructure without training on how to manage, operate and maintain the infrastructure is not the optimization of financial resources. Nor is capacity development without the infrastructure. Both must be financed in order for successful outcomes to water resources management investment projects.

151. **Match the capacity to borrow with the capacity to lend.** Lending capacity not in short supply, but the ability for both national and local governments to borrow is often insufficient. Through increasing the capacity to borrow and mitigating potential risks, the demand for financing will increase.

152. **Increase aid to the sub-sovereign level by national governments.** In their best interest, local communities, cities and regions should claim responsibility for increasing their own

performance, but governments and inter-governmental transfers need to be structured to make a greater relative allocation to the sub-sovereign level, especially smaller and poorer towns, for financing a critical mass of basic local infrastructure services including, water supply and sanitation. These allocations can then be utilized to leverage additional sources of financing from donor agencies and lending institutions. Governments should also help smaller communities access financing and international capital markets and enable better flows, predictability and coordination of existing finances.

153. **Promote the idea that with water security, investments are safer.** Promote the improving national investment climate that comes from greater water security. Support national governments in their engagement with private sector investors in market-oriented investments in the different water-use sectors, especially those that encourage small private sector investments, and effective cost recovery mechanisms should be made accessible.

154. **Encourage sustainable cost recovery.** Water service providers should aim for revenues sufficient to cover their recurrent costs and develop sustainable long-term cost recovery policies, anticipating all future cash flow needs. Sustainable cost recovery includes operating and financing costs as well as the cost of maintaining existing infrastructure. Including environmental costs of water services provision in cost recovery should also be considered for maximum efficiency.

155. **Empower local governments in implementing sustainable cost recovery systems.** Where local governments are the designated service providers, national governments must provide them the necessary authority to implement appropriate and sustainable cost recovery systems, through universal metering and tariffs, while ensuring affordability for all.

156. **Develop good public finance principles.** With most funding for water services and financing coming from public sources, sound public finance principles need to be developed. To be taken under consideration while developing these principles must be the role of other sources of finance, what their best use would be, including issues of targeting subsidies, and the capacity to manage public funds.

157. **Commit ODA to capacity development.** Donors and IFIs should commit increased Official Development Assistance (ODA) to build institutions to prepare for infrastructure projects and build the capacity of water operators to be better prepared to attract new financial resources. Also, improve the modalities for national governments and ODA investment in infrastructure and capacity development of regional importance.

Element 2: Pricing Strategies as a Tool for a Sustainable Water Sector

158. Infrastructure and its operation and maintenance (O&M), is lagging behind in what is necessary to carry out the Millennium Development Goals. Funding is needed in order to finance this infrastructure, but ultimately consumers and tax-payers are those who pay. Therefore pricing strategies become very important in the provision of water and sanitation services. The balance of pricing strategies with other policy objectives becomes challenging when considering finding an equilibrium between social, environmental, financial and economic needs.

Objectives:

159. **Adopt fair and equitable pricing strategies.** Achieve fairness between various categories of water users, promoting universal access to water and sanitation services. Ensure sufficient financial resources for good quality service, maintenance, infrastructure and investment as needed. Create nuanced approach pricing strategy approach sensitive to socio-economic conditions.

160. **Set the table for pricing reform.** While pricing reform may be necessary for more efficient and effective service provision, such changes cannot be made without appropriate

institutional and technical reforms to carry out pricing reform and to enable cost recovery. Involvement of stakeholder participation is crucial in order to achieve optimal buy-in and a smooth transition.

161. **Match policy objectives with pricing strategies.** Balance and prioritize financial, social, environmental and economic policy objectives as they relate to pricing strategies. Ensure that tariffs are perceived as responding to principles of fairness and equity, access to and consumption of adequate levels of services remain affordable for all users and pricing policies do not restrict access to WATSAN services. Review and analyze water and sanitation subsidy and pricing policies.

162. **Promote sustainable cost recovery in pricing strategies.** Utilize tariffs that recover the costs of operation and maintenance, replacement and include environmental protection. Combine water payments with tax-based subsidies to fund services and provide future investment.

163. **Develop pricing strategies that promote water use efficiency.** Within provision of water and sanitation services, address efficiency through innovative pricing strategies such as different pricing structures for different sectors and different services.

164. **Carry out data collection.** Data need to be collected regarding unit costs and lessons need to be learned regarding governments' and relevant sub-sovereign entities' capability to obtain relevant information that is needed to meaningfully regulate service provision under natural monopoly conditions.

Element 3: Pro-poor Financing Policies and Strategies

165. The poor are disproportionately affected by lack of water and sanitation services, especially where settlements are informal. Policies and strategies do not frequently take this fact into consideration and therefore compound the problems facing the most disadvantaged. Fear of not being able to recover costs from investments hinders financing of needed infrastructure and capacity development.

Objectives:

166. **Promote pro-poor financing policies and strategies.** Options exist to help the poor achieve water and sanitation security. Promoting such initiatives as microfinance, output-based aid (OBA), the financing of local private sector providers, including informal providers, and sharing the costs between the public and private sectors for connecting the unserved with the served. Improve investment environments by establishing more effective and diverse credit and financial management systems that are accessible and affordable to the poor.

167. **Recognize the role of small-scale water and sanitation suppliers.** Small-scale private water and sanitation suppliers provide water for many marginalized and poor areas where public water systems do not reach. It is important to recognize their role and the gap they fill while also defining their role, increasing their regulation as well as their financing to utilize their unique niche markets while ensuring affordable prices.

168. **Utilize and develop adequate low-cost technologies.** Large numbers of low-cost technologies exist yet they are not being utilized due to lack of access to such technologies by poor communities as well as problems of distribution. Developing new, appropriate, low-cost technologies should also be a priority to build on existing technologies and achieve greater coverage in disadvantaged areas. Use innovate approaches to reduce the cost of service provision such as community/user own labor and credit/subsidies to purchase materials.

169. **Build on community initiatives.** Innovations in management and financing can be found in community neighborhoods where water provision mechanisms have been functioning

without support. Utilize these initiatives, reinforce them and build on them to propagate positive activities.

170. **Understand the difference/similarities between poor and non-poor.** In order to better service the poor with water and sanitation, it is important to have an understanding of the differences and similarities between the poor and non-poor terms of water use and water-use practices. This will help develop specific pro-poor mechanisms that are most beneficial to the disadvantaged instead of attempting to fit a system that is not optimal.

171. **Establish an international water supply fund.** An international fund should be developed where, through conservation efforts in water-rich countries could reduce water consumption through conservation and donate some percentage of the savings towards the fund to support water supply and sanitation projects in developing and in transition countries.

Theme VI: Education, Knowledge and Capacity Development

172. Often not emphasized enough, but an essential part to succeeding in water resources management, governance and activities related to the water sector, is the conveyance of education and knowledge in order to build capacity among water professionals and institutions and raise awareness in the general public. While infrastructure may be in place and policies and laws established, if there is no capacity to properly manage the infrastructure or carry out mandates, these initiatives have no value and objectives cannot be met. This is also true for the development of technology and the collection and sharing of information and data. Not only must there be a means to conduct such activities, but the capacity to make them happen. In a constantly changing world, data and technology are ever more important to be informed of and adapt to the transformations that are taking place. In some cases the answers to some of the puzzles are no further than our doorstep as indigenous and traditional knowledge are sometimes the best-suited solutions for given problems yet are often not included in mainstream policy and practices. The transfer of water knowledge and education can change the behavior of future generations towards water resources.

Element 1: Education, Knowledge and Capacity Development

173. For several decades, capacity building has been recognized explicitly as a key tool for making development sustainable and for addressing the world's broad spectrum of water management challenges – from drinking water supply and sanitation to water resources management. Donor spending has increased as a result of this recognition. But the knowledge and institutional capacity of many countries to readily “absorb” all of these funds remain severely constrained – that is, key stakeholders are unable to rapidly bring to the table concepts and designs for projects and investments that are economically and socially robust and sustainable, and can be properly implemented, operated and maintained. The weakness in knowledge and capacity is becoming therefore the key constraint to sustainable development.

Objectives:

174. **Share information and knowledge.** Free access to scientific literature for professionals and researchers in developing countries should become an increasingly important factor in reducing the knowledge gap that now exists between the North and the South. Decision-makers should adopt policies and set incentives for their organizations to overcome hurdles of communication, lack of data and skills training and remove limits on the private sector to engage in information and communication services. Donors should provide more fellowships dedicated to e-learning.

175. **Educate the marginalized.** Concerted action should be taken to educate and enhance the skills of those that are marginalized by society yet have important roles to play in water resources management. The poor, youth, women, indigenous peoples need opportunities at education of water resources. This works both ways, however, in that they also can provide knowledge that is important to sustainable water management.

176. **Build on existing local knowledge.** Local actors are at the front line as they are the first in addressing local problems. They hold valuable knowledge and experience and this still too often goes unrecognized. Their knowledge and experience should be identified and reviewed – decision makers need to learn from these stakeholders and apply the lessons learned, such that they use local capacity and knowledge, work with local reformers, build capacity of local institutions and civil society, and apply the subsidiary principle to empower the local actors. A balanced combination is called for to incorporate top-down (often larger scale) and bottom-up (often smaller-scale) approaches and procedures.

177. **Encourage water sector reform.** The transfer of standards, technology, policies and knowledge cannot occur without transformation in the water sector. The systems and technologies for developing countries should be based on standards and technologies that are appropriate, workable and financially feasible in developing countries--cutting-edge innovation may be necessary. In both developed and developing countries, policy instruments such as water pricing, markets and private sector participation are not simple solutions. Designing effective instruments calls for interdisciplinary contextual research that goes beyond prescription.

178. **Build learning networks.** Networks are also becoming very helpful to disseminate and share informal knowledge, identify common problems, build attitudes and confidence, and generate new knowledge. South-South and North-South networks provide platforms to share lessons and adapt them from one place to another. In addition to these horizontal networks of peers, the need is growing for “vertical” connectivity from networks through which local stakeholders can access global networks and knowledge.

179. **Promote integrated approaches.** Multi-disciplinary Problem-Based Learning and demand-driven research agendas should be promoted. Educational and other knowledge institutions should play active roles in multi-stakeholder partnerships for water resources management. This will allow more effective problem solving and better sharing of traditional and formal knowledge.

180. **Invest in capacity development.** While there is a wealth of knowledge, experience, and expertise, there is still limited access to the right information, materials, and tools; insufficient funds for supporting the knowledge transfer process; and insufficient or inadequate human and organizational resources. Adequate investment in capacity development enhances the ability to work with informed partners, work at scale, replicate good practices, and innovate. It also enables local actors to provide the necessary support system to follow through and ensure the continuity of an environmentally sustainable service delivery system.

181. **Create “learning” organizations.** The best organizations in public administration are “learning” organizations, just as knowledge-driven corporations in the private sector tend to be the more successful businesses. They allow themselves to change in response to new challenges and to new knowledge.

182. **Raise awareness – teach water literacy.** More effort must be put in making key technical information much more accessible, not only to the political decision-makers, but also to the water users to make them better informed and empowered. There are important opportunities to promote local innovations and water augmentation/conservation/recycling by working with local businesses and other local organizations in developing and implementing new technologies, such as the necessary information and communication systems.

Element 2: Water Science and Technology - Appropriate and Innovative Solutions

183. Science and technology play a key role in finding solutions to water-related problems ranging from sanitation issues to modeling to water-related disasters. While we cannot depend solely on these for the improvement of the quantity and quality of available water resources, as societal, economic and political factors also influence the situation, innovative solutions can be found to aid people at various levels, by providing options to decision makers as well as providing low-cost alternative to access to water and sanitation among the world's poor.

Objectives:

184. **Conserve/reuse/recycle.** The importance of the conservation, reuse and recycling of water should be elevated not only at a local level among water users and water managers, but also among decision makers at higher levels in order to mobilize funding for these methods and their technologies. These approaches should also be combined with the development of new water, such as rainwater and desalination, in order to create a more flexible approach to new water sources.

185. **Combine advanced technology with capacity development.** Complicated technology can only work if it is accompanied with capacity development. Sustained operations, maintenance and skills training must coincide with the use of high-tech solutions. Raising awareness is the first step, however, in making urban water managers, farmers and other water professionals aware technology that is available to them. Considering the cost of energy and food, this is especially true for the use of irrigation technology.

186. **Promote national and international cooperation.** While some technologies are local in nature others can be utilized in any part of the world. International cooperation should be promoted in not only the transfer of technology between countries, but also in the access to data related to technology.

187. **Broaden technological choices.** The range of technology and management choices must be broadened to include the development of innovative, low-cost technical approaches, such as local household technologies, that can be implemented in poor communities. Where possible, appropriate technologies should be given precedence. How technology can be used by communities and the participation of those communities in the planning process should always be taken into consideration.

188. **Support and promote global water science programmes.** In order to understand complex interactions between the hydrological cycle, associated biogeochemical cycles and the global drivers, scientific research in these areas need to be intensified and extended. It is of particular importance to build relevant capacities in developing countries and have the local research community participate in relevant global research programmes. The role of international water education institutions is extremely important in this regard. Appropriate scholarship programmes for developing countries need to be developed and implemented.

189. **Increase demand-side solutions and related technologies.** To reinforce the shift to demand-side solutions instead of supply-side solutions, demand-efficient solutions and technologies must be promoted, strengthened and developed. Examples already in place to aid in reducing demand are metering, low flow fixtures, utilizing rainwater and innovative pricing mechanisms.

190. **Promote science and technology in tertiary education.** In order to properly advance scientific and technological solutions to water resources problems, quality educational opportunities need to be in place in order to attract students to pursue careers in areas where such advances are made. Such opportunities and participation in such programs should be encouraged at the national and local levels.

Element 3: Professional Associations and Networks

191. Within professional associations and networks is housed a large amount of information, expertise and experience. They are underutilized both at a national and international level and there exists a disconnect between these organizations of practical knowledge and networks and policymakers. In an age where information and networking are having great influence over all aspects of life, governments need to be tapped into these sometimes vast networks to make use of the resources that they can provide.

Objectives:

192. **Carry out human resources assessment.** It is not currently clear how many people are working in water around in the world nor where and what are the precise needs. An urgent requirement is for a periodic assessment of the state of the sector's human resources in order to globally monitor the state of the "professional infrastructure".

193. **Support national associations.** Where national associations exist, for governments to give further support to achieve goals and mandates. Where no bodies exist, to partner with international professional associations to support the formation of nascent national associations.

194. **Strengthen umbrella bodies.** Numerous professional associations and networks exist without a strong, developed umbrella body with the aim of facilitating stronger synergies between these associations and networks.

195. **Engage professional associations in policy and investment.** Professional associations provide a wealth of knowledge and expertise on various issues related to water, depending on their central focus, from the local. These associations and networks can be more involved and engaged, at the earliest of stages of implementation, to influence policy and investments related to their expertise.

196. **Promote governments and professional associations working together to develop human resources.** Professional associations and networks offer a large amount of sectoral and career knowledge that can prove useful to the development of human resources in the water sector. These associations, in partnership with governments, should promote training and education related to careers in water resources management. Concentrated efforts can be made in developing countries and with gender mainstreaming. With youth being the future, young professionals' associations need to be encouraged, supported, guided and promoted throughout the world.

197. **Create better links between sectors.** Coupled with the strengthening of professional associations, it is also essential to create better links with those associations and government, the private sector, civil society, community-level organizations and other stakeholders.

198. **Involve professional associations in national commissions.** Using the experience of international professional associations, governments should invite representatives from these associations to serve in a standing capacity on national science, research and development commissions in order to link effectively research to policy developments.

Element 4: Data for All

199. Lack of data, and open access to existing data, has hindered efforts to create an enabling environment for sustainable water management. Quality data is necessary in order to carry out all aspects of water resources management and is required to not only develop new technologies in the future that will help us tackle global changes, but also to prevent disasters, save lives and provide more water and sanitation to those who are lacking. Monitoring and analyzing this data is crucial as data alone is not sufficient to confront water-related issues. Investment in the collection and analysis of water-related data of all types must be increased throughout the world, and the resulting data and information freely exchanged, particularly in the case of transboundary water bodies, if we are to apply effective and sustainable solutions to the world's water problems.

Objectives:

200. **Understand and assess vulnerability.** A better understanding of the impacts of global changes, including climate change and variability, on water resources is necessary in order to prepare the required response strategies. Resources should be provided and efforts intensified to promote research regarding the potential impacts of climate variability and change on freshwater resources in river basins. Activities should include new investments in capacity building, operation and maintenance of existing monitoring systems, including the redevelopment and upgrading of the existing hydrological networks.

201. **Put data in the right hands.** The role of the water manager is essential to water security in that it includes proposing a comprehensive range of options to meet the desired societal

objectives and needs for water security. The future will present us with many challenges and yet water managers cannot develop practical solutions unless they have all the necessary data and information, not only on the resource itself, but also on the social and economic environment in which the solutions will need to be implemented. At the same time, decision makers should be sensitized to the importance of data so that quality data can influence policy decisions.

202. **Establish data as a public good.** The collection and analysis of critical data and information should not be regarded as an expenditure but as a creditable investment, often financed by tax payers, with high-quality future returns. Lack of sufficient financial and human resources for these tasks is a major and growing cause of concern. Efforts to deal with water security issues will fail unless these investments are made and maintained in the long term. In particular, the number of basic hydrological stations in many countries is inadequate to satisfy even the minimum needs and yet National Hydrological Services have seen the budgetary allocations for hydrological services systematically cut. National governments should take urgent measures directed at reversing the growing decline of these networks and should increase support for operational hydrological and relevant meteorological observation networks. This is especially crucial in developing countries.

203. **Support from the international donor community.** The international donor community should support comprehensive projects to improve data collection, including improvement of hydrological networks, data management and dissemination, which constitute the foundation of all IWRM processes. The United Nations, the World Bank and other international agencies and donors should assist countries with comprehensive projects, in order to improve their data collection networks and build the knowledge and information bases that are needed to develop and manage water resources in a sustainable manner.

204. **Include monitoring and assessment in data collection.** Simple data collection is not enough and monitoring and assessing the data for trends is necessary for proper adaptation and mitigation measures of water-related problems. Urgent issues requiring an influx of data collection, monitoring and assessment include climate change, sanitation, water-related disasters, groundwater and the interface between groundwater and surface water. Monitoring should be carried out on the local, basin, regional, national and international levels and include a peer review process for performance for those who ascribe to the idea.

205. **Promote international data exchange.** For a better understanding of the hydrological cycle under the changing climate, international data exchange should be encouraged. International and national policies should be reviewed and efforts should be directed in order to facilitate the international exchange of hydrological and related data and products, so that regional and global studies of freshwater resources and climate change and variability can be conducted and useful results produced for the benefit of mankind.

Element 5: Water and Culture

206. Cultural diversity is key to environmental sustainability: it provides the multiple human possibilities necessary for sustainable water and climate adaptation strategies. Thus, the fundamental goal is to recognize and respect cultural diversity by interweaving various perspectives towards collaborative and inclusive actions for sustainability of water and cultures. Cultural diversity and biodiversity are intimately connected and interdependent. People's relationship to water is developed through their local culture. Through cultural practices people are motivated towards sustainable use, management and conservation of water for future generations and have therefore continued to develop and adapt technologies that fit their cultural priorities and respond to their changing environments. Given the increasing vulnerability of water resources, it is essential that these cultural practices and technologies be recognized, supported and promoted in order to achieve sustainable water resource management.

Objectives:

207. **Ensure cultural diversity.** Incorporating traditional and local knowledge about the use, management and conservation of water in water policies, reforms and scientific research will make actions on the ground more sustainable, effective and engaging for those who carry out the work. Through adopting processes and strategies that recognize traditional and local knowledge, and crediting ownership of those to specific cultural groups, this can ensure the viability of cultures and ecosystems.

208. **Recognize, integrate and promote cultural diversities and technologies in water management.** Through recognizing the value of diverse cultural practices and technologies in water management, integrating these practices and technologies with scientific knowledge and developing guidelines and recommendations for incorporating them into water management, strategies and policies can better achieve sustainable water management.

209. **Embed cultural diversity in water governance.** Both national and local governments should create an enabling environment through appropriate reforms of water policy and legislation in such a way that customary law, informal water use practices and cultural diversity are formally recognized and accommodated. Through analyzing water policies and laws to see where gaps are between the modern and traditional, reforming water management organizations' structures to reflect cultural diversity, establishing national-local partnerships to monitor changes promoting cultural diversity, and understanding, respecting and documenting effective traditional water management adaptation and mitigation strategies, more resource sustainability will exist and help in realizing the Millennium Development Goals.

210. **Evaluate the relationship between cultural diversity, biodiversity and water resource management.** Recognizing marked decline in cultural and biodiversity, governments and development financial institutions should add to their social and environmental safeguards an explicit concern for cultural diversity and therefore should evaluate the inter-linkages between cultural diversity, biodiversity and water resource management at the project specific, local, national, regional and global levels.

211. **Protect water and its cultural value.** Sacred water sites exist in every nation on every continent. There is the need to identify and then protect these sacred sites. In addition, water's cultural importance is also reflected through songs, stories, designs, dance, music, sports, festivals and multimedia, which should not only be protected as well, but should also celebrate water.

212. **Improve the institutional framework of water and culture.** Inclusion of cultural diversity in water projects and programmes can increase collaboration and reduce conflicts. In carrying out transparent participatory decision-making processes, incorporating the United Nations' guiding principles, which respect cultural diversity, into water policy and development and establishing global, regional, and local water caretakers with responsibilities to monitor watersheds, educate water users and the public, mediate conflict, and remediate, cultural diversity can become incorporated into the everyday thinking of water managers and policy makers.

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Annex I: Contributing Documents

- Alicante Declaration: The Global Importance of Ground Water
- Beppu Policy Brief 2007 (1st Asia-Pacific Water Summit)
- Brisbane Declaration: Environmental Flows are Essential for Freshwater Ecosystem Health and Human Well-being
- Civil Society Statement – AfricaSan + 5
- Conclusions from the “In/Around Turkey” 5th World Water Forum Regional Preparation Meetings
- Dushanbe Declaration on Water-related Disaster Reduction
- eThekweni Declaration (AfricaSan Conference on Sanitation and Hygiene)
- Financing Water for All: Report on the World Panel on Financing Water Infrastructure
- First African Water Week: Summary of Proceeding and Outcomes
- Fourth World Water Forum Ministerial Declaration
- Global Corruption Report 2008: Corruption in the Water Sector
- Hashimoto Action Plan
- International Symposium: Water for a Changing World – Enhancing Local Knowledge and Capacity
- Lisbon Congress and Kampala Conference: International Association of Hydrogeologists (IAH)
- Manual on the Right to Water and Sanitation (COHRE)
- Marseille Statement (UNESCO Symposium on Frontiers in Urban Water Management)
- Message from Beppu (1st Asia-Pacific Water Summit)
- Paris-2007 Statement (UNESCO International Symposium on New Directions in Urban Water Management)
- Sharm El-Sheikh Commitments for Accelerating the Achievement of Water and Sanitation Goals in Africa
- Third International Conference on Managing Shared Aquifer Resources in Africa
- Third United Nations World Water Development Report (WWDR-3)
- Up to and Beyond 2015: Emerging Issues and Future Challenges for the International Water and Sanitation Agenda
- Water for a Sustainable Europe – Our Vision for 2030

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Annex II: Listed Policy Recommendations

Theme I: Global Changes and Risk Management

Element 1: Adapting to Climate Change

- Think outside the “water box”.
- Increase the flexibility of water management practices.
- Develop national and sub-national adaptation strategies.
- Re-design education and training of water professionals.
- Scale up investment efforts in storage capacity and IWRM.
- Design infrastructure projects in anticipation of climate change.
- Develop long-term scenarios and strategies for action in all planning activities.
- Incorporate climate change assessments in National Water Plans.
- Create an international task force.

Element 2: Water-related Migration, Changing Land Uses, Human Settlements and Water

- Improve the knowledge base on the change of water-related population dynamics.
- Strengthen institutions and policies, which bolster resilience in populations.
- Increase awareness about the impact of environmental degradation.
- Develop early monitoring systems.
- Improve legal frameworks.
- Provide adequate humanitarian response.

Element 3: Managing Water-related Disasters

- Integrate water-related Disaster Risk Reduction (DRR) into national development plans.
- Increase preparedness level of afflicted populations.
- Institute risk management plans/measures.
- Strengthen cooperation and build partnerships between national governments, local governments and civil society.
- Improve monitoring, assessment, data collection and sharing, and research.
- Increase public and private investments in DRR.
- Promote, share and develop technologies.

Theme II: Advancing Human Development and the Millennium Development Goals (MDGs)

Element 1: Ensuring Water, Sanitation and Hygiene for All

- Develop national and sub-national plans of action.
- Build cross-cutting local, regional and international partnerships.
- Aid informal settlements.
- Devote funds for water, sanitation and hygiene.
- Mobilize resources and build capacity in water and sanitation.
- Use appropriate, acceptable technology.
- Raise awareness on sanitation and hygiene.

- [Consider the environmental impacts of sanitation.](#)

Element 2: [Water for Energy, Energy for Water](#)

- [Improve the knowledge of the water-energy nexus.](#)
- [Enhance the coordination of water and energy policies.](#)
- [Conduct water and energy sustainability assessments.](#)
- [Anticipate the increase in energy prices in all aspects of water management.](#)
- [Develop new technologies in both water and energy sectors.](#)
- [Invest in hydropower.](#)
- [Conduct more research to better evaluate impacts of biofuels on water resources.](#)

Element 3: [Water and Food for Ending Poverty and Hunger](#)

- [Research population dynamics and its relation to agriculture.](#)
- [Introduce policies to promote the increase of crop yield per unit area.](#)
- [Promote small- and medium-scale agricultural development projects.](#)
- [Scale-up the modernization of irrigation and drainage systems.](#)
- [Strengthen and support water-related institutions and associations.](#)
- [Research, monitor and assess the impact of rising energy costs, and biofuels, on food production, water use and the environment \(the water-energy-food nexus\).](#)
- [Understand the changes in nutrition and diets.](#)
- [Re-engage in the reduction of food losses “from field to fork”.](#)

Element 4: [Multiple Use and Functions of Water Services](#)

- [Recognize and promote multi-functionality.](#)
- [Internalize MUSF in policy and management.](#)
- [Introduce broader approaches to Service Oriented Management \(SOM\).](#)
- [Generate a vision and develop policies of MUSF.](#)
- [Institutionalize MUSF.](#)
- [Promote a multi-sector approach at the local level.](#)
- [Reconsider design and technologies to allow for MUSF.](#)
- [Diversify the use of irrigation water.](#)

Theme III: Managing and Protecting Water Resources and their Supply Systems to Meet Human and Environmental Needs

Element 1: [Basin management and transboundary water cooperation](#)

- [Improve understanding and reinforce cooperation in the transboundary context.](#)
- [Improve the legal framework of transboundary waters.](#)
- [Increase the number of river basin organizations, their strength and capacity.](#)
- [Seek fair, equitable and win-win solutions in negotiations over transboundary water.](#)
- [Develop harmonized water management plans.](#)
- [Promote IWRM.](#)
- [Take into account the interests of stakeholders.](#)
- [Promote cross-border research, monitoring and data exchange.](#)
- [Share infrastructure and jointly finance.](#)
- [Encourage research, education and training on transboundary water cooperation.](#)

Element 2: [Ensuring adequate water resources and storage infrastructure to meet agricultural, energy and urban needs](#)

- [Encourage a holistic approach within a sustainable development framework.](#)
- [Develop frameworks and approaches to determine and prioritize needs.](#)
- [Strengthen the climate change adaptation and storage link.](#)

- [Expand storage infrastructure in developing countries.](#)
- [Integrate social and ecological sustainability.](#)

Element 3: Preserving natural ecosystems

- [Reduce water footprints.](#)
- [Promote ecological corridors.](#)
- [Value ecosystem services.](#)
- [Rethink the role of ecosystems for agriculture.](#)
- [Use ecosystems as a buffer to climate change.](#)
- [Balance reduced degradation and increase in ecosystem services.](#)
- [Empower those who use ecosystem services.](#)
- [Support urban programs for biodiversity, stream restoration and ecosystem enhancement.](#)
- [Preserve environmental flows.](#)

Element 4: Managing and protecting surface, ground and rainwater

- [Integrate water quality management.](#)
- [Understand groundwater rights, laws and policies and develop new ones where there are gaps.](#)
- [Develop policies and institutions to integrate management of surface, ground and rainwater.](#)
- [Incorporate ecological approaches into urban water management.](#)
- [Upscale good practices in small and medium-scale water resources management.](#)
- [Increase the visibility of green water.](#)
- [Afford more attention to rainwater.](#)

Theme IV: Governance and Management

Element 1: Implementing the Right to Water and Sanitation for Improved Access

- [Recognize the right to water and sanitation in national law.](#)
- [Review national laws and policies.](#)
- [Allocate resources to support the right to water and sanitation.](#)
- [Ensure access to water and sanitation.](#)
- [Incorporate the right to water and sanitation in water resources management plans.](#)
- [Establish clear roles, responsibilities and dispute resolution mechanisms.](#)
- [Promote information and training available to all.](#)
- [Ensure water and sanitation to all irrespective of housing and land status.](#)

Element 2: Water institutions and water reforms

- [Carry out policy, legal and regulatory reform.](#)
- [Couple institutional reform with capacity development.](#)
- [Improve the relationship between national and local water institutions.](#)
- [Promote standards and harmonize with regulatory instruments.](#)
- [Recognize the role of small-scale water providers.](#)
- [Strengthen decentralization efforts.](#)
- [Develop groundwater regulation.](#)
- [Institutionalize pollution prevention.](#)
- [Support sub-national governments in confronting global changes.](#)
- [Understand the local context and develop local institutions.](#)
- [Create effective regulation and monitoring.](#)

Element 3: Ethics, Transparency and Empowerment of Stakeholders

- [Engage with a wide range of stakeholders.](#)
- [Define stakeholder participation.](#)
- [Promote transparency and prevent corruption.](#)

- [Incorporate good governance into water management policies and practices.](#)
- [Promote a water ethic.](#)

Element 4: Optimizing Public and Private Roles in Water Services

- [Improve public sector providers/utilities.](#)
- [Create adequate legislation.](#)
- [Facilitate the choice of the best service providers, regardless of sector.](#)
- [Clearly define and formalize roles.](#)
- [Raise awareness about public and private roles and public-private partnerships \(PPP\).](#)
- [Ensure public authority efficiency.](#)
- [Consolidate direction and control of operators.](#)

Theme V: Finance

Element 1: Sustainable Financing in the Water Sector

- [Urgently increase investments and finance.](#)
- [Connect political will, finance and capacity development.](#)
- [Always couple “hard” investment with “soft” investment.](#)
- [Match the capacity to borrow with the capacity to lend.](#)
- [Increase aid to the sub-sovereign level by national governments.](#)
- [Promote the idea that with water security, investments are safer.](#)
- [Encourage sustainable cost recovery.](#)
- [Empower local governments in implementing sustainable cost recovery systems.](#)
- [Develop good public finance principles.](#)
- [Commit ODA to capacity development.](#)

Element 2: Pricing Strategies as a Tool for a Sustainable Water Sector

- [Adopt fair and equitable pricing strategies.](#)
- [Set the table for pricing reform.](#)
- [Match policy objectives with pricing strategies.](#)
- [Promote sustainable cost recovery in pricing strategies.](#)
- [Develop pricing strategies that promote water use efficiency.](#)
- [Carry out data collection.](#)

Element 3: Pro-poor Financing Policies and Strategies

- [Promote pro-poor financing policies and strategies.](#)
- [Recognize the role of small-scale water and sanitation suppliers.](#)
- [Utilize and develop adequate low-cost technologies.](#)
- [Build on community initiatives.](#)
- [Understand the difference/similarities between poor and non-poor.](#)
- [Establish an international water supply fund.](#)

Theme VI: Education, Knowledge and Capacity Development

Element 1: Education, Knowledge and Capacity Development

- [Share information and knowledge.](#)
- [Educate the marginalized.](#)
- [Build on existing local knowledge.](#)
- [Encourage water sector reform.](#)
- [Build learning networks.](#)
- [Promote integrated approaches.](#)
- [Invest in capacity development.](#)

- [Create “learning” organizations.](#)
- [Raise awareness – teach water literacy.](#)

Element 2: Water Science and Technology - Appropriate and Innovative Solutions

- [Conserve/reuse/recycle.](#)
- [Combine advanced technology with capacity development.](#)
- [Promote national and international cooperation.](#)
- [Broaden technological choices.](#)
- [Support and promote global water science programmes.](#)
- [Increase demand-side solutions and related technologies.](#)
- [Promote science and technology in tertiary education.](#)

Element 3: Professional Associations and Networks

- [Carry out human resources assessment.](#)
- [Support national associations.](#)
- [Strengthen umbrella bodies.](#)
- [Engage professional associations in policy and investment.](#)
- [Promote governments and professional associations working together to develop human resources.](#)
- [Create better links between sectors.](#)
- [Involve professional associations in national commissions.](#)

Element 4: Data for All

- [Understand and assess vulnerability.](#)
- [Put data in the right hands.](#)
- [Establish data as a public good.](#)
- [Support from the international donor community.](#)
- [Include monitoring and assessment in data collection.](#)
- [Promote international data exchange.](#)

Element 5: Water and Culture

- [Ensure cultural diversity.](#)
- [Recognize, integrate and promote cultural diversities and technologies in water management.](#)
- [Embed cultural diversity in water governance.](#)
- [Evaluate the relationship between cultural diversity, biodiversity and water resource management.](#)
- [Protect water and its cultural value.](#)
- [Improve the institutional framework of water and culture.](#)