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Satisfying future national and international water demands

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INTRODUCTION

The earth is often referred to as the "Blue Planet" because its surface is mostly water, and yet more than one billion people lack access to clean water and more than 1.8 billion have no sanitation. Together those problems lead to more than three million deaths every year and about one billion instances of disease. Aside from the major impact it has on human well-being, water pollution is also a major source of environmental degradation.

Mankind's knowledge has dramatically expanded during the last century. Most important among the many new insights - to be shared today - are the ways and means to manage our water resources on both sides of the equation of supply and demand. The IWRA, since its establishment in 1972, privileged by its worldwide impact in the sharing of knowledge, has carefully selected the topics and themes of its congresses and international symposia. We recall that for the 1991 Congress, the main theme was "Supply Management" while the theme of the 1994 Congress is "Demand Management." Through the creative efforts of members of IWRA, experience and knowledge gained from the Association's many activities have generated global appreciation and acceptance.

The demand for water is steadily increasing and will continue to increase. But, while the supply is not only fixed at best, its natural availability is at the

mercy of nature, over which we have no control. It is, therefore, obvious that unless we cooperate and plan for the development, conservation and use of this resource, water will be in the near future a serious constraint to the development of many nations.

Two things are unlimited: the number of generations for whom we should feel responsible, and our inventiveness. The first provides us with a challenge: to feed and provide for not only the present but all future generations from the earth's finite flow of natural resources. The second, our inventiveness, may create ideas and policies that contribute to meeting the challenge.

Our responsibility to all generations extends especially to those now living in poor conditions, in all continents. In the present and the future it extends to more than ensuring food, it also extends to keeping the environment clean.

It is the great merit of congresses like the 8th IWRA World Congress that they show us where and when we may reach the frontiers of the possible. They thus clarify the conditions under which sustainable development and a clean environment can be achieved. They show us that there are existing possibilities, and they are limited, more so than many of us think.

The 8th IWRA World Congress on Water Resources took place in Cairo, Egypt, during the period of 21 - 25 November 1994.

The conference was held under the auspices of President Hosni Mubarak and attended by Minister Dr. Abdel Hady Radi, Minister of Public Works and Water Resources, Egypt and Minister Dr. Mesfin Abebe, Minister of Natural Resources Development and Environmental Protection, Ethiopia. About 600 participants from 60 countries took part in the conference activities, which included keynote

and paper presentations, discussions and study tours. About 120 papers were presented, covering seven major topics and five special issues. Representatives of major international and regional organizations attended and participated in the Congress, including the World Bank, UNDP, UNESCO, UNEP, FAO, WHO, WMO, CIDA, DANIDA, USAID, AORD, SIDA, CIHEAM/ IAM-B, CEDARE, PEEM and AWRN. Representatives of major non-governmental associations who participated in the Congress included:

• World Energy Council	(WEC)
• International Water Supply Association	(IWSA)
• International Association for Hydraulic Research	(IAHR)
• International Association of Hydrological Sciences	(IAHS)
• International Association in Water Quality	(IAWQ)
• Water Supply and Sanitation Collaborative Council	(WSSCC)
• International Commission on Large Dams	(ICOLD)
• International Commission on Irrigation and Drainage	(ICID)

Several Egyptian organizations participated in organizing and contributing to the conference including MPWWR, NWRC, SFD, the Academy of Scientific Research and Technology, and several universities and research organizations.

The Congress addressed the theme of "Satisfying Future National and Global Water Demands." Under this general theme seven topics were dealt with:

1. Water Demands: agricultural, industrial domestic, energy-related and other demands.
2. Institutions for managing water demands.
3. Economic aspects of demand management.
4. Environmental aspects of demand management.
5. Demand management for international water bodies.
6. Models for demand management.
7. Satisfying demands under drought conditions.

In addition to the above topics, a number of special sessions dealing with related issues were organized covering the following aspects:

1. Institutional arrangements for international co-operation in water resources.
2. Putting Dublin/Agenda 21 into practice - Lessons and new approaches in water and land management.
3. Non-conventional water practices and management to satisfy agricultural demands under the arid Mediterranean climate.
4. Environmental impacts of irrigation and drainage projects.
5. Conflict resolution in water resources issues - International experience.

The Congress also accommodated a number of parallel activities of significant importance of a focused nature, among these are the following:

1. Executive Board meeting of the IWRA;
2. Management Board meeting of the ICID;
3. Special Session on African water and irrigation issues by the African Focus Group of ICID;
4. The Nile 2002 Conference series - preparatory meetings for 1995 and beyond;
5. Workshops on the Action Plan of the River Nile Basin by the TECCONILE member and observer states; and
6. Signing of memorandum of agreement between ICID and IWRA.

Four keynote papers and the Ven Te Chow memorial lecture set the tone for addressing the Congress topics and special sessions. These were delivered by eminent world water leaders. The Congress, with its seven technical sessions, five special sessions and six parallel activities, was well organized and managed by the Egyptian Organizing Committee. The Congress proceedings contained all the papers submitted prior to the Congress. In addition, several papers and keynote addresses were made available during the Congress.

The Congress agreed that the next IWRA Congress will be held in Montreal, Canada, on September 1 - 6, 1997.

The IWRA honored a number of distinguished people for their contribution to the IWRA activities. Awards were given to the following persons:

M. Abu-Zeid, Outgoing President IWRA
 Asit Biswas, Crystal Drop Award
 Andras Szollozi-Nagy, V.T. Chow Memorial Lecture
 W. Hall C. Maxwell, Editorial Award
 Erich Plate, Best Paper for 1993
 Aly Shady, Distinguished Lecture for 1993.

The results of election for the IWRA executives were announced and are as follows:

President: Glenn E. Stout (U.S.A.)
 Vice-Presidents: Benedito P. F. Braga, Jr. (Brazil)
 Katumi Musiake (Japan)
 Aly M. Shady (Canada)
 Secretary-General: Victor de Kosinsky (Belgium)

Treasurer: Timothy H. Larson (USA)

Directors: M. Safwat Y. Abdel-Dayem (Egypt)

Carlos Fernandez-Jauregui (Uruguay)
 Frank Hartvelt (UNDP)
 Soontak Lee (South Korea)
 Guy Le Moigne (the World Bank)
 Rainer Loof (Thailand)
 John J. J. Pigram (Australia)
 Hillel Shuval (Israel)
 Kuniyoshi Takeuchi (Japan)
 Bingxin Chen (China)

EMERGING GENERAL ISSUES

The 8th IWRA World Congress stressed the following aspects:

1. Issuing the 1994 IWRA Cairo Statement on international water resources to embody the results of the Congress in guiding principles and follow-up to steer future IWRA activities.
2. Water scarcity is defined as the predominant problem of the future generation with its already effect being felt in certain parts of the world. It is recognized that water scarcity poses a tremendous threat to global sustainability and, if not well managed, to world peace and development. It is also recognized that the scarcity will affect mostly the poor, especially women and children, and undermine the economic, social and environmental foundations for many parts of the developing world. Water scarcity is linked directly to the deterioration of water quality and world food security. It is also recognized that the usable fresh water resources are finite; this adds to the fragility of the global system.
3. IWRA emphasizes the need for creating a new paradigm in managing fresh water resources. The shift is focused to making the best use of available fresh water resources with relatively less emphasis on augmenting supplies. This will necessitate the adoption of the more emphasis on conservation and efficiency, an integrated approach for water management, and the development of practical applications of the concept at national, regional and international levels. Policies and priorities will be adjusted to reflect the changes at all appropriate levels.

Relying on forecasting demand and making allocations is no longer sufficient for sustainable management. Demand management may include essential tools such as: water conservation, reuse of reclaimed water, establishing policies and priorities for water use and appropriately pricing water. Such tools are needed to balance supply and demand.

4. There is an acute need to raise the awareness of decision-makers, the media and the population at large regarding the pending water shortage issues and the appropriate mitigating measures to manage the demand in an efficient and effective way. This will require the intensification of communication, training, education and increased participation of the users in the planning, implementation and management of water resources.

SPECIFIC CONCLUSIONS

The Congress made the following specific conclusions:

1. The establishment of the World Water Council is endorsed and should be pursued in the most expeditious manner to fulfill the acute need in the global institutional scene. A special committee, chaired by Dr. M. Abu-Zeid, is mandated to identify an appropriate mode of operation compatible with other international organizations.
2. There is a need to operationalize the conclusions and recommendations of the Dublin Conference on Water - 1992 into practical policies and action plans. The recognition of water as an economic good with a value reflecting its most valuable potential use and water management at the lowest appropriate levels was revived. In the future, an IWRA Congress may include a special session to deal with this issue.
3. Demand on water is approaching the available supply at the global level and is exceeding supplies in certain critical regions. Recognizing the finite supply of fresh water, demand management is imperative to meet the needs of future generations of the ever-increasing world population. Application of water conservation technologies, the reuse of wastewater, water harvesting, aquifer management, intrabasin transfer and the use of unconventional water issues are identified as elements of future strategies for demand management.
4. Comprehensive development of water resources, which must be carried out at the basin level, is essential to harness available resources in the most efficient manner. International river basins require particular attention. Basin-wide cooperation requires changes in attitudes and the adjustment of priorities in order to achieve a win-win relationship among riparian states.
5. Integrated management of water in various sectors is essential for better efficiency. It requires strong commitment from the institutions responsible for managing various water utilization aspects. This is a prerequisite for better decisions and continued monitoring of their implementation.
6. Greater attention to the water requirements of the poor, especially women and children, is imperative where planning for strategies and future investment in infrastructure and programs for water development, conservation and management. All attempts must be made to avoid marginalization of the issue or increasing the burden on vulnerable groups.
7. Water users in all sectors: agriculture, municipal and industrial, should be involved in all aspects of planning, implementation and management of water. This involvement is essential for successful demand management. It should emphasize the bottom-up approach and provide adequate participation in the decision-making.
8. Raising the public awareness to water-related issues; water conservation, water quality, vulnerability of supply, good practices and improved utilization technologies is urgently needed to improve/reduce the demands on water resources. This includes raising the awareness of decision-makers, planners and managers, users and consumers, educators and media personnel.
9. The methodologies for environmental impact assessment of water projects require further development. A great deal of development has already been achieved, however, more comprehensive and better analytical tools are needed to resolve operational difficulties resulting from the inter-disciplinary nature of water management.

- Insufficient follow-up and monitoring of EIAs were recognized as major bottlenecks. The need for capacity building and expansion of the knowledge base was stressed to ensure continued credibility of the EIA process.
10. More research and development work are required for use of unconventional sources of water. Use of waste and brackish water for irrigation requires a better understanding of plant physiology and soil reaction to ensure sustainability of land resources. Good attempts have already been made in this field, especially for land reclamation in arid and semi-arid zones, however, a comprehensive understanding of the whole system in terms of water and waste balance is needed.
 11. It is noted that water use and related projects are site-specific in nature. Design criteria should be developed to meet the specific requirements of each site in order to optimize the utilization, maximize the conservation and improve the economics of the development. At the same time, ensuring greater participation of the affected population should be ensured to mitigate to the extent possible, adverse effects on the environment and human health.
 12. Irrigation is recognized as a major fresh water consumptive user at the global level. Improvement of irrigation efficiency is essential for global demand management and for food security in many parts of the developing countries. To achieve this objective, a better water extension service and farmers training programs on efficient irrigation methods are needed. The formation of an effective farmers' organization, irrigation management transfer, and raising environmental awareness are other factors to be considered seriously in this respect.
 13. Developing countries, in particular, identified greater needs for better performance by contractors implementing water projects. Poor performance reduces quality, efficiency and, increases time and cost to complete the work. Contractors personnel training and technology transfer need more attention to provide better and more modern construction techniques with improved quality control/quality assurance.
 14. The use of mathematical models, GIS and computer technologies for planning, design and monitoring of water systems has reached a certain degree of advancement. Continuing effort should be made to adopt and use the emerging technologies in the appropriate applications.
 15. The African continent has been identified as one of the most affected regions of the globe likely to experience potential water shortages in the near future. There is a need to focus the attention on water issues in this region. Attempts are already under way for the River Nile Basin. Formation and strengthening of national and regional organizations and committees to address the emerging issues are needed for other river basins in this continent.
 16. There is an urgent need to develop and apply new conflict resolution mechanisms for water-related issues which would ensure the equitable use of available resources and better utilization and sustainability of global water resources.

1994 IWRA CAIRO STATEMENT ON INTERNATIONAL WATER RESOURCES

I. Preamble

The central question raised by the Congress and the underlying premise of the meeting is the question of how to meet future national and global needs.

Throughout the Congress repeated diagnosis emphasized the gamut of critical water challenges to all nations in terms of quantity and quality. More than anything else, the themes of sustainability, equity, long-range planning, comprehensive approaches, and participating management are all expressions of what repeatedly was described as the "new paradigm" and vital concepts of the transition to the 21st century. We recognize previous declarations and the group emphasizes particularly the Dublin principles. As an international interdisciplinary group, IWRA would like to assert certain guiding principles that could direct theory and practice as well as express the values animating sustainable water development in the coming years.

II. Guiding Principles

Recognizing the triple threat poised by expanding and increasingly urban populations, over consumption and effluent control, as well as questions of equity, poverty and fair distribution of water resources, the participants would like to underline the following guiding principles and critical issues:

1. The continuous need for expanding knowledge about water, in terms of data and information, interdisciplinary approaches and the building of decision support system combining robust data and informed judgement.
2. Strengthening of existing institutions and innovative institutional approaches as well as imaginative ventures between public and public entities including non-government organizations.
3. A global emphasis of freshwater as a holistic integrated, shared precious resource.
4. Conflict management and alternative dispute resolution efforts which emphasized collaboration, various stakeholders involvement, and public awareness and participation.
5. A balancing of efficiency and equity as part of ecosystemic, technically sound, and socially desirable projects of sustained growth.
6. Improve the ability to manage internally complex, multipurpose, long-term water resources and encourage the capacity to respond to increasing uncertainties through flexible, adaptable and participatory mechanisms.
7. Establishment of new consumption paradigms in which water is recognized as a socio-economic good that should be parsimoniously used.

Follow-up

No declaration of intent and no noble principle can be a substitute for timely and appropriate implementation. IWRA would like to strengthen its goals for encouraging education at all levels; for the transfer of knowledge; for fostering innovative partnerships; for encouraging all citizens in participating, planning and management; and for enhancing awareness, involvement, and communication at all levels.

In order to respond to such broad goals and overall commitment, IWRA would like to:

- Promote cross-cultural communication and involvement.
- Clarify expanding water needs and priorities at both national and global levels.
- Enhance the historical and symbolic importance of water in sustaining natural and social systems.
- Improve the dialogue between professionals, politicians and publics.
- Increase access to skills, data sources and strategies for comprehensive water management.
- Seek institutional forms that facilitate participatory decision-making and accountability over policy making.
- Pursue a variety of international forms to help move towards these objectives.
Specifically IWRA will take the lead in exploring through an appropriate committee under Dr. M. Abu-Zeid, the feasibility and nature of a World Water Council.
- Encourage monitoring, assessment and evaluation of the "State-of-water" as a mechanism for early warning and as a means for proper mobilization of resources and technologies to respond to the challenge of managing water in a sustainable manner.