

Water development and management for desertification control

A review of the past decade

Asit K. Biswas

When plans for two United Nations conferences on water and desertification were initiated ten years ago, the interconnection between the two was recognized. Accordingly, one of the resolutions of the UN Water Conference was aimed at the role of water in combating desertification. This article reviews water development and management for desertification on a global basis over the past decade, with particular reference to: planning management and institutional aspects, assessment of water resources, agricultural water use, mitigation of natural hazards, conservation and enhancement of water quality, shared water resources, community water supply, environment and health, and education and training.

Dr Asit K. Biswas, Director of Biswas & Associates, 76 Woodstock Close, Oxford, OX2 8DD, UK, is the President of the International Society for Ecological Modelling, Vice-President of the International Association for Clean Technology, and former Vice-President of the International Water Resources Association. He was a Senior Advisor to both the Secretary-Generals of the United Nations Conferences on Water and Desertification.

¹The United Nations Conference on Water was held at Mar del Plata, Argentina, 14–25 March 1977, and the United Nations Conference on Desertification was held in Nairobi, 29 August–9 September 1977. Details of the Water Conference can be found in Asit K. Biswas, *United Nations Water Conference: Summary and Main* continued on page 402

Two major events occurred exactly a decade ago that have had major impacts on various aspects of land and water management all over the world – the United Nations Conference on Water held at Mar del Plata, Argentina, and the United Nations Conference on Desertification (UNCOD) held at Nairobi, Kenya.¹ Both events were held at the highest decision-making levels and produced action plans which have profoundly influenced development and research activities during the past decade.

Right from the very start, when plans for these two conferences were initiated, it was recognized that water plays a major role in combating desertification, and as such the two events should influence each other. Accordingly, one of the twelve resolutions of the Water Conference, which was the earlier of the two events, was specifically aimed at the 'role of water in combating desertification'. Resolution V unambiguously pointed out that:

Water is one of the main factors limiting production and settlement in dry lands; and . . . lack of water, lack of the development of, or wasteful uses of, this resource are fundamental causes of many problems of desertification and environmental degradation.²

This Resolution further stated:

Proper planning, adequate development and wise management of water resources should receive priority in the efforts to combat desertification, to prevent environmental deterioration and to promote economic and social development in arid and semi-arid regions.³

Similarly, the Desertification Conference recommended that:

Efficient, socially, economically and environmentally sound planning, development and management of water resources be introduced as part of measures to combat desertification.⁴

It would, however, be an error to consider the Water and Desertifica-

tion Conferences as two special events of the 1970s. The two were an integral part of a series of mega-conferences sponsored by the United Nations during the period 1972–81 on critical global issues. All of these intergovernmental conferences were aimed at the highest policy makers in their respective fields. The Water and Desertification Conferences were preceded by conferences on: the human environment – Stockholm, 1972; population – Bucharest, 1974; food – Rome, 1974; and human settlements – Vancouver, 1976. Two more similar conferences were held following the Water and Desertification Conferences, on Science and Technology for Development in Vienna, in 1979 and on New and Renewable Sources of Energy in Nairobi, 1981. In retrospect, as one of the three or four people who were privileged enough to attend all these world conferences, it is clear that each was affected by the conferences preceding the event, and each in turn had an impact on the conferences that followed. This, however, is how it should be since the primary foci of all the conferences are interrelated: environment–population–food–human settlements–water–desertification–science and technology–renewable energy. For example, it would be possible to show water as one of the major links that can directly influence all the other conference subjects.

Drought and desertification

While there is a close interrelationship between drought and desertification, it should be noted that they are two distinct phenomena. Desertification, a term that was coined in the mid-1970s for the United Nations conference, can be defined as:

... the diminution or destruction of the biological potential of the land, and can lead ultimately to desert-like conditions. It is an aspect of the widespread deterioration of ecosystems, and has diminished or destroyed the biological potential, ie plant and animal production, for multiple use purposes at a time when increased productivity is needed to support growing populations in quest of development.⁵

Drought is primarily a natural phenomenon occurring due to various climatic and meteorological factors, but desertification is principally the result of the misuse or overuse of land by people and, in pastoral economies, by their livestock. These are important distinctions which should be noted.

Review of the past decade

During both the conferences and their preparatory processes, the importance of the implementation of the plans of action was highlighted. Some expressed the concern that the results of two such important events may not be properly implemented due to the lack of funds and/or absence of effective mechanisms for implementation. Many delegations and officials were unanimous in their views that every effort should be made to eliminate the implementation gap in order that commitments made during the conferences could be properly realized.

It is now possible to prepare a reasonably reliable review of water development and management for desertification control on a global basis during the past decade, following the Water and Desertification Conferences. The present review is based on a questionnaire survey carried out by the Intersecretariat Group for Water Resources of the

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Documents, Pergamon Press, Oxford, UK, 1978; and United Nations, *United Nations Water Conference: Round-up, Plan of Action and Resolutions*, United Nations, New York, NY, USA, 1978.

²Biswas, *op cit*, Ref 1.

³*Ibid.*

⁴United Nations, *op cit*, Ref 1.

⁵*Ibid.*

Administrative Committee on Coordination of the United Nations on the implementation of the Water Conference, on a general assessment of progress on desertification carried out by the United Nations Environment Programme (UNEP), country information collected by the World Health Organization (WHO) on the implementation of the International Decade for Water Supply and Sanitation, and my own personal observations and discussions during numerous missions to various developing countries for different multilateral and bilateral organizations.

Planning, management and institutional aspects

Both the action plans recommended that countries should formulate and keep under review national water policies in relation to the use, management and conservation of water, as a framework for planning and implementing specific programmes and measures for efficient operation of schemes. On the basis of the questionnaire survey, currently some 75% of developing countries and 65% of developed countries have national water policy statements. Little more than 50% of reporting developing countries acknowledged the existence of national master plans, but the situation is unsatisfactory in Africa, where only 18% of the countries have such plans. It is, however, heartening to note that a large proportion of countries not having master plans have now embarked on their preparation.

Preparation of national master plans is not enough. Many of the plans I had an opportunity to review have been poorly formulated due to a variety of reasons, among which are lack of adequate indigenous expertise, poor choice of foreign consultants who have assisted the development of such plans, too much emphasis on engineering aspects and not enough on social, economic, environmental, legal and institutional aspects, and their theoretical rather than practical orientations. Accordingly, some of the master plans formulated thus far are likely to be of limited use unless they are modified significantly. It is probably high time to review objectively selected national master plans to identify their strongest and poorest components, so that the countries that are now considering their formulation do not make the same mistakes. Preparation of practical guidelines to formulate national master plans for use by developing countries would be a step in the right direction.

Some countries are also periodically reviewing the master plans and adjusting priorities and targets in order to keep pace with changing national and international conditions. This is a welcome development and should be encouraged.

When national water legislations are considered, the questionnaire survey indicated that around one-third of the African countries, 40% of the Latin American and Caribbean countries and two-thirds of the Asian and Pacific countries felt that the existing legislations are adequate and compatible with the long-term objectives of their national economic and social development plans. Furthermore, whereas in the Latin American and Caribbean region, nearly all countries are at present amending or revising their legislations, only about half the African countries reported similar progress. All the European countries expressed a high rate of satisfaction with existing legislations and their status of revision.

The Water Conference emphasized the need for 'real coordination' among all bodies responsible for the investigation, development and management of water resources as well as the establishment of efficient water authorities. Similarly, the Desertification Conference recommended 'establishing or strengthening a national coordinating body'. Overall 73% of developing countries now have central bodies or mechanisms to coordinate activities at the national level. In contrast, only 61% of the developed countries responding to the survey indicated the existence of similar national coordinating mechanisms. The Latin American and the Caribbean region had the highest percentage of countries (87%) having such mechanisms, whereas the western Asian region had the lowest at 50%. Nearly all developing countries that currently do not have such mechanisms have plans to establish them in the future, but similar interests cannot be witnessed in developed countries. What now needs to be done is to review the performance of these mechanisms in order to identify appropriate measures to improve their efficiency.

Assessment of water resources

This is probably one of the important areas where progress since the Water and Desertification Conferences has been most disheartening. On the basis of available information, it is 'doubtful whether there has been any net improvement in the overall situation'.⁶ Shortage of funds and trained manpower and related resources has made it difficult even to sustain earlier assessment programmes, let alone improve them. This is especially true for many sub-Saharan countries where droughts and other catastrophes have played havoc with national economies. For example, climatological data collection in Chad came to a halt for several years for all practical purposes, and many stations have been closed in recent years.⁷ Without reliable assessment activities, it is difficult to see how water resources can be efficiently managed.

The adequacy of collection of time-series data in developing countries and their perceived reliability varied from one parameter to another as shown in Table 1.

All developed countries and 76% of developing countries now use computers to process, store and retrieve data on precipitation and surface water. Computer usages drop to 78% for developed and 58% for developing countries with respect to groundwater: the corresponding statistic for Africa is 36%. Results on the dissemination of data collected are somewhat mixed. The Latin American and Caribbean region leads with respect to the existence and adequacy of mechanisms to disseminate data on precipitation and surface water (western Asia is the worst), but ranks lowest with respect to groundwater. Most countries are planning to improve their processes for data processing, storage, retrieval and dissemination.

⁶Report of the Secretary-General, *Water Resources: Progress Achieved and Prospects in the Implementation by Governments of the Mar del Plata Action Plan*, Document E/C 7/1985/5, United Nations, New York, NY, USA, 1985.

⁷Asit K. Biswas, 'Land use in Africa', *Land Use Policy*, Vol 3, No 4, pp 247-259.

Table 1. Percentage of developing countries responding to adequacy of networks and reliability of data collection.

Parameter	Adequacy (%)	Reliability (%)
Precipitation	55	69
Surface water	40	60
Evaporation	31	43
Water quality	30	55
Groundwater	25	52

Table 2. Percentage of countries in various regions that consider respective constraints very serious or serious.

Constraints to irrigation development	Africa	Asia and Pacific	Latin America and Caribbean	Developing Europe
Shortage of financial resources	100	79	—	67
Lack of equipment	86	64	58	20
Lack of qualified manpower	75	42	25	0
Institutional deficiencies	55	33	50	20

Source: Report of the Secretary-General, see text, *op cit*, Ref 6.

Agricultural water use

Both the Water and Desertification Conferences noted the importance of reliable and efficient water supply systems for irrigated and rainfed agriculture. Currently agriculture is the largest user of water, accounting for some 80% of world consumption. The urgent necessity of instituting proper water control to sustain and enhance agricultural production has been graphically illustrated by the catastrophic impacts of the recent droughts in many sub-Saharan African countries.

The importance of irrigation can be clearly identified by the fact that 50–60% of the increase in agricultural production during the period 1960 to 1980 has been estimated to have come from either new or rehabilitated irrigated areas. On the basis of the responses received to the questionnaire survey from 54 developing countries, nearly half (25 countries) believe that new and improved irrigation will contribute to less than 25% of the total planned increase in agricultural production, another 15 countries expect the corresponding estimate to be 25–50%, and the rest (14 countries) expect it to be 50–75%.

The perception of constraints to irrigation development faced by various developing regions varies significantly from one another. The percentage of countries of a region that consider various listed constraints as very severe or severe is given in Table 2.

An interesting post-conference development has been the trend to establish targets for the various facets of agricultural water use even though these were not specifically recommended in any action plan. Table 3 shows the percentage of developing countries that have established targets in the fields of new and rehabilitated irrigation, flood protection, drainage and reclamation, and aquaculture.

Mitigation of natural hazards, especially droughts and floods

Two of the important objectives of any water development project are flood control and reducing the impacts of droughts. The untold human sufferings due to recent droughts in many sub-Saharan countries is well known. Similarly, devastations due to periodic floods can be witnessed in all developing countries. Efficient water management can alleviate many of these problems.

Table 3. Percentage of developing countries establishing targets in specific areas, 1977–90.

Targets	Percentage of governments		
	1977–80	1980–85	1985–90
Development of new irrigation	73	84	88
Rehabilitation of existing irrigation	65	74	79
Flood protection in relation to agricultural development	43	60	67
Drainage and reclamation	47	69	75
Introduction to aquaculture	42	59	63

Source: Report of the Secretary-General, see text, *op cit*, Ref 6.

The impact of droughts, mid-season droughts and low and unreliable rainfall on food production, and thus ultimately on human and livestock survival, can be significantly alleviated by the introduction of proper water control through irrigation. Food and forage production can be stabilized at a reasonably sustainable level, which could reduce the trauma associated with boom–bust production cycles. However, the economies of many African countries – ravaged by recurring droughts and facing high external debt burdens – are somewhat unlikely to generate enough internal resources to develop their available water resources within near and medium terms. These countries will not only require external assistance for adequate resources to carry out water development, but also would need formulation of rational water policies at national levels and the continuing political will and commitment to implement them. Both of these two factors are essential requirements for successful future water development and management for desertification control.

For better flood and drought management, a better and broader vision is necessary. Water management by itself is unlikely to be enough. We need to look at land and water as an interacting unit if the adverse impacts of floods and droughts are to be alleviated. In many instances the impacts are worsened due to human activities, which means better planning and control mechanisms need to be used. Watershed management, patterns of land use, a working warning system, and the existence of adequate relief measures are normally essential for management of natural hazards like floods and droughts.

Conservation and enhancement of water quality

As a general rule, developing countries have better expertise, database and institutional capacity for the management of water quantity than for water quality, even though water quantity and quality aspects are closely interrelated. While there are some signs that interest in water quality management is increasing, much progress remains to be made.

Many developing countries have still not formulated water quality standards to control discharge of effluents to both surface and ground waters. Even in those countries where standards are in existence, monitoring and enforcement of standards leave much to be desired. Use of policy alternatives like accelerated depreciation and tax incentives to encourage investment in pollution control facilities require further attention. Similarly, acceptance of the ‘polluter pays principle’ and ensuring that polluters do actually pay will go a long way to control water pollution.

In some developing countries considerable debate is now taking place on the trade-offs between benefits accruing from pollution control and the increased cost of economic activities. A rational analysis of any such trade-off is somewhat complex since the health and environmental costs of water pollution are not easy to quantify, nor are they necessarily paid by the polluters and their immediate customers. Since the environmental benefits of pollution control are often long term and intangible, whereas the costs are short-term and tangible, they are not easy to handle within traditional economic tools such as benefit–cost analysis. While the enforcement of stringent water pollution control measures can, under certain circumstances, prevent the continuing operation of a few old industrial concerns, it can equally be responsible for spawning a

new industry on various aspects of pollution control, and thus create new employment opportunities. The environmental, economic, social and political implications of each case often need to be reviewed separately.

Groundwater presents a special problem in terms of management. There are fundamentally two major problems with respect to groundwater management: higher rate of extraction compared to the rate of recharge (thus contributing to groundwater mining), and pollution of groundwater due to uncontrolled effluent discharges. Both are serious problems in many developing countries, and they have serious long-term repercussions in terms of supporting development activities.

Shared water resources

Rational management of shared water resources is probably one of the most difficult tasks in the area of water management because of their inherent additional political, institutional and legal complexities. The Desertification Conference recommended that 'countries concerned should cooperate in the sound and judicious management of shared water resources as a means of combating desertification effectively'.⁸ In a retrospective analysis of the Water Conference, its Secretary-General Yehia Abdel Mageed commented:

If time and budget had permitted, two other documents would have proved most useful in placing, more forcefully, before the Conference the questions of financial arrangements and shared water resources. It was felt that both these areas were not tackled satisfactorily at the Conference.⁹

Much progress can be reported in terms of general cooperation concerning development of water resources shared by more than one country, since several bilateral and/or multilateral agreements have been concluded in the area of surface water, eg rivers and lakes. Commensurate progress has not been made in the area of groundwater, eg shared aquifers.

Of the countries returning the questionnaire, 67% of developing countries and 86% of industrialized nations reported successful completion of bilateral and/or multilateral agreements on the management of shared water resources. In addition, some three-quarters of the African countries and two-thirds of the Asian and European countries reported that further bilateral and/or multilateral negotiations are now taking place.

There are several instances of multi-country collaboration in Africa which consider the river basin as a unit for development. For example, an agreement to establish an organization for the management and development of Kagera River Basin was reached in August 1977, and similarly a convention in 1980 created the Niger Basin Authority. Under the aegis of UNEP, a development plan for the Zambezi River Basin has now been prepared by the countries concerned.

While it is accepted that creation of a multi-country river basin management institution is generally a less complex and time-consuming task than preparing a basin-wide management plan and then getting the countries to accept it, it is still an important and many times an essential step to successful treaty negotiations.

The Intergovernment Working Group of Experts on Natural Resources Shared by Two or More States, convened by UNEP, has

⁸United Nations, *op cit*, Ref 1.

⁹Yehia Abdel Mageed, 'The United Nations Water Conference; the scramble for resolutions and the implementation gap', *Mazingira*, Vol 6, No 1, pp 4-13.

prepared principles of conduct for the guidance of governments in the conservation and harmonious utilization of shared natural resources. Many of these guidelines are based on experiences on the management of shared water resources. Fourteen countries have used these principles for negotiations, and another eight countries plan to use them in the near future.

Community water supply

Undoubtedly the issue that has received the maximum publicity from the Mar del Plata Action Plan is community water supply, because of the launching of the International Drinking Water Supply and Sanitation Decade by the General Assembly on 10 November 1980. The Decade was recommended by the Water Conference. The Desertification Conference also referred to the importance of the availability of potable water.

The Action Plan had recommended that each country should develop national plans and programmes for community water supply and also identify intermediate milestones. According to WHO, only nine countries had developed decade plans by early 1981, but this number had mushroomed to 59 by the end of 1983. Another 31 countries stated that their plans are at various stages of preparation. All the 59 countries and 17 of the 31 countries preparing plans had stipulated their decade targets by the end of 1983. It should, however, be noted that by this time 22 countries had modified the targets, and had mostly downgraded them since the original targets were too ambitious. It is equally clear that on the basis of progress made thus far, many other countries will also find their targets are over-ambitious and thus cannot be achieved by 1990. Hence, many more countries will either have to scale back their target to more realistic levels or accept the fact that the targets are unlikely to be realized.

On the basis of information available from WHO for 1980 and 1983, and general comparison of data from all countries reporting at any of the surveys conducted, a picture of global coverage can be drawn as shown in Table 4. Because of the problems associated with the data collection processes of WHO, the figures given in Table 4 should be taken as indicative rather than authoritative.¹⁰

Environment and health

Much progress can be reported during the past decade on the environmental and health aspects of water management. Provision of clean drinking water and better sanitation to a constantly increasing number of people, which has been discussed earlier, naturally has immeasurably positive environmental and health benefits.

Since 1977, many developing countries have made it mandatory to prepare environmental impact assessments before specific water development projects can be authorized. This issue was recommended by both the Water and Desertification Conferences. Thus, for the first time in history, a developing country – India – rejected the proposal to build a dam in Silent Valley on purely environmental grounds, since it would have inundated a unique tropical forest. Similarly, in 1986, the People's Republic of China decided to delay the construction of a major dam at Three Gorges mainly because of environmental concerns.

¹⁰Asit K. Biswas, 'Water for the Third World', *Foreign Affairs*, Vol 60, No 1, 1981, pp 148–166.

Table 4. Water supply service coverages by regions, 1980 and 1983.

Regions	Total		Population in millions			
	1980	1983	Number	Coverage %	Number	%
Africa (ECA)						
Urban	135	160	89	66	91	57
Rural	334	356	73	22	103	29
Total	469	516	162	34	194	38
Asia and the Pacific (ESCAP, excluding China)						
Urban	428	493	278	65	330	67
Rural	1064	1109	277	26	488	44
Total	1492	1602	555	37	818	51
Latin America and the Caribbean (CEPAL)						
Urban	234	254	183	78	215	85
Rural	124	126	52	42	62	49
Total	358	380	235	66	277	73
Western Asia (ESCWA)						
Urban	27	30	25	94	29	95
Rural	21	24	9	41	12	50
Total	48	54	34	69	41	76
Totals above						
Urban	824	937	575	70	665	71
Rural	1543	1615	411	27	665	41
Total	2367	2552	986	42	1330	52

Source: Report of the Secretary-General, see text, *op cit*, Ref 6.

Either through institutional machineries set up during the past ten years to consider environmental issues or through appropriate water-related ministries, increasingly more and more developing countries are giving environmental issues due consideration in the decision-making process. In this regard, the attempt by UNEP to prepare practical guidelines for environmentally sound water management for developing countries is to be welcomed, since the lack of such appropriate and authoritative guidelines is seriously hindering work in most developing countries.

Steady progress can be reported in developing countries on the control of water pollution during the past decade through better water quality data collection and legal-institutional steps such as setting and enforcing water quality standards and increasing public awareness of the environmental and health costs of water pollution. This is demonstrated by the fact that some 60% of all pollution control spendings at present, on a global basis, is in the area of water pollution. India's recently launched, highly public campaign to clean up the River Ganges is a spectacular attempt to control water pollution in a large river.

Education and training

During the past decade, there has been a gradual improvement at all levels of skill and expertise necessary for water management in most developing countries, but there have been deteriorations in certain countries as well. Overall, in all areas of manpower, 54% of countries replying to this issue reported that the manpower situation has improved, whereas 11% felt that the situation has deteriorated. The remaining countries indicated that the situation has not changed significantly. In spite of the gradual improvement, nearly one-fifth of all developing countries indicated that availability of manpower is still critical at all skill and expert levels, and especially so for skilled workers, higher technicians and research scientists.

On a long-term basis, training is probably one of the most important requirements for efficient water management. Current evidence indicates that lack of trained and experienced personnel has tended to increase the cost of water projects and at the same time reduced their efficiency. For example, if irrigation projects are considered, lack of trained management personnel and the absence of farmers experienced in irrigated agriculture have not only tended to increase the irrigation costs but also have reduced benefits expected of the schemes. In addition, lack of technicians and other similar trained personnel of lower levels of expertise is creating serious management bottlenecks.

Use of expatriate staff has been a mixed blessing to developing countries. On the positive side, they have considerably contributed to the planning, construction and management of water projects. On the negative side, they are not only very expensive but, in most cases, training of indigenous personnel who were supposed to have taken over from their expatriate counterparts has not been satisfactory. In many cases such training and manpower development has not taken place at all, as in the 1250 hectare Kou Project in Burkina Faso, where at one time there were 60 expatriates but in five years not even a single African member of staff had received any training.¹¹ Consequently, when the expatriate staff members leave, project performances start to decline rapidly.

An important aspect of the development and mobilization of human resources that has not received adequate attention thus far is the underemployment and ineffective use of trained manpower in several developing countries. In these countries, there is generally an adequate pool of trained manpower, but because of lack of incentives, inability of the management to motivate staff, excessive institutional red tape and other related reasons, staff members often do not develop or work at their full potential. While most multilateral and bilateral organizations have now started to give increasing attention to training requirements, commensurate interest in improving the overall managerial skills is generally lacking. If the managerial skills can be improved – and the scope for such improvement is substantial – there is no doubt that more can be achieved in most countries with the currently available financial and human resources. Strengthening of managerial skills requires urgent attention of all parties concerned.

Concluding remarks

Both the Water and Desertification Conferences made several recommendations on all aspects of water development and management. The two conferences produced a wealth of information on various aspects of water development as well as country- and region-specific data and information. Many countries prepared, for the first time, national reports on the availability and use of water as well as a review of management practices. The Desertification Conference especially produced some excellent documentation on land–water–biota interrelationships. Several countries put in motion processes to assess the distribution of surface and groundwater resources, patterns of water demand and use for various purposes and land use practices, many of which have been continued ever since, some with increased efforts.

There is no doubt that the Water and Desertification Conferences sensitized the international community to the need, importance and

¹¹Asit K. Biswas, 'Irrigation in Africa', *Land Use Policy*, Vol 3, No 4, pp 269–285.

complexities of efficient water management and land use practices. Their timings fortuitously turned out to be right. For example, when the Water Conference was first proposed in 1971, little did its proponents realize the severity of the emerging food and energy crises. The term 'desertification' did not even exist at that time. Similarly, the Desertification Conference was held between two serious droughts, the latter being more severe than the former.

A review of the past decade clearly indicates that development and management of limited water resources has been increasingly realized to be an essential component of any sustainable development effort. It is now universally recognized that progress towards food and energy self-sufficiency and desertification control necessitates efficient water management.

Viewed from any direction, the Water and Desertification Conferences were important benchmarks in the field of water management. The fact that the Plans of Action of the two conferences were complimentary has meant that water planners and decision-makers have successfully taken advantage of them during the past decade. It also appears that, generally speaking, more progress has been made on the implementation of water-related recommendations of the Desertification Conference than the other ones. Undoubtedly, one of the main reasons for this is the existing institutional arrangements in developing countries. Nearly all developing countries have a separate water-related ministry, which could take the recommendations of the two conferences and use them effectively to obtain additional resources, both from national and international sources. In contrast, many other recommendations did not have a clearly identifiable 'home' within national institutions because of their multisectoral nature. Accordingly, a clear champion which had direct authority for the implementation of the recommendations did often not exist within the institutional arrangements. This may have reduced their implementable potential.

While much progress has been made during the past decade in water development and management, it is evident that much still remains to be done. Let us hope that even more significant improvement in water management will occur during the next decade compared to the past decade, even though the progress during the past decade has been both substantial and impressive.