

An Assessment of Future Global Water Issues

ASIT K. BISWAS

Third World Centre for Water Management, Atizapán, Mexico

ABSTRACT After decades of neglect, water has recently become a part of the international political agenda. However, the focus of the debate on the global water crisis is still wrong. The main crisis is unlikely to come from water scarcity, though some countries will find it difficult to manage such problems. Instead, it is likely to come from continuing and rapid water quality deterioration, and the availability of investment funds. Neither of these two issues is being adequately reflected in global water debates. In addition, the targets of the water-related Millennium Development Goals are unlikely to be achieved universally by 2015, until and unless consumers pay for the water services they receive. The subsidies should be very specifically targeted to the poor.

Introduction

Water has been considered to be an essential ingredient for human survival and development throughout history. For example, more than 2½ millennia ago, the Greek philosopher Thales of Miletus said “best of everything is water”. While the world has changed dramatically since the time of Thales, the fact still remains that human survival continues to depend on water. Social and economic developments are linked to water through a variety of pathways, including among other uses food, energy, industrial and commercial activities, transportation, and environmental conservation.

Technological developments and industrial progress have meant that the economies of developed countries are now less dependent on water compared to the situations that prevailed some 5 decades ago. However, in spite of these developments, water affects the economic, social and environmental conditions of developed countries in numerous ways, some direct but others indirect, some tangible and others intangible. In contrast, the linkages between developing countries and water continue to be strong, primarily because of their continued high dependence on agricultural activities because of food production and employment generation. In addition, developing countries still have not developed their water infrastructures to the same advanced level as developed countries. Accordingly, floods and droughts currently affect developing countries much more than developed countries in economic and social terms. This situation is unlikely to change in the foreseeable future. It is thus essential to objectively and reliably assess the future

global, regional and national water scenarios in terms of their social, economic and environmental implications.

Water Issues of the Future

While predicting the future is an extremely hazardous business, one item can be predicted with complete certainty: the world in the year 2030 will be vastly different from what it is today. The changes that we shall witness during the next 25 years are likely to be far-ranging and far-reaching, and these changes will certainly be several orders of magnitude higher and more complex than what we have witnessed during the past 25 years. Among the main driving forces that are likely to contribute to these changes are rapidly evolving demographic conditions, concurrent urbanization and ruralization in developing countries, rapid technological advances, the speed, extent and impacts of globalization, improvements in human capital, governance and functioning of institutions, implementation of more effective national and intergovernmental policies, and advances in human expectations and knowledge due to accelerating information and the communications revolution.

The water sector is an integral component of the global system, and it will most certainly undergo major changes during the next 25 years. In fact, *water management practices and processes are likely to experience more change during the next 25 years than has occurred during the past 2000 years*. Many of these new developments will be driven by changes stemming from non-water sectors, on which the water profession will have no, or at best limited, control or say.

Customarily, water professionals have mostly ignored the global forces that are external to the water sector, even though these are likely to shape water use, availability and management practices of the future in some very significant ways. For example, water professionals are continuing to ignore the implications of globalization, even though within the next 5–15 years the various forces unleashed by globalization are likely to make radical changes in water use and requirement patterns in numerous countries, ranging from the United States to Japan, and China to Mexico. These types of global forces are already shaping the future use and availability patterns for water, and yet such issues have been consistently ignored by the water and development professions, and international and national institutions in the recent past. In addition, the water profession continues to ignore major developments in the areas of biotechnology, desalination, information and communication, etc., even though developments in these areas may influence the water futures of the world.

It is now widely predicted and believed that the world will face a major water crisis in the coming decades because of increasing water scarcities in numerous countries. Many international organizations, ranging from intergovernmental institutions such as the World Bank and the various United Nations agencies, to non-governmental organizations such as the World Water Council, have published world maps in recent years, all somewhat similar, which show more and more countries of the world will become water-stressed by 2050 because of increasing scarcities.

Such a 'bandwagon' effect in global thinking is of course not an exclusive issue for the water sector alone: it is prevalent in other areas. Regrettably, political correctness and bandwagons receive more attention than solid scientific studies and logical analyses. Accordingly, an important question arises as to how reliable are these predictions of an impending water crisis, even though numerous major institutions have produced very similar forecasts, often without any reference to the initial source.

An objective review of the facts on which the original forecast was based will indicate that its reliability is highly likely to be poor for a variety of reasons, only a few of which will be discussed here.

First, the data and the information on which such forecasts and maps are based are highly unreliable. Extensive analyses by the Third World Centre for Water Management indicate that the national estimates on which the current global figures are based are often erroneous (in some cases very significantly, and in others, they are totally wrong). For many major countries, such as India and China, estimates of water availability and use are currently available, but no one has a clear idea about the accuracy, relevance and usefulness of such national statistics, and the purposes for which they can be successfully used. Thus, it is impossible to get any reasonably reliable picture of the global and/or regional water situations, which are based on the aggregation of such incomplete and unreliable national data sets.

Secondly, water abstraction is at present widely used as a proxy for water use for such forecasts. Methodologically, this, of course, is fundamentally incorrect. Unlike oil, water is a reusable resource, which can be used and then reused many times. For example, some scientists have estimated that each drop of the Colorado River water is currently used six to seven times before it reaches the sea. Also, globally, water is being increasingly reused, both formally and informally, and all the indications are that the extent of reuse in all countries will accelerate further in the coming decades. Accordingly, the current practice of using water abstraction as a proxy for water available is already significantly erroneous, and so are the forecasts of the future based on such analyses. In about a decade, when water reuse becomes even more extensive, the practice of using water abstraction data in such a fashion will be completely meaningless because of very serious underestimation of the quantity of water that will actually be used. Thus, projecting water availability on this basis to 2050, and then predicting a global crisis, is not a meaningful exercise or good science.

Currently, no reasonable estimates exist on the extent of reuse of water, even at the national levels, let alone for the world as a whole. Some data on water reuse do exist for a very few developed countries such as Japan. In addition, the water profession, regrettably, has not considered reuse as an important factor in global water availability and use considerations, as a result of which the existing forecasts of the magnitudes of future water scarcities are highly suspect, and often somewhat meaningless.

Thirdly, water pricing is likely to play an increasingly important role as the 21st century progresses. The net result of this development is likely to be significant advances in demand management, which currently plays a minor role in most countries of the world, especially for agricultural water use. This would mean that within a short period of about a decade or so, present projections of future water requirements would have to be revised downwards, most likely quite significantly because of increasing emphasis on demand management and cost recovery. Implementation of the European Framework Directive on water within the next decade is likely to further accelerate the global trend to use water pricing as an important instrument for water management.

Fourthly, as water pricing becomes more widespread, and as technology advances further, it is highly likely that the estimates of groundwater availability may have to be revised significantly upwards. At present, since water for agriculture, which is the major user of water, in most countries is virtually free and municipal water use is often highly

subsidized, no economic incentive exists to explore groundwater on a comprehensive basis. Accordingly, the current global and national estimates of usable groundwater are likely to prove to be very serious underestimates. Under these conditions, the global estimates of economically usable groundwater are likely to increase significantly in the future. Due to technological advances, currently unusable sources of groundwater are likely to be used in the coming years.

Furthermore, all the current estimates of the future global water requirements are likely to prove far too high, especially as demand management comes to widespread use, and reuse of water receives priority attention. These estimates will have to be revised significantly downwards during the next decade. This, of course, has also been the historical pattern. For example, all forecasts of future global water use made during the past 50 years have proved to be very serious overestimates. This trend of overestimating future water requirements is still continuing.

Simultaneously, the amount of water that is available for use at present is seriously underestimated because reuse and recycling are ignored; estimates of groundwater availability will have to be revised upwards; and technological advances are making costs of desalination and other non-conventional sources of water more and more attractive. For example, within the past five years, the cost of desalination of sea water has come down to about US\$0.45 per cubic metre due to technological advances and improved management practices. Hence, given the upward adjustments in water availability and downward revisions in requirements, and the expected improvements in the management practices and the institutions that manage this resource, one can now be cautiously optimistic about the global water future.

This, of course, does not mean that it would be an easy process for all countries to adjust to the new realities of a rapidly changing global water scene. Most certainly, many countries are likely to find it difficult to manage the expected transformation without discontinuities because of socio-political constraints, institutional inertia, increasing management complexities, vested interests and current and past inefficient water management practices. However, since 'business as usual' will not be a feasible option for the future in all countries, policy makers, water professionals and water institutions, whether they like it or not, will be forced to react to the new conditions, most probably within the next 10–15 years. All these and other associated developments are likely to make the present 'gloom and doom' forecasts of a global crisis due to water scarcities somewhat unlikely in the coming decades.

The threat of a global water crisis because of physical scarcities only, as expected at present, is overstated. If there is to be a crisis in the water sector, it will probably occur due to two reasons, neither of which is receiving adequate attention at present.

The first cause that could contribute to a crisis is continuous water quality deterioration. Globally, water quality is receiving inadequate attention, even though it has already become a critical issue. While global data on water quantity are poor, they are virtually non-existent for water quality. Even for major developed countries such as the United States or Japan, a clear picture of the national water quality situation currently does not exist. For developing countries and for countries in transition, ranging from Indonesia to Nigeria, and Russia to Mexico, existing legal and institutional frameworks and networks for water quality monitoring are highly deficient, adequate expertise on water quality management simply does not exist and water quality laboratories suffer very seriously from poor quality control and quality assurance practices. Furthermore, senior policy

makers in most developing countries become interested in water quality aspects primarily when there are major local crises due to political considerations, and/or media interventions. Sadly, for all practical purposes, water quality is still receiving only lip service from most senior bureaucrats and politicians in developing countries, countries in transition and the international institutions.

Not surprisingly, because of the above deficiencies, water quality problems are becoming increasingly serious in all developing countries. Accordingly, nearly all surface water bodies within and near urban–industrial centres are now highly polluted. While data on the existing groundwater quality are extremely poor, it is equally likely that groundwater is also becoming increasingly contaminated near centres of population.

In spite of poor water quality management practices, national data available in developing countries and countries in transition mostly give an erroneous picture of the existing water quality conditions. As a general rule, in these countries, the official pictures of water quality situations are mostly rosier than the current conditions warrant. These estimates are accepted at face value by international institutions, and are repeated in their reports without any comments and qualifications. This practice has given these erroneous estimates legitimacy, which is unwarranted. This, in turn, has given the world a false sense of security, which is likely to prove highly counterproductive in the future.

Recent estimates made by the Third World Centre for Water Management indicate that in spite of the official rhetoric and figures published by several international organizations, less than 10% of wastewater generated in Latin America is properly treated and disposed of in an environmentally acceptable fashion. The situation is likely to be very similar in Asia, and probably worse in Africa. Furthermore, most universities in the developing world do not provide appropriate education and training on water quality management. Accordingly, rapid capacity building in this area would be a Herculean task under the best of circumstances. In addition, currently no reasonable estimates exist as to what would be the investment needed in Latin America or Africa to improve wastewater treatment from paltry levels of less than 10% to a reasonably tolerable level of 50–70%. All that can be stated at present with complete confidence is that the total investment costs necessary for proper wastewater treatment, disposal and management are likely to be astronomical, and most developing countries would find it extremely difficult to meet these very high resource requirements in a timely manner.

The second possible crisis is likely to come from lack of investments for both water quantity and quality considerations. Investment requirements for wastewater treatment have already been mentioned. These are for point sources only; investment needs for controlling non-point sources of pollution such as agricultural run-off are simply unknown at present, even for the Organization for Economic Co-operation and Development countries, let alone for developing countries. In addition, most existing water development projects in developing countries need massive investments for rehabilitation and modernization, and then for their efficient and sustainable operation. Equally, new projects are becoming increasingly expensive to develop because more efficient project sites have already been developed, or are in the process of development, and because of the social and environmental countermeasures necessary to reduce, or even eliminate, the anticipated adverse impacts. Analyses of current cost estimates for the next generation of water supply projects in developing countries indicate that these are likely to be 1.75–3 times the cost of the present generation of projects, in real terms and per cubic metre of water delivered. These high costs are still not adequately reflected in the current budget

estimates of nearly all water agencies of the developing world, which is further distorting the levels of investments that will be required.

Globally, the total investment costs for modernizing and efficiently managing existing water development projects and wastewater treatment plants and to construct new ones are likely to be astronomical. Currently, not even 'ballpark' estimates of such costs are available. Thus, an important question is from what source would such financial investments be available? Governments all over the world now have high national debts and the resource-generating capacities of most developing countries and countries in transition, where most of the water projects have to be rehabilitated and the new ones are to be constructed, are limited. Moreover, the World Bank and the regional development banks have steadily reduced their financial support to water development projects as a percentage of their total loan portfolios in recent years. Furthermore, because of strong pressures from social and environmental activists, international financial institutions have become increasingly reluctant to finance new water development projects, irrespective of their overall societal benefits. In fact, a historian in the 21st century might very well conclude in a retrospective analysis that the Sardar Sarovar Project (Narmada Dam) in India became the World Bank's 'Viet Nam' in terms of its support to water projects during the 1990s. The regional development banks, which for all practical purposes follow the World Bank's leadership in most areas, have taken, at least unofficially, a very similar stance. There seems to be some rethinking going on in these institutions in terms of changing these politically expedient policies, but what is likely to be the actual policy during the next 10–20 years is anybody's guess. Thus, it is likely that unless the current situation improves very significantly, the lack of investments available may precipitate a water crisis as the 21st century progresses, from both water quantity and quality considerations.

Water Pricing and Public–Private Partnership

There is no question that if water management is to be efficient, and if an adequate amount of water of appropriate quality is to be made available for various purposes in the future, water pricing will have to be an important policy instrument for efficient water management. Water pricing is already a central pillar for the European Framework Directive, including agricultural water use. Similarly, the World Commission on Water identified water pricing and cost recovery as the single most important factor for improving water management practices. All these and other similar associated developments are likely to make water pricing increasingly acceptable in socio-political terms.

The issue of water pricing has generated considerable debate in recent years. For example, during both the Second and Third World Water Forums, water pricing and the roles of the private sector became two of the most controversial issues, much of which was because of a misunderstanding of the situation, vested interests and dogmatic and ideological beliefs of some people and institutions.

Water pricing is opposed by some groups for two main reasons. First, they believe that water is a human right and thus should be available to all at no cost, or at highly subsidized rates. Secondly, some others believe that water pricing is a code word for handing over the management of public water institutions to the private sector multinational companies, a step they are totally opposed to for philosophical reasons. They are inherently against the

fact that the multinational water companies will make profits for running water services, which is a basic human requirement for survival.

The situation, however, is not so simple since the issues involved are complex and multi-faceted. If water pricing is considered, irrespective of whether one is for or against such a practice, the following are indisputable facts.

- It has not been possible to provide clean water and proper wastewater disposal to a very significant part of the world's population. As noted earlier, wastewater management is likely to be one of the most critical issues in the future. The main objective of the International Water Supply and Sanitation Decade that was proclaimed by the United Nations was that, by 1990, everyone in the world would have access to safe water and sanitation. There is no question that the Decade had a major impact in improving the quality of life of millions of people who received access to clean water and sanitation, which without the Decade would not have happened as rapidly as was the case. The ambitious goals of the Decade, however, could not be met for many reasons, which unfortunately were never properly evaluated.

Subsequently, the Millennium Development Goals were proclaimed, with the aim of reducing by half the number of people that do not have access to clean water and sanitation, by 2015. The latest trends and realistic forecasts for the next decade indicate that these targets are likely to be met by many countries, but equally many other countries will not be able to meet them, primarily in sub-Saharan Africa.

- Nearly all developing countries will find it impossible to provide adequate funds for the construction of new water supply and wastewater disposal facilities and efficient management of the existing facilities if water supply and wastewater services continue to be free, or highly subsidized by the government. The demand for investment funds for all sectors will increase further in the future, and the water sector should not expect to receive priority attention for funding allocations by the respective governments.
- All the historical data and trends indicate that efficient water management is simply not possible without water pricing, irrespective of whether the water services are managed by the public or private sector.
- Water pricing does not mean that the poor will not have access to water-related services. The systems should be so designed that those who can afford to pay for water services should pay for them, in exactly the same way that they do now for other basic services such as electricity. Subsidies should be very specifically targeted only to the poor.
- The private sector currently accounts for only about 5–6% of the urban water consumption of the developing world. Even under the most optimistic conditions, this percentage is highly unlikely to exceed 15% by the year 2020. In other words, under all foreseeable conditions, the overwhelming majority of consumers in the developing world will continue to receive their water-related services from the public sector.
- The performance of public sector companies has been generally poor. Equally, however, the two most efficient water supply systems of the world are in the public sector, and not in the private sector. These are in Singapore and Tokyo.

Thus, public water systems can be the world's best or the worst. Hence, the most important factor to consider for the future is how to improve very substantially the overall performance of the public sector companies, since they will continue to be the main supplier of water-related services in the developing world for the foreseeable future. The performances of the public water institutions cannot be improved without instituting an efficient and equitable water pricing system.

- While some people are ideologically opposed to having private sector companies involved in a basic service such as water, conceptually and socio-politically there is nothing wrong with such an involvement, as long as the overall process is independently and properly regulated and the private sector services are efficient, equitable and cost-effective.
- Listening to the opponents of private sector involvement in water services, it is clear that their main objection is based on the fact that these providers are multinationals (and thus not local), and that they are likely to make profits from these endeavours. However, the facts are that these multinationals, after an initial burst of enthusiasm in the late 1990s and early 2000s, are now retrenching primarily because in many cases they not only did not make the profits they anticipated, but also actually made very significant losses due to currency devaluations (as in Buenos Aires and Jakarta) and to political and social considerations. Many urban centres of the developing world, such as Kathmandu, have recently found out that not even a single multinational company is willing to bid for the concession to run their water systems.
- The involvement of the private sector companies has had one major benefit, albeit indirect, for the public sector institutions. The competitive pressure has forced the public sector companies to improve their performance in the developing and developed world, including the United States. This trend is likely to continue. Without the threat of the private sector competition, it is unlikely that the performance of the public sector companies would have improved as much as it has within a comparatively short period.

All the present trends indicate that over the next decade, water pricing will become an increasingly important instrument for efficient water management, irrespective of whether the water-related institutions are managed by the public or private sectors. The question is no longer whether water should be priced or heavily subsidized, but rather how to formulate and implement an economically efficient pricing system so that those who can afford to pay for the services do so, and the poor receive a very specifically targeted subsidy. How to make water pricing socio-politically acceptable has been a somewhat neglected subject thus far. It must receive priority attention from the water professionals and institutions, as well as from the policy makers.

Concluding Remarks

The world is changing very rapidly, and with it, the existing water management practices must change as well. However, the potential prospects and problems of future water issues must be objectively analysed in the light of changes that are expected. In the final analysis, it is deeds, not words or dogmatic beliefs, that will be most important in solving future water issues. Problems and potential solutions must be considered objectively in order to

address them efficiently in a timely manner. Past forecasts and recent trends can no longer shed any meaningful light on the coming, new, turbulent environment of the world of water, which is likely to have diversified requirements reflecting the different needs and interests of the various stakeholders, rapid technological changes, globalization and relentless economic competition.

As the world moves into the 21st century, a clear vision of the future, and of how this vision could be achieved in the best way to serve humanity, is needed. It is important to discern what societies value most, which will determine and drive their unique visions of the future. Taking these steps in a timely and cost-effective manner will not be an easy task, but it will be an essential requirement for the water profession of the future. There is now a revolution taking place, even though most observers are not aware of it. In the wake of this revolution, long-held concepts and models of water management are likely to evolve further in an accelerated manner, and some may even disappear completely. Never before in human history have such profound changes taken place within such a short period of time as are likely to be witnessed during the coming two decades and possibly longer, as to how best the water resources systems may be efficiently planned, managed and operated. It is essential that the water profession not only identifies the expected changes as early as possible, but also take timely, cost-effective and socially acceptable countermeasures to meet these expected challenges.