

# Chapter 13

## Summary

**Carlos Eduardo de Mattos Bicudo, José Galizia Tundisi,  
and Marcos Cortesão Barnsley Scheuenstuhl**

In an Interview to the Reuter News Agency, Zafar Adel, the current president of UN-Water (where he coordinates the works related to the water of 26 UN agencies) and Director of the Water, Environment and Health Institute of the UN of the University in Canada, said that water impacts every moment of our lives, weather it is on society, weather on natural systems and the habitats. He also said, that the disturbances to the environment can threaten agriculture and the supply of fresh water from Africa to the Middle East, and can generate conflicts because of its scarcity, as already is seen for example in Darfur in Sudan, where it is a factor that contributes towards wars. However, Zafar Adel also mentioned that water has also served, in several instances, to promote cooperation and cited, as an example, that India and Pakistan collaborated towards managing the Indo River, despite their land conflicts, and that Vietnam, Thailand, Laos and Cambodia cooperated in the Commission of the Mekong River.

Zafar Adel mentioned as well, that water deserves a more central placement in debates over food security, peace, climate changes and the recovery of financial crises, for it is crucial in all of these discussions; however it is not usually seen as such. He also highlighted the efforts towards management of water supply, accounting for the amount of water encompassed in products (virtual water) ranging from meat to coffee.

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C. E.de M. Bicudo (✉)  
Núcleo de Pesquisa em Ecologia, Instituto de Botânica,  
Caixa postal 68041, 04045-972 São Paulo, SP, Brazil  
e-mail: [cbicudo@terra.com.br](mailto:cbicudo@terra.com.br)

J.G. Tundisi  
Associação Instituto Internacional de Ecologia e Gerenciamento Ambiental, Rua Bento  
Carlos, no 750, 13560-660 São Carlos, SP, Brazil

M.C.B. Scheuenstuhl  
Academia Brasileira de Ciências,  
Rua Anfilóbio de Carvalho, no 29, 20030-060 Rio de Janeiro, RJ, Brazil

He concluded his interview stating that the world can meet one of the goals of the millennium—that of reducing by half, by the year of 2015, the portion of people who do not have access to fresh water, but that it is clearly failing at one of its other goals: that of improving sanitation. He exemplified that about 2.8 billion people do not have access to basic sanitation.

The workshop called “The water crisis and national development: a multidisciplinary challenge” held in Belo Horizonte, State of Minas Gerais, on the 29 and 30 of October 2009, had already addressed debates about this, however, focused on our country. The meeting counted with participation of renowned specialists in the areas of management, supply, ground water, climate changes, political geography, limnology, chemistry and engineering. At the plenary session of the workshop, the discussions over the themes presented were consolidated, highlighting some of the aspects considered crucial for the improvement of the management of water resources in Brazil, with special emphasis on suggestions to be included in the National Plan for Water Resources and on consideration which need to pass on to the National Water Agency and to the Ministry of Science and Technology. The following issue deserves special attention: management of transboundary waters, detailing of aquatic ecoregions aiming at conservation and the sustainable use of water resources, training of municipal managers, increase of water reuse, creating geological reference of water with regards to supply, contamination and geodynamic processes, recovery of historical series, effects of climate changes, and water safety scenarios, among others.

The management of water resources in our country has been experiencing a considerable leap in quality in the last 30 years, with focus on an efficient and multi-objective public management. Law number 9433/1997, of Management of Water Resources in Brazil, was the cornerstone of this new phase, as was the creation of the National Water Agency (ANA) in 2006. The shared management of water resources becomes a challenge for society, for the public financial resources become diluted in the face of the increase of population, of the environmental problems and of the global economic crisis. Brazil might benefit, by being a producer of commodities, from its territorial extent and its geographic position in the planet. Then, faced by this dilemma, how will the Brazilian society deal with scarcity of water in the near future? This is the challenge faced by the managers of public policies.

However, alterations in the biological cycle caused by the process of global climate changes tend to aggravate the situation. Almost 90% of the approximate four billion annual cases of diarrhea in the whole world are attributed to deficiencies in sanitary sewage and in the provision of good quality water for public consumption. In Brazil, the main public health problems associated to water are diarrheic diseases, diseases whose vectors are aquatic (malaria and dengue), schistosomiasis, leptospirosis, several helminths and poisoning by cyanotoxins. One should also consider the increase in conflicts over the use of water, the elevated costs associated to billing for water, the response from the financial market to the companies who promote conservationist practices, and the appeal that the positive environmental image has been causing on the industrial sector, stimulating them to implement extensive programs of environmental management. A significant commitment of industrial and agricultural industries towards goals to reduce water consumption,

reuse and recycle industrial effluents has been occurring as a result of such actions. Yet, the universal practice of reuse of water in Brazil in all sectors is today, far from becoming a reality and will only occur through a political institutional decision and through the enactment of a realistic legal framework, which can be effectively implemented through the hydrographic basin committees.

The variety of Brazils within our Brazil, which can clearly be seen through the endless number of landscapes, races, climates and economies, generate a vast disparity with regards to distribution and quantities of water resources in its territory. The edaphoclimatic and social economic characteristic of the so called Brazilian semi-arid requires specific usage technologies for their water resources. In this region, aside from the state of scarcity of water, almost perennial, the incorrect use of water increases the region's fragility to the process of desertification. One should address, in this context, the problems deriving from water scarcity and those relevant to the supply of spread out communities taking into consideration alternative technologies, which are of low cost and accessible to the population. Some of these alternatives and the importance of the integration works between hydrographic basins for this region should be dealt with as an absolute priority, in order to enable a management of its water resources focused on conservation and sustainable use.

The Northeast of Brazil is the most exposed region to the risks of climate variability and to a possible process of aridization and subsequent desertification due to the climate changes themselves. It is estimated that by 2025 more than 70 % of the cities located in the northeastern semi-arid region, which possess a population of more than 5000 inhabitants, will face a severe crisis of water supply for human consumption. As per ANA's estimate, supply problems should affect about 41 million inhabitants of this region. The situation is also worrisome in Amazonia, where the possibility of occurrence of periods of intense droughts can surpass the current 5 % (a severe drought every 20 years) to 50 % in 2030 and 90 % in 2100.

In the densely populated centers, urbanization increases competition over the same natural resources (air, water and land) within a small space for all human needs related to life, production and recreation. The infrastructure for water usually includes, in urban centers, water and sanitation. Sanitation refers exclusively to the collection and treatment of domestic and industrial effluents, never including drainage and solid residues. However, both are components of a sustainable urban environment that includes environmental conservation, health and the social economic aspects of urban development. Urban water management itself is fragmented, indicating that there is no integration between the services of the agencies, nor a company that manages the services as a whole. The results are therefore poor and there is no indication of being efficient. In addition, the increase in population added to the diversification of the multiple uses of water, the constant withdrawal of water for varied purposes and the loss of water retention mechanisms has considerably decreased availability, causing numerous problems of scarcity. In the urban scenario, the above situation is aggravated by the growth of irregular occupation of land and by the complete lack of a sanitation system or, at least, by an efficient system of sanitation.

Brazil has been exploiting, in a growing and worrisome way, ground water to supply cities and urban centers, as well as industries, irrigation and tourism. Despite

its evident contribution to the social economic development of many regions of Brazil and its ecological role in maintaining the base flow of bodies of water, the management of ground water is still very incipient and does not reflect its current or strategic importance. The lack of public policies for this sector becomes painfully noticeable when one observes the gap in knowledge about the state of use and the potentiality of aquifers, as well as the risks of anthropogenic contamination to which they are subject to and which affect their quality. The water matrix of our country does not properly contemplate this resource, and therefore loses opportunities to efficiently use water, which would allow us to reduce costs related to the implementation of water supply systems and operational systems, and render the source more protected from events associated to climate changes. We lack, in our country, a disciplining of ground water use, acknowledging the areas of greater demands and assessing the dangers of an over exploitation. We also lack protection of aquifers and their catchments, with regards to anthropogenic contamination. Lastly, we lack the determination of technical information that allow for the use, in an integrated and synergetic way, of surface and ground water resources.

There is a pressing need therefore of promoting a more effective integration of Science, Technology and Innovation with the integrated management of water resources and with the water governance. The State should invest more efficiently in research in the areas of contamination, eutrophication, persistent organic pollutants, monitoring technologies and studies of bioindicators, aiming at promoting a more efficient management of surface and ground water resources at a hydrographic basin level. Investments should also be directed towards the development of technologies for desalination and reuse of water, aiming at reducing demand and at a regional economy of the resource. The implementation of scenarios and ecological and mathematical models will be crucial in the selection of new opportunities and alternatives for management. The economic valuation of the services of ecosystem can add new perspectives to the use of economic tools for the management of water. A more effective interaction among ecologists, limnologists and engineers is absolutely necessary and indispensable for a systemic vision. And lastly, the use of strategic studies will promote new possibilities in the integrated and predictive management at a hydrographic basin level.

The current outlook on water in Brazil seems gloomy. Despite being the owner of an immense contingency of bodies of water, since the country has about 12 % of the world's water resource availability, the distribution of these resources is extremely uneven in the country. To exemplify: 80 % of these reserves are found in Amazonia, while the semi-arid region only has 4 %, even when including the large hydrographic basin of the São Francisco River.

We have to therefore urgently take care of our waters, so that these do not become scarce, or where they exist, prevent them from presenting inadequate characteristics for human consumption. With this in mind, we need to highlight the following:

- 1) The new challenges for the management of water resources include decentralization of management to regional hydrographic basins; the organization and the support towards basin agencies as executing agencies of the management policies and proposals; and the capacity of innovation and organization of scenarios based on data bases and historical series of each hydrographic basin.

- 2) There is the need for supporting advanced researches on water resources and aquatic ecosystems; the ecological functioning of rivers, lakes, dams and estuaries should receive greater attention in the form of massive investments in interdisciplinary teams capable of dealing with the challenges and of producing new knowledge with high added value.
- 3) Advancements in quality and quantity monitoring of surface and ground water is crucial. There is a need for investments in monitoring technologies and in the organization of regional monitoring networks integrated to management technologies. The integration of the monitoring data with the systems of basin management, geo-processing, modules and models of load generation in the basins should improve in an extremely positive way, integrating the water mesh and the quantitative information of the watershed. The creation of interfaces between the data from monitoring, the database systems and the historical series, and the processes and methods of basin management is yet another item of exceptional importance for watersheds.
- 4) The organization of a network of studies that integrate data on water quality with human health is another urgent need in Brazil. There is limited epidemiological information in Brazil on the impacts of quality water on human health and their short, medium and long term effects. Periurban areas of large metropolis have vulnerable population with an increased risk of water borne diseases, due to the poor quality of supply water, to precarious basic sanitation and due to the poor living conditions.