Water security, economic growth and sustainable developmen

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"When one door closes, another door opens; but we so often look so long and so regretfully upon the closed door, that we do not see the one that is open to us."

Alexander Graham Bell (1847-1922)
Scottish engineer and inventor

Individually, each of the three topics of this paper – water security, economic growth and sustainable development – is a difficult, complex and challenging subject. Academics and policy-makers often differ with each other as to even the definitions of the three topics, let alone their ramifications. Accordingly, and not surprisingly, when these three interrelated topics are combined, their complexities, uncertainties and intricacies multiply by several orders of magnitude, and become further convoluted.

The fact is, in the real world, from a development-related policy perspective, they should be considered and analysed within a holistic and synergistic framework. The danger often is that when these three topics are considered independently, as they mostly are, policies in one area have direct and indirect impacts on the other two sectors. These unplanned and unexpected impacts are often negative. This mostly means that formulation and implementation of policies exclusively in any one of the three sectors are likely to have sub-optimal, or even net negative, impacts over the medium to long terms. Water security, economic growth and sustainable development are closely interrelated. One affects and, in turn, is affected by the others. So, over the long term, they have to be considered together.

A major current global concern is how to ensure a high rate of economic growth that is both sustainable and equitable, so that hundreds of millions of the people who are now poor can have a significantly improved standard of living and quality of life. Equally, the middle classes need to maintain their current lifestyles and improve them progressively over time. All these have to be achieved with the full recognition that the world population is likely to increase to 9.7 billion in 2050, from 7.3 billion at present.

Achieving these goals will not be easy, because the world will have to eradicate poverty that exists now and then further cater to 2.4 billion additional people during the next 85 years. Even in the world's most prosperous country, the United States, the Census Bureau reported in 2012 that more than 45 million people, 14.5% of all Americans, were living under the poverty line. The United Nations estimates that nearly 795 million people (nearly one in nine) in the world do not have enough food to lead a healthy active life.

We need to consider water security, not in the present myopic sense of availability of enough water to satisfy the burgeoning water needs of current and future generations for drinking, industry, agriculture, energy and other uses, but rather water as a cross-cutting issue which can act as a catalyst for economic development, improving the standards of living of all people and ensuring a clean aquatic environment.

Future global water needs are currently being seen primarily in terms of business-as-usual incremental scenarios. Such analyses invariably conclude that the world will face an accelerating water crisis of unprecedented magnitudes. Forecasting apocalyptic visions of water has been a feature for some three decades. Putting "water crisis" in Google, on 20 February 2016, identified some 74 million entries, and this number is increasing exponentially. Nearly each month, at least one major institution somewhere in the world comes out with the forecast that the world will be facing a serious water crisis.

Our view is different. We have consistently argued that the world is not facing a water crisis because of physical scarcity of water. It is facing a crisis because of poor management of water over a century.

Consider a few facts which seldom enter into the current discussions.

First, water is a renewable resource. This means water differs from other important natural resources like oil, coal or gas, which once used break down into different components and cannot be used again. In contrast, after water is used, it becomes contaminated with pollutants. This wastewater can be properly treated, and then reused for all purposes, including drinking. This use-treat-use cycle can continue *ad infinitum*.

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We have had the technology and management expertise to continue this cycle for at least three decades. For example, the city of Windhoek, Namibia, has been using treated wastewater as a direct source of drinking water for well over 35 years.

Second, for the world as a whole, water for drinking and agriculture account for about 9% and 69% respectively. These two sectors alone use 78% of annual global water use. Sadly, agricultural water use is mostly free, and domestic water use is either free or heavily subsidised. Consequently, both these sectors use water very inefficiently.

Take domestic use in Qatar, a desert country which provides water to its citizens primarily through desalination. An average Qatari citizen, who receives water for free, uses around 1,200 litres per day. In contrast, an average non-Qatari, who pays about 35% of the operation and maintenance cost of water, uses about one-sixth that of a Qatari citizen. Compare this level of *per capita* water use with cities like Tallinn or Hamburg. Through the use of economic instruments like pricing and incentives, as well as public education and awareness, average Tallinn and Hamburg residents use 95 and 111 litres per day respectively.

Producing drinking water and supplying it to households, and then treating wastewater, are normally very energy-intensive processes. Since around 90% of water used comes back as wastewater which needs to be treated, less water use results in lower energy requirements for both water supply and wastewater treatment, thus saving both water and energy.

Third, efficiencies for water use in agricultural and urban sectors are very low. With existing knowledge and technology, water use for the agricultural sector can be reduced by one-third without sacrificing crop yields. Policy instruments are already available which can save 23% of current global water use.

For urban water, most cities of the world currently lose 25%-60% of water that enters the supply system. The largest water utility of England and Wales, Thames Water, which has been in private hands from 1989, routinely loses 25% of all the water it supplies. In contrast, water utility in Tokyo loses less than 4% and Singapore less than 5%. Even a third-world city like Phnom Penh loses 6.5% of water. Thus, there are tremendous opportunities of saving water in urban domestic sectors as well.

> *"The world is not facing a water crisis because of physical scarcity of water. It is facing a crisis because of poor management of water."*

Fourth, it is necessary to take a holistic look at water, food, energy and economic development sectors. If achieving food security is an objective, one of the low-hanging fruit is to reduce food waste. At present, some 40% of food produced is never eaten by consumers. It is estimated that if this food waste can be eliminated, it will save 57% of water extracted from the environment and one-third of the land cultivated to grow food. Thus, if saving water is an important objective, reducing food waste has to become a priority consideration. Regrettably such alternatives are not in the purview of all water ministries or the profession.

Fifth, all the apocalyptic views of the water sector assume that science and technology will advance only incrementally in the future. We think this is fundamentally wrong. Major advances are taking place in crop breeding, genetic modifications, advances in using sensors and technology, and many other areas which are likely to change the water-food-energy interlinkages very substantially in the coming years.

Sixth, during the post-2000 period, more and more major heads of multinational corporations are becoming aware of the importance of sustainable water management. Probably the most notable example is Peter Brabeck, former CEO and current Chairman of the Board of Nestlé. Under his leadership, Nestlé has institutionalised efficient water management in its culture. The company has reduced its water requirements to manufacture each tonne of product by one-third during 2005-13. It has also reduced water discharges per tonne of product by 60% between 2003 and 2013, and in total quantity by 37.2%. In 2013 alone, it reused 6.7 million tonnes of water. In its Mexico and India milk factories, recovery and use of condensation from milk, and other conservative practices, have made them self-sufficient in terms of water.

> *"More and more business enterprises are realising the value of water."*

Other major multinationals like Unilever, Danone, Coca-Cola and Tyson have also shown significant improvements in their water management practices since 2000. Increasingly more and more business enterprises are realising the value of water and taking measures to continually increase their water use efficiencies and decrease their wastewater discharges.

Last but not least, many governments are facing up to the dangers of water scarcity to their economies, especially after prolonged droughts. The decade-long millennial drought in Australia, and the current ongoing one in California, have forced governments to take hard political decisions which without the crises may not have been possible. As more and more countries start facing serious water crises because of climatic changes and fluctuations, as well as results of decades of poor water management practices, they will be forced to make difficult political decisions which they have been reluctant to make earlier. All these recent and future crises will create numerous new positive feedback loops which would substantially improve water management practices in the coming years.

The water profession and the institutions have largely ignored these developments which will substantially alter the global water management landscape in the coming years. In fact, we believe water management practices and processes will change more during the next 15 years compared to the past 150 years.

The door to manage water as an exclusive sector is now closing rapidly. However, many new doors are opening which will allow humankind to manage water, food, energy and economic development effectively. Unlike the vast majority of the water profession, we are cautiously optimistic about the world's water future.

Professor Biswas is the 2006 winner of the Stockholm Water Prize and one of the founders of the International Water Resources Association and the World Water Council. Dr Tortajada is Past President of the International Water Resources Association. Both are co-founders of the Third World Centre for Water Management, Mexico.