Hydrological Sciences Journal
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/thsj20

Cooperation or conflict in transboundary water management: case study of South Asia

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Available online: 04 Jul 2011

To cite this article: Asit K. Biswas (2011): Cooperation or conflict in transboundary water management: case study of South Asia, Hydrological Sciences Journal, 56:4, 662-670

To link to this article: http://dx.doi.org/10.1080/02626667.2011.572886

Cooperation or conflict in transboundary water management: case study of South Asia

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Received 25 August 2010; accepted 25 November 2010; open for discussion until 1 December 2011

Citation Biswas, A. K. (2011) Cooperation or conflict in transboundary water management: case study of South Asia. *Hydrol. Sci. J.* **56**(4), 662–670.

Abstract The transboundary Himalayan rivers flowing through Bhutan, Nepal, India and Bangladesh provide a golden opportunity to improve the standard of living of the largest concentration of the poor people in the world. Bhutan and India have shown that, given goodwill and trust between the countries concerned, water can be successfully used as an engine for economic growth. This can bring substantial benefits to the people of both the countries. In contrast, lack of trust between Nepal, India and Bangladesh has compounded the deprivation of the region through underdevelopment. This paper analyses two very contrasting results of managing transboundary rivers in South Asia, a most successful one in Bhutan and India, and a missed opportunity in Nepal, India and Bangladesh.

Key words transboundary rivers; water management; international relations; conflict prevention; South Asia

Coopération ou conflit dans la gestion des eaux transfrontières: étude de cas de l'Asie du Sud

Résumé Les rivières Himalayennes transfrontalières qui traversent le Bhoutan, le Népal, l'Inde et le Bangladesh sont une opportunité majeure pour améliorer le niveau de vie de la plus grande concentration de populations pauvres au monde. Le Bhoutan et l'Inde ont montré que, compte tenu de la bonne volonté et la confiance entre les pays concernés, l'eau peut être utilisée avec succès en tant que moteur de la croissance économique. Cela peut apporter des avantages substantiels aux peuples des deux pays. En revanche, le manque de confiance entre le Népal, l'Inde et le Bangladesh a aggravé le sous-développement de la région. Cet article analyse deux résultats trés contrastés de gestion de riviéres transfrontalières en Asie du Sud, un succès entre le Bhoutan et l'Inde d'une part et une occasion manquée entre le Népal, l'Inde et le Bangladesh d'autre part.

Mots clefs rivières transfrontières; gestion de l'eau; relations internationales; prévention des conflits; Asie du Sud

INTRODUCTION

The management of transboundary rivers has become an important social and political issue in recent years, for a variety of reasons, some valid and others due to linear but erroneous thinking. There are several valid reasons. First, there are many major transboundary rivers and lakes where there are no treaties for water allocation between all the co-basin countries that could provide a guiding framework for water planning and management. Second, even though the Convention on the Law of Non-Navigational uses of International Watercourses was overwhelmingly approved on 21 May 1997 by the United Nations (UN) General Assembly, with only three dissenting votes but 33 abstentions (Biswas, 2008a), it has not yet entered into force even 13 years after the initial approval. In recent years (from 2007), there appears to be a slightly increased momentum for its ratification, acceptance, accession or approval, which included countries such as Germany, Guinea-Bissau, Spain, Tunisia and Uzbekistan. A few NGOs, such as the WWF, have launched an initiative to accelerate the ratification process, but it is likely to be several years before the Convention is ratified. The campaign by the NGOs has brought additional attention to the issue of management of transboundary rivers and lakes. However, delays in the ratification of this convention indicate two contributory factors: (a) management of transboundary water courses is not a priority issue

ISSN 0262-6667 print/ISSN 2150-3435 online

doi: 10.1080/02626667.2011.572886
http://www.informaworld.com

in the world's political agenda, and (b) the countries that have transboundary rivers appear to prefer to have bilateral or multilateral negotiations between the co-basin countries, and do not seem to be in any special hurry to ratify the Convention.

Third, global interest in transboundary water management has been further heightened, because of the recent discord between the Nile Basin countries. The countries failed to agree on a treaty in May 2010, when the five upstream countries (Ethiopia, Kenya, Uganda, Rwanda and Tanzania) decided to sign an agreement without the basin heavyweights, Egypt and Sudan. Indeed, the transboundary issue had received increased international attention earlier when Pakistan decided to go straight to arbitration without considering the other options available under the Indus Water Treaty (Biswas, 1992). It is worth noting that the Indus Water Treaty has often been held as a showcase where the two signatories, India and Pakistan, had gone through two wars but the Treaty had functioned reasonably well during the past five decades. It illustrates the difficulties with static water treaties, since conditions change over time and the countries concerned find that treaties become increasingly out of tune with the new conditions.

All these, and other associated, reasons have put the management of transboundary rivers and lakes in the international limelight. Yet, there are also other unjustifiable reasons why global attention has focused on this issue. Some water professionals, and also people with somewhat limited knowledge and appreciation of water issues, have repeatedly claimed, in recent years, that countries are likely to go to war with each other because of increasing water scarcity. The national and international media have given this idea of water wars considerable attention. These somewhat sensational claims have further increased global interest in the issue.

According to this linear and incremental thinking, the global demand for water is rapidly outpacing the supply available. As the world population increases, the demand for water would increase concomitantly to provide more food and energy, and to satisfy burgeoning domestic and industrial water requirements. With a simplistic but faulty reasoning and an extremely dubious database, both somewhat similar to the earlier *Limits of Growth* (Meadows *et al*., 1972) discussions, several major international institutions have predicted that, by 2025, some two-thirds of the world's population would live in areas of moderate to serious water stress (WHO/UNICEF, 2005). Fortunately, such statements have no logical and scientific rationale. The demand for water, according to these institutions, is growing exponentially, but they assume erroneously that management practices, economic instruments and technology would grow only by discrete and limited amounts. They also erroneously assume water to be a finite resource, like oil or coal, which, once used, break down into various components and cannot be used again. The fact that water is a renewable resource, and, with good management practices, can be used, treated and re-used several times does not figure in this linear thinking.

With this simplistic thinking, many international institutions and water professionals predict that the world is facing an unprecedented water crisis, which will make many co-basin countries on the transboundary water courses go to war with each other. This has created a vicious circle: the more publicity these institutions and water professionals receive, the increasingly grim their claims of the world's water future become. Sadly, water crisis and water wars have become a growth industry. For example, if one searches for "water crisis" in Google, 12 400 000 citations may be found in the English language alone. Similarly, if "water conflicts" is searched, 10 500 000 citations would be found (these numbers correspond to those found at the time of writing this article). With such a wide coverage, the prevailing wisdom is that water scarcities will lead to conflicts, and even wars, between co-basin countries.

This thinking is incorrect. The fact is, water management practices in most of the countries of the world have been historically poor and continue to be poor. There is no question that if the present rate of inefficiency and complacency, in both developed and developing countries, continues in the future, the world would face a water crisis that would be unprecedented in human history, in terms of both quality and quantity. However, the potential threat of such a crisis and the increasing realization that many of the water problems can be solved by better management practices, including the use of good and enlightened economic instruments, institutional innovations and adoption of technological advances, have already started to create positive feedback loops, which are improving water-use patterns and efficiencies in many sectors in several countries. The current indications are that these positive developments will intensify in the future, which would greatly reduce the magnitude and intensity of the widely-perceived water threat.

As both the water professionals and the national and international institutions begin to realize that much of the world's water problems of the future can be resolved with the currently known, or available, management practices, technology and investment funds (Biswas & Seetharam, 2008), there is likely to be an increasing focus on selecting and using good management practices. In fact, there is some anecdotal evidence that this is already happening, albeit at a slower rate than desirable, in certain parts of the world. What is now needed is an accelerated drive to improve water management practices in most parts of the world, which would ensure that the discussions of water wars and water scarcities become increasingly irrelevant.

Implementation of better water management practices will have a profound effect on the management of transboundary rivers and lakes, and the changes in the mindsets of policy makers and the general public in the co-basin countries. Instead of the current pre-occupation with conflicts, both water professionals and policy-makers are likely to focus their attention on cooperation and collaboration between the countries, not only with respect to water but also in terms of a whole spectrum of development issues, such as agriculture, energy, industrial development, intermodal transportation (including navigation), which will invariably result in a very significant win-win situation for all the countries concerned (Ahmad *et al*., 2001; Biswas & Uitto, 2001; Biswas, 2008a,b).

While much of the global attention of recent years has been focused on the wrong problem definitions, such as water wars and water conflicts, some countries are realizing that there is a much better solution. This will require implementation of good water governance to reduce demands, search for unorthodox "out-of-the-box" solutions, intensive cooperation between the countries, and the use of water as an engine for economic development, poverty alleviation and environmental conservation. There are signs that this is already happening. However, while the mainstream water profession and the media have been pre-occupied with water wars and conflicts in transboundary rivers, they are not aware of the good cases of cooperation and collaboration that have brought untold benefits to the people of the countries concerned.

The present paper focuses on the benefits of cooperation on transboundary rivers, as well as on the cost of non-cooperation between countries, with special emphasis on the South Asian countries.

COOPERATION FOR REGIONAL DEVELOPMENT

In most Asian transboundary rivers, water allocation treaties between the relevant co-basin countries have been very difficult to negotiate. The Indus Water Treaty was unusual in the sense that the negotiation process, lasting just less than one decade, was short. However, it should be noted that Asia was a different continent half a century ago, and the World Bank, which acted as a facilitator to make this treaty possible (Biswas, 1992), was held in very high esteem in the subcontinent at that time. In addition, the political leaderships in both India and Pakistan were enlightened, and the leaders of both countries truly wanted a solution. Equally, the relationships between the two countries were significantly more positive compared to what exists at present. Furthermore, Eugene Black, the then World Bank President, was willing to take the risk of possible failure in the negotiations, in contrast to the mostly risk-averse Presidents who have followed him. The "carrot" that the World Bank dangled in front of the two countries, consisted of significant funding for projects in both, provided they reached a mutually acceptable agreement. This proved to be a very important practical incentive to expedite the Treaty.

These were some of the very special conditions that contributed to the success of the agreement on the Indus Water Treaty. The timing of the negotiations was most opportune. In the current situation, where the distrust between the two countries is high, and the importance and respect of the World Bank in Pakistan and especially India, is significantly lower than in the 1950s, it is highly unlikely that such a feat could now be duplicated. This cannot be seen as a positive development, since the earlier cooperation agreement has been of immense economic and social benefit to both countries.

In contrast, in recent years, in most Asian transboundary rivers, agreements have been difficult to negotiate between the appropriate co-basin countries because of many interrelated factors, among which are historical rivalries, political mistrust, asymmetric power relationships, increasing nationalism, short-term requirements of national political parties as compared to long-term national interests, growth of religious extremist groups, negotiations exclusively on water issues which invariably reduces water allocation to a zero-sum game, absence of properly formulated negotiating frameworks that could consider an overall development spectrum which could contribute to improving the standard of living in the countries concerned, emergence of other issues of

conflict between the countries which adversely affect the negotiating atmosphere, and the presence of many vociferous, media-savvy and single issue NGOs that are more interested in promoting their own agendas and dogmas than improving the quality of life of the people whom they often claim to represent.

While the priority and importance of all these factors vary from one transboundary river of South Asia to another, individually and collectively they have seriously hampered cooperation in most of the transboundary rivers of the region, especially between Bangladesh and India, and India and Nepal.

Progress on managing transboundary rivers for mutual benefit has been mostly dismal due to non-water-related reasons, the deep-rooted mutual distrust, and sometimes even hostility. Accordingly, the benefits foregone by each of these three countries not using water as an engine for economic and regional development have been very substantial (Verghese 1990, 2007). This constitutes an appalling situation, especially when the extensive and abject poverty that exists in all three countries is considered. In fact, it is little known that a greater number of absolutely poor people now live in the Ganges-Brahmaputra-Meghna (GBM) basin than in all the countries of sub-Saharan Africa combined. Considering the current level of poverty that exists in this region, none of these three countries can afford to continue with the unacceptably low level of cooperation which has greatly contributed to the sad situation.

Another important factor that is often lost in this debate is the fact that if developments of fossil fuels or mineral resources are delayed, these resources are not lost to the nations or to future generations. They remain in the ground, untouched, and can be exploited in the future whenever the countries decide to do so. The benefits will accrue whenever such resources are utilized. In contrast, if water is not used for hydropower generation or agricultural production at a given time, the potential benefits to the society are lost forever: they can never be recovered for societal benefit.

The only example in South Asia where cooperation on water-related developments has been the norm, rather than exception, has been the one between Bhutan and India. In fact, the GBM basin provides two excellent but contrasting examples of the very substantial benefits that can accrue when the countries concerned decide to collaborate actively for very substantial mutual benefits (India and Bhutan), and also

Fig. 1 Transboundary rivers of Bhutan, India, Nepal and Bangladesh (source: Biswas *et al*., 2009. Copyright: Third World Centre for Water Management).

equally the very substantial benefits that are foregone because the countries eschew the pursuit of common development goals for whatever reasons, some of which may be real but others could be imaginary (Bangladesh and India, and Nepal and India). Figure 1 shows the transboundary river systems of Bhutan, Nepal, India and Bangladesh (Biswas *et al*., 2009). The benefits of cooperation and the cost of non-cooperation within the context of the GBM basin will be discussed next.

BHUTAN AND INDIA: A SYMBIOTIC POSITIVE RELATIONSHIP

In the area of transboundary water management, the constructive collaboration between Bhutan and India during the past three decades, which has brought very significant benefits to both countries, is basically unknown. Because of the size of Bhutan and its small population, the benefits to the country have had enormous impacts. In contrast, while benefits to India have also been significant, because of its size and population, they have not been a "game-changer" as has been the case for Bhutan. The experience definitively shows that, given enlightened leadership, political will and mutual trust and confidence, the benefits of cooperation in transboundary rivers often could be very substantial. Regrettably, however, in the present world, water conflicts attract considerably more attention than cooperation, and the proponents of conflicts receive far more attention relative to those who prefer cooperation. Thus, not surprisingly, the positive results of this very good collaboration between India and Bhutan are hardly known, even in the Indian subcontinent, let alone in the rest of the world. The collaboration between India and Bhutan is an excellent example of how transboundary rivers can be managed within an overall collaborative development framework which uses water developments as an engine for economic growth and poverty alleviation in a highly impoverished region.

Bhutan, often known as the Hermit Kingdom, was basically inaccessible to the world until 1960. When this landlocked country, located on the Himalayan mountain range, initiated its first development plan in 1961, it had by far the lowest per capita income in South Asia and one of the lowest in the developing world. Because of the mountainous nature of its terrain, its agricultural potential is limited. Its high mountainous location, however, provides the country with unique advantages, especially in terms of its hydropower development, which is estimated at 20 000 megawatts (MW), slightly less than one-quarter of the potential of its western neighbour, Nepal. However, in terms of population, Bhutan is much smaller than any of the other GBM Basin countries.

Bhutan realized, sometime ago, that one of its main natural resources is water, and, if the country is to develop economically and make social progress, it must develop its water resources wisely and efficiently. Since nearly all of its water is transboundary in character, it decided to cooperate closely with India to develop these resources. Bhutan also recognized the following facts:

- Water development is not an end by itself, but only a means to an end, where the end is to improve the lifestyles of the people of the nation through a variety of complex interrelated socio-economic pathways.
- Alone, it cannot develop its water resources efficiently and quickly, because the country lacks investment capital and necessary technical and management expertise.
- Even if its water resources are developed, it will not be able to take full advantage of the resulting benefits exclusively within the national territory because of its small and dispersed population. In other words, the country simply does not have enough capacity to absorb all the benefits that could be generated by the water development activities.

Accordingly, Bhutan embarked upon a very different path, compared to either Bangladesh or Nepal, to develop its transboundary water bodies. It decided that the most efficient solution would be to develop its water resources in close collaboration with, and with the support of, its southern neighbour, India, with whom it shares its transboundary rivers.

Around 1980, Bhutan initiated a plan to develop the hydropower potential of the Wangchu Cascade at Chukha, in cooperation with India. Following extensive consultations, India agreed to construct a 336 MW run-of-the-river project at Chukha, on the basis of a 60% grant and 40% loan. The estimated cost of the project was INR 2450 million. It was commissioned in stages from 1988 onwards. The project was so successful that it had covered its costs by 1993. The generating capacity was later increased to 370 MW. Because of the Indian support to the planning, construction and management of the project, Bhutan agreed to sell the excess electricity from the project, that it could not use, to India at a mutually agreed rate. A 220-kilovolt (kV) transmission line was constructed, which linked the Bhutanese capital, Thimpu,

and the city of Phuntsholing on the Indian border, from where electricity was subsequently supplied to four Indian states.

The agreement between the two countries is that the electricity generated will be first used to satisfy Bhutan's own internal needs. Before the construction of the Chukha plant, electricity in Bhutan was generated by diesel and mini-hydro plants. Thus, the total electricity generated was extremely limited. Transporting diesel to a landlocked and mountainous country was an expensive and complex process; it also was inefficient. Not surprisingly, in 1980, per capita energy consumption in Bhutan was only 17 kWh, which was less than 10% of that of India, at 173 kWh.

Bhutan's per capita electricity consumption has steadily increased since the Chukha project became operational. For example, by 2008, Bhutan's per capita energy consumption, at 370 kg of oil equivalent, had already almost caught up with India (385 kg), was the same as in Pakistan (370 kg), and significantly higher than in Bangladesh (125 kg) or Nepal (47 kg).

The unit cost of hydropower generation has steadily declined since the Chukha plant was first constructed, because of greater and more economic scales of production and increasingly more efficient operation and management. The electrical network has steadily expanded to different parts of Bhutan, which has meant reduced use of fuel wood, and of diesel that had to be imported from India. Reduced fuelwood use has reduced the deforestation, and so has a beneficial impact on the forests and the environment.

The electricity produced in excess of the requirement of Bhutan is purchased and used by India as peak power through its eastern electricity grid. Initially, the two countries agreed to have two different pricing patterns for firm and secondary power. Later, the two tariffs were amalgamated into one, and, subsequently, the tariff that was initially paid by India was revised upwards four times. The revenue that Bhutan has been receiving from its electricity sales to India has not only serviced its debt load for the Chukha project without any problem, but also left enough surplus to finance other development activities, and to support some social services, including increasing the salaries of its civil servants. In addition, electricity has provided the impetus for Bhutan's industrialization and commercial development.

Since the construction of the Chukha project has proved to be beneficial to both the countries, they have agreed to expand their collaborative efforts to other new hydropower projects. Bhutan realized that the revenues from the development, use and export of its hydropower potential can accelerate the economic and social development of the country, and can contribute very significantly to poverty alleviation. The arrangement has also been beneficial to energy-hungry India, whose electricity requirements have been increasing in recent years at 7–9% per year. The decision for mutual collaboration on transboundary rivers has proved to be an important win-win situation for both the countries.

India and Bhutan have subsequently collaborated with the funding and construction of a 45-MW run-of-the-river hydropower station at Kuri Chu. Similar collaborative efforts have taken place, or are under active consideration, for Chukha II (1020 MW) and Chukha III (900 MW, with a storage dam). In addition, the two countries signed an agreement in 1993 to study the feasibility of a large storage dam on the Sunkosh River. When all these projects are completed, and assuming the unit price paid by India for electricity will continue to be revised upwards periodically, Bhutan can easily earn more than US$100 million annually in the foreseeable future from the sale of hydropower to its neighbour. Considering that its present population is only a little over 2 million, this sale of hydropower to India represents a very substantial income for this relatively small country, that will accrue regularly, year after year. Because of this success, not surprisingly, Bhutan's development framework, Vision 2000, envisages careful and progressive utilization of its 20 000 MW hydropower potential as an important means to propel the country forward and upward so as to ensure a better quality of life for all its citizens.

The win-win approach used by Bhutan and India is a good example of how transboundary water bodies can be successfully managed by the basin-sharing countries for regional economic development, which can directly contribute to improvements in the quality of life of the people of both the countries through income generation, poverty alleviation and environmental conservation.

Viewed from any direction, the collaboration between the two countries has been mutually very beneficial, including enhancement of regional peace and stability. These water-based developments have meant that Bhutan's per capita GDP has increased from being the lowest of any South Asian country in 1980, to being the highest by far in the GBM region at US$1932.8 in 2008, compared to US$1061.3 in India, US$1010.2 in Pakistan, US$493.7 in Bangladesh and US$465.4 in Nepal. If the current trends continue,

and it is highly likely that they will, by 2015, Bhutan would have the highest per capita GDP in entire South Asia, all due to its farsighted and enlightened approach to developing its transboundary rivers collaboratively with its neighbour.

NEPAL, INDIA AND BANGLADESH: A MISSED OPPORTUNITY

In contrast to the successful case of Bhutan and India, the last 20 years have proved to be a missed opportunity for Nepal, India and Bangladesh because of continuing mistrust, and due to the "big brother–small brother syndrome". These developments illustrate the validity of the perceptive views of Jawaharlal Nehru, the first Prime Minister of independent India, who urged the people to override national conflicts. Nehru deplored the inability to overcome not only the "narrow boundaries of geography but, what is worse, of the minds".

The bilateral negotiations between Nepal and India, and India and Bangladesh have resulted in some agreements, and even treaties. However, real progress to use the waters of the river systems as a catalyst for economic development and poverty alleviation in the region has been minimal. Good historical analyses of the negotiations between Bangladesh and India can be found in Abbas (1982), and of those between all the countries in Verghese (1990), who also provides an excellent and objective analysis as to why the negotiations have failed to produce good results for all the countries concerned.

Had the three countries, Nepal, India and Bangladesh, approached jointly the planning and management of the transboundary rivers in a positive and constructive spirit, the benefits to all three, in terms of regional development, poverty alleviation and improvements in the quality of life of their people, most certainly would have been very substantial. Regrettably, this has not happened, partially because of political uncertainties that clouded the negotiations and partly because of asymmetric power relationships between the three countries. Many of these constraints should have been overcome by the Gujral doctrine of the mid-1990s, which very specifically eschewed absolute reciprocity in India's relationships with its smaller neighbours. While this new doctrine produced a burst of enthusiasm and activities between the three countries, this momentum could not be sustained for many different reasons. Accordingly, this was a missed opportunity for all the three countries. In retrospect, this perhaps hindered the progress and economic development of Bangladesh and Nepal more than India, since they had far fewer development options compared to India.

The overall situation of the region is not encouraging, since half of its population currently lives below the poverty line. In fact, in spite of recent economic advances, the total number of poor people in this region has continued to increase. Not surprisingly, the various health and social indicators for the countries still leave much to be desired.

Water is one of the few resources this region has that can promote long-term economic development. The countries need to formulate and implement cooperative strategies and joint action plans in which water could act as the catalyst for economic take-off. Several options and opportunities for collaborative efforts have existed for decades in areas such as hydropower generation, flood management, drought mitigation and agricultural development. However, progress has been very slow.

The GBM region is characterized by endemic poverty (Rahman, 2009). The performance of the region with respect to social indicators, such as economic growth, education and health, is disappointing, especially in comparison to other regions of the world. About 40% of the developing world's poor people (with a daily calorie intake of less than 2200–2400 kcal) live in this region; and, even though there has been a decline in poverty in recent years, the absolute number of poor people has increased due to population growth. Adult illiteracy is still very high, especially among women. The three countries spend a lower share of public expenditure on education than the world average.

Health indicators are also dismal in the region. Infant (under 1 year) and child (under 5 years) mortality rates in these countries are much higher than those of many other developing countries, as well as the world average. Although access to clean water has improved in recent years, only a limited population has proper access to wastewater collection and treatment.

Nearly 45% of the land of the GBM region is arable, but per capita availability of arable land is very small, around one-tenth of a hectare, which is almost half the global average. One other crucial element to be taken into consideration in envisioning a sustainable development framework for the GBM region is the trend in urbanization. In Bangladesh, India and Nepal, annual urban growth rates (1995–2000) were 5.2, 3.0 and 6.5%, respectively. These rates are much higher than those of Europe (0.5%),

Latin America (2.3%), Australia (1.2%), the USA and Canada (1.2%) and Japan (0.4%). While the proportions of urban population in the three GBM countries are 20, 27 and 14% respectively, they are expected to rise to over 50% in the case of India and Bangladesh, and to about 22% for Nepal by 2025. This change in the spatial distribution and localization of population will have significant implications for water, energy and other related demands for natural resources and their socio-environmental impacts.

Despite the poor socio-economic status of the region, it has rich natural endowments of water, land and energy. It is indeed an agonizing paradox. The development and utilization of these natural resources in an efficient manner have never been sought by the countries due to past perceived differences, a legacy of mistrust, lack of goodwill and an absence of sustained political will (a very important factor for development), which could lift millions of people out of the poverty trap. The abundance of water in the GBM region, as a shared resource, could be a principal driver of economic development for the millions of poor people. The shared river systems can be optimally developed only through collaborative efforts. It is imperative, therefore, to formulate a framework for the sustainable development of this region in a long-term time frame and on a cooperative basis, which would be acceptable to the three countries and implemented.

CONCLUDING REMARKS

The framework for sustainable development in South Asia should be based on a vision of poverty eradication and sustained improvement in the living conditions of many hundreds of millions of its inhabitants (Biswas & Uitto, 2001). The world's largest concentration of economic misery is to be found in this region. There is no reason for such abject poverty, given the rich bounty of its natural resources, especially water, waiting to be harnessed.

However, a lack of trust between the countries and the absence of forward thinking have consistently bedevilled the relationship among the co-riparians for nearly half a century, and compounded the poverty and deprivation in the region. This pernicious mindset has eroded goodwill and confidence, and has generated mutual mistrust and suspicion. The situation is further compounded by the failure of the political leaders to create public opinion in favour of formulating and implementing a vision for regional cooperation and development.

The drivers that would influence the conditions towards achieving the regional vision include population growth, urbanization, technology, globalization, governance and environment. Technological changes, manifested through innovation/adoption of new products and techniques, can enrich human resources through capacity development. The South Asia region might benefit from transferring water-related technology from industrialized countries as well as from within the region, especially concerning irrigation efficiency, pollution control, water storage, disaster management and information systems. The contemporary process of globalization could be another driver in the region's long-term vision for sustainable development. The region would benefit from trade liberalization, greater capital mobility and technology transfer; but, at the same time, it is important to be vigilant against potential instability and the risk of greater inequality in income distribution. To address this issue effectively, it is necessary to establish good governance at all levels of society, reflected in accountability, rule of law, elimination of corruption and participatory approaches (Biswas & Tortajada, 2010).

The regional vision formulation can be approached under three scenarios: pessimistic, optimistic and plausible. A scenario is a possible course of events. The pessimistic scenario is basically a business-as-usual approach under the assumption of a *status quo* and "do nothing" response strategy; this approach is unsustainable and unacceptable for the long term. The optimistic scenario is the other extreme, which is overly ambitious, utopian and an unrealistic goal to pursue. In between lies the plausible scenario. It is pragmatic to seek sustainable water resource management for the region through genuine cooperation and collaboration, as has been the case between Bhutan and India.

The experience from the South Asian countries clearly indicates that, over a longer time frame, the countries have no other alternatives but to cooperate with each other in managing their transboundary rivers. In the entire human history, no two countries have gone to war because of water. While water wars may be of interest to the media, it can be safely predicted that if there were ever to be a war between the countries sharing a transboundary river, the root causes would be non-water reasons. Water would, at best, be one of the many tertiary causes, but never the primary or secondary reason.

The benefits of cooperation can be seen by the results of the India–Bhutan relationship, while the

costs of non-cooperation can be seen by the Nepal–India–Bangladesh experience. In the final analysis, the costs of non-cooperation in the South Asian transboundary rivers will be paid not by the politicians and the media, but by the hundreds of millions of poor people, the vast majority of whom would be forced to live in abject poverty for decades to come.

REFERENCES

Abbas, B.M. 1982. *Ganges water dispute*. Dhaka: University Press.

Ahmad, Q.K., Biswas, A.K., Rangachari, R., and Sainju, M.M. 2001. *Ganges Brahmaputra-Meghna region: a framework for sustainable development*. Dhaka: University Press.

Biswas, A.K. 1992. Indus Water Treaty: the negotiating process. *Water International*, 17 (4), 201–209.

Biswas, A.K. 2008a. Management of transboundary waters: an overview. *In*: O. Varis, C. Tortajada, and A.K. Biswas, eds. *Management of transboundary rivers and lakes*. Berlin: Springer, 1–20.

Biswas, A.K. 2008b. Management of Ganges-Brahmaputra-Meghna systems. *In*: O. Varis, C. Tortajada, and A.K. Biswas, eds. *Management of transboundary rivers and lakes*. Berlin: Springer, 143–164.

Biswas, A.K., and Seetharam, K.E. 2008. Achieving water security for Asia. *International Journal of Water Resources Development*, 24 (1), 145–176.

Biswas, A.K. and Tortajada, C. 2010. Future water governance: problems and perspectives. *International Journal of Water Resources Development*, 26 (2), 129–139.

Biswas, A.K. and Uitto, J.I. 2001. *Sustainable development of Ganges-Brahmaputra-Meghna Basins*. Tokyo: United Nations University Press.

Biswas, A.K., Rangachari, R., and Tortajada, C. 2009. *Water Resources of the Indian Subcontinent*. New Delhi: Oxford University Press.

Meadows, D.H., Meadows, D.L., Randers, J., and Behrens, W.W. 1972. *The limits to growth*. New York: Universe Books.

Rahman, M.M. 2009. Principles of transboundary water resources management and Ganges treaties. *International Journal of Water Resources Development*, 25 (1), 159–173.

Verghese, B.G. 1990. *Waters of hope: Himalaya-Ganga development and cooperation for a billion people*. New Delhi: Oxford and IBH Publishing.

Verghese, B.G. 2007. *Waters of Hope: Facing New Challenges in Himalaya-Ganga Cooperation.* New Delhi, India: Research Press.

WHO/UNICEF, 2005. *Water for life: making it happen*. Geneva: World Health Organization, WHO Press.