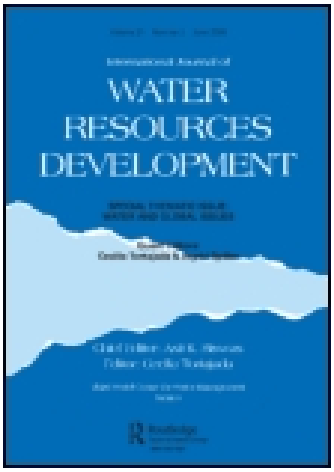

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Review Essay

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REVIEW ESSAY

India's Inter-Basin Water Transfer Plan, Not Really an ILR Plan

Interlinking of Rivers in India: Issues and Concerns
M. Monirul Qadar Mirza, Ahsan Uddin Ahmed and Qazi Kholiquzzamam Ahmad (Eds)
CRC Press – A Balkema Book, 2008. 298 pp., ISBN 978-0-415-40469-3 (hardback)

Water resources development enabled by raising the level of river water for water transfer has been practised for centuries to serve multiple uses in needy areas within and across river basin boundaries. The structures constructed for this purpose are: storage or diversion dams, canals, pipelines, tunnels and/or pumping stations for crossing intervening high ground. Within-basin water transfer is mostly from upstream to downstream, facilitated by gravity. At the same time, inter-basin water transfer (IBWT) of as much as 630 billion m^3, has been carried out in over 36 countries for drinking water supply, irrigation, navigation or hydropower generation, where cost effective. Amongst these, India accounts for at least 11 operating IBWT schemes transferring over 73 billion m^3 of water, out of a total of about 550 billion m^3 of water utilization enabled by water resources development through storages and groundwater use. As is well known, in the latter half of the 20th century India has implemented a massive water resources development plan, to utilize the country's potential of over 1300 billion m^3. Yet, storage availability per capita in India is amongst the lowest in the world. The present level of use can be raised to almost 1100 billion m^3 by 2050 to meet the needs of the projected population of about 1500 million. In spite of increasing water use efficiency, this quantum may then fall short of the requirement of about 1300 billion m^3, in view of the reducing per capita availability of land and extra water needed in order to meet the aspirations of people. Further water resources development to capture fresh water behind storages at several possible locations has gradually become more difficult during the last couple of decades. As demands for fresh water could not be met by intra-basin transfers alone, public demand for innovative solutions including IBWT grew. IBWT also provided an alternative avenue to overcome various objections.

The national water resources development planners therefore responded by formulating a National Perspective Plan in 1980. The plan was further studied and refined in successive stages from Pre-Feasibility Reports through Feasibility Reports into a programme comprising 29 IBWT schemes (called links). The task, spanning more than two decades of sustained work, was carried out by a special outfit, the National Water Development Authority (NWDA) which included experts and representatives of states in a participatory mode.

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The programme consisted of two parts by way of availability: i) the Himalayan Component, comprising 15 links and one alternative, and ii) the Peninsular Component with 14 links. On the whole, the links can also be considered to be located in eastern and western sectors in the plains, leaving the hilly region in between. Since the Himalayan Component had international dimensions, involving protracted negotiations with Nepal and Bangladesh, the Peninsular Component was given greater priority. Both components together considered water transfer across basins and redistribution, with substitution within the receiving river basin of about 170 out of 1900 billion m^3 (9%) of available runoff of India's rivers, by means of storage dams, hydropower stations, canals, tunnels and other infrastructure. It called for sensitive handling of the related social issues of displacement, rehabilitation and resettlement of about 0.6 million people as well as environmental impacts. The plan, as it stands presently, serves the following objectives: i) drought proofing of 250 000 ha; ii) reduction of flood peaks due to reservoirs by about 30%; iii) increase in gross irrigation potential from 140 to 175 million ha; iv) the addition of 34 000 megawatts of Hydropower installed capacity, essentially enabled by reservoirs; v) about 12 billion m^3 of water supply for drinking, municipal and industrial needs; and vi) reversal of migration of about 50 million people.

Preparation of Feasibility Reports was undertaken for the Peninsular Component links as stand-alone schemes first, since water transfer was within Indian territory and water transfer passing the eastern region of India serving the state of Tamil Nadu, a chronically deficit region, could be augmented with water transfer from the Himalayan Component's Brahmputra–Ganga link, when available. Besides this eastern connection, there is a connection between the Himalayan Component and the western part of the Peninsular Component through Yamuna–Rajasthan–Gujarat links, serving the deserts there. The Peninsular Component also has a western coastal component where water transfer of surplus waters of Damanganga River running into the Arabian Sea is planned for the states of Maharashtra and Gujarat. Farther south, water transfer from west-flowing rivers to the east is contemplated through the Periyar–Achankovil–Vaigai (PAV) link, besides two links in the Kaveri Basin in Karnataka. Out of 29 links of the programme, nine links are independent (two Himalayan, seven Peninsular), accounting for the transfer of about 12.4 billion m^3 per year. The two Himalayan links, for 8 billion m^3 are both south of the Ganga River. The seven Peninsular links for transfer of 4.4 billion m^3 are in west India, each transferring up to 1 billion m^3. The remaining 20 links (13 Himalayan, 7 Peninsular) are in a way interdependent, substituting water transfer upstream or downstream in the receiving basin. One major link in the Himalayan Component is the Manas–Sankosh–Tista–Ganga (MSTG), connecting the Brahmaputra system with the Ganga, for which an alternative link (Brahmaputra–enroute other rivers–Ganga) is under study. This key link is planned for transfer of about 40 billion m^3 (about 7%) out of over 600 billion m^3 yield of Brahmaputra water entering Bangladesh annually.

Seven links (four Himalayan, three Peninsular) involve lift and consequently incur large yearly running costs for pumping. The critical review group of the programme Task Force in 2003 studied alternatives to these links to reduce lift height and/or the quantum to be lifted and consequently pumping cost. These studies have to be considered during the preparation of a Detailed Project Report. The 20 inter-dependent links are dependent on transfer from an originating link, using part of the water transferred in the receiving basin and transferring the remainder to the next basin. In the Himalayan Component, transfer from the Brahmaputra system to the Ganga system is about 43 billion m^3 (7%) of available runoff. Water transfer from the Ganga system to Rajasthan/Gujarat is about 8 billion m^3,

which is about 3%, and Ganga to Mahanadi is 38 out of 240 billion m^3 (12%), largely from Brahmaputra transfer inflow. A large-scale redistribution of almost 16% has been presently planned within the Ganga system through links involving Gandak, Ghagra, Kosi, Sone, Ken-Betwa, Parbati-Chambal, etc. Transfer from the Ganga system to Rajasthan/Gujarat is at 8 billion m^3 (3%). Pre-feasibility studies were nearing completion while some Feasibility Reports were in progress. These two steps of preparing Pre-Feasibility and Feasibility Reports in the National Water Development Authority were distinct from the usual approach of going in for preparation of Detailed Project Reports straightaway. They enabled in-depth study of the complexity of each link, making the decision process more participatory and transparent. Detailed Project Report preparation as per the Central Water Commission (CWC) as well as Planning Commission guidelines for preparation of such reports for water resources development projects, statutory clearances and investment decisions were to follow after developing consensus about the parameters of each link. Cost estimates were not made. A rudimentary cost estimate of about INR5600 billion (US$120 billion) for the programme was put together.

This meticulously studied plan, however, was all of a sudden propelled into the glare of media attention, publicity and debate when in December 2002 the Government of India, in response to a suggestion from the Indian Supreme Court on a different matter, set up a Task Force for Inter-Linking of Rivers (ILR) to review the National Water Development Authority plan and prepare an action plan to implement it. Impressed by mention of the IBWT plan's potential to resolve India's many water resources development issues, the Supreme Court suggested consideration of a fast-track 10-year span for its implementation. In keeping with the enthusiasm generated in the country, the Court also offered to periodically monitor progress of this programme. The monitoring process continues at this time, five years since the Court's suggestions to the government. It seems in hindsight that the following four major issues attracted extraordinary attention, from both proponents and detractors: i) mention of the likely considerable cost of INR5600 billion (US$120 billion), when several other water resources development schemes were starved of funding; ii) the Court's suggestion for consideration of a time span of 10 years; iii) the misnomer 'Inter-Linking of Rivers', signifying river links akin to transportation links enabling two-way transfer, instead of designating it as IBWT; and iv) the over-enthusiastic rallying response from politicians, the media and the general public to the programme as a panacea, when adequate preparation of the necessary background work to forge a consensus on each link was ongoing and incomplete. In the ensuing euphoria and hype, there was a failure to grasp the fact that this was not a single project but a sizeable programme of schemes for implementation, each dependent on being found feasible and cleared after an elaborate process. It was also forgotten that each scheme was separate, although some formed a sequential group, some served as substitutes and some were stand-alone schemes, and that they would need processing for clearance. In this present review, the acronym IBWT is adopted in place of the misleading ILR, which is consciously avoided.

Curiously, the hype and the Task Force lasted for about 18 months and ended after a new political administration took over the central government. Official committees replaced the Task Force. A memorandum of understanding for one Ken-Betwa link had been signed and the Detailed Project Report process was set in motion. Another memorandum of understanding for a Parbati–Kali Sindh–Chambal link is soon to be

signed. Good progress has been made on consensus building between the states of Maharashtra and Gujarat on two western links for which a memorandum may be signed soon and Detailed Project Report work is likely to be started. Similar work on two more prioritized links of the eastern coastal component is under way. In light of the intensity of the ongoing debate in the country, a Parliamentary Committee was set up to gauge public opinion. Its report will soon be tabled in Parliament. The website has been strengthened; the completed Feasibility Reports uploaded. Unfortunately, few comments have been received although there was a shrill clamour for the information. Consensus building has progressed haltingly. Many activities were stalled, but debate has continued sporadically, gradually declining in intensity and rhetoric. Nearly six years have passed since the setting up of the Task Force. The debate has become stale and lost steam. Many issues and concerns have been accommodated by the National Water Development Authority. A lot of water has flowed down the Indian rivers! It is at this juncture that the anthology under review highlights issues and concerns that have lost sheen and relevance.

Two aspects of the country's water resources development programme, including IBWT, have received much criticism over the past few decades in spite of scientific clarifications offered, namely, the lack of consideration given to objections and options. The papers in the anthology under review repeat these criticisms. At several places in the book, one can perceive the undercurrent of a bias about projects such as Narmada, although the issues were settled in the highest judicial/political/administrative institutions almost a decade ago and have become irrelevant. The editors promise 'an edited authentic anthology of debate-backed science indicating opposing schools of thought' *as if none existed*. Nonetheless, the projected objections and options and the reviewer's opinion are summarized below. They are first discussed in general terms, followed by a review of each individual paper.

Objections

As indicated earlier, the following objections raised in different papers are not specific to IBWT but are raised against water resources development generally. They deal with: submergence of land and forest, and ecological degradation; transmission of alien flora/fauna/pollutants, and exploitation of nature; displacement of people (tribals) and inadequacies in rehabilitation and resettlement; inter-state disputes; low water-use efficiency emphasizing supply- rather than demand-management; heavy financial costs; the interest of the moneyed classes in supporting privatization; the lack of public participation and involvement in decision-making; and top-down rather than bottom-up approaches. They ignore the revised policies now in place which cover rehabilitation and resettlement, environment and forests, environmental impact assessment, public hearings, water pollution and quality. They likewise ignore the fact that there is also provision for ample compensation for negative effects to advance sustainable development. Some of the other effects of IBWT cited in the volume include jeopardizing the future water resources development needs of the basin of origin, and the spread of pollution and transmission of invasive species to the transferee basin. However, these effects may be more perceived than real, as no evidence is given in support. Detailed planning for each link during the Detailed Project Report process, however, is required to address these issues, if missed in the earlier process.

Options

The options favoured in this volume are that small is beautiful and going micro is better than going gigantic. Local water resource development, watershed development, rainwater harvesting, groundwater development, artificial recharge, run-of-the-river hydropower or alternative energy sources, saving water and managing the already deployed quantum, and decentralization are all presented as possible solutions. They are dealt with below.

Micro-scale Water Resource Development Comprising Watershed Development and Rainwater Harvesting

A river basin is also a watershed on a macro scale, draining river runoff through its mouth into a sea. Sub-basins of tributaries, streams joining a tributary, and further down the watershed—classified as major, small, mini or micro—all drain their catchments through a common mouth into an upper-order channel of fresh water. A micro facility often operates within a narrow band of meteorological parameters of intensity, duration, antecedent rainfall, potential evaporation, infiltration capacity, etc. and hence has a larger chance of failure. Its dependability is lower, proportion of loss due to evaporation is high and hence the cost per unit of water available is larger with size reduction from macro to micro, and longevity is relatively short. Being dispersed, micro water resource development requires a dedicated village-based multidisciplinary organization for implementation as compared to the specialist organization for macro-scale development. The former directly conserves top soils and biomass but is often found productive and complementary to the latter. It recharges groundwater and satisfies rural drinking needs. Large-scale funding has been made available for micro watershed development in the last three five-year plans through the departments of Agriculture, Rural Development, Forests, Panchayats, Wasteland Development and Groundwater in central and state ministries, as well as from bilateral funding agencies of the developed world. Yet, the fruitfulness of watershed development and rainwater harvesting is slow and more difficult for benefit–cost assessment. It is estimated that in all, about 30 billion m^3 of water could be harnessed through these strategies in India, whereas that from macro water resource development could be as high as 400 billion m^3. The realization of this harnessed quantum of 30 billion m^3 may take centuries.

Small or Big Dams

The decision to build a large or a small dam depends upon location and economical-hydro-geo-technical considerations. In a basin, a discrete combination of all facilities is required. The claims that small dams meet all demands are unreal. A relatively larger volume of water is lost to evaporation in small structures. A recent study of Tamil Nadu tanks indicated that revival is more expensive than building large systems. The capital cost per 1000 cubic metre of storage varies from US$50 for large storage to US$160–600 for micro storage facilities (Keller *et al*., 2000). Operation and maintenance costs increase with decreasing size. When large quanta are to be harnessed, large organized facilities prove cost effective and are unavoidable.

Run-of-the-River Hydropower Stations

In monsoon-dominated river basins, stand-alone installations without upstream storages are not viable, as they are vulnerable to sediment-related clogging and erosion of turbines.

Solar and Non-Conventional Sources as Alternatives to Hydropower

No doubt, these constitute the ultimate inexhaustible source but they remain in a developmental stage. Their present costs are unaffordable. The bio-mass-based gassifiers require land for growing bio-mass, which might not be available or which would in turn require water supply from conventional water resource development schemes. They therefore remain unviable at present.

The editors of the volume do not indicate the principles based on which contributions were invited, and the papers seem rather one-sided, with 12 opposing IBWT and three in favour which clarify some of the issues raised in the papers criticizing IBWT. Two chapters appear to be extraneous to the debate and the reader is not told why they have been included: chapter 12, which deals with the implications of climate change but supports IBWT, and chapter 14, describing 'indigenous knowledge' in micro watershed development which is really unrelated. The perspective of water resources engineers in favour of IBWT is noticeably absent. The focus of the book is on Ganga–Brahmaputra–Meghana Basin schemes in the Himalayan Component. Three contributions deal with the concerns of Bangladesh, and two cover those of Nepal. Two other chapters (16 and 17) are also focussed on Bangladesh, and take a positive approach in providing new ideas for the National Water Development Authority's consideration. Chapter 11 on the Ken-Betwa link deserves to be taken into account during preparation of the Detailed Project Report. However, these 17 contributions leave the reader with the impression that the Peninsular Component was not given much attention. Although the editors acknowledge valuable comments from reviewers, there are no details on the nature of the comments. The volume could have been improved with a little more editorial care, to avoid repetitions (for instance, the paper by K. L. Rao, Dastur plans, maps regarding Inter-Linking of Rivers and the list of links). It is also difficult to tell if any effort was made to narrow the differences between contributors.

Cover and Preface

It is worth noting that the hardback cover of the book is an artistic though slightly bizarre graphic showing segments of Indian territory divided by rivers. The image is not to scale, is thereby confusing and may be a tongue-in-cheek comment on the subject. Although the source of the graphic is identified (as Editor, *Himal*), there is no discussion or comment on its intended meaning. In the Preface, the editors remark that they prefer not to draw any general conclusions from the anthology, but the overall impression would suggest that they are critical of IBWT. The book claims to be a compilation of papers from 22 contributors on both sides of the debate, albeit more from those in opposition. It recommends the notion emanating from two pilot projects by peoples' organizations that "water scarcity is more related to water management than availability". The editors do not clarify if, in their view, this notion goes against IBWT. The anthology contains, in chapter 14, work on micro scale efforts, but this too does not contest IBWT. The well-known international dimensions of the Himalayan

Component that impact Bangladesh and Nepal, as mentioned by the Editors, are no doubt being addressed through diplomatic channels. In fact, the National Water Development Authority would do well to consider them during the ongoing studies of related links.

The editors express the hope that the options discussed in the book will facilitate a 'dialogue' on similar projects 'elsewhere' in the world. However, it appears as though there was little if any dialogue among the contributors to the anthology, some of them holding opposing views. Some statements are seemingly rather broad, and could benefit from corroboration by water resources development experts. The recommended options do not provide the quantification of benefits, costs and durations necessary for a comparison of merits with the IBWT programme.[1] The potential of enabling 'dialogue elsewhere' would thus seem limited.

The following review provides a summary organized by chapter in sequence (the numbers refer to chapters in the volume).

1. Summary of Issues and Concerns

This chapter describes the evolution of India's IBWT plan and past experiences. It condemns beneficial impacts, without quantifying them, on account of adverse environmental impacts (2, 7, 9, 11). The aim, in IBWT, to increase food production through irrigation (3, 12) is criticized (4), although it is globally recognized that food productivity of irrigated agriculture is about three to four times that of rain-fed agriculture. Problems related to governance, however, dog the sector, though several measures have been undertaken to impart sustainability. The chapter does not survey the work done by the National Water Development Authority for 22 years and by the Task Force as described in chapter 3, and also by the multidisciplinary Committee which was its successor and the more recent Parliamentary Committee. Unfortunately, the editors scan only the Himalayan Component and international issues rather than the IBWT plan for all of India. The papers present the following Himalayan-focused views:

(a) The concept of surplus/deficit basins is discussed, but the guidelines, which are central to the subject and as laid down by the Multi-State Technical Advisory Committee of the National Water Development Authority, are not referred to.
(b) Hydrological changes are emphasized, meaning likely flooding in Nepal due to reservoirs (6) and drought in Bangladesh (10), but quantification details are not provided.
(c) The risks in treating the Himalayan and Peninsular Components separately and not as a system are highlighted (5), but there is no discussion of how the two components stand alone also, albeit with sub-optimal performance, how each link was to be examined and cleared according to inter-dependence, and the manner in which the two components were to be integrated.
(d) The unprecedented and expensive security need for IBWT infrastructure is discussed, but without due consideration of how the already existing much larger water infrastructure of India is taken care of (5).
(e) Plans for flood mitigation through 30 dams are classified as being of 'little consequence', while the achievements of over 4000 large dams in India are ignored, and the adverse effects on agriculture and morphology in Bangladesh are emphasized, without data (10) and ignoring the fact that every water

resources development scheme on balance mitigates the flood/drought syndrome.

(f) Priority is accorded to hydropower on the question of energy, since India, like South Asia, uses only five percent of the global average generation. However, because the environmental/social cost is high, the chapter calls for social benefit–cost analysis. Without adequate quantification of the small proportion of energy needed for lift, vis-à-vis that generated in IBWT schemes on a much larger scale, the chapter criticizes lift component.

(g) On matters of health, the summary accords a negative mark to Inter-Linking of Rivers or ILR on account of the transfer of pollutants, the effect on downstream flows in the Ganga River, increase in health risk in the Yamuna River due to the Ken-Betwa link (11), alteration of micro-climate (9), and transmission of pollution from the Ganga to non-polluted rivers of the Peninsular Component. Such issues indeed have to be assessed in Feasibility and Detailed Project Reports in progress as part of benefit/cost streams.

(h) The chapter cites the Fourth Action Report of the Intergovernmental Panel on Climate Change (IPCC, 2007) (12) and calls for its incorporation into IBWT design. At the same time, the chapter arrives at the general conclusion that on account of its size and complexity IBWT may prove intractable in practice, but does not adequately explain why.

(j) On ecosystems, the chapter states, without quantification, that abstraction from Farakka reservoir has damaged Bangladesh mangroves (7, 10) and calls for specified flow releases.

(k) In discussing social and ecological impacts, chapter 11 draws attention to inadequacies in present plans of the Ken-Betwa link, which will undoubtedly be dealt with during the Detailed Project Report stage.

(l) On international legal issues, the chapter restricts discussion to the Himalayan Component and argues that it has been developed on a unilateral basis by India, without consulting other riparian countries about economic costs. The chapter does not specify whether existing institutions such as the Joint Rivers Commission or the Joint Committee on Water Resources could be effective or not. The authors call for compliance with legal needs, and seem to overlook the fact that such issues are addressed through diplomatic channels.

(m) Emphasis is laid on consideration of economic alternatives consisting of an increase in water-use efficiency, better agricultural practices to improve productivity, phasing out subsidies, rainwater harvesting, etc. However, it could be argued that these measures are matters of governance and do not really belong in this discussion (14).

(n) Regional co-operation is recommended, mainly for five links for which dams are required in Nepal and links on the Brahmaputra affecting Bangladesh downstream. Cooperation as evident in the Ganga treaty (1996) is cited (15,16,17) and the authors call for comprehensive joint investigations by the three countries. Again, this concern falls under the group of international issues requiring special treatment. The status of ongoing negotiations between Nepal and India are not discussed, nor is any attempt made to reconcile differences as indeed attempted by one of the editors through a three-nation approach in the past. The concrete issue of the effects on Bangladesh of the

diversion of only seven percent of the waters of the Brahmaputra system is not dealt with.

2. ILR Experience from across the World

It is surprising that the authors do not refer to the databases and work of well-known professional organizations such as the International Commission on Irrigation and Drainage (ICID, 2007) and the International Commission on Large Dams (ICOLD). Over 221 existing schemes in 36 countries transfer about 629 billion m^3 of water every year. In addition, 73 new schemes are being planned for the transfer of some 1082 billion m^3. Apart from earlier publications on the subject, one recent reference is *Inter-Basin Water Transfer: Case Studies from Australia, United States, Canada, China and India* by Fereidoun Ghassemi and Ian White of the Australian National University, Canberra. The work of two other scholars published in 1999 on IBWT benchmarks is also relevant. One of them, Shiklomanov (1999), has proposed a classification of IBWT schemes by size into three classes on the basis of the volume of water transferred and the distance over which it is transferred. Cox (1999) similarly proposed three criteria of economic productivity and two for socio-cultural issues for evaluations of the sustainability of IBWT.

The authors do, however, acknowledge that IBWT is not new, and cite and quote schemes in USA, Canada, Soviet Union, Chile, China and Lybia. Despite this, they point out (in Box 2.1) only three positive points that are clouded by 11 negative points, and hurriedly conclude that IBWT's adverse environmental impacts outweigh its beneficial impacts. The authors argue that many IBWT proposals have remained wishful thinking due to high costs, on account of not having considered options, and due to likely negative impacts such as environmental damage, potential for affecting future water resources development schemes, migration, etc. The lack of environmental impact assessment (EIA) in old schemes is lamented, which is surprising given that the EIA concept is of recent origin. For instance, in India the Ministry of Environment and Forests issued notifications and practices between 1996 and 2006. These are still evolving and have to be addressed through the Detailed Project Report process.

The survey of IBWT projects across continents is somewhat unbalanced: America is covered in a single page, with Africa (dealing with South Africa and Lesotho only) in two pages. A table summarizes pre- and post-project assumptions and actual effects. Europe is covered in two pages, but the discussion is centred on environmental loss in the Tagus-Segura scheme of Spain, and the chapter avoids description of any positive impacts. The rest of Europe seems to be forgotten. Central Asia is covered in one page, on the Aral Sea. East Asia is dealt with in two pages, including China. There is some discussion of the Three Gorges Project, but it is limited to negative aspects. Latin America, mainly Brazil, is dealt with in a page. The chapter cites South America's Initiative for the Integration of South American Infrastructure project of Brazil, Bolivia and Peru, painting a negative picture. The discussion of South Asia spans five pages. India's five projects including the Indira Gandhi Nahar Project (IGNP) are heavily criticized, without any mention of their benefits which far outweigh the costs.

3. Vital Links

This chapter describes past-IBWT proposals, their evolution into the version put forward by the National Water Development Authority and the setting up of the Task Force and the

Inter-Linking of Rivers project. It dwells on India's needs in 2050 and the expected role of IBWT. It describes Task Force activities and the multidisciplinary approach, lays emphasis on the assessment of socio-environmental viability through public consultation, lists the international dimensions and relevant legal issues, and discusses various options to fund the programme and the preparation of two action plans. The chapter asserts the need to shun controversies, move ahead and adopt trade-offs where necessary lest the delays be perilous. The Task Force did bring the National Water Development Authority's work to public attention, but with the media attention caused in part by pronouncements by the President, the Supreme Court and politicians, an intense debate has ensued about water resources development, large dams EIA and sustainable development, and India's National Water Policy (1987 and 2002 revision).

4. Inter-Linking of Rivers: Questions on Scientific, Economic and Environmental Dimensions

The authors call for openness in feasibility assessment, arguing that the country's hydrographic picture is likely to be drastically altered by IBWT, although they admit that IBWT is backed by convincing logic and Feasibility Reports are now available on the project website. They decry the present 'reductionist' approach of water resources development, but it isn't clear if by this they mean the examination of isolated parts or simple concepts. They also recommend a generic, rather than a specific or special, approach to water resources management, calling for the allocation of water for eco-services. In a similar vein, they seek the replacement of 'arithmetical' hydrology by 'holistic' eco-hydrology. They cite the National Commission on Integrated Water Resources Development report to highlight their differences with the work of the National Water Development Authority, but they do not discuss adopted approaches or their reasons in detail and ignore the National Commission's treatment of the environment as a user sector in 1999 and allocation of priority to 'ecology' in the National Water Policy (2002). The authors join issue with the Supreme Court's suggestion to consider IBWT implementation within, say, 10 years. But they miss the fact that the Court did not rule out the elaborate procedural requirements of Detailed Project Report preparation and clearances. The authors do not seem to take account of developments of the past decade, including revision of the National Water Policy (NWP). They examine the Ken-Betwa link but complain of a lack of information (despite the fact that the authors of another paper in this volume obtained specific details about the same link). They cite Australia's Murray-Darling basin, in addition to Chile and USA where some dams have been proposed for decommissioning, but seem to forget that IBWT was the basis of those very schemes. It is not clear whether they think dams are needed at all. Nor is their argument clarified when they declare that they do not mean that rivers should never be linked. Floods according to them are blessings for ecology, but they don't quantify their devastating impacts. They decry the inadequacies of Feasibility Reports, but don't acknowledge the Detailed Project Report process for ongoing detailing which removes the inadequacies. They wonder whether IBWT is at all a cost-effective option in drought-prone areas, but do not give credence to the work of the National Water Development Authority and project clearing agencies indicating their drought-proofing components. They ask if food security is dependent on inter-linking of rivers, and the volume editors call it rubbishing. Although it

has not been argued that the primary aim of IBWT is food security, the authors ignore the fact that a significant part of IBWT is planning to augment water availability where droughts cause a strong deficit. They assert the existence of a knowledge gap in the public domain on issues for the Himalayan Component such as seismic vulnerability of structural interventions, floods, drainage, heavy sedimentation and economic feasibility. This is a valid point, but these issues are not specific to IBWT. They exist for every water resources development scheme and they are considered during the Feasibility Report and Detailed Project Report stages. The Himalayan Component links no doubt require detailed study. The Supreme Court's suggestion for speeding up the IBWT programme does not preclude addressing this knowledge gap through a competent expert agency. The authors feel that IBWT will multiply water conflicts. But indeed no link can be cleared and undertaken unless there is a consensus among party states. NWP requires any water resources development scheme to cater to drinking and domestic water supply needs on a priority basis: watershed development and rainwater harvesting have limitations as discussed earlier. The rhetoric deployed by the authors generates confusion about rights and wrongs. They claim that food security is currently independent of IBWT, yet say that 200 million Indians are underfed. They don't project the food needs of the future and examine whether intra-basin water will be adequate for food production, without the augmentation afforded by IBWT. The World Bank is cited on inadequate productivity to support their argument (it is worth recalling that the Bank has consistently supported viable water resources development, including IBWT). The authors list several ills of present integrated water resources management but do not consider the fact that these are caused by inadequacies in governance and not due to IBWT. In spite of these unexplored aspects, they ascribe various problems to IBWT and remark that IBWT may be still pushed through without open professional assessment. The basis for such a surmise remains unexplained.

5. Systems Approach to Examine Viability

The author of this chapter bemoans the lack of discussion about IBWT in Parliament, stonewalling of requests for information, lack of transparency, deep distrust based on past evidence, and a miserable track record of rehabilitation and resettlement with millions remaining unsettled and forcible displacement in some instances. Some exaggeration can of course be used to dramatize a point of view, but this section seems to go much further without recognizing the significant developments over the past five years: a functioning website, new all-India Rehabilitation, Resettlement and Environment policy, besides the 2006 guidelines, the work of the Parliamentary Committee, etc. The author claims, on the issue of design, that basic data used in the IBWT proposal is not valid and that design assumptions are undefined, but does not share with the reader how he arrived at this conclusion and provides no information. He lists three major flaws: i) IBWT will carry heavy sediment load, clogging canals; ii) new head works will be required where rivers are shifting; and iii) heavy evaporation and seepage losses will take place in long IBWT canals. He does not allow for the fact that such 'flaws' are sought to be neutralized during the Feasibility Report and Detailed Project Report process. He discusses the threat of sabotage, calling for expensive security, and the effects on ecological viability. This too is valid, but these aspects are to be built into the operationalization of every scheme. The chapter raises several key questions: a) insufficient funding for incomplete projects and

how to finance the costs of IBWT; b) drought or flood relief is inadequate in the Himalayan Component, while it is not needed in the Peninsular Component; c) absence of a systems view of the chain of water supply from Himalaya to Vaigai Basin, a flow plan is not available, and the inter-dependence of links is not fully known, not fail proof and not workable; and d) the objections of several states (Andhra Pradesh, Orissa, Kerala, Karnatak, Gujarat and Tamil Nadu) make IBWT unworkable. It is interesting that the author does not look into the proceedings of scores of events held in the country since 2002 to explain the IBWT proposal, which deal with such concerns.[2] The author fears that IBWT has a risk of system failure due to the following: i) basic assumption flaws (which are not identified); ii) multi-dimensional uncertainties and imponderables affecting millions of people, both living and unborn (it isn't clear what the author's argument is); iii) IBWT cannot be insured as the risk is immense and cannot be assessed (but is such infrastructure insured?); iv) since no transparent review of dams is available and the track record is opaque, the author advises India "not to take such large risk" (it would appear that the author does not consider the available facts, and is waging a lone battle to fight the devils of water resources development); and v) the options of rainwater harvesting and watershed development to obtain 'water', the product of the inter-linking of rivers, are not examined (as a matter of fact, they have been considered and ruled out). The author also argues that energy privatization has proved expensive, but then seems to reverse his position and reluctantly admits that India can perhaps find the requisite resources and emphasizes the importance of not undertaking IBWT without exploring the options.[3] The author goes on to state that the Ministry of Water Resources has admitted that IBWT is not feasible, but does not provide a reference for this unfounded statement, and hence predicts that the venture "will end in ruin".[4] At the end of the chapter, the author concludes that the situation can be avoided if a) money is invested in watershed development and rainwater harvesting; b) the ill-conceived and unworkable IBWT proposal is shelved; and c) the democratic process curbs the greed of corporations and individuals.[5]

6. Impacts on Nepal: A Critical Analysis

This chapter argues that the Himalayan Component has serious implications for Nepal. The author lists plans for the use of existing and new storages (nine major dams in all, eight in Nepal: Pancheshwar, Saptakoshi, Chisapani, Budhi Gandak, Bagmati, Kamla etc.) and five links related to Nepal. According to him, the major concern is that Nepal is not informed, even in bilateral negotiations up till October 2004. While the developments of the past four years are not mentioned, the author discusses the Bangladesh-Farakka agreements of 1977 and the new agreement of 1996. The author goes on to assert the need for tripartite co-operation as in a joint study reported in 1989. He laments India's bilateral approach but does not provide arguments in favour of a tripartite one. Bilateral negotiations have their perils, not to speak of the complexity and futility introduced by a tripartite approach. In this matter too, recent developments of the past 10 years are not discussed. To sum up, the author seems concerned about: i) protection of Nepal's existing and proposed uses in Nepal under IBWT; ii) submergence due to new dams in Nepal; iii) shares of irrigation and hydropower benefits to Nepal; iv) lack of measures to remove a historical distrust between India and Nepal, and seeking future co-operation on a continuous basis; v) sharing of costs and benefits; and vi) rehabilitation and resettlement in Nepal.

These aspects are undoubtedly under discussion in bilateral diplomatic negotiations, and they will hopefully be resolved in an appropriate manner.

7. Modelling IBWT Ganges: Simulated Change of Flow

The authors of this chapter report on the application of the Hydrologic Engineering Center's Hydrologic Modelling System (HEC-HMS) model to 17 hydrologically similar sub-basins and 37 reaches (with significant storage characteristics) to study likely changes in water quality due to IBWT. The model is calibrated on old Farakka flow data (1965–8). The sites studied are Allahabad (Ganga/Yamuna), Patna (Gandak, Gomti, Sone, Ghagra) and Farakka. The impact of Farakka on downstream flood moderation is examined. The model then simulates IBWT for the Manas–Sankosh–Tista–Ganga link, along with the Rajasthan link.[6] The results indicate the degree of improvement (+) or degeneration (−): + 4% at Allahabad, − 22% and − 34% at Patna and Farakka respectively. The authors then describe the implications for the Ganga treaty of 1996 and conclude that IBWT may call for its renegotiation. The essay agrees that IBWT could reduce flooding, but may pose problems of water quality and would need to take into account the effects of climate change.

8. Energy and Inter-Linking of Rivers

As hydropower uses a renewable (and carbon-free) energy resource, the authors welcome IBWT. But, they argue, methane emissions from reservoirs, likely change in water quality, habitat destruction etc. could be of concern, and need to be incorporated into decision-making. The authors call for balancing generation with peaking/firm energy needs, and also point out that several governance issues such as deregulation, restructuring and privatization require attention. They cite discussions about cost–benefit analyses by the World Bank and others, and note the growth in Bhutan on the basis of hydropower. Although the infrastructure required for IBWT could be considerable, the authors suggest that it provides an affordable and reliable source to fuel sustainable economic growth.

9. Public Health Implications

The authors of this chapter note with concern the emergence of 'diseases of development'. However, they do not mention the successful eradication of diseases related to water quality in many instances around India. Since Inter-Linking of Rivers is not different from other water resources development schemes, the negative health implications could be averted with suitable measures. The authors stress the need to address root causes instead of focusing on eradication after the fact. They cite EIA's mandatory requirements of 1978, which have been superseded by the new guidelines issued in 2006. They discuss trauma (physical and mental) due to stress (citing anecdotal sources) due to deficient rehabilitation and resettlement. They also cite Arundhati Roy, Ted Scudder (both of whom are well-known opponents of IBWT) and the Morse Report[7] concerns. But they remain silent about the rejection of these findings by the World Bank and the Government of India. On surveying the Indian scene, the authors reluctantly admit some positive effects. They discuss the incidence of malaria in IGNP at Tungbhadra, Srisailam and Ukai in isolated instances but fail to survey the overall positive impacts on health. Similarly, mention is

made of schistosomiasis at Aswan, the Three Gorges Project and Ginvi of Maharashtra in an isolated case from 1952, and the authors seek continual monitoring. No case of cholera is cited. They expect enhanced salinity intrusion in Bangladesh, which could create a climate favourable to disease. On the matter of water quality they cite problems in the Ganga-Yamuna, fluoride in groundwater, incidence of knock-knee (Genu valgum) and fluorosis in Kanpur. They agree that supply of fresh water will reduce risk, but it is striking that they don't cite results from the Sardar Sarovar Project in North Gujarat and Saurashtra where fresh water supply has transformed public health concerns. The authors claim that hydraulic modelling and pollution studies through HEC-HMS can help prediction, based on increase/decrease of flow. Towards the end of the essay, however, they rather mysteriously make some sweeping generalizations without any quantification, and possibly displaying a bias: "ILR will have more negative than positive effects". Reluctantly, however, they admit that these are speculative conclusions till details are released and grant that there could be some potential benefits.

10. Living in the Downstream: Development in Peril

This chapter presents the case of a perilous situation in Bangladesh, which is likely to deteriorate further due to IBWT. It begins with a critique, in rather strong language, about the effects of the oft-cited Farakka case, which resulted in hydrologic imbalance (in terms of spatial distribution, with the East wet and the West dry), ecosystem damage, jeopardized livelihoods and a doomed economy. Salinity intrusion added to the dismal scenario. Now, the authors point out, over and above these consequences, IBWT will make Bangladesh bear the brunt of the impact, slowing down industry and affecting navigation and estuarine flow. Somewhat predictably, the authors point out that Bangladesh has received no intimation and no information, and that guesswork is therefore hazardous (nonetheless, the paper relies on guesswork). The authors state that the Ganga provides a third of the water for Bangladesh; the Gorai canal, which is an offtake, is silted post-Farakka, whose planning and construction was a unilateral decision. Salinity ingress has enlarged, mangroves have been affected and so have poor farmers. The authors argue that hydro-enviro-development security is in danger. While IBWT may reduce floods, its effect on the sedimentation process may change river morphology or forms. In addition, the newsprint processing industry is likely to be affected and the socioeconomic effects include migration, reduction in food production and increasing imports. The essay concludes, pessimistically, that water-related hazards will add to Farakka woes and asks India to analyse the situation and introduce remedial steps. Unfortunately, the chapter contains little quantitative data to support these conclusions. All these issues were the subject of protracted diplomatic negotiations that culminated in an agreement.[8] *Prima facie*, the small abstractions from the Ganga system and inputs from the Brahmaputra system should ameliorate the effects cited by the authors.

11. A Closer Look at Ken-Betwa Pilot Link: Assessment of ILR

The basis for the examination of the Ken-Betwa link in this essay is the Feasibility Report on the NWDA/MoWR websites. It is worth noting that the Detailed Project Report is currently underway, and this study is thus a little too early. The authors have undertaken an analysis of hydrological information, wildlife and social impacts. A digital elevation

model was used to prepare maps, and land cover was classified from Landsat. The effect on soils due to erosion, inundation and water quality degradation has been assessed to identify vulnerability. Regarding effects on wildlife, the authors are uncertain about the Feasibility Report's statement that impact is limited to nine per cent of the Panna National Park and Tiger Reserve area. They advocate an assessment of impact of all links together to enable an appropriate mitigating strategy. They point out deficiencies on social issues in the now outdated Feasibility Report and ask for them to be corrected in the Detailed Project Report through the involvement of the public and beneficiaries in planning, in order to avoid resource conflicts. They also urge selection of the best alternatives and incorporation of remedial actions after an examination of why the 24 existing dams in the area deliver inadequately. On the whole, the essay presents a fairly balanced approach that may be considered in the Detailed Project Report.

12. Climate Change Impacts on ILR

There is a distinct climate divide of drought/flood in India. The overall availability of water is adequate but spatially skewed, and thus requires appropriate water management. Climate change is manifested in surface warming, and increasing extremes of drought and flood. The water balance for river basins may change by the mid-21st century, veering towards an increase in the Indus, Brahmaputra, Ganga, Mahanadi, Brahmani and Godavari Basins, and a decrease in the Krishna, Pennar, Kaveri, Tapi, Narmada, Mahi, Sabarmati Basins. For IBWT, the chapter advocates a study of uncertainties and accounting for the changes. However, it does not discuss the need to downscale global circulation models to suit the monsoon system, nor a basin-level study of impacts. The author argues that sediment load, and a water conservation, reuse and recycle strategy would need special consideration in the context of climate change, but the reasons are not clarified.

13. International, Regional and Legal Aspects of IBWT

The authors provide a detailed background for IBWT, which promotes security against flood, drought, energy and food shortages, and secures domestic industrial needs. They describe the historical evolution of IBWT, but claim (without citing a reference) that drought-prone areas in India have actually increased in the recent past. Since this contradicts the rationale of IBWT, they argue, it has become a cause of concern. The growth of irrigated area in India is a clear rejoinder to this claim. The authors then turn to Bangladesh where new tensions are simmering due to IBWT. They claim that the Farakka Barrage provides an indicator of potential adverse impacts of IBWT for Bangladesh; the proposed diversion from the Brahmaputra system may adversely impact salinity (bringing about an increase), fisheries and prawns; it may cause impoverishment, reduce employment opportunities, affect biodiversity and the Sundari mangroves and cause the shrinking of natural water bodies. They lament the fact that India did not take advantage of the Joint Rivers Commission for discussions with Bangladesh, and that Pre-Feasibility Reports or Feasibility Reports were not released for public scrutiny. They argue that IBWT might marginalize Bangladesh by depriving it of its share, and thus seek a lasting solution to secure for the country a just and equitable share according to the UN Convention on the Law of the Non-Navigational Uses of International Water Courses 1997. They also invoke other issues including sovereignty, riparian rights and principles of

good neighbourliness, in addition to India not implementing her obligation not to cause harm and not following the requirement for prior notice. They cite cases of the USA in relation to Mexico and Canada, Austria–Bavaria, Spain–France, the Indus Water Treaty, the Ganga agreement of 1996 etc. However, they conclude that although IBWT is not entirely unmerited, Bangladesh may be satisfied if river flow is augmented in the interest of ecological balance, livelihoods and sustainable economic development. The authors stress IBWT's legal illegitimacy, arguing that India has taken a secretive and unilateral stand instead of following an approach of constructive bilateralism in the spirit of the South Asian Association for Regional Cooperation, for the benefit of both countries. However, they ignore the fact that the inadequacies of the proposals are being addressed in further work on IBWT.

14. Indigenous Knowledge and Water Management

This essay is not directly related to the subject of the anthology. It describes the use of traditional knowledge in the work of a non-governmental organization. Watershed development and rainwater harvesting have limited and local scope in water resources development, as mentioned earlier in this review, and do not constitute options for macro works such as IBWT, a view with which the author seems to agree.

15. Cooperation in the Ganga-Brahmaputra-Meghana River Basin with an ILR Focus

The theme of this chapter, which is focussed on Bangladesh, is that South Asian countries are destined to share the Ganga-Brahmaputra-Meghana (GBM) River Basin in order to meet Millennium Development Goals. In Bangladesh, no water storages are possible, and 92% of its water flows in and goes out to the Bay of Bengal and causes flooding in 20–30% of its area on a yearly basis. Despite this, shortage affects a third of both area and population in the dry season. The essay suggests that population pressure and climate change may add to the problem. Some proponents have argued that storages upstream of Bangladesh will augment flow within the country, not reduce it. However, the authors feel that the Farakka experience indicates otherwise. They don't seem to consider the fact that storages and adjunct hydropower generation augment downstream non-monsoon flow. The authors say that India favours bilateralism which they admit has some merit, but, they argue, some issues (that are not specified) need regional (or multi-lateral) cooperation and advocate the initiation of dialogue among or at the level of heads of nations. The essay describes both components of the IBWT programme and recommends linking the two, but does not mention other independent links and those in the western sector. The two countries must agree on the principles of equity, fairness and no harm. If India had informed Bangladesh, the authors assert, about the Pre-Feasibility Report and Feasibility Report process for links in the Himalayan Component, distrust would have been avoided. They suggest that in the future India should communicate with Bangladesh about IBWT activities, and projects such as Tipaimukh, SaptKoshi, Mahakali and Karnali could be discussed. The essay concludes that mutual benefit, progress and peace can be brought about through cooperation, a change in the mindset and with the backing of strong political will.

16. Hydrologic Impact on Bangladesh due to Water Resources Development Plans of India and China

This essay lists two existing dams (China and Bhutan) in the area, and argues that more will be built. The consequences for Bangladesh will be augmentation or reduction of dry flow and reduction of wet flow. With this background, the essay presents a fresh, realistic and welcome approach. At Nuxia in China, downstream of the confluence of a major left bank tributary, the Brahmaputra starts a descent from the Tibetan plateau around the 7756 m high peak Namche Barwa with a clockwise bend and a fall of 2400 m, through a gorge height of 6 km and 110 km in length as the Dihang River into India. Water flow is measured on this river first at three points in Tibet, the last point being just before the descent, next at 29 miles on the Dihang River at Pandu (India) and then at Bahadurabad (Bangladesh). In Bangladesh, the infrastructure consists of flood embankments that need annual upkeep to control westward migration. In the dry season, salinity ingress calls for fresh water releases. China might regulate the river at Nuxia for hydropower across the great bend or divert flow to the Yellow River (800 km away). Hydropower generation can be also located en route. To add to the complexity, without consulting the lower riparian country of Bangladesh, India has announced its IBWT project, to which Bangladesh objects. The essay does not make clear whether Bangladesh has also objected to China's unilateral actions. India plans regulation at Jogighopa on the Brahmaputra River to lead waters to Farakka and onwards to the Mahanadi River in the Peninsular Component. An alternative to the Manas–Sankosh–Tista–Ganga link is currently under study, and Tipaimukh, Dihang and Subansiri are under active consideration. Bhutan is already generating hydropower and some more stations are planned. Bangladesh's proposed Bahadurabad Barrage (WARPO, 2001) is intended for hydropower and irrigation, in addition to achieving flood control through reservoirs upstream. The authors contend that Bangladesh needs to study the possible impacts of such developments and evolve its own response, and that this essay is a step in that direction. They also argue that China's proposed IBWT, though difficult, may be attempted in order to meet energy needs. The essay quantifies impacts on flow in Bangladesh due to both India's IBWT and China's plans under six scenarios. The authors conclude that development need not be inhibited by issues such as boundary disputes and displacement, and that Bangladesh should pragmatically recognize 'realpolitik', assuming that China and/or India may go ahead with their plans. In order to avoid reduction of dry-weather flow, Bangladesh could also consider proposal presented in the next essay (17) to serve the needs of both. Bangladesh may then gain through cooperation.

17. Could Bangladesh Benefit from IBWT?

Bangladesh's Water Resources Planning Organisation, Ministry of Water Resources (WARPO) has a plan similar to India's IBWT, and Bangladesh could propose a joint planning exercise to integrate the two. This chapter dwells on the legitimate shares as per international law (UN Convention 1997), presently not in force. In its absence, the only source of law is a corpus of signed treaties numbering about 2000 (FAO 1978), international custom and interpretations. With regard to GBM, the essay refers to five existing agreements (one dealing with trade, one on economic cooperation, another on the Mahakali River between India and Nepal, one concerning the Ganga River between

Bangladesh and India, and one on the India-Bhutan Tala hydropower project). The Ganga agreement is for an equal (and not equitable) share that, the author feels, favours Bangladesh. Access to water shares is proposed through barrages in Bangladesh, while the National Water Development Authority has proposed a link through India's narrow gooseneck-shaped territory as Bangladesh does not agree on a link across its territory. The author is of the opinion that soils along the gooseneck link may liquefy. Yet he argues that a win-win solution lies in the adoption of the Farakka–Paksi–Mawa Complex as an alternative, involving lift and ensuring desired dry season shares for both sides. Details on benefits, costs and cost sharing are indicated by the author on the basis of a preliminary study. The author favours large reservoirs in the upstream section, with due care for impacts, but proposes a joint study in order to determine the most cost-effective solution or option. Like the previous essay, this chapter provides a fresh perspective and deserves consideration.

Summary

This review essay originally aimed at a conventional review of the contents of this volume on a crucial subject of water resources development related to the well-being of India's teeming millions, intended firstly to remove the existing mismatch between needs and availability of water for different uses and secondly to address the sustainability of water resources development needed for its ultimate population size. However, it became apparent that such a review would be inadequate as the editors and contributors of the anthology had relied on somewhat outdated information (in some cases about five years old). Understandably, the editors' focus was on Ganga–Brahmaputra waters in the Himalayan Component of the IBWT project for Bangladesh, ignoring the stand-alone Peninsular Component though the proposal was to later augment it from the Himalayan Component. Although a balance in perspectives (and authorship) was intended, it had not fully materialized, and especially lacking was a defence of the heavily criticized water resources development sector.

Secondly, the editors/contributors do not make explicit the information and background material on which they draw, in terms of i) the subject as a whole, i.e. the small quantum of water transfer as a proportion of overall water resources; ii) the existing elaborate procedures for undertaking water resources development schemes, including IBWT; iii) the ongoing critical review; iv) the procedures followed by the National Water Development Authority—for instance, participation of states and water balance computations at diversion points; and v) the recently initiated Detailed Project Report and subsequent project clearance processes. To a large extent, the cause of these informational inadequacies is the times through which we are passing—the media attention, biases and anti-establishment ethos, and the often successful activism which is characteristic of our times.

Drawing on information that the editors/contributors possibly did not have, the reviewer has tried to remove these misunderstandings, misconceptions and then proceed with a review of each of the 17 essays. The review lists and deals with the objections and the options to IBWT raised in the book, showing that they lack quantification or cost/benefit analysis. It is important to bear in mind that most studies for options and alternatives are conducted during the Detailed Project Report stage, which has just begun. The editors selected only two or three papers in favour of IBWT. It is surprising that they did not include the perspectives of experts in the field who could have shed light on certain objections. In contrast, at least two

papers seem extraneous to the debate and the logic of their inclusion is not made clear. This review also found some editorial weaknesses which could have been avoided: sweeping statements without suitable referencing and inappropriate negative remarks.

An IBWT website was set up in response to persistent demand by activists and yet, if this anthology is anything to go by, it is hardly used to obtain information or to provide comments on the Feasibility Reports posted there. It also seems that many of those interested in these issues have not aired their views in the Parliamentary Committee or the Experts Committee that succeeded the Task Force. Lastly, although the volume editors hope that the anthology will promote a dialogue, apparently no effort was made towards such communication before proceeding with this publication. Had they initiated a dialogue amongst the contributors and/or with the National Water Development Authority, perhaps their purpose would have been served. It is therefore difficult to avoid an impression of the book as a missed chance, a wasted opportunity to have set in motion a thorough discourse on improving the IBWT programme, rather than critiques bordering on condemnation. The review commends the positive analytical approach displayed in some honourable exceptions (8, 11, 16 and 17) and hopes that the contributors, if not the editors, will raise them for consideration by the National Water Development Authority which is engaged in Detailed Project Report preparation for some prioritized links.

C. D. Thatte[9]

Notes

1. The National Water Development Agency offers a web-facilitated dialogue on IBWT (http://nwda.gov.in). It is not clear whether the authors and/or editors availed of this service to seek clarifications. This could have clarified several issues and concerns voiced by them.
2. Perhaps more objectionable, and surprising since the author is an engineer, are remarks such as 'engineers are not above manipulation' (p. 84) and 'they [engineers] can be made to agree to almost everything (for personal benefits)' (p. 86). It is a pity that such comments were not edited, for they suggest a bias harboured by the contributors and raise doubts about the circumspection of the editors.
3. The author's concept and definition of 'surplus' in this discussion is rather vague.
4. The author also claims that climate change can interfere with water resources development plans but provides no information, which suggests that this view is not based on an evaluation but on perception.
5. Perhaps here lies the real agenda.
6. The essay states that one of the authors collected diagrams from the National Water Development Agency in 2004 about yearly inputs/outputs in the Himalayan Component. Surprisingly, other authors in this volume complain that these data are not available.
7. Bradford Morse was Chairman of an Independent Review Committee for Sardar Sarovar Project of India (Morse Commission, 1992).
8. The governments of India and Bangladesh entered into a Ganga (Ganges) Water (at Farakka) Sharing Treaty in December 1996 after protracted negotiations.
9. Formerly, Secretary to India's Ministry of Water Resources, Secretary General ICID and Member Secretary India's Task Force on ILR (IBWT).

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