

*Nandita Bhatnagar*

## DEVELOPMENT OF WATER RESOURCES IN SOUTH ASIA

Land and water are the two natural pillars of economic progress, integrals in the development equation. Efficient management of these two resources can completely transform the economic landscape of a country.

The South Asian countries are endowed with limited land and ample water resources. The region accounts for 20 per cent of the world's population and only 3.31 percent of the land area. It has a population density of 182 persons per sq km as compared to the world average of 30 persons per sq km. The limited arable land available and mounting population pressures rule out significant extension of the cultivable area. This paucity of land is, however, compensated to a great extent by the rich water resources of the region. The water resources of India, Pakistan, Bangladesh and Nepal, on adding up the national average annual river water flows, amount to 2,822 m.a.f. Of this the Himalayan river system i.e. the Ganga-Brahmaputra-Barak/Meghna river system, accounts for a combined annual discharge of approximately 1,082 m.a.f. of water.

As such, while South Asia may not be spectacularly rich in resources, it is not poor either. In the area of water resources especially, it has tremendous potential.

However, the level of economic development of the South Asian countries is still low. Bangladesh, Nepal and parts of India have been placed by the United Nations in the category of the 'least developed' areas.



They each have different approaches to development ; their economies have different degrees of openness. But each of them has only a slim margin between subsistence and disaster. They exist in a fragile ecosystem which is threatened by the growing pressure of population. Without irrigation and water-management they are afflicted by droughts, floods, soil erosion and creeping deserts, all of which cut into the levels of food production. The sun and water which might be valuable and abundant sources of cheap energy, remain, for the most part, underutilized, while they are forced to use relatively expensive conventional forms of energy.

Energy and cereal imports constitute a large proportion of the total import bill of India, Bangladesh and Nepal—all of which have to carry large burdens of soaring deficits in balance of payments. Proper control and management of the region's rich water resources can, to a great extent, ease this back-breaking burden. Unpredictable rainfall makes agricultural planning difficult but once water is available all the year round, the farmers will be protected from the vagaries of the climate and will be encouraged to adopt improved farming techniques. Irrigation, along with proper drainage, will give greater yields, a more flexible choice of crops and more intensive farming. At the same time, it will contribute to hydropower generation. A greater degree of self-sufficiency in food and fuel would thus be ensured.

## I WATER RESOURCES DEVELOPMENT IN SOUTH ASIA

The tremendous economic opportunities offered by water development have not been recognized until recently. The South Asian countries have made some efforts to develop waters within their national boundaries but these have met with limited success. In India, of the 24.3 million hectares of the flood affected catchment area of the Himalayan rivers, only 7.7 million hectares have been given flood protection. In Bangladesh, progress is more dismal with flood protection measures extending to only 0.56 million hectares out of the total flood prone area of 7.9 million hectares. The embankments and



reservoirs constructed are handicapped by high siltation and rising river beds. The Renganga Project in Uttar Pradesh (India), commissioned in 1976, had a designed reservoir life of 185 years. But on account of a far higher silt load than assumed, the useful life of the dam has been reduced to a mere 48 years. Some 20 per cent of the Kosi canals are also silted up. In the field of irrigation, although India has made significant progress, the Indian irrigation projects have been handicapped by low irrigation intensity and limited water supply. Nepal's efforts to tap its hydropower potential have also been modest. Only 0.06 per cent of it has been exploited so far. Among its existing hydel schemes is the Indian aided Trisuli project and the Chinese aided Sun Kosi project. In the case of Bangladesh, only the Kaptai project has been undertaken to harness the hydro-electric resources of the Karnaphulli in the Chittagong Hill Tracts.

## II INTEGRATED DEVELOPMENT : A STRATEGY FOR THE OPTIMUM EXPLOITATION OF AN INTERNATIONAL RIVER SYSTEM

Individual efforts within the precincts of national boundaries, have not the desired spectacular results. In every field of water management, at every level, unilateral efforts have been obstructed by the hydrological interdependence that exists among the various riparian countries. In the case of the Himalayan river system, these are Nepal, India and Bangladesh. It needs to be recognized that optimum exploitation of the water resources of some rivers like the Himalayan rivers, cannot be done on single-country basis. These rivers do not obey political boundaries and freely flow across countries. As such they bind the riparian states in natural bonds of hydrological interrelatedness. Utilization of water by one riparian state can directly affect the quantity and quality of water available to another riparian country. Also, as the altitude zones and relief of the river system cut across national boundaries, any development effort entailing the construction of multipurpose dams requires the cooperation of the upstream, middlestream and downstream riparian countries. Hence, a single nation



approach to the development of cross country river systems will inevitably meet with interstate problems. Joint regional planning is then the only viable strategy for the optimum development of such river systems.

An integrated development strategy is, however, not easy to plan or implement. This is not surprising. Even within India, development of the water resources of rivers flowing through a number of states, such as the Narbada and the Godavari, has proved to be complicated and difficult, requiring the coordination and cooperation of various state governments and agencies whose interests have not always coincided. The problems are greatly magnified in the case of international rivers for here sovereign governments are involved, each pursuing its national interest as perceived by its own national elite.

Indeed, multilateral efforts to develop a river system are a major issue of foreign policy, producing an offspring term "fresh water diplomacy". Fresh-water diplomacy can work smoothly if political

---

*A single nation approach to the development of cross country river systems will inevitably meet with interstate problems. Joint regional planning is then the only viable strategy for the optimum development of such river system.*

---

relations among the states concerned are friendly and if a shared desire and will to exploit the water resources for shared benefits can draw the capital inputs required. On the other hand, water diplomacy runs into trough if the states concerned are vastly different in size and stature and their relationships are less than friendly. In the latter event, mutual fears and suspicions strain the reach of water diplomacy. Each state wants to protect certain security sensitive areas from the presence of one or more of the other states. The smaller and weaker states entertain fears that the larger and stronger state would run away with an unequal agreement. These fears spur the smaller states to join



together against the larger state, while the larger state tries to take all possible measures to prevent the smaller ones from "ganging up". Water diplomacy succeeds if the states concerned entertain positive images of their partners' attachment to a policy of justice and equality in respect of neighbours. In short, a certain degree of shared confidence amongst the states concerned is essential for regional cooperation for the development of river resources. All the more because river management arrangements, once implemented, are more or less irreversible.

### III INTEGRATED DEVELOPMENT OF THE HIMALAYAN RIVER SYSTEM : OBSTACLES IN IMPLEMENTATION

Devising a plan for water resource development in the North-eastern sector of South Asia becomes an extremely complex exercise as the region contains five different nations (China, Nepal, Bhutan, India and Bangladesh) ; ten Indian states (Assam, Arunachal, Bihar, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and West Bengal); and diverse topographical patterns ranging from the highest mountains to swampy marshlands and saline coasts.

#### a) The Political Equation

The asymmetry in power relations between India, Nepal and Bangladesh as well as the poor bilateral relationships have impinged on regional cooperation efforts. In South Asia, the regional balance is twisted by the geographical predominance of India, in terms of size and resources as well as military and industrial capacities. The imbalances, reinforced by colonial legacies, have assumed the mantle of distrust and suspicion between India and its smaller neighbours.

While it is not unnatural for large and powerful countries to raise images of fear and insecurity among their small neighbours, it is equally a fact that the fears of bigness or smallness are psychological. The India-Nepal-Bangladesh triangle is evidence of this.

Nepal is paranoid that India might encourage a people's movement in Nepal with a view to destabilizing the monarchy. It fears that



the dominant Indian business interests might reduce Nepal to a periphery servicing India's core economy. The large Indian population settled in Nepal makes it ever vigilant of any Indian action ranging from direct takeover to covert intervention.

Bangladesh's fears of domination by India are rooted partly in the psychology of the nascent state as a whole and partly in its historical reminiscences of being exploited by the Hindu *zamindars* and the Marwari business class of West Bengal. The cultural dominance of India has also ruffled feathers—the apprehension of being swamped by India resulting in the obsessive assertions of independent identity.

Indeed the experience of the past years of relative distrust and fear of India's greater power to intervene in the internal matters of adjoining states, has left a lingering hesitation in the minds of the smaller states. As long as these countries remain prisoners of the past, cooperation with India in matters like joint water development will remain a tardy process.

#### b) Strategic Considerations

The integrated development of the Himalayan river system is obstructed also by the fact that the low strategic importance of the eastern flank does not generate sufficient political will to reduce tensions in the region. In spite of the problems with China in the not so distant past, Nepal and Bangladesh are strategically of less than top priority to India. So also, the North Eastern Indian provinces, with their modest political clout in New Delhi, are not considered to be of crucial political significance. Their share in the central power structure is too small. If the same scenario had been located on the western flank of the sub-continent, it would most certainly have received greater attention.

#### (i) *Indus Water Dispute : Speedy Settlement in the North-Western Sector :*

River water problems have been inherent in the political geography of the South Asian region. In a sense, South Asia was born with them



for the partition of the sub-continent created problems for Pakistan leaving it dependent for all water supplies on flows from the Indus river system which originates in India. This gave India, if it so chose to use it, the physical capacity to cut off vital irrigation supplies to large agricultural tracts in West Pakistan. However, with the Kashmir problem a livewire in the north-western sector, both countries recognized that the escalation of the Indus dispute could result in war. Hence strategic calculations compelled India and Pakistan to resolve the issue by signing the Indus Accord on 19 September 1960, under the IBRD's good offices. The essence of the Treaty lay in its functional approach. Political claims and controversies were bypassed. The Indus solution comprised of :

- the separation of rivers (the western rivers viz. the Chenab, the Jhelum and the Indus being assigned for the exclusive use of Pakistan and the eastern rivers i.e. the Ravi, the Beas and the Sutlej for India's exclusive use),
- the construction of new engineering projects in the then West Pakistan. In particular the construction of a system of replacement canals to convey water from the western rivers into those areas in Pakistan which had hitherto depended for their irrigation supplies on water from the eastern rivers,
- a fixed payment of £ 62,060,000 by India as contribution towards the cost of replacement works,
- the funding of a large part of the new projects by grants from friendly countries and the World Bank.

Thus, the Indus dispute was resolved by the separation of rivers rather than by a joint development of the river system. This was so primarily because Pakistan was opposed to any such scheme. Its whole experience from the Mountbatten-Menon negotiations to Kashmir and the canal closures by India had indicated that it could not trust control of its life supply of irrigation water to India. For its part, India felt it could go ahead, at considerably less ultimate cost to itself, with the Bhakra-Beas-Rajasthan project.



The Indus Accord was concrete evidence that political tensions in themselves are not insurmountable. India contributed gracefully to the Agreement in order to reduce tensions in a sector which it perceived to be of strategic importance to itself. Also, the final settlement was a purely economic and technical one. It was concluded even while political issues remained unresolved.

(ii) *Water-Sharing at Farakka : Procrastinated Diplomacy in the Eastern Flank :*

In direct contrast to the successful water diplomacy in the western flank of the subcontinent is the Farakka problem in the east.

Water sharing at Farakka has been a longstanding irritant in the relations between India and East Pakistan since 1971, Bangladesh. The genesis of the problem lies in the wide seasonal fluctuations of the river flow. While for most of the year, the average discharge of about 100,000 cusecs is more than adequate, the lean months (especially between mid-April to mid-May) pose difficulty in meeting the water requirements of both India and Bangladesh.

For India, it is the port of Calcutta which is threatened. Calcutta serves a vast hinterland (UP, Bihar, Orissa, Bengal, Madhya Pradesh, Assam, Sikkim as well as landlocked Nepal and Bhutan). However, high silting, high salinity, frequent and intense tidal bores, poor navigability because of reduced water flows and sandbars, make it imperative to introduce into the Hooghly additional water supplies of 40,000 cusecs during the lean season to flush out silt deposits and keep the port in operation. The Farakka project was conceived as the means of diverting 40,000 cusecs of water from the Ganges into the Bhagirathy.

The construction of the barrage at Farakka, however, has direct repercussions on the lower riparian country. It leaves for Bangladesh only 15,000 cusecs of the Ganga flow as also the additional 8,000-11,000 cusecs of ground water regenerated between Farakka and the Hardinge Bridge (Bangladesh). This is not to Bangladesh's satisfaction. Its



Ganga water demands in the lean season have escalated from the meagre 3,503 cusecs estimated by Pakistan in 1951 to 55,000 cusecs. The absence of this waterflow, Bangladesh maintains, would jeopardize its own water development projects (i.e. Ganga-Kobadak, Pabna project, Dhaka North-West project, Faridpur-Barisal project). Further, it points out, reduced waterflows would adversely affect its principal transport network as well as estuarine fisheries. The ill-effects of saline intrusion and the lowered groundwater level in the basin would also cut down agricultural production.

Prior to 1971, Indian and Pakistani experts had met ten times, including five meetings at the Secretary-level, to decide on a water sharing settlement. Yet, apart from safeguarding the 'reasonable water requirements of East Pakistan', no agreement could be arrived at.

With the creation of Bangladesh in 1971, and the coming into power of a weak and friendly Awami League Government, negotiations were resumed. A Joint Declaration (March 1972) set up a Joint River Commission "to ensure the most effective joint efforts in maximizing the benefits from (their) common river systems to both countries" (Art 4 of the Indo-Bangladesh statute). With the Commission's persistent diplomatic efforts an Indo-Bangladesh agreement on sharing of waters was signed in April 1975, a few months before the assassination of Sheikh Mujibur Rahman. This, however, was a stopgap solution for the Farakka Barrage had in the meantime been constructed and India had to be saved of the embarrassment of having to commission it without Bangladesh's consent.

The agreement secured for India 11,000-16,000 cusecs of water from 21 April to 31 May 1975. Bangladesh received the remaining flows of 44,000—49,500 cusecs. In response to India's significant concessions, Bangladesh too reduced its demands from 55,000 cusecs to 44,000—49,500 cusecs of Ganga water during the lean period.

The year following the expiry of the agreement on 30 May 1976 was marked by hard bargaining on both sides. During this time, India unilaterally withdrew 40,000 cusecs of water at Farakka. The



assassination of Sheikh Mujibar Rahman and the killing of his family in August, 1975 apparently earned Mrs. Indira Gandhi's displeasure and India's attitude towards the new government at Dhaka hardened. The unsuccessful efforts of Bangladesh to get India back to the negotiating table altered its posture too. With a view to pressurizing India, efforts were made to internationalize the issue at the Islamic Foreign Ministers' Conference (May 1976), the Non-Aligned Summit at Colombo (August 1976), and the UN General Assembly (November 1976). There was a termination of what were, rightly or wrongly, perceived to be the pro-Indian policies of Mujibur Rahman and a sterner attitude was adopted by the Bangladeshis.

Mrs. Gandhi's defeat in the parliamentary elections of March 1977 and the formation of the Janata Government in New Delhi paved the way for the 1977 Accord.

This agreement of five-year duration provided for a distribution of the Ganga waters during the lean season : 20,800 cusecs were allocated to India and 34,700 cusecs to Bangladesh. The proportions amounted to 37.5 per cent and 62.5 per cent respectively of the minimum flow of 55,000 cusecs in the leanest ten days. Thereafter, India's share increased at a higher rate to claim 40,000 cusecs as soon as possible.

The 1977 agreement was shrouded in controversy. Condemnations were heaped upon it for having compromised India's national interest to Bangladesh's advantage. Equally vehemently, it was applauded as a pragmatic gesture of trust, a temporary giving in to facilitate long term settlements. It was justified in terms of the policy of "trust begets trust". Whichever be the case, the 1977 agreement did secure for India more water than the previous arrangement. However, this too expired on 4 November, 1982. The Memorandum of Understanding signed during General Ershad's visit to India in the fall of 1982, remained in operation for one and a half years. Terminating in May 1984, it has left a legal vacuum in the water sharing arrangements between India and Bangladesh.



As such, the attitudes of the parties involved in the Farakka dispute has differed greatly from those involved in the Indus controversy. Even though the Indian involvement is common to both, its response in the two cases has been determined by its strategic interest

---

*India has deliberately soft-pedaled the negotiations. Bangladesh too has not made sincere efforts to resolve the problem, preferring to keep the dispute alive, to maintain and intensify anti-Indian sentiments.*

---

as perceived by its ruling elite. In the eastern sector, India has deliberately soft-pedaled the negotiations. Bangladesh too has not made sincere efforts to resolve the problem, preferring to keep the dispute alive, to maintain and intensify anti-Indian sentiments.

As it is, the Farakka negotiations have been confined to tackling the problem of water sharing during the limited time span of the lean period. Plans for joint river development remain in the embryonic stage.

### **(c) International Examples in Joint River Management**

Part of the difficulty in adopting an integrated development approach for the exploitation of the river resources of the Himalayas lies in the fact that there are hardly any successful international examples to inspire and stimulate the South Asian countries. Even though project plans have been made in almost all continents, there is little concrete example to go by.

The Columbia river and the rivers of the US-Mexico border have to some extent been developed jointly by their respective riparian states. In the case of the Columbia River Basin, Canada undertook the construction of a system of reservoirs in the Columbia basin, providing a storage of 15.5 m.a.f. This storage effectively regulates the flow of waters to the lower riparian state, the USA, enabling it to derive certain advantages like hydropower generation and flood



protection. USA, for its part recognized that 'Canada is entitled to one half of the downstream power benefits', these benefits, determined in accordance with treaty provisions, are paid for by the US to Canada in kind. Further, for the flood control provided by Canadian storages, the USA pays Canada specified sums of cash. However, as the arrangement for the development of the Columbia river involves two developed countries which are self-sufficient in capital, technology and funds, it cannot be duplicated in the South Asian context.

The US-Mexico Treaty regarding the international basin of the Rio-Grande, Colorado and Tijuana rivers is the second variant involving as it does cooperation between a developed and a developing country. Years of negotiations and intermediary arrangements went into creating this scheme. According to it, on the Rio Grande, each country is assigned the use of water of enumerated streams. In the case of the Colorado, Mexico has been guaranteed 1.5 m.a.f. of water. On the lower Rio Grande, joint construction of dams for conservation, storage and regulation of annual flows has been proposed. On the Colorado, Mexico is to build at its own expense the necessary conversion dam and the US is to build, also at its own expense, the necessary storage dam. Also, Mexico is required to pay the USA a proportion of the costs for the construction of other dams, according to the ratio of their use by each country. The treaty also established an International Boundary and Water Commission to implement its provisions and undertake studies for flood control and hydro-electric power works. The implementation of this Treaty has, however, been subject to the limitations that are inherent in any relationship between a superpower and a weaker country. Also, the strained political relationship between the USA and Mexico has impinged on the working of the arrangement from time to time.

In the Third World, there are projects for the joint development of the Uruguay river by Uruguay, Brazil and Argentina, the Niger river by the nine basin countries viz. Guinea, Mali, Ivory Coast, Upper Volta, Dahomey, Niger, Nigeria, Chad and Cameroon ; the Senegal river by Mauritania, Guinea, Senegal and Mali ; the Lake



Chad by Niger, Nigeria and Chad and the Nile by Egypt and Sudan. However, all these projects are still in the initial stages of negotiation and planning. Lack of consensus and of funds has prevented them from taking off in any substantial way.

#### *The Mekong Development Plan :*

The development of the river Mekong is the first experiment in the multilateral development of a river system with the help of an international organization.

The Mekong flowing through South East Asia is one of the world's largest rivers with an average waterflow of more than 475,000 million  $m^3$  per year. The lower Mekong Basin covers about 606,000  $km^2$  and comprises almost the whole of Laos, Kampuchea, one-third of Thailand and one-fifth of Vietnam. The hydrology of the Basin is characterized by large seasonal fluctuations in the river flows caused by the alternating dry and wet monsoon climate of the region. As a result, while at the flood peak, there is extensive flooding in the low ends of Kampuchea and Vietnam in the lean period, the possibility of cultivation is ruled out by scarcity of water.

The 'Preliminary Report on Technical Problems Relating to Flood Control and Water Resources Development in the Mekong—An International River' (1952), prepared by the Economic Commission for Asia and the Far East (ECAFE), now called the Economic and Social Commission for Asia and the Pacific (ESCAP) and its Bureau of Flood Control and Water Resources Development, provides the blue print for the efficient water-management of the Mekong. A 'Committee for Coordination of Investigations of the Lower Mekong Basin' (the Mekong committee, for short), established in 1957, under the auspices of the United Nations, provides the legal and institutional framework for implementing the Mekong development plan.

The Mekong committee consists of one member from each of the four riparian countries "with plenipotentiary authority to promote, coordinate, supervise, and control the planning and investigation of



water resources development projects in the lower Mekong Basin". Recognizing the economic and welfare interdependence of the riparian nations, the Statute of the Committee provides for unanimity in decision-making.

The Indicative Basin Plan based on the data collected and the preinvestment investigations is a sectoral plan for the orderly development of the water resources of the Basin to provide the infrastructure and services (such as flood control, irrigation and drainage for increased agricultural production and electrical power for industrial and other uses) as well as some improvement in water supply and navigation, which are essential for the overall economic and social advancement of the countries of the lower Mekong Basin. The plan has been divided into : 1) a short-range plan for the decade 1971 to 1980, comprising independent projects which can satisfy the needs in rather localized areas ; 2) a long-range plan, extending to the year 2000, comprising "several possible sequences of mainstream projects" which would be interdependent and aimed at meeting national and regional needs; and 3) a plan covering complementary programmes of research, training and the development of minor infrastructural facilities, all of which are essential if the objectives of water resource projects are to be fully achieved.

The Mekong Development Plan is premised on marshalling assistance, financial and technical, from outside the region as the countries of the lower Mekong Basin are too poor to undertake the large scale project investments required. Recognizing that the financing of the Mekong project is beyond the internal capacity of the Basin nations, the major United Nations agencies and some 26 countries have offered comprehensive development aid. The USA, Japan, Australia, Canada and France have been the major donors. The UNDP, the ADB and the IBRD have also contributed generously to the Mekong Committee-sponsored projects. Whereas the other joint river development programmes have been localized efforts on the part of the riparian states, the Mekong is the first case where the mobilization of foreign aid has been sought.



However, the operational experience of the Mekong Development Plan shows that it has not been smooth-sailing. The successes of the early years did bring recognition in the form of the Ramon Magsabay Award for international understanding given collectively to the Mekong Committee in 1966. Foreign aid also flowed in liberally. Yet, today the Mekong project lies in deep freeze. One reason for this is the fact the Mekong experiment was initially conceived as an integral part of the US policy in Indo-China. Following its defeat in the Vietnam war, USA has withdrawn from the region militarily. Its economic commitments in these countries have also been cut down. As such, whereas the US had been in the front rank of donor countries, its pledged contribution being upto 13 per cent of the total assistance, since 1976 all US support to the Mekong project has ceased. Moreover, as USA masterminds the international financial institutions, aid from these organizations has been reduced to a trickle. Political instability in South East Asia have also impinged on the efficient working of the Mekong committee. The relations among the countries of the area have deteriorated greatly since the Vietnam war. Apart from the ideological divide between the communist regimes,—Cambodia, Vietnam and Laos on the one hand and Thailand on the other, the armed conflict between Vietnam and Cambodia also makes unified efforts at river basin development elusive.

The Mekong Development Plan, then, is important to the extent that it points to the need for direct institutionalized cooperation among the riparian countries, for optimal river water utilization. It has also

---

*Bilateralism has not proved entirely successful between the strong and the weak. It generates psychological hangovers that complicate the already strained relationships.*

---

shown that the constructive involvement of international expertise, finance and good offices need not be ruled out. They can be mobilized as and when necessary. However, beyond that, it becomes essential for every region which wants to jointly develop its river systems to



formulate its own design which takes into account the special characteristics and requirements of the countries of that region. The problems of seismic geological conditions in the 'Greater Ganga' basin and the high silt content of the Himalayan rivers precludes the possibility of duplicating the Mekong Model in the Ganga-Brahmaputra—Barak/Meghna river system of the Himalayas.

Joint river resource development efforts in South Asia have been confined essentially to bilateral efforts. There are several cases of bilateral cooperation between India and Nepal. Projects at Durghat, on the Karnali, the Pancheshwar-Poornagiri and the Rapti are all either in the process of negotiation or construction. However, bilateralism has not proved entirely successful between the strong and the weak. It generates psychological hangovers that complicate the already strained relationships. The aura of multilateralism is still to be inaugurated in South Asia. In its absence, benefits arising from the development of the 'Greater Ganga' river system remain for the most part unexploited.

#### IV THE GANGA-BRAHMAPUTRA-BARAK/MEGHNA RIVER SYSTEM : A HYDROLOGICAL ASSESSMENT

The Ganga-Brahmaputra Barak/Meghna river system in South Asia with a combined discharge of over 1,000 m.a.f. of water is one of the world's greatest natural assets. Of this average annual run off, the Brahmaputra accounts for nearly 50 per cent, the Ganga for some 40 per cent and the Bramaputra-Barak for about 10 per cent. Only the rivers Amazon and the Platt in South America and the Congo in Africa have larger discharge. The average run off of the Indus river is only 167 m.a.f. and that of the Mekong, 400 m.a.f.

Covering a distance of 2,900 kms (1,600 kms in Tibet, 880 kms in India and 420 kms in Bangladesh the Brahmaputra runs virtually untapped and accounts for almost one-third of the Indian rivers. Its annual run off at Bahadurabad is 560 m.a.f., its maximum flood discharge 2.5 million cusecs and the annual silt runoff 735 million tonnes.



The Ganga with its international tributaries flowing from Tibet and Nepal (e.g. the Kali, the Kauriala, the Rapti, the Karnali, the Kosi, the Gandak, the Baghmata, the Tirsuli etc.) constitutes one of the most important international river systems and the cradle of one of the oldest living civilizations. The annual run off of the Ganga at Harding Bridge is 432 m.a.f., its maximum flood discharge 2.16 million cusecs and the annual silt runoff 472 million tonnes.

The Ganga and the Brahmaputra rivers unite at Gualanda in Bangladesh under the name of Padma and are subsequently joined by the Meghna, itself an outfall of the Barak river. The Meghna has, at Bhairab Bazar, an annual runoff of 90 m.a.f. and a maximum flood discharge of 464,400 cusecs. In view of the several interlinking channels, these rivers, i.e. the Ganga, the Brahmaputra, the Barak and the Meghna, are taken to be a single river system.

The river flows are recharged by precipitation : partly by the melted snow of the higher Himalayas but for the most part by the monsoon rain. However, while the monsoon is abundant, it is erratic and subject to extreme temporal variations. Nearly 80 per cent of the rainfall occurs mainly during the south-west monsoon season, from July to October. If the Himalayan river system is the gift of the monsoon, poor management of the monsoon waters is responsible for the problems of the region—during the rainy season floods caused by poor drainage and during the dry season lack of water for irrigation and double cropping. The solution lies in efficient conservation and regulation of water supplies during the monsoons.

#### V JOINT DEVELOPMENT OF THE 'GREATER GANGA' : DEVELOPMENT POTENTIAL :

Harnessed, the 'Greater Ganga' river system offers unprecedented opportunity for transforming the lives of the 370 million residents of a vast regional basin which constitutes probably the largest single block of destitution in the world.



Floods, an annual visitation in the plains of India and Bangladesh, cause agonizing devastation to life, property, crops, cattle and communications. In India, the provinces lying in the Ganga-Brahmaputra basin viz. Delai, U.P., Bihar and West Bengal, accounts for nearly 15 million hectares out of the total flood prone area of 25 million hectares. Its peculiar topography and natural drainage characterized by 'haors' makes the problem more severe in Bangladesh. One-third of Bangladesh territory gets flooded by more than 1 metre of water every year. The costs involved in flood relief operations are a back-breaking burden on the already over-stretched budgets of these countries. Moreover, flood protection measures undertaken by them extend to only a very small percentage of the cultivated area. This is partly because of paucity of resources and partly because storage sites have to be located upstream in the hilly territory of North-Eastern India and Nepal.

The irrigation benefits flow naturally from these storage reservoirs. Although primarily agricultural economies, India, Nepal and Bangladesh are importers of cereal. This is essentially the result of the low yields in the region. The possibility of increasing food production by extending cultivable area is ruled out by the increasing numbers. Irrigation has therefore become essential for intensifying cultivation. As vast agricultural tracts in this region are entirely dependent on rainfall for agriculture, the cropping patterns are determined by the availability of rainwater rather than by the soil quality and climatic conditions of the 'Greater Ganga' basin, which allow for all-year-round cultivation.

Since the droughts of the mid-60's, India has made significant progress in the area of irrigation. In 1950-51, the gross irrigated area was 22.6 million hectares. By 1979-80, the figure had risen to over 50 million hectares. In Bangladesh, progress has been less substantial. However, as the storage potentialities of the Ganga are very limited in relation to the irrigation needs of its densely populated basin, the sites in Nepal are of crucial importance for water regulation in the lower basins.



For Nepal, the negative costs of submergence, displacement, rehabilitation and even ecological imbalances would be compensated by the development processes that would be unleashed. Apart from extending irrigation facilities, the construction of dams would force the pace of development by employing Nepalese labour and skill to the maximum and by necessitating the building of roads and other infrastructure. This, in turn, would give impetus to the growth of related industries.

The mountain sites of Nepal could also generate power to meet the energy needs of the region. The Ganga-Brahmaputra has approximately 10 per cent of the world's total hydel power potential. Countrywise estimates show that Bangladesh has a potential of 6,000 MW, India (the Himalayan region) of 25,000 MW, and Nepal of 83,000 MW. Greater availability of energy supplies would enable widespread use of pumping sets and tubewells to exploit ground water and extend irrigation. It would provide a cheaper communication system, thereby lowering production costs and extending markets. It would also encourage the growth of power based and related industries and generate employment opportunities.

However, very little of this potential has been harnessed. India has developed 8.4 per cent of it. The figure rises to 16.9 per cent if the projects under construction are included. The rate of growth of commercial energy, however, lags behind the annual rate of growth in energy consumption in which an additional four-fold increase has been projected for the next two decades. In the case of Bangladesh, its flat terrain with a gradient of less than 5" rules out the construction of hydel power projects.

In Nepal, the three basins, viz the Karnali, the Kosi and the Gandak, have a hydel power potential of 32 MKW, 22 MKW and 21 MKW respectively. However, only 0.06 per cent of this potential has been harnessed. Nepal's domestic energy requirements are limited to domestic use, cottage industries and transport. Power can also be used to pace up agricultural production and build medium and large forestry industries. Above all, by developing hydel power Nepal can balance



its trade by exporting energy to India and Bangladesh. Indeed, hydroelectric power can be to Nepal what oil is to Kuwait. However, Nepal cannot develop its hydel potential single-handedly. It lacks technically trained manpower, finances and technology. Resorting to imports would only expose its economy to the ill-effects of dependence on the technology-rich countries. On the other hand, through

---

*Regional efforts are made viable because of the complementarities that exist between the natural resource endowments of the countries of the region.*

---

an integrated development strategy, an effort can be made to mobilize engineering skills, expertise and equipment from within this region which has a tradition of efficient water management.

Multipurpose and multilateral development of the Greater Ganga river system would also completely transform the economic landscape of the North Eastern sector of the subcontinent, by extending communication lines through the natural waterways. With the rising fuel prices, water transport is today the most economical means of transport. It has been estimated that 1 horsepower can move a 150 kg load on road, a 500 kg load on rail and a 4,000 kg load in water. Both India and Bangladesh have tremendous potential as well as historical experience in the operation of the inland water system. In India, the economic prosperity of the North Eastern states is predicated on the development of inland waterways. It would facilitate their integration into the national economy by transporting machinery, fuel and raw-materials to them and giving them access to wider markets. In Bangladesh, the length of navigable waterways (some 8,000 kms) are almost twice the length of roads and certain places are connected to the rest of the transport system only through waterways. However, proper water regulation is essential for all year round navigation. For this it becomes necessary to construct dams upstream.

The preservation of the fragile ecological system—the crucial prerequisite for enjoying the manifold advantages of river develop-



ment—is the greatest incentive for pursuing an integrated river development approach. Under the pressure of expanding population and its ever increasing energy demands, forest resources have been dwindling at an alarming rate. The problem gets compounded by the negative chain reaction triggered off by deforestation as the resulting soil erosion reduces the productivity of land and forces people to cultivate marginal lands. This only results in greater deforestation. The problem of deforestation becomes especially critical for Nepal. Almost 240 million metres of fertile Nepalese soil is washed down every year. Downstream, this creates siltation and drainage problems for India and Bangladesh. To check these, it is necessary to plant trees with the capacity to conserve soil and water in the upstream riparian state. Afforestation schemes in Nepal can also generate additional job opportunities in ancillary industries like the cane/bamboo/paper pulp industries, mushroom cultivation, sericulture and the like.

Thus, the multilateral development of the Ganga-Brahmaputra-Barak/Meghna river system can give a timely facelift to the sagging economic profiles of the South Asian countries. Regional efforts are made viable because of the complementarities that exist between the natural resource endowments of the countries of the region. For example, the hydroelectricity potential of Nepal is complemented by the large markets for energy available in the region. So also, the potential for construction of storage dams in Nepal is matched by the vast irrigable lands in India and Bangladesh.

#### VI MULTILATERAL-MULTIFUNCTIONAL DEVELOPMENT OF THE 'GREATER GANGA' RIVER SYSTEM : PROSPECTS FOR IMPLEMENTATION :

Any effort towards multilateral and multifunctional development of the 'Greater Ganga' river system must necessarily start with the augmentation of the Ganga flows during the lean season. For this purpose, two proposals have been put forward.

The Bangladesh proposal suggests the conservation of monsoon flows through storage dams constructed in India and Nepal. It



identifies 12 storage sites on the rivers Karnali, the Sapt Gandaki and the Sapt Kosi and 2 on the Arun and the Tarun rivers in Nepal. These storage dams, it is estimated, could increase waterflows from 55,000 cusecs to almost 180,000 cusecs during the dry season. The plan is, however, predicated on Nepal's participation.

India's reponse to this proposal has been unfavourable as it claims all the Ganga storage waters, less Nepal's uses, for its irrigation needs in the densely populated Ganga basin. Moreover, it is opposed to the involvement of Nepal in the scheme for if Nepal is included, it sees no reason for freezing out the other upstream riparian countries, China and Bhutan. India considers it unfair to make Nepal submerge its territory by constructing storage dams for the benefit of India and Bangladesh. It also claims that there is little likelihood of Nepal's agreeing to do so. India's objections are also tied to political considerations. In the given environment of Indo-Nepalese relations, it is well possible for Nepal to make its co-operation conditional to negotiations on certain contentious issues like free navigation rights and the zone of peace proposal. This, India fears, would make negotiations for the development of the 'Greater Ganga' more long-winding, troublesome and complicated.

Accordingly, India has put forward a proposal for excavating a 165 km link-canal to divert a part of the Brahmaputra water flow at Dhubri to the Ganga system at Farakka, through Bangladesh.

However, the Indian proposal is not to Bangladesh's satisfaction as the construction of the canal through its territory would result in the loss of some 20,000 acres of land which it can scarcely afford. The construction of the canal would also necessitate extensive and costly cross-drainage to check water-logging in the link-canal area. Above all, there is the fear that the link canal would allow India to exercise control over Bangladeshi economy as both ends of the canal would be located on Indian territory. With both parties unwilling to compromise, the issue remains unresolved and the only agreement reached has been limited to seasonal watersharing arrangements at Farakka,



ignoring the staggering potential of the Ganga-Brahmaputra river system.

The problem is essentially one of lack of confidence. The implementation of any joint development plan depends on the level of confidence that the participating countries have in the effort as well as in the sharing of benefits. In the South Asian region, the big neighbour-small neighbour political syndrome has made deep inroads into the mutual confidence among states. The problem is compounded by certain domestic considerations because of which the ruling elites of these countries accord low priority to the development of the 'Greater-Ganga' system.

In Bangladesh, the country's political instability is one of the principal reasons for the low priority given to structural development. The image of an enemy is needed to mobilize political support. Certain Indian attitudes and behaviour have only helped them to do so. Bangladesh's hesitance to pursue joint development of the 'Greater-Ganga' also stem from its fear that India might somehow use this

---

*The problem is compounded by certain domestic consideration because of which the ruling elites of these countries accord low priority to the development of the 'Greater-Ganga' system.*

---

opportunity to increase its power or to gain an advantage at the expense of Bangladesh. As such apart from the hydrological and economic considerations, there is a psychological need to include Nepal in the negotiations with India. By aligning itself with another small neighbour, Bangladesh feels itself a more equal negotiator with India.

Nepal's attitude is equally determined by domestic considerations. A slow pace of development means a slow pace of social and political change. This would suit the interest of the ruling monarchy and the feudal elements backing it. As far as joint development schemes go, the Indo-Nepalese projects on the rivers Kosi and the Gandak have



left Nepal dissatisfied with what it perceives to be disproportionate benefits going to India. The costs of submergence, displacement and rehabilitation are in its estimation not compensated by the low employment and irrigation benefits for Nepal. Also, in negotiating the selling rates of hydel power to India, it finds itself at a disadvantage. As such, Nepal is keen on involving foreign consultants in its negotiations with India to ensure a more equitable sharing of benefits.

For its part, India fears that the smaller neighbours might gang up against it. Its persistent advocacy of bilaterism as against multilateralism is rooted in this long-standing apprehension. It sees multilateralism and international involvement as encouraging the smaller states to raise their demands at India's expense.

The development potential of the Himalayan river system can provide unimaginable benefits to India as also to Nepal and Bangladesh. But for its optimum exploitation, cooperation is a must and that entails negotiations and consensus. Sub-regional groupings by smaller states seem to strengthen their confidence in negotiating with India without actually undermining the predominance of India. As such if Nepal and Bangladesh are willing to negotiate only on a tripartite basis by involving international actors and agencies, for the purpose of realizing optimum benefits for the region as well as for itself, India stands to gain by acceding to their demands. In this connection, it is promising to note that India and Nepal have already accepted the World Bank's assistance in preparing the feasibility report on the Karnali project. This could well signify a movement from pure bilateralism to the acceptance of third party involvement.

#### VII POLICIES RECOMMENDED FOR THE MULTILATERAL-MULTIFUNCTIONAL DEVELOPMENT OF THE HIMALAYAN RIVER SYSTEM

On the basis of the above discussion it is possible to identify certain long-run and short-run policies which would encourage the multilateral efforts for the development of the Ganga-Brahmaputra-Meghna/Barak river system. The long term policies are as follows :



(1) As accommodation is the key to joint river development, confidence building measures need to be undertaken in earnest. Non-interference in each other's internal matters can make a significant contribution towards clearing the political atmosphere. Indeed, if India, Nepal and Bangladesh are to be partners in development, confidence in each other and understanding of each other's fears and susceptibilities is important. Political relations have constantly impinged on cooperation efforts. Smoothing them out would give a greater impetus to the multilateral development of the Greater Ganga.

(2) It is equally important to formulate a comprehensive cost-benefit analysis of the integrated development of the Himalayan river system. Such an exercise would identify the various benefits (the power-potential, the flood control benefits, the irrigation and navigational facilities) as well as the costs (of dams, power plants and other civil structures, afforestation, resettlement, transmission of energy, maintenance of river channels and of port facilities, that accrue to the region as a whole. Having calculated the net development prospects for the region, a method must be devised to apportion the burden of finances among India, Bangladesh and Nepal. However, the diplomatic and economic processes need to be pursued simultaneously as they are mutually reinforcing. The knowledge of the economic advantages strengthens the political will to accommodate so also an improved political environment promotes cooperation in joint exploitation of resources.

(3) The formulation of a comprehensive development plan is essential to provide a basic plan frame for regional cooperation. This programme spread over 20 to 40 years would need to be broken down into a number of phases in time and space. It would also need to be decentralized into basins, major watersheds, command areas and finally into clusters of villages encompassed in micro-watersheds. In the absence of such a macro-plan, *ad hoc* development would be made in the individual countries which might produce sub-optimal results. For this purpose, in his Coromandel lecture entitled 'The Gift of the Greater Ganga' (10 December, 1977, New Delhi) B.G.



Verghese advised the review of all existing schemes and proposals for the development of the Himalayan river system in order to safeguard against false starts based on short-term gains.

(4) It is also essential to strengthen the institutional framework for the development of the Greater Ganga basin. As of now, there is no overall territorial or interdisciplinary body to deal with the entire gamut of possibilities either at the national or at the regional levels. Organizations like the Ganga Basin Organization, the Ganga and Brahmaputra Flood Control Boards, and the Ganga Brahmaputra Inland Water Transport exist in India as well as in Nepal and Bangladesh. However, all these are by and large limited in scope and lack the necessary resources and authority. Thus (a) as a first step, all the three countries need to establish national river development authorities with far greater powers than the present ones, (b) at the second stage, the national organizations can be linked by an international Greater Ganga Commission which will deal with the optimized development of the whole river system in all its interrelated aspects. As India has participated and assisted in the working of the Mekong Commission, it is familiar with its operational procedures and can help in creating an organization along similar lines in the Himalayan sector.

(5) Coordination in planning is also very important. It is necessary to set harmonious national priorities for each country. As profitable exploitation of the river resources depends on the rate of growth of demand for the services derived from their development, coordination is required in planning complementary demand patterns.

The successful implementation of these long term policies however, depends on the implementation of certain short run policies. These are as follows :

(i) It is essential that there be mutual cooperation among neighbouring countries in collecting the relevant geological, geotectonic and hydro-metereological data related to the correct assessment of the region's water resources and the location of prospective storage sites.



(ii) It is also necessary to undertake special studies relating to fisheries, agriculture, irrigation, flood control, drainage, forestry, navigation, transportation, power markets, and the general economy. These are highly specialized areas of river basin planning and as such require specialized and detailed analysis. These studies can then be incorporated in the comprehensive Development Plan.

(iii) Feasibility studies need to be undertaken regarding specific project plans. The projects which are required for the implementation of the long-range plan have to be studied with regard to their ability to meet real needs as well as their benefit-cost ratio.

(iv) Exchange of trained personnel, experts, technical knowhow and training facilities is required. Complementary programmes of research also need to be undertaken.

## VIII CONCLUSION

The multilateral and multifunctional development of the 'Greater Ganga' river system holds the key to bringing about an economic revolution in South Asian agriculture and industry. It can be an elixir of life to the teeming millions inhabiting this region, cursed as they are with mass poverty and underdevelopment. However, the legacies of the past and bureaucratic approaches have till now slowed down the pace of cooperative behaviour. The ruling elites of Nepal, Bangladesh and India have preferred to softpedal serious negotiations on this subject. Delay has only meant a loss of opportunities in the face of rising developmental costs.

To fail to take timely steps now to exploit the optimum development potential of the Greater Ganga would be a great tragedy for the region. In its absence, poverty in South Asia will only get more deeply entrenched and social and structural violence increased with the addition of more mouths of feed. The countries must decide now to start a joint and cooperative effort to develop the water wealth of the Himalayas. Only the visions of a happier future can break the present impasse over vital issues.