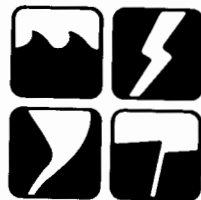


Natural Hazard Research

FIVE VIEWS OF THE FLOOD ACTION PLAN FOR BANGLADESH

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PREFACE

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SUMMARY

The Bangladesh Flood Action Plan (FAP) was created primarily in reaction to devastating floods that took place in 1987 and 1988. Because of its emphasis on structural mitigation (e.g., building additional embankments, cross dams), the plan has been criticized by those who feel it is ignoring the human component.

Issues regarding the plan's workability are discussed in the five papers presented here. Wescoat raises several questions and particularly encourages the use of the many already existing scholarly resources available regarding the history, culture, and ecology of the Bengal delta. Chowdhury, an engineer, points out that building embankments may not be the best route to reducing the negative effects of floods on exposed populations, and Parker continues this discussion by outlining some of the negative impacts embanking has on humans and their environments. Khondker summarizes how local populations relate to the rivers; details the effects of, and subsequent recovery from, the 1988 flood; and describes the political and economic conditions that led to the development of the FAP. Finally, James and Pitman discuss the FAP in detail, how it has created opposing groups who either support embankment construction or floodproofing—and suggest ways for the two groups to find a "common ground" upon which to build effective measures to reduce loss of life and livelihood.

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THE FLOOD ACTION PLAN IN BANGLADESH: A NEW INITIATIVE CONFRONTED BY BASIC QUESTIONS

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The Bangladesh Flood Action Plan (FAP) was organized by the World Bank and a consortium of governments and technical assistance organizations following catastrophic flooding in 1987 and 1988. The scope of the overall plan, which has 26 components and a time frame of several decades, is broad and ambitious.

But the FAP faces persistent questions about the relative importance and balance of its components. Does the proposed system of embankments threaten the long-term ecological and natural resource productivity of the delta? Will the embankments increase flood hazards in some areas or for some social groups? Have nonstructural approaches been adequately conceived, supported, and integrated into the plan? Will social costs and benefits be equitably distributed? Does the plan expand the participation and range of choice for those at risk?

In considering these questions raised in the papers presented on the following pages, it is useful to keep in mind several previous studies and projects in the Bengal delta. A 1989 investigation known as *The Eastern Waters Study* (Rogers et al.) stands out as a comprehensive, sensitive, and diplomatic assessment of the larger flood problem. Are the recommendations and spirit of that study fully embodied in the FAP? In 1987, the Smithsonian Institution organized a symposium on "conservation" of the Sundarbans ecosystem of the Bengal delta, compiling a bibliography of 2,000 items on the history, culture, and ecology of the region, and publishing its results in a special issue of *Agriculture and Human Values* (1990). Have such scholarly resources been fully utilized in the FAP? And long before the current generation of studies, Rahdakamal Mukherjee wrote *The Changing Face of Bengal: A Study in Riverine Economy* (1938), a milestone for its insights and foresight about the joint natural and cultural challenges of the delta.

Millions of people now depend upon a successful plan to reduce the loss of life and livelihood due to floods in the delta. It is vital that the Flood Action Plan measure up to all of the challenges raised in the following pages and to the lessons and legacy of the delta.

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FLOOD ACTION PLAN: ONE SIDED APPROACH?

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The difference of opinion generated by the Flood Action Plan is often viewed as the convictions of engineers versus those of environmentalists or socioeconomists. This division is far from true, as demonstrated by this article, adapted from the *Bangladesh Environmental Newsletter*, Vol. 2, No. 2 (June 1991). The author is one of the country's leading engineers – eds.

A major flood control plan for Bangladesh, known as the Flood Action Plan (FAP), covers a five year period (1990-1995) and consists of 26 studies at an estimated cost of about US \$150 million. The aim of the FAP is to set the foundation of a long-term program for achieving a permanent and comprehensive solution to the flood problem. A broad framework for the long-term program up to the year 2015 has been provided by "Eleven Guiding Principles" and the eleventh principle says: "Encourage popular support by involving beneficiaries in the planning, design, and operation of flood control and drainage works". Has this principle been actually followed in the preparation of the FAP? Past flood control, drainage, and irrigation projects totally ignored people's opinions, though they were expected to cooperate in managing the projects. There is no evidence belying this tendency during the preparation of the FAP.

The FAP focuses on the embankment as the basic element of a comprehensive flood control program. It is proposed that all the major rivers should be contained by embankments so that the floods are safely funneled to the Bay of Bengal. About two-thirds of the country is subjected to flood due to spillover from rivers. The flood control embankment itself can bring hazards to the people, for example as in the Meghna-Dhonagoda project. This embankment was breached twice, in 1987 and 1988, causing complete destruction of crops and infrastructure, and bringing immense misery to the people. It has become difficult to bring back the confidence of the people in this project.

Because of technical and socioeconomic limitations in Bangladesh, it may not be possible to ensure that embankments will not fail. With flood control programs based on extensive embankments, the frequency of such human-caused disasters is likely to increase.

Rivers carry a great deal of sediment along with flood flows, and a significant amount of this is deposited on the inundated floodplains. Embankments along a river prevent such deposition. As a result, the morphological balance between the river and the alluvial floodplain is disturbed. In some medium and small rivers such as Gumti and Bhadra, embankments have caused a rise in the river bed. There are also examples showing that changes in local morphology can cause the death of perennial rivers. A detailed assessment of such morphological consequences of embankments is vital before launching any long-term plan.

It is now recognized that potassium and nitrogen deposited from flood-borne blue-green algae and other sediments are beneficial to soil fertility (Bangladesh Agricultural Research Council, 1989). The country harvested a bumper crop after the catastrophic flood of 1988.

The objective of a flood management plan should be to maximize the beneficial effects of flood while minimizing their adverse effects. Inundated floodplains provide breeding and feeding habitats for many inland water fish species. Flood control structures stop or delay the establishment of hydraulic linkages between the rivers and open-water bodies in the floodplains, thus adversely affecting the breeding habitats of fish. It cannot be denied that inland freshwater fisheries resources have been drastically reduced by human interventions in floodplains through construction of embankments and polders [dike-protected land—ed.]. A substantial part of the animal protein in the Bangladeshi diet comes from fish. Are we going to deprive the undernourished people of our delta from this important source of protein by a massive program of constructing embankments along rivers?

Frequent reference is made to the Mississippi of the U.S. and the Hwang Ho of China in support of the full containment of the Brahmaputra and the Ganges by embankments. The entire reaches of the Mississippi and the Hwang Ho are inside the respective countries, while less than 10% of the Brahmaputra and the Ganges are inside Bangladesh. Is it hydraulically appropriate to try to contain the whole lower reach of a river while the upper reach (which is more than 90% of the total length) is beyond our control? Moreover, the floodplain occupies about 80% of the total land area of Bangladesh, while this is not the case with either the Mississippi or the Hwang Ho.

It is hard to find an instance in Bangladesh, where a flood control and drainage project has been completed on time. Project completion is always delayed due to a shortage of funds and as a result, on substantial part of the expected benefit is not realized. In some cases, the project remains half done. In Bangladesh project managers commonly express their dissatisfaction that adequate funds are not available for operation and maintenance. The master plan for the period 1965-1985 prepared by the IECO in 1964 is a case in point.

Who can guarantee the uninterrupted huge foreign aid required for the schemes under the long-term program proposed in the FAP? In the words of Prof. S. Rashid, "A monster embankment may well succeed but what about a half monster, or a monster we cannot adequately feed with maintenance and repairs?" (1990).

The flood factor has not been considered seriously in the past in the planning and design of various development activities such as rural infrastructures, urbanization, industrial centers, national networks of roads and highways, etc. As a result, the country is experiencing increased flood losses every year. Floodplain zoning according to cause of flood, depth, duration, and time of flood, risk to agriculture, fisheries, and forestry has been successful in several countries in mitigating flood losses. The formulation of a "Floodplain Land Use Regulation" is necessary to ensure that individuals, nongovernment organizations, and government organizations give proper attention to flood factors in the planning and design of development projects as well as flood management plans.

Embankments are, of course, essential where lives and valuable properties are endangered by floods. What we would like to emphasize is that embankments are not suitable for all situations. Measures against the flood problem should be compatible with the environment, socioeconomic condition, and culture of our society.

The FAP, which is expected to be the basis for a long-term solution to the flood problem, should be economically and ecologically sustainable. Decision makers should encourage wide public debate on technical, economic, and environmental aspects of the FAP, so that the issues are resolved at the planning stage.

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SOCIAL IMPACTS OF THE BANGLADESH FLOOD ACTION PLAN

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Bangladesh is periodically inundated by monsoon floods that cover 20% of the territory one year out of two and 37% of the territory one year out of ten. However, in 1987 and 1988, 40% and 60% of the land was inundated. The devastating cyclone of April 30, 1991 is believed to have killed about 150,000 people.

The Bangladesh Flood Action Plan (FAP) aims to substantially improve the economic security and quality of life of the floodplain population. The FAP was drawn up in 1989 by the Bangladeshi government and the World Bank and will cost about \$5 billion. Donors include European Community countries, the U.S., Canada, Japan, and Sweden. Flood Action Plan 1 is the first of four FAPs envisaged between 1990 and 2010 and has 26 components, most of which are feasibility studies or pilot projects. By June 1991 the terms of reference for most of the 26 components were approved and investigations had commenced.

The FAP is mainly premised upon river training and flood control, although floodproofing and flood warning projects are included. The principal aim is to improve the Brahmaputra's upstream embankments and then those of the Ganges, before trying to protect the downstream floodplains. Previous attempts to reduce floods and stimulate economic development also concentrated on embankments. However, the embankments were frequently washed away, river channels silted up, and some rivers rapidly cut new channels. Farmers also frequently cut load embankments to release trapped floodwaters. Due to a perceived lack of success with the embankment strategy and high returns from irrigation development, prior to the FAP, the emphasis in water management had switched towards small scale irrigation.

The concepts of partial flood control, compartmentalization, and controlled flooding also featured in the FAP. "Total" flood control is inappropriate because of the dependence of crop yields on "normal" flooding. Protected areas behind embankments will be divided into embanked compartments to permit the temporary storage of high

flood flows. The authorities can then decide to flood a particular compartment in order to protect another, thereby controlling the flooding process.

Social and distributional issues raised by the FAP are of central concern in any aid project, but they may well receive insufficient attention. Should the FAP achieve some success, it promises to benefit some areas much more than others and to disadvantage many—perhaps even the majority—even though the net impact upon total social welfare might prove to be positive. Some reasons are as follows:

- Recent postevaluation of a previous flood embankment and irrigation project in Chandpur—a river port near the confluence of the Brahmaputra and Ganges—reveals that while flood damages have been reduced and foodgrain production has been raised, many small landowners have been forced into debt. Also, the landless people dependent on laboring have gained little. While flood protection has made possible fish cultivation in ponds, the productivity of open water fisheries has been reduced because wetland habitats have been lost. The repercussions for fishermen and the supply of the nation's animal protein, about 80% of which comes from fish, are severe. In contrast, the much less numerous large landowners have prospered.
- The embanking program will increase the numbers of homeless because their land will be acquired to accommodate embankments and to provide sources of earth.
- The potential impacts of upstream embankment projects upon downstream floodplains appear to be underestimated. Embankments merely pass on floodwater to downstream areas. For downstream districts such as Chandpur the prospects may be for worsened flooding under the FAP, while large cities such as Dhaka will be better off.
- The distributional consequences of the strategy of compartmentalization and controlled flooding require careful analysis because upstream areas will have to be flooded to protect downstream areas. It will be difficult to justify the flooding of one area to protect another and to resist the demands of powerful landowners.
- The FAP projects promise to be socially divisive, not only between the rich and poor and between urban and rural areas, but between those inside and outside project areas and between fishermen and farmers.

While the FAP impacts on beneficiaries and "disadvantaged groups" are recognized in the FAP plan components, there is a distinct risk that policies designed to relieve adverse impacts on the poor majority (such as compensation payments for those suffering reduced incomes or loss of livelihood) will take second place, or will simply be ineffective, in a nation where policy implementation is frequently driven by patronage and the abuse of economic power.

THE POLITICAL IMPERATIVES OF 1988 FLOOD IN BANGLADESH

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Bangladeshis are no strangers to calamities of nature such as floods and cyclones. With the devastating cyclone of April 29-30, 1991, which took a toll of over 140,000 human lives fresh in our memory, there is no need to belabor the point of the role of natural hazards in the lives of the Bangladeshis. The April 1991 cyclone with a wind velocity of 240 km/hr created a 20-foot high tidal bore (a wall of water, as some survivors recalled), which swept away offshore islands and parts of Chittagong.

Cyclones and their tidal waves in the Bay of Bengal constitute one of two types of flooding in Bangladesh. The other, more common, type of flooding results from the overrun of major rivers that pass through Bangladesh, channeling water from the Himalayas upstream to the Bay of Bengal downstream. Some of the biggest and most magnificent rivers in the world flow through Bangladesh, forming the largest delta in the world. The Ganges-Brahmaputra river system forms a delta of 25,000 square miles (Rashid, 1978, p. 3). This deltaic land is highly fertile and the normal streamflow irrigates the agricultural land, depositing rich silt and contributing to land fertility. Yet an overrun of the water often causes flooding in the basin, damaging crops, livestock, human lives, and property. Bangladesh is a prisoner of its own ecology.

The people of this deltaic region, which is formed by three major rivers—the Padma (known as the Ganges on the Indian side) and the Brahmaputra (and their confluences), and the Meghna—have lived with an unpredictable nature, bountiful yet often gratuitously punishing, for centuries. Rivers play an important part in shaping the culture of Bangladesh. Folktales and songs teem with stories of rivers, most of which depict their awesome power. Rivers are revered. Oarsmen normally invoke the name of Badar, the pir [saint or religious guide—ed.] of water, before crossing a river. In times of calamity, wavy rivers can cause some fear even in the minds of the brave.

The ecological setting of Bangladesh is dominated by the rivers, with resultant implications not only for the economy but also for the politics and culture of the country.

Indeed, in order to understand the consequences of flooding in Bangladesh one has to look at the patterns of flood, their intensity, duration, and timing and how these interact with the nature of the political regime. From a theoretical standpoint, this issue has bearing on the delicate subject of the relationship between space – in the geographical sense – and political power.

Floods of different magnitude, intensity, coverage, and depth are bitterly familiar to Bangladesh. Floods are usually classified as normal, moderate, severe, and devastating or catastrophic (Khan and Nazem, 1988, p. 463). While normal and even moderate floods – especially the ones with a very short duration – are a boon for agriculture and, thus, for the Bangladesh economy, if the water level persistently rises and stays elevated for a long time, as it did in 1987 and 1988, it becomes a bane and catastrophe follows. Normal flooding of the banks is crucial not only for agriculture but also for keeping the salinity level low in Bangladesh, yet an abnormal flooding may easily tip the delicate balance. As Paul puts it, "The agriculture in Bangladesh is, thus, both flood-dependent and flood-vulnerable" (1984).

It is this ecological encounter that has made the people of Bangladesh both resilient and fatalistic at the same time. The cycle of floods and hunger are as familiar to the Bangladeshis as the dark clouds of monsoon storms in the sky of April; over the years disasters have been frequent visitors to this region. The people have learned to endure, for without endurance few will survive. The foamy waters of floods are reminiscent of the Biblical/Koranic deluge. About 84% of the population of Bangladesh are Muslims, most of whom not only know the story of Noah's flood but also view floods as one of the weapons in the arsenal of god to punish the irreligious, the wayward. Floods reinforce in their minds the destructive powers of nature or god. In a study on perceptions of floods in the Jamuna floodplain, the majority of the respondents anticipated recurrence of floods because god "is displeased with people" for their "anti-religious activities" (Paul, 1984, p. 14).

Floods like earthquakes are clear examples of natural disasters, but the impact of these natural disasters on the community is mediated by the political-economic process. The political significance of the space affected by the natural disaster will dictate the level of response the crisis will evoke. The flood of 1988 in Bangladesh provides an

opportunity to explore some of these issues.

Bangladesh experienced 28 floods between 1954 and 1989 of which 11 were severe and five were catastrophic (Alam, 1989). Of the five catastrophic floods that occurred in 1954, 1955, 1974, 1987, and 1988, the three recent ones occurred in post-independence Bangladesh. The floods of August-September 1988 were unprecedented in many ways and will remain in the memory of the people of Bangladesh for many years to come. The floods, caused by excessive downpours in the Himalayan foothills in the north, were widespread and devastating. At their peak, floodwaters covered about three-fourths of the country affecting 50 of the 64 districts (*The Straits Times*, 1988, p. 3). Nearly 104,000 square kilometers were submerged compared with 57,000 square kilometers in 1987, which was also a severe flooding year. According to a senior official of the Water Development Board, the floodwater was 2.1 - 2.4 m higher than the previous year (*Far Eastern Economic Review*, 1988, p. 79). The flood of 1988 left 28.5 million people, of a total population of 110 million, homeless. The official death toll, which is always very conservative, was put at 650 (*Economist*, 1988, p. 29); the unofficial count was at least three times more. Outbreaks of diarrhea and other waterborne diseases also claimed many more lives.

The possibility of another famine loomed as a large part of the standing rice crops (the country's staple) to be harvested in November were washed away. Foodgrains in some silos were also waterlogged. The grain reserve of 1.2 million tons looked ominously inadequate; at least 3 million tons were needed in emergency relief to avoid starvation (*The Straits Times*, 1988, p. 3). It was feared that even if emergency relief was mobilized, the problem of distribution would be insurmountable. Major roads, bridges, and railway tracks were washed away rendering the task of supplying food, medicine, and other relief goods to the interior parts of the country much more difficult. Power and telephone lines, more than 2,200 miles of road networks, and 1,500 bridges and culverts were washed away, damaged, or destroyed (*Newsweek*, 1988, p. 10). This destruction not only undermined the relief operation but also imposed additional repair costs.

Despite alarms concerning an impending famine, the worst was avoided. The predicted famine did not occur; although many people starved and suffered from hunger

quietly, the situation was not defined as a famine either by the media or by the vocal opposition political parties. Although the Ershad regime, the government then in power, failed the country in many respects, the crisis of 1988 was tackled with a great deal of efficiency and the worst was avoided. How did the Ershad regime, riddled with corruption, manage to avert the famine? And, more importantly, why? Keeping these questions in view, we discuss below the consequences of the 1988 flood and generate some hypotheses regarding the relationship between space and power in Bangladesh.

In a way the flood of 1988 was a more "equal opportunity" disaster than previous ones. Unlike past floods, this one also affected the capital city of Dhaka, the center of power. The president's residence in the cantonment itself was inundated, and the president was said to be using a small boat to travel. The posh Gulshan and Banani area, the residential district of the diplomatic corps and the local elites, was flooded too. For the rich of Dhaka, flood was no longer experienced through newspapers and television screens; for the first time floodwaters were in their backyards. Ironically, this flood was an eye-opener for the elites. One of the well-known victims of the 1988 flood was the wife of the French president, who was on a tour of Bangladesh and staying in the diplomatic zone. Her personal encounter with the flood played a role in the French government's subsequent keen interest in helping Bangladesh with flood prevention plans.

The 1988 flood, which was more devastating than the flood of 1987 (Table 1), generated a lot of public discussion and governmental attention. The two consecutive floods raised serious doubts in the minds of the people of Bangladesh about the ecological viability of the country. The discussion in the international media on global warming and its effects on the recurrence of floods in Bangladesh via a rise in sea level also received a great deal of attention. The 1987 and 1988 floods surpassed all past floods in terms of area inundated, depth, rate of increase, and duration as well as damage. Intense rainfall throughout the region and the Himalayan discharge caused the three-river system to swell within a short span of three days (compared to 30 days during the 1954 flood, 27 days during the 1974 flood and 34 days during the 1987 flood) (Khan and Nazem, 1988, p. 465).

The relief operation was hampered by the closing of the international airport to

TABLE 1
FLOODS IN BANGLADESH

Year	Coverage of Area as % of total area
1954	25.6 %
1955	35.2
1956	24.7
1960	19.7
1961	20.0
1962	26.0
1963	30.0
1964	21.7
1965	20.0
1966	24.3
1967	18.3
1968	26.0
1969	20.9
1970	29.6
1971	25.3
1972	14.4
1973	20.8
1974	36.6
1975	11.5
1976	19.7
1977	8.7
1978	7.5
1980	22.9
1983	7.7
1984	19.7
1985	7.9
1987	39.9
1988	67.0

Source: Khan and Nazem, 1988, p. 478

large planes. The water-logged airport could only handle small planes, and the runways remained submerged for several days, cutting Bangladesh off from vital aid links. Planes loaded with emergency aid had to wait in foreign airports. Thanks to the timely and prompt decision by concerned authorities (especially Bangladesh Airlines), an air-bridge between Dhaka and Calcutta was set up to ferry passengers and relief goods that

reached Calcutta from various foreign sources. Internally, the distribution of supplies to affected villages was hampered by a shortage of helicopters. The government had only six large helicopters and India sent in four to help, but sometimes these helicopters with supplies failed to land in affected areas for lack of dry ground.

Bangladesh's suffering generated an outpouring of generous international response and humanitarian assistance, and the relatively efficient management of the flood disaster was due to a large extent to the generosity of international assistance. The U.S. released a total of about \$150 million in disaster relief, \$84 million of it in cash and the rest in grain and supplies. Japan pledged \$14 million in relief aid. A number of Muslim nations, such as Saudi Arabia, Kuwait, Pakistan, Iraq, Qatar, and Turkey also contributed (*Newsweek*, 1988, p. 11). The U.S., Britain, Australia, and Pakistan together promised US \$1.5 million as of the first week of September in rice and cash. More foreign assistance in the forms of food, medicine, and other emergency supplies came in the following months.

There were both short-term and long-term responses to the crisis. In the short-run the government and innumerable nongovernmental organizations (NGOs) executed a major relief operation mitigating the crisis. The long-term strategy included a plan for preventing flooding in Dhaka by building an embankment around the city.

Long-Term Response: From Flood Control To Water Management

After the floodwater receded, a number of plans were mooted. Because the flood of 1988 followed the flood of 1987, the two successive floods generated a great deal of international concern. The U.S., France, China, and Japan expressed their concern over the recurring flood devastation. Expert teams from Denmark, the European Economic Community (EEC) and the United Nations Development Program (UNDP) visited flood-ravaged Bangladesh and prepared reports recommending flood control measures. Two schools of thought were presented: one plan had the support of the French with the backing of the UNDP; the other plan came from the U.S.

The French proposal suggested building embankments on either side of the main rivers of Bangladesh to contain overflow. It also recommended cross dams to prevent river erosion. The cost for the French plan—a project that would last 20 years—was estimated at \$10.2 billion. The UNDP report also recommended construction of em-

bankments and river training to prevent overflowing of waters. It laid special emphasis on regional cooperation to combat floods. The UNDP plan also proposed the formation of a new organization like the National River Authority, and it criticized existing organizations for bureaucratic ineptitude. This project had a price tag of \$7.5 billion. An expert team from the U.S. recommended that Bangladesh should not attempt such expensive flood control measures and should concentrate on mitigating strategies instead. The Chinese plan was similar to that of the U.S., suggesting small-scale plans rather than large flood control plans (*Dhaka Courier*, 1989a, p. 130).

Floods create trying times for the individual, the family, the community, and the government in charge of providing succor. The relief administration and the crisis-intervention mechanisms in Bangladesh are as fragile and inept as the government itself. The floods and their aftermath were a trying time for the entire governmental apparatus, which came under tremendous pressure. Yet the Ershad government was no more incompetent in coping with the disaster than any of the country's previous administrations. The handling of the 1988 flood was a success by local standards. The valuable experience learned from previous floods was put to use in mitigating the crisis at hand. The military played an important and efficient role in distributing relief supplies.

But, more importantly, a political reason accounts for the relative success of the government in mounting an extraordinary relief operation. The Ershad regime lacked a popular mandate. General Ershad was a self-appointed president who came to power in a military coup in March 1982. General Ershad "won" a yes/no referendum in March 1985, the credibility of which was likened to a Cayman Islands tax return (*The Economist*, 1986a, p. 26). In a parliamentary election in 1986, in which the opposition Awami League was winning too many seats in the initial tallies, the counting was delayed; when the counting resumed results began to favor Ershad's party (*The Economist*, 1986b). In October 1986, Ershad elected himself president after fraudulently "winning" an election in which less than 5% of the electorate participated. The abnormally low turn-out was due to a boycott of the election by all the country's major opposition political parties. At the time of the 1988 floods the Ershad regime had been suffering from a serious crisis of legitimacy (*The Holiday*, 1988).

The efficient administration of relief can provide legitimacy to a government in

an impoverished country like Bangladesh, where the volatility of nature is often mirrored in the politics, and the Ershad administration was pragmatic enough to understand this.

In a situation of grave emergency, as occurred in Bangladesh during the flood of 1988, it was important for all political parties to stand united and extend their wholehearted cooperation in overcoming the crisis, but such a consensus did not emerge. While various political parties wholeheartedly participated in the relief operation, they also sought to take political advantage of this crisis by criticizing the Ershad regime (*Bichitra*, 1988, p. 29). While the Deputy Prime Minister claimed that the government was capable of protecting people from floods (*The Bangladesh Observer*, 1988a), opposition leader Begum Khaleda Zia asserted that the government's relief operation in different relief camps in the city and elsewhere was limited to publicity. She stated that various opposition political parties and nongovernmental organizations were at the forefront of relief operations (*The Bangladesh Observer*, 1988b).

In the aftermath of the flood, the Ershad government decided to go ahead with the plan to build an embankment around the city of Dhaka to keep the people of Dhaka safe from the threat of flood. Ershad was motivated to support this plan primarily for political reasons, although from the very beginning questions were raised regarding the ecological viability of the so-called "Greater Dhaka Flood Protection Embankment" plan. Despite criticisms, even from some of the experts who were on the committee, the plan was put into effect. By the middle of 1989, because the first phase of the project remained incomplete as the monsoon (flood) season approached, a contingency plan was adopted to protect at least certain parts of Dhaka. The area to be protected included the Navy Colony, Sena Palli (cantonment), and the international airport, while such low-lying, vulnerable areas as Suhrawardy Hospital, Shishu (childrens') Hospital, and Pangu (disabled) Hospital, were excluded from the contingency plan (*Dhaka Courier*, 1989b, p. 14).

The building of dams or embankments for flood control has been a controversial issue in Bangladesh since the United Nations Technical Assistance Mission, popularly known as the Krug Mission, recommended embankments along the major rivers in 1957. The Krug Mission favored policies that would entail cooperation between neighboring countries in adopting a comprehensive plan to manage the river systems. But, experts

are divided on the subject of building dams as a measure to control floods. There are high financial as well as ecological costs, and there are many historical examples of dam building that has been counterproductive, adding to misery (Goldsmith and Hildyard, 1984, p. 121). However, Bangladesh's Ershad government had no time for considering the long-term effects of the Dhaka protection plan, its immediate objective was to gain political ground. Hence, the focus was on short-term popularity and support from the powerful urban sections of the population.

Conclusion

The flood of 1988 will be remembered both for its destruction as well as for the response it evoked. The main reason for the unusual response was that although flooding is a "normal crisis" (in the sense of Perrow's "normal accident" [1984]) in Bangladesh, and a large part of the rural society have been living with it for ages, it was a new experience for the urban elites. Dhaka, being the center of political power and the capital city, had to be protected. It was another proof of the Lipton (1977) thesis of urban bias in planning.

The flood also led to an unprecedented increase in crime in Dhaka. A high incidence of lawlessness permeated city life. People in the suburbs lived under constant threat of armed robbery. This was a new situation for postdisaster Bangladesh. In earlier disasters, unlike many other countries, very little looting or criminal activity was recorded in Bangladesh; natural disasters actually reinforced the esprit de corps in rural Bangladesh. Law enforcement authorities could do very little to bring the situation to normalcy and saw in it not only a threat to public order but also to the authority of the government. This also motivated the Ershad administration to undertake flood control measures to protect the capital city.

NGOs, which have mushroomed in Bangladesh over the last 20 years, played a very effective role in mitigation and disaster relief. The government to a large extent followed the trails of the NGOs. The Ershad regime, well-known for its corruption and lacking legitimacy to begin with, found in disaster relief an opportunity to reclaim legitimacy, and in the short run it did. The regime continued to rule for two more years before collapsing in the wake of a mass uprising in the late 1990s.

The political fortune of Bangladesh has always been closely linked with the vicis-

situdes of nature – a relationship that has been manifest since the November cyclone of 1970 (Khondker, 1991). The 1988 flood and its impact on political processes revealed that that relationship is still intact.

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FLOOD ACTION PLANNING FOR BANGLADESH

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Introduction

Bangladesh lies on a fertile river delta at the base of the world's highest mountains. During the monsoon season, moist air moves northward, is lifted orographically as it rises over the mountains, and generates some of the world's heaviest rains. Runoff reaching several million cubic feet per second rushes down the steep mountain slopes, erodes and carries sediment, spreads over the flat lands below, and deposits sediment loads so large that major rivers change their courses.

A Worsening Flood Problem

This natural setting has made flooding the national plague of Bangladesh for centuries, and three trends now make the problem much worse. The first is an annual population growth rate of 2.5% per year that has increased the number of people to the oppressive average density of 2,200 per square mile. More people need more space to grow food, live, and conduct their business and are occupying lands with greater hazard; the increasing conflict between people and water for the use of the floodplains is multiplying losses. Simultaneously, this region has over the last 300 years gone from being one of the richest to one of the poorest places on earth and left people fewer resources for coping with their losses.

The second trend is the growing world economy and the rising expectations of people everywhere. The people of a poor country will no longer remain content living in poverty. They want the opportunity to invest in a better future without periodically having their possessions washed away. Ways must be found to advance the national economy of Bangladesh in the midst of the flood hazard.

The third trend is a growing disillusionment; people feel that they can do little and that government programs are ineffective. Such nonstructural approaches to flood

mitigation as land management, flood insurance, and even warning, evacuation, and relief are undertaken in other countries, but they work poorly in Bangladesh because of the size of the area inundated, the amount of losses, the lack of flood-free land, poor communications, illiteracy, and the rudimentary financial institutions that exist in an economy that has not yet reached a monetary basis. Standard reservoirs and channels are ineffective because of the vast quantities of water involved, limited numbers of storage sites, and mild gradients. People see two remaining options, embankments and floodproofing, and their proponents are dividing into opposing camps that separate people and obstruct workable solutions.

The embankment builders, disparagingly called "embankers," are more active in Bangladesh, and floodproofers, or "proofers" are more active in the international community. The country has built embankments over the years to protect towns and farms; they are now topped by roads for year-round transport. However, the construction disrupts natural flow patterns, resulting in eroded banks, higher river levels, disturbed fisheries and wetland environments, and levee failures that can cause greater losses than natural flooding.

Kinds of Flooding

In order to find solutions, one must first understand the problem. Flooding in Bangladesh has four principal forms. The most dangerous floods are caused by cyclones that sweep out of the Bay of Bengal, tilt the sea surface northward, generate waves on top of the higher water that breach the coastal dikes, and send walls of water into populated areas where many lives are lost.

River floods, in which stages rise over a few weeks to spread over the countryside, are the second form of flooding. The worst conditions come when the peak flows on the three main rivers—the Ganga, the Brahmaputra, and the smaller Meghna—coincide.

The embankments constructed to contain river flooding may cause river levels to continue higher than the land for weeks. The third cause of flooding is the blockage of drainage due to rains that can total several feet while the rivers are high and due to seepage through the levees.

The fourth kind of flooding occurs when levees are overtopped by large floods or

breached by people trying to protect themselves by directing the floodwaters elsewhere. The damages following levee failures are aggravated by the rushing waters, and people can be trapped by such floods, as they are by cyclone floods in coastal areas.

Flood Action Planning

Following disastrous riverine flooding that inundated about 40% of the country in 1987-88, the government of Bangladesh asked the World Bank (IDA) for help. The bank assembled experts from around the world to formulate a Flood Action Plan (FAP). Study teams of specialists from Bangladesh, international agencies, donor governments, and nongovernment organizations addressed the flood problem in 26 little FAPs. Participants in addition to the U.S. are the European Economic Community (EEC), the United Nations Development Program (UNDP), and the Asian Development Bank (ADB). The first six FAPs are regional studies (IDA, UNDP, EEC, France, Japan, and Canada). The others are: 7) cyclone protection (EEC), 8) Dhaka protection (ADB, Japan, and Finland), 9) secondary loan protection (ADB, IDA), 10) flood forecasting (UNDP, Japan), 11) disaster preparedness (UNDP), 12) and 13) agriculture, and operation and maintenance (Britain, Japan), 14) flood response (U.S.), 15) resettlement (Sweden), 16) environmental impact (U.S.), 17) fisheries (Britain), 18) topographic mapping (Switzerland, Finland, France), 19) geographic information systems (U.S.), 20) compartmentalization (Netherlands, Germany), 21) bank protection (Germany, France), 22) floodplain management (Germany, France), 23) floodproofing (U.S.), 24) river survey (EEC), 25) flood modeling (Denmark), and 26) institutional development (UNDP).

American participation is coordinated by the firm of Camp Dresser & McKee, assisted by seven other organizations, in a consortium called the Irrigation Support Project for Asia and the Near East (ISPAN), with offices in Arlington, Virginia, and Dhaka. The American team involves about 40 people from a number of disciplines in universities and consulting firms around the country. The purposes of the four American FAPs are to define ways for: 1) floodproofing to develop an economy in the midst of flooding, 2) protecting environments while implementing flood measures, 3) integrating the lessons learned from past flood experiences into future programs, and 4) using

geographic information systems (GIS) as a spatially distributed information base for planning.

Conceptualization of Flood Action Planning

Some embankers see levees ringing multiple polders [dike-protected land–ed.] as the structural way to solve the flood problem. They point to success in the Netherlands and other delta areas and the need for capital infusion to build a weak economy. Many embankers see floodproofing as only applicable in areas that cannot be placed behind embankments or as a stop-gap measure until levees can be built. Proofers make embankers see red when they mention floodproofing as a substitute for costly embankments.

People from both polarized positions view the Flood Action Plan as a tool of their opposition. Proofers see the FAPs as promoting large embankments in a country that can ill afford them, in an environment where they do great harm, and in an economy that will realize little gain. Embankers see the FAPs as opposing embankment building against the aspirations of the people who could be protected.

The true spirit of the FAPs is to investigate the pros and cons of alternatives, in all their variations, throughout the country, to combine them in good programs for each location. The long-term goals are productivity (economic development), stability (insulation of incomes against minor disturbances), sustainability (continued growth over time despite flooding), and equity (gains evenly distributed over the population).

Conceptualization of Floodproofing

Whereas embankments contain floods, floodproofing seeks to reduce the vulnerability of the people to floods. A good program reduces physical, social, and economic vulnerabilities by preserving production capacity and supporting commerce. Farms, factories, and infrastructure must continue to function. The most vulnerable people have their livelihoods placed at risk by hazards that they poorly understand with little institutional support for mitigating their losses. Embankments may increase vulnerability by changing flood risk to an unfamiliar form, and floodproofing can alleviate this situation.

Many floodproofing ideas that seem good to expatriates are untried in the Bangladesh culture. Other floodproofing practices have been employed in Bangladesh

for generations, but better risk information can help people do a better job. The FAP is proposing measures for diverse places. Four proposed pilot projects are:

- 1) Refuge areas to provide people safety and security during flood events. For stable service over time, these should be run locally and be made fiscally sound by generating income by performing supplemental services year after year.
- 2) Flood emergency centers to deliver flood forecasts, data on current flood conditions, and supporting services to help people during flood events. The center should have the knowhow to help and the authority to intervene.
- 3) Floodproofed infrastructure to set design and maintenance tools and standards that will reduce disruptions to transport and commerce. For example, road builders can use river models to study alternative alignments and reduce flood losses.
- 4) Risk information center to define flood risks to give land use planning and construction design reliable information and sound technical expertise. Better information will help build confidence for investing in the national economy.

The goal of finding floodproofing suitable for Bangladesh is not the same as preserving the status quo. It is working with people who want to reduce their vulnerability and to develop their communities economically and not just with people who would be benefactors of the illiterate poor.

Different Planning Concepts

Both embankers and proofers argue from principles rather than specifics. The controversy could be ameliorated by a better concept of planning. Two concepts are:

Concept A: Decision makers choose a measure (generally they are biased for embankments over floodproofing) and plan to expedite its efficient implementation.

Concept B: Decision makers recruit teams of experts and ask them to find a good combination of measures for each location.

The Bangladesh bureaucracy and both proofers and embankers prefer Concept A.

However, problems are more likely to be solved by Concept B. In order to bring people together, Concept B Planners must search out reasons why Concept A is so popular and address legitimate fears. Some probable reasons are:

- a) Early decisions give political leaders a sense of control that helps them use programs to secure popular support.

- b) The more simplistic approach reduces the complexity of the studies and the possibility of surprises.
- c) Concept B planning feeds continuing confrontations that make many people uncomfortable and uncertain.
- d) Part of the Concept B approach is to identify and correct mistakes, and that places people who make decisions in uncomfortable positions.

Concept B planning would supplement justified embankments with floodproofing against the consequences of levee failure during extreme floods. It would supplement floodproofing with small local embankments to protect buildings. Each group would see its program helped by expertise from the other. Proofers who provide contingency floodproofing to reduce losses should the embankments be overtopped will begin working with embankers. Everyone will understand each other better, and a track-record of cooperation that will add credibility to both programs will be developed. It would alleviate the fears of Concept A embankers, now in control in Bangladesh, who foster delays to protect their position. The FAP studies are to find facts for all to use.

Much rhetoric on environmental protection is exacerbating fears and obstructing efforts to find facts and make objective decisions. A widespread feeling, too often reinforced by bad experiences, is that studies are largely a means of delaying action. Environmentalists need a track record of not being swayed by "minors" but holding fast to protect "majors."

Flood Program Dynamics

Concept B planning is likely to favor floodproofing early and embankments later when they can be justified by an upward trend in marginal benefits. However, effective floodproofing that is introduced now and continued throughout urbanization will reduce the amount of embankments. People living near migrating rivers, where embankments will never be justified, can improve their lives by floodproofing and living productively with the hazard.

Floodproofing should not be conceived as a way to protect present livelihoods but as a way to better life so that people can improve their lot without moving to the cities. Both embankments and floodproofing can initiate local economic "take off." Bangladesh cannot afford greater population concentrations in urban centers.

Floodproofing requires a major effort by common people who will not work hard

unless they can better themselves. The poor of Bangladesh are more interested in their personal welfare than in saving their government or the world community the cost of buying structural flood control.

Implementation

One important issue is the capacity of the country to absorb foreign aid. The government of Bangladesh may have reached its limit in managing programs, but many floodproofing concepts can be implemented through the private sector where more capacity exists. Planning should make an effort to be productive without upsetting established bureaucratic channels. Ways need to be found to maintain floodproofing despite the technical problem of keeping ahead of natural deterioration and the financial problem of paying for the work.

Conclusions

The priority short-run objective for Bangladesh is to sustain the food supplies of its current population; the long-run objective is economic growth. No country has fully integrated structural and nonstructural measures over time, and yet many would ask one of the world's poorest and most backward countries to do so. We talk of using floodproofing, an information intensive technology, in a country where few people read. We talk of protecting a delicate natural environment for people who scarcely have enough food. Our greatest challenge is to overcome ideologies and find a practical road to better lives for a poor and suffering people.

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