QUICK RESPONSE REPORT #76

FARMERS' AND PUBLIC RESPONSES TO THE 1994-95 DROUGHT IN BANGLADESH: A CASE STUDY

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1995

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This material is based upon work supported by the National Science Foundation under Grant No. CMS-9632458. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

ACKNOWLEDGEMENTS

I wish to thank the Natural Hazards Research and Applications Information Center at the University of Colorado-Boulder for funding this project. I would also like to thank Dr. Maudud Elahi, Professor of Geography, Jahangirnagar University, Savar, Dhaka, Bangladesh for his generous assistance with the field work. Special thanks are due to all field investigators, particularly Md. Hamidur Rahman, Khandoker Zakir Hayat, and Md. Mofaqkharul Islam for conducting field survey in Bangladesh. Figures used in the original report were drafted by Michael J. Kollmeyer. This assistance is highly appreciated. Finally, I express my gratitude to the Department of Geography, Kansas State University for providing me financial as well as logistical support to complete this research project.

SUMMARY

Droughts are recurrent features in Bangladesh. They affect plant growth, leading to loss of crop production, food shortages, and for many people, starvation. The main objective of this study was to examine the means by which residents of a drought affected area of Bangladesh cope with this hazard. Data used in this paper were collected during the summer of 1995 from 301 drought affected households located in the northern part of Bangladesh. The analysis of the data suggests that respondent households practiced an array of adjustments to mitigate adverse effects of the 1994-

95 drought. While both high and low income households were affected by the drought, the analysis further indicates that households belonging to the lower socio-economic group suffered the most. Among all households they received the least support from the government. In fact, the governmental responses were delayed and inadequate to provide financial and other assistance to the drought victims. It is suggested that the government should be prepared for drought long before the occurrence of such an event.

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INTRODUCTION

Many people in Bangladesh as well as the government perceive floods and cyclones as recurrent environmental hazards in the country. They also view that these two hazards are the main contributors to crop loss in the country. But in reality, droughts afflict the country at least as frequently as do major floods and cyclones, averaging about once in 2.5 years (see Adnan 1993, 1; Ericksen 1993, 5; Hossain 1990, 33). In some years droughts not only can cause a greater damage to crops than a flood or cyclone, but they generally also affect more farmers across a wider area. For example, drought was the lone environmental factor to cause severe crop damage in Bangladesh in 1994. The northwestern region of the country, popularly known as North Bengal, experienced one of the most severe droughts of the century, which started in October 1994 and was broken in July 1995 with the onset of monsoon rain (Rahman

1995, 8).

The continued drought in the northwestern districts of Bangladesh led to a shortfall of rice production of 3.5 million tons (Rahman and Biswas 1995, 7).(1) These districts are considered the granary of Bangladesh and produce surplus rice - the main staple of the country. However, by early 1995, the government food stock fell the lowest level in the last five years. The government had agreed to import 0.2 million tons of rice to offset the shortage in government stock and meet the country's requirement on an emergency basis (Rahman and Biswas 1995, 9). A significant quantity of food grain has already reached the country.

OBJECTIVES

Despite the recurrent and devastating nature of drought in Bangladesh, it has received much less attention from researchers than floods and cyclones (Brammer 1987, 21; also see Alexander 1995, 2). In a recent annotated bibliography of social science literature on natural disaster in Bangladesh, Alam (1995, 6) listed only 11 titles on drought as against 156 for floods and 54 for cyclones. The primary objective of this study was to explore and analyze the ways and means by which residents of drought affected areas adjust to drought conditions. The extent of damaged caused by the 1994-95 drought is also examined with the help of data collected from a sample survey conducted in the drought-affected northern districts of Bangladesh.

The adjustment strategies adopted by the people in rural Bangladesh will be studied using a structuralist political-economy approach (Emel and Peet 1989, 50; Zaman 1989, 198). This approach claims that people affected by environmental hazards respond in different ways, depending on their economic position, and social and political linkages. Variables important in this context are occupational characteristics, landholding size, tenancy status, and years of schooling. Some of these variables make some people more vulnerable to drought than others (see Liverman 1990, 50).(2) The household responses to the 1994-95 drought will be examined in relation to the above variables.

An additional variable is also considered in order to see whether or not institutional membership status influences adjustment strategies of the affected people. In the context of flood adjustments, it has been found that the households that were members of institutionalized groups demonstrated a better performance compared to their counterpart nonmembers (Haque 1993, 384). The institutionalized groups are defined as the registered target groups of government and nongovernment organizations (NGOs) such as agricultural cooperatives, credit unions, and women's groups.

Before dealing with the research design and findings of the sample survey, definitions of drought and its effects are conceptualized in the next section. This is followed by a section which provides a brief accounts of drought occurrences in Bangladesh. These two sections are very relevant to understand drought as an extreme event to which Bangladesh is prone. The next section deals with the survey design of the study and the profile of the sample households. The main section reports the results of the sample survey. The concluding remarks are presented in the final section.

CONCEPTUAL ISSUES

Drought definitions abound and are used to meet specific goals such as agricultural development planning or water resource management (Giambelluca et al. 1988, 406; Jallow 1995, 24). In the context of Bangladesh, Brammer (1987, 21) defines drought as a period when soil moisture supply is less than what is required for satisfactory crop growth during a season when crops normally are grown. This definition resembles one provided by Heathcote (1974). He defines drought as a "shortage of water harmful to man's agricultural activities. It occurs as an interaction between agricultural activity (i.e., demand) and natural events (i.e., supply), which results in a water volume or quality inadequate for plant and/or animal needs." Thus, a drought is not absolute in the sense of there being a total lack of rainfall during a normal crop growing season.

The impacts of drought are diverse and often ripple through the economy. Impacts can be classified as economic,

environmental, and social. They are often referred to as direct or indirect, or they are assigned an order of propagation (i.e., first-, or second- order) (see Kates et al. 1985). In a society where agriculture is the main economic activity, a direct or first-order impact of drought is observed in the form of decrease in food production via decrease in area and yield. The second-order impact is decreased employment and income. The delay in sowing and transplanting crops reduces agricultural employment. Employment opportunities are further reduced due to diminished need for weeding and harvesting.

Because of reduced food production, prices of foodgrains usually rise rapidly following a drought (Ghose 1982, 389). Decreased food production, abnormal increases in foodgrain prices, and non-availability of jobs reduce the food entitlement of rural people, especially the small farmers and landless laborers. At this stage, drought victims often are compelled to buy food by selling their lands, household goods, and livestock at distressed prices (Reardon et al. 1988, 1065).(3) People start to consume wild plants, tubers, and leaves not normally eaten (Jallow 1995, 35). This provides an 'early warning' of famine. In this stage government and NGOs need to mobilize additional food from different sources and distribute it free of cost or at subsidized price to the affected people and provide additional employment opportunities or financial aids to the drought victims. Failing these responses famine becomes unavoidable.

People adapt various strategies to cope with the effects of drought. At the household level, people intend to reduce the effects of drought hazard by using two types of drought-mitigating techniques. These techniques are referred to as agricultural and non-agricultural adjustments. People usually practice agricultural adjustments to compensate for crop loss. Without such adjustments, people will get lower than expected food production, which can threaten their food security. People practice some agricultural adjustments, such as resowing of crops, in order to compensate for the reduction in the crop area, and others, such as application of irrigation water, to increase crop yield (Brammer 1987, 24-25). Both adjustments are practiced for the same purpose, i.e., to attain food production at or near the level of normal year.

Because of many fold rise in the prices of foodgrains during the drought period, people need additional cash to buy food crops for consumption. For this reason, they generally practice non- agricultural adjustments. The need for cash is further aggravated due to remarkable decrease in demand for agricultural wage laborer. As a result, people either sell and/or mortgage their land and livestock, and sell their belongings to earn additional cash. The community in which the drought victims live also helps in coping with the negative impact of the hazard. All members of the affected community are not equally vulnerable to drought. At the community level, friends, neighbors, relatives, and affluent members of the *samaj* may help the drought victims by providing cash, loans, food, and clothes.(4) In the same way, the local government and various NGOs can also help to avert the impact of the drought.

Beyond the community level, the national government as well as friends and relatives of the drought victims who live outside the victims' community can play key roles by providing financial and other support to overcome the hardships of the drought victims as well as to halt the occurrence of famine. Distribution of free food, clothes, medicine, and other relief goods is the appropriate public response to drought hazard. The government can also minimize hardships by creating employment opportunities for the drought victims and providing financial assistance to them.

The non-local NGOs may also extend their support to the drought victims to cope with drought losses. Indeed, the impact of the drought can be reduced significantly if all parties respond to the hazard adequately in appropriate time. Otherwise drought victims will face hardship in coping with the hazard. The government's interventions are particularly needed to avert famine and minimize the hardship of the drought victims.

DROUGHTS IN BANGLADESH

Since independence, Bangladesh has experienced droughts of major magnitude in 1973, 1978, 1979, 1981, 1982, 1989, 1992, 1994, and 1995 (Adnan 1993, 1; Hossain 1990, 33). Although droughts are not always continuous in any area, they do occur sometimes in the low rainfall zones of the country. As listed above, Bangladesh experienced consecutive droughts in 1978 and 1979, 1981 and 1982, and 1994 and 1995. The 1973 drought was labelled 'the worst in recent history,' 1979 drought was dubbed 'the worst in living memory,' (see Murshid 1987, 35) and 1994-95 drought 'the worst in this century' (Rahman 1985, 8).

Drought severely affects crop output in Bangladesh. Because of nonavailability of relevant data, the figures on the annual drought-related loss of crop production cannot be presented except for the 1982 drought. The total loss of rice production due to drought in 1982 was 52,896 metric tons (BBS 1986, 287-90). This accounted for about 41% of the total damage caused by all types of environmental hazards (cyclones, hailstorms, heavy rains, floods, and drought) that occurred in that year. The 1982 flood damaged about 36,000 metric tons of rice, much lower than the damage done by drought. Brammer (1987, 21) claimed that the 1978-79 drought reduced rice production by an estimated two million tons. It directly affected about 42% of the cultivated land and 44% of the population (Ericksen et al. 1993, 5). Ahmed and Bernard (1989, 40) and Hossain (1990, 37) contend that during the 1973-87 period, crop losses to drought were almost as severe as the losses attributed to floods. About 2.18 million tons of rice were damaged due to drought in the above period. The corresponding flood loss was 2.38 million tons.

Drought adversely affects all three rice varieties (*aman*, *aus*, and *boro*) grown in three different cropping seasons in Bangladesh.(5) It also causes damage to jute, the country's main cash crop, and other crops such as pulses, potatoes, oilseeds, minor grains, winter vegetables, and sugarcane. Rice alone accounts for more than 80% of the total cultivated land of the country. Droughts in March-April prevent land preparation and plowing activities from being conducted on time. As a result, broadcast *aman*, *aus*, and jute cannot be sown on schedule. Droughts in May and June destroy broadcast *aman*, *aus*, and jute plants. Inadequate rains in August delay transplantation of *aman* in high land areas, while droughts in September and October reduce yield of both broadcast and transplanted *aman* and delay the sowing of pulses and potatoes. *Boro*, wheat, and other crops grown in the dry season are also periodically affected by drought. Fruit trees, such as jackfruit, litchi, and banana, often die during drought. But the loss of rice production is the most costly damage incurred by droughts in Bangladesh.

The impact of drought spreads disproportionately amongst regions of Bangladesh. There is a popular impression in Bangladesh that the northwestern districts of Rajshahi, Dinajpur, Rangpur, Bogra, and Pabna are particularly drought-prone (Murshid 1987, 38).(6) The northwestern districts are relatively dry, receiving only 50 inches of rainfall annually. The eastern districts, in contrast, receive more than 80 inches of rainfall. But drought can hit both drought-prone and nondrought-prone areas (see Murshid 1987, 38; Paul 1995).

RESEARCH DESIGN

Selection of the Study Area

This study is founded on data collected from a selected rural area of Bangladesh. Eight northern districts (Dinajpur, Gaibanda, Kurigram, Lalmonirhat, Nilphamari, Panchagarh, Rangpur, and Thakurgaon) of Bangladesh were severely affected by the 1994-95 drought. The drought-affected districts cover an area of 16,318 square km and contained a population of nearly 12 million in 1991 (BBS 1994, 39-40).(7) Based on newspaper reports and consultation with government officers residing in the drought affected districts, eight thanas (Badarganj, Debiganj, Gangachara, Ghoraghat, Gobindaganj, Kishoreganj, Mithapukur, and Saidpur) were initially selected for field survey.(8) These thanas are located in five of the eight drought affected districts of Bangladesh. After consultation with the thana government officials and leaders, 32 villages were chosen for this study.(9)

Questionnaire Survey

The primary sampling unit of this study was individual households. A household is a group of people in a housing unit living together as a family and sharing the same kitchen. The household head represented his/her household members as a respondent of the survey. The head of the household is defined as the person who makes the major economic, social, and household decisions irrespective of age and gender.

A sample size of 320 households was covered and the heads of the sample households were interviewed with the help of a structured questionnaire (see Appendix). The interview was supplemented by informal post-interview discussion. The questionnaire comprises two parts. The first part contains questions on the extent of crop and other damages

caused by the 1994-95 drought and on coping strategies adopted by the drought victims to mitigate the effects of the hazard. The second part focuses on sociodemographic background of the respondent family.

A complete list of all households of the selected villages was compiled and the appropriate number of samples was then chosen from each selected village using a random procedure. Ten trained field investigators conducted the field survey during the month of May in 1995. The PI was in Bangladesh at the time of field survey and participated in the field work. Most field investigators have already earned Master's degree either from the University of Dhaka or Jahangirnagar University. Others are students of one of the above two universities.

Profile of the Sample Households

Out of a total of 320 respondents, 314 were successfully interviewed, resulting in a response rate of 98%. Thirteen responses were excluded because the questionnaire was not filled out in proper way. This gives a final sample size of 301. Selected characteristics of the heads of the sample households are presented in Table 1. They are categorized under four occupational groups: farmers, service holders, businessmen, and laborers. As many as 72% of the sample households were engaged in agriculture. If agricultural laborers, which categorized under laborers, are considered as employed in the agricultural sector, the percentage of respondent households directly dependent on farming rises to 77. This percentage is more or less consistent with the corresponding figure for the country as a whole. Nearly 16% of the respondents are service holders, while about 6% are businessmen. Farming is the secondary occupation of both these two groups.

Based on land ownership, the latest agricultural census of Bangladesh classified farmers into three categories: small farmers (up to 2.4 acres), medium farmers (2.5-7.4 acres) and large farmers (7.5 acres or more). They account for 62%, 32%, and 7% of the total farmers of the former districts of Rangpur and Dinajpur (BBS 1994, 158). The first category also includes landless households. The proportion of respondents interviewed under three landholding categories differs from the above percentages (see Table 1) because the study area has relatively larger landholding size compared to the other parts of Rangpur and Dinajpur districts. In fact, the average landholding size of both Dinajpur (3.3 acres) and Rangpur (2.3 acres) districts is higher than the national average (2.2 acres) (BBS 1994, 158).

Based on their tenancy status, the respondent households are also classified into two groups: owner farmers and tenant farmers. Irrespective of their landholding size and occupational category, the respondent households are considered owner farmers if they themselves cultivate their farm lands with the aid of family labor and/or hired labor. Tenant farmers are those who, along with their own land, also cultivate lands of others as share croppers, or rent out some of their own lands to others. Table 1 shows that 58% respondent households are classified as owner farmers while the remaining 42% as tenant farmers.

Data on educational attainment indicate that 68% of the total heads of the sample households were literate. Given the country's overall literacy rate of 32.4 in 1991 (BBS 1994, 263), the sample represents a higher literacy rate. It is noteworthy that the male literacy rate (38.9) in Bangladesh is much higher than the female literacy rate (25.5%) (BBS 1994, 263). With one exception, all heads of the households in the study villages were male. Nearly 21% of the respondents had one to five years of schooling while 47.2% had more than five years of schooling. Only 9% respondent households were members of the various registered organizations.

RESULTS

Similar to the rest of Bangladesh, agriculture is the principal economic activity of the vast majority of the people in the study area. The main crops of the study area are all three varieties of rice, jute, wheat, pulses, and potatoes. *Boro* rice and other minor crops of the dry season are grown with the aid of irrigation. Lack of moisture often causes damages to the other two rice varieties, particularly if no rain occurs during the growth period of rice plants or at the flowering stage. As a result, crop damages constitute the major damage caused by drought in Bangladesh.

Crop Damage

Among all the respondent households, ten had no farm land. Only one of the ten landless households was employed in farming as pure tenant farmer.(10) Of the 292 respondent households who either owned land and/or associated with farming as a share cropper, as many as 290 experienced crop damage due to the drought of 1994-95. The damage was so widespread because the 1994-95 drought expanded over all three cropping seasons and, thus, all three rice varieties were affected by it. No loss of human life was caused by the drought.

The survey data shows that as many as 15 different crops wereaffected by the drought of 1994-95 (Table 2). A large number of crops were damaged because the drought period corresponds with 1995 sowing period of *aus*, *aman*, and *boro* rice, jute, and (summer) chillies; 1994 sowing period of winter crops (e.g., vegetables, potatoes, pulses, til, kaon, onion/garlic, chillies, and wheat); 1994 harvesting period of *aman* rice; and 1995 harvesting period of *boro* rice, and winter crops including wheat. The loss in crops was attributed to both decrease in acreage and yield of crops.

Aman was the most affected crop by the 1994-95 drought. Of the 290 respondent households, 281 (97%) reported loss of *aman* rice (Table 2). Like most other parts of Bangladesh *aman* is the main rice crop of the study area. It accounts for nearly 56% of the total rice acreage of Bangladesh (see BBS 1994, 180). Another reason for widespread damage of *aman* rice was that both sowing and harvesting periods of the crop correspond with the drought period. The percentages of the total *aman* acreage damaged ranged from 45% to 100%, with average damage in the vicinity of 75%.

In terms of extend of crop damage, *aus* rice ranks second followed by jute and *boro* rice (Table 2). Two hundred thirty-two of the 290 respondent households reported loss of *aus* rice acreage due to 1994-95 drought. Based on the responses of the sample households, nearly 65% and 55% of the *aus* and jute acreages were respectively damaged by the drought. Other crops damaged by the 1994-95 drought were: wheat, potatoes, kaon, sugarcane, pulses, til, vegetables, onion/garlic, chillies, and groundnut (see Table 2). Kaon is a drought resistent minor grain crop while til is one type of oilseed. Sugarcane is an annual crop, sown in October and November and harvested between the following December and March. Two respondent households left their entire farm land fallow during the 1995 sowing period of *aus*, *aman* rice, and jute.

The percentage of crop acreage damaged by the 1994-95 drought as reported by the respondents seems consistent with the reports published in the national dailies. They claim that the crop yield in the drought affected areas of the greater Rangpur and Dinajpur districts was reduced by 60-70% (see Rahman 1995, 8). The decrease in production was more than the decrease in yields because of reduction in cropped area. A substantial amount of arable land remained unsown in the study area due to lack of water.

Other Damages

In addition to crop loss, 178 (59%) respondent households experienced other types of damages due to the 1994-95 drought. The extreme heat and lack of moisture caused loss of trees of as many as 163 respondent households. The respondents lost different types of trees such banana, mango, bamboo, coconut, bettlenut, and jackfruit trees. Twenty-two respondents reported that they lost one or more livestock. Another 18 experienced loss of poultry. Dried up pond beds caused loss of fish of 9 respondents.

Drought Adjustment Mechanisms

In order to cope with the adverse effects of the 1994-95 drought, the affected households practiced various adjustments at the household level. Beyond the household levels, they also received support from both formal and informal sources.

Household Level Adjustments: Agricultural Adjustments

Since the study area is subject to occasional drought, the local communities have over the years developed a range of strategies to combat it. In an agrarian country like Bangladesh, crop adjustments usually constitute the focal point of risk aversion strategies (Jallow 1995, 28). Surprisingly, only 22 (8%) respondent households out of 290 practiced

agricultural adjustments to reduce crop loss due to the 1994-95 drought. As many as 16 of the 22 respondents were from Debiganj (Panchagarh district) area. The remaining six respondents were from Ghoraghat (Dinajpur district), Badarganj and Mithapukur (Rangpur district) areas. Because of the location in the remotest corner of the country, the respondents of the Debiganj thana expected little help from formal sources. Probably for this reason, a relatively large proportion of households practiced agricultural adjustments. Additionally, the area was hardest hit by the 1994-95 drought. As will be evident from later discussion, many respondent households did not practice agricultural adjustments due to financial reasons. All of the respondent households who practiced agricultural adjustments adopted crop replacement strategy. They cultivated kaon, jute, wheat, and onion instead of rice.(11) Other strategies were practice of irrigation, gap-filling, and interculture of wheat and kaon, each practiced by a single respondent household. Gap- filling is practiced in fields where germination of an earlier crop has been poor or patches of seedlings have died.

A number of agricultural adjustments practiced during the drought period in other parts of Bangladesh were not reported by the respondent households (see Brammer 1987). One traditional adjustment farmers usually practice if drought occurs during early *kharif* (March-April) is the conservation of the soil moisture provided by occasional showers. After each shower, farmers quickly plough or handweed their fields. These operations reduce moisture losses by evaporation and evapotranspiration, and prepare the soil to absorb the next shower quickly and deeply. The study area did not experience any rainfall and probably this is why this adjustment technique was not employed.

Resowing of crops was not also reported by the respondent households. This is an adjustment usually practiced if drought occur in April after *aus*, *aman*, and jute have been sown. The young plants may die due to lack of moisture. In such a situation, farmers often resow the crops in May and June. As the 1994-95 drought lasted since October of 1994, respondents had limited opportunity to resow crops. Agricultural adjustments to drought are not confined only during the drought period. To compensate loss of crop production, farmers devote more land to crops in the post-drought period.

Since only a few households practiced agricultural adjustments to drought, no attempt is made to explore the relationship between the adjustment and the selected characteristics of the respondent households. The analysis of reasons for not practicing agricultural adjustments, however, suggests that the respondents of the middle and large landholding categories were in a better position to practice agricultural adjustment compared to their counterparts, the respondents of the small landholding class. One hundred twenty- four respondent households reported that they could not practice agricultural adjustment because of financial reasons. Of them 71 (61%) fall in the small landholding size category.

Resowing or irrigating crops requires additional money, which many respondent households, particularly the poor ones, could ill afford during the disaster period. There are two sources of irrigation for crops in the study area. Application of water in the crop field by fetching water from nearby sources, such as wells, tanks, or hand pump tubewells. An alternative is to install a deep or shallow tubewell in the crop field. The former requires additional labor while the latter demands large capital investment. Even if some villagers are financially able to invest capital in a well or could get institutional finance to sink a well, still there is no certainty that they will get water in the well due to decrease of the water table. In fact 124 respondent households mentioned lack of water as the principal reason for nonadoption of agricultural adjustment. This resulted in the decrease of gross irrigated areas. Another 33 respondents did not practice adjustments because they suffered from indecision. A considerable number of respondents gave more than one reasons.

Household Level Adjustments: Non-agricultural Adjustments

Household and personal assets are not generally disposed of under normal circumstances. But this changes with the onset and intensification of an environmental hazard like drought. When a drought occurs and domestic food stocks become exhausted or very low, efforts to raise cash through the sale of assets assume more importance. The survey showed that 88% of the total respondent households sold their belongings to cope with the devastating effect of the 1994-95 drought. As many as 166 (55%) respondent households attempted to cope with the drought by selling their livestock, 112 (37%) respondents by selling their land, and 106 (35%) respondents by mortgaging-out their land (Table 3).(12) Twenty-six (9%) respondent households sold other belongings such as poultry and housing structures. Only two respondents mortgaged out their livestock. Members of only one respondent household migrated to an other area.

No respondent spent previous savings or sold their valuable possessions such as jewelry to cope with the 1994-95 drought. But a vast majority of the respondent households deferred the purchases of clothing and luxury items during the drought period.

One important point emerged from the extent and type of nonagricultural adjustments made by the respondent households. The 1994-95 drought was a severe one since 72% of the respondents had to sell and/or mortgage out their lands to cope with the hazard. As mentioned above, villagers usually sell and mortgage out land only in extreme circumstances. It is worthwhile to mention that all respondents who had practiced agricultural adjustments also practiced non-agricultural adjustments. This suggests that they were the group most affected by the 1994-95 drought and they were compelled to adopt both types of individual level adjustments in order to ensure their survival against the devastating effects of the 1994-95 drought.

Table 4 presents individual level adjustments by selected socio-economic and demographic characteristics of the head of the respondent households. The X2 statistic in the table shows that the practice of both agricultural and non-agricultural adjustments differs significantly with respect to occupational characteristics of the head of the sample households. Farmers were more likely to adopt adjustment at the individual level compared to businessmen and service holders. Because of their educational attainment and access to government and other sources, businessmen and service holders are in a better position compared to the farmers to receive support from various sources. For this reason, they seem less willing to make individual level adjustments to cope with drought hazard.(13)

Adoption of individual level adjustments to drought also significantly differs according to landholding size and tenancy status of the sample households. As expected, the small and middle farmers adopted adjustments relatively in greater proportion compared to the large farmers. Ninety-six percent of all tenant farmers adopted individual level adjustments. The corresponding percentage is 82 for owner farmers (Table 4). More than two-thirds of the tenant farmers are also small farmers, which might explain why they practiced individual level adjustments in larger numbers compared to their counterparts.

Data presented in Table 4 further suggests that illiterate respondents practiced individual level drought adjustments in larger proportion than the literate respondents. This is consistent with the earlier findings reported on occupational categories and adoption of adjustments. Illiterate respondents have the least access to various sources involved in supporting the drought victims and therefore they are compelled to make individual level adjustments to mitigate the effects of the hazard. No statistically significant difference is observed with respect to drought adjustments between member respondents and non-member respondents of institutional organizations.

Beyond Household Level Support

Some drought affected households received support from community and beyond community level sources. Because these sources provided support to a relatively small number of households, they are aggregated for convenience of analysis. The survey showed that 113 (38%) respondent households received financial and other forms of support from various government and nongovernmental sources to cope with the drought hazard of 1994-1995. Table 5 indicates that the respondents used six different sources of support and four respondents received support from two sources. The principal source of support for the respondent households was the national government, whose involvement was restricted to provide cash loan to the drought victims through public banks such as Janata Bank, Sonali Bank, and Krishi Bank. Other sources of support were relatives, friends, NGOs, other villagers, and local government. Eighteen respondents were the recipients of support from their relatives, sixteen from their friends, nine from NGOs, seven from other villagers, and four from local government. Some friends and relatives lived in villages other than victims' ones. Assistance from informal sources during times of environmental and other hazards is expected and is still forthcoming.

The items of assistance received from the above six sources were cash loans, food, seeds, and fertilizer. One hundred seven (36%) respondent households received cash loans from government banks, relatives, friends, and NGOs (Table 5). Similar to the national government, NGOs' role was limited to provide cash loans to the victims. The respondent households who were successful in obtaining cash loans from formal sources, on an average, received Tk. 9,140.00 (US $228.00). The amount of loans ranged from only Tk. 200.00 (US $5.00) to Tk. 1,00,000 (US $2,500.00). The

median per capita household loan received from government sources was Tk. 5,000.00 (US $125.00). The amount of loans provided by friends, relatives, and other villages was much lower compared to the corresponding amount provided by the formal sources. The average amount of money borrowed from the informal sources was only Tk. 2,500 (US $62.50) per borrower household. Local government, friends, relatives, and other villagers were the sources for other items offered to the drought victims. Only 10 respondents received other items of supports.

Table 6 suggests that the support receipt from both governmental and nongovernmental sources differ significantly according to the occupation, land ownership, tenancy, and years of schooling of the respondents. Contrary to the expectation, no difference exists in terms of receiving support from different sources between farmers, and businessmen and service holders. The statistically significant X2 value is found because of the laborer group. Only 11% of all laborers received support from government and non-government sources (Table 6).

But when only governmental sources are considered, the businessman and service holders were the overrepresented groups. As indicated earlier, members of these two groups are more educated and also own relatively more land compared to their counterpart groups. Additionally, they are acquainted with local and thana levels government officers and have regular contact and/or personal relationship with the officers, bank managers, other key officials involved in providing support to mitigate hazard loss. Because of their connections and influence, they not only were overrepresented in receiving government support, but received larger amounts of support compared to their counterparts. The average cash loan received from the government banks was about Tk. 20,000 (US $500.00) for respondent households engaged in business or employed in the service sector.

Since the respondents owning moderate and large landholdings are more influential than their counterparts, the former two groups were better represented in receiving supports beyond the household level (Table 6). The survey data indicates that a considerable number of middle and large landowners rented out some of their lands to tenant farmers. Additionally, some educated respondents who are employed in nonagricultural sectors also rented out lands to tenant farmers. As noted earlier, both rented out and rented in tenants are considered tenant farmers. For this reason, a strong positive relationship is also evident between receiving support and the type of tenancy.

In terms of ability to secure support from various sources, the respondent households that were members of institutionalized groups did better compared to their counterpart nonmembers (see Table 6). Eighty-two per cent of members of institutional organizations received support from various government and nongovernment sources. Only 18% of all nonmember respondents received such support. The above finding corroborates the contention that the development of social institutional networks can effectively lessen hazard efforts. A similar observation was also made by Haque (1993, 384) in the context of the 1988 catastrophic flood of Bangladesh.

Discussion

Droughts are not only climatic, meteorological, and hydraulic, but also socio-political phenomena. The government has a responsibility to minimize hardships of the hazard-affected people by organizing relief work, providing loans, and generating employment schemes for drought victims. Evidence presented in this paper suggests that the national government was involved in mitigating the effect of drought in northwestern Bangladesh only by providing financial assistant to 21% of the respondent households. The government did not supply emergency relief goods to the drought victims and no measure was undertaken to create employment opportunities for the affected people. Although the daily news papers published from Dhaka and affected districts contained reports of drought occurrence, the government did not pay any attention to these reports. In fact, at the initial stage of the drought, the government denied the occurrence of such a hazard in the country. Thus, the government's response to the drought was late and inadequate. For this reason, 88% of the respondents practiced household level adjustments and were compelled to draw more on their household resources to cope with the drought. Local government and NGOs also played limited roles in drought-mitigating efforts. Victims also received some support from friends and relatives living either in their own community or outside of it. However, the support they received from various sources not only helped them to survive through the disaster period, but also assisted them in either not selling or only selling some of their belongings at nominal prices. In fact, the support of both institutional and non-institutional sources helped halt the process of marginization of many victims. But the experience of the victims should not be catalogued as a complete success.

While both poor and rich households were affected by the 1994- 95 drought in the study area, the analysis of adjustment strategies adopted to cope with drought situation suggests that the households that belonged to the former socio-economic group suffered the most. Among all households they received the least support from the government and were hurt most from sharp increase of foodgrain prices. This finding contrasts with the studies dealing with the flood adjustment strategies of the farmers in Bangladesh (see Paul 1995) but supports the contention of researchers who use social- historical and political-economic perspectives in studying environmental hazards.

One surprising finding is that irrespective of socio-economic conditions of the affected households, drought victims were able to maintain their consumption pattern of a normal year. This occurred in spite of marked increase in rice prices and lack of widespread availability of consumption credit from the government. During the drought period, people usually consume less amounts of rice and depend largely on famine foods such as coarse wheat bread, vegetables, and wild leaves. Drought victims in the study area did not consume famine foods because the affected area produces surplus rice. Many households consumed food from their previous year's stock which was stored for selling in the market. There was an acute shortage of water for irrigation. But the study area did not suffer seriously for shortages of drinking water. Probably because of low disruption to the consumption pattern and drinking water, the incidence of diseases, such as diarrhoea, dysentery, other intestinal diseases, scabies, skin diseases, and diseases related to nutritional deficiencies was not widespread in the study area. In general, the 1994-95 drought did not cause a severe worsening of physical health status of the people of the affected area.

Had the 1994-95 drought struck other parts of Bangladesh, its effects would have been more severe. The characteristics of the people and the affected area helped in dissipating the devastating effects of the drought. The people of the drought affected area are wealthier than the people of the rest of Bangladesh. Moreover, the study area belongs to the region which produces surplus rice. Although the study area experienced severe shortage of irrigation water, its drinking water sources were less affected by the drought. This is because the 1994-95 drought occurred after the installation of hand pump tubewell, which is the main source of drinking water in the study area.

CONCLUSION

Results of a sample survey conducted in Bangladesh to examine the extent of damage caused by the 1994-95 drought and the adjustment mechanisms adopted by rural households to mitigate its effect have been presented in this paper. While drought victims practiced an array of adjustments to cope with the drought, the public responses were delayed and inadequate to provide employment for the affected population and to compensate for the eroded income. This contrasted sharply with the overwhelming attention and enthusiasm devoted to controlling floods.

In spite of all the adjustment mechanisms used by the drought victims, their sufferings were substantial, particularly for the socio-economic groups with little or no land, assets, and education. They have few resources with which to buffer themselves against adversity. In order to alleviate worse effects of drought, the government should be prepared for the hazard before it occurs. Projects to be implemented during drought periods should be developed in advance of drought. It is an important lesson gained from this study which can be useful for hazard management programs in other countries, including the United States.

In the virtual absence of empirical research on drought in Bangladesh, the findings of the present study may provide useful information on the survival strategies used to combat drought at the individual and community levels. This information is crucial for planners, administrators, extension officials, and NGOs to improve responses to future drought occurrences and thus help to minimize resulting hardships. The conceptual framework developed to study drought mitigating techniques adopted by drought victims and the support they received from various levels can provide important insights into how humans subject to different levels of vulnerability respond to an extreme natural event, like a drought.

FOOTNOTES

1. A district is the second largest administrative unit in Bangladesh.

2. Natural hazard "vulnerability" is broadly defined as the characteristics of places or people that are likely to be harmed by extreme natural events (Liverman 1990, 50).

3. Droughts also affect livestock by reducing the availability of fodder and grazing lands.

4. The *samaj* is an informal, predominantly social grouping based on kinship, social, and religious interests of its members.

5. Three rice varieties (*aman*, *aus*, and *boro*) are grown in three different cropping seasons in Bangladesh. *Aus* and jute are the crops of *kharif* season (late March to early September), while *aman* is grown in *haimantic* season (August to early December) and *boro* in *rabi* or dry season (late November to early April). These seasons partly overlap. It is important to note that there are two *aman* varieties: broadcast *aman* is sown in April to May and harvested in December, while transplanted *aman* is transplanted in June to July and harvested in December.

6. At present, the country is divided into 64 administrative districts which have been created from the former nineteen district. The latter districts are also referred to as greater districts.

7. The 1995-94 drought affected 11% of the total area and population of the country.

8. Thanas are the third largest administrative unit in Bangladesh.

9. On behalf of the Principal Investigator (PI), Dr. Maudud Elahi, Professor of Geography, Jahangirnagar University, Savar, Dhaka, also personally visited some of these thanas in order to select sample villages. Dr. Elahi has vast experience in conducting field work in rural Bangladesh.

10. A pure tenant farmer does not own any farm land but cultivates lands of others as share cropper.

11. The cultivation of rice usually requires more water than other crops such as kaon, jute, and wheat.

12. For some, dwindling fodder availability was also a reason for selling livestock.

13. For this reason, they are grouped into one category in order to calculate the X2 value.

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TABLES

Table 1. Some Selected Characteristics of the Heads of the Sample Households

Characteristic	Number	Percentage
Occupation		
Farming	217	72.1
Service	48	15.9
Business	17	5.7

Laborer	19	6.3
Total	301	100.9
Landholding Size		
Small	126	41.9
Medium	137	45.5
Large	38	12.6
Total	301	100.0
Tenancy Status		
Owner	175	58.1
Tenant	126	41.9
Total	301	100.0
Education		
Illiterate	97	32.2
1-5 yrs. of schooling	62	20.6
Above 5 yrs. of schooling	142	47.2
Total	301	100.0
Membership Status		
Yes	28	9.3
No	273	90.7
Total	301	100.0

Table 2. Crop Damage*

Crop	Number	Percentage**
Aman	281	97
Aus	232	80
Jute	199	69
Boro	147	51
Wheat	39	13
Potatoes	36	12
Kaon	30	10
Sugarcane	24	8
Pulses	17	6
Til	17	6
Vegetables	9	3
Onion/Garlic	8	3
Chillies	7	2
Groundnut	6	2

*N=290. Multiple responses are possible.
**Rounded to the nearest whole number.

Table 3. Distribution of Non-agricultural Adjustments Adopted by the Respondent Households*

Type	Number	Percentage**
Sold Livestock	166	55
Sold Land	112	37
Mortgaged land	106	35
Mortgaged livestock	2	1
Sold Belongings	26	9
Moved family members to other area	1	-

*N=265. Multiple responses are possible.
**Rounded to the nearest whole number.

Table 4. Distribution of Respondent Households Who Practiced Individual Level Adjustments by Selected Characteristics

	Yes	No	Total
Occupation			
Farming	206 (95.0)	11 (5.0)	217 (100.0)
Business*	43 (89.6)	5 (10.4)	48 (100.0)
Service*	9 (52.9)	8 (47.1)	17 (100.0)
Laborer	7 (36.8)	12 (63.2)	19 (100.0)
Total	265 (88.04)	36 (12.0)	301 (100.0)

X2=61.074 (p=0.001) d.f.=2

Landholding Size			
Small	108 (85.7)	18 (14.3)	126 (100.0)
Medium	127 (92.7)	10 (7.3)	137 (100.0)
Large	30 (79.0)	8 (21.1)	38 (100.0)
Total	265 (88.04)	36 (12.0)	301 (100.0)

X2=6.457 (p=0.040) d.f.=2

Tenancy Status			
Owner	143 (81.7)	32 (18.3)	175 (100.0)
Tenant	122 (96.28)	4 (3.2)	126 (100.0)
Total	265 (88.04)	36 (12.0)	301 (100.0)

X2-15.886 (p=0.001) d.f.=1

Years of Schooling			
Illiterate	90 (92.8)	7 (7.2)	97 (100.0)
1-5	49 (79.0)	13 (21.0)	62 (100.0)
>5	126 (88.7)	16 (11.3)	142 (100.0)
Total	265 (88.04)	36 (12.0)	301 (100.0)

X2=6.995 (p=0.072) d.f.=3

Membership Status			
Yes	25 (89.3)	3 (10.7)	28 (100.0)
No	240 (87.9)	33 (12.09)	273 (100.0)
Total	265 (100.0)	36 (12.0)	301 (100.0)

X2=0.046 (p=0.831) d.f.=1

*Business and service are aggregated to calculate X2 value.

Table 5. Sources of Support by Items of Support

Source	Item: Cash Loan	Food	Fertilizer	Seed	Total
National Government	63	-	-	-	63
Local government	-	3	1	-	4
NGO	9	-	-	-	9
Friend	14	1	-	1	16
Relative	16	2	-	-	18
Other Villagers	5	-	-	2	7
Total	107	6	1	3	117

Table 6. Distribution of Respondent Households Who Received Assistance by Selected Characteristics

Occupation	Yes	No	Total
Farming*	86 (39.6)	131 (60.4)	217 (100.0)
Business	6 (35.3)	11 (64.7)	17 (100.0)
Service	19 (39.6)	29 (60.4)	48 (100.0)
Laborer*	2 (10.5)	17 (89.5)	19 (100.0)
Total	113 (37.5)	188 (62.5)	301 (100.0)

X2=9.297 (p=.010) d.f.=2

Landholding Size			
Small**	31 (24.6)	95 (75.4)	126 (100.0)
Medium	67 (49.9)	70 (51.1)	137 (100.0)
Large	15 (39.5)	23 (60.5)	38 (100.0)
Total	113 (37.5)	188 (62.5)	301 (100.0)

X2=16.601 (p=.001) d.f.=2

Tenancy Status			
Owner	54 (30.8)	121 (69.2)	175 (100.0)
Tenant	59 (46.8)	67 (63.2)	126 (100.0)
Total	113 (37.5)	188 (62.5)	301 (100.0)

X2=7.966 (p=.005) d.f.=1

Years of Schooling			
Illiterate	20 (20.6)	77 (79.4)	97 (100.0)
1-5	19 (30.7)	43 (69.3)	62 (100.0)
>5	74 (52.1)	68 (47.9)	142 (100.0)
Total	113 (37.5)	188 (62.5)	301 (100.0)

X2=25.963 (p=.001) d.f.=2

Membership Status			
Yes	23 (82.1)	5 (17.9)	28 (100.0)
No	90 (33.0)	183 (67.0)	273 (100.0)
Total	113 (37.5)	188 (62.5)	301 (100.0)

X2=26.191 (p=.001) d.f.=1

*Farming and Laborer are aggregated to calculate X2 value.
**Including landless households.

Appendix

Farmer's Responses to 1994-95 Drought in Bangladesh

_____

District Name: _____ Thana Name: _____
Village Name: _____ Respondent's Name: _____
Sample No.: _____
_____

Part l:
1. Do you consider drought to be a serious environmental hazard?
Yes: _____ No: _____

2. Why do you think so? Specify reasons:
_____

_____

_____

3. How often does drought occur in your locality?
Once in every ____ years

4. When did the last drought occur in your locality? Specify the year: _____

5. Were your crops damaged due to the 1994-95 drought?
Yes: _____ No: _____ (go to question 8)

If answer is yes:

6. What percentages of the total acreage were damaged due to the 1994-95 drought?
Aus: _____ Aman: _____

Boro: _____ Jute: _____
Other Crops (specify): _____

7. What adjustments did you practice to reduce crop loss? (specify by crop varieties)

_____

_____

_____

Did nothing (specify reasons): _____

8. Were you experienced other damages?
Yes: _____ No: _____ (go to question 10)

9. List items damaged due to the 1994-95 drough:

_____

_____

_____

10. Did you receive any financial and other forms of support from the government and other sources?
Yes: _____ No: _____ (go to question 12)

If answer is yes:

11. What type of support did you receive? (specify by sources):

Sources	Types of Support (e.g., food, clothes, cash, seeds, housing materials, loans, free labor)
Relatives	_____
Friends	_____
Other Villagers	_____
Local Government	_____
Government	_____
NGOs	_____
Others (specify)	_____

12. What are the other adjustments (e.g., sale of land, livestock, and belongings, mortgaged land, dismantled housing structure, borrowed money, spent previous savings, family members migrated to other areas) did you adopt to cope with the 1994 drought?

_____

_____

_____

Nothing: _____

Part ll:

13. What is the current family size of your household?
_____

14. For each member of your household, provide the information (including the yourself):

Name	Age	Sex	Yr. of Schooling	Occupation
_____	___	___	_____	_____
_____	___	___	_____	_____
_____	___	___	_____	_____

15. What is the landholding size of your family?

Total Farm Land Owned: _____ Bigha
Farm Land Rented Out: _____ Bigha
Farm Land Rented In: _____ Bigha
Total Non-Farm Land Owned: _____ Bigha

16. If possible can you tell us approximate monthly income of your family?
_____ Takas.

17. Are you a member of institutional group?
Yes: _____ No: _____

If answer is yes:

18. What is the name of the group?
_____

Thank You!

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