Weather and Climate (1991) 11: 132-133

IMPACTS OF CLIMATE CHANGE ON BANGLADESH

Alan Porteous
N Z Meteorological Service

Introduction

Most of Bangladesh consists of an alluvial river delta, built up over millennia and only a few metres above sea level. The country is dominated by a vast confluence and interlacing of several river systems, of which the Ganges, Brahmaputra, and Meghna are the most important.

The area is described as a battle ground between the warm, moist and convectively unstable south-west monsoon, the north-east monsoon from the cold Siberian anti-cyclones, and the warm dry easterly trades. Most storms and severe storms occur during the onset of the south-east monsoon as it arrives up the Bay of Bengal in May, and during its withdrawal in October/November. The Bay of Bengal is four times as cyclogenetic as the Arabian Sea. The combined effects of south-west winds pushing water up the Bay of Bengal, low surface pressure at the vortex of cyclones and the spirally convergent winds, and the tidal bore of about 3m, commonly cause storm surges of 10-12 metres, which can be devastating for coastal areas. Tidal waves can penetrate many kilometres inland.

Bangladesh is surrounded to the north and east by high mountain ranges, and warm moist airflows from the south are orographically lifted, causing some of the heaviest rainfall in the world. About a third of the country is flooded every year by normal monsoon activity, while the probability of further large areas being inundated is greater than 50%.

Things could get worse

There is a general consensus both among authorities in Bangladesh and other observers that if sea levels rise by 50 cm or more as a result of climate warming, about a third of that country will become uninhabitable. As many as 30 million people may be permanently displaced from their homes by the end of next century. The geopolitical conflicts that this would unleash are unprecedented. Mass or insidious movement of people inland into already crowded areas, and having to compete for scarce food and clean water resources and living space, would trigger further regional clashes.

Any intensification of extreme events such as severe storms, which may result from climate change, would raise the toll of lives and rapidly reduce the habitability of coastal areas. In 1970, tidal swells of up to 10 m contributed to the deaths of 500,000 people. In November 1988, the worst reported flood in 100 years covered an estimated 74% of the land area of the country. The storm was accompanied by 200 km/hr winds.

Things are getting worse

Although the Bangladesh Meteorological Service reports no anomalous shift in the frequency of weather disasters in recent years when compared with the 100 year record, increased population densities in vulnerable areas has meant that more recent events have caused greater disruption. There has been an absolute and proportional increase in the number of people most vulnerable, particularly because of the lack of entrepreneurial opportunity for lower socio-economic

groups, entrenched social structures and unresponsive political structures.

These problems are compounded by Himalayan deforestation (as well as deforestation in Bangladesh) causing higher silt loads in the rivers, and consequent lowering of the efficiency with which they drain the land. An estimated 2.4 billion tonnes of sediment is carried annually, the highest of any river system in the world. While this does contribute to land accretion in some places, this is offset by resultant drainage congestion. Depletion of ground water aquifers due to extraction for irrigation is also causing land subsidence in some places. There have been protracted difficulties in reaching international understanding on river management, to devise protocols that would maximise irrigation and drainage potentials. Marshlands have been drained for agricultural development, including areas that would otherwise absorb large volumes of flood water during critical periods. The Bay of Bengal has become shallower due to silt deposition and this has reduced storm wave mitigation.

Things could get better

While the potentially catastrophic impacts of present and future climates on Bangladesh continue to be cause for concern, some measures are being taken to reduce the severity of the effects of extreme climatic events. Land protection measures, such as controlled flooding, are under way, with the construction of up to 10 m embankments in designated localities, such as around the international airport at Dacca. A sophisticated storm warning radar system is in place. However international co-operation is imperative, particularly in reforestation of unstable areas in the Himalayan region and upper hill slopes, and between Bangladesh, India, Nepal, Tibet and China particularly in the implementation of mutually beneficial river management agreements. Microenterprise development amongst lower socio-economic groups will allow some margin for individual initiative in times of difficulty. There may also be grounds for innovative building design, such as housing that is more storm proof, or safe community buildings.

Figure 1 Map of Bangladesh