



Bangladesh's dynamic coastal regions and sea-level rise

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ABSTRACT

The physical geography of Bangladesh's coastal area is more diverse and dynamic than is generally recognised. Failure to recognise this has led to serious misconceptions about the potential impacts of a rising sea-level on Bangladesh with global warming. This situation has been aggravated by accounts giving incorrect information on current rates of coastal erosion and land subsidence. This paper describes physical conditions within individual physiographic regions in Bangladesh's coastal area based on ground-surveyed information, and it reviews possible area-specific mitigation measures to counter predicted rates of sea-level rise in the 21st century. Two important conclusions are drawn: the adoption of appropriate measures based on knowledge of the physical geography of potentially-affected areas could significantly reduce the currently-predicted displacement of many millions of people; and the impacts of a slowly-rising sea-level are currently much less than those generated by rapidly increasing population pressure on Bangladesh's available land and water resources and by exposure to existing environmental hazards, and the latter problems need priority attention.

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Introduction

There is a widespread misconception that a rising sea-level with global warming will overwhelm Bangladesh's coastal area contour by contour and will thereby displace as many as 10–30 million people in the 21st century e.g., (Gore, 2009; Houghton, 2009). In some accounts, that situation will be aggravated by high rates of land subsidence (Syvitski et al., 2009), a recent doubling of the rate of sea-level rise (Smith, 2012) and rapid, on-going rates of coastal erosion (Vidal, 2013a,b). The accounts given to-date imply that the Bangladeshi people are helpless against a rising sea-level and will be unable to resist the rising water.

Those assumptions and descriptions are incorrect. Bangladesh's coastal area is not uniform, nor is it static. It is dynamic, and so are the people of Bangladesh. Environmental scientists have an important role to play in establishing environmental facts in order to identify practical, area-specific, mitigation measures to counter realistically-probable impacts of sea-level rise in different geographical regions. This account illustrates the kinds of information on geomorphology, hydrology, soils, land use and socio-economic geography that are needed to provide a sound basis for planning area-specific measures to counter sea-level rise in low-lying coastal areas elsewhere in the world.

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The geographical setting

Regional diversity

Soil surveys carried out of the whole of East Pakistan and Bangladesh between 1963 and 1975 showed that the country has a great diversity of physiographic regions and that relief, soil and hydrological patterns within regions are often complex (Brammer, 2012). This diversity and complexity is clearly visible on satellite images. All or parts of four physiographic regions adjoin the coast (E, J, L, M), three of them divided into subregions (Fig. 1); low-lying parts of four regions further inland (D, F, I, J) lie sufficiently close to the coast that they could be affected by a rising sea-level at an early date. As is described below, land accretion and erosion are taking place at different rates along the coast, and the natural physical environments in each of the regions have been changed in various ways by human interventions, particularly by embankments built to prevent flooding by saline tidal water or seasonal river floods. The coastal zone is exposed to the risk of tropical cyclones in the pre-monsoon and post-monsoon seasons, with the associated risk of storm surges in areas close to the coast.

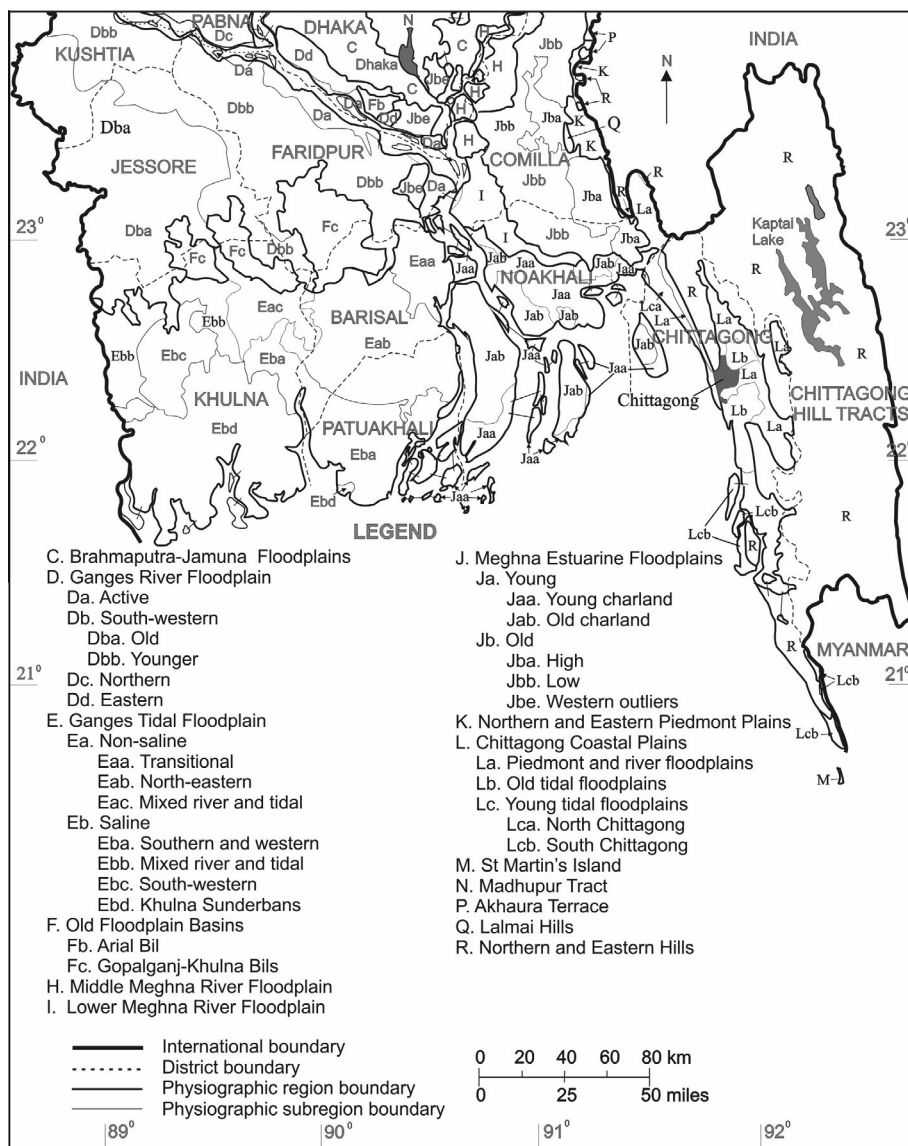


Fig. 1. Physiographic regions in southern Bangladesh. Source adapted from Brammer, 2012.

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