



An integrated framework to assess future livelihood and poverty changes in deltas: an application to coastal Bangladesh

Robert J. Nicholls (1), Attilia Lazar (1), Andres Payo (1), Helen Adams (2), Mashfiqus Salehin (3), Anisul Haque (3), Derek Clarke (1), Lucy Bricheno (4), Jose Fernandes (5), Mofizur Rahman (6), Ali Ahmed (6), and Kim Streatfield (6)

(1) University of Southampton, Faculty of Engineering and the Environment, United Kingdom (r.j.nicholls@soton.ac.uk), (2) Department of Geography, King's College London, King's Building, Strand Campus London, United Kingdom, WC2R 2LS, (3) Bangladesh University of Engineering & Technology, Dhaka-1000, Bangladesh, (4) National Oceanography Centre, Brownlow Street, Liverpool, United Kingdom, L3 5DA, (5) Plymouth Marine Laboratory, Prospect Place, The Hoe, Plymouth, United Kingdom, PL1 3DH, (6) International Centre for Diarrhoeal Disease Research, Bangladesh, Dhaka-1000, Bangladesh

Coastal deltas represent some of the most densely populated areas in the world. A good example is the coastal zone of Bangladesh where there are more than 1000 people/km² in the rural areas. Livelihoods, food security and poverty in this area is strongly dependent on natural resources affected by several factors including climate variability and change, upstream river flow modifications, commercial fish catches in the Bay of Bengal, and engineering interventions such as polderisation. The scarcity of fresh water, saline water intrusion and natural disasters (e.g. river flooding, cyclones and storm surges) have negative impact on drinking water availability and crop irrigation potential. This severely affects land use and livelihood opportunities of the coastal population. Hydro-environmental changes can be especially detrimental for the well-being of the poorest households that are highly dependent on natural resources.

The ESPA Deltas project aims to holistically examine the interaction between the coupled bio-physical environment and the livelihoods of these poor populations in coastal Bangladesh. Here we describe a new integrated model that allows the long-term analysis of the possible changes in this system by linking projected changes in physical processes (e.g. river flows, nutrients), with productivity (e.g. fish catches, rice production), social processes (e.g. access, property rights, migration) and governance/management (e.g. fisheries, agriculture, water and land use management). This includes the development and application of a range of scenarios, including expert-derived scenarios on issues such as climate change, and stakeholder-derived scenarios on more local issues in Bangladesh. This integrated approach is designed to provide Bangladeshi policy makers with science-based evidence of possible development trajectories within the coastal delta plain over timescales up to 50 years, including the likely robustness of different governance options on natural resource conservation and poverty levels. This presentation describes the model framework and demonstrates model results on changes in the environment, in the livelihoods and poverty of the coastal population of Bangladesh.