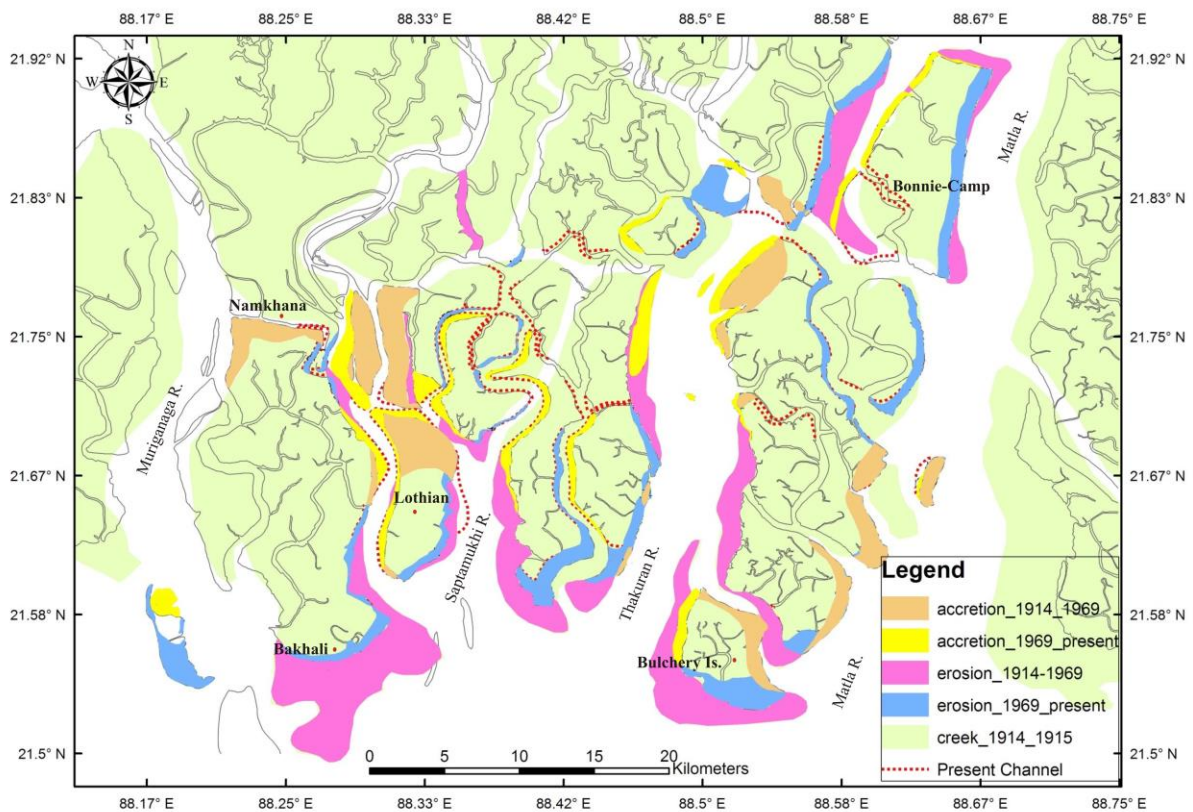


Indian Sundarban Delta (ISD), West Bengal, India

The Sundarban is the single largest continuous mangrove forest in the world and has been recognized as an international important Ramsar Wetland Site (1992) and declared as a World Heritage Site (WHS) by the UNESCO in 1997. Sundarban Delta is the part of Bengal basin, shared by Bangladesh (60%) and India (40%) with unique biodiversity. Sundarban is formed at the confluence of the Ganges, Brahmaputra, Meghna (GBM) river system, which debouches sediments into the Bay of Bengal. The present configuration of Bengal Delta is a late Pleistocene to Recent (Mukherjee, Fryar and Thomas, 2008) phenomenon. The beds are nearly horizontal, low dipping towards the east and south-east and their deposition and dispersal patterns are also controlled by the tidal regime through times. Ganges-Brahmaputra Delta came into existence around 11000 YBP (Goodbred and Kuehl, 2000, Allison et. al., 2003) earlier than the other Holocene deltas because of the large amount of sediment supply from the rising Himalayas in the north. After the Flandrian (around 6000YBP) marine transgression (Banerjee & Santra, 1999) the delta has prograded east and south-eastward with coalescing lobes (Allison et. al., 2003). The active delta, formed in a macrotidal (>4m) regime has acquired a typical shape of tide-dominated deltas (Goodbred and Saito, 2012) with numerous islands oriented along the strong tidal flow perpendicular to the shoreline.

The entire area of Sundarban is interspersed with an intricate network of channels and creeks of varying dimensions, which divide the area into a number of islands. The Indian Sundarbans is bounded by Raimangal River in the east and Hooghly River in the west which carry fresh water supply. Other major N-S trending rivers in the ISD include Saptamukhi, Thakuran, Matla and Bidya. All these rivers are mostly tide dominated with very insignificant fresh water input from upland. The islands face episodes of erosion - accretion processes caused by the tide dominated channels and creeks generating a threat to the inhabitants. Land stability study carried out based on bathymetric survey and satellite imagery studies shows that the erosion occurs in the eastern and south eastern margins of the islands, whereas the western and north-western margins show progressive growth of the islands. The channels and creeks, in general, are found to migrate towards north-west – with development of mud flats and point bars towards south-east. During last one century, the total land eroded is nearly 300km² whereas accretion took place in nearly 150km² area Only. Study carried out by M&CSD, GSI indicates towards reduction of land masses in Indian Sundarbans posing a tremendous threat towards future settlement of the inhabitants and their livelihood.



Erosion and accretion of pattern landforms in Indian Sundarban during last century

In this area tidal influence extends up to 100km inland, with general elevation less than 3m above mean sea level (Kausher et al., 1996). Unable to cope up with rising sea level and reduced sediment supply, the western abandoned delta continued to suffer severe land loss since the last one and half century. Other than the rapidly rising relative sea level, frequent cyclones and associated coastal flooding by storm surges are the major natural hazards in the delta. The Bay of Bengal normally registers 7% of the major cyclones of the world (Dubey et al., 1997). Over the last 120 years, there is around 26% rise (Singh 2007) of very severe cyclonic storms over northern Bay of Bengal which makes the delta coast exceptionally vulnerable to death and destruction during cyclones and surges. Around 18 million people live in this region in 51 administrative blocks, despite extreme poverty and natural hazards like tropical cyclones, tidal flooding, erosion, etc. The people of this region are mainly dependent on agriculture while people living in the coastal belt, adapt multiple livelihood activities related to sea and forest e.g. fishing, aquaculture, honey collection, boat maintenance, net making, etc. (WB SAPCC,2012). A gradual increase in soil salinity and saline water in subsurface forced people to opt for salt-tolerant cropping practices or brackish water aquaculture.