FUTURE COASTLINE RECESSION AND BEACH LOSS IN SRI LANKA

Amongst accelerating trends, the response of coastlines to sea-level rise is of major importance to policy makers. This research aims to provides nation-wide overview of short-term (2050) and long-term (2100) coastline recession and beach loss along the Sri Lankan coast.

Coastline recession estimates have been acquired using the Bruun rule (Bruun, 1962), nearshore bathymetry measurements, and mean and likely climate change predictions according to the four Representative Concentration Pathways (RCPs) in IPCC (2013). Additionally, future coastline recession at beaches downdrift from several important rivers, and large coastal lakes and lagoons have been assessed using the (reduced) SMIC method introduced in Ranasinghe et al. (2013), and the BQART model (Syvitski & Milliman, 2007) combined with the sediment trapping efficiency protocol in Kummu et al. (2010).

The nation-wide averaged (representing 48% of the Sri Lankan coast) mean sea-level rise induced long-term coastline recession is 16 m (RCP2.6), 21 m (RCP4.5), 23 m (RCP6.0) or 31 m (RCP8.5). However, significant regional (e.g. South-east vs North-east) in the coastline recession estimates are present. Combined with present beach widths measured from satellite data, the mean Bruun rule coastline recession estimates show considerably reduced future beach widths and the possible disappearance of a vast number of beaches along most of the Sri Lankan coast.

Downdrift from East and North-east coast lagoons that are open or intermittently closed to the ocean, sea-level rise will result in mild to (dangerously) strong local coastline recession. The presence of lagoons in the Jaffna Peninsula is expected to result in local coastline progradation. Projected changes to the terrestrial climate and continuing human development of river catchments will result in increased annual fluvial sediment supplies. However, without limits to future river mining activities, local coastline recessions remain a possibility.





Figure 2: Estimated nation-wide averaged mean future



Figure 1: Sri Lankan coastline deemed suitable for the application of the Bruun rule.

Figure 3: Nation-wide 2050 and 2100 exceedance frequency of beach widths according to the mean RCP2.6 or RCP8.5, 95% likelihood RCP2.6, or 5% likelihood RCP8.5 sea-level rise projections.

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