Flooding in *Haor* Region and Waterlogging in Sylhet City: Causes and Remedies

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Abstract:

The occurrence of flooding and waterlogging in greater Sylhet and the *haor* region in Bangladesh has become a chronic problem over the last couple of decades. Major flooding events and waterlogging events that crippled the life and livelihoods of *haor* region in general and the Sylhet City in particular took place in 2008, 2017, 2019, and 2022. This paper investigated underlying causes of flooding and waterlogging in Sylhet city in the context of topography, natural drainage patterns, existing road networks, and landuse changes due to urbanization.

The following factors have been identified as underlying causes of flooding and waterlogging in Sylhet City: (1) lack of necessary natural drainage network, (2) reduction in water-carrying capacity in natural canals and storm sewage network, (3) impediment to surface water flow by roads and inadequate bridges and culverts, (4) increase in impervious surfaces that generates additional surface run-off due to a decrease in infiltration of precipitation in the ground.

The following recommendations are proposed as solutions to waterlogging in Sylhet City: (1) re-establishing natural drainage network in the *haor* region and Sylhet city through demarcation of proper boundaries, (2) increasing water-carrying capacity of natural drainage network through dredging that is necessary to accommodate the additional surface run-off generated by changed landuse patterns, (3) building storm sewage network following hydrologic drainage modeling in areas that lack natural drainage to carry surface run-off, (4) construct adequate bridges and culverts in the existing roads in areas of water accumulation identified through hydrologic modeling, (5) increasing water-carrying capacity of the Surma River to match the surface run-off from episodic storm events, (6) increasing water-holding capacity of surface water reservoirs, (7) practicing least impact development (LID) through building of green infrastructures in future urban planning, (8) ensuring adequate drainage network in upstream and downstream regions of the city to facilitate unimpeded surface water flow during rainy season.

Keywords: Flooding, waterlogging, Sylhet City, Hydrologic Modeling, LID, Landuse

Future Floods in the Brahmaputra River Basin Based on Multi-model Ensemble of CMIP6 Projections

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Abstract

The Brahmaputra River frequently floods large areas in Bangladesh and northeast India during the annual monsoon rains with devastating consequences. The intensity and duration of these flood events may increase as the climate warms. We incorporated the CMIP6 data to project the basin-scale changes in mean annual precipitation using three Shared Socioeconomic Pathways (SSPs). We analyzed the tail behavior of projected precipitation to estimate the probability of future extreme precipitation in the basin. Moreover, we projected the future peak streamflow that will result due to global warming by 1, 1.5, 2, and 2.5 °C. Our results show an increase in the ensemble mean annual precipitation by 7.48%, 8.01%, and 19.37% under SSP126, SSP245, and SSP585, respectively, during the 2071–2100 period as compared to the 1981–2010 historic period. The basin will experience more intense precipitation compared to the historic period. Based on the SSP585 and 1.5-degree warming, the peak discharge at Bahadurabad, Bangladesh, will potentially increase by 39%, resulting in an increase in flood risk in Bangladesh. Collaboration among co-riparian countries in the basin will be essential for optimal utilization of water resources and for minimizing future damage caused by increased flooding.