# Effect of cyclone's approach angle and cyclone induced precipitation on costal inundation

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**ABSTRACT:** The Indian coastline is often prone to tropical cyclones that leads to high rise of water elevations and associated flooding. Tropical cyclone-induced storm surges have a large potential to cause extensive damage of property and life along the coast. Storm surges combined with tides and wind waves become even more destructive for the coastal regions. Many cyclones in the Bay of Bengal experience a recurvature from the usual path and makes landfall from any direction. Therefore, to enhance the forecasting abilities, it is essential to understand the impact of cyclone's approach angle on the generation of storm surges and the nonlinear interaction of surges with tides and wind waves. The presentation includes idealized experiments that are performed using numerical models to understand these processes. The simulations are made using a standalone Advanced Circulation (ADCIRC) to compute combined effect of storm surges and tides and coupled ADCIRC+SWAN model to include wind wave effects well. The results suggest that the perpendicular cyclone track causes maximum storm surges and interaction with tides and wind waves compared to any other track.

The risk of coastal inundation in the region increases with storm-tide interaction with the river systems and the intense precipitation during the cyclone period. The vulnerability enhances particularly, if the cyclone makes landfall near the estuaries, river deltas, or any adjoining rivers in the coastal area. Therefore, it is important to understand their interaction and quantify their contribution to coastal inundation for precise mapping of inland flooding. In this study, numerical simulations are performed for the 1999 Super cyclone and the Phailin cyclone using a standalone ADCIRC and a coupled system of ADCIRC and Hydrologic Engineering Center River Analysis System (HEC-RAS) model for understanding the contribution of storm-tides, river discharge, and cyclone induced precipitation on simulation of coastal flooding. The simulations suggest that a coupled model with a properly resolved river system and hydrological components like river discharge and precipitation helps to achieve more detailed flood mapping in the river delta region.