



Unravelling the river morphological – flood pattern linkages in Ayeyarwady River Basin, Myanmar

Karthikeyan Matheswaran, Dhyey Bhatpuria, and Thanapon Piman
Stockholm Environment Institute (SEI), Bangkok, Thailand (karthi.matheswaran@sei.org)

The Ayeyarwady River in Myanmar is one of the last free flowing large rivers in the Southeast Asian region. It hosts some of key biodiversity hotspots in the Indo-Burma conservation corridor. River impoundments are restricted mainly in the small tributaries, allowing natural flow regime in the main channel. It also serves as one of main transportation River morphological change and extreme floods events are common occurrence in the basin owing to seasonal dynamics imparted by monsoonal rainfall in river flow and sediment patterns

Such yearly morphologically change pose threat to thousands of villages located along the banks of the Ayeyarwady River in addition to the risk faced by agricultural land and navigation routes. In addition, the interconnections between hydrology, morphological change and flood patterns of Ayeyarwady River has be rarely studied with the aim of supporting decision making and influencing policy change. This critical knowledge gap can aid in providing vital information towards integrated management of the Ayeyarwady River system for multiple uses and users.

Using a suite of remote sensing-based monitoring tools and hydrological models we assess the interconnections between the biophysical features of the Ayeyarwady River Basin driving the river morphological change. Using long term remote sensing data (Landsat), we assess morphological change at various time scales (seasonal, yearly, decadal and long term) to identify reach hotspots within the river to categorize the risk from erosion. Erosion and deposition rates as well as channel migration rates were estimated for the entire river length seasonally. The erosion estimates are consistently larger than the deposition rates in recent years, which are in line with the observed widening of channel at different reaches. We aggregated Landsat and MODIS based flood maps to create a long-term time series covering entire Ayeyarwady Basin. A lumped hydrologic model was used to assess the historical (1989 to 2019) flow dynamics within the river system.

One key conclusion is that, there exists a strong relation between the reaches prone to large morphological change and high to medium flood risk areas within the basin. In Ayeyarwady, the management of river morphological change and flood management are undertaken separately. The outcome of this study provides a key knowledge base emphasizing that river morphological

change and flood patterns are strongly correlated and need to be managed as interrelated problems. The flow patterns and sediment budgets of the Ayeyarwady River are undergoing change from intensifying anthropogenic activities such as upstream land use change, which are likely to affect the river's morphological hotspots. We further assessed the potential for using the "room for river" concept to manage morphological hotspots by estimating the economic implications of converting productive agricultural lands adjacent to the riverbanks into forested sections to drive policy thinking towards adopting nature-based solutions for better channel management.