Linkage of Hydro-Climatological Variables to Flood and Drought in the Ganges Delta of Bangladesh

Sonia Binte Murshed\(^1\) and Jagath J. Kaluarachchi\(^2\)

\(^1\)Graduate Research Assistant, Department of Civil and Environmental Engineering, Utah State University, sonia.murshed@aggiemail.usu.edu
\(^2\)College of Engineering, Utah State University, jagath.kaluarachchi@usu.edu

1. Research background

**What are the key factors causing floods and droughts?**

- Anomalies of hydro-climatological factors (rainfall, temperature, ET, flow)
- Man Kendall trend, Sen’s slope tests
- Cross border treaty (1976)
- Post-treatment period (1976-2015)
- With treaty 1 (1976-1989)
- Without treaty (1990-1997)

2. Methods

- River water level (WL) crossing danger level (DL)
- Change in land elevation with respect to flooding depth
- Delta of Bangladesh

3. Results

- Spatial variation of rainfall
- Change in flows with respect to pre-barrage period
- Sedimentation

4. Results

- Deviation of hydro-climatological parameters in the dry season from the mean of the pre-barrage period
- Changes in land types with respect to flooding depth
- River erosion

5. Results

- Contribution of floods by major rivers

6. Conclusions

- Key factors for Floods:
  i. Drainage congestion due to high sedimentation
  ii. Reduced river carrying capacity
- Key factors affecting Droughts:
  i. Statistical significant increase in temperature and ET
  ii. Negligible amount of dry season rainfall (normal condition)

7. Future Plan

To develop a comprehensive water management plan that can minimize floods, droughts and support future water availability in this freshwater deficit region.