



Background





- Owing to the geological conditions of many parts of India, flooding is one of the most common source of destruction to life and property in it. Proper measures are required to adapt and mitigate to the problems and damages instigated by flooding.
- The management of flood risk is heavily dependent on flood modelling.
- HEC-RAS is one of the famous software used by researchers for hydrodynamic modelling to estimate the effects of flood for a river channel.

Methodology

- The discharge flood is considered to move in 1D steady flow conditions.
- RAS-mapper is a geospatial function available in HEC-RAS. Shapefile and DEM are imported in it for the considered area as illustrated in Figure 1.
- The area considered in a part of Purna River, Gujarat, India.
- The following constraints are located manually for flood mapping.



Figure 1. DEM considered

1. River center line 
2. Bank lines 
3. Flow path lines 
4. Cross-section cut lines 

Methodology

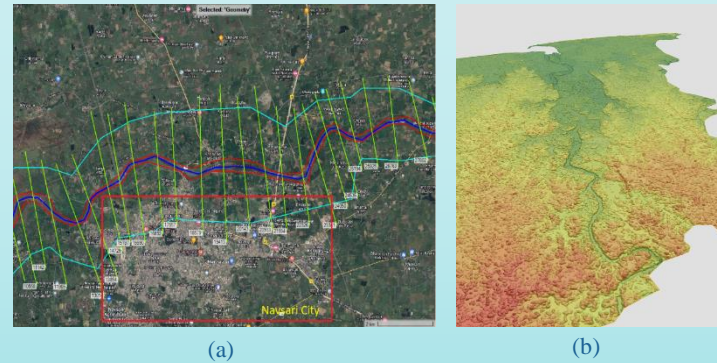


Figure 2 (a). Purna River with geometry considered along Navsari City
(b). 3D View of the Terrain

Results

The flood water enters the city. However, the water depth and velocity distribution varies for 50YR and 100YR.

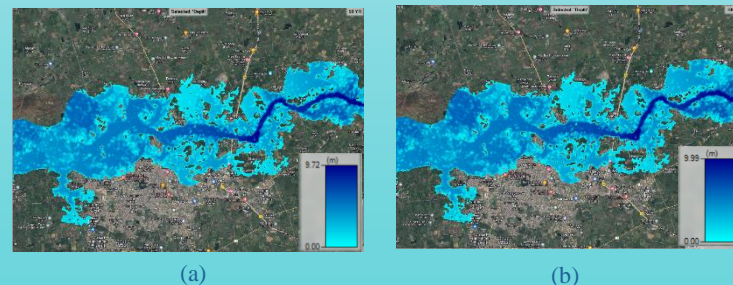


Figure 3. Water Depth for
(a). 50 YR (0m to 9.72m), (b). 100 YR(0m to 9.99m)

Results

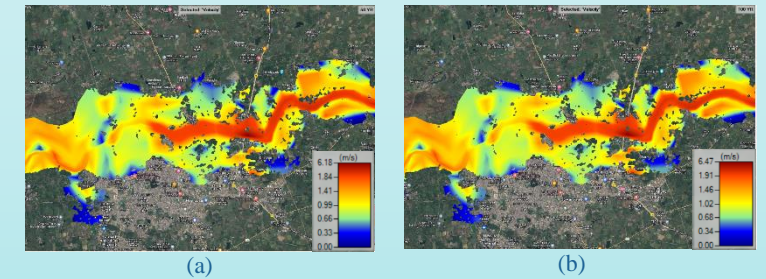


Figure 4. Velocity distribution for
(a). 50 YR(0m/s to 6.18m/s), (b). 100 YR(0m/s to 6.47m/s)

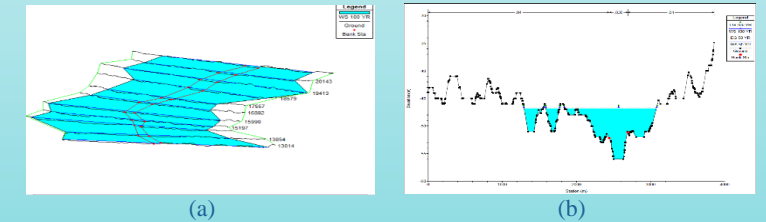


Figure 5. (a) Profile plot across the Navsari City (b) Cross-section at the point where flood water initially enters the city

Conclusion

The study illustrates the need of new control measures in the banks corresponding to the Navsari district. Developing countries are more prone to flood damage since they hesitate in expenditures pertaining to development of infrastructures that helps in mitigating the damage caused by extreme events.

The recent flood in 2022, which occurred in Maharashtra and Gujarat during monsoon can be taken as an example to act against the ever-changing climate conditions