

A Calibrated Combined Storm Surge-Inland Runoff Model for the Coastal Zone of Arecibo, Puerto Rico

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Hurricane Georges- September 21, 1998 (A)

- Hurricane Georges was the most **destructive** hurricane to strike the entire island of Puerto Rico since 1932.
- Electricity was lost to **96%** and water and sewer service was lost to **75%** of the islands customers. Total houses affected 100,610.
- The total damage in Puerto Rico was estimated at **\$1,907,026,374**.
- A 24-hr storm total precipitation of **30.51in.** was recorded at Jayuya, PR

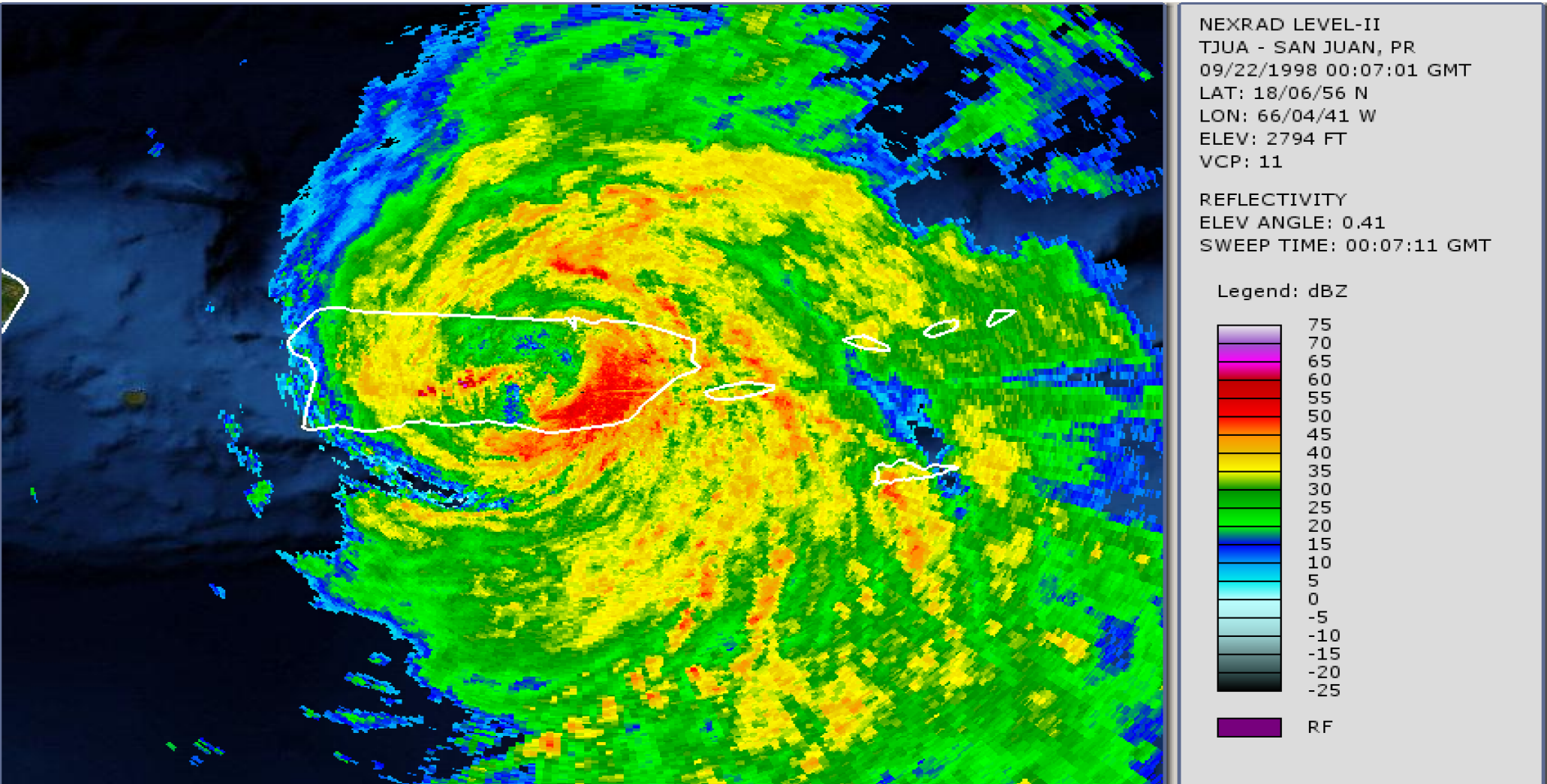


Figure 1: Reflectivity of Hurricane Georges (from NOAA & NCEI)

Area of Interest (B)

- Located on the North-Central Region of PR, between seven municipalities.
- Principal Tributaries: Arecibo River and Caonillas River.
- Principal Reservoirs: Dos Bocas and Caonillas.
- Watershed Population for 2010 US Bureau Census: **98,000** habitants.
- The total area of the watershed system is **257 sq. miles**.
- Land Use cover of the watershed:
 - 52%** Forest and Pasture
 - 42%** Agricultural
 - 4%** Urban Development

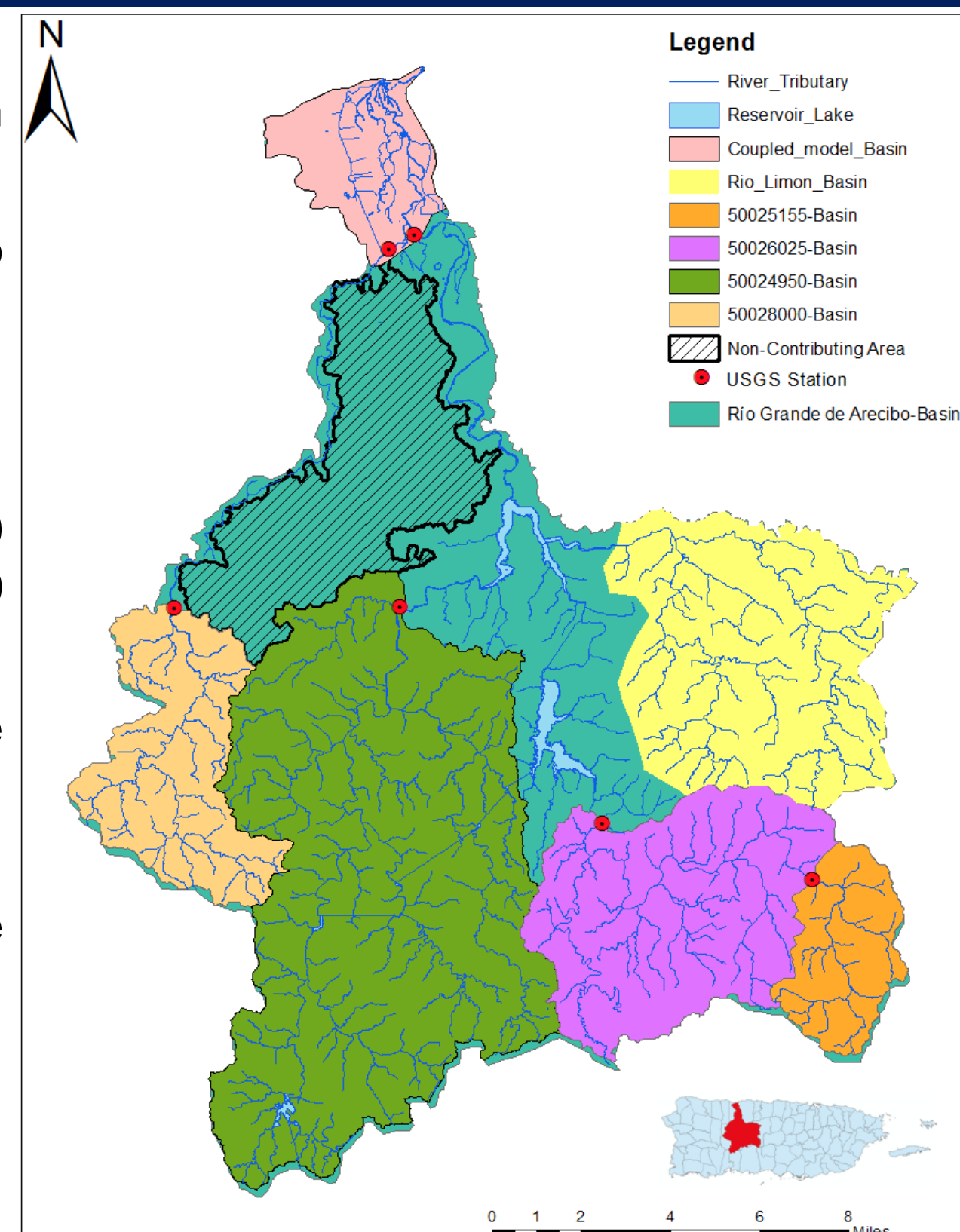


Figure 2: Area of Interest for the North Coast study.

Combined Storm Surge-Inland Runoff Model

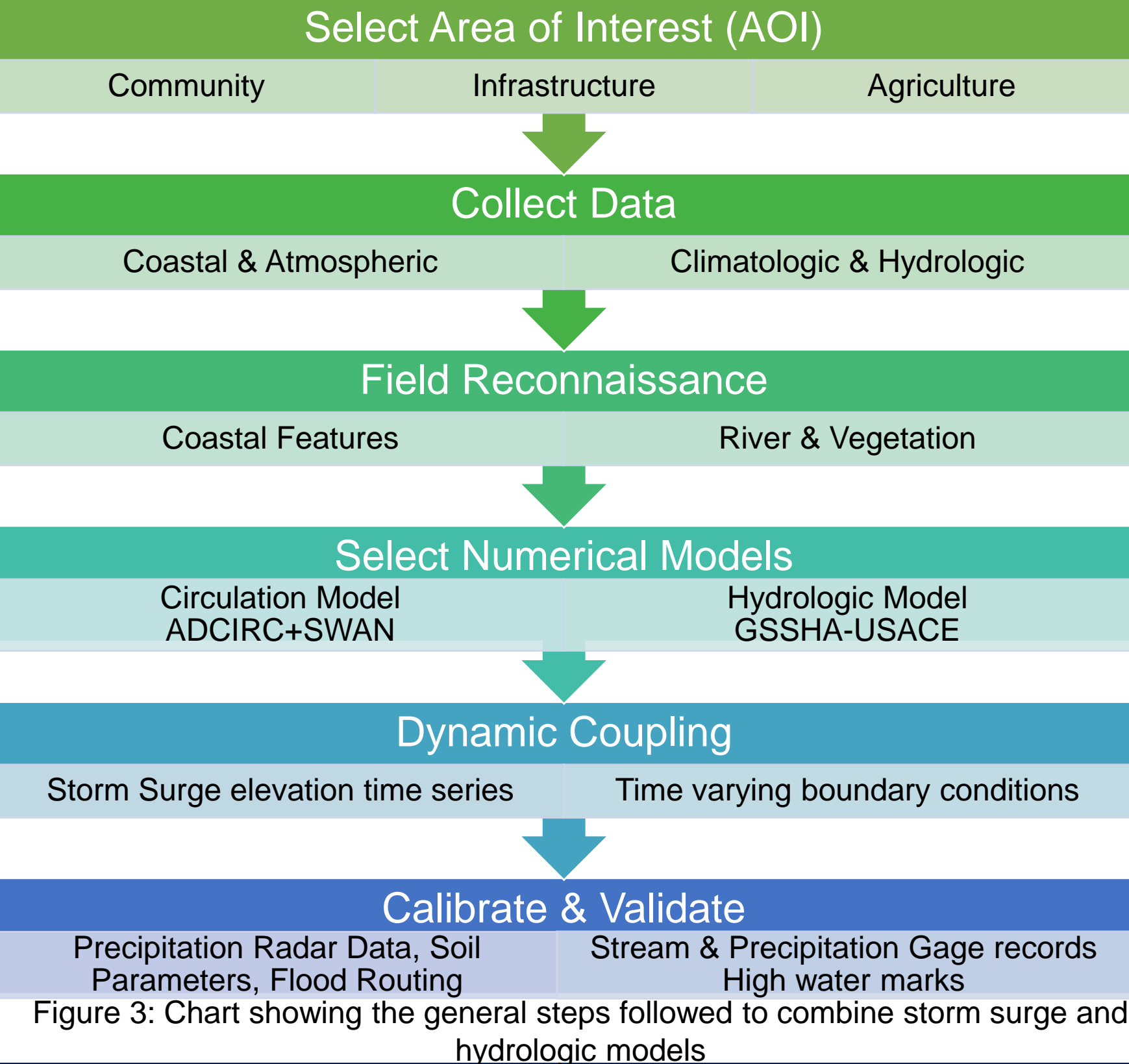


Figure 3: Chart showing the general steps followed to combine storm surge and hydrologic models

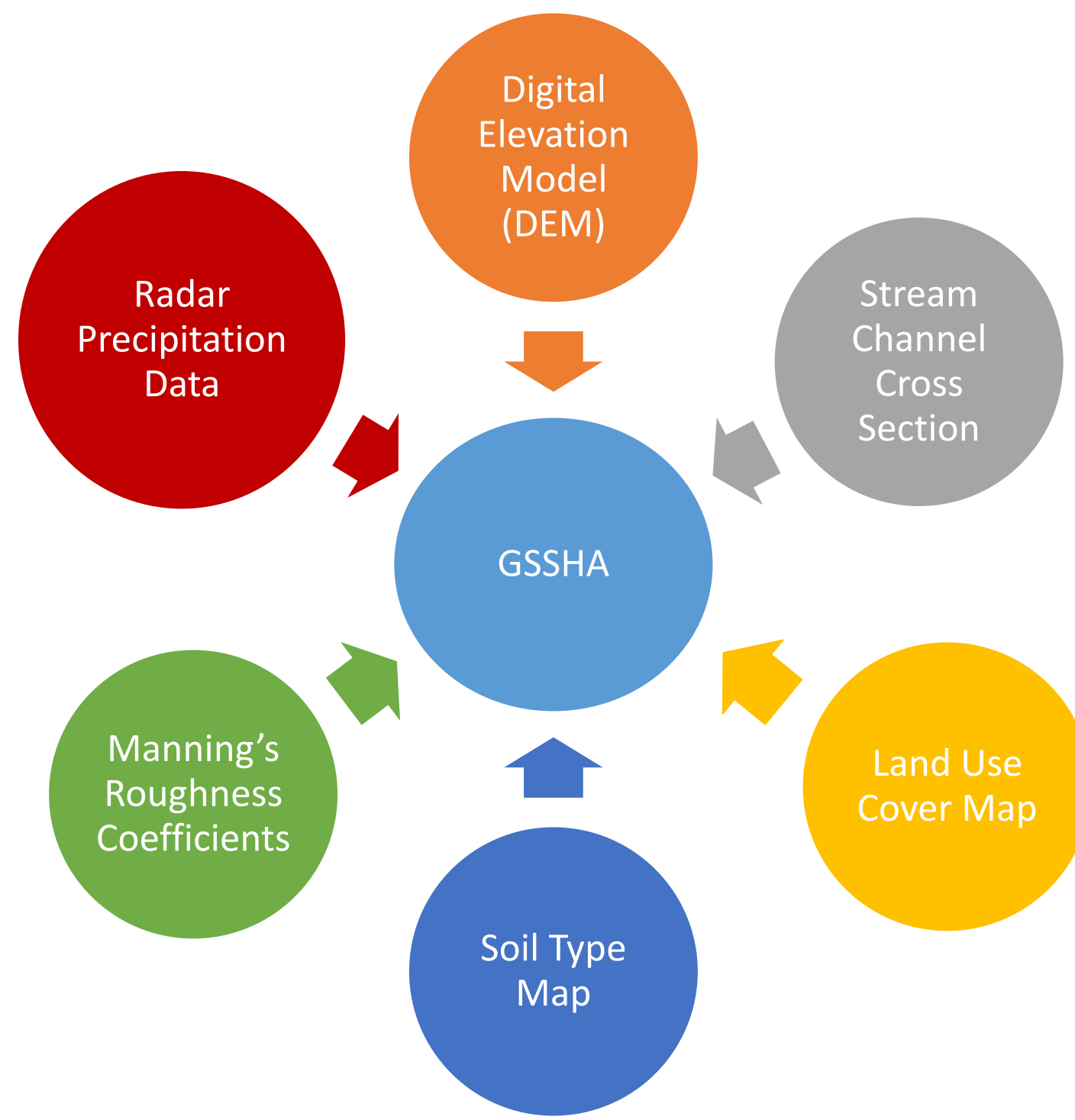


Figure 4: Required data for the distributed hydrologic model GSSHA

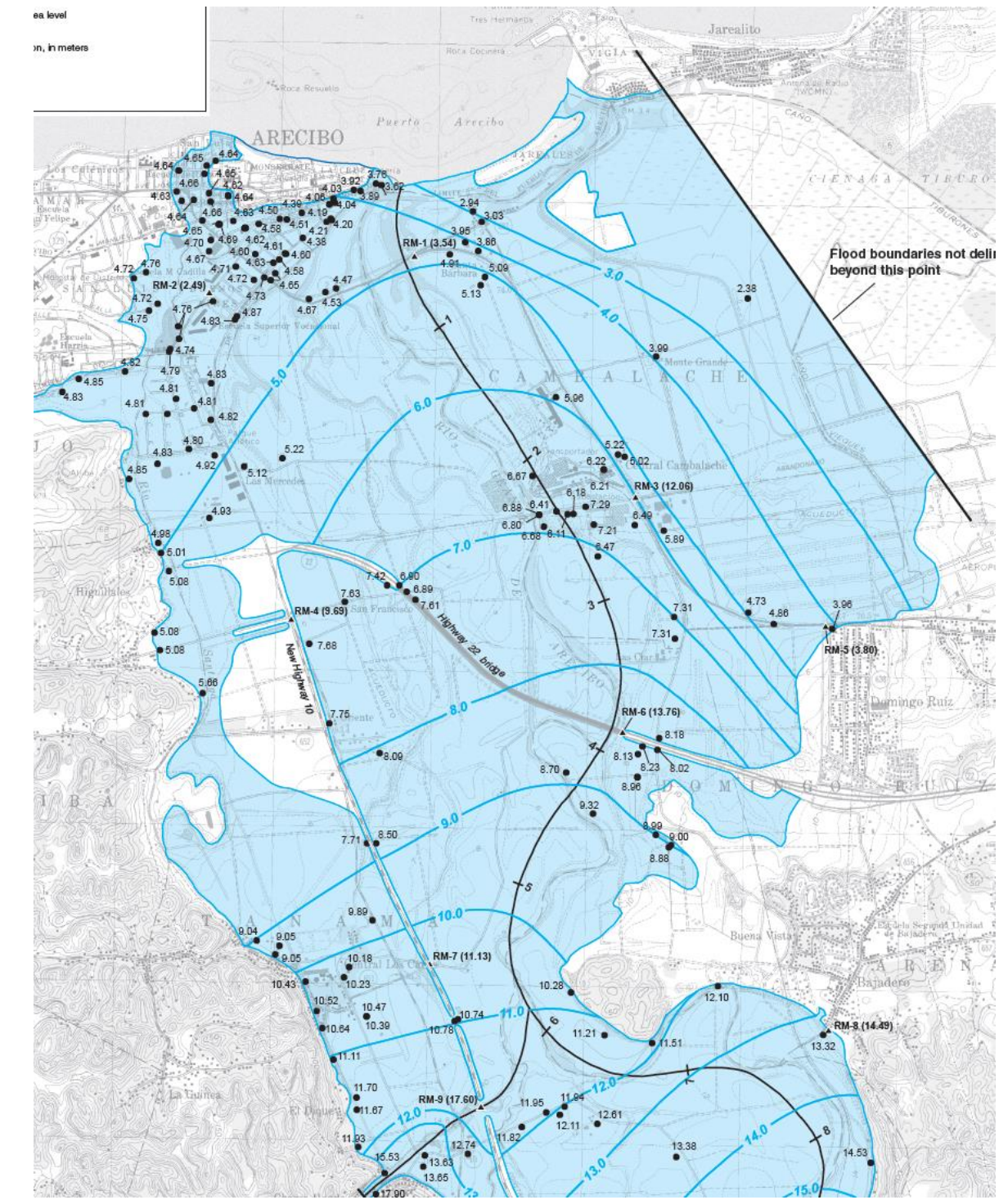


Figure 5: Flood of September 22, 1998 in Arecibo, Puerto Rico reported by the U.S. Geological Survey

Previous Studies: East Coast of Puerto Rico

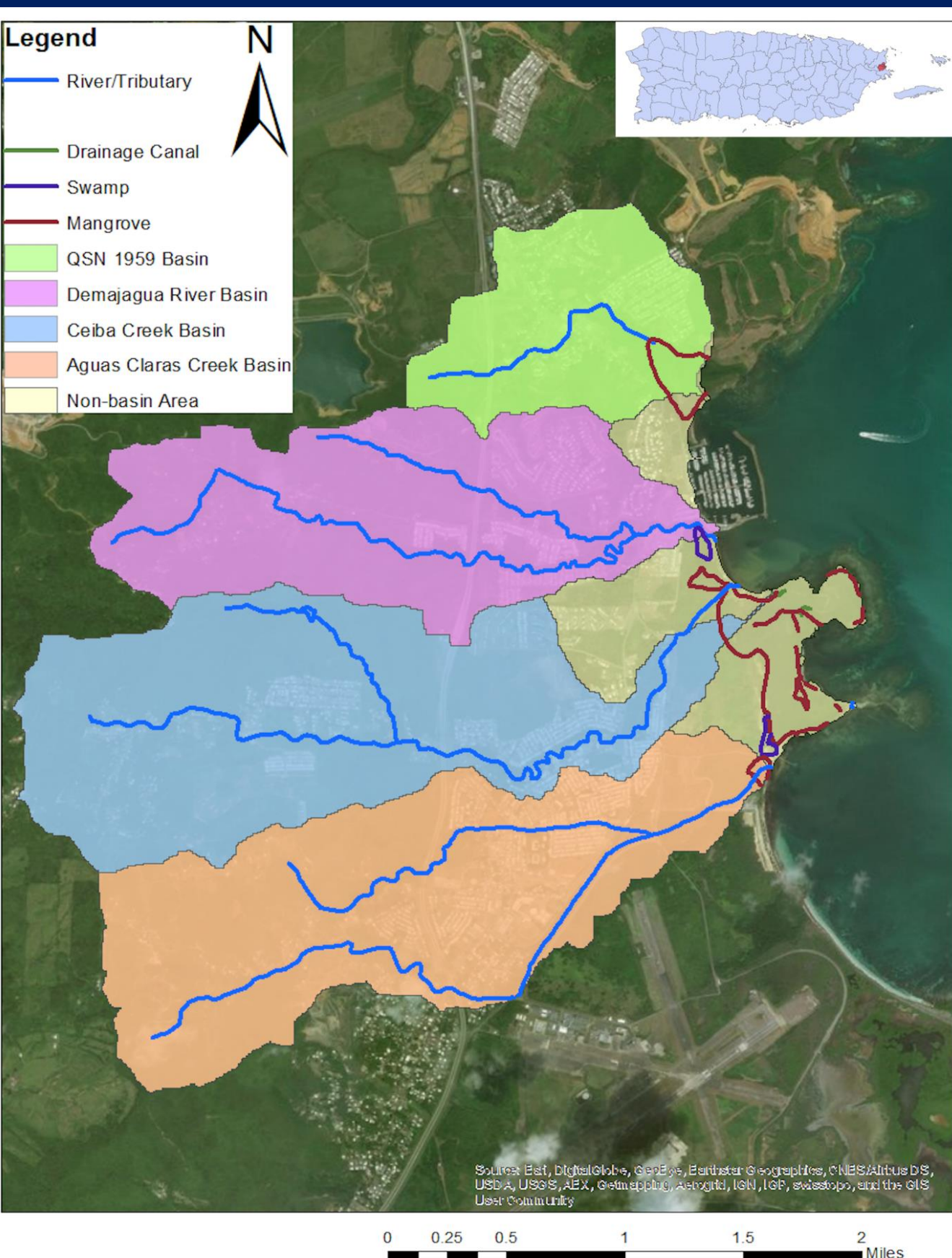


Figure 6: Area of Interest for the East coast study

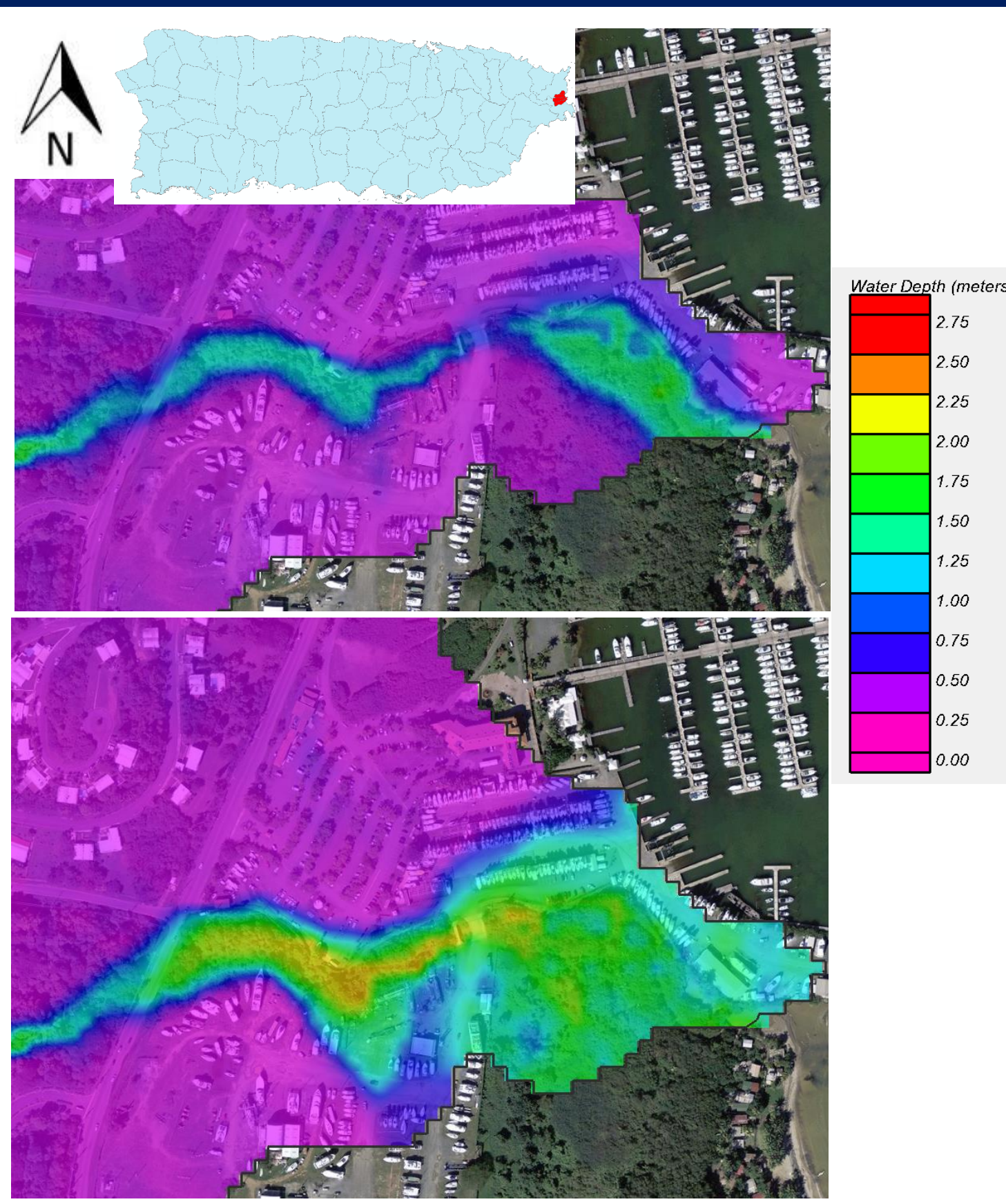


Figure 7: Maximum flood depth for the different flooding scenario at the Demajagua River watershed. A) Without storm surge penetration. B) Considering storm surge penetration.

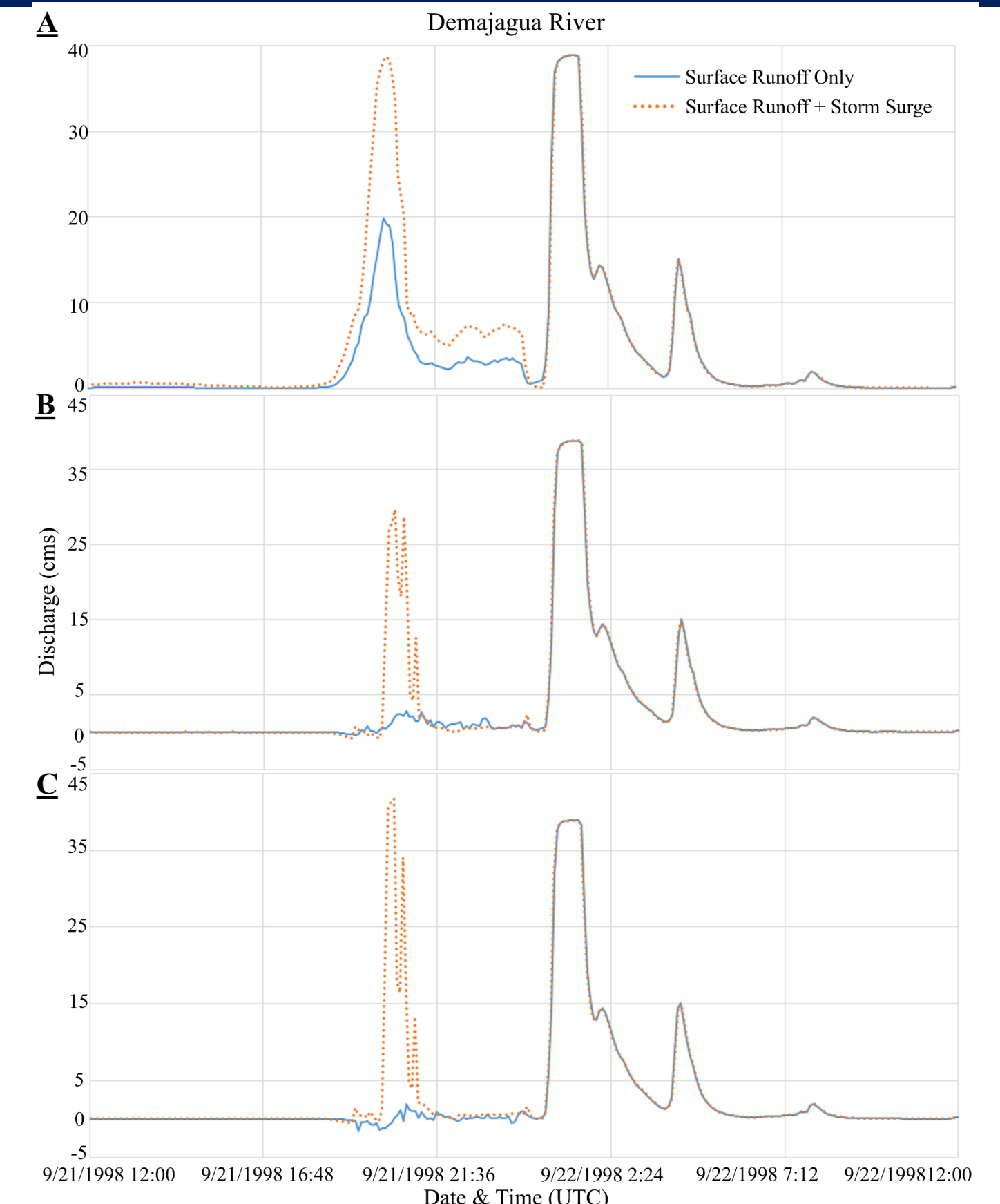


Figure 8: Discharge hydrograph for both flooding scenario and at different locations for the Demajagua River watershed. A) At 0-meters, B) At 50-meters, and C) At 100-meters from the stream outlet.

Next Steps

Perform a field reconnaissance trip to obtain the necessary stream cross-section for the hydrologic model. Calibrated the stream discharge of the Tanama River with USGS stream flow gage record. Assemble both models for the coastal zone and calibrated with USGS high water marks record.

References/Acknowledgements

- (A) Bennett, S., and Mojica, R. (2009). "Hurricane Georges Preliminary Storm Report: From the Tropical Atlantic to the United States Virgin Islands and Puerto Rico", NWS, San Juan, PR.
(B) Departamento de Recursos Naturales de Puerto Rico. (2008). "Plan Integral de Aguas de Puerto Rico".
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