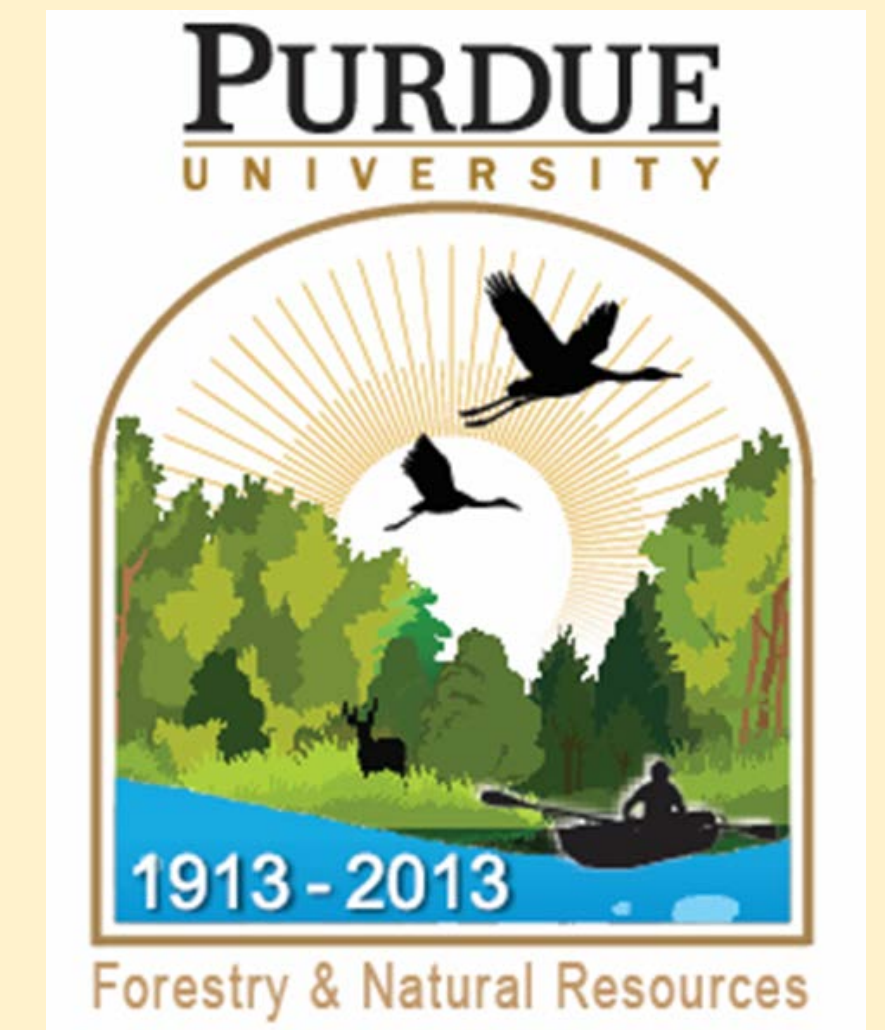




Spatial analysis of landfills in respect to flood events and global sea-level rise using ArcGIS Pro



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Introduction

- Media coverage of flood events has garnered much attention due to tropical storms like Hurricane Matthew and the costly damages that resulted.
- Under climate change, events like sea-level rise (SLR) and flooding threaten infrastructure, which make it necessary for proper planning before, during, and after installation to mitigate risk.
- Studies in Austria and the UK have revealed that many landfills are located in flood zones as well as coastal areas effected by coastal erosion. In the U.S. however, there have not been publications on landfill locations related to flood events and SLR.
- The interest of gaining knowledge on flood prone and SLR at-risk landfills is that studies reveal that inundation of landfills can spread contaminants to other areas (e.g. marshes) that can have both ecological and health risks.

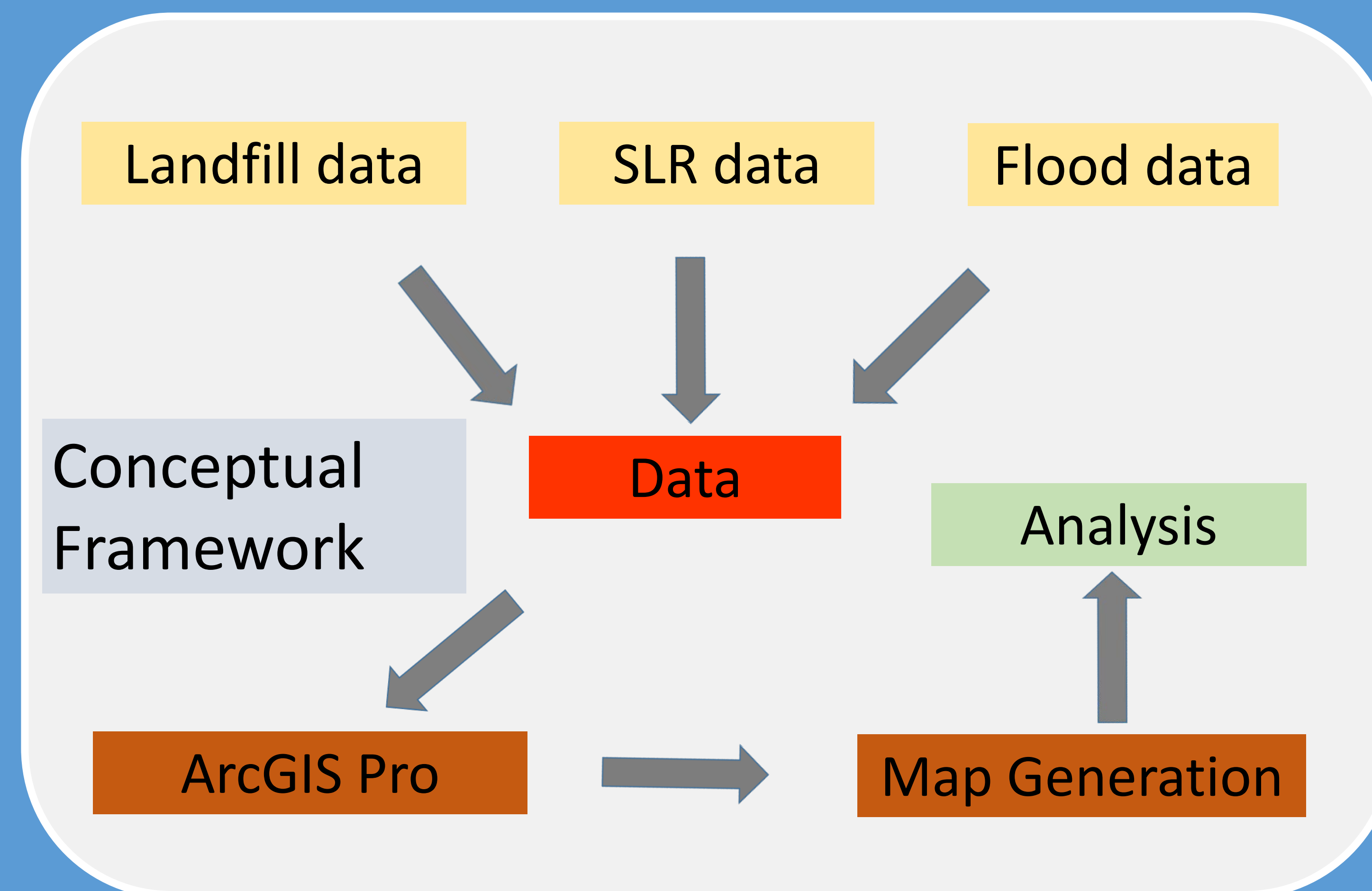


Figure 1. Conceptual framework for the analysis. Data for landfills, global sea-level rise (SLR) and flood data was collected and then added into ArcGIS Pro to then generate in-depth maps ready for analysis.

Mapped Landfills

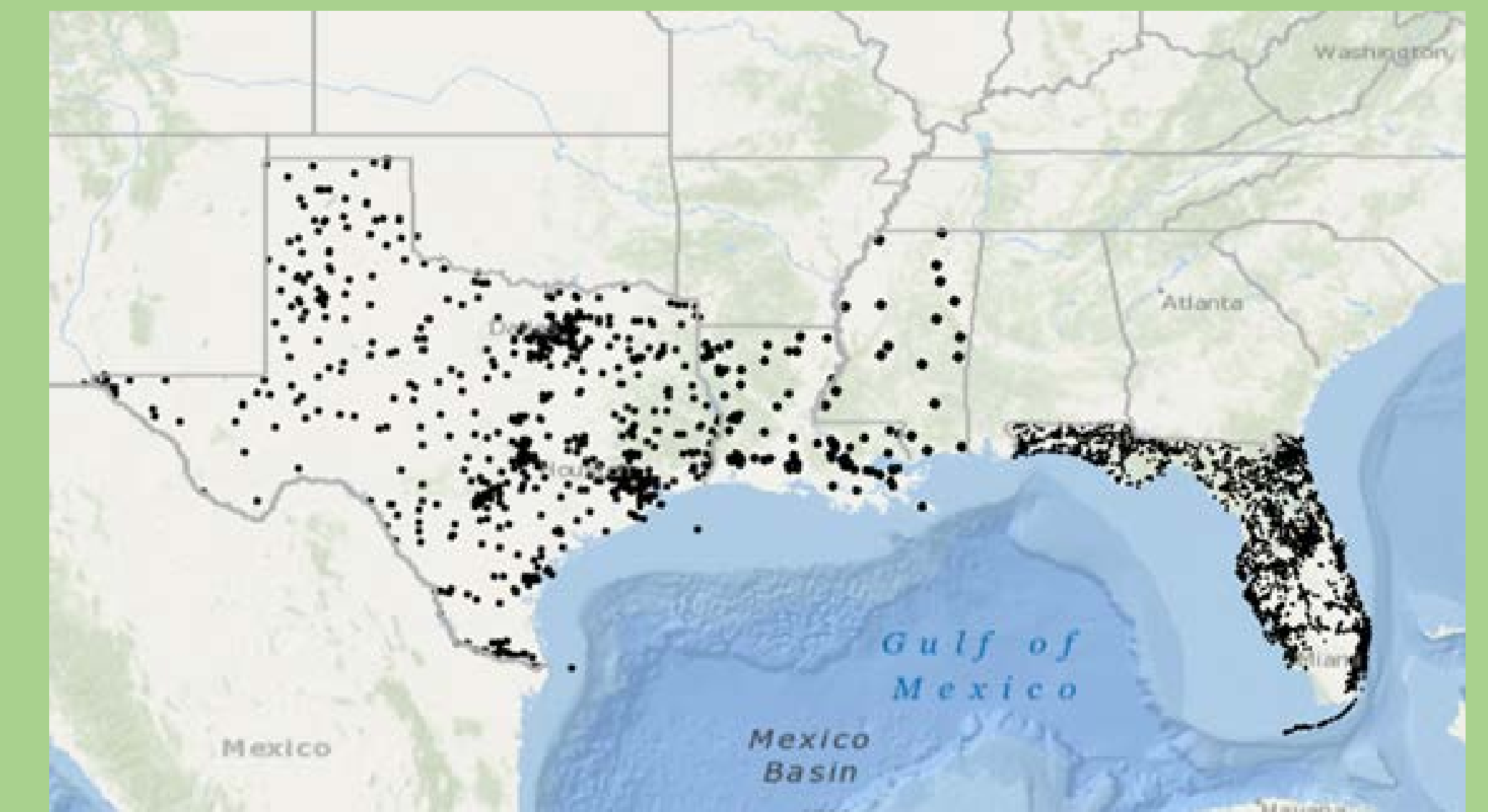


Figure 3. Map of landfills in the Gulf-state region: Texas, Louisiana, Mississippi, and Florida.

Preliminary result: flooding

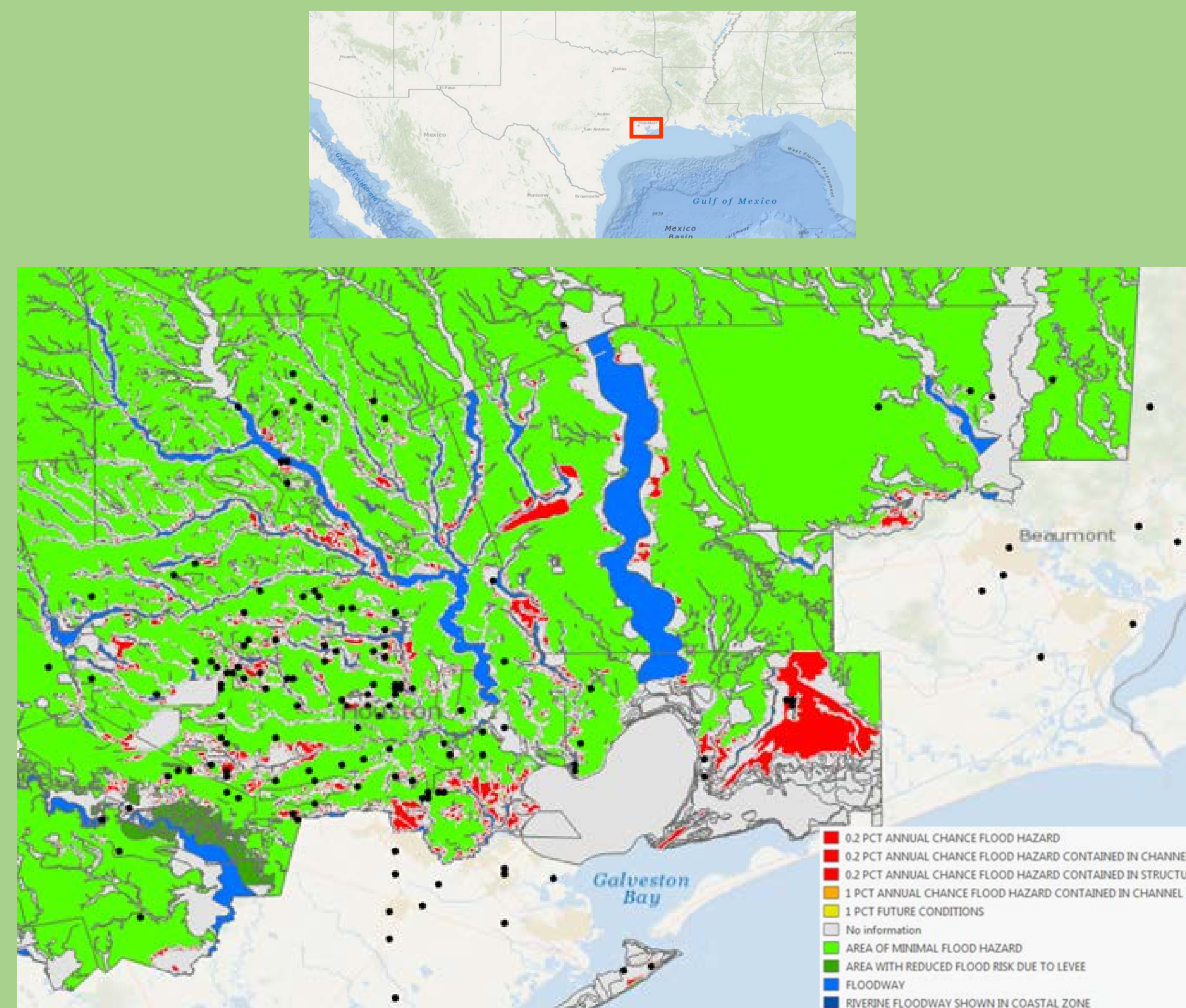


Figure 2. Map of Houston area. Red depicts highest chance of annual flooding, green depicts lowest chance, blue represents floodways, and no color is where data is incomplete. Observation of a few landfills in high chance and floodways is noted.

Analysis:

- Many landfills are at risk of inundation, particularly in Texas, Louisiana, and Florida coastal regions.
- Of those, many are also at risk for SLR; especially along the Florida coasts.

Future direction:

- Complete flood mapping for all of gulf state region.
- Add SLR layers.
- Analyze and come up with methodology for determining at-risk landfills

Research Questions

- What landfills are at risk from floods or SLR?
- How many landfills are at risk?
- What makes a landfill at risk to flooding and or SLR?
- What communities could be affected from these potential "at-risk" landfills?
- What ecological impacts and effects could be felt by landfills that have been inundated or eroded?

Goals of the Analysis

- Determine the number of landfills at risk from flooding events, SLR, or both
- Create a dataset that can be examined and used for future studies

References

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- Neuhold, C. (2013). Identifying flood-prone landfills at different spatial scales. *Natural Hazards*.
- Laner, D., Fellner, J., & Brunner, P. H. (2009). Flooding of municipal solid waste, 2015=2030.
- Spencer, K., & Brand, J. (2016). Floods and coastal erosion may expose contents of UK landfills, study finds. *Science Direct*.

Data

- Flood layer data: Derived from National Flood Hazard Layer made by FEMA.
- Landfill Data: Texas came from Texas Commission on Environmental Quality, Florida came from the Florida Department of Environmental Protection Geospatial Open Data site, Louisiana was derived from geocoded addresses, and Mississippi came from the Mississippi Department of Environmental Quality

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