2019 NSF Civic Innovation Challenge

Code for Sacramento - Resilience Theme
Hack Night Presentation - 12/12/18

Problem Statement

- Communities are at a high risk from flooding and erosion. How can we use data and technology tools, like sensing and mapping, to help protect our communities?”
- Code4Sac Objectives:
  - Develop tools to identify and assist at-risk communities
  - Support Mayor’s Commission on Climate Change
  - Raise public awareness regarding climate change
  - Explore new datasets and technologies

Potential Impacts

- Flooding: Increased or Erratic Rainfall due to Climate Change
  - Property Damage, Emergency Response and Shelter
  - Insurance Coverage and Fraud During Recovery
  - Homeless Population within Watershed
- Erosion: Collapse or Subsidence of Land after Flooding
  - Water Quality Impact due to Erosion
  - Groundwater Impacts due to Pollution
  - Aquatic Wildlife Impacts due to Pollution

Flooding and Erosion

1. Climate change causes erratic rainfall patterns (NOAA)
    a. Flooding causes displacement of residents and homeless
    b. Existing infrastructure to minimize impact (FEMA, ACOE)
    c. Emergency response and recovery efforts (FEMA, OES)
2. Erosion is determined by water volume, soil type and slope
    a. Streambed alteration and wildlife impacts (USGS, NOAA, CDFW)
    b. Potential groundwater impacts (USGS, Sacramento Watershed)

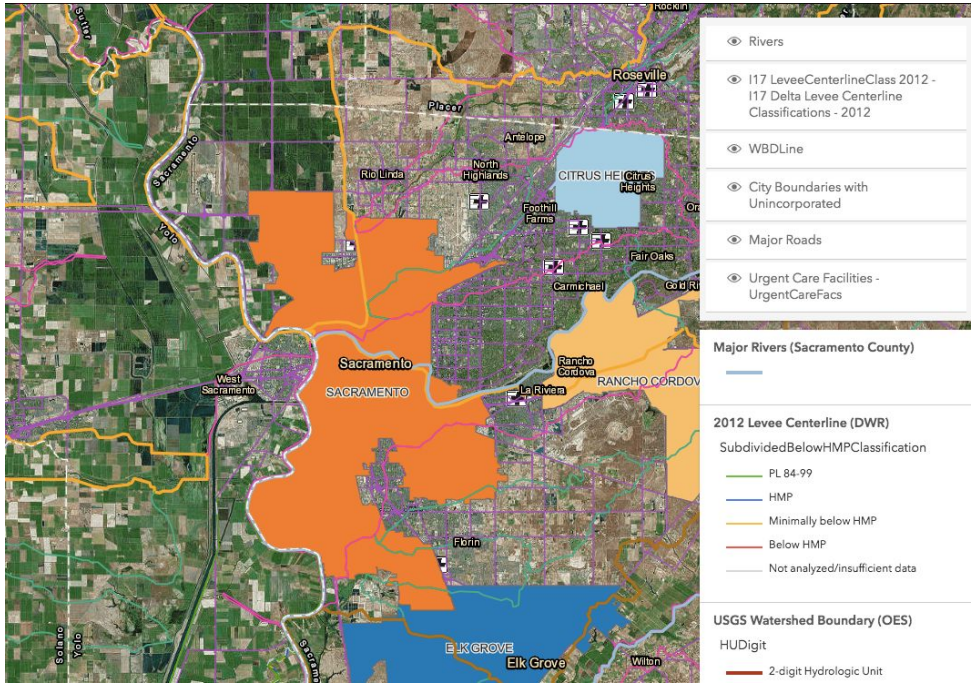
Addressing the Challenge

1. Develop GIS base map and data layers
    a. Understand hydraulics, watershed and infrastructure
2. Identify at-risk communities
    a. Identify resilience characteristics, needs and response
3. Develop technology and tools
    a. Web application: Notification and communication system
    b. Data science: GIS, monitoring, sensing and crowd-source data
4. Draft report, recommendations and next steps

Demo

- Node.js + Express
- ESRI JS API
- Bootstrap
- Heroku

https://ncic.herokuapp.com/map



Datasets

1. ESRI Open Data Portal
2. Federal:
    a. FEMA: Flood Hazard Data , GIS Portal , KML Layers
    b. USGS: Monitoring Data , GIS Portal, Data Portal , Flocast
    c. NOAA: NWS Portal , NOAA Portal
    d. Army Corp. of Engineers (ACOE): ArcGIS Library , GIS Portal
3. State:
    a. Sacramento River: GIS Portal , Data Portal
    b. Office of Emergency Services (OES): GIS Portal
    c. Dept. of Water Resource (DWR): ArcGIS Library , GIS Portal

Resources

1. Sensor and Monitoring:
    a. IoT Sensor Datasets: Array of Things , Data.gov
    b. USGS Monitoring Data: Water Quality , Groundwater
2. Flooding:
    a. Santa Clara Water District: Homeless Encampments Program
    b. FHWA Research: *Rivers, Rainfall, and Resilient Roads*
    c. CalRecycle: Homeless Encampments Guide

Next Steps

1. Team Roles
    a. Developers, Designers, Data Scientists and Analysts
2. Research
    a. Define resilience and its characteristics
    b. Identify at-risk communities and communication
    c. Contact subject matter experts
3. Develop web application, data model and analysis
4. Draft Report and Recommendations