

**ENHANCEMENT OF THE SOURCE ASSESSMENT MAPPING
INTERFACE (SAMI) TOOL TO PROTECT COMMUNITIES
FROM WATERBORNE PATHOGENS DURING FLOODING
EVENTS ALONG THE GULF OF MEXICO (GOM)**

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This must be **Slide 2** of your presentation.

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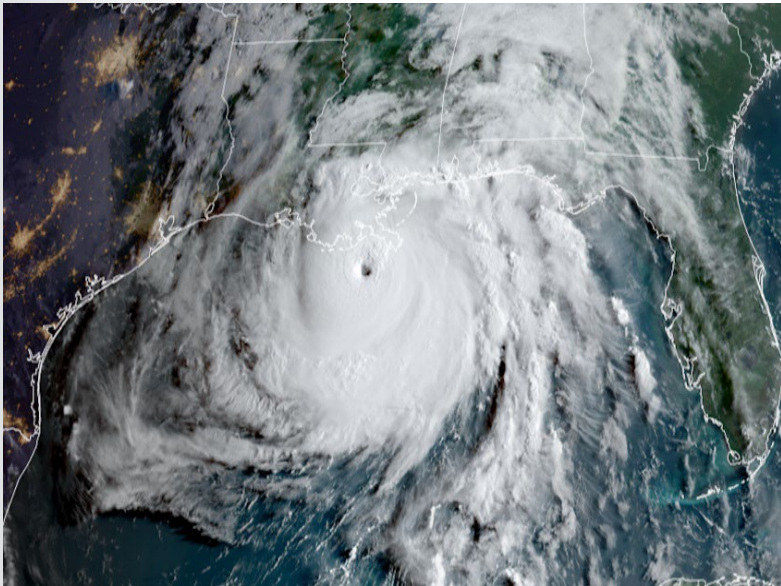
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Employment: **United States Environmental Protection Agency**, Office of Research and Development, Center for Computational Toxicology and Exposure

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Hurricane IDA: *Photo Credit*
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Satellite, Data, and Information Service
(NESDIS)

- One impact of *climate change*:
 - *Increased number and severity of storms* (e.g., hurricanes, tropical storms, tropical depressions, and El Niño/La Niña cycles) in the Gulf of Mexico (**GOM**) region (<https://www.gfdl.noaa.gov/global-warming-and-hurricanes/>)
 - **NOAA** reported that the **2020 Atlantic Hurricane Season** was historic (<https://www.nesdis.noaa.gov/content/noaa-expert-answers-our-questions-about-historical-2020-hurricane-season>)
 - Projections indicate an even bigger increase in *climate change-driven storms* in future years
- Increase in **GOM** storm and flooding events:
 - Highlights need to provide *locations and concentrations of ‘zones of concern’ or ‘hot spots’ for microbial contaminants/waterborne pathogens, harmful algal bacteria, anthropogenic leaks/spills*, and the potential of exposure risk to human health and ecological health
 - Affect a high proportion of *Environmental Justice* communities



Links to ORD Research

- Project supports **Safe and Healthy Communities (SHC)**, **Safe and Sustainable Water (SSW)**, and **Chemical Safety and Sustainability (CSS)** Research Programs through:
 - a) **Identifying and mapping community assets and vulnerabilities**, including social, natural, and built environmental determinants of vulnerability (e.g., drinking water sources, wetlands)
 - b) Improving **connections between community and ecosystem resilience** in the context of contaminated sites and extreme climate events
 - c) Developing an **advanced monitoring technique** that offers:
 - Integration of hurricane-induced flood locations with accurate concentrations of waterborne pathogens, harmful algal bacteria, and anthropogenic leaks/spills (e.g., **oil and gas production**)
 - Modeling of fate and transport of bacteria from a 'hot spot' zone to the surrounding area(s) as flooding sets in
 - Rapid assessment of risk factors
 - An early warning system to protect human health and the environment
 - **Note:** Many underserved communities live in areas prone to hurricanes and flooding and are constantly exposed to anthropogenic contaminants (e.g., 9th Ward [**NOLA**], St. James Parish).

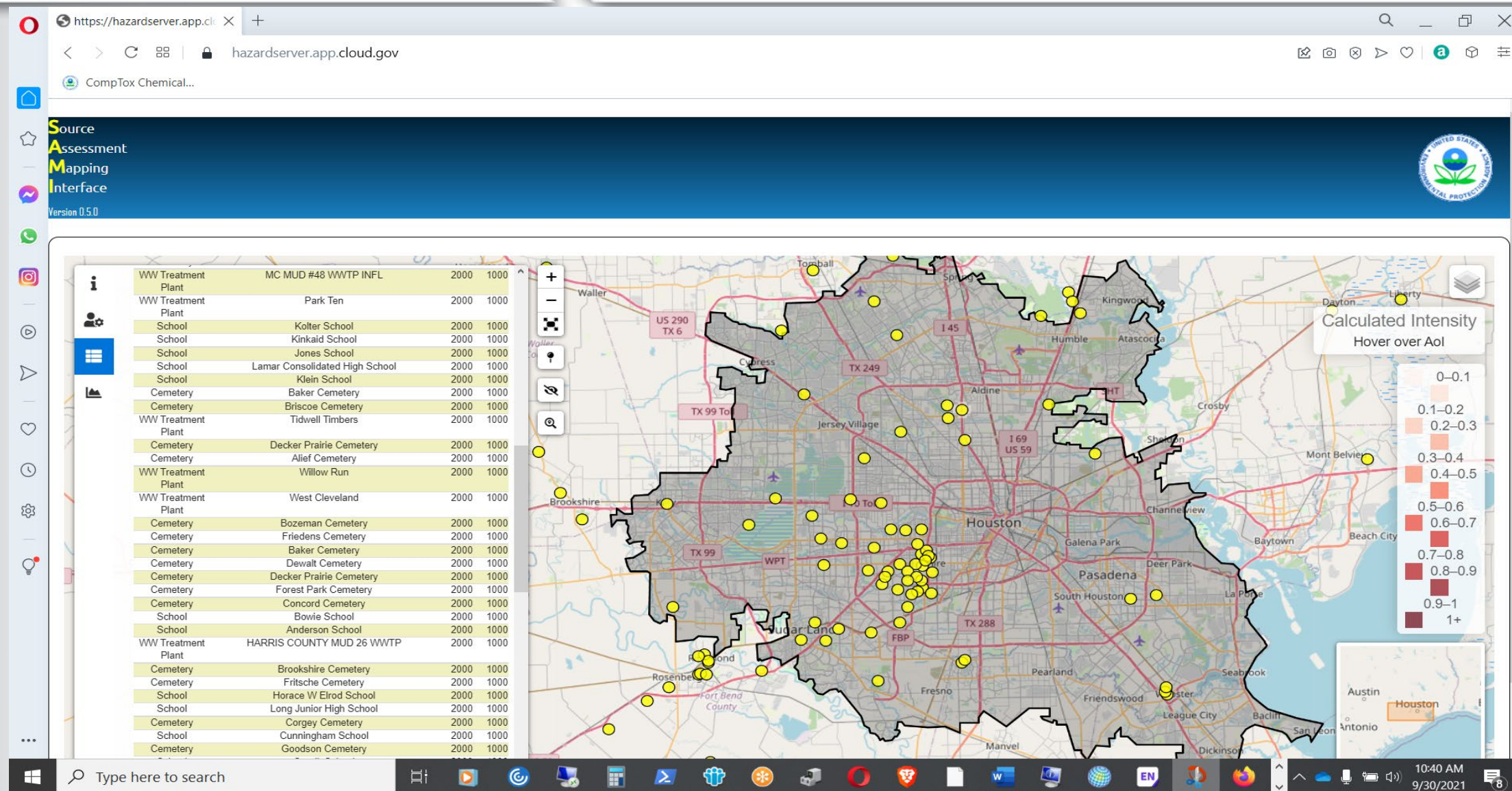


Innovative Research Approach

- Enhance the **Source Assessment Mapping Interface (SAMI)** Tool to:
 - Display **high-concentration levels of waterborne pathogens** (i.e., pathogenic bacteria, viruses, harmful algal bacteria, and fecal indicators) **and anthropogenic leaks/spills** during storm and subsequent flooding events
 - Plan and implement actions to protect public health (e.g., **map drinking water contamination areas**)
 - Operate in a similar manner to '**weather apps**' which provide users with weather information and associated warnings
- Initial SAMI Tool was developed in a previous Regionally-Applied Research Effort (**RARE**) Research Project (**Project 2086**)
 - Successfully applied in *Houston, Texas*
 - Current operational version (Pre-Alpha Version: **Version 0.5.0**) is located here: <https://hazardserver.app.cloud.gov/>.
 - A 2020 demo webinar of SAMI is found here: <https://www.youtube.com/watch?v=xTzVQnNBfAU&feature=youtu.be>.
 - Software code will be modified, enhanced, and applied in an initial target city (*New Orleans, Louisiana - **NOLA***)
- Approach used in **NOLA** - plan to replicate at other locations in the GOM (in EPA R6 and EPA R4, i.e., [west to east]):
 - McAllen TX, Brownsville TX, Corpus Christi TX, Houston TX {GIS shapefile exists}, Texas City TX, Galveston TX, Beaumont TX, Lake Charles LA, Lafayette LA, Baton Rouge LA, New Orleans LA {GIS shapefile will be developed}, Gulfport MS, Biloxi MS, Mobile AL, Pensacola FL, Tallahassee FL, St. Petersburg FL, Tampa FL, and Sarasota FL
 - **Note:** Many GOM areas (TX and LA) **experienced multiple hurricanes and floods in 2021** (Ida, Larry, etc.)



SAMI: Houston 'Sensitive' Land Use Locations



- The **Lake Pontchartrain Conservancy** (Dr. Brady Skaggs; brady@saveourlake.org; 1-504-836-2235)
- The **Louisiana Department of Health** (Chris Lemaire; chris.lemaire@la.gov; 1-225-342-7540)
- **University of Malaysia Pahang** (UMP: Dr. Adam Adman; adamadman@ump.edu.my)
- **Massey University: Environmental Health Intelligence New Zealand - EHINZ** (Dr. Barry Borman; B.Borman@massey.ac.nz)
- **Massey University: Environmental Health Intelligence New Zealand - EHINZ** (Patrick Hipgrave; P.Hipgrave@massey.ac.nz)



Users of Research Output

- Impacted **Citizens**
- Environmental Justice (EJ) Communities
- **Emergency (First) Responders**
- Environmental Agencies (State and Tribal)
- Louisiana Health Department
- Lake Pontchartrain Conservancy
- **EPA R6 states** (Arkansas, Louisiana, New Mexico, Oklahoma, Texas)
 - **66 Tribal Nations** located in the R6 states
 - EPA R6 On-Scene Coordinators
 - EPA R6 Water Division personnel
- **EPA R4 states** (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee)
 - **Six [6] Tribal Nations** located in R4 states
 - EPA R4 personnel and first responders
- **EPA R1, R2, R3, and R4 Atlantic Coast communities**



Project Team

- Eric S. Hall (ORD/CCTE/SCDCD): PI/COR
 - ***Software Development/Quality Assurance***
- Marirosa Molina (ORD/CEMM/WECD): co-PI/Alt COR,
 - ***Microbial Risk Assessment***
- Sala N. Senkayi (EPA R7/LSASD)
 - ***Regional Project Management/Test Coordinator***
- Michael G. Morton (EPA R6)
 - ***Regional Science Liaison (RSL)***
- ***Garner Hancock*** (ORD/CCTE/SCDCD): Student Services Contractor (SSC)
 - ***GIS Developer/Data Analyst/Coder***



DISCLAIMER

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CONCLUSION

- **THANK YOU!**