ANDREW JUAN

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EDUCATION

Rice University   Houston, TX
PhD in Environmental Engineering (*August 2016*)
Dissertation: Evaluating the Hydrodynamic Performance of Green and Gray Infrastructure in Urban Watersheds for the Greater Houston Region (*Advisor: Philip Bedient*)

Rice University   Houston, TX
MS in Environmental Engineering (*May 2011*)
Thesis: Developing a Radar-based Flood Alert System for Sugar Land, Texas (*Advisor: Philip Bedient*)

Pensacola Christian College   Pensacola, FL
BS in Mechanical Engineering (*summa cum laude*) (*May 2007*)

RESEARCH EXPERIENCE

Institute for a Disaster Resilient Texas (IDRT) – *Associate Research Scientist*
Texas A&M University at Galveston   Houston, TX
December 2022 – present
- **Regional flood impact analysis**: Evaluate the flood impact of a dam system to downstream communities in the Navasota River basin (SC Texas) under historical and current conditions.

Rice University – *Research Scientist*   Houston, TX
September 2018 – November 2022
- **Wastewater epidemiology:** Evaluate viral load persistence of SARS CoV-2 in Houston sewersheds by estimating wastewater travel times within the existing wastewater distribution system.
- **Regional urban flood mitigation studies**: Evaluate various region-wide flood mitigation options (e.g., regional detention, palustrine wetlands / prairies, and property buyouts) under existing and projected development scenarios by using hydrologic / hydraulic models, land use projection models, and statistical tools.
- **Coupled real-time flood warning and road network accessibility study**: Develop a framework that integrates real-time flood inundation with a road network accessibility model for a flood-prone urban watershed in Houston, TX.
- **Estuarine and coastal wetlands hydrodynamics**: Investigate the impacts of canals and spoil banks on the hydrodynamics of estuarine / marine wetlands in Breton Sound, Louisiana by using hydraulic and storm surge models.

Rice University – *Postdoctoral Research Associate*   Houston, TX
October 2016 – August 2018
- **Urban hydrologic studies**: Utilize hydrologic (HEC-HMS, Vflo®) and hydraulic (1D steady and 1D/2D unsteady HEC-RAS) models to perform various studies (e.g., flood risk / damage, flood mitigation, land use/ land cover (LULC) impacts, stormwater management, drainage, detention / retention) in urban watersheds throughout the Greater Houston.
- **Green Infrastructure**: Investigate the infiltration capacities and potential flood storage of native prairies owned by the Katy Prairie Conservancy in Upper Cypress Creek watershed.

- **Coastal environmental risk**: Conduct research on coastal environmental risk assessment and resiliency in the Houston-Galveston region using a combination of storm surge, hydraulic, and environmental models.
- **Water resources**: Evaluate the issue of water apportionment between Georgia and Florida by analyzing historical rainfall, stream discharge, and consumptive use, as well as simulating reservoir operations.
- **Flood alert systems:** Maintain and improve on the previously-developed real-time flood alert system (FAS) for the Texas Medical Center and the City of Sugar Land, and provide technical support to city officials and emergency personnel during severe storm events.

Rice University – *Graduate Research Assistant*   Houston, TX
May 2009 – August 2016
- **Low Impact Development (LID)**: Simulated and assessed the hydrologic performances of LID features (e.g. green roofs and rain gardens) on the watershed-scale using Vflo®, and participated in field surveys, data collection, and sampling/ monitoring of various LID sites in Houston.
- **Floodplain analysis**: Performed hindcast analyses, floodplain, and flood damage studies on several watersheds in the Houston region (e.g. Spring Creek, White Oak Bayou, Brays Bayou watersheds) using various hydrologic and hydraulic models.
- **Flood risk management**: Completed a floodplain revision study for the Texas Medical Center (TMC) in Houston, TX, and provided technical support and annual workshops for TMC's Flood Alert System (FAS).
- **Hydrology / Hydraulics**: Analyzed and evaluated the improvements of implementing a proposed drainage network for Rice University against existing drainage conditions utilizing the hydrologic model HEC-HMS and a hybrid 1D/2D hydraulic model (XP-SWMM).
- **Flood warning**: Developed a real-time, radar-based flood alert system for Sugar Land, Texas to aid city officials and emergency personnel during severe storm events.
- **Coastal flood / surge**: Consulted in a flood/ surge risk study for a coastal watershed in Jakarta, Indonesia as part of a knowledge exchange effort between the Severe Storm Prediction, Education, and Evacuation from Disasters (SSPEED) Center at Rice University and the Institute of Catastrophe Risk Management (ICRM) at Nanyang Technological University (NTU) in Singapore (*January 2013*).

PROFESSIONAL EXPERIENCE

PBB & Associates – *Hydrologist / Water Resources Engineer*   Houston, TX
October 2016 – present
- **City of Friendswood Flood Mitigation Analysis** (City of Friendswood)
  Perform a flood vulnerability analysis at the City of Friendswood in the context of Hurricane Harvey (August 2017), the existing 100-yr (HCFCD), and the new 100-yr (NOAA Atlas 14 – 2018) storms; and evaluate the effectiveness of various flood mitigation options proposed by the City of Friendswood.
- **San Jacinto River Basin Flood Impact Analysis** (Hagans Law)
  Perform a hindcast and flood impact analysis on Lake Conroe located in the West Fork San Jacinto River Basin to the City of Kingswood, TX in the context of Hurricane Harvey.
- **Big Creek Watershed floodplain Study** (Fort Bend County Flood Control District)
  Performed an infiltration field study at several field sites in Fort Bend County to determine appropriate infiltration parameters used in the hydrologic models for the watershed. Also conducted a comprehensive review of existing / proposed H/H models for Big Creek watershed.
- **Greens Bayou Barges Study**
  Perform a hindcast analysis of barge displacement using a 1D/2D hydraulic model at Greens Bayou near the Houston Ship Channel during Hurricane Harvey (2017).

- **I-12 Flood Impact Study** (City of Denham Springs, Louisiana)
  Assess the impacts of highway median barriers in I-12 (Denham Springs, LA) in impeding flow conveyance during the August 2016 storm in the Amite River basin using a 2D hydraulic model.
- **Addicks / Barker Upstream Flood Impact Study**
  Assess the flood damage / impacts on upstream Addicks / Barker residential properties due to flood storage of the two reservoirs during Hurricane Harvey (2017) using hydrologic and hydraulic models as well as other statistical tools.
- **Cedar Bayou Flood Impact Analysis** (Arkema, Inc.)
  Performed a hindcast and flood impact analysis on Cedar Bayou during Hurricane Harvey and other historical storms (Oct 1994 and Oct 2015) by using and modifying HCFCD's hydrologic and hydraulic models.
- **Exploration Green Detention Study** (CLCWA)
  Evaluate the flood storage capacity and impacts of Exploration Green, a natural drainage / wetlands / detention basin converted from an existing golf course on Armand Bayou watershed.
- **Georgia – Florida Water Apportionment** (State of Georgia)
  Evaluated the issue of water apportionment between Georgia and Florida in the Apalachicola-Chattahoochee-Flint (ACF) river basin by analyzing historical rainfall, streamflow, consumptive use, and simulating water balance and various reservoir operation scenarios (Matlab, LSPC, HEC-Ressim).
- **Grambling State University Flood Damage Assessment** (GSU, Louisiana)
  Performed a flood analysis of GSU for the March 9-10, 2016 storm, in which the western portion of campus was severely inundated due to 13-17 inches of rain in 24 hrs. Project scope included site assessment, data collection, hydrologic / hydraulic analysis, and the preparation of a damage assessment report.

Wylie Consulting Engineers – *Mechanical Engineer*   Houston, TX
May 2007 – January 2009
- Designed HVAC systems for commercial, retail, residential, and healthcare facilities utilizing AutoCAD to comply with applicable standards (e.g. ASHRAE and LEED) and building codes.
- Performed load calculations and psychrometrics analyses to aid in mechanical equipment selection.

RESEARCH ARTICLES

- McCall, C., Fang, Z.N., Li, D., Czubai, A.J., Juan, A., LaTurner, Z.W., Ensor, K., Hopkins, L., Bedient, P.B., Stadler, L.B., 2022. Modeling SARS-CoV-2 RNA degradation in small and large sewersheds. Environ. Sci.: Water Res. Technol. 10.1039.D1EW00717C. https://doi.org/10.1039/D1EW00717C.
- Atoba, K., Newman, G., Brody, S., Highfield, W., Kim, Y. and Juan, A., 2021. Buy them out before they are built: evaluating the proactive acquisition of vacant land in flood-prone areas. *Environmental Conservation, 48(2), pp.118-126*.
- Garcia, M, Juan, A., Bedient, P., 2020. Integrating Reservoir Operations and Flood Modeling with HEC-RAS 2D. *Water*: 12(8):2259.
- Juan, A., Gori, A., and Sebastian, A., 2020. Comparing Floodplain Evolution in Channelized and Un-Channelized Urban Watersheds in Houston, Texas. *Journal of Flood Risk Management 2020; e12604. https://doi.org/10.1111/jfr3.12604.*
- Gori, A., Gidaris, I., Elliott, J.R., Padgett, J.E., Loughran, K., Bedient, P.B., Panakkal, P., and Juan, A., 2020. Accessibility and recovery assessment of Houston's roadway network due to fluvial flooding during Hurricane Harvey. *Natural Hazards Review*, doi:10.1061/(ASCE)NH.1527-6996.0000355.

- Panakkal, P., Juan, A., Garcia, M., Padgett, J.E., and Bedient, P.B., 2019. Towards enhanced response: Integration of a flood alert system with road infrastructure performance models. *SEI Structures Congress 2019,* doi:10.1061/9780784482223.029
- Gori, A., Blessing, R., Juan, A., Brody, S., & Bedient, P. B., 2018. Characterizing Urbanization Impacts on the 100-yr Floodplain through Integrated Land Use, Hydrologic, and Hydraulic Modeling. Journal of Hydrology, doi: 10.1016/j.jhydrol.2018.10.053.
- Bass, B., Juan, A., Gori, A., Fang, Z., and Bedient, P., 2016. 2015 Memorial Day Storm Flood Impacts for Changing Watershed Conditions in Houston, TX. *Natural Hazards Review,* doi: 10.1061/(ASCE)NH.1527-6996.0000241.
- Juan, A., Hughes, C., Fang, Z., and Bedient, P., 2016. Hydrologic Performance of Watershed-scale Low Impact Development (LID) in a High Intensity Rainfall Region. *Journal of Irrigation and Drainage Engineering,* doi: 10.1061/(ASCE) IR.1943-4774.0001141.
- Juan, A., Fang, Z., and Bedient, P., 2015. Developing a Radar-Based Flood Alert System for Sugar Land, Texas. *Journal of Hydrologic Engineering*, doi: 10.1061/(ASCE)HE.1943-5584.0001194.

OTHER PUBLICATIONS

- Sebastian, A. and Juan, A., 2022. Chapter 5: Urban Flood Modeling: Perspectives, challenges, and opportunities. *Coastal Flood Risk Reduction - 1st Edition*.
- Fang, N., Juan, A., and Nikiel, C., 2018. Chapter 13 - Case Studies in Water Resources: Flood and Drought Management in the United States. *Hydrology and Floodplain Analysis, 6th ed.*
- Bedient, P. and Juan, A., 2017. Lack of infrastructure, regulation made Houston vulnerable. *Houston Chronicle*, September 9, 2017.
- Juan, A., Fang, Z., and Bedient, P., 2013. Flood Improvement and LID Modeling Using XP-SWMM. *Published in* http://xpsolutions.com/Resources/Case-Studies/.

SELECT CONFERENCE PRESENTATIONS AND POSTERS

- **American Geophysical Union,** *December 2018*
  Poster title: "Comparison of 1D and 2D Approaches for Flood Inundation Modeling in an Urban Watershed"
- **American Geophysical Union,** *December 2017*
  Poster title: "Quantification of Interbasin Transfers into the Addicks Reservoir during Hurricane Harvey"
- **World Environmental and Water Resources Congress**, *May 2017*
  Presentation title: "Comparing Floodplain Evolution in Channelized and Un-Channelized Urban Watersheds in Houston, TX"
- **American Geophysical Union,** *December 2016*
  Poster title: "Quantifying the Influence of Urbanization on a Coastal Floodplain"
- **World Environmental and Water Resources Congress**, *May 2015*
  Presentation title: "Evaluating Watershed-Scale LID Performances in a High-Intensity Rainfall Region with a Distributed Hydrologic Model"
- **American Geophysical Union,** *December 2013*
  Poster title: "Rice University Flood Improvement and LID Modeling Using XP-SWMM"
- **World Environmental and Water Resources Congress**, *May 2012*
  Presentation title: "Flood and Storm Surge Impact on a Highly Urbanized Area – The Harris Gully Watershed"
- **Texas Floodplain Management Association**, *April 2011*

Presentation title: "Flood Warning Indicator: Establishing a Reliable Radar-based Flood Warning System for the Upper Oyster Creek Watershed in Sugar Land, Texas"
- **National Flood Workshop**, *October 2010*
Presentation title: *"*Developing a Radar-based Flood Warning System for Sugar Land, Texas"

ACHIEVEMENTS AND AWARDS

- Recognition by Rice University's Board of Trustees for the development of a Letter of Map Revision to mitigate campus flooding and reduce flood insurance premiums (2015)
- Rice University Graduate Research Fellowship (2009)

QUALIFICATIONS AND SKILLS

- Certified Engineer In Training (EIT #52327) in Texas
- ASCE Member (#9823658)
- Hydrologic/ hydraulic models: HEC Suite (HEC-1, HEC-2, HMS, Geo-HMS, RAS, Geo-RAS, Res-Sim), EPA-SWMM, XP-SWMM, Infoworks, Modflow, Vflo®, LSPC
- Other software: ArcGIS, AutoCAD, Matlab, Python