

Cyndi Vail Castro, PhD, PE

NSF Earth Sciences Postdoctoral Fellow

University of Illinois at Urbana-Champaign

Department of Civil & Environmental Engineering

Department of Geography & Geographic Information Science

1301 W Green St, Urbana, IL 61801 | +1 409.670.2214 | cvcastro@illinois.edu

RESEARCH INTERESTS

- ✓ Hydrology & Hydraulics
- ✓ Riverine Geomorphology
- ✓ Green Infrastructure
- ✓ Floodplain Mapping
- ✓ Watershed Modeling
- ✓ Urban Water Governance
- ✓ Human-Water Systems
- ✓ Stakeholder Partnerships
- ✓ Socio-Hydrology
- ✓ Environmental Justice
- ✓ ArcGIS Spatial Analysis
- ✓ Decision Support Tools
- ✓ CyberGIS & Web Maps
- ✓ Hydro-Informatics
- ✓ Space-Time Scaling

EDUCATION

- Ph.D., Civil Engineering University of Houston, 2021
Chair: Dr. Keh-Han Wang
- M.S., Civil & Environmental Engineering University of Texas, 2016
Advisor: Dr. David Maidment
- B.S., Civil Engineering (Cum Laude) Texas A&M University, 2011
Advisor: Dr. Scott Socolofsky

PROFESSIONAL EXPERIENCE

(reference pp. 12-14 for details)

- 2022 – Postdoctoral Fellow University of Illinois at Urbana-Champaign
Mentor: Dr. Murugesu Sivapalan
- 2019-2020 Policy Analyst City of Houston Office of Sustainability
- 2018-2021 Research Fellow University of Houston
- 2015-2018 Civil Engineer Jones|Carter Engineering, now Quiddity
- 2014-2016 Research Fellow University of Texas at Austin
- 2014 Project Manager City of Houston Stormwater Engineering
- 2013 Construction Manager AECOM International Services Ghana
- 2011-2014 Graduate Civil Engineer AECOM Technical Services
- 2010-2011 Research Assistant Texas A&M University Ocean Engineering

PUBLICATIONS

Journal Articles

- 2022 **Castro, C.V.** Systems-thinking for environmental policy coherence: Stakeholder knowledge, fuzzy logic, and causal reasoning. *Environmental Science & Policy*, 136. doi: [10.1016/j.envsci.2022.07.001](https://doi.org/10.1016/j.envsci.2022.07.001).
- 2022 **Castro, C.V.** Optimizing nature-based solutions by combining social equity, hydro-environmental performance, and economic costs through a novel Gini coefficient. *Journal of Hydrology X*, 100127. doi: [10.1016/j.hydroa.2022.100127](https://doi.org/10.1016/j.hydroa.2022.100127).
- 2022 Pande, S., Haeffner, M., Blöschl, G., Alam, F., **Castro, C.V.**, Di Baldassarre, G., Elshorbagy, A., Frick-Trzebitzky, F., Hogeboom, R., Kreibich, H., Mukherjee, J., Mukherji, A., Nardi, F., Nüesser, M., Tian, F., van Oel, P., Sivapalan, M. Never ask for a lighter rain but a stronger umbrella. *Frontiers in Water*, 204. (Perspective article). doi: [10.3389/frym.2014.00005](https://doi.org/10.3389/frym.2014.00005).
- 2021 **Castro, C.V.** and Rifai, H. S. Development and assessment of a web-based national spatial data infrastructure for nature-based solutions and their social, hydrological, ecological, and environmental co-benefits. *Sustainability*, 13(19): 11018. doi: [10.3390/su131911018](https://doi.org/10.3390/su131911018).
- 2020 **Castro, C.V.** and Maidment, D. R. HMS-PrePro: A GIS preprocessing tool for rapid initialization of HEC-HMS basin models. *Environmental Modelling & Software*, 130: 104732. doi: [10.1016/j.envsoft.2020.104732](https://doi.org/10.1016/j.envsoft.2020.104732).

Book Chapters

- 2023 **Castro, C.V.** Penny, G., Gunda T., Montanari, A., Polo Gomez, M.J. (lead-authors) [+ 75 co-authors] “Chapter 11, Panta Rhei Case Studies” in: Tian, F., Wei., J., Sivapalan, M., Blöschl, G. (Eds.) *Coevolution and prediction of coupled human-water systems: A synthesis of change in hydrology and society*, Cambridge University Press (Accepted, Forthcoming 07/2023).
- 2023 Viglione, A., Mukherjee, J., Archfield, S., **Castro, C.V.**, Hirabayashi, Y., Lafaye de Micheaux, F., Leong, C., Mazzoleni, M., Merz, B., Nakamura, S., Nardi, F., Rusca, M., Szolgay, J., Yan, H. “Chapter 6, Human-Flood Systems” in: Tian, F., Wei., J., Sivapalan, M., Blöschl, G. (Eds.) *Coevolution and prediction of coupled human-water systems: A synthesis of change in hydrology and society*, Cambridge University Press (Accepted, Forthcoming 07/2023).
- 2023 Benavides, J.A., Karges, J., Mayes, K.B., Rifai, H.S., **Castro, C.V.** “Chapter 5 - Gulf Coast Rivers of the Southwestern United States” in: Delong, M.D., Jardine, T.D., Benke, A.C., Cushing, C.E. (Eds.) *Rivers of North America, Second Edition*, pp. 176-224. Academic Press.

Theses

- 2021 **Castro, C.V.** “Nature-based solutions at the interface of hydro-environmental science, social justice, and complex decision-making.” Ph.D. Dissertation. University of Houston.
- 2016 **Castro, C.V.** “HMS-PrePro – A GIS preprocessing tool for extracting geospatial data and preparing HEC-HMS models.” M.S. Thesis. University of Texas at Austin.

Media Articles

- 2021 Castro, C.V. “HMS-PrePro: An automated GIS toolbox for extracting cloud-based data, delineating watersheds, and calculating hydrological parameters.” ArcGIS Water. <https://tinyurl.com/hmsprepro-esriwater>
- 2016 Castro, C.V. “The Living Atlas can provide better access to data for hydrologic modeling.” Esri ArcUser, Spring 2016, pp 32-35. <https://tinyurl.com/livingdata>

Open-source Products

- 2021 Castro, C.V. “NBS-Geo: National spatial data infrastructure system for nature-based solutions.” doi: [10.4211/hs.3f9f741ef6f54cb19c78d3d858e643b2](https://doi.org/10.4211/hs.3f9f741ef6f54cb19c78d3d858e643b2).
- 2019 Castro, C.V. “HMS-PrePro: ArcGIS geo-processing tool for rapid derivation of HEC-HMS hydrological basin models using cloud-based datasets and semi-automated spatial analyses.” doi: [10.5281/zenodo.3662765](https://doi.org/10.5281/zenodo.3662765).

Articles In Preparation/Review

Castro, C.V., Carney, C., De Brito, M.M. “The role of network structure in integrated water management: A case study of collaboration and influence for adopting nature-based solutions.” Submitted to: *Frontiers in Water*. (Endorsed by 1 reviewer, in 2nd-round review by other reviewer).

Castro, C.V. and Sivapalan, M. “Timescale interactions in urban catchments with green infrastructure.” To submit to: *Water Resources Research*.

Cudennec, C., Montanari, A., de Brito, M.M., Addor, N., Aghakouchak, A., Knoben, W., Fowler, K., Arnbjerg-Nielsen, K., di Baldassarre, G., Muller, M.F., Viglione, A., Finger, D., Aksoy, H., Pande, S., Wei, Y., Castro, C.V., Arheimer, B., Krüger, T., McMillan, H., Liu, J., Tian, F., Mendiondo, E.M., Sivapalan, M., Kreibich, H. “A review of Panta Rhei research on changes in hydrology and society.” To submit to: *Hydrological Sciences Journal*.

TEACHING EXPERIENCE

Co-Instructor

- 2022 (Fa.) University of Illinois, CEE 450: Surface Hydrology (cross-listed, hybrid)
- 2022 (Sp.) University of Illinois, CEE 554: Hydrologic Variability (graduate)

Guest Lecturer

- 2022 (Fa.) Colorado State University, WR 416: Land Use Hydrology (cross-listed)
- 2022 (Fa.) University of Connecticut, NRE 3125: Watershed Hydrology (undergrad, online)
- 2015 (Sp.) University of Texas, CEE 394K: GIS in Water Resources (graduate)
- 2015 (Sp.) University of Texas, CEE 398: Flood Forecasting (graduate)

Teaching Certifications & Trainings

- 2021 NSF Center for Integration of Research, Teaching, & Learning (CIRTL) Associate
- 2018-2019 University of Houston Future Faculty Program (FFP) Trainee
- 2018 Innovative Teaching & Learning at a Distance: Universal Design for Learning

Community Mentoring

- 2023 Red Elementary Engineering Week, Presenter on The Water Cycle
- 2021-2022 Texas American Water Works Association, Professional Mentor
- 2019-2020 City of Houston's Hire Houston Youth Program, Professional Mentor
- 2017-2018 Jones|Carter University Workshop, Lecturer for Professional Engr. (PE) Exam
- 2017-2018 TestMasters PE Prep, Design of Hydrology Course Syllabi & Lectures
- 2017-2018 MathCounts Competition Series: Texas Society of Professional Engineers, Mentor
- 2016-2017 Jones|Carter University, Workshop Facilitator for AutoCAD Civil 3D
- 2016-2017 Jones|Carter University, Workshop Facilitator for ArcGIS Spatial Analysis
- 2012-2014 Rice University Engineers Without Borders Student Chapter, Professional Mentor
- 2011-2014 Architecture, Construction, Engineering (ACE) Mentor Program, Team Mentor
- 2010-2011 Save Our Streets Youth Program, Community Mentor
- 2009-2011 Society of Women Engineers Reading & Writing Lab, Student Mentor
- 2009-2010 Texas A&M Center for Student-Athlete Services, Individual/Group Tutor in STEM

Supervision/Mentoring of Student Research

- 2022 Master's Thesis External Examiner, Title: "Hydrologic model loss parameters for Northern Territory River basins", Charles Darwin University, Australia

2020-2021 Zuziwe Nyareli, Master’s Thesis External Mentor, Title: “Using remote sensing and GIS-based NRCS-CN approach to map and monitor runoff source areas in a poorly gauged catchment area in South Africa from 1940 to 2010”, South African National Biodiversity Institute & Stellenbosch University, South Africa

GRANTS & AWARDS

National Science Foundation (NSF) Fellowships

2022-2023	NSF Earth Sciences Postdoctoral Fellowship (NSF EAR-PF) Solicitation 18-565. Award ID 2052598. PI: Castro, C.V., Title: “Green infrastructure scaling from local observations to regional applications as a coupled human-water system.”	\$174,000
2019-2020	NSF Internship Supplemental Funding (NSF INTERN) Solicitation 18-102. Award ID 1934192. Co-author with PI Rifai, H.S., Title: “Enhancing flood resilience through robust academic-governmental partnerships.”	\$55,000
2014-2019	NSF Graduate Research Fellowship Program (NSF GRFP) Solicitation 13-085. Award ID 2013162199. PI: Castro, C.V., Title: “Flood and landslide risk analysis using LiDAR imagery.”	\$142,000

Additional Awards, Fellowships, & Grants

2023	International Association of Hydrological Sciences Travel Grant	\$2,500
2022	Frontiers in Hydrology Meeting Early Career Travel Grant	\$1,000
2021	Cullen Graduate Fellowship Travel Grant	\$750
2021	American Geophysical Union Student Travel Grant	\$1,000
2021	Cullen Graduate Student Success Fellowship	\$500
2019-2022	Crawford and Hattie Jackson Foundation Fellowship (x3)	\$15,000
2019-2022	American Water Works Association Award, Texas Division (x3)	\$6,000
2019-2020	Union Plus Firefighter Scholarship	\$1,000
2019-2020	University of Houston Future Faculty Fellowship	\$3,000
2019-2020	CHI University Award for 2D PC-SWMM Hydraulic Model	\$2,000
2018-2019	American Water Works Association Award, Southeast Chapter	\$1,750
2018-2019	University of Houston President’s Endowed Scholarship	\$4,000
2018-2021	University of Houston Graduate Tuition Fellowship	\$42,000
2014-2016	University of Texas Thrust Endowed Fellowship	\$18,000
2010-2011	Chi Epsilon National Honor Society, President	
2010-2011	Texas A&M President’s Scholar Academic Excellence Award	\$1,500
2010-2011	Judy K. and Donald Ray ’68 Scholarship	\$4,000
2009-2010	Texas A&M Study Abroad Scholarship, Katholieke Universiteit, Belgium	\$6,000
2009-2011	Texas A&M Civil Engineering Scholarship (x2)	\$4,000
2009-2011	Texas A&M Academic Achievement Award (x2)	\$6,000
2009-2010	British Petroleum, Barnes & Noble, and Dean McCorkle Scholarships	\$3,000
2007-2008	Texas A&M Industrial Engineering Achievement Scholarship	\$1,000
2007	National Merit Scholar	

TOTAL AWARDED FUNDING: \$495,000

SERVICE ACTIVITIES

Service to the Profession

- 2023 Work Group Participant, Identifying the Next Decade of Hydrological Science, International Association of Hydrological Sciences (IAHS), Córdoba, Spain.
- 2023 Session Co-Convener, European Geosciences Union (EGU), General Assembly, Vienna, Austria. “State-of-the-Art of Hydrological Scaling”.
- 2022-2023 Committee Member, American Geophysical Union (AGU)
Hydrology Section Student Subcommittee (H3S)
- 2022 Session Convener/Co-Convener/Chair, AGU Frontiers in Hydrology Meeting (FIHM), San Juan, Puerto Rico. “Bridging Resolutions Series”, Sessions: 109, 123, 134, 135, 143, 147, 151, 213, 151, 306, 307, 415, 439
- Hydrological Phenomena & Human Behavior (Chair)
 - Sustainable Solutions & Policy-Making (Chair)
 - Natural Hazards & Civilization
 - Place-Based Environmental Equity
 - Water Security & Justice
- 2021 Session Convener/Co-Convener, AGU Fall Meeting, New Orleans, LA. “Socio-hydrology Series”, Sessions: SY35A, SY52A, SY54A, SY55D.
- Integrating Complex Dynamics & Broadening Social Impacts (Chair)
- 2021 Work Group Participant, Citizens and Hydrology (CANDHY), International Association of Hydrological Sciences (IAHS)
- 2020-2021 Committee Member, Texas American Water Works Association (TAWWA)
Southeast Texas Chapter: Diversity and Inclusion Subcommittee

Peer Reviews

PublonsID: AAY-8693-2020

- Journals: Journal of Hydrology, Hydrology & Earth System Sciences, Geocarto International, Geoscientific Model Development, Journal of Mountain Science, International Journal of Digital Earth
- Grants: Sigma Xi Research Honor Society, National Academies of Sciences Gulf Research Program, National Science Foundation Hydrologic Sciences

International Outreach

- 2018 *Respire Haiti, Gressier, Haiti*: Organized team trips to support various initiatives for education, nutrition, development, and medical needs in local community.
- 2017-2018 *Inter-American Development Bank (IADB), Limonade, Haiti*: Contacted by consulting firm for assistance regarding satellite precipitation datasets and intensity-duration-frequency curves for bridge and culvert design in flood-prone region as result of online report for master’s class project.

- 2017 *Engineering Ministries International, Ludhiana, India*: Provided comprehensive civil engineering surveying, design, and cost estimates for aging medical college, including drainage analysis, sanitary sewer design, and water supply/treatment.
- 2014-2015 *Road to Mafraq, Inc., Mafraq, Jordan*: Board member of 501c organization to expand K-12 education within displacement settlements of Syrian refugees.
- 2013-2014 *United Nations High Commissioner for Refugees (UNHCR), Takoradi, Ghana*: Provided volunteer civil engineering consulting services for water, sanitation, grading, and electrical needs within displacement settlement of Cote d'Ivoire refugees while working in nearby region for AECOM.
- 2013 *Living Water International, Leon, Nicaragua*: Provided services for various water wells and sanitation services throughout Nicaragua, including on-site installation, fund-raising, community training, and stakeholder partnership for maintenance.
- 2011-2013 *Engineers Without Borders, San Salvador, El Salvador*: Student mentor (Rice University) and professional civil engineer for potable water supply systems, sanitary water treatment systems, and mitigation of various local wells through multi-year design initiative, site visits, and community collaborations.
- 2012 *Children's Educational Center, Gonaives, Haiti*: Long-term partnership with local orphanages, including raising funds and establishing key partnerships for installation of two water wells.
- 2011 *Disaster Response Team, Carrefour, Haiti*: Provided disaster mitigation services alongside various NGOs following Haiti earthquake, including clean-up, logistics, water access, and sanitation.
- 2010 *Water Purification, Lusaka, Zambia*: Partnered with local designers to install low-cost water treatment devices throughout water-scarce communities.

PRESENTATIONS

National & International Conferences

- 2022 **Castro, C.V.**, Pande, S., Haeffner, M., Blöschl, G., Alam, M., Di Baldassarre, G., Frick-Trzebitzky, F., Hogeboom, R., Kreibich, H., Mukherjee, J., Mukherji, A., Nardi, F., Nüsser, M., Tian, F., van Oel, P., Sivapalan, M. "Addressing societal interactions amidst water systems through the lens of Panta Rhei." *AGU Frontiers in Hydrology Meeting*, San Juan, Puerto Rico, Jun. 24.
- 2022 **Castro, C.V.** "A novel web-based national spatial data infrastructure for dynamic mapping of complex functionalities associated with nature-based solutions." *AGU Frontiers in Hydrology Meeting*, San Juan, Puerto Rico, Jun. 21.
- 2022 de Brito, M.M., **Castro, C.V.**, Carney, C., Malard-Adam, J. "Elucidating complex-thinking and power dynamics in natural resources management." *AGU Frontiers in Hydrology Meeting*, San Juan, Puerto Rico, Jun. 20.

- 2022 **Castro, C.V.** “Balancing policy coherence in socio-hydrology.” *International Association of Hydrological Sciences Assembly*, Montpellier, France, Jun. 3.
- 2022 **Castro, C.V.** “Water resources management as a coupled hydro-environmental and social-equity-based optimization framework.” *International Association of Hydrological Sciences Assembly*, Montpellier, France, Jun. 1.
- 2022 Shafiei, M., Gharari, S., Gharesifard, M., Ghoreishi, M., **Castro, C.V.** “Sustainability Assessment: The role of Indicator-based Frameworks in Sustainable Water Management.” *International Association of Hydrological Sciences Scientific Assembly*, Montpellier, France, Jun. 1.
- 2022 **Castro, C.V.**, Montanari, A., Penny, G., Gunda, T., Polo, M.J. “Panta Rhei: A decadal review of cause-effect pathways from global case studies.” *International Association of Hydrological Sciences Assembly*, Montpellier, France, May 30.
- 2022 Polo, M.J., **Castro, C.V.**, Penny, G., Gunda, T., Montanari, A. “Contribution of local examples of co-evolution of society and hydrology to address current and future challenges of sustainability in the context of the Panta Rhei book.” *European Geological Union (EGU) General Assembly*, Vienna, Austria, May 26.
- 2021 **Castro, C.V.**, Penny, G., Gunda, T., Montanari, A., Polo, M.J. “A decadal reflection of case studies encompassing the Panta Rhei paradigm.” *AGU Fall Conference*, New Orleans, LA, Dec. 17.
- 2021 **Castro, C.V.** and Rifai, H.S. “Decision-making for nature-based solutions through a user-friendly and holistic web-app.” *Science to Action, AGU Fall Conference*, New Orleans, LA, Dec. 14. (Poster)*
- 2021 **Castro, C.V.** “Institutional and societal feedbacks and influences regarding nature-based solution implementation.” *Delft Conference on Socio-Hydrology*, Delft University of Technology, Netherlands, Sept. 7.
- 2021 Viglione, A., Mukherjee, J., Annis, A., Archfield, S., **Castro, C.V.**, Hirabayashi, Y., Hollermann, B., Lafaye de Micheaux, F., Carmen Llasat, M., Mazzoleni, M., Merz, B., Nakamura, S., Nardi, F., Rusca, M., Yan, H. “Human-flood systems: A multi-disciplinary perspective.” *Delft Conference on Socio-Hydrology*, Delft University of Technology, Netherlands, Sept. 7.
- 2021 Penny, G., **Castro, C.V.**, Gunda, T., Montanari, A., Polo Gómez, M.J. “A decadal review of cause-effect pathways from global case studies of human-water systems.” *Delft Conference on Socio-Hydrology*, Delft University of Technology, Netherlands, Sept. 7.
- 2020 **Castro, C.V.** “The levee effect and socio-hydrological adaptation.” *Women in STEM Symposium*, University of Chicago, Chicago, IL, Mar. 10.
- 2019 **Castro, C.V.** “Hydrological, societal, and environmental impacts of flood control reservoir releases on downstream communities using remote sensing and modeling

during Harvey.” *AGU Fall Conference*, San Francisco, CA, Dec. 9. (Poster)

- 2017 **Castro, C.V.** “Public geospatial data sourcing and processing for watershed analyses.” *Texas Floodplain Management Administration (TFMA) Annual Conference*, Austin, TX, Jul. 31.
- 2016 **Castro, C.V.** “A GIS framework for gathering data and preparing HEC-HMS basins.” *Texas Natural Resources Information System (TNRIS) GeoRodeo Conference*, Austin, TX, Oct. 27.
- 2016 **Castro, C.V.** “Living Atlas of the World provides data services for hydrologic modeling.” *Esri ArcGIS Water Conference*, Austin, TX, Feb. 10.
- 2015 **Castro, C.V.** “Performance assessment of WFDEI satellite data for estimating global rainfall intensity.” *Global Flood Partnership Annual Conference*, National Center for Atmospheric Research (NCAR), Boulder, CO, May 5. (Poster)*

Departmental Presentations

- 2023 **Castro, C.V.** “Leveraging nature-based solutions for improved decision-making across scales in complex socio-hydrological systems.” Department of Geography and the Environment, University of North Texas, Feb. 23.
- 2022 **Castro, C.V.** “Leveraging watershed science to sustain global water security and enrich humankind.” Department of Ecosystem Science & Sustainability, Colorado State University, Nov. 14.
- 2022 **Castro, C.V.** “Exploring nature-based solutions as a network: Power dynamics and collective action.” *Water Resources Engineering Seminar*, Department of Civil Engineering, University of Illinois at Urbana-Champaign, Apr. 15.
- 2019 **Castro, C.V.** and Kiaghadi, A. “Urbanization challenges and solutions in public policy, engineering, and academic research.” *Houston Honors Early Research Experience*, University of Houston, Houston, TX, Feb. 26.
- 2015 **Castro, C.V.** “Geospatial framework for the National Flood Interoperability Experiment.” *Departmental Seminar for Civil, Environmental, & Architectural Engineering*, University of Texas at Austin, Austin, TX, Apr. 3.
- 2014 **Castro, C.V.** “Unified Methods for GIS-based Hydrological Modeling.” *Departmental Seminar for Civil, Environmental, & Architectural Engineering*, University of Texas at Austin, Austin, TX.

Community Outreach Presentations

- 2018 **Castro, C.V.** “Natural disaster response and preparation with citizen science.” *Taste of Science*, Houston, TX, Apr. 24.
- 2017 **Castro, C.V.** “Girls in STEM: A Day in the Life.” *Girls in STEM: Empowered and Motivated to Succeed*, Klein Intermediate, Klein, TX, Nov. 4.

- 2017 **Castro, C.V.** “The Future of Flooding.” *TEDx*, Sugar Land, TX, Sept. 30.
- 2014 **Castro, C.V.** “Derivation of hydraulic and hydrologic guidelines for Jeddah, Saudi Arabia.” *American Society of Civil Engineering*, Texas A&M, Jan. 15.
- 2011 **Castro, C.V.** “Integrating urban growth, land development, and stormwater master planning in a metropolis.” *American Society of Civil Engineering*, Texas A&M University at College Station, Oct. 19.

Stakeholder Engagement Presentations

- 2022 **Castro, C.V.** “Equity tools in sustainable resources management: Defining strategy, policy, and equity at the watershed-scale.” *City of Houston Office of Sustainability*, Feb. 8.
- 2022 **Castro, C.V.** “Advancing social equity in regional planning of urban green infrastructure.” *San Francisco Estuary Institute*, Jul. 8.
- 2021 **Castro, C.V.** “Development framework for prioritizing and decision-making of sustainable infrastructure.” *National League of Cities*, May 14.
- 2018 **Castro, C.V.** “Insights into stormwater and drainage impacts after multiple 500-year events.” *Harris County Flood Control District*, Houston, TX, May 23.
- 2018 **Castro, C.V.** “Reflecting on Hurricane Harvey: Human-water interactions and future impacts.” *Houston Energy Corridor District*, Houston, TX, Jan. 12.
- 2017 **Castro, C.V.** “Regional stormwater detention and environmental mitigation for native vegetation and natural habitats.” *City of Houston Public Works*, Apr. 19.
- 2016 **Castro, C.V.** “ArcGIS preprocessing for extracting geospatial data from cloud-based repositories.” *Lower Colorado River Authority*, Austin, TX, Mar. 10.
- 2015 **Castro, C.V.** “Federal floodplain mapping: Trending toward data as a service.” *City of Austin Public Works*, Austin, TX, Dec. 14.

WORKSHOPS & SYMPOSIUMS

- 2023 United Nations Water Conference, online (New York, NY)
- 2020 Regional Green Infrastructure Coalition, Facilitator (Houston, TX)
- 2019 Resilient Cities Collaboration Workshop (Houston, TX)
- 2019 Greater Houston Flood Mitigation Symposium (Houston, TX)
- 2019 Regional Geographic Information System Expo (Houston, TX)
- 2018 NSF in Transition: User-Inspired Research in the Geosciences (U. Houston)
- 2018 Local Engagement and Recovery Efforts Symposium (Rice U.)
- 2018 Innovative Teaching and Learning at a Distance (U. Houston)
- 2018 SSPEED Urban Floods & Infrastructure, Moving Forward from Harvey (Rice U.)
- 2016 Esri User Conference, ArcHydro Technical Workshop (San Diego, CA)

PROFESSIONAL ASSOCIATIONS & LICENSURES

2021 –	Member, International Association of Hydrological Sciences
2020	Hines Student Competition Participant, Urban Land Institute
2019 –	Member & Committee Member, American Geophysical Union
2018-2022	Member & Committee Member, Texas American Water Works Association
2016 –	Professional Engineer, Texas Board of Professional Engineers, No. 123286
2016-2018	Certified Floodplain Manager, Texas Floodplain Management Association
2012-2014	LEED Green Associate, U.S. Green Building Council
2009-2014	Communications Officer, Engineers Without Borders Professional Chapter
2009-2011	Member, American Water Resources Association
2008-2011	Member, Society of Women Engineers
2008-2018	Member, American Society of Civil Engineers

TECHNICAL EXPERTISE

Air Quality	EPA Co-benefits Risk Assessment (COBRA), EPA Avoided Emissions & Generation Tool (AVERT)
Computer-Aided-Drafting	AutoDesk AutoCAD / Civil 3D, Bentley Microstation, Solidworks
Geographic Systems	ArcGIS Desktop / Pro / Online, ArcPy (Python) Coding, ArcHydro Water Resources, HEC-GeoHMS / HEC-GeoRAS Spatial Analysis, Large Data Processing (i.e., ASCII, NetCDF, GRIB)
Hydraulics	USACE HEC-RAS 1D/2D, FHA HY-8 Culvert Analysis, TxDOT Winstorm Modeling, Bentley FlowMaster
Hydrology	USACE HEC-HMS, Soil and Water Assessment Tool (SWAT), Computational Hydraulics International PC-SWMM, EPA Stormwater Management Model (SWMM) 5.0+, USGS Surface Water Data Analysis
Natural Hazards	Federal Emergency Management Association (FEMA), Hazus Disaster Risk Assessment Modeling (certified)
Remote Sensing	ENVI Geospatial Image Processing, LiDAR Point Clouds, GPS/UAV Georeferencing, NWS Radar
Water Distribution	Bentley OpenFlows WaterGEMS

PROFESSIONAL EXPERIENCE

Sustainability Governance

- 2019-2020 Sustainability Policy Analyst *City of Houston Mayoral Office*
National Science Foundation (NSF) internship alongside local-global policymakers for climate resilience and sustainable development.

Spearheaded decision-centric frameworks for trans-scale stakeholders regarding nature-based solutions, ecosystem management, and social equity-based planning.

Analyzed regional water laws and policies; directed various workshops and taskforces across a wide spectrum of water institutions for holistic watershed management regarding flood recovery and natural hazard mitigation.

Formed democratic partnerships between community advocates and regional policymakers for improved polycentric water governance and co-management.

Designed stakeholder-led environmental information systems to search, assess, and download overlapping geospatial datasets for green infrastructure planning (i.e., social, climatic, ecosystem, environmental, hydrological, and topographical).

Initiated transformative projects and secured grant funding with local, state, & federal agencies for sustainable community infrastructure improvements.
- 2014 Stormwater Program Manager *City of Houston Public Works*
Managed 30+ consulting firms throughout life cycle of stormwater improvement projects, including costs, scheduling, regulations, planning, & construction.

Civil Engineering

- 2016-2018 Civil Engineer (P.E.) *Jones/Carter Engineering*
Designed natural bank stabilization for portion of Colorado River using sheet piling, gabion baskets, high-performance textiles and engineered anchors.

Established native vegetation and earthen-engineering soil layer lifts for slope stability, water quality, and wildlife habitat across numerous channels.

Designed primary engineering services for Buffalo Bayou Park, which involved transforming an industrial channel to a vibrant, urban park, complete with hiking trails, bike pathways, cultural arts, sporting activities, and meeting space.

Performed geodetic surveying, sediment transport modeling, scour analysis, and earthway analysis of cut-fill design using latest industry standards.

Analyzed stability and conveyance analysis of Addicks & Barker Reservoirs after Hurricane Harvey. Provided expert advice for downstream channel conveyance, structural floodwall mitigation, emergency release scheduling, and maintenance.

Performed primary drainage analyses and construction designs for several major interstate expansions, including environmental impact assessment, rainfall-runoff modeling, detention storage and release, scour analysis, & structural stabilization.

Designed drainage models and civil engineering site plans for rehabilitating high-risk roadways into user-friendly corridors comprised of protected bike lanes, urban green infrastructure, pedestrian pathways, and optimized traffic signaling.

Performed high-resolution hydraulic mapping of various floodplain tracts to modify federal zoning amidst land use changes.

Rehabilitated regional-scale detention ponds using native riparian vegetation while protecting various endangered and threatened species.

Acquired and managed natural hazard funds from various agencies to mitigate large-scale drainage infrastructure after damaging storm events.

2011-2014

Graduate Civil Engineer-in-training

AECOM Technical Services

Provided slope stability mitigation design for first ‘earthen wall’ stream rehabilitation project to be conducted in Texas. Coordinated with leading national experts in fluvial geomorphology to optimize channel conveyance with engineered earthen channelization techniques (e.g., gabion baskets, native vegetation, coconut fiber reinforcements).

Performed high-resolution geotechnical field reconnaissance (topographical surveying, geological soil boring, environmental assessment, high water mark evaluation, scheduling of upstream reservoir releases w/ Army Corps of Engineers).

Developed site designs for various subdivisions, including grading, roadway layout, utilities, and construction phase services.

Designed LEED-certified stormwater plan for Rice University tennis court facility.

Designed hydrologic and hydraulic models for various large-scale highway expansions, including bridge culverts, detention storage units, and conveyance.

Engineered construction plans and specifications for large-scale pressurized water transmission systems (i.e., pump stations, storage tanks, utilities).

Designed stormwater masterplan for Jeddah, Saudi Arabia in ArcGIS. Processed raw LiDAR; digitized subsurface utilities; derived drainage design standards using historical Radar rainfall; performed large-scale hydrologic/hydraulic modeling.

Managed multi-national construction team for natural gas processing facility in Takoradi, Ghana. Used GIS to map watershed drainage characteristics, construction site services, marine ecosystem health, pipelines, stations, and regional security.

Performed dozens of drainage analyses using ArcGIS (HEC-GeoHMS, HEC-GeoRAS) using empirical observations for a variety of clients.

Human-Water-Environment Research

- 2022 - Postdoctoral Fellow (NSF EAR-PF) *University of Illinois, Urbana-Champaign*
Improving water governance frameworks by identifying power hierarchies and democratic pathways using stakeholder cognitive maps and graph theory.
- Combining quantitative and qualitative approaches for systems-thinking and analysis regarding complex human-water dynamics and causal feedback loops.
- Elucidating trans-scale relationships between hydrological characteristics and social patterns using power law distributions, geomatics, and coarse graining.
- Coordinated a global effort to summarize the International Association of Hydrological Sciences (IAHS) Panta Rhei Research Decade (2013-2022). Partnering with over 100 scholars in 20+ countries to demonstrate the breadth of research approaches used by the human-water community and to cast a vision for future research at the interface of hydrological science and social needs. Synthesizing research progress toward achieving the 2030 Sustainable Development Goals of water security and its cross-cutting themes.
- 2018-2021 Graduate Research Fellow *University of Houston*
Modeled regional flood control management in high-intensity storm events and cascading impacts to social, environmental, and hydrologic systems.
- Developed optimization frameworks to integrate human-water-environmental characteristics with economic variables amidst variable hydro-dynamic patterns.
- Spearheaded Department of Energy research to understand climate change impacts on novel energy technologies, air quality, and human health.
- Assessed health of Galveston Bay Estuary through field sampling campaigns (freshwater quality, sedimentation, coastal waters, fish species) for environmental risk amidst climate change.
- Investigated salinity recovery in Galveston Bay following compound flood event in Hurricane Harvey (partnered with University of Texas Oden Institute).
- 2014-2016 Graduate Research Fellow (NSF GRFP) *University of Texas, Austin*
Evaluated and optimized modeling framework for the National Flood Interoperability Experiment (now the National Water Model, managed by NOAA).
- Advanced theoretical foundations of cloud-based geospatial analysis within high-resolution watershed modeling.
- Used ArcPy (Python) coding to enhance rapid basin model development for HEC-HMS and HEC-RAS programs.