

CYNDI V. CASTRO, PH.D., P.E.

ASP Postdoctoral Fellow

Research Applications Laboratory, Hydrometeorological Applications Program
& National Security Applications Program (RAL HAP/NSAP)
National Science Foundation National Center for Atmospheric Research
University Corporation for Atmospheric Research (NSF NCAR/UCAR)
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RESEARCH INTERESTS

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

EDUCATION

Ph.D., Civil & Environmental Engineering	University of Houston, 2021
M.S., Civil & Environmental Engineering	University of Texas at Austin, 2016
B.S., Civil Engineering (Cum Laude)	Texas A&M University, 2011

PROFESSIONAL EXPERIENCE

(reference pp. 15-18 for details)

- 2024 - **Postdoctoral Fellow**, NSF National Center for Atmospheric Research / University Corporation for Atmospheric Research (NSF NCAR/UCAR) Advanced Study Program (ASP), Research Applications Lab. Mentors: Olga Wilhelmi, Aubrey Dugger, David Yates. Boulder, CO.
- 2022-2023 **Postdoctoral Fellow**, University of Illinois at Urbana-Champaign, NSF Division of Earth Sciences Postdoctoral Fellowship, Dept. of Geography & Geographic Information Science, Dept. of Civil & Environmental Engineering. Mentor: Murugesu Sivapalan. Urbana, IL.
- 2019-2020 **Sustainability Policy Intern**, City of Houston Mayoral Office, NSF Non-Academic Research Internship Fellowship, Dept. of Sustainability & Resilience, Dept. of Flood Recovery. Advisors: Laura Patiño, Steve Costello. Houston, TX.
- 2018-2021 **Graduate Research Fellow**, University of Houston, NSF Graduate Research Fellowship, Dept. of Civil Engineering. Advisor: Keh-Han Wang. Houston, TX.
- 2015-2019 **Civil Engineer (PE)**, Jones|Carter Engineering (now Quiddity Engineering). Dept. of Hydrology & Hydraulics. Advisor: Erin Williford. Houston, TX.
- 2014-2016 **Graduate Research Fellow**, University of Texas at Austin. NSF Graduate Research Fellowship. Center for Water Resources Research Lab. Dept. of Civil & Environmental Engineering. Advisor: David Maidment. Austin, TX.

- 2014 **Program Manager**, City of Houston Public Works (AECOM Subconsultant). Dept. of Stormwater Engineering. Advisor: Dane Schneider. Houston, TX.
- 2013 **Project Manager**, AECOM Technical Services – International Development. Dept. of Construction Engineering. Dept. of Environmental Health Services. Construction Management for Natural Gas Processing Plant. Takoradi, Ghana.
- 2011-2014 **Graduate Civil Engineer (EIT)**, AECOM Technical Services. Dept. of Community Infrastructure. Dept. of Hydrology & Hydraulics. Houston, TX.
- 2010-2011 **Undergraduate Research Assistant**, Texas A&M University. Dept. of Ocean Engineering. Advisor: Scott Socolofsky. College Station, TX.

PUBLICATIONS

Peer-Reviewed Scientific Articles

- 2023 **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. *Frontiers in Water*, 5, 1011952. doi: [10.3389/frwa.2023.1011952](https://doi.org/10.3389/frwa.2023.1011952).
- 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).
- 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. GIS preprocessing for rapid initialization of HEC-HMS hydrological basin models using web-based data services. *Environmental Modelling & Software*, 130: 104732. doi: [10.1016/j.envsoft.2020.104732](https://doi.org/10.1016/j.envsoft.2020.104732).

Peer-Reviewed Opinion Articles

- 2024 Arheimer, B., Cudennec, C., Castellarin, A., Grimaldi, S., Heal, K. V., Lupton, C., ... **Castro, C.V.**, ... & Xia, J. (2024). The IAHS Science for Solutions decade, with Hydrology Engaging Local People IN a Global world (HELPING). *Hydrological Sciences Journal*. doi: [10.1080/02626667.2024.2355202](https://doi.org/10.1080/02626667.2024.2355202).

- 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*, 3, 204. doi: [10.3389/ frym.2014.00005](https://doi.org/10.3389/frym.2014.00005).

Book Chapters

- 2024 **Castro, C.V.** Penny, G., Gunda T., Montanari, A., Polo Gomez, M.J. “Chapter 11, The Widening World of Panta Rhei Case Studies” in: Tian, F., Wei., J., Haeffner, M., Kreibich, H. (Eds.) *Coevolution and Prediction of Coupled Human-Water Systems*, Cambridge University Press.
- 2024 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., Haeffner, M., Kreibich, H. (Eds.) *Coevolution and Prediction of Coupled Human-Water Systems*, Cambridge University Press.
- 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. doi: [10.1016/B978-0-12-818847-7.00012-4](https://doi.org/10.1016/B978-0-12-818847-7.00012-4).

Technical Reports & Products

†: Primary Engineer-of-Record

- 2018 **Castro, C.V.** † “Field reconnaissance, geomorphological analysis, and three-dimensional bank stabilization for urban drainage channels damaged in Hurricane Harvey.” *Harris County Flood Control District & Federal Emergency Management Agency (FEMA)*. ID Z100-00-00-X274.
- 2018 Landry, K. † and **Castro, C.V.** “Catchment analysis for street rehabilitation and stormwater conveyance in floodway. Houston Avenue and White Oak Drive.” *Memorial Heights Redevelopment Authority & City of Houston*. ID N-T05000.
- 2017 **Castro, C.V.** † “Flood control reservoir stability and downstream conveyance analysis for channel improvements and structural floodwalls following Hurricane Harvey. U.S. Army Corps of Engineers’ Addicks & Barker Reservoirs.” *Houston Energy Corridor District*.
- 2017 **Castro, C.V.** † “Earthen channel slope stabilization and sediment transport improvement for major tributary following Hurricane Harvey damage. Buffalo Bayou Park bank improvements.” *Harris County Flood Control District*. ID W100-00-00-X036.
- 2017 **Castro, C.V.** † “FEMA hazard mitigation for regional detention pond and weir flood control system.” *City of Houston, Spring Creek Utility District, & FEMA*. ID 17005056.

- 2017 **Castro, C.V.** † “Nature-based solution stormwater detention basin rehabilitation of three regional ponds, including ecological investigation and environmental protection for endangered species.” *City of Houston*. ID M-430296.
- 2017 **Castro, C.V.** † “Flood hazard modeling and delineation to modify effective floodway zones and elevations for National Flood Insurance Program.” *Federal Emergency Management Agency*.
- 2016 **Castro, C.V.** and Haerber, J. † “Hydrologic and hydraulic analysis for bridge highway over Grapevine Creek, Interstate 635 in Dallas County, Texas.” *Texas Department of Transportation*. ID 2374-07-063.
- 2013 **Castro, C.V.** and Williford, E. † “Green infrastructure stormwater assessment for tennis court facility and site development at Rice University.” *City of Houston*.
- 2013 **Castro, C.V.** “Health, safety, and environmental protection analysis for natural gas infrastructure development site plan in rural Takoradi, Ghana.” *Ghana National Gas Limited Company*.
- 2012 Williford, E. † and **Castro, C.V.** “Revitalization of concrete-lined channel into natural, meandering stream and community resource: Buffalo Bayou Park bank stabilization and hike-bike trails.” *Harris County Flood Control District & Buffalo Bayou Park Partnership*. ID No. W100-00-00-X036.
- 2012 Williford, E. † and **Castro, C.V.** “Masterplan drainage analysis, street paving improvements, and sub-surface utility rehabilitations for City of Houston Stormwater Management Plan.” *City of Houston*. ID M-420126-0076.
- 2013 Holder, A., Zeve, M. †, Williford, E., and **Castro, C.V.** “Hydrologic and hydraulic modeling and drainage analysis for US-59 highway expansion in Rosenberg, Texas.” *Texas Department of Transportation*.
- 2012 **Castro C.V.** and Krahn, K. † “Urban stormwater drainage masterplan for 7 watersheds in Jeddah, Saudi Arabia, including large-scale LIDAR collection and processing, geospatial big-data analytics, development of a novel unit hydrograph method, integrated two-dimensional SWMM modeling, and drafting of construction plans.” *Kingdom of Saudi Arabia*. ID WER06-REP-0040-C.

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 Tools

- 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).

RESEARCH FUNDING: GRANTS & AWARDS

Research Proposals

- 2024 **NSF Research Advanced by Interdisciplinary Science & Engineering (RAISE), NSF Confronting Hazards, Impacts and Risks for a Resilient Planet (CHIRRP) (* Under Review: NOT Awarded)**

Title: “Wind and Hazards Investigation for Resilience to Landfalling Tropical Cyclones (WHIRLTC)”

Principle Investigator (PI): Xiaomin Chen, University of Alabama in Huntsville

NSF NCAR Investigators: Chris Rozoff (Co-PI), Eric Hendricks (Co-PI), Olga Wilhelmi (Co-PI), Jason Knievel, Sue Ellen Haupt, Cyndi Castro

Castro Support: 6 Months’ Postdoctoral Salary Support

Description: Increase coastal community resilience to hurricane wind-related compound hazards through turbulence-resolving large-eddy simulations and machine learning models to better depict near-surface sustained and maximum gusty winds. Castro Research: 1) Study societal vulnerabilities and responses to wind hazards associated with landfalling hurricanes and compound hazards and 2) closely collaborating with community partners in developing actionable risk information products and forecasting services to increase coastal resilience.

Graduate/Postdoctoral Fellowships

- 2024 **NSF NCAR/UCAR Advanced Study Program Fellowship (ASP)**

Title: “Identifying Scale Patterns in Socio-Hydrological Models”

Award: \$ 155,950

Dates: December 2024 – May 2026

Principle Investigator (PI): Cyndi Castro

Castro Support: 2 Years’ Postdoctoral Salary Support

- 2022 **NSF Earth Sciences Postdoctoral Fellowship (EAR-PF)**
Title: “Green infrastructure scaling from local observations to regional applications as a coupled human-water system.”
Award: \$ 174,000
Dates: January 2022 – December 2023
Principle Investigator (PI): Cyndi Castro
Castro Support: 2 Years’ Postdoctoral Salary Support
- 2019 **NSF Internship Supplemental Funding (INTERN)**
Title: “Enhancing flood resilience through robust academic-governmental partnerships.”
Award: \$ 55,000
Dates: January 2022 – December 2023
Principle Investigator (PI): Hanadi Rifai, University of Houston
Co-PI: Cyndi Castro
Castro Support: 1 Year Graduate Research / Internship Salary Support
- 2014 **NSF Graduate Research Fellowship Program (GRFP)**
Title: “Flood and landslide risk analysis using LiDAR imagery.”
Award: \$ 142,000
Dates: August 2014 – July 2016; August 2018 – July 2019
Principle Investigator (PI): Cyndi Castro
Castro Support: 3 Years Graduate Research Salary Support

Awards & Honors (Graduate/Undergraduate)

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	

TEACHING EXPERIENCE

Co-Lecturer / Instructional Assistant

2022 (Fa.)	University of Illinois at Urbana-Champaign, CEE 450: “Surface Hydrology” Civil & Environmental Engineering, graduate/undergraduate, hybrid model
2022 (Sp.)	University of Illinois, CEE 554: “Hydrologic Variability” Civil & Environmental Engineering, graduate, in-person

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)

SERVICE ACTIVITIES

Service to the Profession

2024	Panelist, Women in Civil Engineering, University of Illinois at Urbana-Champaign, International Association for Hydro-Envr Engr & Research
2024	Volunteer, Super Science Saturday, NSF NCAR/UCAR Mesa Lab
2024	Panelist, Graduate Research Seminar, Metropolitan State University of Denver
2024-2025	Networking Committee Member, Advanced Study Postdoc (ASP), NSF NCAR
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
	<ul style="list-style-type: none"> – 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: Earth’s Future, Journal of Hydrology, Hydrology & Earth System Sciences (HESS), Geocarto International, Geoscientific Model Development, Journal of Mountain Science, International Journal of Digital Earth, Communications Earth & Environment

Grants: Sigma Xi Research Honor Society, National Academies of Sciences Gulf Research Program, National Science Foundation Hydrologic Sciences

International Outreach

- 2024 *Engineering Ministries International, Mai Mahiu, Kenya*: Provided remote hydrological modeling support for on-site engineering team regarding investigative solutions to catastrophic flash flooding and dam breach analysis.
- 2020 *South African National Biodiversity Institute, Pretoria, South Africa*: Provided pro-bono hydrologic modeling to investigate the impact of land use changes on biodiversity loss in South Africa using remotely sensed datasets.
- 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.

Community Mentoring

- 2024-20205 NSF NCAR/UCAR Mentoring Program, Mentee
- 2023 Red Elementary Engineering Week, Presentation/Demo - 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

PRESENTATIONS

*: Invited Speaker

Conference Presentations

- 2025 **Castro, C.V.*** “The Levee Effect: Flood Risk, Social Vulnerability, and Engineered Solutions” *American Meteorological Society (AMS) Annual Meeting*, New Orleans, LA, Jan. 12-16.
- 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 Seminar Presentations

- 2024 **Castro, C.V.*** “Hydro-social scale effects of green infrastructure planning in urban catchment hydrology.” Hydrosystems Seminar Series, Water Resources Engineering & Science, University of Illinois at Urbana-Champaign, Oct. 11.
- 2023 **Castro, C.V.** “Leveraging nature-based solutions for improved decision-making across scales in complex socio-hydrological systems.” Faculty Interview Seminar, Department of Geography & Environment, University of North Texas, Feb. 23.
- 2022 **Castro, C.V.** “Leveraging watershed science to sustain global water security and enrich humankind.” Faculty Interview Seminar, 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

- 2022 **Castro, C.V.** “Social equity and nature-based solutions: An optimization and planning challenge for the 21st century.” *City of Houston’s Equity Tools Workshop*, Houston, TX, Feb. 8.
- 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.

PROFESSIONAL DEVELOPMENT

NSF NCAR/UCAR Development Sessions

- 2024 NSF NCAR/UCAR Professional Development
- “Navigating Change” - UCAR Talent and Learning Team
 - “Improving Communication Dynamics During Meetings” – ASP Fellows
 - “Discovering our Conflict Styles” – Beyond Inclusion Group
 - “Mentoring Fundamentals” – Staff Mentoring Program

Teaching Certifications & Trainings

- 2021 NSF Center for Integration of Research, Teaching, & Learning (CIRTL) Certificate
- Exploring Critical and/or Feminist STEM Teaching & Research
 - Equity-Oriented Inclusive Teaching in STEM
 - How Can We Interrupt & Mitigate Implicit Bias When We See It?
 - Facilitating A-Synchronous Sessions & Promoting Student Engagement
 - Building a Social Presence in the Online, Synchronous Classroom
 - Using an ePortfolio to Promote Reflection & Integration of Knowledge
 - Introducing Teaching as Research: A Systematic Approach to Improve
- 2018-2019 University of Houston Future Faculty Program (FFP) Graduate Course
- 2018 Innovative Teaching & Learning at a Distance: Universal Design for Learning

Development Workshops & Symposiums

- 2024 UCAR Africa Initiative Workshop (NSF NCAR/UCAR)
- 2023 United Nations Water Conference Symposium, online (New York, NY)
- 2022 Expanding the Critical Zone Research Network Workshop (Colorado Mines)
- 2020 Regional Green Infrastructure Coalition Workshop, Facilitator (Houston, TX)
- 2019 Resilient Cities Collaboration Workshop (Houston, TX)
- 2019 Greater Houston Flood Mitigation Symposium (Houston, TX)
- 2019 Regional Geographic Information System Expo Workshop (Houston, TX)
- 2018 NSF Use-Inspired Research in the Geosciences Workshop (U. Houston)
- 2018 Local Engagement and Recovery Efforts Symposium (Rice U.)
- 2018 Innovative Teaching and Learning at a Distance Workshop (U. Houston)

2018 SSPEED Urban Floods & Infrastructure Symposium (Rice U.)
2016 Esri User Conference, ArcHydro Technical Workshops (San Diego, CA)

PROFESSIONAL ASSOCIATIONS & LICENSURES

2024 – Member, American Meteorological Society
2021 – Committee Member, International Association of Hydrological Sciences
2020 Hines Student Competition Participant, Urban Land Institute
2019-2023 Committee Member, American Geophysical Union
2018-2022 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 PRODUCT SKILLS

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

SUMMARY OF PROFESSIONAL EXPERIENCES

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 (EIT)

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-Environmental Research

2022 - Postdoctoral Fellow (NSF EAR-PF) *University of Illinois, Urbana-Champaign*

Improved water governance frameworks by identifying power hierarchies and democratic pathways using stakeholder cognitive maps and graph theory.

Combined quantitative and qualitative approaches for systems-thinking and analysis regarding complex human-water dynamics and causal feedback loops.

Elucidated 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).

Partnered 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.

Synthesized 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 geospatial modeling framework for the National Flood

Interoperability Experiment (now the National Water Model, managed by NOAA).

Advanced theoretical foundations of cloud-based geospatial analysis of continental-scale flood forecasting with high-resolution watershed modeling.

Used ArcPy (Python) coding to create custom toolset that automates watershed model development for USACE's HEC-HMS from Esri's Living Atlas, including data gathering and processing, watershed delineation, stream-catchment topology, and estimation of infiltration and routing parameters from high-resolution data.

Explored viability of using NHDPlus datasets in the National Water Model. Optimized topological errors in NHDPlus using custom Arcpy tools.

Worked with regional and national partners (e.g., City of Austin Fire, Office of Emergency Management, National Weather Service, etc.) to advance prediction of streamflow at the street level and to communicate with pertinent decision-makers.