Shahzaib Khan

PhD CANDIDATE
UNIVERSITY OF WASHINGTON, SEATTLE, WA

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Personal Website | Email | Personal Email

Education

Ph.D. with Data Science Option, **University of Washington** Fall 2025

- Civil and Environmental Engineering | Hydrology and Hydrodynamics
- Dissertation title: *From Sources to Sinks: Advancing Surface Water Management Through Satellite Remote Sensing*

M.S., **University of Washington** 2022

- Civil and Environmental Engineering | Hydrology and Hydrodynamics
- Thesis title: *Understanding volume estimation uncertainty of lakes and wetlands using satellites and citizen science.* Related paper.

B.Tech (with Honors), **Indian Institute of Technology Gandhinagar** 2021

- Department of Civil Engineering

Awards, Honors, and Media

Appreciation Award

- Awarded by *Bangladesh Water Development Board* for training on utilizing SWOT satellite data for water resource management, *News Link* 2023
- Awarded by *NASA* to train early adopters during the *SWOT Early Adopter Virtual Hackathon* at the *University of Washington* 2022

Fellowship

- Awarded with the *American Water Resources Association (AWRA) Fellowship* 2023
- Deans List for exceptional performance in academia, *IIT Gandhinagar* 2023

News

- IRAS system featured in *NASA* article, *News Link* 2023
- sD.R.I.P.S-Sense work featured in *University of Washington News*, *News Link* 2023

Peer-Reviewed Publications

1. **S. Khan,** Z. N. Hossain, S. Suresh, and F. Hossain (2025). The Untapped Hydropower Potential of World's Cities, *Next Energy* (In Review).
2. **S. Khan,** and F. Hossain (2025). (sDRIPS): A Cloud-Based, Open-Source Python Package for Satellite-Informed Surface Water Irrigation Optimization. *Digital Water* (In Review).
3. **S. Khan,** F. Hossain, M. Ahamed, and K. Islam (2025). Satellite Data Rendered Irrigation using Penman-Monteith and SEBAL – sDRIPS for Surface Water Irrigation Optimization, *Hydrology and Earth System Sciences (HESS)* (In Review, preprint - https://doi.org/10.5194/egusphere-2025-4574).
4. **S. Khan,** F. Hossain, et al. (2024). A Network Design Approach for Citizen Science-Satellite Monitoring of Surface Water Volume Changes in Bangladesh, *Environmental Modelling and Software*. https://doi.org/10.1016/j.envsoft.2023.105919.
5. **S. Khan,** F. Hossain, et al. (2022) Understanding Volume Estimation Uncertainty of Lakes and Wetlands Using Satellites and Citizen Science**,** *IEEE JSTARS.* https://doi.org/10.1109/JSTARS.2023.3250354.
6. **S. Khan,** N. Kamboj, U. Bhatia (2020) Lifeline Infrastructures and Hydro-climate Extremes: A Future Outlook, *Climate Change and Extreme Events.* https://doi.org/10.1016/B978-0-12-822700-8.00004-4.

7. A. M. Gómez, S. Biancamaria, T. Pavelsky, K. Nielsen, G. Parkins, M. Lane, **S. Khan**, F. Hossain, R. Bhattarai, S. Ghafoor, J.F. Crétaux, C. Yanez, N. Picot (2024). Evaluation using In-Situ Observations from National Governments and Citizen Scientists Suggests Nadir Altimeters can Accurately Measure Water Levels Changes Regardless of Lake Area. *GIScience and Remote Sensing.* https://doi.org/10.1080/15481603.2025.2543521.
8. Darkwah, G, F. Hossain, V. Tchervenski, G. Holtgrieve, C. Seaton, D. Graves, S. Minocha, P. Das, **S. Khan**, S. Suresh (2024) Reconstruction of the Hydro-Thermal History of Regulated River Networks Using Satellite Remote Sensing and Data-driven Techniques, *Earth's Future, vol 12(10)*, https://doi.org/10.1029/2024EF004815.
9. Minocha**,** S., F. Hossain, P. Das, S. Suresh**, S. Khan,** G. Darkwah, K. Andreadis, H. Lee, G. Holt, S. Galelli (2023). Reservoir Assessment Tool: A scalable and easy-to-apply python based software architecture to empower the global water community, *Geoscientific Model Development*, https://doi.org/10.5194/gmd-2023-130.
10. S. Suresh, F. Hossain, S. Minocha, P. Das, **S. Khan**, H. Lee, K. Andreadis and Perry Oddo (2023). Satellite-based Tracking of Reservoir Operations for Flood Management during the 2018 Extreme Weather Event in Kerala, India, *Remote Sensing of Environment, vol. 307*, https://doi.org/10.1016/j.rse.2024.114149.
11. Minocha, S., Pei-Hsin Pei, **S. Khan**, and F. Hossain (2023). Factors influencing Lake Surface Temperature for Reservoirs of the Columbia River Basin**,** *Northwest Science, vol. 97(4)*. https://doi.org/10.3955/046.097.0403
12. Das, P., F. Hossain, **S. Khan**, N. K. Biswas, H. Lee, T. Piman, C. Meechaiya, U. Ghimire, K. Hosen (2022) Reservoir Assessment Tool 2.0: Stakeholder driven Improvements to Satellite Remote Sensing based Reservoir Monitoring**,** *Environmental Modeling and Software.* https://doi.org/10.1016/j.envsoft.2022.105533.

Conference Presentations

1. **S. Khan;** F. Hossain; M. Ahamed (2024). sD.R.I.P.S: Satellite Data Rendered Irrigation Using Penman and SEBAL - A Framework For Surface Water Irrigation Optimization. *AGU Conference 2024*
2. **S. Khan;** et al, (2024). sD.R.I.P.S-Sense: A Hybrid Framework of Satellite and Sensor-Based Data Rendered Irrigation Using Penman and SEBAL Model. *AGU Conference 2024*.
3. T. Pavelsky, F. Hossain, S. K. Ghafoor, G. Parkins, A. M. Gomez, **S. Khan,** R. Bhattarai and M. Hendrickson (2024). Building a Global Lake Observation System through the Lake Observations by Citizen Scientists and Satellites (LOCSS) Project. *AGU Conference 2024*
4. **S. Khan**; F. Hossain, et al, (2023). An Optimal Network Design Framework for Citizen Science-Satellite Monitoring of Surface Water Volume Changes in Bangladesh. *AGU Conference 2023*
5. A. M. Gomez, T. Pavelsky, G. Parkins, M. Lane, **S. Khan**, F. Hossain, R. Bhattarai, S. K. Ghafoor, J.F. Crétaux (2023). Regional lake monitoring network design aided by Citizen Scientists and Satellites *AGU Conference 2023*.
6. S. Minocha, F. Hossain, P. Das, S. Suresh, **S. Khan**, G. Darkwah (2023). Collaborative Water Management for Advancing Open Science in Regulated River Basins with the Open-Source Reservoir Assessment Tool (RAT) 3.0: A Python Package Integrating Cloud Computing, Satellite Data, and Modeling *AGU Conference 2023*.
7. S. Suresh, F. Hossain, S. Minocha, P. Das, **S. Khan**, H. Lee, K. Andreadis, P. Oddo (2023). Satellite Earth Observations Based Tracking of Reservoir Operations for Flood Preparedness in Mountainous and High Precipitation Regions: A Case of the 2018 Kerala Floods. *AGU Conference 2023*
8. A. M. Gomez, D.R. Arias, T. Pavelsky, G. Parkins, M. Lane, L.D. Donado, **S. Khan**, F. Hossain, W.J.G Ríos, R. Bhattarai, S.K. Ghafoor (2023). Enhancing levels of engagement in citizen science projects involving lake water level monitoring. *AGU Conference 2023*
9. **S. Khan**; F. Hossain; T. Pavelsky, et.al, Investigating Volumetric Uncertainty of Lakes and Wetlands Using Satellites and Citizen Science, American Water Resources Association Annual Conference 2022, Seattle, WA, Nov. 7-9, 2022 *AWRA Conference 2022*
10. A. M. Gomez, S. Biancamaria, T. Pavelsky, G. Parkins, M. Lane, **S. Khan**, F. Hossain, R. Bhattarai, S.K. Ghafoor, J.F. Crétaux, N. Picot (2023). Nadir altimeter validation in small lakes using multisource ground observations. *AGU Conference 2022*
11. **S. Khan**, D. Upadhyay, U. Bhatia, Extreme Precipitation Volatilities and Its Implication for Critical Infrastructures in India, American Meteorological Society (AMS) Conference (15th Symposium on Societal Applications: Policy, Research and Practice) 2020, Boston, MA, Jan. 14-15, 2020. *AMS Conference 2020*

Magazine Articles

1. Das, P., S. Minocha, **S. Khan**, and F. Hossain. How satellites helped debunk 2024 flood myths. In *International Water Power and Dam Construction*, 2025. *Link*
2. F. Hossain, P. Das, G. Brencher, H. Conroy, G. Darkwah, A. McCall, S. Minocha, G. Schelepp, S. Yao, **S. Khan**, A satellite remote sensing perspective on water resources. In *International Water Power and Dam Construction*, 2023. *Link*
3. P. Das, F. Hossain, H. B. Helgason, and **S. Khan**. Satellites over the amazon capture the choking of the 'house of god' by the belo monte dam – they can help find solutions, too. In *The Conversation*, 2022. *Link*

Textbooks

1. Contributed tutorials and exercises to the textbook - Hossain, F. (2025). Satellite Remote Sensing for Water Management, *Cambridge: Cambridge University Press*. https://doi.org/10.1017/9781009453509

Journal Peer Review Activity

Geophysical Research Letters (2)	Environmental Modelling and Software (1)	Earth and Space Science (1)
Scientific Reports (1)	Earth Science Informatics (1)	Discover Geoscience (1)

Experience

Graduate Research Assistant at the **University of Washington**, Seattle, WA

Fall, 2021 – *Present*

- **Python package for irrigation advisories** – Developed a satellite-informed package that generates weekly irrigation advisories for farmers and canal operators. Integrates in situ sensors and local weather station data (when available) to bias-correct global weather models and satellite observations, improving evapotranspiration estimates.
- **Canal water allocation framework** – Created an open-source, scalable, and user-friendly framework that helps water canal operators allocate water more efficiently based on crop water demand and actual field conditions, supporting climate change adaptation in irrigation management.
- **Scalable gauge network framework** – Designed an open-source framework integrating citizen science with current and future satellite observations to optimize gauge placement in lakes and wetlands, enhancing monitoring of regional surface water storage.
- **Uncertainty in volumetric estimates** – Investigated uncertainties in lake volume change estimates, focusing on variability introduced by radar- and optical-based water surface detection methods, while leveraging citizen science elevation data.

Summer Intern at **Jet Propulsion Laboratory**, **NASA**, Pasadena CA

July 2025 – September 2025

- Investigated PODAAC's SWOT On-Demand Raster Generation tool for generating customized spatial-resolution rasters and developed a Python-based framework to streamline data requests and processing.

Teaching

Teaching Assistant 2024, 2025

- Taught Google Earth Engine (GEE) in *Satellite Remote Sensing for Water Resources* class at the *University of Washington*

Guest Lecturer

- *Environmental and Water Program Seminar, University of Washington's Civil and Environmental Engineering Department* – Delivered a lecture on utilizing satellite remote sensing to optimize surface water irrigation. 2024
- Led tutorial class for *Satellite Remote Sensing for Water Resources* on estimating evapotranspiration through satellite data. 2023

Mentor 2022

- Supervised and taught the basics of geospatial data analysis and QGIS software to a high school student. 2025

Trainer

- Trained 25 participants on '*Remote sensing based surface water tracking, citizen science, Cloud Computing and the Surface Water and Ocean Topography (SWOT) Mission*' (Dhaka, Bangladesh). 2023
- Trained the engineers of *the Department of Agricultural Extension, Bangladesh,* on the use of the *Integrated Rice Advisory System (IRAS)* for irrigation advisory dissemination. 2023

- Trainer at *3rd SWOT Early Adopter Virtual Hackathon*, organized by *NASA, CNES, and the University of Washington.* 2022
- Trained engineers from *the Department of Hydrology and Meteorology, Nepal,* on *Utilizing Satellite Remote Sensing Data to Monitor Lakes*. 2022

Notable Tools Developed

1. sD.R.I.P.S – A scalable, user-friendly decision-support tool that advises water providers and consumers on optimal irrigation amounts based on actual crop water requirements.
2. sD.R.I.P.S-Sense – A hybrid tool that dynamically integrates satellite-based monitoring with in situ sensor data (when available) to assess crop water needs. Currently used by landscape workers at the University of Washington.
3. SWODLR-Python – A Python-based framework to request, download, and process customized SWOT L2 raster data from the PO.DAAC cloud.
4. SWOT Raster Visualizer – A visualization tool for SWOT raster products to monitor water surface elevation. Applied during the 2024 Tripura (India) floods.
5. IRAS – Provides weekly irrigation advisories for rice cultivation in Northeastern and Northwestern Bangladesh. The advisories are disseminated by the Department of Agricultural Extension to hundreds of thousands of farmers, supporting large-scale water management and food security.
6. PyWRIS – A Python API for streamlined data access to India's Water Resources Information System (WRIS)

Leadership Activities

American Water Resources Association (AWRA), University of Washington Chapter 2023

- Revived the student chapter post-COVID-19, fostering community and engagement in water resources.

Class Representative, Indian Institute of Technology Gandhinagar 2019, 2020

- Represented peers in academic and administrative discussions, serving as the primary liaison between students and faculty

Stakeholders Engagement

- **Bangladesh Water Development Board** (A government agency that is responsible for water management in Bangladesh).
- **Department of Agricultural Extension** (A government agency in Bangladesh that provides extension services to the farmers in accessing and utilizing better know-how to increase profitable crop production.
- **Crown Farms** (A private farm in South Africa)
- **University of Washington Landscape Workers**
- **Pakistan Council of Research in Water Resources** (A government agency that is responsible for water management in Pakistan).

Skills & Interests

Cloud computing and programming: Google Earth Engine, Python, MATLAB, Bash, HTML, Javascript

Software: ArcGIS, QGIS, Git, Figma

Society Affiliations: Student Member at American Geological Union (AGU) and American Water Resources Associations (AWRA)

Recommendations By

Dr. Faisal Hossain (fhossain@uw.edu) - University of Washington

Dr. Tamlin Pavelsky (pavelsky@email.unc.edu) - University of North Carolina

Edward Armstrong (edward.m.armstrong@jpl.nasa.gov), Karen Yuen (karen.yuen@jpl.nasa.gov) - JPL, NASA