

**Nishan Kumar Biswas**

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**Area of Expertise**

- Satellite remote sensing application in water resources and hydro-climatic disaster management
  - Open science, cloud computing and data science application in hydrology
  - Scientific visualization and geospatial analysis
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**Experience****Associate Scientist (February 2021 - Present)****Hydrological Sciences Laboratory, NASA Goddard Space Flight Center**

- Team-member of NASA [EIS open-science initiative](#), co-leading quantification of hydrological changes in coastal regions of the world due to [climate change and human activities in Bengal Delta](#).
- [Land Information System \(LIS\)](#) team member of NASA Integrated Digital Earth Analysis System ([IDEAS](#)), an Earth System Digital Twin Architecture funded from Advanced Information Systems Technology program of NASA's Earth Science Technology Office.
- Lead developer of Google Cloud Platform based Landslide Hazard Assessment model for Situational Awareness ([LHASA-Mekong](#)) and LHASA-Mekong forecast for the Lower Mekong Region of South-East Asia. Leading to migrate landslide hazard monitoring system to the advanced computational infrastructure (i.e. Google Earth Engine, Google Cloud Platform).

**Graduate Research Assistant (December 2015 - February 2021)**Department of Civil Engineering ([SASWE Research Group](#)), University of Washington

- A [Global Reservoir Assessment Tool \(RAT\)](#) was developed to monitor the operating pattern of 1600 reservoirs solely based on satellite observations, which showed an accuracy of more than 75%.
- A [Dynamic River Width based Altimeter Height Visualizer](#) was developed to generate near-real-time river stages of 210 virtual stations over South and South-East Asia. [News link of JPL, NASA](#)
- A skillful and computationally efficient [flash flood forecasting system](#) developed for the northeastern region of Bangladesh which has been used operationally to minimize flood risk and damage.
- [World's first operational transboundary reservoir monitoring system was developed for Mekong and Red River Basins](#) to monitor upstream dams using EO data with a promising accuracy. [EOS news link](#)
- A web analytics based real-time correction system was implemented for satellite-based precipitation over the South and South-East Asia river basins which showed a significant improvement in prediction.
- A scalable and operational web interface [South Asian Surface Water Modelling System](#) was developed which connects complex back-end models with user-friendly front-end. [Earth Sciences News of NASA](#)

**Student Intern (June 2017- September 2017)**

Hydrological Sciences Laboratory, Goddard Space Flight Center, NASA

- An interactive web based dynamic framework [LIS-ATLAS](#) was developed to visualize Land Information System ([LIS](#)) Model outputs and quantitative evaluations of model predictions.

**Junior Engineer (July 2013 – December 2015)**

Flood Management Division, Institute of Water Modelling (IWM), Dhaka, Bangladesh

- A vertically integrated and automated system were designed, developed, and implemented for an operational flood prediction and inundation mapping for 160 million people of Bangladesh.
  - More than 6 hydrological-hydrodynamic models were developed, calibrated, and validated using state of the art tools and software for river stage and flow prediction and water resources management.
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**Education****PhD in Civil and Environmental Engineering (June 2017 – February 2021)**

University of Washington, Seattle, WA, USA

Thesis: Mainstreaming multi-mission satellite observations in advancing operational water management

**MSc in Civil and Environmental Engineering (January 2016 – June 2017)**

University of Washington, Seattle, WA, USA

**BSc in Water Resources Engineering (January 2008 – February 2013)**

Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh

**Awards and Honors**

- NASA HBG Annual Peer Award for Science/Technical support (2022), NASA GSFC
- Career journey highlighted in [Early Career Scientist Spotlight](#) (2022), NASA GSFC
- NASA Certificate of Appreciation (2021), SWOT Early Adopter Virtual Hackathon
- NASA Certificate of Appreciation (2020), SWOT Early Adopter Virtual Hackathon
- Appreciation Award (2020) for flash flood forecasting, Bangladesh Water Development Board
- Public Messaging and Engagement Award (2019), [UW Student Film Contest 2019](#)
- Co-organizer of Engineering Discovery Days (2016-2018), University of Washington
- Ivanhoe Fellowship (2017), University of Washington
- Ivanhoe Fellowship (2016), University of Washington
- Engineers Stipend (2011), Bangladesh University of Engineering and Technology
- Higher Secondary School Examination Scholarship (2007), Government of Bangladesh

**Peer reviewed publications**

1. **Biswas, N.K.**, Laverde, M., Stanley, T.A., Kirschbaum, D.B., Amatya, P.M., Meechaiya, C. (2023). Dynamic and near-real-time Landslide forecasting for the Lower Mekong Region (in preparation)
2. Getirana, A., **Biswas, N. K.**, Qureshi, A. S., Rajib, A., Kumar, S., Rahman, M., & Biswas, R. K. (2022). Avert Bangladesh's looming water crisis through open science and better data. <https://doi.org/10.1038/d41586-022-03373-5>
3. **Biswas, N.K.**, Stanley, T.A., Kirschbaum, D.B., Amatya, P.M., Meechaiya, C., Poortinga, A. and Towashiraporn, P. (2022). A dynamic landslide hazard monitoring framework for the Lower Mekong Region. *Front. Earth Sci.* 10:1057796. <https://doi.org/10.3389/feart.2022.1057796>
4. Das, P., Hossain, F., Khan, S., **Biswas, N.K.**, Lee, H., Piman, T., Meechaiya, C., Ghimire, U., Hosen, K. (2022). Reservoir Assessment Tool 2.0: Stakeholder driven Improvements to Satellite Remote Sensing based Reservoir Monitoring, *Environmental Modeling and Software*, vol. 157. <https://doi.org/10.1016/j.envsoft.2022.105533>.
5. Du, T.L.T., Lee, H., Bui, D.D., Graham, P., Pechlivanidis, I.G., Darby, S.D., Leyland, J., **Biswas, N.K.**, Choi, G., Batelaan, O., Bui, T.T.P., Tran, T.V., Nguyen, H.T. (2022). Streamflow prediction in highly regulated, transboundary watersheds using multi-basin modelling and remote sensing imagery, *Water Resources Research*, 58, e2021WR031191. <https://doi.org/10.1029/2021WR031191>
6. Hossain, F., Ahmed, T., Hoque, B.A., Khanam, S., **Biswas, N.K.**, Khan, M. S. K., and Katagami, M. (2022) Impact Evaluation of an Operational Satellite-based Integrated Rice Advisory System in Northeastern Bangladesh, *Agricultural Water Management*. Vol. 9 (1), pp. 001-011.
7. **Biswas, N. K.** and Hossain, F. (2021) A Multi-decadal Analysis of Reservoir Storage Change in Developing Regions, *Journal of Hydrometeorology*, 23, 1, 71-85. <https://doi.org/10.1175/JHM-D-21-0053.1>
8. Bose, I., Jayasinghe, S., Meechaiya, C., Ahmad, S. K., **Biswas, N.K.**, & Hossain, F. (2021). Developing a Baseline Characterization of River Bathymetry and Time-Varying Height for Chindwin River in Myanmar Using SRTM and Landsat Data. *Journal of Hydrologic Engineering*, 26(11), 05021030. [https://doi.org/10.1061/\(ASCE\)HE.1943-5584.0002126](https://doi.org/10.1061/(ASCE)HE.1943-5584.0002126)
9. **Biswas, N. K.**, Hossain, F., Bonnema, M., Lee, H., & Chishtie, F. (2021). Towards a global Reservoir Assessment Tool for predicting hydrologic impacts and operating patterns of existing and planned reservoirs. *Environmental Modelling & Software*, 140, 105043. <https://doi.org/10.1016/j.envsoft.2021.105043>
10. Bose, I., Hossain, F., Eldardiry, H., Ahmad, S., **Biswas, N. K.**, Bhatti, A. Z., ... & Kamal Khan, M. S. (2021). Integrating Gravimetry Data with Thermal Infra-Red Data from Satellites to Improve Efficiency

- of Operational Irrigation Advisory in South Asia. *Water Resources Research*, 57(4), e2020WR028654. <https://doi.org/10.1029/2020WR028654>
11. Beveridge, C., Hossain, F., Biswas, R. K., Haque, A. A., Ahmad, S. K., **Biswas, N. K.**, ... & Bhuyan, M. A. (2020). Stakeholder-driven development of a cloud-based, satellite remote sensing tool to monitor suspended sediment concentrations in major Bangladesh rivers. *Environmental Modelling & Software*, 133, 104843. <https://doi.org/10.1016/j.envsoft.2020.104843>
  12. Bhuiyan, M. A. E., Yang, F., **Biswas, N. K.**, Rahat, S. H., & Neelam, T. J. (2020). Machine learning-based error modeling to improve GPM IMERG precipitation product over the brahmaputra river basin. *Forecasting*, 2(3), 248-266. <https://doi.org/10.3390/forecast2030014>
  13. **Biswas, N. K.**, Hossain, F., Bonnema, M., Aminul Haque, A. M., Biswas, R. K., Bhuyan, A., & Hossain, A. (2020). A computationally efficient flash flood early warning system for a mountainous and transboundary river basin in Bangladesh. *Journal of Hydroinformatics*, 22(6), 1672-1692. <https://doi.org/10.2166/hydro.2020.202>
  14. Hossain, F., Bonnema, M., **Biswas, N.**, Ahmad, S., Duong, B., & Luong, N. D. (2019). When floods cross borders, satellite data can help, *Eos*, 100. <https://doi.org/10.1029/2019EO115775>.
  15. **Biswas, N. K.**, Hossain, F., Bonnema, M., Okeowo, M. A., & Lee, H. (2019). An altimeter height extraction technique for dynamically changing rivers of South and South-East Asia. *Remote Sensing of Environment*, 221, 24-37. <https://doi.org/10.1016/j.rse.2018.10.033>
  16. Hossain, F., Sikder, S., **Biswas, N.**, Bonnema, M., Lee, H., Luong, N. D., ... & Long, D. (2017). Predicting water availability of the regulated Mekong river basin using satellite observations and a physical model. *Asian Journal of Water, Environment and Pollution*, 14(3), 39-48. <https://doi.org/10.3233/AJW-170024>
  17. Hossain, F., **Biswas, N. K.**, Ashraf, M., & Bhatti, A. (2017). Growing More with Less Using Cell Phones and Satellite Data. *Eos*. <https://doi.org/10.1029/2017eo075143>
  18. **Biswas, N. K.**, & Hossain, F. (2017). A scalable open-source web-analytic framework to improve satellite-based operational water management in developing countries. *Journal of Hydroinformatics*, 20(1), 49-68. <https://doi.org/10.2166/hydro.2017.073>
- Google scholar link: <https://scholar.google.com/citations?user=e0y35q0AAAAJ&hl=en>  
 ResearchGate Profile: <https://www.researchgate.net/profile/Nishan-Kumar-Biswas>

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#### Conference Proceedings and non-peer reviewed journals

1. **Biswas, N.K.**, Laverde, M., Stanley, T.A., Kirschbaum, D.B., Amatya, P.M., Meechaiya, C. (2023). A near-real-time and dynamic landslide hazard forecasting framework for the Lower Mekong Region. 6<sup>th</sup> World Landslide Forum, November 2023 in Florence, Italy.
  2. **Biswas, N. K.**, Getirana, A., Kumar, S. (2022). Understanding the stress on water resources due to climate change and human activities in Bangladesh using satellite observations. AGUFGM, H52L-0621
  3. **Biswas, N. K.**, Stanley, T. A., Amatya, P. M., Kirschbaum, D.B., Meechaiya, C., Laverde, M., and Towashiraporn, P. (2022). A dynamic Landslide hazard forecasting Framework for the Lower Mekong Region. AGUFGM, GC15G-0523.
  4. Kirschbaum, D., Stanley, T., Khan, S., **Biswas, N.K.**, Emberson, R., Orland, E. (2022). Investigating the potential of forecast products to inform extreme event analysis and multi-scale landslide hazard assessment. AGUFGM, A52F-04.
  5. Stanley, T., Kirschbaum, D., Amatya, P.M., **Biswas, N.K.**, Emberson, R., Orland, E., Soobitsky, R. (2022) Advancing landslide hazard assessment around the world, AGUFGM, NH15B-08
  6. Dandridge, C., Stanley, T., **Biswas, N.K.**, Lakshmi, V., Kirschbaum, D. (2022). Evaluation of Satellite-Based Soil Moisture Products using the Landslide Hazard Assessment for Situational Awareness (LHASA) Model for Landslide Prediction and Hazard Analysis in the Lower Mekong River Basin. AGUFGM, H42G-1378
  7. Huang, T., David, C.H., Kang, J., Marlis, K.M., Milosevich, M., Perez, S., Phyto, W., Oaida, C.M., Roberts, J., Wronkiewicz, M., Kumar, S.V., **Biswas, N.K.**, Stackhouse, P.W., Borges, D., Broddle, M.,
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- Macpherson, B., Baillarin, S., Blanchet, G., Bretar, F., Kettig, P., Rodriguez, R., Ricci, S.M., Piacentini, A., Nguyen, T.H., Valladeau, G., Poisson, J.C., Froidevaux, A., Raynal, R., Huynh, T. (2022). A Multi-Agency Collaboration Digital Twin for Flood Prediction and Analysis. AGUFGM, IN35D-0423
8. **Biswas et al.** (2021). Development of a dynamic landslide hazard awareness system for the Lower Mekong Region. AGUFGM, 2021
  9. **Biswas, N. K., & Hossain, F.** (2020). A Global Reservoir Assessment Tool for Predicting Hydrologic Impact and Operating Pattern of Existing and Planned Reservoirs. In AGU Fall Meeting 2020. AGU.
  10. **Biswas, N. K., & Hossain, F.** (2018). A Satellite Observations and Numerical Modelling Based Integrated Flash Flood Forecasting System for North-East Region of Bangladesh. AGUFGM, 2018, H41I-2162.
  11. **Biswas, N. K., & Hossain, F.** (2016). Design and Performance Analysis of a Real-time Correction Application to the IMERG Estimated Precipitation in Ganges-Brahmaputra Basin, AMS Fall Meeting 2016
  12. **Biswas, N. K., Paul, M., & Haider, M.R.** (2015). Calibration and Sensitivity Analysis of a Hydrological Model for Jamunesswari River Basin of Bangladesh, Journal of Civil Engineering and Environmental Technology, ISSN: 2349-879X; 2 (2), 200-205.
  13. **Biswas, N.K. & Ahammed, M.** (2014). Application of CCHE2D Mathematical Model in the Gorai Offtake for Two-Dimensional simulation, International Journal of Surface and Groundwater Management (IJSGWM), 1(1), 52-58. Rahman, M.M.,
  14. Rahman, M.M., **Biswas, N.K., & Jubair, S.** (2014). Sustainability of an artificial dredged channel along the braided Jamuna River of Bangladesh, Journal of River Research Institute, 12(2), 59-67
  15. Hossain, S., Pramanik, S., Kafi, A. H., **Biswas, N.K.** (2014). Application of mathematical models to improve flood control, drainage, and irrigation facilities Shariatpur district, Bangladesh. 5th International Conference on Water & Flood Management, 6-8 March 2015, IWFM, BUET, Dhaka, Bangladesh

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**Cloud computing and programming:** Google Cloud & Earth Engine, Python, C#, MATLAB, Bash  
**Hydrological Modelling:** VIC Hydrological Model, MIKE by DHI, HEC-RAS, HEC-HMS, CCHE 2D  
**GIS Analysis and Database:** ArcGIS, QGIS, GDAL, ENVI, Microsoft SQL Server Express, SQLite  
**Drafting and Documentation:** AutoCAD 2D & 3D Modelling, Microsoft Office  
**Web and Visualization:** HTML, CSS, JavaScript, WordPress, D3.js, Leaflet.js, Highcharts.js

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#### Workshops, Forums

- Presented a talk on understanding the stresses on freshwater resources in Ganges Delta due to climate change and human impact using satellite observations in 11th conference on International Perspective on Water Resources and the Environment jointly organized by Environmental & Water Resources Institute, American Society of Civil Engineers and Institute of Water and Flood Management, Bangladesh University of Engineering and Technology, Dhaka, Bangladesh on January 4-6, 2023.
- Participated and presented a talk on understanding the stresses on freshwater resources in Ganges Delta due to climate change and human impact using satellite observations in Early Career Scientist Forum 2022 (Hybrid), NASA Goddard Space Flight Center.
- Participated in courtesy visit and discussion between Department of Mineral Resources (DMR), Thailand, Asian Disaster Preparedness Center (ADPC), Thailand, and National Aeronautics and Space Administration (NASA). Led a deep dive discussion on final handover of LHASA to SERVIR-Mekong and end users, future of forecasting of landslide hazard in the Lower Mekong Region and potential future collaboration between NASA and regional agencies on 26-28<sup>th</sup> September, 2022.
- Participated in the NASA SERVIR Applied Sciences Team Science Exchange, held in Huntsville, AL, from May 10-12, 2022. The event was geared toward exploring innovations in the use of Earth observation information to address global development challenges. [UMBC news link](#)
- Hacker and helper of [SWOT Virtual Early Adopter Hackathon \(2021\)](#), organized by NASA and the University of Washington to build deeper engagement with SWOT Early Adopters.



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- Invited speaker on Data Science and Cloud Computing application in Remote Sensing (2020), Sensing River 2020 Workshop organized at University of Washington.
  - Presenter, helper, and hacker of [SWOT Virtual Early Adopter Hackathon \(2020\)](#), organized by NASA and the University of Washington to build deeper engagement with SWOT Early Adopters.
  - Summer school participant (2019) on using Satellite Observations to Advance Climate Models, organized by Center for Climate Sciences, Jet Propulsion Lab, NASA.
  - Posters presented in American Geophysics Union Fall Meetings (2018, 2020, 2021)
  - Poster presented in Fifth AMS Symposium on the Joint Center for Satellite Data Assimilation, American Meteorological Society Meeting, 2017.
  - Undergrad internship in Flood Management Division, Institute of Water Modelling (IWM), Dhaka, Bangladesh
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## Trainings

### *Trainings as the lead:*

- Provided training on LHASA-Mekong (July 26, 2022), a landslide hazard model for the Lower Mekong Region, to staff from NASA SERVIR Coordination office and relevant participants.
- Provided an online Regional LHASA 2.0 Training for Landslide Monitoring and Forecasting on 24-26 August 2022 for 60 participants from different regional agencies in Thailand, Nepal, Vietnam. This training was focused on understanding different datasets for landslide forecasting and access them within GEE and hazard map generation using a pre-trained model and geospatial datasets.
- Led an online LHASA version 1.1 Hackathon on Satellite Observations and Tools for Landslide Monitoring and Forecasting on July 24-25, 2022 with hands-on experience in setting up and operating a system for landslide monitoring and forecasting. The training is primarily intended for the Department of Mineral Resources, Ministry of Natural Resources and Environment, Thailand.
- Provided 2-days training on LHASA-Mekong (May 2022), a landslide hazard model for the Lower Mekong Region, to staff from Asian Disaster Preparedness Center and SERVIR using [Google Collab](#).
- Led an online training on Satellite Observations and Tools for Landslide Monitoring and Forecasting (March 8-11, 2022) where the application of Google Earth Engine (GEE), precipitation data in GEE, and exposure model in GEE and GEE-based Landslide Hazard Assessment for Situation Awareness (LHASA) was familiarized with the training participants.
- Provided hands-on training on Landslide Hazard Modelling during SERVIR-Mekong and NASA Goddard Space Flight Center organized online training on Satellite Observations and Tools for Landslide Risk Management in the Lower Mekong Region.
- Spent 14 days at Hanoi, Vietnam for the technical training workshop (July 1st 2018 to July 14th 2018) to mainstream decision support system for Vietnam on USAID Evidence to Action project for "Application of Satellite Gravimetry, Satellite Altimetry, and VIC Hydrological Model for Water Resource Management in Vietnam"
- Led a workshop entitled "Supporting Water Management in the Lower Mekong with Satellites" from 5-7th October, 2016, Hanoi, Vietnam supported by SERVIR-Mekong, funded by USAID in partnership with NASA, joined forces with USAID's Partnerships for Enhanced Engagement in Research (PEER) with participants from various agencies in Vietnam, Cambodia, Lao PDR, Myanmar, and Thailand
- Online IT training on how to build and maintain web-portals such as South Asian Surface Water Modelling System (<http://depts.washington.edu/saswe>) using non-proprietary (free) software to Pakistan Council for Research in Water Resources, Pakistan and Department of Hydrology and Meteorology, Nepal by University of Washington
- Training at University of Washington, Seattle on development of Variable Infiltration Capacity (VIC) Model and Satellite Altimeter to person/group from:
  - National University of Civil Engineering (NUCE), Vietnam (March - April 2016)

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- Department of Hydrology and Meteorology (DHM), Nepal (April - May 2016)
  - Pakistan Council of Research in Water Resources (PCRWR), Pakistan (May 2017)
  - National Center for Water Resources Planning and Investigation (NAWAPI), Vietnam (Oct - Nov 2016)
  - Asian Disaster Preparedness Center (ADPC)
  - Bangladesh Water Development Board, Bangladesh
  - Online IT training on how to build and maintain web-portals such as South Asian Surface Water Modelling System (<http://depts.washington.edu/saswe>) using non-proprietary (free) software to Pakistan Council for Research in Water Resources, Pakistan and Department of Hydrology and Meteorology, Nepal by University of Washington

***Trainings as a participant:***

- Training on User Interface Development using C# and SQL Server Database Management by Institute of Water Modelling
  - Training on Environmental Impact Assessment & Environment Management Plan by the Department of Civil Engineering, BUET
  - Training on MIKE 11: Flood Mapping and Data Assimilation from the Academy by DHI, Delft Hydraulic Institute, Denmark.
  - Training on MIKE 11(HD & NAM) by Institute of Water Modelling
  - Training on Basic Arc-GIS by Institute of Water Modelling
  - Orientation Training of Junior Engineers by Institute of Water Modelling
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**Outreach Activities and Professional Memberships**

- Interviewed in ClimateAds on the climate change impact in the underprivileged Global South region of the world.
  - UMBC news featuring Dr. Biswas's work on Bangla delta: <https://gestar2.umbc.edu/post/130465/>
  - Op-Ed on tracking Bangladesh's climate change and human intervention on water resources using satellite information is published leading daily news paper of Bangladesh (the Daily Star): <https://www.thedailystar.net/opinion/views/news/what-nasa-satellites-say-about-bangladeshs-climate-3234491>
  - Developed course material on situational landslide hazard monitoring and forecasting using machine learning and cloud computing which is disseminated through <https://courses.adpc.net/>
  - Reviewer of [MDPI Remote Sensing](#), [MDPI Sustainability](#), and [IEEE Transactions on Geoscience and Remote Sensing](#)
  - Guest Editor of special issue "[Artificial Intelligence and Statistical Techniques to Advance Weather Forecasting and Impact Modeling](#)"
  - Associate Member, American Society of Civil Engineers (ASCE)
  - Member, American Geophysical Union (AGU)
  - Member, American Meteorological Society (AMS)
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