Pranav Dhawan

EDUCATION AND TRAINING

[11/2022 – 04/2026] **Doctoral Student** (Scholarship holder)

Free University of Bozen-Bolzano, Italy (Bolzano, Italy)

Thesis title: Optimising the Water–Energy Nexus: Data-to-Decision Methodologies for Meteorological Forcing and Hybrid Renewable Integration

- Conducted research on data-to-decision methodologies, enhancing understanding of climate variability impacts on water resources through statistical and ML-driven analysis.
- Modelled pumped storage hydropower systems under climate change scenarios, developing hydrological forecasts that integrate floating PV and meteorological inputs for water-energy nexus optimization.

Research Exchange at Newcastle University, U.K.

- Applying advanced Machine Learning techniques (Reinforcement Learning) to optimise Pumped Storage Systems for Water-Energy nexus.

Ph.D. Student Representative of the Ph.D. Programme - Sustainable Energy and Technologies
Teaching: Hydropower Systems – Hydrological Modelling using HEC-HMS and QGIS
Co-supervisor of five Master's student theses on hydropower systems and hydrological modelling, providing guidance on research methods, data processing, and interpretation.

[10/2014 – 09/2016] **M.Sc. Hydroinformatics and Water Management, Erasmus Mundus Euroaquae** (Scholarship holder)

University of Nice-Sophia Antipolis (Nice, France)

Thesis Title: Flood Management under Changing Climate

Consortium of Universities: Brandenburg University of Technology, Cottbus (Germany); University of Newcastle upon Tyne (U.K.); University of Nice-Sophia Antipolis (France), Technical University of Catalonia (Spain); Budapest University of Technology and Economics (Hungary)

[07/2009 – 06/2013] **Bachelor of Technology in Mechanical and Automation Engineering**

Amity University Uttar Pradesh (Noida, India)

WORK EXPERIENCE

[02/2026 – Present] ***Free University of Bolzano-Bozen, Italy*** (Bolzano, Italy)

Postdoctoral Researcher

- Developed a multi-sectoral modeling framework for the NextWater_ST project, integrating Water-Energy-Food-Ecosystem Nexus perspectives to model water availability/demand for energy, agriculture, and ecosystems in South Tyrol under climate scenarios.
- Contributed to the technical drafting of research proposals and grant applications for multi-sectoral water management projects

[04/2021 – 10/2022] ***Free University of Bolzano-Bozen, Italy*** (Bolzano, Italy)

Assistant Researcher

- Developed high-resolution (250m, hourly) gridded climate dataset for Trentino-Alto Adige, processing large meteorological datasets to support hydrological modelling and climate impact assessments, applicable to post-processing ensemble weather forecasts.
- Implemented univariate and multivariate bias correction methods on future climate variables using observational data, improving forecast skill for precipitation and other meteorological parameters.

[08/2020 – 03/2021] ***National Institute of Disaster Management, Ministry of Home Affairs, Government of India*** (New Delhi, India)

Consultant (Remote Sensing and GIS Expert)

Flood Monitoring Cell

- Analysed gaps in India's flood forecasting systems using satellite imagery, assessing flood extent and contributing factors (e.g., urban encroachment, erosion) to recommend improvements in operational prediction frameworks.

- Evaluated meteorological and hydrological drivers of riverine/coastal flooding, with a focus on Indian monsoon precipitation patterns and extreme event forecasting, informing policy for enhanced precipitation forecast utilization during extreme events.

[01/2018 – 11/2019] ***DHI (India) Water and Environment Pvt. Ltd.*** (New Delhi, India)

Water Resources Engineer

Design of Flood Protection works along Sukhbhadar River in Dholera Special Investment Region, Gujarat

- Led the project as **Project Manager** for a 5-member team, overseeing planning, scheduling, budgeting, resource allocation, client coordination, and timely report delivery.
- Conducted river modelling and proposed long-term, sustainable flood mitigation strategies.

Climate Change Decision Support System for Samrat Ashok Sagar Dam, Bhopal

- Served as **Deputy Project Manager**, coordinating between Bhopal, New Delhi teams, and UNDP.
- Downscaled climate models to reservoir level and assessed future climate vulnerability to support adaptive water release and drought/flood preparedness.

Quantification of losses suffered by Jammu and Kashmir on account of Indus Water Treaty (IWT)

- Worked as **Hydrologist** to evaluate hydropower and irrigation potential losses due to the IWT.
- Quantified treaty-related impacts through comparative analysis of with/without treaty scenarios.

Strengthening Smart Water Management and Urban Climate Change Resilience in Tamil Nadu, India

- Acted as **Modeler** for climate risk assessment in coastal towns.
- Simulated baseline and climate change scenarios using MIKE HYDRO RIVER, MIKE 21C, and MIKE URBAN to model overland flooding and recommend mitigation measures.

Trainings Conducted

- Delivered hands-on training on MIKE HYDRO to master's and PhD students at IIT Roorkee.
- Led professional training on MIKE FLOOD 3-way coupling (MIKE HYDRO RIVER, MIKE 21 FM, MIKE URBAN) for state government officials at the Karnataka State Natural Disaster Monitoring Centre.
- Conducted training on MIKE FLOOD 2-way coupling (MIKE HYDRO RIVER & MIKE 21 FM) in Sardar Vallabhbhai National Institute of Technology (Surat, Gujarat), Assam Engineering College (Guwahati, Assam) and National Institute of Technology, Kurukshetra for postgraduate students, researchers and academic staff.

[09/2017 – 12/2017] ***Indian Institute of Technology (I.I.T), Roorkee*** (Roorkee, India)

Research Assistant

Real Time Inflow Forecasting System for Tehri Dam by IIT Roorkee and Tehri Hydro Development Corporation (THDC) India Ltd.

- Inflow forecasting and snowmelt modelling of Tehri Dam (1000 MW).

[04/2016 – 09/2017] ***International Commission on Irrigation and Drainage*** (New Delhi, India)

Research Analyst

[06/2015 – 09/2015] ***World Meteorological Organization, Geneva*** (Geneva, Switzerland)

Graduate Intern

TECHNICAL SKILLS

Programming & Data Analysis
MATLAB, Python, R/RStudio, UNIX/LINUX environment, data manipulation, statistical analysis, data visualization, quality control, reproducible analysis.

Machine Learning & Statistics
Reinforcement Learning, Deep neural networks, Gradient boosting, ensemble/statistical modelling.
Bias correction methods

Climate & Meteorological Data
Climate data processing and analysis, Climate data quality assurance and validation
High-resolution gridded climate product development (250m, hourly)

Hydrological & Flood Modelling
Hydrological modelling tools - HEC-HMS, HEC-RAS, MIKE HYDRO, MIKE FLOOD, MIKE URBAN
Flood risk assessment, Reservoir, river and urban catchment modelling.

GIS & Remote Sensing
Satellite image processing and analysis for flood extent mapping and environmental monitoring
Spatial analysis, mapping and geoprocessing using ArcGIS, QGIS and open data platforms.

Productivity & Technical Communication
Scientific report writing, academic publications, stakeholder presentations, visualisation for scientific/non-technical audiences
Teaching and training, workshops on GIS and hydrological modelling
Microsoft Office Suite; LaTeX

Languages
Mother Tongue – Hindi; English – C1; German – C1, Italian – A2

PUBLICATIONS

Research Articles published

- **Dhawan, P.**, Dalla Torre, D., Niazkar, M., Kaffas, K., Larcher, M., Righetti, M. and Menapace, A., 2024. A comprehensive comparison of bias correction methods in climate model simulations: Application on ERA5-Land across different temporal resolutions. Heliyon, 10(23). https://doi.org/10.1016/j.heliyon.2024.e40352
- **Dhawan, P.**, Dalla Torre, D., Zanfei, A., Menapace, A., Larcher, M. and Righetti, M., 2023. Assessment of ERA5-Land data in medium-term drinking water demand modelling with deep learning. Water, 15(8), p.1495. https://doi.org/10.3390/w15081495
- Menapace, A., **Dhawan, P.**, Dalla Torre, D., Kaffas, K., Crespi, A., Larcher, M., Righetti, M. and Cannon, A.J., 2025. Review of bias correction methods for climate model outputs in hydrology. Journal of Hydrology, p.133213. https://doi.org/10.1016/j.jhydrol.2025.133213
- Margoni, M., **Dhawan, P.,** Righetti, M., 2025. Sustainable Energy Management through Optimized Hybrid Hydro-Solar Systems, Energies, 18(24), 6412, https://doi.org/10.3390/en18246412
- Niazkar, M., Menapace, A., Brentan, B., Piraei, R., Jimenez, D., **Dhawan, P.** and Righetti, M., 2024. Applications of XGBoost in water resources engineering: A systematic literature review (Dec 2018–May 2023). Environmental Modelling & Software, 174, p.105971. https://doi.org/10.1016/j.envsoft.2024.105971
- Niazkar, M., Piraei, R., Menapace, A., **Dhawan, P.**, Torre, D.D., Larcher, M. and Righetti, M., 2024. Bias correction of ERA5-Land temperature data using standalone and ensemble machine learning models: a case of northern Italy. Journal of Water and Climate Change, 15(1), pp.271-283. https://doi.org/10.2166/wcc.2023.669

Conference Proceedings

- **Dhawan, P.**, Dalla Torre, D., Menapace, A., Majone, B., and Righetti, M.: High-resolution gridded dataset of precipitation and temperature for Trentino-Alto Adige, EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023, EGU23-11499, https://doi.org/10.5194/egusphere-egu23-11499
- **Dhawan, P.**, Dalla Torre, D., Menapace, A., and Righetti, M.: Floating solar power potential for the Alto Adige region of Italy, EGU General Assembly 2024, Vienna, Austria, 14–19 Apr 2024, EGU24-6199, https://doi.org/10.5194/egusphere-egu24-6199
- **Dhawan, P.**, Righetti, M., Puchkova, A., Herrera, M., Formulation of an optimization framework for pumped storage with floating photovoltaics integration: Towards smart hydropower, 13th World Congress on Water Resources and Environment (EWRA 2025), Palermo, Italy, 24 - 28 June 2025
- **Dhawan, P.**, Herrera, M., Righetti, M., Optimization of Pumped Storage Systems using Reinforcement Learning: A Data-Driven Approach for Alpine Hydropower, The Water Resources and Energy Systems (EW 2026), Naples, Italy, 1-3 July 2026
- **Dhawan, P.**, Righetti, M., Herrera, M., Enhancing Hydropower Sustainability through Predictive Reinforcement Learning: Assessing the Causal Impact of Geopolitical Volatility on Market-Aware Scheduling, 13th International Congress on Environmental Modelling and Software (iEMS 2026), Dublin, Ireland, 12-16 July, 2026
- Menapace, A., **Dhawan, P.**, Dalla Torre, D., Larcher, M., and Righetti, M.: Analysis of the statistical bias correction of ERA5-Land on different time aggregations in Trentino-Alto Adige, EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023, EGU23-15537, https://doi.org/10.5194/egusphere-egu23-15537

Conference Attendance

- HYDRO 2023 conference on the topic “New Ideas for Proven Resources”, Edinburgh, Scotland, 16-18th October 2023.

Google Scholar: https://scholar.google.com/citations?hl=en&user=Hg2vP58AAAAJ
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