

COURSE

INTRODUCTION TO BIG DATA FOR WATER SUSTAINABILITY



Course Context

Over two billion people do not have safe access to clean water. Yet, quantifying the extent of global water insecurity, particularly when incorporating indicators such as freshwater quality, quantity, value, and governance, can be challenging. We are in need of innovative and creative solutions to water sustainability management that are relevant at both local and global scales, and based on a data-driven approach. Large investments are made annually to acquire, compile, and analyze data on lakes, rivers, aquifers, groundwater, and wetlands around the world. However, it is not always apparent where to find these datasets and there may be steep learning curves associated with using them.

In this course, we reveal the power of harnessing open-access data, novel technologies, inclusive international collaborations, and integrating Indigenous knowledge in a two-eyed seeing approach, to understanding water resource sustainability around the globe. An expert will describe the importance of remote sensing technologies, community networks, traditional knowledge, and increased accessibility of open-access data. We offer exciting opportunities to expand our knowledge of global freshwaters, particularly in previously unexplored regions, or those that suffer from insufficient access to resources. In each module, an experienced practitioner will guide you through accessing, using, and applying an open-access global freshwater dataset. We hope that this course will provide the tools to spark creative data-driven solutions to safeguard our global freshwater resources and work towards a future of equitable access to clean freshwater worldwide.

Learning Objectives

After completing this course, learners will be able to:

- Appreciate how to access big data repositories associated with freshwater resources.
- Identify diverse novel technological and computational resources used to compile big datasets.
- Explore opportunities for using diverse data sources for local to regional to global freshwater management issues.
- Learn how to use and apply open-access data sources to develop data-driven solutions to water sustainability.

Course Outline and Content



Module 1: UN Water Data Portal

Dr. Maggie Kossida,
UN Water





Module 2: Applying and integrating global remote sensing data

Dr. Nattachet Tangdamrongsub,

Asian Institute of Technology (AIT) will provide a tutorial on how to access, use, and apply remote sensing data from around the world and their integration with models.



Module 3: Innovative, data-driven management to spark creative solutions

Dr. Annie Feighery,

mWater will highlight data and management resources to address environmental and public health solutions. The mWater platform is typically used for Surveying, Monitoring, Evaluation, & Learning, and Management by individuals, organizations, and governments in over 190 countries in the world.



Module 4: The SWOT Mission (Surface Water and Ocean Topography) to measure freshwater

Dr. Tamlin Pavelsky,

University of North Carolina at Chapel Hill will provide the rationale behind and design of the SWOT satellite, its capabilities and limitations, and how to access and explore data from the first global survey of Earth's surface water from NASA, Centre National D'Etudes Spatiales, with contributions from the Canadian Space Agency and United Kingdom Space Agency.



Module 5: The power of high-frequency sensors and global international networks

Dr. David Hamilton,

Griffith University will present on the role of establishing global networks in developing open access data, in addition to discussing the increasing prominence of AI in data-driven science.





Module 6: Integrating remote sensing, in situ observations, and Indigenous knowledge to characterize ice safety in the Arctic

Dr. Katherine Wilson,

SmartICE will highlight the power of integrating novel technologies with on-the-ground observations and traditional knowledge to create innovative environmental solutions.



Module 7: Tracking the World's Lakes with Satellites: Products, Power, and Potential

Dr. Michael Meyer,

United States Geological Survey, will present a tutorial on how to access global water quantity and water quality data. In particular, we will highlight the potential for the power of novel technologies to improve access to water quality data and analysis.



Course Evaluation

Each module will include an evaluation. You must complete 6 of the 7 modules and attain an overall grade of 75% or higher after which you will receive a credit towards a certificate of completion.



Instructors



Professor Sapna Sharma,
York University



Dr. Maggie Kossida,
UN Water



Professor Nattachet Tangdamrongsub,
Asian Institute of Technology (AIT)



Dr. Annie Feighery,
mWater



Professor Tamlin Pavelsky,
University of North Carolina
at Chapel Hill



Professor David Hamilton,
Griffith University



Dr. Katherine Wilson,
SmartICE



Dr. Michael Meyer,
United States Geological Survey





**SUSTAINABLE
DEVELOPMENT
GOALS**