

# HydroAtlas maps Earth's river and catchment systems to enhance understanding and protection

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A composite image of the Western hemisphere of the Earth. Credit: NASA

Two friends from opposite ends of the Earth have created a world-first high spatial resolution atlas that maps the environmental characteristics of all the globe's rivers and catchments.

HydroATLAS assists researchers and practitioners—such as country agencies or bodies like the UN—to address gaps in river or catchment protection methods and understand the [human impact](#) on freshwater ecosystems.

HydroATLAS was co-developed by Dr. Simon Linke from Griffith's Australian Rivers Institute and Associate Professor Bernhard Lehner and his team from McGill University's Department of Geography in Montreal.

The development was also aided by Michele Thieme from World Wildlife Fund—a long-term collaborator of Dr. Linke and Professor Lehner—who frequently uses their science to aid [conservation projects](#) in remote areas, such as the Congo Basin or Bhutan.

The HydroATLAS database is a standardised compendium that collates more than 50 environmental variables representing over 280 individual attributes into a single resource that allows detailed analysis of the factors that drive the hydrology and ecology of rivers and their catchments.

Dr. Linke said that for the first time, global information about rivers and their contributing catchments could now be found in one place, within HydroATLAS. It offers non-specialists the opportunity to explore patterns in [global data](#) without having to pull information from scattered databases.

"This can help to, for example, understand where gaps in river protection are, or what the characteristics of catchments are that are particularly

threatened by human activity," he said.

"This is an incredibly detailed resource. We have attached the environmental data to over 8 million river segments and 1 million catchments globally," Professor Lehner said.

Research detailing the HydroATLAS compendium has been published in *Nature Scientific Data*.

HydroATLAS collates descriptive hydro-environmental information for all catchments and rivers around the world. It offers data on:

- Hydrology (e.g. discharge, runoff, wetland inundation, groundwater table depth)
- Physiography (e.g. elevation, slope, landform)
- Climate (e.g. temperature, precipitation, evapotranspiration, snow, aridity)
- Land cover & use (e.g. ecoregions, forest types, natural vegetation, wetland classes, [habitat types](#))
- Soils & geology (e.g. clay, silt and sand content, organic carbon, geologic classes)
- Anthropogenic influences (e.g. population, human footprint, road densities).

"Our lab at Griffith is one of the global leaders in predicting current and future habitat for freshwater species—but we were previously hindered by not even having the underpinning environmental data ready," Dr. Linke said.

"Now we—and others—can focus on deriving relationships between environmental drivers and fauna without spending excessive amounts of time on searching for data.

"The beauty of HydroATLAS is that the user does not need any special expertise in computer mapping, but can click on a river or area and the readily available information will be pulled from the database. Users can also easily calculate upstream climatic, soil and other variables that contribute to the character of a river or catchment."

Work on the HydroATLAS was inspired by a similar Australian product, led by Dr. Janet Stein from Australian National University, which Griffith researchers used to build a fish map of Northern Australia and mapped ecosystems in the Murray Darling Basin.

"This was such an incredibly useful resource that Professor Lehner and I thought 'we need to do this globally'," said Dr. Linke.

"We had already built the most detailed maps of rivers and catchments worldwide in previous projects, which required more than a decade of interpreting remote sensing information and developing computer algorithms," Professor Lehner said.

"Through the collaboration with Dr. Linke we managed to add a wide range of [environmental data](#) from many other sources, building the most detailed and comprehensive global river and [catchment](#) information system currently available."

The researchers hope HydroATLAS is especially useful for applications by intergovernmental bodies such as the UN Environment Program, the WorldBank or the International Union for Conservation of Nature.

"While some countries like Australia are able to account for progress towards international targets like the UN's Sustainable Development Goals, we need global consistency of data to draw global comparisons," Dr. Linke said.

"Because of the simple format, we hope practitioners from NGOs, intergovernmental bodies or other countries that do not have detailed base layers readily available will use HydroATLAS for practical applications."

The research 'Global hydro-environmental sub-basin and river reach characteristics at high spatial resolution' has been published in the Nature journal *Scientific Data*.

**More information:** Simon Linke et al. Global hydro-environmental sub-basin and river reach characteristics at high spatial resolution, *Scientific Data* (2019). [DOI: 10.1038/s41597-019-0300-6](https://doi.org/10.1038/s41597-019-0300-6)

Provided by Griffith University

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