



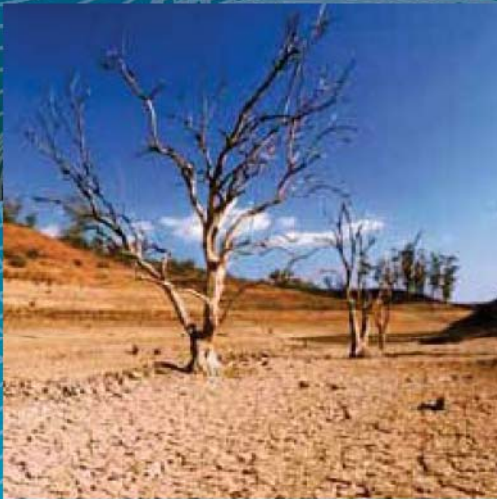
United Nations  
Educational, Scientific and  
Cultural Organization



International  
Hydrological Programme

# FRIEND -Water

FLOW REGIMES FROM INTERNATIONAL EXPERIMENTAL  
AND NETWORK DATA



International Hydrological Programme  
Division of Water Sciences

# What is FRIEND -Water?

FRIEND-Water (FLOW REGIMES FROM INTERNATIONAL EXPERIMENTAL AND NETWORK DATA) IS AN INTERNATIONAL COLLABORATIVE NETWORK OF EXPERTS THAT AIMS TO GENERATE NEW UNDERSTANDING ABOUT REGIONAL HYDROLOGY AND MULTI-SCALE WATER CYCLE PROCESSES.

FRIEND-Water is investigating long-term variations and changes in hydrological variables to better understand the climate, river basin and human controls on the spatial and temporal distribution of water. The science and training supported by the FRIEND-Water programme are critical for: **1)** water resources management, **2)** socio-economic development, safeguard the environment, and **3)** assessing the impact of global change, including climate change and human impact.

As a cross-cutting theme of UNESCO's International Hydrology Program (IHP), FRIEND-Water contributes to research on: **1)** regional water resources, **2)** water-related disasters (such as floods and droughts), **3)** global change and the water cycle, and **4)** water education and capacity building. The FRIEND-Water programme complements and interacts with many national projects and international initiatives.

## WHAT DOES FRIEND-Water DO?

The FRIEND-Water initiative works to improve the scientific understanding of hydrological processes at a regional to global scale. The programme aims to foster and consolidate cross-disciplinary networks that facilitate cooperation within research and capacity building, development of analytical tools and data sharing, primarily across national boundaries.

The above goals are reached by the four main components of the FRIEND-Water programme: **1)** the establishment of regional databases, **2)** establishment of a global network for research collaboration and exchange of data, **3)** the initiation and coordination of regional research, and **4)** dissemination and capacity building.



## WHO PARTICIPATES IN FRIEND-Water?

With eight regional groups and over 162 participating countries, FRIEND-Water reflects the best in international cooperation between different stakeholders like researchers in universities, national institutes and other water-related agencies. The eight regional FRIEND-Water groups currently include:

Europe (● EURO FRIEND),  
Mediterranean (● MED FRIEND),  
Latin American and Caribbean (● AMIGO FRIEND),  
Southern Africa (● SA FRIEND),  
West and Central Africa (● AOC FRIEND),  
Asian Pacific (● AP FRIEND),  
Hindu-Kush-Himalayas (● HKH FRIEND),  
and Nile Basin (● NILE FRIEND).

## WHY IS AN INTERNATIONAL WATER RESEARCH NETWORK NEEDED?

Many of the world's water resources are shared. Trans-boundary rivers originate in one country and flow through downstream countries before reaching the ocean. Furthermore, large-scale climate drivers that may cause hydrological extremes, like floods and droughts, have a spatial extent clearly beyond nation. Thus, it is vital that nations collaborate on analysing and solving hydrological issues of trans-national importance. As an international network, FRIEND-Water enables researchers to collaborate, exchange experience and to share data. Moreover, it offers an excellent platform to build and harvest hydrological science synergies between countries and provide education and training at technical and tertiary levels.

## WHY ARE HYDROLOGICAL DATABASES IMPORTANT?

To better understand the processes controlling the hydrological cycle it is necessary to have quality-controlled, regularly updated hydrological data with adequate geographical coverage, as well as metadata and auxiliary information (e.g. climate, land use etc.).

These regional hydrological databases are essential for a better understanding of the hydrological variability in space and time, identifying regions and time periods most sensitive to climate and human impacts, predicting flows in ungauged basins and informing decision makers on water security issues and where and when to take measures to mitigate water hazards and stresses such as floods and droughts. By storing centrally and making hydrological data available, each regional hydrological database allows researchers to collaborate on joint research projects, share data and develop common analytical tools.

A hydrological database is one of the cornerstones for the research activities of each of the eight regional FRIEND-Water groups. Notable achievements include the EURO FRIEND European Water Archive (EWA) and AP FRIEND's five volumes Catalogue of Rivers for Southeast Asia and the Pacific. Additionally, the advantage of having an international network is evident in the collaboration between MED FRIEND, AMIGO FRIEND and AOC FRIEND in creating a central database that shares common data and information architecture.



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## WHAT DOES FRIEND-Water RESEARCH?

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FRIEND-Water provides an excellent framework for scientific collaboration on a wide range of research topics. Common research themes of all eight regional groups include local and regional analyses of hydrological processes, water resources and the impact of global change on the hydrological cycle, extreme events such as floods and droughts, large scale hydrological variation, rainfall-runoff modelling and catchment hydrology.

In addition, regional FRIEND-Water groups study topics that are of particular local interest such as glacial melt and runoff (HKH FRIEND), karst aquifers (MED FRIEND), biogeochemical processes (EURO-FRIEND and ERB) or water resources management (SA FRIEND, AOC FRIEND, AP FRIEND).

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## HOW DOES FRIEND-Water EDUCATE?

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Education is a high priority for all eight of the regional FRIEND-Water groups, which includes transfer of skills, knowledge and experience by dissemination of research results through regional training courses, field courses, summer schools, technical workshops, conferences, symposia, production and distribution of technical literature, and support for postgraduate student activities. Throughout all training activities, FRIEND-Water ensures and encourages equal participation of male and female students (gender mainstreaming) and has a focus on the least developed countries. FRIEND-Water is also active in the development of scientific briefs for policy-makers, providing technical assistance to professionals and helping nations develop water research and education capacity.

# FRIEND-Water: Some major research questions

## HOW DOES FRIEND-Water COMMUNICATE AND DISSEMINATE THE RESULTS

A key feature of FRIEND-Water is the summary reports, published every four years, which provide an overview of the major research topics studied and results obtained in each regional group, and give information on future research direction of FRIEND-Water. The achievements are presented and discussed at an international conference with a four-year cycle, hosted by one of the regional FRIEND-Water groups. Lessons learned from original research are made available openly through various websites, newsletters, and scientific journals. FRIEND-Water researchers have won several international prizes such as the Tison Award and the International Hydrology Prize.

## CELEBRATING 25 YEARS OF FRIEND-Water

In 25 years (1985-2010), FRIEND-Water has transformed from a group of four European countries to representing the interests of over 162 countries divided into eight regions of the world. Over this time, researchers associated with FRIEND-Water have contributed to more than 2000 publications in well recognised journals covering a wide range of water-related disciplines. Other accomplishments include the establishment of regional hydrological databases, which has encouraged and facilitated data sharing between nations and made a lasting contribution to international cooperation, study material, and impacted regional policy-making, e.g. the European Water Framework Directive through the European Drought Centre ([www.geo.uio.no/edc/](http://www.geo.uio.no/edc/)).

## THE FUTURE OF FRIEND-Water

FRIEND-Water will further strengthen its research on hydrological processes and variability in the context of global change; promote education by capacity building and exchange of hydrological knowledge; and it will continue to provide important guidance for the sustainable use of water to safeguard this precious resource.



### AMIGO:

- How can better meteorological and climatological information enhance our understanding of drought evolution in Latin America?

### AOC:

- How can eco-hydrological approaches inform and improve pollution control and ecosystem health in tropical environments?

### SA:

- How do groundwater bodies interact with ephemeral streams to manage conjunctive use of water resources?
- How do we train a future generation of decision makers for water resources management in Africa?

### NILE:

- How can mapping of erosion risk further foster understanding of sedimentation processes?
- How can eco-hydrology be integrated in Integrated Water Resources Management (IWRM)?

### HKH:

- What are the effects of global change on Himalayan glaciers and snow cover?
- How do we predict and mitigate the impact of glacier lake outburst floods?

### AP:

- How will climate variability impact on water resources and management in the tropics?
- How can we cope with uncertainty in flood forecasting?
- How do stakeholders comply with top-down requests to develop a national water resources policy?

### MED:

- How will the frequency of rainfall and flood events over large areas alter under global change?
- How do we prevent salt water intrusion in heavily-used karstic groundwater bodies in coastal regions?
- How can hydrological knowledge be extended and exploited to reduce soil erosion?

### EURO:

- How can droughts in streamflow be predicted from weather data and soil moisture conditions?
- Are global hydrological models able to capture observed spatial and temporal changes in hydrological regimes and extremes?
- How can experimental river catchment studies enhance our understanding of hydrological processes at different scales?



## GLOBAL SECRETARIAT OF FRIEND

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