As low and middle-income countries pursue their action plans for sustainable development, the Institutes of the United Nations University (UNU) offer a wealth of expertise and support for policy, technical problem-solving, natural resource planning, and new technologies. The mission of the UN University is to contribute, through collaborative research and education, to the resolution of the pressing global development problems that are the concern of the United Nations’ Member States.

At least five out of 13 UNU Institutes, with some 25 experts with complementary expertise and diverse geographical experiences help countries deliver on water-related Sustainable Development Goals (SDGs):

- **UNU-INWEH** - the Institute for Water, Environment and Health (Hamilton; Ontario, Canada),
- **UNU-FLORES** - the Institute for Integrated Management of Material Fluxes and Resources (Dresden, Germany),
- **UNU-EHS** - the Institute for Environment and Human Security (Bonn, Germany),
- **UNU-IAS** - the Institute for the Advanced Study of Sustainability (Tokyo, Japan), and
- **UNU-INRA** - the Institute for Natural Resources in Africa (Accra, Ghana).
UNU-INWEH research and capacity development programme is entirely water-focused and addresses a range of global water development challenges. UNU-INWEH offers a ‘think tank’ and ‘knowledge center’ services in four interconnected areas:

**Accelerating the implementation of water-related SDGs**

The Institute provides normative support to countries, in their efforts to achieve water-related SDGs. The Institute’s SDG 6 Policy Support System (SDG-PSS) is a unique tool that countries use to set, gather evidence on and track progress toward national water targets. The tool is already in use by decision makers in Costa Rica, Ghana, Pakistan, the Republic of Korea and Tunisia, serving some 280 million people. The SDG-PSS is currently being rolled out to 50 more countries.

**Activating a technology revolution for water security in the Global South**

As many countries realise that their river flow and groundwater may not be enough to meet their growing water needs over the coming decades, they turn to other sources that include sea water desalination, offshore and deep aquifers, fog harvesting, cloud seeding, treated wastewater, etc. UNU-INWEH runs a unique activity that synthesises and promotes the globally available knowledge and experiences in this area and helps countries integrate such unconventional water sources and technologies into their national resource management strategies. Another related focus is on new digital “disruptive” technologies that can be applied in innovative ways to improve water management in the Global South.

**Advancing gender equality for effective water management**

Finding ways to activate the role of women in water-related policies, practices and risk management remains a challenge. UNU-INWEH is focusing on how to make it happen. This effort pays special attention to minimising impacts of water-related disasters on the health of women and girls, explores complex causes and consequences of water- and climate-related displacement on women and girls, and identifies initiatives to enhance the participation of women in community-based water conflict resolution.

**Managing water- and climate-related risks for improved water security**

Climate and health-related water risks are well-known, but many of them remain unresolved and new ones are emerging. UNU-INWEH examines how to accelerate the resolution of environmentally persistent pharmaceutical pollution and arsenic contamination of drinking water, vulnerability of populations to water-borne diseases such as malaria and worm infections, vulnerability of urban centres to flooding and ageing water storage infrastructure, and other risks. The Institute also develops ways to put the concept of “water security” into operational practice of the UN member states.

*Contact: contact.inweh@unu.edu*
UNU-FLORES examines complex interdependencies of water, soil, waste, energy, and other geo-resources – the ‘Resource Nexus’ – and designs innovative transdisciplinary solutions to ensure that overall resource use efficiency is maximised.

**Supporting innovation in water quality monitoring**

The Institute provides expertise in the field monitoring of various aspects of water quality including contaminants of emerging concern such as pesticides, microplastics, and pharmaceuticals. UNU-FLORES explores how to make the role of citizen science in water quality monitoring more effective. It analyses the effect of funding mechanisms, types of citizens and pollutants, and geographical factors on data accuracy and sustainability of surface and groundwater quality monitoring. This research advances the acquisition of so much needed water quality data that remains a chronic problem globally.

**Governing wicked resource management problems**

Problems, such as how to integrate management of water, soil, and waste, are often characterised by goal diversity, system complexity and information uncertainty, and are not easy for public administration and governments to deal with. UNU-FLORES identifies ways to better handle such problems through analyses of responsibilities, capacities, and interactions of institutions, regulations, and economic incentives. Diffuse and point-sources pollution of freshwater resources in China, Europe and Latin America are used as example wicked problems.

** Recovering resources from wastewater**

While many wastewater treatment projects have been undertaken globally in the past decades, the success of these often large-scale, centralised infrastructures in providing access to clean water and sanitation, in particular to the poor, is strongly contested. In the Latin America and Caribbean region alone more than half the urban population lives in cities with less than 1 mill people, and hence locally acceptable technical options for wastewater treatment for small- to medium-sized cities are needed. UNU-FLORES runs a unique initiative that co-designs, together with the future users, such alternative wastewater treatment and management systems for two pilot areas in Guatemala and Mexico. The methodologies of co-design will be a brand-new product in the wastewater treatment sector.

**Contact:** flores@unu.edu
UNU-EHS develops solutions that minimise the risks associated with environmental hazards and global change. Specific research areas include ecosystem-based flood management and climate change adaptation, global and regional drought characterisation and water-energy nexus.

Assessing the risk of drought impacts at global and regional scales

UNU-EHS contributes to the development of a global drought risk information system that aims to assess adverse drought impacts on water resources, public water supply, crop productivity, and agricultural systems. The analyses at global scale are complemented by regional studies in more detailed analyses in heavily drought affected countries, such as South Africa and Zimbabwe.

Alleviating flood risks in Asia and Africa

UNU-EHS analyzes present-day and simulated future flood risks in urban regions or transboundary basins, with case studies in Southeastern Asia and Western Africa. The research aims at better understanding drivers and dynamics of flood risk and explores how to reduce such risk and adapt to it. UNU-EHS integrates science-based data with local information and knowledge, and co-develops tools that help to prioritize different risk reduction, risk transfer and adaptation measures based on their impact reduction, social acceptance, long-term sustainability and cost-efficiency.

Regional water and energy security and energy systems’ transition

UNU-EHS explores the water footprint of different energy systems in order to identify the impact of water scarcity on energy transition towards renewables. UNU-EHS also supports the institutional development of the Pan African University - Institute of Water and Energy Sciences (PAUWES), which is hosted at the University of Tlemcen in Algeria and constitute one of the four academic arms of the African Union Commission mandated to promote higher education, science, and technology in Africa.

Sustainable mountain management for freshwater conservation

Mountains play an important role in freshwater supply worldwide. UNU-EHS is running the only mountain-specific programme at the UNU. The programme aims to developing resilience of mountain communities towards natural and man-made risks. The programme constitutes a collaborative activity and scientific alliance with Eurac Research based in Bolzano, Italy.

Contact: info@ehs.unu.edu
UNU-IAS conducts policy-oriented research and capacity development focusing social, economic and environmental dimensions of sustainability. The research activities of the institute are structured around 3 thematic areas: i) sustainable societies, ii) natural capital and biodiversity, and iii) global change and resilience. Since 2018, UNU-IAS has run a 4-year research initiative- Water for Sustainable Development (WSD) - as part of the “Sustainable Societies” program.

The WSD Initiative examines the role and value of water in the economy, natural environment, and the society in selected locations throughout Asia, including in Indonesia, India, Nepal and Thailand. WSD develops integrated (monetary and non-monetary) method to examine the direct and indirect water consumption and pollutants’ discharge in the production process of the economy. Based on this analysis, WSD develops scenarios of future environmental water needs in the case study locations. WSD aims to provide tools and policy options that will accelerate regional implementation of SDG 6.3 (water quality) and 6.4 (water use efficiency) in Asia.

Contact: ias.wsd@unu.edu
UNU-INRA's mandate is to contribute to the sustainable development of Africa’s natural resources in a way that maintains the quality of the natural environment and transforms lives. The Institute’s programme areas focus on the development, management, and governance of Africa’s renewable and non-renewable natural resources as well as green economy promotion. The Institute operates from its main office in Ghana and carries out some of its programme activities through a network of Operational Units that consist of multi-disciplinary groups of researchers located in Cameroo, Ivory Coast, Namibia, Senegal and Zambia. The work by UNU-INRA addresses water resources management in Africa as part of an integrated approach to natural resources’ management.

Contact: inra@unu.edu