



Women and children collect water in Tanzania (photo taken by PhD Researcher Sekela Twisa during her field research).

# UNU-FLORES

## ANNUAL REPORT 2020

### FORGING RESILIENCE THROUGH THE RESOURCE NEXUS



UNITED NATIONS  
UNIVERSITY

**UNU-FLORES**

# UNU-FLORES

## ANNUAL REPORT 2020

### United Nations University Institute for Integrated Management of Material Fluxes and of Resources (UNU-FLORES)

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# 2020 At a Glance



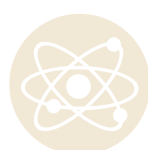
29

No. of peer-reviewed publications



29

No. of events



20

No. of projects



29

No. of interns



3

No. of PhD graduates



74

No. of researchers

# FOREWORD

I am immensely proud of the UNU-FLORES team's positivity, resilience, and compassion throughout 2020 – a year that brought many challenges, as well as opportunities. These unprecedented times have seen us rethink the way we work, with more flexibility, technological changes, and a focus on inclusivity.

Fortunately, our previously introduced Flexible Working Arrangements meant that we were well-prepared to continue our work despite global challenges, and taking our events to a virtual format, such as the very successful Dresden Nexus Conference, allowed for a more expansive, accessible, and global effort in advancing the Resource Nexus at UNU-FLORES. We were also able to use this time to collaborate on the Institute's Implementation Plan, which informs our work moving forward, as well as our individual performance goals. We have seen other exciting developments at the Institute this year, with several successful PhD defences taking place virtually, strategic and valuable networks and partnerships being built and strengthened, and the signing of a renewed Funding Agreement with our donors to secure the ability of UNU-FLORES to maintain its important work for the next four years. Our relationship with the wider UN is also flourishing, with collaborations with UNIDO and UN-EMG, as well as the UNU Water Network.

Of course, adapting to a completely remote working environment is not without its obstacles, and I wish to thank every member of our team for their constant dedication and support of each other. 2020 has solidified UNU-FLORES as an innovative, adaptable, and determined team, and has shown that, indeed, we are stronger together.

Thank you for your continued support of our institute.

Stay safe,  
Prof. Edeltraud Guenther  
Director, UNU-FLORES



Prof. Edeltraud Guenther, Director



# RESEARCH & POLICY IMPACT

The UN Secretary-General António Guterres launched the **Decade of Action for delivering the Sustainable Development Goals (SDGs)** in 2020. At UNU-FLORES, the **Resource Nexus** is at the core of our research strategy. With nearly all SDGs relying in one way or another on the vitality of our planet, nexus thinking critically equips us to both recognise interlinkages between the SDGs and supports the development of environmental management strategies that are more effective and socially acceptable. The book chapter **“Sustainable Development as the Ultimate Target of Adopting a Nexus Approach to Resources Management”** illustrates – through case studies – the importance of considering both social and environmental dimensions when adopting a Nexus Approach for sustainable development.

To varying degrees, the activities at UNU-FLORES are broadly aligned with all seventeen SDGs. Where research is concerned, a total of 20 projects contributed to all of these SDGs in 2020.

[View Research Projects](#)

2020 saw the UNU-FLORES team virtually get together to co-create an **Implementation Plan** for the Institute that focuses our research towards achieving impact in the following areas:

### The Resource Nexus and the SDGs

1. Resource Nexus in Agri-Food and Forest Systems
2. Resource Nexus in the Circular Economy
3. Resource Nexus in Climate Change Mitigation and Adaptation
4. Biodiversity and the Resource Nexus
5. Resource Nexus at UNU-FLORES

### Analytical Perspectives on the Resource Nexus

1. Data Science and Citizen Science for the Resource Nexus
2. Governance for the Resource Nexus
3. Sustainability Assessment for the Resource Nexus
4. Barriers for the Resource Nexus
5. Health in the Resource Nexus
6. Resource Nexus in Transformation Regions

As the events of 2020 have drawn attention to the importance of **resilience**, the following sections discuss UNU-FLORES projects, publications, and events in each of the above domains through this lens.

**“Organizations will only be able to enhance their resilience if there is clarity on the concept and the variables that determine resilience in order to assess, develop, and continuously improve them over time.”**

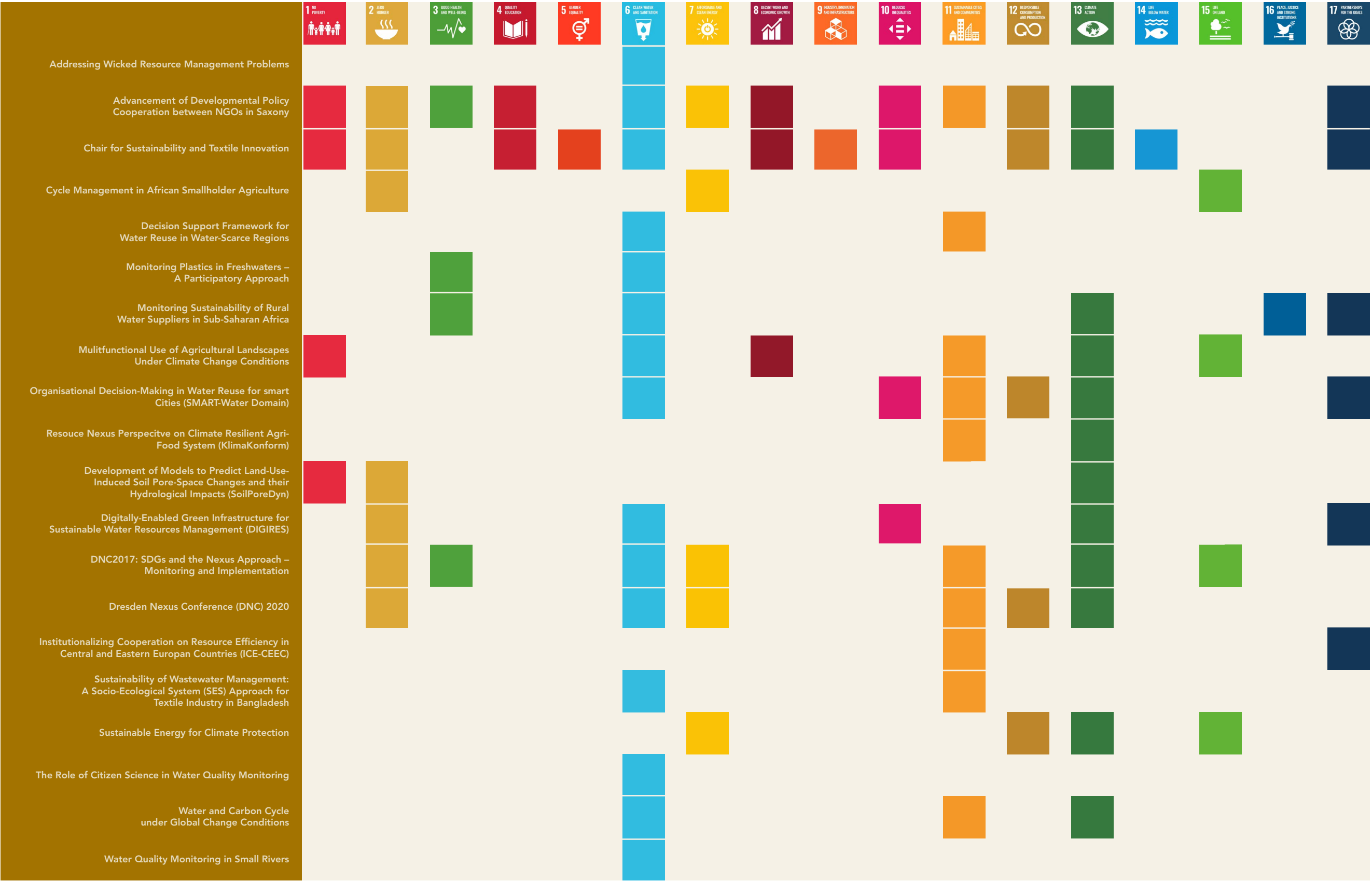
– Julia Hillmann and Prof. Edeltraud Guenther in **“Organizational Resilience: A Valuable Construct for Management Research?”** (2020) for *International Journal of Management Reviews*

In all of its work, UNU-FLORES advocates for open science and where possible publishes in open-access journals to allow unobstructed and free access to knowledge and data.

[View Publications](#)



# Aligning Our Research with the Sustainable Development Goals







## Resource Nexus and the SDGs

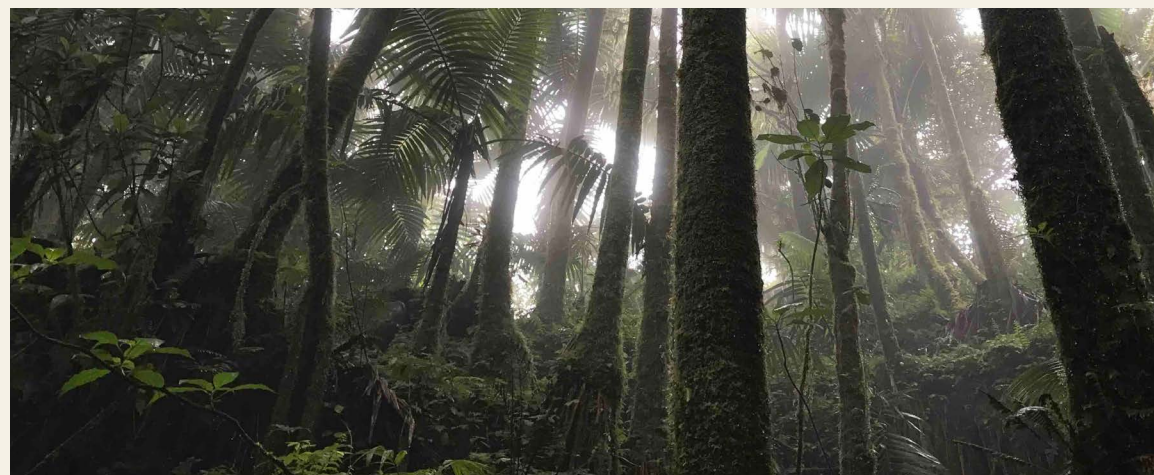
# RESOURCE NEXUS IN AGRI-FOOD AND FOREST SYSTEMS

The sustainable development of the agri-food industry and forest systems is vital to securing a prosperous future for society, the economy, and the environment. Conventional management methods have often overlooked the interconnectedness of resources. The negative consequences of which come to the fore when these systems are placed under stress – as the COVID-19 pandemic has unravelled – putting their resilience to the ultimate test. The projects at UNU-FLORES call for a more synergised perspective to better support sustainability across agriculture, food production, and supply chains.

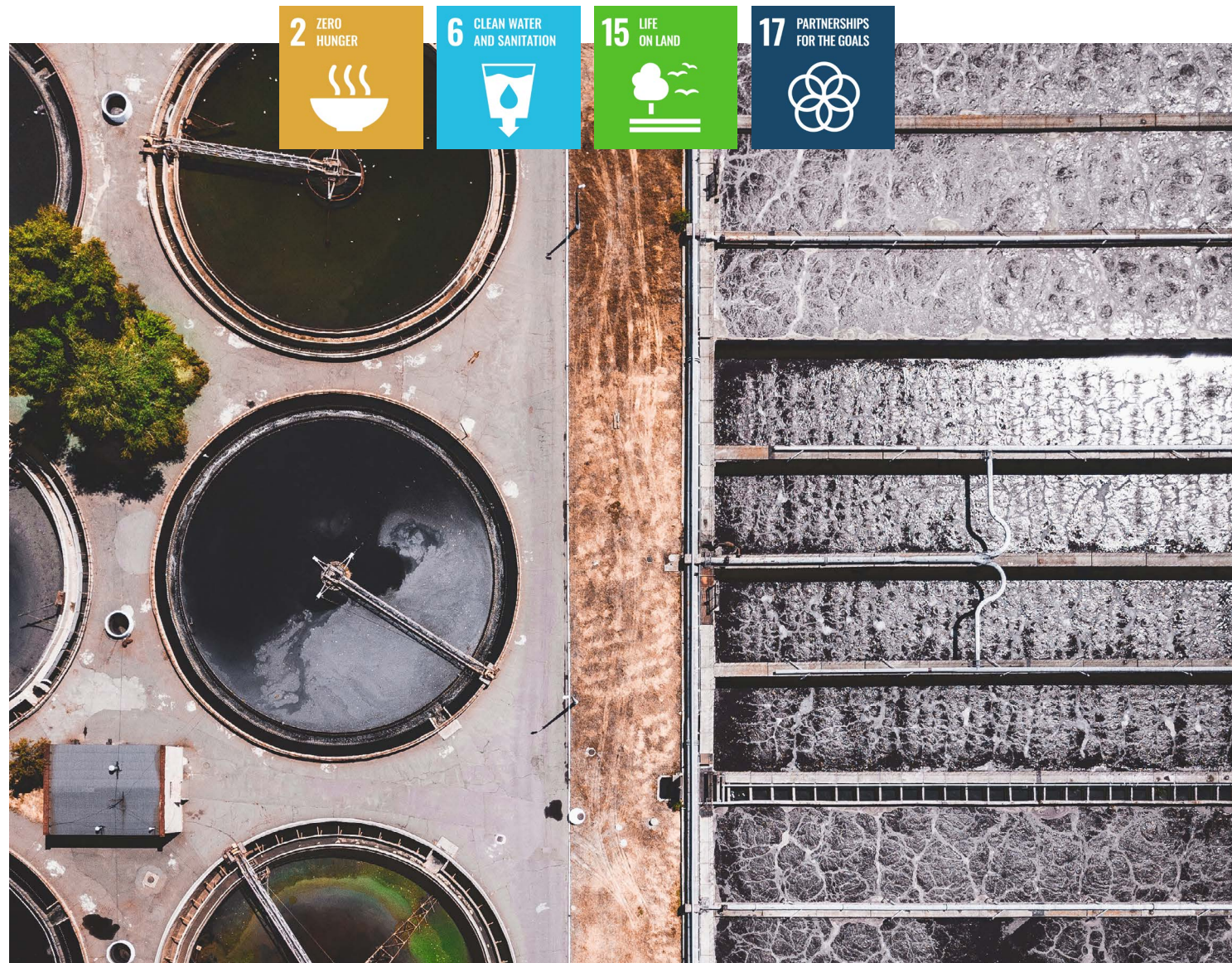
The project, [Resource Nexus Perspective on Climate Resilient Agri-Food System: Stakeholder Analysis, Land Management and Business Decisions \(KlimaKonform\)](#), promotes an integrative and action-oriented approach to empower the resilience of communities in adapting to climate change and to enhance land management and decision-making practices through designing decision support systems.

Dr Lulu Zhang's article ["Planting Trees Must Be Done With Care – It Can Create More Problems Than It Addresses"](#) in *The Conversation* explores the necessity of a holistic approach for sustainable land management to combat critical levels of resource depletion at the cost of another. For afforestation efforts to result in resilient ecosystems, it must consider water security while combating land degradation. This threat is also a focus of the study, **Multifunctional Use of Agricultural Landscapes Under Climate Change Conditions**, which aims to develop strategies for a multifunctional agricultural landscape that would both produce food and preserve precious environmental resources such as soil, water, and biodiversity – all of which are crucial for more resilient economic growth and rural life.

The UNU-FLORES book, [Waste Composting through Nexus Thinking: Practices, Policies, and Trends](#), considers the importance of organic waste as a valuable resource to food security. Nexus thinking provides a way forward to approaching the compost chain in an integrated manner – what would have otherwise been waste gets composted to feed into soil and agriculture health, thus promoting system resilience. The project, [Cycle Management in African Smallholder Agriculture](#), also contributes to increasing the multifunctionality of smallholder farming systems in East Africa, conserving soil and water-related ecosystem services, and integrating gender-inclusive decision-making. In so doing, it promotes resilience to climate change and fights loss of biodiversity and degradation of land, water, and vegetation and seeks to combat hunger, poverty, and gender-based inequality in smallholder agriculture.







## RESOURCE NEXUS IN THE CIRCULAR ECONOMY

The circular economy is a core component of the Resource Nexus as an integrated management concept for water, soil, waste, energy, and other geo-resources. Nexus thinking breaks down silos of knowledge through increased synergies and reduced trade-offs between sectors to help us close the loop.

UNU-FLORES is committed to expanding outreach on circular economy as part of the Resource Nexus, which featured as the theme of the 2020 [Dresden Nexus Conference](#) ("Circular Economy in a Sustainable Society"), as well as in the PhD project, [Sustainability of Wastewater Management: A Socio-Ecological System \(SES\) Approach for Textile Industry in Bangladesh](#), which addresses the socio-ecological system (SES) by studying factors influencing behaviours and policy to improve the practice and effectiveness of wastewater management in the textile industry. Circular economy and forging resilience in communities and particularly cities are also a major focus of the project, [Organisational Decision-Making in Water Reuse for Smart Cities \(SMART-WaterDomain\)](#), which aims to bridge the gap between the public and private sectors for smart urban water reuse.



## RESOURCE NEXUS IN CLIMATE CHANGE MITIGATION AND ADAPTATION

Climate change has affected and will continue to affect everyone on the planet in different ways. It has also resulted in disruption to national economies and can affect the quality, quantity, and reliability of many goods and services provided by natural resources.

The work of UNU-FLORES aims to advance the application of nexus-oriented climate mitigation and adaptation methodologies, knowledge and strategies towards green development, environmental protection, and adaptable supply chains and resource management.

The project, [Digitally-Enabled Green Infrastructure for Sustainable Water Resources Management \(DIGIRES\)](#), proposes managed aquifer recharge (MAR) as the replacement of traditional water infrastructure with resilient Nature-Based Solutions (NBS) to allow for more equitable water provisioning towards sustainable urban development.

To reduce smallholder dependence on fossil fuels in the palm oil industry amid increasing energy consumption and related greenhouse gas emissions in the Global South, the project, [Sustainable Energy for Climate Protection](#), seeks to integrate biowaste-based renewable energy in production processes to achieve a greener and more resilient economic development.

The [Water and Carbon Cycle under Global Change Conditions](#) project contributes to the adaptation and refinement of monitoring schemes by advancing knowledge on the coupling mechanisms between carbon and water cycles, and the response of carbon and water fluxes to climate variability and extremes, with the ultimate objective of balancing water supply and carbon sequestration ecosystem services for a more climate-resilient society.







# BIODIVERSITY AND THE RESOURCE NEXUS

Biodiversity is essential to the future of humanity and the world and is under threat. A Nexus Approach realises the vital linkages between conserving biodiversity and resources and offers the opportunity to find sustainable solutions to challenges, including climate change, deforestation, and anthropogenic pollution.

The importance of identifying this interrelatedness is detailed in Dr Serena Caucci, Dr Lulu Zhang, and Yein Kim's long-form article, ["To Lose Soil Biodiversity is to Lose Food"](#), which advocates for reconciliation between food production and biodiversity conservation and invites us to look at the biodiversity beneath our feet.

As the external and intrinsic values of biodiversity are perceived differently across societies and cultures, strong partnerships are needed to bring science, politics, and communities together to build resilience and empower them. UNU-FLORES Partnerships and Liaison Officer Dr Nora Adam discusses this in her article, ["On Partnerships and Collaborations: From Nature to Serve Nature"](#).



## RESOURCE NEXUS AT UNU-FLORES

The sustainable and wise treatment of natural resources form UNU-FLORES's core mission – in terms of research, partnerships, and daily office life. A drop of 98 per cent in **CO<sub>2</sub> travel emissions** in 2020 due to COVID-19 shows us the way to the future, where video conferencing in many cases would be an equal alternative to personal travel. With the appointment of a **Sustainability Coordinator**, UNU-FLORES now has even more capacity to promote and implement strategies for sustainability across sectors.

UNU-FLORES is also represented in several sustainability-related working groups across a range of geographic, political, and educational levels, such as the Deutsche Forschungsgemeinschaft (DFG) and the UN **"Greening the Blue"** campaign. UNU-FLORES has also been consulted regarding the Institute's floating office concept and the Green Office initiative at TU Dresden.







## Analytical Perspectives on the Resource Nexus

### DATA SCIENCE AND CITIZEN SCIENCE FOR THE RESOURCE NEXUS

The challenge in applying the Resource Nexus in information-poor environments may, in turn, affect decision-making. Improved access to disaggregate data and tools and the creation of robust monitoring frameworks can result in progress being adequately measured and facilitate governance processes.

In the frame of the study, [Development of Models to Predict Land-Use-Induced Soil Pore-Space Changes and their Hydrological Impacts \(SoilPoreDyn\)](#), UNU-FLORES and TU Dresden PhD Researchers looked at how agricultural management affects soil structure and how this might change the soil's ability to store and transmit water. The data collected helped simulate observed changes and improve hydrological models, informing [measures](#) in agriculture, forestry, and environmental and land-use management.



One means of addressing data challenges is through citizen science, essential in provoking sustainable change. Increased spatial and temporal data via citizen science can help enhance awareness-raising and policy impacts.

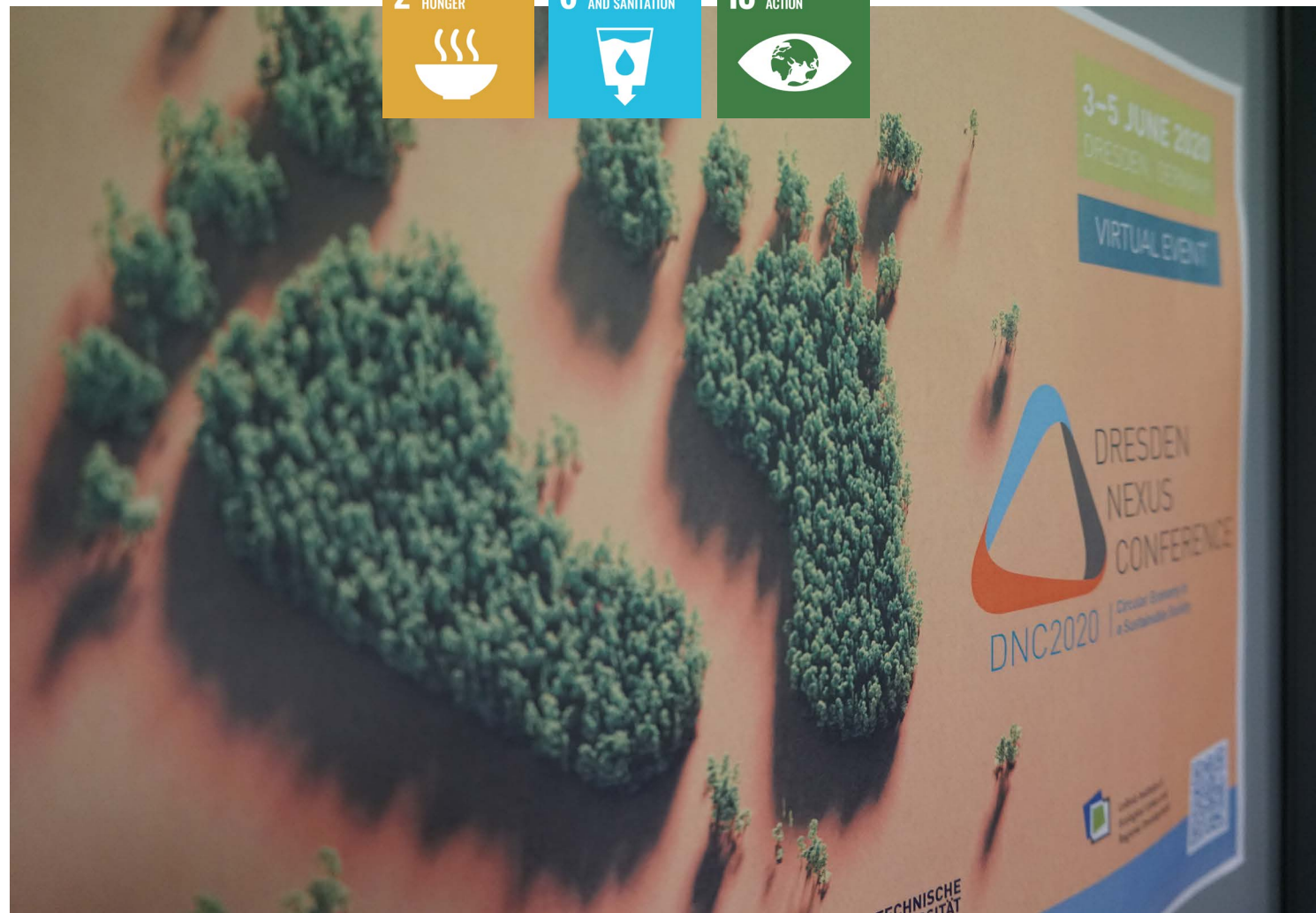
The project, [The Role of Citizen Science in Water Quality Monitoring](#), analyses the design and effects of citizen science in the field of water, for instance, after flood events. Research shows that citizen science goes well beyond the actual collection of data but also increases citizens' awareness of environmental problems, their learning about science and politics, as well as their networking and political engagement. As such, citizen science can also increase citizens' resilience regarding water quality changes in the context of extremes. The article, ["Success Factors for Citizen Science Projects in Water Quality Monitoring"](#) makes a case for involving citizens in data collection. At the [Citizen Science SDG Conference](#), Dr Sabrina Kirschke presented the results of a global survey promoting the value of communities in the creation of a sustainable and resilient society.

The project, [Water Quality Monitoring in Small Rivers](#), aims to develop and employ a reliable yet straightforward approach to optimise and quantify the WQM network's effectiveness in rivers. The assessment made in the article, ["Capacity Challenges in Water Quality Monitoring: Understanding the Role of Human Development"](#), can be used to help practitioners improve technical capacity development activities and to identify and target investment in capacity development for monitoring.

### GOVERNANCE FOR THE RESOURCE NEXUS

Resource management problems are often wicked because they include complex dynamics, conflicts, and informational uncertainties. Governance research at UNU-FLORES analyses which conditions and strategies facilitate the design and implementation of policies to strengthen resilience in these wicked problem territories – this is explored in the project, [Addressing Wicked Resource Management Problems](#).





# SUSTAINABILITY ASSESSMENT FOR THE RESOURCE NEXUS

Sustainability assessments promote research beyond the siloed biophysical-oriented view of a resource by involving all three dimensions, namely, social, economic, and environmental. This aligns with the comprehensive and holistic view proposed by the Resource Nexus perspective.

The project, [Decision Support Framework for Water Reuse in Water-Scarce Regions Involving Risk and Sustainability Assessments](#), aims to develop and test a decision support framework to evaluate the sustainability of water reuse as a water scarcity risk reduction measure. Based on a case study in Latin America, the results of this project will support societal decision-making for sustainable water (re)use in water-scarce regions. This project increases the resilience of communities by supporting risk reduction, considering coping capacities and adaptation.

The research project, [Monitoring Sustainability of Rural Water Supplies in Sub-Saharan Africa](#), also addresses water scarcity – namely the challenge of drought risk monitoring in Sub-Saharan Africa – by examining the potential of using water points as a source of data for monitoring the resilience and sustainability of rural water sources.

UNU-FLORES also actively contributed to the 2020 **World Toilet Day** by working together with local and international partners to address sanitation problems worldwide. Dr Serena Caucci took the opportunity to promote this important topic by presenting her research pitch at the webinar [Making the World Open Defecation Free: Possibility or Dream?](#), organised by UNU-MERIT in collaboration with Friend In Need India.

Effective and lasting partnerships are key to supporting resilient communities and promoting good governance. The project, [Advancement of Developmental Policy Cooperation between NGOs in Saxony, involving the Entwicklungspolitischen Netzwerks Sachsen e.V.](#), developed a study to understand the structure and content of the current engagement of non-governmental organisations (NGOs) in the Free State of Saxony in Germany in international development cooperation. The analysis indicates the challenges and opportunities to foster international development cooperation efforts of these NGOs.

Events are also indispensable to bring together a range of stakeholders for governance-related issues and discussions. Dr Sabrina Kirschke presented at both the 'Governance of Water Quality Protection' and the 'Transitions in Agriculture: Designing Policies for Sustainability and Quality' sessions at the [ECPR General Conference](#).

The highlight of the UNU-FLORES event calendar was the [Dresden Nexus Conference 2020 \(3–5 June\)](#), the organisation of which displayed great resilience in the face of the COVID-19 pandemic. Co-organised with TU Dresden and the Leibniz Institute of Ecological Urban and Regional Development (IOER), the conference took place in a new virtual format to promote inclusivity and accessibility. It created dialogue on nexus thinking to foster research and capacity development on the theme "Circular Economy in a Sustainable Society". With more than 1,200 people – 22 per cent of whom were from developing countries – from around 100 countries registering for the conference, DNC2020 played a role in accelerating the transition to a more sustainable economy by drawing attention to the concepts that nexus thinking offers in support of the transition towards a circular economy through the 13 sessions held over three days. Not only was DNC2020 more inclusive for participants, but this edition also featured a wide-ranging line-up of experts from academia to policy and business.







## BARRIERS FOR THE RESOURCE NEXUS

The multifaceted nature of the Resource Nexus can result in barriers to its implementation. Therefore, promoting and developing an in-depth understanding of this approach is vital to overcoming this obstacle.

Research at UNU-FLORES aims to identify and address the challenges in implementing the Resource Nexus under different social, economic, political, technical, and environmental contexts and strengthen understanding of its complexity, thereby advancing meaningful and comprehensive resources nexus-related research.

In her [op-ed for the Frankfurter Allgemeine Zeitung](#), Prof. Edeltraud Guenther detailed the interdependence of the environment and the economy – and a way forward in addressing the challenges associated with fostering this relationship.



## HEALTH IN THE RESOURCE NEXUS

Understanding the complex interlinkages and interdependencies among climate change, ecosystems, and human health are essential to effectively plan adaptation responses against the accumulation of emerging contaminants and antibiotics that have not yet been considered in water treatment programmes nor monitored in different environmental compartments.

As a transformative approach, the Resource Nexus can be applied to address the multiple paths to sustainable and resilient socio-ecological systems. This enhanced coordination and collaboration among international development partners and diverse stakeholders can help better identify priority areas for intervention to ensure mutual socio-ecological co-benefits and reduce the negative impacts on ecosystem services. An example of the importance of a Nexus Approach to health is outlined in the chapter, [“Organic Waste Composting Through Nexus Thinking: Linking Soil and Waste as a Substantial Contribution to Sustainable Development”](#) of the UNU-FLORES book entitled [Organic Waste Composting through Nexus Thinking](#).

As we have all witnessed, the effect of the COVID-19 pandemic on global health is vast and indisputable. The experts at UNU-FLORES responded to this unprecedented event by addressing its impact on resource use and voiced their recommendations – see [Dr Serena Caucci in her interview with Channel News Asia](#).







# RESOURCE NEXUS IN TRANSFORMATION REGIONS

The research programme, **Resource Nexus for Regions in Transformation**, aims to develop and assess strategies to implement Resource Nexus perspectives in regions undergoing significant changes.

The project, **Institutionalizing Cooperation on Resource Efficiency in Central and Eastern European Countries (ICE-CEEC)**, focused on the establishment of successful cooperation between CEE countries to develop resilient and collaborative strategies across education, science, and research in the fields of sustainable use and integrated management of environmental resources and climate change. The resulting consortium partners benefitted from intense knowledge exchange and proposal development, with a view to working together to support decision makers and institutions alike in building a low-carbon, greener future to ensure water, energy, and food security in the long term.

UNU-FLORES's contribution to the post-mining rejuvenation of the Lusatia region is steadily progressing, with a tree-planting initiative in the Saxon city of Weisswasser and contributing to the Development Strategy for Lusatia. The involvement of the Institute in this critical project will aid in building the resilience of these communities as they enter a new and greener era.

**"Achieving SDG 6 requires us to go one step further — to move from data to action. Making this step is easier said than done and requires mostly one thing: courage."**

- Dr Sabrina Kirschke in *One Earth's Voices* on **"Moving from Data to Action' in Decade of Action on SDG 6"**



**"Regions in transformation are characterised by changes that significantly alter their socioeconomic or natural environment. The Resource Nexus guides inter- and transdisciplinary research for sustainable development from both a policy and capacity development perspective."**

- Prof. Daniel Karthe, Head of Research Programme – Resource Nexus for Regions in Transformation



# EDUCATION & CAPACITY BUILDING



Three candidates defended their PhD theses virtually in 2020.



## Graduate & Postgraduate Training

Water, soil, waste, energy, and other geo-resources and their sustainable management are of concern to the United Nations and its Member States, particularly in developing and emerging countries. UNU-FLORES is dedicated to developing future scientists and leaders on integrated resources management. The successful implementation of the **Joint PhD programme** is one of the best examples of such endeavours. Established by UNU-FLORES and jointly offered with TU Dresden, the programme provides a unique working environment to early-career scientists with an extensive research network at all levels and connections to national and international institutions and the UN System. Countries in the Global South will benefit from a new generation of environmental scientists, engineers, and managers, who will apply the Resource Nexus approach to the sustainable management of environmental resources after undergoing training through the courses, seminars, PhD symposia, and workshops developed at UNU-FLORES.

### › View Doctoral Programmes

In 2020, UNU-FLORES had the privilege to further expand the collaboration with TU Dresden in research and education by establishing a **Joint Junior Researcher Programme (JJRP)**. The programme aims to develop scientific cooperation with all faculties at TU Dresden that have a thematic relation to the Resource Nexus. Within the JJRP, graduate and postgraduate students at TU Dresden have the opportunity to undertake research for a **master's thesis** or a **doctoral dissertation** on the Resource Nexus under the guidance of experts at **TU Dresden** and **UNU-FLORES**. In addition to the JJRP, UNU-FLORES envisions strengthening collaboration with the Global South by offering a Master's Thesis Opportunity to graduate students enrolled at a university other than TU Dresden.

### › View Master's Thesis Opportunity

Despite the challenges posed by a global pandemic in 2020, we proudly celebrated **three graduations** from the Joint PhD Programme:

- Janis Kreiselmeier (Germany)
- Parvathy Chandrasekhar (India)
- Thuy Hoang Nguyen (Vietnam)

This brings the PhD Programme to a total of **seven graduates** since its implementation in 2015. While seeing our young scientists take the exciting first steps towards their new careers, UNU-FLORES had the privilege of welcoming **four new PhD Researchers** to our doctoral programmes:

- Kamol Gomes (Bangladesh)
- Shadrack Stephene Achilla (Tanzania)
- Isabella Georgiou (Greece)
- Isabela de Paula Salgado (Brazil)

In December 2020, the DAAD selection committee of the **Graduate School Scholarship Programme (GSSP)** recognised our joint application with TU Dresden. UNU-FLORES and TU Dresden have been awarded up to **four DAAD-funded doctoral fellowships** for two consecutive years (2021 and 2022) for international students.

## Visiting Scholar Programme

The Visiting Scholar programme targets young graduates and mid-career professionals who wish to develop and pursue their research ideas at UNU-FLORES. Typically, Visiting Scholars can be affiliated with UNU-FLORES for up to twelve months. In 2020, three researchers started their journey with us. Their research topics are:

- Sustainable Energy for Climate Protection
- Integrated Legal Framework to Fight Plastic Pollution and Prevent Antimicrobial Resistance Spread in Waters: A Nexus Approach
- Sustainable Entrepreneurship to Leverage Water Reuse in Agriculture: Business Case and Policy Implications for Circular Economy at Various Scales

These research partnerships have been made possible by the Alexander von **Humboldt Foundation** and the **Green Talents Programme** of the **German Federal Ministry of Education and Research (BMBF)**.

### › View the Visiting Scholar Programme



**Luisa Cortat** (Brazil)  
Green Talents Awardee



**Dr Kelechi Anyaoha** (Nigeria)  
Alexander von Humboldt Climate Fellow

# Bringing Together Early-Career Scientists Across Different Nations



**Janis Kreiselmeier (Germany)**

Temporal Changes in the Soil Pore Size Distribution and Variability of Soil Hydraulic Properties under Long-term Conventional and Conservation Tillage

💰 Funded by DFG

Supervisor at UNU-FLORES: Dr Kai Schwaerzel  
Supervisor at TU Dresden: Prof. Karl-Heinz Feger



**Anika Reetsch (Germany)**

Integration of Organic Waste into the Biomass Production of Smallholder Farming Systems in Kagera-Region, Tanzania

💰 Funded by Heinrich Böll Stiftung

Supervisor at UNU-FLORES: Dr Kai Schwaerzel  
Supervisors at TU Dresden: Prof. Karl-Heinz Feger,  
Prof. Christina Dornack, Prof. Gerald Kapp



**Isabella Georgiou (Greece)**

Assessing the Sustainability and Opportunities of Urban Water Reuse in the Industrial Sector Under a Public-Private Partnership

💰 Funded by BMBF

Supervisor at TU Dresden: Prof. Peter Krebs, Dr Jonathan Morris  
Supervisor at UNU-FLORES: Dr Serena Caucci



**Parvathy Chandrasekhar (India)**

Predicting Land-use Induced Soil Pore Space Changes and Their Hydrological Impacts

💰 Funded by DFG

Supervisor at UNU-FLORES: Dr Kai Schwaerzel  
Supervisor at TU Dresden: Prof. Karl-Heinz Feger



**Kamol Gomes (Bangladesh)**

Sustainability of Wastewater Management: A Socio-Ecological System (SES) Approach for Textile Industry in Bangladesh

💰 Funded by KAAD

Supervisor at UNU-FLORES: Prof. Dr. Edeltraud Günther  
Supervisor at TU Dresden: Prof. Jürgen Pretzsch,  
Prof. Judith Miggelbrink



**Thuy Nguyen (Viet Nam)**

Optimisation of Water Quality Monitoring Network Design Considering Compliance Criterion and Trade-offs between Monitoring Information and Costs

💰 Funded by DAAD

Supervisor at UNU-FLORES: Prof. Hiroshan Hettiarachchi  
Supervisor at TU Dresden: Prof. Peter Krebs



**Andrea Müller (Chile/Germany)**

Decision Support Framework for Water Reuse in Water-Scarce Regions Involving Risk and Sustainability Assessments

💰 Funded by ANID Chile

Supervisor at UNU-FLORES: Dr Tamara Avellán  
Supervisor at TU Dresden: Prof. Jochen Schanze



**Isabela de Paula Salgado (Brazil)**

Analysis and Evaluation of the Sustainability and Resilience of Novel Mineral-Bonded Composites

💰 Funded by DFG

Supervisor at UNU-FLORES: Prof. Edeltraud Günther  
Supervisor at TU Dresden: Prof. Viktor Mechtcherine



**Shadrack Stephene Achilla (Tanzania)**

Effects of Agricultural Land-Use Intensification Patterns and Dynamics on Ecosystem Services Provision along the Altitudinal Gradient in the Watershed Area

💰 Funded by SMEKUL

Supervisor at UNU-FLORES: Dr Lulu Zhang  
Supervisor at TU Dresden: Prof. Karl-Heinz Feger



**Sekela Twisa (Tanzania)**

Sustainability of Rural Water Supply in Sub-Saharan Africa: GIT Bases Studies in East-Central Tanzania

💰 Funded by Ministry of Water of Tanzania

Supervisor at UNU-FLORES: Dr Mathew Kurian  
Supervisor at TU Dresden: Prof. Manfred Buchroithner



# Internship Programme



Natchiyar Balasubramamian (India), Research Intern



Yein Kim (Korea), Research Intern



Ametus Kuuwill (Ghana), Research Intern



Dahye Lee (Korea), Intern at the Office of the Director



Muqheet Iqbal (Pakistan), Research Intern



Ying Liu (China), Intern at the Office of the Director

The UNU-FLORES internship programme's overarching aim is to create a dynamic, challenging, and rewarding experience for students and recent graduates. COVID-19 was a challenge, but interns stayed resilient and managed their work remotely. Despite this challenge, their dedication to gain new skills still allowed them to have practical experience in various areas from academic research, human resources, communications and advocacy, and

administration. The internship programme was a brilliant success in 2020, with UNU-FLORES hosting **29 interns**. A new training series was begun, and several interns had the chance to participate in a “Protocol and Diplomacy” training. The internship programme has been adapted and will now have both in-person and remote interns, which will allow for greater inclusivity and diversity of interns at the Institute. [View the Internship Programme](#)

**“Learning about science and policy in a multicultural environment is my favourite part of being at UNU-FLORES.”**  
– Muqheet Iqbal (Pakistan), Research Intern

**“The series of presentations as part of the internship programme helped me to build personal confidence, crucial for success in any organisation.”**  
– Ametus Kuuwill (Ghana), Research Intern

**“UNU-FLORES’s innovative approach to the management of environmental resources – the Nexus Approach – appeals to me.”**  
– Ying Liu (China), Intern at the Office of the Director

**“The research team works on state-of-the-art policy concepts and creates great learning opportunities for students.”**  
– Natchiyar Balasubramamian (India), Research Intern



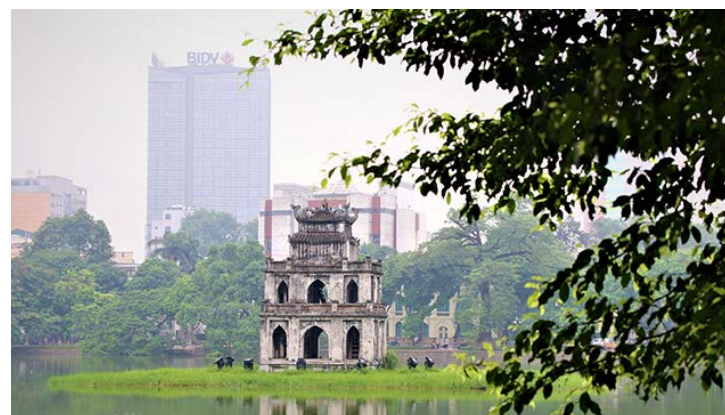
## Nexus Seminar Series



The [Nexus Seminar Series](#), in collaboration with TU Dresden, through the [PRISMA – Centre for Sustainability Assessment and Policy](#), strengthens knowledge on the Resource Nexus and reinforces an integrative approach towards the Sustainable Development Goals in their social, ecological, and economic dimensions. The Nexus Seminars also serve as a platform for networking and for discussing current research with a broader audience.

Seven seminars in 2020 highlighted various dimensions of research on the Nexus Approach, ranging from hands-on implementation strategies to theoretical debates. The Nexus Seminar Series forms the foundation for UNU-FLORES's contribution towards teaching at **TU Dresden** and the **Centre for International Studies (ZIS)** through ad hoc modules on the Resource Nexus.

[› View the Full Series](#)



## Capacity Building



Promoting higher education:  
[Chair for Sustainability and Textile Innovation project](#)

in Bangladesh, the project seeks to revise and improve the curricula, teaching methods and material, and the quality of research at AUST. This project is part of Engelbert Strauss' sustainability activities in Bangladesh, where the clothing manufacturer and retailer aims to promote the quality of higher education by enhancing local skill sets with regard to social responsibility, environmental protection, and technical innovation in the country.

The **International Water Colloquium**, organised by **UNU-FLORES**, together with the **University of Bonn** and **TU Dresden**, addressed the topic **"Cooperation in Water Management – Tackling a Global Challenge"**. UN institutions, alongside their local partners, shared their experiences about collaborative water-related projects and activities, highlighting the need for cooperation within water management. The weekly series that ran from 4 November to 16 December 2020 aimed to foster collective knowledge development and further possibilities for cooperation. In this current time of uncertainties and disruptive changes, collaboration and cooperation are key for conducting successful joint research projects to create a positive impact in the world. The lecture series underlines this with a range of **best-practice case studies** in a variety of fields.

[› Relive the Colloquium](#)



[The International Water Colloquium brought scientists and practitioners into dialogue](#)





# ADVOCACY

To facilitate efforts in supporting change and policy development based on science for sustainable development, UNU-FLORES strives to disseminate its research at strategic occasions. In 2020, although having to take most of its events into a virtual format, UNU-FLORES successfully (co-)organised **29 events**, reaching out to over **2,200 delegates** both locally and internationally. These events include conferences, symposia, seminars, workshops, and lectures.

## Events in the Region

An established annual event for people in and around Dresden is **UN Day**, in 2020 made even more special as it was also a celebration of 75 years of the United Nations. Since 2015, UNU-FLORES has joined forces with local partners (the United Nations Association for Germany – for Saxony, Saxony-Anhalt and Thuringia e.V., City of Dresden, Lokale Agenda 21 für Dresden e.V., UNICEF Working Group Dresden, Lions Club Dresden Agenda 21, and Technische Universität Dresden) to engage with the local and regional population and discuss key UN issues and their significance in the daily lives of the local community. UN Day Dresden 2020 drew public attention to the concluding UN Decade on Biodiversity.

The event, **Platform in Support of Coal Regions in Transition: Sharing Experiences from Germany**, co-organised by UNU-FLORES, World Bank, and the European Commission Directorate-General for Energy, underscored our commitment to the region. In this workshop, experiences of German coal mining regions' transformation ranging from national strategies to their regional (State of Saxony) and local (Central German Metropolitan Region) implementation were exchanged. The target group involves 250 stakeholders from the West Balkans and Ukraine, including policymakers, managers, scientists, and civil society representatives.

In collaboration with TU Dresden, the UNU-FLORES project team, led by **Dr Nora Adam** (Partnerships and Liaison Officer) and **Atiqah Fairuz Salleh** (Communications and Advocacy Lead), convinced an expert panel with their proposal to increase the awareness of biodiversity through a public dialogue series in Saxony. The Saxon State Ministry for Energy, Climate Protection, Environment and Agriculture (SMEKUL) awarded the team the **eku Future Prize for Energy, Climate, Environment in Saxony**.



## In Service to the United Nations

In conjunction with **World Water Day 2020**, UN-Water, with the collaboration of UN entities and international partners, released the annual **World Water Development Report (WWDR)** that focuses on different strategic water issues every year. In the 2020 edition, UNU-FLORES experts – Dr Tamara Avellán, **Dr Serena Caucci**, **Prof. Edeltraud Guenther**, Angela Hahn, Dr Stephan Huelsmann, **Dr Sabrina Julie Kirschke**, and **Dr Lulu Zhang** – contributed to seven chapters (3, 4, 5, 6, 7, 9, and 11) in the edition on "Water and Climate Change".

UNU-FLORES contributed to the **High-Level Committee on Programmes (HLCP)** task team on "A Common UN Approach on Biodiversity" to integrate biodiversity and nature-based solutions into the UN's policy and programme planning and delivery. The Institute also provided inputs to the 40th Session of the HLCP, Agenda Item VI — Biodiversity & Nature-based Solutions for Sustainable Development that took place on 1 and 14 October 2020.

Plastics in freshwater is of increasing concern to the public, given their potential negative impact on socio-ecological systems. At the same time, plastic monitoring is a rather fresh topic in the field of water quality monitoring, and hardly any globally applicable standards for monitoring plastics in freshwaters exist. Against this background, UN Environment and the Helmholtz-Centre for Environmental Research (UFZ) aim at providing harmonised monitoring methodologies of macro-plastics and microplastics in rivers and lakes. The ultimate goal is to reduce and prevent marine litter and microplastics pollution from rivers in the future. However, the implementation of such guidelines depends on the goals and capacities of States with regards to water quality monitoring. The project **Monitoring Plastics in Freshwaters – A Participatory Approach** supports the goals of UN Environment and UFZ by organising the involvement of stakeholders in the development of recommendations for plastic monitoring.

On **World Environment Day**, UNU-FLORES, together with UNU-INWEH, launched a **UN-Water Analytical Brief** on unconventional water resources at DNC2020.



## Digital Media

The Institute enhanced its digital footprint through the website and relevant social media platforms by, among others, participating in UN-wide campaigns and producing more high-quality audiovisual products. For the first time since its establishment, the 2019 Annual Report took on an entirely digital – hence environmentally friendly – format. Other publications authored by UNU-FLORES researchers have also increasingly adopted the digital approach. Visualised scientific content increases the level of engagement among UNU-FLORES's target audiences and thus boosts the potential policy impact of research. UNU-FLORES's vibrant presence on **Twitter**, **Facebook**, **LinkedIn**, and **YouTube** extended to **Instagram** in early 2020, provides the Institute with further tools and a larger audience to drive traffic to our researchers' valuable work. We intend to continue this path and constantly assess new and innovative means of science communications.





Prof. Guenther visited the Saxon State Ministry for Science, Culture and Tourism (SMWK) and met with State Minister Sebastian Gemkow

## PARTNERS & NETWORKING

In 2020, UNU-FLORES **strengthened collaboration and expanded partnerships**. Main efforts focused on deepening cooperation with UN entities.

At the local level, UNU-FLORES signed a Memorandum of Understanding (MoU) with the **Johann Heinrich von Thünen Institute** on research cooperation in forestry and agriculture and renewed its Cooperation Agreements with two other key players in the scientific landscape in Saxony: the **Helmholtz Center for Environmental Research (UFZ)** and the **Leibniz Institute for Ecological Urban and Regional Development (IOER)**. Further, in collaboration with the **Saxon State Ministry for Regional Development (SMR)** and the **Institute of Process Engineering and Environmental Technology of TU Dresden**, UNU-FLORES organised a virtual "Workshop on Transition in Mining" as a side event of the Dresden Nexus Conference (DNC2020). Apart from **intensifying donor relations** in Saxony and Germany, the workshop led to close collaborations with the **World Bank Group** and the **Secretariat of the European Commission's Platform for Coal Regions in Transition**.

Internationally, UNU-FLORES strengthened and expanded collaborations with the **Global Change Research Institute of the Czech Academy of Sciences (CzechGlobe)** and the **Saxon State Ministry for Science, Culture and Tourism (SMWK)** with the funding of three PhD positions within the Joint PhD Programme on the topic "Resource Nexus Issues Revealed by COVID-19 for Professional Communities in the Agri-Food Supply Chain". This agreement contributes to **responsive research** at UNU-FLORES and strengthens the scientific ties between the Czech Republic and Germany. Moreover, UNU-FLORES partnered with the **Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)** for the development of two research projects: one in Namibia related to biodiversity economy in close collaboration with **Namibia University of Science and Technology Biodiversity Research Center (NUST BRC)**, and the other in Bangladesh on textile sustainability in partnership with **Ahsanullah University of Science and Technology (AUST)**.

Within the UN ecosystem, UNU-FLORES collaborated on the activities of the **UNU Water Network** and strengthened its partnership with the **UN Environment Management Group (EMG)**. Additionally, a collaboration with **UNIDO** resulted in funding for a PhD position to investigate the barriers to innovations related to water, soil, waste, and energy in Sub-Saharan Africa.



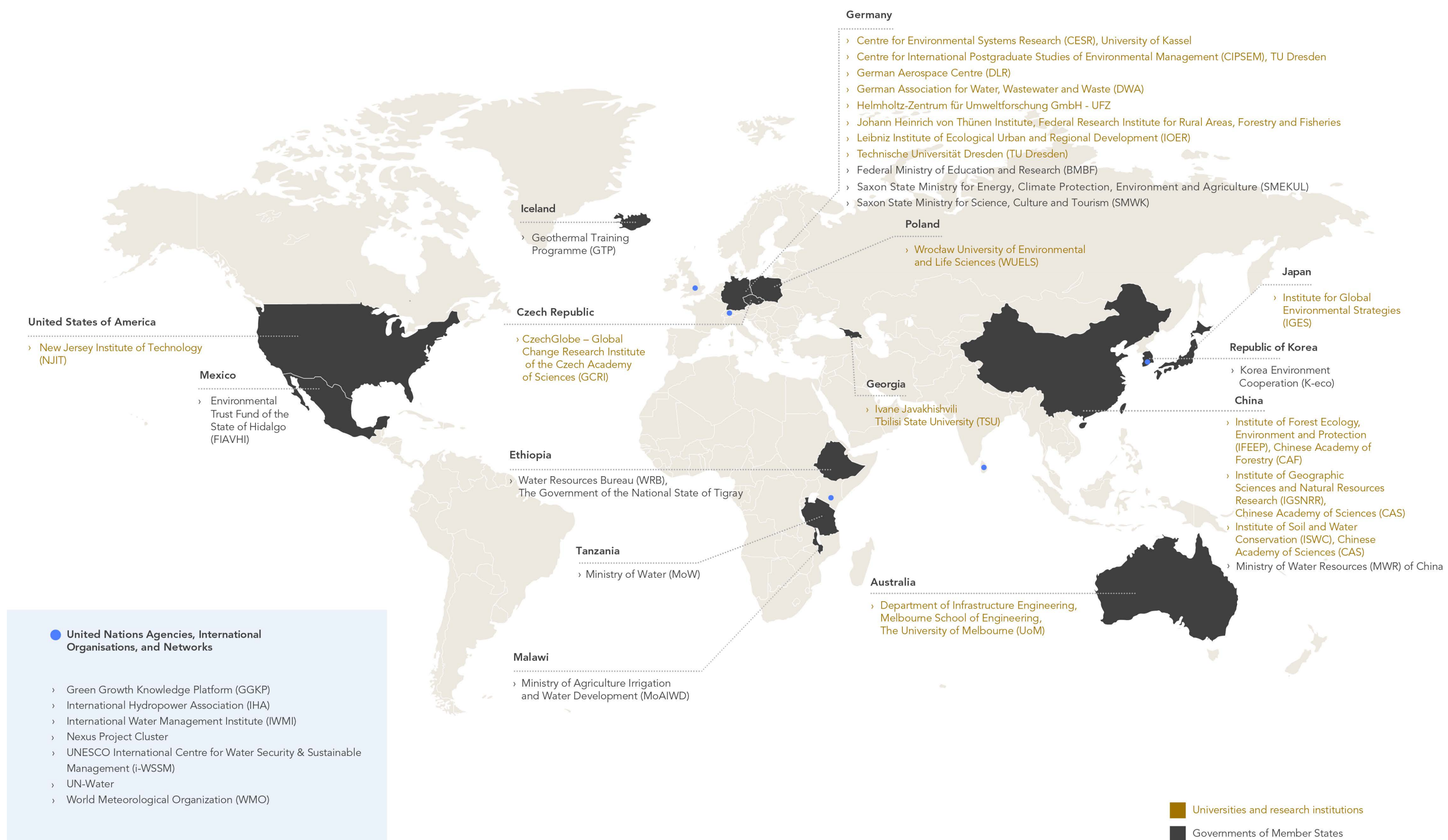
UNU-FLORES and IOER renew Cooperation Agreement



Prof. Guenther, Saxon State Minister Sebastian Gemkow, and CzechGlobe Director Michal V. Marek sign funding agreement for three PhD positions



# Working Together with Stakeholders Worldwide





# RESOURCES

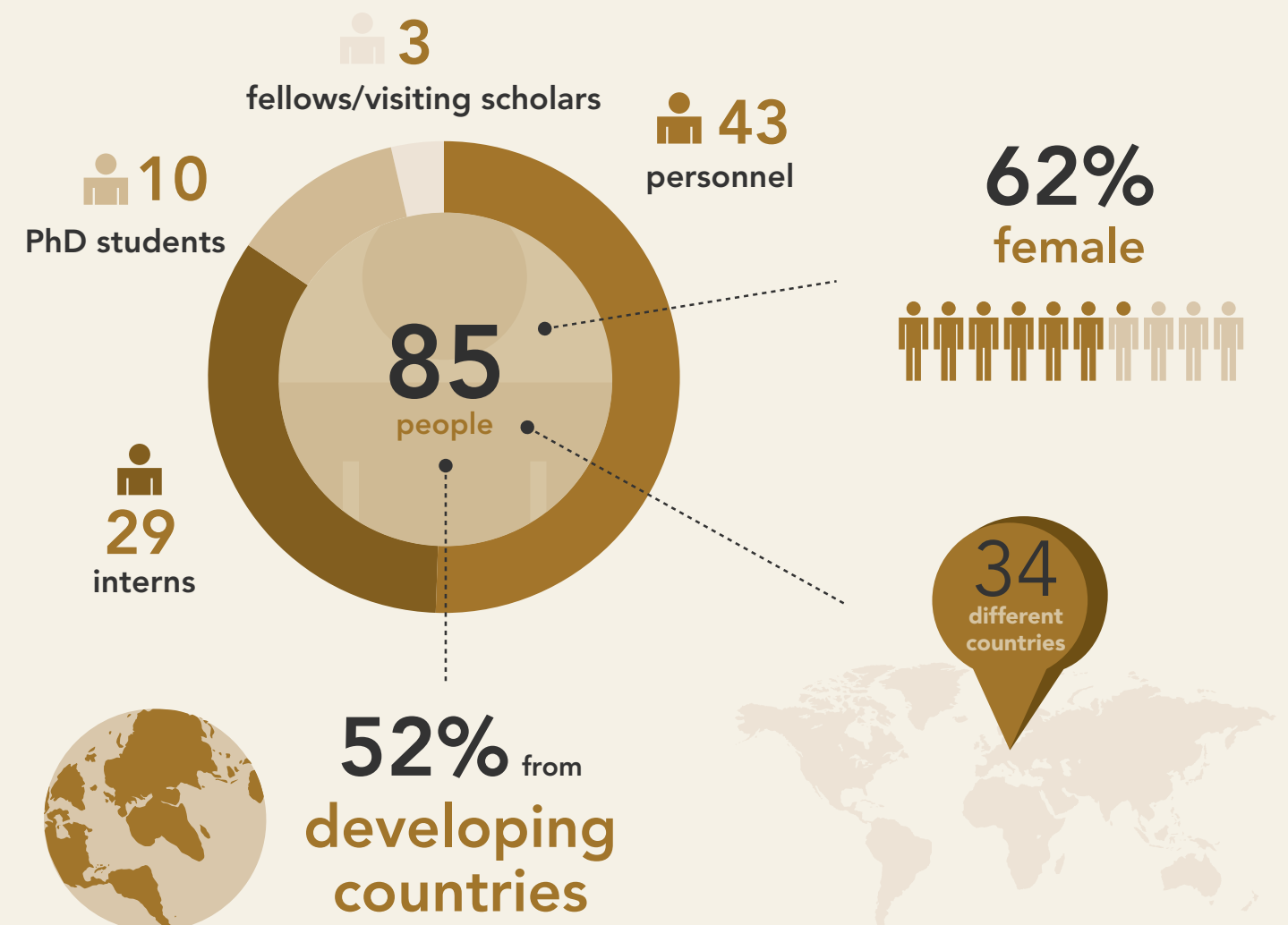
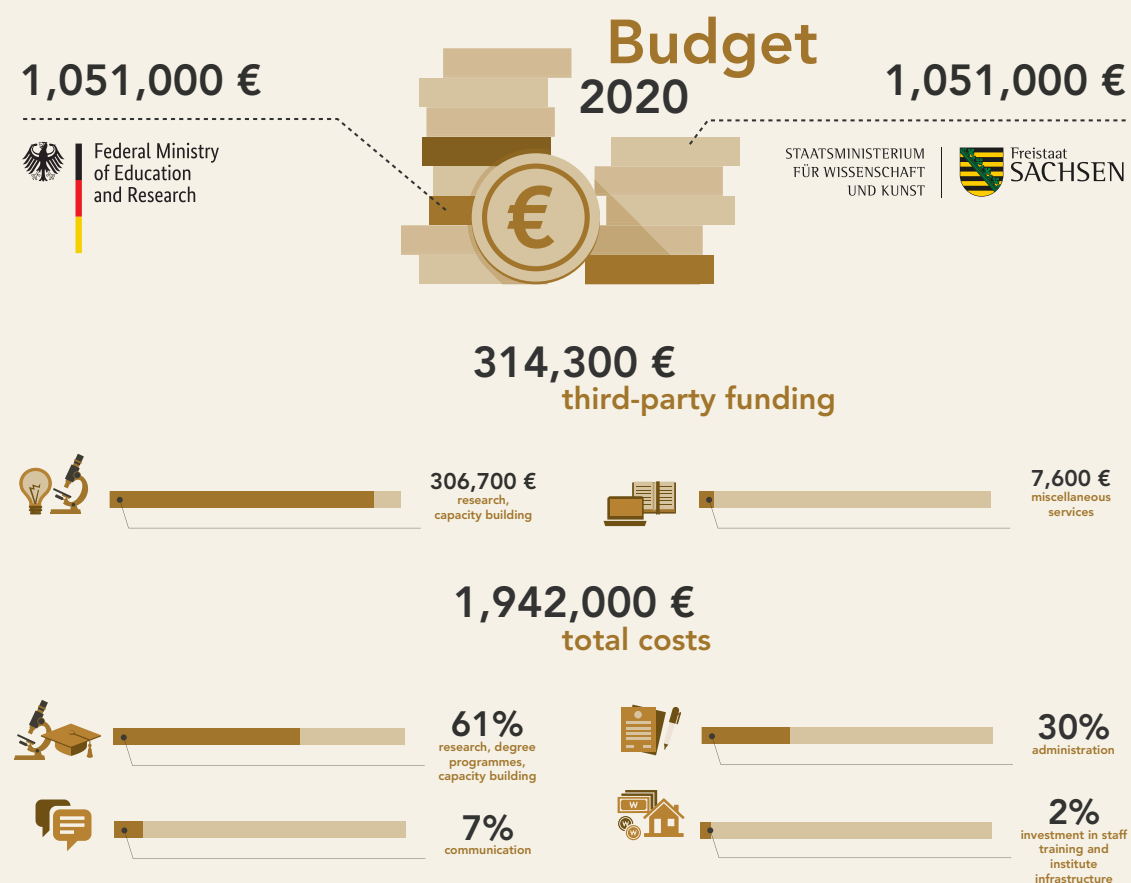
## Budget & Finance

UNU-FLORES is financed solely by voluntary contributions from governments, foundations, agencies, and other sources. The Institute does not receive any funds from the regular UN budget.

The Institute's core budget is financed by the **German Federal Ministry of Education and Research (BMBF)** and the **State Ministry for Science, Culture and Tourism (SMWK)** of the **Free State of Saxony**. BMBF and SMWK committed EUR 1,051,000 each to the 2020 budget of UNU-FLORES through cash and in-kind contributions.

In 2020, the Institute succeeded in securing funding from third parties amounting to approximately EUR 314,300, including around EUR 306,700 for research and capacity building projects and around EUR 7,600 for providing miscellaneous services, such as advisory, editorial, and IT hosting services. Besides the actual cash collection for third-party funded projects, UNU-FLORES signed project-related agreements in 2020 with total funding of EUR 633,800 in ten projects. FLORES through cash and in-kind contributions.

All income contributes to diverse academic and institutional activities, while the Institute aims to maximise academic activities and keep administrative costs within budget. The total expenses in 2020 add up to approximately EUR 1,942,000. The majority of expenses incurred were from **research, degree programmes, and capacity building**, with a share of about 61 per cent. Approximately 30 per cent of the costs were related to administrative expenses, such as office rent, utilities, and the Institute's administration. Around 7 per cent of the total expenses related to **communications** costs, promoting the Institute and its activities. The investment in new **equipment and staff members' training** added up to approximately 2 per cent in 2020.





# Human Capital

2020 has been a challenging year globally. However, it was also marked by positive changes and inspiring challenges for human capital at UNU-FLORES.

Several new team members joined the Institute: the strategic decision to introduce Nexus Research Programmes on the integrated management of environmental resources saw the hiring of the **Head of Research Programme for the Resource Nexus for Regions in Transformation**. Furthermore, the Institute filled **three core functions**: new colleagues started at the Office of the Director, the Communications and Advocacy team, and the Partnerships and Liaison team. Furthermore, we filled **two newly created third-party funded positions** related to research project coordination. Finally, we are also delighted to welcome **four PhD Researchers** to the Institute.

In 2020, we also said goodbye to former colleagues. We celebrated the **graduation of three PhD Researchers** and two employees separated during the past year to pursue new career opportunities outside of UNU. Following successful fundraising efforts, UNU-FLORES succeeded in securing funds for six new PhD Researchers.

In addition to the Visiting Scholar programme, UNU-FLORES introduced a **new opportunity as an Adjunct Researcher/Professor**. This opportunity targets senior scientists to collaborate on joint projects and contribute their expertise to the Resource Nexus topics.

Effective 1 January 2020, UNU-FLORES introduced a **new pay scale for Personnel Service Agreement contracts** based on the UN salary scales applicable for Germany. This development was an important milestone for UNU-FLORES to remain an inclusive and transparent workplace.

When the COVID-19 pandemic hit Germany with the first lockdown in March 2020, UNU-FLORES was well prepared to extend the existing **Flexible Working Arrangements (FWA)**. Consequently, we have been able to address the disruptive event quickly and to remain fully operational. The pandemic has created a new normal, and our experience with the home office has been a resounding success. While we look forward to returning to the office in the future, we continue to support all team members to adapt to this new reality. In 2020, we also strongly focused on **healthy work environment** measures and supporting a healthy work- and private-life balance. UNU-FLORES promotes core values such as trust, transparency, tolerance of failure, and de-escalation in all our activities. The Institute is developing a **modern work culture** to ensure that we can continue to grow, adapt, and succeed. To positively impact our work, we are currently developing a floating office concept, conducting yearly UN Leadership dialogues, organising training for all team members, offering personal development training, and conducting regular Employee Engagement surveys and activities.

[› View the Staff](#)

## Advisory Committee

The **Advisory Committee** (AC) of UNU-FLORES convenes once a year for an update on the Institute's activities and to provide guidance and advice accordingly. In 2020, the annual session took place entirely online. 2020 saw the appointment of Prof. Wim van Vierssen as the new Chair and Prof. Joseph Alcamo as the newest member of the Institute's AC. The Committee comprises a diverse group of four renowned scientists:

- Prof. Wim van Vierssen (Netherlands) (Chair)
- Prof. Karl-Heinz Feger (Germany)
- Prof. Bancy Mati (Kenya)
- Prof. Joseph Alcamo (USA)

Prof. Wim van Vierssen chaired the **seventh annual session** of the AC on 8 June 2020, with the attendance of UNU Rector and Under-Secretary-General of the UN Dr David Malone and UNU-FLORES Director Prof. Edeltraud Guenther, who are ex officio members of the Committee.

[› View the Advisory Committee](#)



The UNU-FLORES team continued meeting regularly via teleconference during the pandemic from our respective home offices.



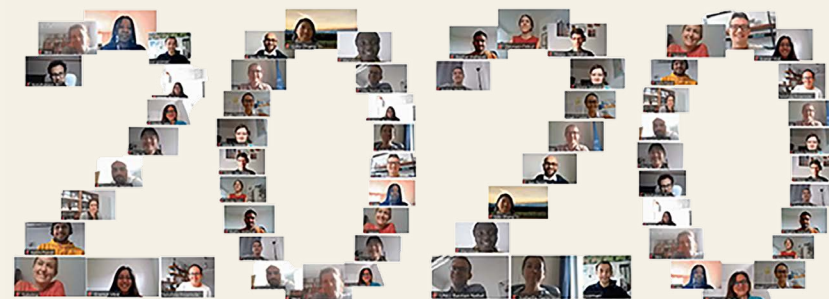
# LOOKING AHEAD

2020 came with its own challenges for the world, yet the true test of resilience has shown that we are stronger together. UNU-FLORES embraced the Decade of Action for delivering the Sustainable Development Goals that was launched by the UN Secretary-General António Guterres in 2020 by aligning its work directly with the Development Agenda of 2030 as seen in the Institute's newly outlined **Implementation Plan**.

In research, efforts will be dedicated to further defining and refining an **impact-driven research** agenda as research activities broaden to advance the Resource Nexus in relation to targeted themes and analytical perspectives. The embedded interdisciplinarity within the research programmes ensures that nexus orientation is inherent in all of the research efforts. Going forward, the current roadmap helps ensure that UNU-FLORES's research remains relevant and responsive to global changes and research trends.

Increased **policy uptake** of UNU-FLORES's research will continue to be fostered through stronger partnerships with government ministries, other UN agencies, and various stakeholders. Increased engagement with wider audiences digitally will help us to increasingly become ever more inclusive and get UNU-FLORES's work to the people who would benefit from it. Showcasing the impact of nexus research will help strengthen UNU-FLORES's brand as a strong advocate of the Resource Nexus.

With the committed efforts of the team throughout 2020, UNU-FLORES has developed numerous initiatives despite a global pandemic. The years to come will continue to be exciting for UNU-FLORES as it embarks on new adventures in the 'new normal'. Embracing the lessons learnt and aligning with the Implementation Plan, UNU-FLORES is set to achieve new heights in advancing the Resource Nexus and to **build back better and greener**.



# STAY IN TOUCH

Do you want to keep up with the latest on the Nexus Approach to the sustainable management of environmental resources? Stay abreast with the latest developments in UNU-FLORES's research and activities through our quarterly newsletter **NexNews**.

› [Sign up for NexNews](#)







UNITED NATIONS  
UNIVERSITY

**UNU-FLORES**

The United Nations University Institute for Integrated Management of Material Fluxes and of Resources (UNU-FLORES) was established in Dresden, Germany in 2012 with the support of the Federal Ministry of Education and Research (BMBF) and the Ministry for Science, Culture and Tourism (SMWK) of the Free State of Saxony, Germany. As part of the United Nations University (UNU), the Institute helps build a bridge between the academic world and the United Nations. UNU encompasses 14 research and training institutes and programmes located in 12 countries around the world. UNU as a whole aims to develop sustainable solutions for pressing global problems of human survival and development.

UNU-FLORES develops strategies to resolve pressing challenges in the area of sustainable use and integrated management of environmental resources such as water, soil, and waste. Focusing on the needs of the UN and its Member States, particularly developing countries and emerging economies, the Institute engages in research, capacity development, advanced teaching and training as well as dissemination of knowledge. In all activities, UNU-FLORES advances a Nexus Approach to the sustainable management of environmental resources.

Find more information at: [flores.unu.edu](https://flores.unu.edu)

## ADVANCING A NEXUS APPROACH TO THE SUSTAINABLE MANAGEMENT OF ENVIRONMENTAL RESOURCES

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