

2016 UNU-FLORES
ANNUAL REPORT

THE NEXUS APPROACH BUDDING



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UNU-FLORES

Institute for Integrated Management
of Material Fluxes and of Resources

THE NEXUS APPROACH BUDDING

UNU-FLORES ANNUAL REPORT 2016

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

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BUDDING

A MESSAGE FROM THE DIRECTOR

At the United Nations and at UNU-FLORES, 2016 was about laying the groundwork for advancing the Sustainable Development Goals (SDGs). To realise the integrated 2030 Development Agenda involving various resources, there needs to be a deeper appreciation for and understanding of the interconnectedness of the SDGs. As such, our work to advance the Nexus Approach to the management of environmental resources has never been more important.

In this regard, timing could not have been better. In 2016 many of the young sprouts we nourished over the past few years have grown into major projects and activities and some have even begun to bud. From gathering examples of the safe use of wastewater in agriculture in Latin America that were used promptly for a capacity development training in Iran, to developing strategies for multifunctional land use in northwest China, at UNU-FLORES we worked closely with UN Member States and international research institutes in 2016 around the world to develop nexus solutions.

Understanding that these findings and results are only useful if they reach the proper users, we also devoted considerable efforts to advocacy and widespread and strategic dissemination. Thus, in 2016 we saw the publication of our successful book *Safe Use of Wastewater in Agriculture: Good Practice Examples* and the second round of Nexus Observatory online courses. An informative event was held at UNESCO headquarters on the connection between the Nexus Approach and the SDGs and UNU-FLORES research was taken up in the *Report of the Secretary-General on Agriculture development, food security and nutrition (A/71/283)*. A number of articles were released in popular print and digital media, one reaching over 28,000 readers by itself. And looking to 2017, we began preparing for the second biennial Dresden Nexus Conference on “SDGs & Nexus Approach: Monitoring and Implementation”.

As we journey into 2017, we are excited to see many more projects come to fruition and to share these results with our ever growing nexus network!



Reza Ardakanian, Director

MEMORABLE MOMENTS

IN 2016

SG Report: UNU-FLORES contributed to the **Report of the Secretary-General on "Agriculture development, food security and nutrition"**.

UNU-FLORES@UNESCO:

UNU-FLORES organised an event at **UNESCO Headquarters in Paris on "Achieving SDGs: A Nexus Approach to Managing Environmental Resources"** with UNESCO-International Hydrological Programme and under the patronage of H.E. Ambassador Dr Michael Worbs, Permanent Delegate of Germany to UNESCO. Over 100 officials and representatives from around 75 Permanent Delegations and numerous UNESCO Secretariat Offices were in attendance.

A Methodology for Monitoring SDG Target 6.3:

Building on the MoU between UNU-FLORES and UN-Habitat, the two organisations began to develop, test, and evaluate a methodology **for SDG target 6.3**. At a regional consultation workshop researchers and policymakers from Indonesia, Lao PDR, the Philippines, Thailand, and Viet Nam agreed to develop the **Wastewater Reuse Effectiveness Index** that can, with appropriate calibration, be used in numerous countries and regions. In August 2016, a field visit to Indonesia to develop a prototype was conducted.



New DNC Working Paper & Policy Brief Series:

UNU-FLORES launched two new publication series in 2016. The **DNC Working Paper** and **Policy Brief** series feature content from stimulating presentations at the Dresden Nexus Conference that are intended to inspire discussion and debate in the DNC community.



SUWA Training Workshops:

UNU-FLORES organised two international workshops on **using wastewater in agriculture**. In Lima, Peru (24-25 Feb) experts from South America, Asia, and Africa discussed their different experiences. The scientific and capacity development workshop in Tehran, Iran (5-7 Dec) helped enhance national capacities to practise and promote the safe and productive use of wastewater.



Publications:

UNU-FLORES's experts produced 19 publications including the edited volume ***Environmental Resource Management and the Nexus Approach*** and the pathbreaking compilation of 17 case studies gathered from around the world on wastewater use in agriculture in ***Safe Use of Wastewater in Agriculture: Good Practice Examples***.



ADVANCING

NEXUS-ORIENTED RESEARCH



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PROJECTS

SAFE USE OF WASTEWATER IN AGRICULTURE INITIATIVE

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Waste Management

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Funding:
German Ministry for
Economic Cooperation
and Development
(BMZ) via UNU-ViE

Collaborators:
United Nations
Environment Pro-
gramme (UNEP),
IPES – Promoción del
Desarrollo Sostenible

The increasing scarcity of water, combined with other challenges such as those related to energy and fertilisers, is driving millions of farmers and other entrepreneurs to make use of wastewater. In developing countries and countries in transition, the safe reuse of water requires addressing various technical, institutional and policy challenges. There is a need for defined institutional arrangements and more skilled human resources, as well as a more comprehensive understanding of the opportunities and potential risks of wastewater use. The Safe Use of Wastewater in Agriculture (SUWA) initiative is a direct response to the aforementioned needs.

Dissemination of Good Practice Examples and Setting the Research Agenda

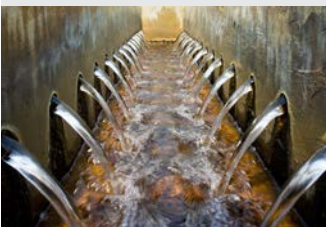
In 2016, the UNU-FLORES identified a number of SUWA-relevant case studies from Latin America, Asia, and Africa. Key personnel involved in these case studies were invited to be part of the workshop UNU-FLORES organised in Lima, Peru in February 2016. About 35 experts including researchers, academics, and ministerial representatives engaged in moderated discussion sessions to identify the knowledge gaps in SUWA-related activities where there is need for further research.

Above case studies were later published in an edited volume. All cases provided first-hand information as they have been authored by the experts who implemented these cases or monitored the progress of them closely for years. The edited volume consists of three sections: Section I - Technological Advances; Section II - Health & Environmental Aspects and; Section III - Policy & Implementation Issues.

The book was formally launched in both printed and electronic formats at the 2016 World Water Week in Stockholm on 28 August 2016. Considering the fact that Latin America is predominantly Spanish-speaking, especially at the ground level that matter to the Safe Use of Wastewater in Agriculture, the book has also since been translated into Spanish and made freely available online.

Outputs:

- › Hettiarachchi, Hiroshan and Reza Ardakanian (eds.). 2016. *Safe Use of Wastewater in Agriculture: Good Practice Examples*. Dresden: UNU-FLORES. <http://collections.unu.edu/view/UNU:5764>.
- › Hettiarachchi, Hiroshan y Reza Ardakanian (eds.). 2017. *Uso seguro de aguas residuales en la agricultura: ejemplos de buenas prácticas*. Dresden: UNU-FLORES. <http://collections.unu.edu/view/UNU:5957>



Events:

- › Workshop on “Good Practice Examples and Future Research Needs” (24-25 February 2016) Lima, Peru; Co-organised with Promoción del Desarrollo Sostenible, United Nations Environment Programme
- › Book Launch “Safe Use of Wastewater in Agriculture: Good Practice Examples” at the World Water Week 2016 in Stockholm, Sweden on 28 August 2016

Scientific and Capacity Development Workshop

In 2016 UNU-FLORES co-organised a workshop in Tehran, Iran to train government officials on SUWA aspects based on a request received from Iran, a Member State of the UN. UNU-FLORES took the lead in designing and developing of the programme and material and also assembling an international team of experts as instructors. Shahid Beheshty University, National Water and Wastewater Engineering Company, and Tadbir Economic Development Group of Iran provided all the ground support in Tehran. About 140 government officials, academics, and PhD students participated in the event.

Outputs:

- › A guide on how SUWA can be implemented will be published in the format of an edited volume. It is currently in the planning phase. All collaborators will contribute to this publication.

Events:

- › Scientific and Capacity Development Workshop on Safe Use of Wastewater in Agriculture (5-7 December 2016) Tehran, Iran; Co-organised with Shahid Beheshty University, National Water and Wastewater Engineering Company, and Tadbir Economic Development Group of Iran

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Shahid Beheshty
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Water and Waste-
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Company, Tadbir
Economic Develop-
ment Group of Iran

Collaborators:
KWR Waterycycle
Research Institute (The
Netherlands), Interna-
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Irrigation and Drainage
(India), German
Association for Water,
Wastewater and Waste
(Germany), Humboldt
University Berlin
(Germany), National
Research Institute for
Rural Engineering,
Water, and Forestry
(Tunisia), University
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UNU-INWEH (Canada)



THE NEXUS OBSERVATORY – DATA, MONITORING, AND GOVERNANCE

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Collaborators:

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Institute of Ecological
Urban and Regional
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Government of the
National State of Tigray
of Water Resources
Bureau of Ethiopia,
Ministry of Agriculture
Irrigation and Water De-
velopment of Malawi,
IGES, Ministry of Con-
struction of Vietnam,
National University of
Civil Engineering (Viet-
nam), UN-Habitat, GIZ,
Livelihoods and Natural
Resource Management
Institute (India)

Advancing a Nexus Approach to the sustainable management of natural resources requires better alignment of data collection, access to complete data, comparable standards, better analysis of data as well as a unified monitoring framework. The Nexus Observatory is an initiative of UNU-FLORES, which aims to advance data classification, strengthen monitoring frameworks, and facilitate governance processes for evidence-based decision making and knowledge transfer. It will facilitate and support synergies, as well as enhance coordination, communication, and collaboration between sectors and stakeholders. The main focus of the Nexus Observatory is the engagement with science-policy challenges and the identification of capacity development opportunities, along with responding to regional/national priorities. In addition, current trends and debates within the UN system, such as discussions about Agenda 2030, in particular the Sustainable Development Goals, inform activities of this initiative. Thus, it will serve as an online platform for consolidating and translating science into relevant information and evidence, which will empower decision makers to develop strategies, policies as well as natural resource management planning and implementation frameworks.

Outputs:

- › Kurian, Mathew, Mario Suardi and Reza Ardakanian. 2016. *Nexus Planning Primer: Lessons from Case Studies*. Dresden: UNU-FLORES.
- › Kurian, Mathew, Reza Ardakanian, Linda Gonçalves Veiga and Kristin Meyer. 2016. *Resources, Services and Risks: How Can Data Observatories Bridge the Science-Policy Divide in Environmental Governance?* Springer.
- › 2016. *Nexus Observatory Training Workshop on Drought Risk Monitoring: Capacity Development Priorities for Sub-Saharan Africa, 17–18 December 2015, Dar es Salaam*. Dresden: UNU-FLORES.
- › Meyer, Kristin ed. 2016. *Nexus Observatory Workshop on Water-Wastewater Nexus in Urbanising Asia: Building Capacity for Monitoring Water Quality Risks, Ha Noi, 24–25 May 2016*. Dresden: UNU-FLORES.
- › UNU-FLORES offered the following three **e-learning courses** with its partners:
 - › *Green Economy and the Life-Cycle Cost Approach* (delivered jointly with IOER)
 - › *Rethinking Infrastructure Design for Multi-Use Water Services* (delivered jointly with TU Dresden)
 - › *Financing Public Services and Environmental Sustainability*

Events:

- › International Expert Workshop on Inequalities, “Bridging the Gap: Approaches and Policies for Reducing Inequalities”, Berlin, Germany, 5-6 September 2016. Organised by GIZ. Kristin Meyer served as discussant for a session.



- › 12th Symposium on the Southeast Asian Water Environment, Ha Noi, Viet Nam, 28-30 November 2016. Organised by the National University of Civil Engineering (Vietnam), the Research Center for Water Environment Technology (Japan), and the Southeast Asian Center for Water Environment Technology (Thailand). Paper presentation by Kristin Meyer.
- › Nexus Seminar No. 15 by Kristin Meyer on “Fostering Regional Cooperation through Policy-Relevant Nexus Research”. 17 October 2016, UNU-FLORES.

Wastewater Reuse Effectiveness Index

The Memorandum of Understanding (MoU) signed between UN-Habitat and UNU-FLORES aims to develop, test, and validate a monitoring methodology for SDG target 6.3. In May 2016 UNU-FLORES, UN-Habitat, and the Institute for Global Environmental Strategies (IGES) in Tokyo, Japan organised a regional consultation in Ha Noi (see page 42) which was hosted by the Ministry of Construction, Government of Viet Nam. The workshop resolved to develop a monitoring methodology for SDG target 6.3 – the Wastewater Reuse Effectiveness Index (WREI). UNU-FLORES and UN-Habitat have since worked closely to develop a prototype monitoring methodology that benefitted from consultations with the Ministry of Environment and Bogor Agriculture University in Indonesia. WREI is an important output of the Nexus Observatory project. Preliminary discussions between UNU-FLORES and the State Secretariat of Sanitation and Water Resources of Sao Paulo, Brazil and Arab Countries Water Utilities Association (ACWUA) indicate support for pilot testing and validating WREI as a monitoring methodology for SDG target 6.3. This would be an important outcome in terms of the ability of the Nexus Observatory project to demonstrate policy impact and be of service to the United Nations.

Outputs:

- › Meyer, Kristin ed. 2016. *Nexus Observatory Workshop on Water-Wastewater Nexus in Urbanising Asia: Building Capacity for Monitoring Water Quality Risks, Ha Noi, 24–25 May 2016*. Dresden: UNU-FLORES.
- › Kurian M. L. Veiga, R. Boer and G. Alabaster. 2016. Wastewater Reuse Effectiveness Index- Monitoring Methodology for Sustainable Goal Target 6.3, UNU-FLORES, Dresden

Events

- › Water Health Seminar in November 2016 organised by Municipality of Sao Paulo and University of Sao Paulo, Brazil flores.unu.edu/en/news/news/discussing-urban-water-health-challenges-in-sao-paulo.html
- › Nexus Observatory Workshop on “Water-Wastewater Nexus in Urbanising Asia: Building Capacity for Monitoring Water Quality Risks”, Ha Noi, Viet Nam, 24–25 May 2016. Convened in collaboration with the Ministry of Construction (MOC), Vietnam, the National University of Civil Engineering (NUCE), Viet Nam, and the Institute for Global Environmental Strategies (IGES), Japan.

Staff:

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Funding:

Core budget with in-kind contributions for organisation of regional consultation from the Ministry of Construction, Government of Viet Nam

Collaborators:

Institute for Global Environmental Strategies (IGES) (Japan); Ministry of Construction, Government of Vietnam, UN-Habitat, Bogor Agriculture University (Indonesia), University of Minho (Portugal)

REUSE POTENTIAL OF BIOMASS FROM CONSTRUCTED WETLANDS

Managing Unit:
Water Resources
Management Unit

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Funding:
UNU-FLORES
Core Funding

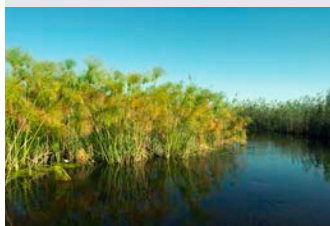
The use of constructed wetlands for water pollution control has a long-standing tradition in urban, peri-urban, rural, agricultural and mining environments. The capacity of wetland plants to take up nutrients and to filter organic matter has been widely discussed and presented in diverse fora and published in hundreds of articles. In our ever increasingly complex global world, constructed wetlands not only play a role in providing safe sanitation in decentralised settings, shelter for biodiversity, and cleansing of polluted sites. In addition, constructed wetlands produce biomass that can be harvested and used for the production of fodder and fuel. Biomass for human consumption comes in the form of food for direct use, as fodder for livestock, and as semi-woody biomass for fuelling purposes, be it directly for heating and cooking or for the production of biogas and/or biofuel. Examples of the use of biomass harvesting in constructed wetlands include the use of duckweed as fodder for poultry, bamboo as construction material, cattail for heating, etc. Given the universal applicability of constructed wetlands in virtually all settings, from arid to tropical, from relatively high to low nutrient loads, and from a vast variety of pollutants, we postulate that the biomass produced in constructed wetlands can be used more extensively in order to enhance the multi-purpose use of these sites.

Events:

- › Seminar on “Using Wastewater Efficiently to Protect the Environment and Combat Poverty” co-convened with Deutsches Institut für Entwicklungspolitik (DIE), Food and Agriculture Organization of the United Nations (FAO), United Nations Environment Programme (UNEP), and Center for Environmental Systems Research (CESR) at World Water Week 2016 in Stockholm, Sweden (28 August–2 September 2016)
- › Poster presentation on “The Role of Constructed Wetlands for Biomass Production within the Water-Soil-Waste Nexus” at the 15th International Water Association Specialist Conference on Wetland Systems for Water Pollution Control, 4–9 September 2016, ECS, Gdansk, Poland

Outputs:

- › “The Role of Constructed Wetlands for Biomass Production within the Water-Soil-Waste Nexus” Manuscript in the proceedings of the 15th International Water Association Specialist Conference on Wetland Systems for Water Pollution Control, 4–9 September 2016, ECS, Gdansk, Poland.
- › Gremillion, Paul and Tamara Avellán. 2016. *Wastewater As a Resource: The Water-Waste-Energy Nexus in Sub-Saharan Africa*. UNU-FLORES Policy Brief. Dresden: UNU-FLORES.



WATER YIELD RESPONSE TO CHANGES IN LAND USE AND CLIMATE IN A SEMI-HUMID/-ARID TRANSITION REGION (JINGHE BASIN, NORTHWEST CHINA): BOOK DEVELOPMENT

In recent decades, efforts to restore vegetation in the Jinghe Basin have effectively addressed soil erosion. These developments have, however, also been accompanied by a drastic reduction of water yield in the main tributaries of the Yellow River. This has led to a notable debate about forest development. The origin of these developments is yet unclear. It is also possible, that increased temperature and decreased precipitation may have contributed to water yield reduction. An essential key for developing an integrated land-use and water management approach is to understand and separate the hydrological response to changes in land use and climate.

This project looks at water balance components, vegetation structure dynamics, and soil hydraulic properties on multiple scales, ranging from single tree to watershed. These various characteristics are investigated and continuously monitored on selected plots containing vegetation typical to the region. Our research is carried out in the semi-humid/-arid transition region of Jinghe, which is an important tributary of the Yellow River. We follow a nested approach on scales of plots and watersheds along an upstream/downstream situation in a representative subbasin. On the basis of these measurements, the process-oriented model BROOK90 is used to predict the water yield response to changes in climate and vegetation, depending on relief and soil conditions. The results obtained from plot studies will be used to parameterise the distributed model SWIM. In a next step, SWIM will be fitted to the catchment discharge and to assess the effect of different land-use and vegetation management on water yield. This assessment will provide a solid foundation for how much of the catchment area can be changed by vegetation restoration through forest management to maintain a certain level of water supply security that will ensure a more sustainable regional development.

In 2016, the findings were consolidated into a book on the promotion of multifunctional land-use systems.

Outputs:

- › Zhang, Lulu and Kai Schwärzel, (Eds.). Forthcoming. *Multifunctional Land-Use Systems for Managing the Nexus of Environmental Resources*. Berlin, Heidelberg: Springer-Verlag.

Events:

- › Oral Presentation on "Managing in a Balanced Setting: Multifunctional Land Use" at IUFRO Regional Congress for Asia and Oceania on "Forests for Sustainable Development: The Role of Research" (24-27 October 2016)

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German Research
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Collaborators:
Chinese Academy
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Chinese Academy of
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NEXUS TOOLS PLATFORM: A WEB-ACCESSIBLE DATABASE OF MODELLING TOOLS FOR INTEGRATED RESOURCES MANAGEMENT

Managing Unit:
System and Flux
Analysis Considering
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Collaborators:
Input from Several
Model Developers

The realisation of the Water-Soil-Waste Nexus Approach requires a holistic understanding of the interlinkages of all related environmental processes, while also taking into consideration global change and socioeconomic aspects. Exploring these interlinkages and advancing an integrated management approach requires integrated modelling tools. However, no single modelling tool is available or conceivable that would cover all processes, interactions, and drivers related to water, soil, and waste resources. Instead, a vast number of models are available and in use dealing with specific environmental processes related to water, soil, and waste resources, at varying degree of detail, covering certain spatial and temporal scales and applying different mathematical process-describing relationships. To address a specific research question or management issue, in particular when applying a Nexus Approach, instead of developing a tool from scratch, it is more efficient and effective to make use of available tools and modify or couple them as required. For this to be possible, we first need a database that allows the interactive comparison of such tools.

This project aims at further developing and maintaining an interactive Nexus Tools Platform for inter-model comparison of existing modelling tools. The project shall provide detailed information on a subset of a larger compilation of available modelling tools. An Alpha version of the platform was launched in 2015 and is continually being improved. The platform offers interactive charts and advanced search and filter functions that allow selecting the most appropriate (set of) model(s) for the specific needs and to do a gap analysis of current model capabilities.

Access: <https://data.flores.unu.edu/projects/ntp>



Outputs:

- › Mannschatz, T., T. Wolf, and S. Hülsmann. 2016. "Nexus Tools Platform: Web-Based Comparison of Modelling Tools for Analysis of Water-Soil-Waste Nexus." *Environmental Modelling & Software* 76: 137–53.
- › Mannschatz, Theresa and Peter Dietrich. 2017. "Model Input Data Uncertainty and Its Potential Impact on Soil Properties." In *Sensitivity Analysis in Earth Observation Modelling*, edited by George Petropoulos and Prashant K. Srivastava, 25-52. Oxford: Elsevier Inc.

Events:

- › Hülsmann, Stephan. "A nexus perspective on SDGs: the importance of modelling tools" Presentation, at *A systems approach to Sustainable Development Goals*, workshop organised by the Center for Environmental Systems Research (CESR)

DEVELOPMENT OF MODELS TO PREDICT LAND-USE-INDUCED SOIL PORE-SPACE CHANGES AND THEIR HYDROLOGICAL IMPACTS (DACH)

Adaptive land uses are gaining importance as preventative measures for soil and water conservation. The development of adaptation strategies is often based on hydrological models. Previous studies have shown that soil structure changes significantly as a result of land-use and soil management. Therefore, if the dynamics of soil structure are neglected in planning adaptation strategies, the uncertainty of model results increases. This could lead to incorrect planning and greater or misdirected resource consumption in land-use systems. This project aims to measure changes in soil structure and hydraulic properties as a result of different land-use practices (soil tillage, crop rotation, afforestation). These measurements will be used to introduce newly developed functions into hydrological models, increasing their applicability as the foundation of land-use adaptation strategies.

Outputs:

- › Weninger, Thomas, Janis Kreiselmeier, Parvathy Chandrasekhar, Stefan Julich, Kai Schwärzel, Andreas Schwen. 2016. "Alterations of hydraulic soil properties influenced by land-use changes and agricultural management systems" in *EGU General Assembly Conference Abstracts*, Band 18.

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Funding:
German Research
Foundation (DFG)

Collaborators:
University of Natural
Resources and Life
Sciences in Vienna
(BOKU), TU Dresden



TIGER – REMOTE SENSING OF WATER USE AND WATER STRESS IN AFRICAN SAVANNA ECOSYSTEM FROM LOCAL TO REGIONAL SCALE: IMPLICATIONS FOR LAND PRODUCTIVITY

Managing Unit:
System and Flux
Analysis Considering
Global Change

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Collaborators:

University of Western
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and the Council for
Scientific and Industrial
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Africa), Andalusian
Institute of Agricultural
Research and Training
(Spain), European
Space Agency,
ITC-Faculty of Geo-
Information Science
and Earth Observation
(Netherlands)

Savannas are among Africa's most productive landscapes, supporting livestock and rural livelihoods. Droughts and erratic rainfall patterns across large parts of Africa result in water-limited environments, sensitive to climatic conditions, environmental changes (i.e. invasive species), and land management practices, jeopardising this ecosystem's productivity and resilience. This project aims to develop a modelling framework to quantify savannas' water use/stress, as well as to determine the spatial distribution and effects of invasive species on water resources, from local to regional scales integrating Earth Observation (EO) data, to support decision making at different levels (farm, river basin). The high spatial and temporal resolution VIS/NIR data provided by Sentinel 2 will allow a continuous monitoring of vegetation cover (from each layer) and actual evapotranspiration (Kc-FAO56). Meanwhile, thermal data provided by Sentinel 3, at lower spatial resolution will help to assess ecosystem water stress (TSEB). The procedure will first be tested with SPOT 5 (VIS/NIR) and AATSR (TIR) and then with Sentinel 2 (VIS/NIR) and Sentinel 3/MODIS (TIR). After validation (flux towers), the method can be applied to other areas. By combining these evapotranspiration-estimation approaches savanna water use and the influence of invasive species can be regularly monitored, providing key information to improve integrated water resources management over large areas.

Outputs:

- › Andreu Ana, Dube Timothy, Nieto Hector, Mudau Azwitmami Eric, Guzinski Radoslaw, Hülsmann Stephan and González-Dugo M^aPatrocinio (2016). Remote Sensing of Water Use and Water Stress in African Savannah Ecosystem (Kruger National Park) from Local to Regional Scale: TIGER Research Project." Oral presentation. 11th International Conference of the African Association of Remote Sensing in Kampala, Uganda.
- › Andreu Ana, Kimonye Eva and Dube Timothy. Forthcoming. *TIGER Savanna Tool Handbook: On Remote Sensing of Water Use and Water Stress in African Savanna Ecosystems from Local to Regional Scale*. Dresden: United Nations University Institute for Integrated Management of Material Fluxes and of Resources (UNU-FLORES).

Events:

- › Training Segment on "Remote Sensing of Water Use and Water Stress in African Savanna Ecosystem from Local to Regional Scale" at the training course "Use of Satellite Products for Drought Monitoring and Agricultural Meteorology Applications" Harare, Zimbabwe, 24–28 October 2016. Organised by the World Meteorological Organization (WMO) and European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT)
- › Andreu, Ana. "Water management in drought-prone areas", PAUWES-UNU Webinar, Summer School for students of the Pan African University Institute for Water and Energy Science in the African Union organised by ZEF and UNU-EHS, 13 March 2016.



RESEARCH GAPS IN WATER SCIENCE IN SUPPORT OF THE SDGs

UNU-FLORES acts at the forefront of research initiatives that promote a Nexus Approach to the sustainable management of water, soil, and waste. As part of the SDG monitoring and evaluation efforts we consider the following three types of research efforts to be crucial:

1. Data collection and analysis
2. Computation of indicators
3. Change management

The “hidden part of the iceberg” that deserves more emphasis is the deep-rooted problem of data and indicator development. To drive informed implementation, it is crucial to develop data collection, quality controlling and analysis, on one hand, and indicator development, computation, and validation on the other. In order to develop robust indicators, we need to assess, compare, and understand trends in the data. Further, to determine the robustness of the indicators, we need to scrutinise the quality of data sources.

Outputs:

- › “Water and sanitation interlinkages across the 2030 Agenda for Sustainable Development”, *UN-Water Analytical Brief*, 29 August 2016. Collaborator and reviewer.
- › “Closing Research Gaps in Water Science in Support of the SDGs”, Thought Piece featured on the UNU-FLORES webpage, www.flores.unu.edu.
- › “The role of research and capacity development on water-related SDGs” Extended Abstract submitted to the International Conference on Water and Environment in the New Millennium: Education and Capacity Building (WENM2016)

Events:

- › “Water and SDGs”, Presentation at the **3rd Water Seminar** of TU Dresden, Dresden, Germany, 17 June 2016.
- › “COP21 – its relevance for future water research”, Open Space at the **7th Water Research Horizon Conference**, Dessau, Germany, 28-19 June 2016. Co-hosted with German Climate Service Center and TU Dresden.
- › Ardakanian, Reza, Keynote speech at the **International Conference on Water and Environment in the New Millennium: Education and Capacity Building (WENM2016)**, Teheran, Iran, 3-5 December 2016.

Managing Unit:
Water Resources
Management Unit

Staff:
Tamara Avellán
(Research Fellow),
Reza Ardakanian
(Director)

Funding:
UNU-FLORES
Core Funding



RESOURCE RECOVERY FROM WASTE-WATER IN THE AMERICAS - ASSESSING THE WATER-SOIL-WASTE NEXUS (SludgeTec)

Managing Unit:

Water Resources Management Unit,
Waste Management Unit

Staff:

Tamara Avellán
(Research Fellow),
Serena Caucci
(Research Assistant),
Hiroshan Hettiarachchi
(Academic Officer),
Sabrina Kirschke
(Research Assistant)

Funding:

BMBF

Collaborators:

Technische Universität Dresden, Bildungs- und Demonstrationszentrum für dezentrale Abwasserbehandlung - BDZ e.V., University of San Carlos of Guatemala, ISA University – Dominican Republic, Fideocomiso de Infraestructura Ambiental de los Valles de Hidalgo, Mexico

This project aims to implement the UNU-FLORES Nexus Approach to determine and - where suitable - implement sustainable management options to the wicked problem of wastewater treatment. Particular focus is placed on selected pilot areas in the Americas.

With this project we want to highlight the need for more investment in locally adapted technologies to treat wastewater. In particular investment is needed in Latin America and the Caribbean, where 50% of the population does not live in large cities and that same population is expected to increase dramatically. A preliminary analysis showed the availability of different technologies at different levels of wastewater treatment across three pilot areas in Guatemala, Mexico, and the Dominican Republic, respectively. Where collection and separation of wastewater exists in part, little to no systems are in practice for stabilization, dewatering, and drying of sludge. The existing policy frameworks guiding wastewater treatment and the use of effluent water and stabilized sludge are in different stages of maturity across the countries. Beyond these technical and legislative challenges, the cultural and behavioural contexts differ, calling for adapted capacity development programmes. By applying a Nexus Approach to this kind of problem setting we strive to provide solution options for sustainable management that consider more than one resource, namely water, waste, and soil.

The project commenced in December 2016 with initial funding from the Germany Federal Ministry for Education and Research (BMBF).

Outputs:

- › Cardona, Jamie and Daniel Gieseler. 2016. "Módulos de Capacitación: Gestión Descentralizadas y Manejo de Lodos orientado a contextos Latinoamericanos". Report. Leipzig: BDZ e.V.
- › Geissler, Anne. 2016 "Initial review of the status of sludge management laws, decrees and practices in selected Latin American countries". Report. Leipzig: BDZ e.V.

Events:

- › Kick-Off Workshop with Project Collaborators at Bildungs- und Demonstrationszentrum für dezentrale Abwasserbehandlung - BDZ e.V 13 December 2016, Leipzig, Germany



PROGRAMMES

VISITING SCHOLAR PROGRAMME

The Visiting Scholar Programme of UNU-FLORES provides qualified scholars an opportunity to undertake research on topics related to Systems and Flux Analysis, Capacity Development and Governance, Water Resources Management, Soil and Land-Use Management, Waste Management as well as other material fluxes and resources management disciplines.

In 2016 UNU-FLORES hosted three exceptional scholars working on exciting projects.



Oluwabamise Lanre Afolabi, *Alexander von Humboldt Foundation*



Period: March 2016 – February 2017

Hosting Unit: System and Flux Analysis Considering Global Change Assessment

Mr. Oluwabamise Lanre Afolabi is a recipient of the International Climate Protection Fellowship awarded by the Alexander von Humboldt Foundation and was hosted by UNU-FLORES during this period. His research project revolved around climate change adaptation in the River Niger Basin of sub-Saharan Africa (Nigerian part) using a water-energy Nexus Approach. To conduct this project, Mr. Afolabi took research leave from his position with the National Integrated Power Project at Niger Delta Power Holding Company Ltd in Nigeria, where he was born. Mr. Afolabi holds a Master's degree in energy and the environment from Lancaster University, United Kingdom, and a Bachelor's degree in environmental management and toxicology from the University of Agriculture, Abeokuta, Nigeria.



Prof. Ahmed Abdel Kader, *Port Said University, Egypt*



Period: April 2016 – July 2016

Hosting Unit: Waste Management

Prof. Ahmed Abdel Kader is the Head of the Department of Environmental Sciences at Port Said University in Egypt, where he was born. His research topics focus on wastewater treatment systems, particularly in bioremediation technology and wastewater management. He is also working on the monitoring of pollution indicators, water quality, and the management of water resources, eco-microbiological treatment of heavy metals, herbicides, pesticides, oil spills, as well as soil and microbial solid wastes management. As visiting scholar at UNU-FLORES, Prof. Ahmed concentrated his work on wastewater treatment and management within the framework of the Nexus Approach. He holds a Bachelor of Science, Master of Science, and a PhD in Microbiology from Warsaw University in Poland, where he was a Postdoctoral Fellow at the Faculty of Biology.



Prof. Yanhui Wang,
Chinese Academy of Forestry, Environment and Protection



Period: Nov 2016 – Dec 2016
Hosting Unit: Soil and Land-Use Management

Prof. Yanhui Wang is the Head of the Department of Forest Hydrology and Integrated Water and Soil Management at the Chinese Academy of Forestry. His research topics focus on forest-water interaction and integrated management, particularly in dryland regions. He is also working on soil and water conservation, soil acidification and forest damage, and multifunctional forestry and forest management. As a visiting scholar at UNU-FLORES, Prof. Wang concentrated on multifunctional and integrated forest-water management at various scales from stand to watershed within the framework of the Nexus Approach. He holds a Bachelor of Agriculture and Master of Agriculture from the Beijing Forestry University in China, and a PhD in Forestry from Göttingen University in Germany.

PHD PROGRAMME

UNU-FLORES partners with the Technische Universität Dresden to offer the joint PhD Programme in Integrated Management of Water, Soil and Waste. The first of its kind, the programme aims to equip a new generation of environmental scientists, engineers, and managers, with the detailed knowledge, critical understanding, strategies, and tools to take an interdisciplinary and integrated approach towards the sustainable management of water, soil, and waste.

Given the unique interdisciplinarity of the programme, it attracts budding researchers from a variety of backgrounds – from engineering, natural sciences, as well as the social sciences. However, to ensure that students have an evenly-matched starting point, and also to introduce the basic concepts of the nexus of water, soil, and waste, the programme comprises coursework (35 credits) in addition to the dissertation (175 credits). Spanning over 7 semesters, students have access to academic and teaching resources at both universities throughout the duration of the programme.

In its third year running, the programme is home to 9 young researchers from 6 countries, most of them in the developing world. In line with UNU-FLORES's research agenda, their dissertation research topics are focused on solving current challenges related to the water-soil-waste nexus.

Current PhD Students



Parvathy Chandrasekhar (India)



Topic: *"Land-Use Induced Soil Pore-Space Changes and Their Hydrological Impacts"*



Solomon Gebrechorkos (Ethiopia)



Topic: *"Assessing and Synthesizing Climate-Related Data for Integrated Water-Soil Management in East Africa"*



Mahesh Jampani (India)



Topic: *"Integrated Evaluation of Wastewater Irrigation for Sustainable Agriculture and Groundwater Development"*



Janis Kreiselmeier (Germany)



Topic: *"Quantification of Temporal Variations of Soil Hydraulic Properties by Periodic Field and Laboratory Measurements"*



Thuy Nguyen (Viet Nam)



Topic: *"Continuous Longitudinal Boat-Based Data Analysis for Efficient Water Quality Monitoring in Small Rivers"*



Anika Reetsch (Germany)



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



Sekela Twisa (Tanzania)



Topic: *"Source Sustainability of Rural Water Supply in East Africa: Applications of Geo-Information Technologies"*



Agossou Gadedjisso-Tossou (Togo)



Topic: *"The Impact of Soil Variability on Crop Water Productivity and Food Security of Irrigated Agriculture in West-Africa"*



Sridhar Patra (India)



Topic: *"Water-Carbon Nexus in an Irrigated Cropping System under Different Tillage Practices"*

ONLINE COURSES

Following its successful run in 2015, UNU-FLORES's online courses were back in their second consecutive year last year. Hosted on the Blended Learning Platform, the online courses aim to equip decision makers, practitioners, and students with an interest in the planning and management of environmental resources with access to relevant knowledge in addressing capacity development needs and to develop new skills on how to apply the acquired knowledge in practice. Nested within the Nexus Observatory, the online courses are delivered with partners at the Leibnitz Institute of Ecological Urban and Regional Development (IOER) and the Faculty of Environmental Sciences of the Technische Universität Dresden.

The courses consider the Nexus Approach from different methodological perspectives. They advance the nexus concept through a focus on life-cycle analysis (*Green Economy and the Life-Cycle Cost Approach*), multiple uses (*Rethinking Infrastructure Design for Multi-Use Water Services*), and intergovernmental fiscal relations (*Financing Public Services and Environmental Sustainability*).





Experts from Imperial College London (UK), Livelihoods and Natural Resources Management Institute (LNRMI) (India), and University of Minho (Portugal) collaborated to design the curriculum. Over 12 weeks, participants from different parts of the world and sectors were exposed to policy-relevant topics and were encouraged to put on a problem-solving attitude in dealing with them.






PUBLICATIONS

* Available for free download at flores.unu.edu/en/publications

BOOKS



Cover	Title	Author(s)
	Environmental Resource Management and the Nexus Approach: Managing Water, Soil, and Waste in the Context of Global Change <i>Springer</i>	<i>Editors:</i> Hettiarachchi, Hiroshan, and Ardakanian, Reza
	Resources, Services and Risks: How Can Data Observatories Bridge The Science-Policy Divide in Environmental Governance? <i>Springer</i>	Kurian, Mathew, Ardakanian, Reza Veiga, Linda, and Meyer, Kristin
	Nexus Planning Primer: Lessons from Case Studies*	Kurian, Mathew, Suardi, Mario, and Ardakanian, Reza
	Safe Use of Wastewater in Agriculture: Good Practice Examples*	<i>Editors:</i> Hettiarachchi, Hiroshan, and Ardakanian, Reza

BOOK CHAPTERS

Cover	Title	Author(s)
	<p>"Landfill Design and Operation" <i>in Sustainable Solid Waste Management (American Society of Civil Engineers)</i></p> <p>This book chapter briefly discusses landfill design, construction, and operation. It presents siting considerations, regulations, and other important steps before the design stage.</p>	Meegoda, Jay N., Hettiarachchi, Hiroshan, and Hettiaratchi, Joseph Patrick
	<p>"Nexus Approach: Resource Management for Soil Productivity" <i>in Encyclopedia of Soil Science, Third Edition</i></p> <p>UNU-FLORES's researchers define the Nexus Approach in the Encyclopedia of Soil Science (Third Ed.) edited by Prof. Rattan Lal.</p>	Schwärzel, Kai, Ardakanian, Reza, Avellán, Tamara, and Zhang, Lulu
	<p>"Model Input Data Uncertainty and Its Potential Impact on Soil Properties" <i>in Sensitivity Analysis in Earth Observation Modelling</i></p> <p>This book chapter illustrates that the methods used for collecting data are not without uncertainty, and it is crucial to take these uncertainties into consideration and communicate them appropriately.</p>	Mannschatz, Theresa, and Dietrich, Peter



PEER-REVIEWED ARTICLES

Cover	Title	Author(s)
	<p>Possible Climate Change/Variability and Human Impacts, Vulnerability of Drought-Prone Regions, Water Resources and Capacity Building for Africa <i>Hydrological Sciences Journal</i></p> <p>This review article discusses the climate, water resources, and historical droughts of Africa, drought indices, vulnerability, impact of global warming, and land use for drought-prone regions in West, southern and the Greater Horn of Africa, which have suffered recurrent severe droughts in the past.</p>	Gan, Thian Yew, Ito, Mari, Hülsmann, Stephan, Qin, Xiaosheng, Lu, Xi Xi, Liong, Shie-Yui, Rutschman, Peter, Disse, Markus, and Koivusalo, Harri




Cover	Title	Author(s)
	Mineral Resource Depletion: A Coming Age of Stockpiling? <i>BioPhysical Economics and Resource Quality</i> <p>This paper discusses several ways in which the market of mineral resources could evolve, in particular the concept of a “metal bank” that could be used to manage the supply of rare and sensitive minerals.</p>	Bardi, Ugo, Jakobi, Rolf, and Hettiarachchi, Hiroshan
	Nexus Tools Platform: Web-Based Comparison of Modelling Tools for Analysis of Water-Soil-Waste Nexus <i>Environmental Modelling & Software</i>	Mannschatz, Theresa, Wolf, Tobias, and Hülsmann, Stephan

POLICY BRIEFS*

Cover	Title	Author(s)
	DNC2015 Policy Brief No. 1 on “Economic Growth and Resource Use: Exploring the Links” <p>This policy brief aims at exploring the relationship between GDP and GDP-per-capita with the resource metrics and projected resource use related to water, food, and energy till the year 2100.</p>	Sušnik, Janez <i>Series Editor:</i> Hettiarachchi, Hiroshan
	DNC2015 Policy Brief No. 2 on “Natural Resource Use and Adaptation to Climate Change in the Nigerian Savanna” <p>This brief highlights the climate change challenge in Nigeria and its declining natural resources and explores the effectiveness of existing policies in addressing these challenges and the viewpoints of households who directly suffer from these pressures.</p>	Olorunfemi, Felix, Fasona, Mayowa, Olouko, Grace, Elias, Peter, and Adedayo, Vide <i>Series Editor:</i> Hettiarachchi, Hiroshan
	DNC2015 Policy Brief No. 3 on “Energy Resource Use Options for Improved Energy Security in Ethiopia” <p>Addressing Ethiopia’s critical challenges in the energy sector, this brief assesses the country’s renewable energy potential and the impact of expected future climate change on power generation. It subsequently puts forth adaptation measures and policy recommendations for green energy development.</p>	Guta, Dawit Diriba <i>Series Editor:</i> Hettiarachchi, Hiroshan

Cover	Title	Author(s)
	DNC2015 Policy Brief No. 4 on “Energy in Iceland: Adaptation to Climate Change” Iceland demonstrates that a 100% renewable electricity system is possible. Iceland indeed has done and is applying modifications for present and future hydropower assets to cope with and take advantage of climate change. This brief elaborates on the questions that need to be addressed when taking adaptation measures.	Sveinsson, Oli G. B. <i>Series Editor:</i> Hettiarachchi, Hiroshan
	Policy Brief No. 1/2016 on “Wastewater As a Resource: The Water-Waste-Energy Nexus in Sub-Saharan Africa” This policy brief reveals how the Nexus Approach towards water reuse could help improve food and energy security in Sub-Saharan Africa.	Gremillion, Paul, and Avellán, Tamara



WORKING PAPERS*

Cover	Title	Author(s)
	DNC2015 Working Paper No. 1 on “The Post-2015 Development Agenda: How Food Loss and Waste (FLW) Reduction Can Contribute Towards Environmental Sustainability and the Achievement of the Sustainable Development Goals” This working paper delves with the debate on global food loss and waste in the context of sustainable development and explores how FLW reduction can contribute to the achievement of the SDGs, emphasising the broader environmental impacts.	Wieben, Emilie <i>Series Editor:</i> Hettiarachchi, Hiroshan
	DNC2015 Working Paper No. 2 on “Implementation of SEMIZENTRAL: An Integrated Infrastructure Approach for Fast-Growing Cities” This working paper discusses SEMIZENTRAL, an integrated, district-related infrastructure approach that has been developed for fast-growing cities, in order to meet their challenges in regard to the supply of water and the treatment of biowaste and wastewater.	Tolsdorf, Johanna, Bieker, Susanne, and Cornel, Peter <i>Series Editor:</i> Hettiarachchi, Hiroshan
	DNC2015 Working Paper No. 3 on “Assessment of the Effects of Climate Change on Land Use and Land Cover Using Remote Sensing: A Case Study from Kenya” This working paper presents a study on the combined effect of land-use land-cover (LULC) changes and the effects of climate variability for a specific study area in Kenya. LULC changes revealed competing land uses, which increased base and rock cover.	Mercy, Mwaniki W. <i>Series Editor:</i> Hettiarachchi, Hiroshan

REPORTS*

Cover	Title	Author(s)
	<p>Proceedings on “Nexus Observatory Training Workshop on Drought Risk Monitoring: Capacity Development Priorities for Sub-Saharan Africa”</p> <p>These proceedings document the Nexus Observatory Workshop convened jointly by UNU-FLORES, Water Development Management Institute (WDMI), and the Tanzanian Ministry of Water that took place from 17–18 December 2015 in Dar Es Salaam.</p>	<p><i>Editors:</i> Sekela Twisa and Kurian, Mathew</p>
	<p>Proceedings of the Nexus Observatory Workshop “Water-Wastewater Nexus in Urbanising Asia: Building Capacity for Monitoring Water Quality Risks”</p> <p>A regional consultation took place in Ha Noi, Viet Nam on 24–25 May 2016 to discuss nexus challenges and to ascertain the potential for regional cooperation in Southeast Asia.</p>	<p><i>Editors:</i> Meyer, Kristin and Kurian, Mathew</p>
	<p>UNU-FLORES Annual Report 2015</p>	

CONTRIBUTIONS TO UNITED NATIONS PUBLICATIONS

Cover	Title	Author(s)
	SG Report UNU-FLORES contributed to the Report of the Secretary-General on "Agriculture development, food security and nutrition".	UNU-FLORES <i>(Contributor)</i>
	Water and Sanitation Interlinkages across the 2030 Agenda for Sustainable Development UN-Water Analytical Brief, 29 August 2016	UNU-FLORES <i>(Collaborator and Reviewer)</i>

POPULAR PRESS ARTICLES

Cover	Title	Author(s)
	Why a New Water Decade is Key to Meeting the World's Development Needs <i>The Conversation</i> Our Director comments on a proposal for a new International Decade for Action on "Water for Sustainable Development" unveiled by the Government of Tajikistan as part of the Call for Action adopted at the High-Level Symposium on SDG 6 and Targets (9–11 August 2016) in Dushanbe.	Ardakanian, Reza
	Superbugs Evolve in Wastewater, and Could End Up in our Food <i>The Conversation</i> Once curable common infections are becoming increasingly resistant to the antibiotics used to treat them. The UNGA committed for the first time to act on antimicrobial resistance. Still, a part of the picture is missing: health risks are strongly connected to poor water quality.	Caucci, Serena

A grayscale photograph of a hand pouring water into the soil. The hand is positioned in the upper half of the frame, with water streaming from the fingers down to the ground. The background is a soft, out-of-focus landscape with hills and a bright light source, possibly the sun, creating a hazy atmosphere. The overall tone is serene and hopeful, symbolizing growth and nurturing.

FOSTERING

A NEXUS-ORIENTED NETWORK

Besides knowledge creation, knowledge translation and knowledge sharing are a fundamental part of UNU-FLORES's role as a think tank for the UN System and Member States and as a hub for the Nexus Approach research community. Thus, scientific advisory, capacity development, and community building activities are an important dimension of UNU-FLORES's mandate. The various endeavours of UNU-FLORES in 2016 to engage its community, translate and transfer knowledge are outlined in this chapter.

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17–19 MAY 2017
DRESDEN, GERMANY

DEUTSCHES HYGIENE MUSEUM

DRESDEN NEXUS CONFERENCE

As a hub for initiatives on the Nexus Approach, UNU-FLORES understood early on the importance of providing an international platform to foster cooperation and collaboration amongst all actors and sectors involved in a Nexus Approach to managing environmental resources. That platform is the Dresden Nexus Conference (DNC). A biennial conference, the Dresden Nexus Conference showcases innovative and policy-relevant research at the interface between the Sustainable Development Goals (SDGs) and the water-soil-waste nexus.

However, the role and impact of DNC goes much beyond that of a typical academic conference. In a community lacking an organised network, DNC is a cross-sectoral platform for nexus-oriented initiatives, and thus a key pillar for advancing the Nexus Approach to the integrated management of resources. Bringing together scientists, implementers, decision makers, and donors, DNC has and will continue to connect UN entities, first-class research institutions, governmental institutions, and non-governmental organisations both to each other and to UNU-FLORES as a hub for nexus-oriented research.



**Multifunctional
Land-Use Systems**



**Resources Management in
Resilient Cities**



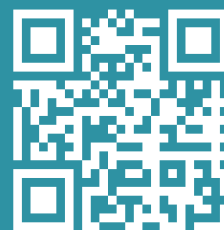
The Inaugural Dresden Nexus Conference 2015: Global Change, SDGs, and the Nexus Approach

From 25–27 March 2015, UNU-FLORES, the Technische Universität Dresden, and the Leibniz Institute of Ecological Urban and Regional Development (IOER) organised the inaugural Dresden Nexus Conference 2015 (DNC2015) on “Global Change, SDGs and the Nexus Approach”. Building on the outcomes of the 2013 “International Kick-Off Workshop on Advancing a Nexus Approach to the Sustainable Management of Water, Soil and Waste”, the main focus of the conference was how the integrated management of environmental resources guided by a Nexus Approach may help to achieve the potential targets of the post-2015 agenda.

With over 350 participants from 65 countries and 5 continents, high-level representatives from several UN Member States, numerous UN and UNU entities, international organisations, universities and research institutions, and various foundations and technical assistance agencies, the inaugural DNC2015 was a distinct success. By bringing these stakeholders together, the foundation for a dynamic and effective network of researchers and practitioners applying the Nexus Approach to resource management has been laid. In this vein, DNC2015 has played an important role in aligning research and implementation of nexus-oriented, policy-relevant solutions to addressing global change and in strengthening Dresden’s role as a hub for research on sustainable development. The costs of the conference were covered by the participants, funds provided by the German Research Foundation (DFG), the City of Dresden, and the three organisers.

For more information about DNC2017, please visit:
www.dresden-nexus-conference.org

We look forward to welcoming you to Dresden!



Dresden Nexus Conference 2017: SDGs and the Nexus Approach – Monitoring and Implementation Strategies

Building on the success of the inaugural Dresden Nexus Conference (DNC) in March 2015, the second biennial DNC is planned to take place 17-19 May 2017. DNC2017 will bring together researchers and implementers (policy- and decision makers) from universities, national and international organisations, UN organisations, ministries and governmental agencies, as well as individual researchers, stakeholders from the private sector and civil society from around the world under the theme “Sustainable Development Goals and the Nexus Approach: Monitoring and Implementation”.

The Nexus Approach to the sustainable management of water, soil, and waste emphasises the interrelatedness of these three resources along with the cycle of research to implementation. DNC2015, under the umbrella “Global Change, Sustainable Development Goals and the Nexus Approach”, focused on the challenges posed by different aspects of global change (climate change, urbanisation, population growth) on environmental resources management and how a Nexus Approach may help to cope with them. There was overall consensus among participants of DNC2015 that applying a Nexus Approach is key for the sustainable use of environmental resources under conditions of global change. It will, therefore, be instrumental for achieving the Sustainable Development Goals (SDGs), which will frame the international development agenda for the next 15 years.

While the importance of the Nexus Approach for achieving the SDGs can be deduced rather straightforwardly from conceptual considerations, the more complex question remains HOW to adopt and implement it. With the adoption of the SDGs in autumn 2015 the overall targets related to resources management are clear. Many of the SDGs are interrelated, which already points to the need for a Nexus Approach. Furthermore, the management of environmental resources is of particular relevance for goal 2 (end hunger and achieve food security), goal 6 (sustainable management of water and sanitation), goal 7 (energy security) and, representing an overarching topic, goal 11 (resilient and sustainable cities). A common theme and potentially strong integrator is therefore the need for monitoring strategies reflecting the Nexus Approach and the SDGs. These strategies and the respective data are crucial to be able to evaluate any advance towards sustainable environmental resources management and achieving SDGs and have to be a decisive component of policies and guidelines for the implementation of integrated management approaches.

DNC Organisers



UNITED NATIONS
UNIVERSITY

UNU-FLORES

Institute for Integrated Management
of Material Fluxes and of Resources



**TECHNISCHE
UNIVERSITÄT
DRESDEN**



Leibniz Institute of
Ecological Urban and
Regional Development

DNC2017 Stakeholders



UNESCO-IHE
Institute for Water Education



UNITED NATIONS
UNIVERSITY

UNU-INRA

Institute for Natural Resources in Africa



UNITED NATIONS
UNIVERSITY

UNU-INWEH

Institute for Water,
Environment and Health



UNITED NATIONS
UNIVERSITY

UNU-EHS

Institute for Environment
and Human Security



Global Water
Partnership



international hydropower association



ICID-CIID



International
Water Management
Institute



World
Agroforestry
Centre



WROCLAW UNIVERSITY
OF ENVIRONMENTAL
AND LIFE SCIENCES



Global Change Research Institute CAS



University of Natural Resources
and Life Sciences, Vienna



TEXAS A&M UNIVERSITY



KWR Watercycle
Research
Institute



RAOB ANBO
Réseau Africain des Organismes de Bassin
African Network of Basin Organizations

UNIVERSITY OF
WESTMINSTER



ARUP



WAGENINGEN UR
For quality of life



Mercator Research Institute on
Global Commons and Climate Change

UNIVERSITY OF
EXETER



International Institute for
Sustainable Development



WATER CONSERVATION FOUNDATION



THE OHIO STATE
UNIVERSITY

I.C.L.E.I.
Local
Governments
for Sustainability



STOCKHOLM
ENVIRONMENT
INSTITUTE



Penn IUR
PENN INSTITUTE for URBAN RESEARCH



German Committee
Future Earth

d.i.e

Deutsches Institut für
Entwicklungspolitik



German Development
Institute



HELMHOLTZ
CENTRE FOR
ENVIRONMENTAL
RESEARCH - UFZ



Zentrum für Entwicklungsforschung
Center for Development Research
University of Bonn



CESR Center for
Environmental
Systems Research



Federal Ministry
of Education
and Research

STAATSMINISTERIUM
FÜR WISSENSCHAFT
UND KUNST

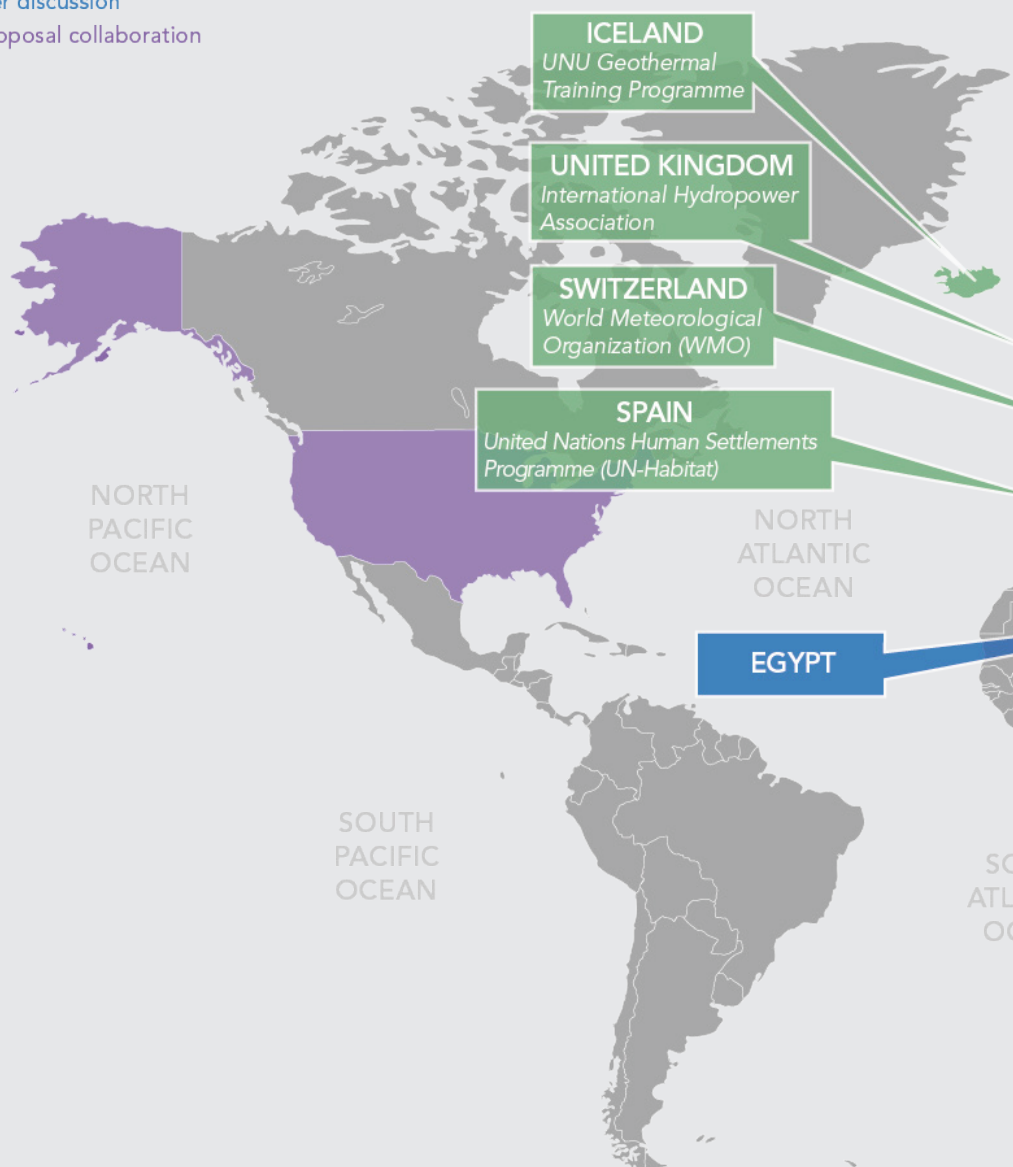


Freistaat
SACHSEN



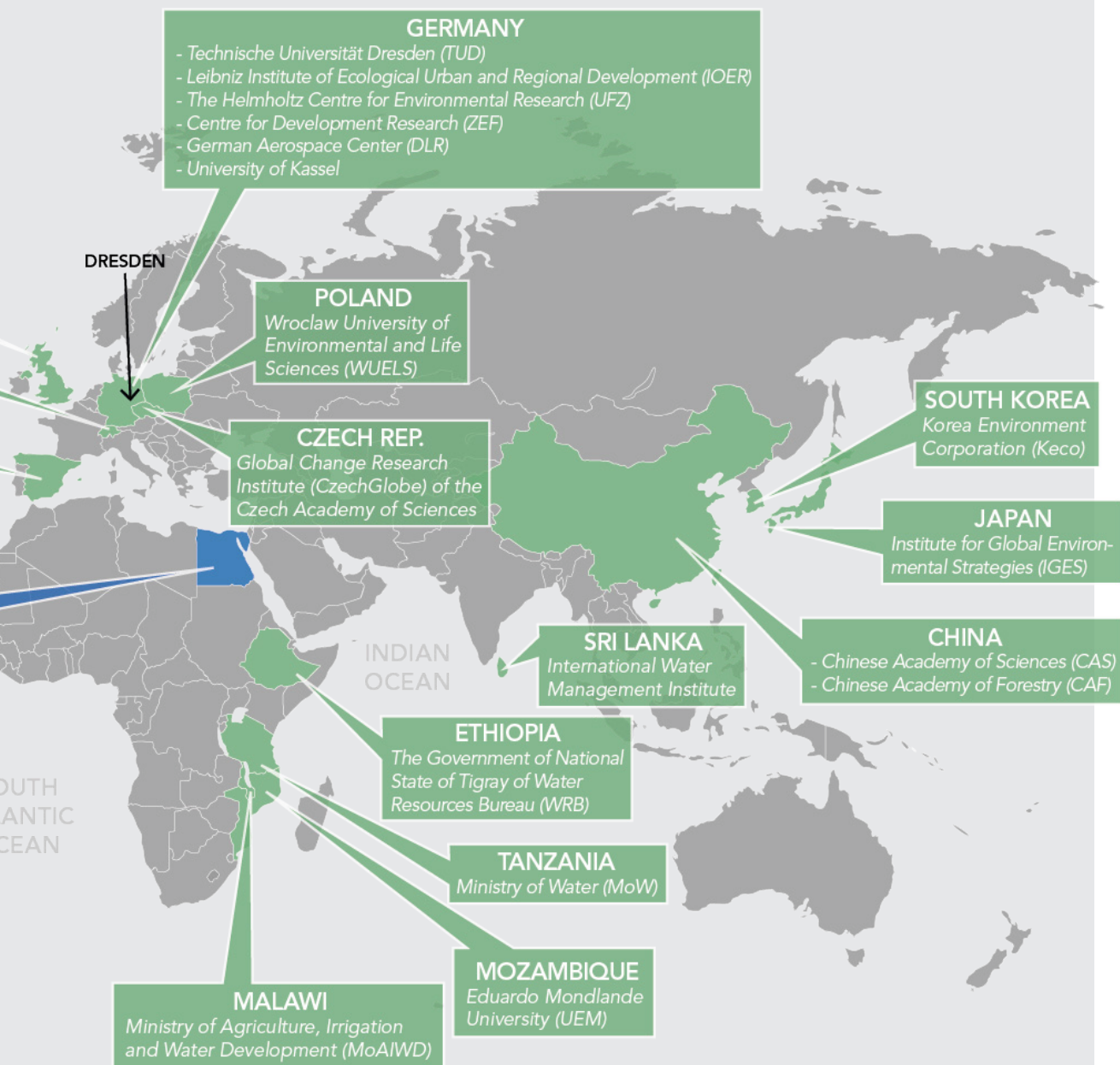
Dresden.
Dresden

- Established partnerships
- To be finalised / under discussion
- Scientific research proposal collaboration



NETWORKING

Building and sustaining strategic partnerships is fundamental for UNU-FLORES in its role both as a think tank for the UN System and Member States. The Institute has developed a vibrant and diverse network both locally and internationally that together covers numerous aspects of the Nexus Approach to managing water, soil, and waste. The Institute takes a client's-perspective, asking what a Member State would hope to receive when aiming at managing its environmental resources in a sustainable way.



In 2016 UNU-FLORES entered into or began negotiations for several cooperation agreements with international organisations and research institutions. To date, the Institute has signed agreements with 20 entities in 15 countries.

COOPERATION AGREEMENTS REACHED IN 2016

The following outlines the cooperation agreements that UNU-FLORES entered into or began negotiating in 2016.

On Strengthening Ties to Mitigate Flood and Drought Risks

Partner: World Meteorological Organization

The Associated Programme on Flood Management hosted by the World Meteorological Organization provides guidance on flood management policy and strategy. UNU-FLORES is excited to support this programme towards better mitigation of flood risks. The Institute has also pledged support to the Integrated Drought Management Programme.

On Strengthening Collaborative Research and Scientific Exchange

Partner: The Global Change Research Institute of the Czech Academy of Sciences (CzechGlobe) and TU Dresden

On 15 June 2016, CzechGlobe, the Technische Universität Dresden (TU Dresden) and the United Nations University (UNU) celebrated the signing of a Cooperation Agreement signifying the start of a closer trilateral partnership between the institutes in several areas. The parties aim to strengthen their collaboration with regard to research, knowledge transfer, education, and training activities.

Trilateral Cooperation Agreement on Research and Scientific Exchange

Partner: Wrocław University of Environmental and Life Sciences (WUELS) and TU Dresden

Following a fruitful visit of the Polish partners to Dresden in February this year, the Wrocław University of Environmental and Life Sciences (WUELS) hosted representatives of UNU-FLORES and TU Dresden and took the collaboration to a higher level. On 16 June 2016, the three institutes celebrated the signing of a Cooperation Agreement in Wrocław signifying the start of a closer trilateral partnership in the areas of research, knowledge transfer, education, and training activities.

On Advancing Soil Research

Partner: The Institute of Soil and Water Conservation at the Chinese Academy of Science (CAS- ISWC)

On 15 July 2016, UNU-FLORES and CAS- ISWC signed a cooperation agreement that will expand the collaboration between the two institutes in new areas. The new agreement with UNU-FLORES is based on a successful established cooperation in the frame of a German Research Foundation (DFG) project that was funded in 2011. The main aim of the agreement is to continue the established liaison by increasing the direct scientific exchange between the two institutes.

On Enhancing Research Relations

Partner: University of Kassel and TU Dresden

UNU-FLORES and TU Dresden signed a cooperation agreement with the Center for Environmental Systems Research (CESR) to enhance existing relations. The agreement covers various opportunities for joint research and capacity building activities and potential mutual outputs, addressing the specific niche emerging from the supplementary expertise of all involved partners.

On Knowledge Sharing

Partner: The Korea Environment Corporation (Keco)

Building on existing successful collaboration to promote young scientists, UNU-FLORES and the Korea Environment Corporation (Keco) have agreed to upscale mutual knowledge-sharing activities. The MoU establishes a formal framework for collaboration between the two organisations in the areas of research, promotion of young scientists, as well as dissemination of knowledge and implementation of research results. The focus will be on developing innovative strategies for sustainable environmental resources.

EVENTS

An active member of its community, the Institute interacts with a vibrant and diverse network both locally and internationally. In these activities, UNU-FLORES continually endeavours to effectively engage not only the academic community, but also policy- and decision makers as well as the general public. In the following section, a few key examples of how UNU-FLORES engaged its community during 2016 are highlighted. To see a full list of the events that UNU-FLORES organised or participated in, please see the index on page 53.







NEXUS SEMINAR SERIES

UNU-FLORES, in collaboration with the Faculty of Environmental Sciences of TU Dresden, organises a monthly Nexus Seminar Series featuring lectures by senior scholars that highlight all dimensions of research on the Nexus Approach, ranging from hands-on implementation strategies to theoretical debates. Taking place once a month during the German academic semesters, each seminar is open to the public and is held alternatingly at UNU-FLORES and TU Dresden. The lectures in 2016 covered the following exciting topics:



- › No. 9: The Role of Waste in the Water-Soil-Waste Management Nexus by Hiroshan Hettiarachchi (18 January 2016)
- › No. 10: Ecosystem Carbon Pumping in a Time of Drought: Addressing Limits in the Czech Republic by Manuel Acosta (18 April 2016)
- › No. 11: Organic Matter Dynamics at the Interface of Soil and Water – A Soil Science Perspective by Karsten Kalbitz (23 May 2016)
- › No. 12: Water in the Nexus Approach by Tamara Avellán (20 June 2016)
- › No. 13: Kilimanjaro under Global Change by Andreas Hemp (11 July 2016)
- › No. 14: Wastewater and Public Health: Challenges & Opportunities by Serena Caucci (19 September 2016)
- › No. 15: Fostering Regional Cooperation through Policy-Relevant Nexus by Kristin Meyer (17 October 2016)
- › No. 16: Climate Change Impacts on Energy Supply in Nigeria: A Climate-Water-Energy Nexus Assessment by Oluwabamise Afolabi (21 November 2016)
- › No. 17: Environmental Protection Strategies Under Conditions of Sustainable Land Use Management by Goddert V. Oheimb (12 December 2016)



WORKSHOPS & CONFERENCES

“Safe Use of Wastewater in Agriculture” Workshop

In order to address the technical, institutional, and policy challenges of safe water reuse, developing countries and countries in transition need clear institutional arrangements and more skilled human resources, with a sound understanding of the opportunities and potential risks of wastewater use. Sharing information between countries/regions on “good practice examples of safe water reuse in agriculture” is an important step in this process. This was the main objective of the “Safe Use of Wastewater in Agriculture” Workshop. During the workshop attendees had the opportunity to learn about 18 case studies from South America, Asia, and Africa in which wastewater is being used for agricultural purposes.

The outcome of the workshop clearly underlined that the policy and implementation-related dimension of using wastewater in agriculture continues to be a considerable challenge. Knowledge gaps and research needs were identified. In part to address this, the book *Safe Use of Wastewater in Agriculture: Good Practice Examples* compiles the case studies from the workshop. Covering cases from Brazil to South Africa to Nepal, this publication includes 17 case studies exemplifying the practice of wastewater use in agriculture across the globe.

24–25 February 2016
Lima, Peru

Type: Workshop

Partners: World Health Organization; United Nations University Institute for Water, Environment and Health; United Nations Food and Agriculture Organization; International Water Management Institute

Supporters: Promoción del Desarrollo Sostenible, United Nations Environment Programme, Federal Ministry for Economic Cooperation and Development





24–25 May 2016
Ha Noi, Viet Nam

Type: Workshop

Partners: Ministry of Construction, Vietnam (MOC), National University of Civil Engineering, Vietnam (NUCE), Institute for Global Environmental Strategies, Japan (IGES)

Nexus Observatory Workshop on “Water-Wastewater Nexus in Urbanising Asia: Building Capacity for Monitoring Water Quality Risks”

Urbanisation considerably affects the natural water cycle both in terms of quantity and quality of water available for human consumption. In Asia, the fluctuation of water quality risks flooding low-lying areas, spreading disease, and destroying crops. UNU-FLORES’s Nexus Observatory workshop on “Water-Wastewater Nexus in Urbanising Asia: Building Capacity for Monitoring Water Quality Risks” sought to address these concerns. Building on a proposal writing workshop with researchers in Tokyo, Japan, in December 2014, the Nexus Observatory workshop in Ha Noi aimed to ascertain potential for regional cooperation in Asia and discuss nexus challenges in the region. Researchers and policymakers from five South East Asian countries – Indonesia, Lao PDR, the Philippines, Thailand, and Viet Nam – gathered to discuss data needs, frameworks for data and information sharing, and capacity building requirements related to water quality and wastewater management.

Dr. Graham Alabaster from UN-Habitat joined the discussions on Day 2 and provided an overview of the Global Environmental Monitoring Initiative and stressed the importance of a regional consortium approach to support SDG Target 6.3. The workshop served as an important catalyst for advancing the development of the Wastewater Reuse Effectiveness Index (WREI, see page 9.)





High-Level Symposium on SDG 6 and Targets

9–11 August 2016
Dushanbe, Tajikistan

Type: Conference

Representing the United Nations University on an invitation from the Government of Tajikistan, UNU-FLORES joined forces with United Nations Department of Economic and Social Affairs (UN DESA) to organise Session TS 7 “Improve Water Quality by Reducing Pollution”. UNU-FLORES Director Reza Ardakanian discussed SDG target 6.3 with other high-level ministry officials and civil society representatives. The Symposium was organised by the Government of Tajikistan and UN DESA. Attended by representatives of 90 national governments and 50 international and civil society organisations, a proposal for a new International Decade for Action on “Water for Sustainable Development” was unveiled by the Government of Tajikistan at the symposium. The proposal is part of the Call for Action adopted at the High-Level Symposium on SDG 6 and Targets (9–11 August 2016) in Dushanbe. It was brought before the United Nations General Assembly (UNGA) in September 2016. On 21 December 2016, the UNGA unanimously adopted the resolution International Decade for Action “Water for Sustainable Development”, 2018–2028.





**28 August–
2 September 2016
Stockholm, Sweden**

Title: Wastewater
Reuse for Enhanced
Food and Non-Food
Value Chains

Type: Panel Discussion at
World Water Week 2016

Partners:
Center for Environmental
Systems Research (CESR)
of University of Kassel,
German Development
Institute (DIE-GDI), Food
and Agriculture Organ-
ization of the United
Nations (FAO), United
Nations Environment
Programme (UNEP)

World Water Week 2016

At the 2016 World Water Week in Stockholm UNU-FLORES organised a variety of activities focusing on recognising and using wastewater as a resource safely. Wastewater has never been such an important and valuable resource – distinguishing between its safe and risky use is key. The panel session looked at the opportunities for using wastewater within multifunctional land-use systems in urban transition zones in Sub-Saharan Africa. Increasing opportunities for capacity development was the motivation behind UNU-FLORES's new book *Safe Use of Wastewater in Agriculture: Good Practice Examples* launched directly following the session. Building on the discussions of the first seminar, an afternoon session convened by UNU-FLORES and UNEP highlighted the value of wastewater as a resource for food production (irrigation, fertilisation), employment, and electricity generation. It focused on the role of wastewater in implementing Integrated Water Resource Management approaches in developing countries.

Besides convening the aforementioned sessions and launching a new book, UNU-FLORES represented the United Nations University in the World Water Week Exhibition. Under the slogan #UNU4Water, UNU-FLORES showcased the various projects and publications focusing on this theme from the University as a whole.





Scientific & Capacity Development Workshop on “Safe Use of Wastewater in Agriculture”

UNU-FLORES joined forces with the Islamic Republic of Iran to co-organise a scientific and capacity development workshop on the Safe Use of Wastewater in Agriculture (SUWA). It aimed to enhance the UN Member State’s national capacities to practise and promote the safe and productive use of wastewater. The best possible team of experts gathered to share their knowledge in Tehran. The workshop rounded up representatives from the wastewater management companies from all 31 provinces in the country, as well as ministerial and university experts. Moving forward, UNU-FLORES’s key partner, NWWEC, has shown genuine interest in working together in implementing SUWA.

5–7 December 2016
Tehran, Iran

Type: Workshop

Partners:

Shahid Beheshti University, National Water and Wastewater Engineering Company (NWWEC) of Iran, Tadbir Economic Development Group





24–28 October 2016
Harare, Zimbabwe

Type: Training Course

Partners: WMO

USE OF SATELLITE PRODUCTS FOR DROUGHT MONITORING AND AGRICULTURAL METEOROLOGY APPLICATIONS

During a training course on the “Use of Satellite Products for Drought Monitoring and Agricultural Meteorology Applications”, UNU-FLORES researcher Ana Andreu from the Systems and Flux Analysis Considering Global Change Unit presented the project entitled “Remote Sensing of Water Use and Water Stress in African Savanna Ecosystem from Local to Regional Scale: Implications for

Land Productivity” under the TIGER initiative. Organised by the World Meteorological Organization (WMO) and European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), the training course that took place 24–28 October 2016 in Harare was a timely intervention.

Directed at experts in agrometeorology in the National Meteorological Services and Ministries of Agriculture of Angola, Botswana, Namibia, Lesotho, Malawi, Mozambique, Republic of South Africa, Swaziland, Zambia, and Zimbabwe, the training in the Zimbabwean capital aimed to provide information on appropriate weather and climate technologies to equip decision-making in food security – at national and smallholder farmer levels – in southern African countries. Strengthening local technical capacity helps authorities improve disaster preparedness and management.





2ND WORLD IRRIGATION FORUM

The sustainable management of resources in irrigation and drainage is only attainable if we apply a complete water chain approach and fully involve stakeholders from start to end and from farmer to minister.

Speaking at the 2nd World Irrigation Forum, UNU-FLORES Director Reza Ardakanian addressed the key issues in managing resources sustainably and offered three plausible solution pathways, namely: managing increasing resource demands from various sectors, minimising the negative environmental effects of irrigation and maximising the provision of ecosystem services, and understanding the role of stakeholders in governing irrigation and drainage matters. Prof. Ardakanian was presenting the background paper of the Forum's sub-theme 1: "Key Issues of Irrigation and Drainage in Balancing Water, Food, Energy, and Ecology".

Taking place 6–12 November in Chiang Mai, Thailand, this year's installation of the triennial event focuses on the main theme "Water Management in a Changing World: Role of Irrigation in Sustainable Food Production" with three sub-themes. Policymakers, experts, manufacturers, and farmers gather this week to address various multidisciplinary perspectives on irrigation and drainage and allied sectors. The mega event is also the largest business event relating to agriculture, water, and the environment. Not only is information being exchanged between experts globally at the Forum, but it is also a platform where the latest skills and products in the fields are being exhibited.

6–12 November 2016
Chiang Mai, Thailand

Type: Conference

Partners: ICID





6–8 December 2016
Geneva, Switzerland

Type: Global Stock-Taking Workshop

Partners: UNECE

Assessments of the Water-Food-Energy-Ecosystems Nexus and Response Measures in Transboundary Basins

On 6–8 December 2016 Tamara Avellán, Head of the Water Resources Management unit at UNU-FLORES, shared the Institute’s experience and promoted its resource-based Nexus Approach at UNECE’s global stocktaking workshop “Assessments of the Water-Food-Energy-Ecosystems Nexus and Response Measures in Transboundary Basins” and at the fourth meeting of the Task Force on the Water-Food-Energy-Ecosystems Nexus under the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) in Geneva.

At the workshop, experts and key global stakeholders in the nexus arena reviewed key methodologies and initiatives of relevance for assessing intersectoral (nexus) issues in transboundary basins and drew lessons learnt from the assessments carried out, among other things. The audience repeatedly highlighted the challenge in distinguishing IWRM from the Water-Energy(-Ecosystem)-Food Nexus promoted by agencies and research institutes alike, and were pleased to note how the UNU-FLORES resource-based Nexus Approach opened space to move beyond the resource ‘water’ to also addressing the resources soil and waste.





SPECIAL EVENTS

Federal Celebration on the Day of German Unity

From 1 to 3 October 2016, Dresden hosted the federal celebration of the Day of German Unity. The festivities spread across the entire city centre, with many interactive and informative public activities. UNU-FLORES was invited by the Saxon State Chancellery and the German Federal Ministry for Economic Cooperation and Development (BMZ) to be part of the event. UNU-FLORES was present with a stand in the area organised by BMZ under the theme "One world – Our Responsibility". In the area UNU-FLORES organised an exhibition on the Sustainable Development Goals (developed together with the SDG Action Campaign). It is estimated that more than 450,000 guests visited the festivities.

1-3 October 2016
Dresden, Germany

Partners: German
Federal Ministry for
Economic Cooperation
(BMZ), UN SDG Action
Campaign



SUSTAINABLE DEVELOPMENT GOALS
LEAVING NO ONE BEHIND
ALLE mitnehmen

Nearly 10 million people from 194 countries have participated in the United Nations MY World survey, making it the largest survey ever undertaken.

Behind every vote, there's a personal story that deserves to be told. This exhibition features content from the photo-narrative series 'Humans of NY World', shedding light on the human stories behind the Sustainable Development Goals.

Agenda 2030 and the 17 Sustainable Development Goals (SDGs) represent an unprecedented leap forward in the fight against poverty and inequalities, as well as in the struggle for environmental sustainability. The SDGs embody a universal, inclusive and transformative vision of development, which calls upon all Member States to ensure a life of dignity for all, leaving no one behind.

This is a key year to move from commitment to action on the SDGs. It is important that world leaders do not forget the priorities of their people.

Fast 10 Millionen Menschen aus 194 Ländern haben an der MY World Umfrage der Vereinten Nationen teilgenommen. Damit ist diese Umfrage die größte aller Zeiten.

Hinter jeder Stimme steckt eine Geschichte, die es zu erzählen lohnt. Die vorliegende Ausstellung präsentiert Fotos und Zitate aus der Serie „Humans of NY World“: Sie zeigt die Geschichten hinter den Nachhaltigen Entwicklungsplan und der Agenda 2030.

Die 17 Nachhaltigen Entwicklungsziele stellen einen Quantensprung im Einsatz gegen Armut und Ungleichheit dar, aber auch im Ringen um ökologische Nachhaltigkeit. Die Nachhaltigen Entwicklungsziele verkörpern eine universelle, inklusive und transformative Vision von Entwicklung, die jeden der Möglichkeiten dazu auf, ein Leben in Würde für alle zu ermöglichen und dabei niemanden zurückzulassen.

In diesem Jahr sollen die Nachhaltigen Entwicklungsziele von der Verpflichtungserklärung hin zum konkreten Handeln gelangen. Dabei, so der Appell an die Regierungen der Welt, sollen die dringlichen Bedürfnisse der Menschen nicht aus dem Blick verloren werden.

ZIELE FÜR NACHHALTIGE ENTWICKLUNG



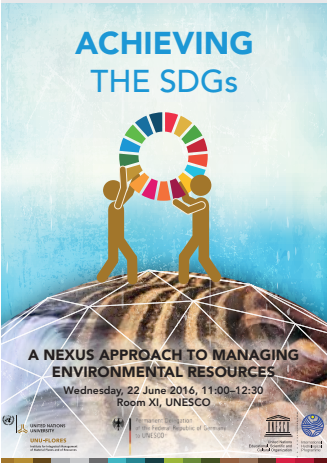


22 June 2016
Paris, France

Type: UNESCO-Inter-
national Hydrological
Programme

“Achieving the SDGs: A Nexus Approach to Managing Environmental Resources” at UNESCO Headquarters

UNU-FLORES organised an event at UNESCO Headquarters in Paris on “Achieving SDGs: A Nexus Approach to Managing Environmental Resources” under the patronage of H.E. Ambassador Dr Michael Worbs, Permanent Delegate of Germany to UNESCO. High-level officials and representatives from over 60 Permanent Delegations, and numerous UNESCO Secretariat Offices were introduced to the Nexus Approach to environmental resources management and its relevance for national strategies to achieve the UN SDGs. At the event, UNU-FLORES also launched the book *Environmental Resource Management and the Nexus Approach: Managing Water, Soil, and Waste in the Context of Global Change* (Springer 2016), which was agreed to provide a valuable contribution to debates on sustainable environmental resource management practice.



Launch of UNU-FLORES book *Environmental Resource Management and the Nexus Approach: Managing Water, Soil, and Waste in the Context of Global Change* (Springer 2016)



UNU-FLORES Director Prof. Reza Ardakanian



H. E. Ambassador Dr Michael Worbs, Permanent Delegate of the Federal Republic of Germany to UNESCO



Assistant Director-General for Natural Sciences at UNESCO Dr Flavia Schlegel



Representative of UNU at UNESCO
H.E. Ambassador Daniel Rondeau



UNU-FLORES International Advisory Committee Member
Prof. Wim Van Vierssen



Dr Giuseppe Arduino, Chief of Section a.i. Eco-hydrology, Water Quality and Water Education Section (EQE), UNESCO-IHP



H.E. Ambassador Mr Byong Hyun Lee, Permanent Delegate of the Republic of Korea to UNESCO



H.E. Ambassador Mrs Begum K. Taj, Permanent Delegate of Tanzania to UNESCO



H.E. Mr Raul Hildalgo Gallegos, Chargé d'Affaires of the Permanent Delegation of Peru to UNESCO



24 & 28 October 2016
Dresden, Germany

Partners: The City of Dresden, German United Nations Association, Technische Universität Dresden (TU Dresden), Unicef Local Working Group Dresden, the Local Agenda für Dresden 21 Association, Lions Club Dresden Agenda 21, World Trade Center

Funds: Stiftung Nord-Süd Brücken of the German Federal Ministry for Economic Cooperation (BMZ)

Sponsors: DREWAG Stadtwerke Dresden GmbH, Dresdner Verkehrsbetriebe AG, Ostsächsische Sparkasse Dresden, Stadtentwässerung Dresden, Steuerkanzlei D. Müller-Greven

UN Day Dresden

The UN Day programme in Dresden kicked off with the UN Spotlight Talk on "Resilient Cities" on 24 October 2016. Speaking to about 200 guests at the City Hall of Dresden, Dan Lewis, Chief of the UN Habitat City Resilience Profiling Programme, delivered the keynote speech of the evening. This was followed by a panel discussion with local experts and an award ceremony where the 17th Agenda 21 Awards for local projects promoting sustainable development were conferred.

The UN Day celebration culminated in a public fair on 28 October 2016 at World Trade Center Dresden. Under the slogan "Discovering Sustainability – 17 Goals for a Better World", a variety of information stands and participatory activities were organised in the inner courtyard. Open to the public, schoolchildren and the local population of Dresden had a chance to learn about the United Nations, its tasks, and goals, as well as a chance to get acquainted with sustainability issues. An exhibition on the Sustainable Development Goals (SDGs) was featured this year. As part of an initiative to raise public awareness about the Global Goals, we ran a social media campaign in which we engaged with Dresden locals who were present at the fair and talked to them about the Goals. The outcome of the interesting exchanges was captured on our Twitter feed. Happening parallel to the fair and stage programme and also throughout the week in schools were workshops on various topics ranging from human rights by Amnesty International to ecology by BUND. In total our partners reached out to 25 school classes, benefitting about 500 schoolchildren through the workshops.



INDEX OF EVENTS


Title	Location	Date	Role of UNU-FLORES
Nexus Seminar No. 9: The Role of Waste in the Water-Soil-Waste Management Nexus	Dresden, Germany	18 Jan	Co-Organiser
TIGER Workshop	Addis Ababa, Ethiopia	1–2 Feb	Participant
“Safe Use of Wastewater in Agriculture” Workshop	Lima, Peru	24–25 Feb	Organiser
6 th Science Congress of the German Society of Waste Management	Berlin, Germany	9–11 Mar	Participant
The Impact of Climate Change on the Water Cycle and Options for Adaptation: Drought	Bonn, Germany	30 Mar	Speaker
Visit of CzechGlobe & Nexus Seminar No. 10: Ecosystem Carbon Pumping in a Time of Drought: Addressing Limits in the Czech Republic	Dresden, Germany	18 Apr	Host & Co-Organiser
“Jumpstarting the SDGs in Germany: Natural resources and sustainable consumption and production”	Berlin, Germany	3 May	Participant
Inter-Agency Meeting on Sound Chemicals Management	Geneva, Switzerland	10 May	Participant
BMBF-PAUWES Workshop	Bonn, Germany	11–12 May	Speaker
Conference “Exzellente Wissenschaft” at Saxon State Ministry for Science, Higher Education and the Arts	Dresden, Germany	20 May	Presenter
Nexus Seminar No. 11: Organic Matter Dynamics at the Interface of Soil and Water – A Soil Science Perspective	Dresden, Germany	23 May	Co-Organiser
Nexus Observatory Workshop on “Water-Wastewater Nexus in Urbanising Asia: Building Capacity for Monitoring Water Quality Risks”	Ha Noi, Viet Nam	24–25 May	Organiser
Dresdner Wasserseminar 2016 on “Sustainable Development Goals”	Dresden, Germany	17 Jun	Speaker
Nexus Seminar No. 12: Water in the Nexus Approach	Dresden, Germany	20 Jun	Co-Organiser
“Achieving the SDGs: A Nexus Approach to Managing Environmental Resources” at UNESCO Headquarters	Paris, France	22 Jun	Co-Organiser
Visit of Saxon Parliamentarians	Dresden, Germany	28 Jun	Host
UNU-FLORES Advisory Committee Meeting	Dresden, Germany	30 Jun–1 Jul	Organiser
6 th Sino-EU Panel on Land and Soil	Beijing, China	4–6 Jun	Speaker

Title	Location	Date	Role of UNU- FLORES
Nexus Seminar No. 13: Kilimanjaro under Global Change	Dresden, Germany	11 Jul	Co-Organiser
High-Level Symposium on SDG 6 and Targets	Dushanbe, Tajikistan	9–11 Aug	Session Convenor
Book Launch, Sessions, and UNU Booth at World Water Week 2016	Stockholm, Sweden	28 Aug–2 Sep	Session Convenor
Poster Presentation at IWA Specialist Conference on Wetland Systems for Water Pollution Control	Gdansk, Poland	4–9 Sep	Presenter
Nexus Seminar No. 14: Wastewater and Public Health: Challenges & Opportunities	Dresden, Germany	19 Sep	Co-Organiser
“Discover the SDGs” Exhibition at national celebration for Day of German Unity	Dresden, Germany	1–3 Oct	Organiser
Workshop on “How Do We Want to Live Tomorrow? Perspectives on Water Management in Urban Regions”	Essen, Germany	4–7 Oct	Participant
Workshop on “A Systems Approach to Sustainable Development Goals” at CESR	Kassel, Germany	13 Oct	Speaker
Nexus Seminar No. 15: Fostering Regional Cooperation through Policy-Relevant Nexus Research	Dresden, Germany	17 Oct	Co-Organiser
IUFRO Regional Congress for Asia and Oceania on “Forests for Sustainable Development: The Role of Research”	Beijing, China	24–27 Oct	Speaker
Training Course on the “Use of Satellite Products for Drought Monitoring and Agricultural Meteorology Applications”	Harare, Zimbabwe	24–28 Oct	Trainer
UN Day Dresden 2016	Dresden, Germany	24 & 28 Oct	Co-Organiser
Special Lecture “The Challenge of Change in South Africa: Implications for Water Governance” by Dr Owen Horwood	Dresden, Germany	31 Oct	Organiser
2 nd World Irrigation Forum (WIF2)	Chiang Mai, Thailand	6–12 Nov	Session PR (1.5), Co-Chair
2 nd Workshop on “Assessing the Water-Food-Energy-Ecosystems Nexus and Benefits of Transboundary Cooperation in the Drina River Basin”	Belgrade, Serbia	8–10 Nov	Facilitator
Seminar on Water and Health	São Paulo, Brazil	9–10 Nov	Speaker
“Pop Up Muse” at World Science Day for Peace & Development	Geneva, Switzerland	10 Nov	Facilitator
Nexus Seminar No. 16: Climate Change Impacts on Energy Supply in Nigeria: A Climate-Water-Energy Nexus Assessment	Dresden, Germany	21 Nov	Co-Organiser

Title	Location	Date	Role of UNU- FLORES
Workshop on “Nexus Research Meets Nexus Practice”	Bonn, Germany	21 Nov	Participant
12 th International Symposium on the Southeast Asian Water Environment	Ha Noi, Viet Nam	28–30 Nov	Presenter
Keynote Speech at event on “Water and Environment in the New Millennium: Education and Capacity Building”	Tehran, Iran	3–5 Dec	Speaker
Scientific & Capacity Development Workshop on “Safe Use of Wastewater in Agriculture”	Tehran, Iran	5–7 Dec	Co-Organiser
Workshop on “Assessments of the Water-Food-Energy-Ecosystems Nexus and Response Measures in Transboundary Basins” & 4th Meeting of the Task Force on the Water-Food-Energy-Ecosystems Nexus	Geneva, Switzerland	6–8 Dec	Presenter & Participant
Nexus Seminar No. 17: Environmental Protection Strategies Under Conditions of Sustainable Land Use Management	Dresden, Germany	12 Dec	Co-Organiser
Visit of Korea Environment Corporation (Keco)	Dresden, Germany	15 Dec	Host

ABOUT

THE INSTITUTE



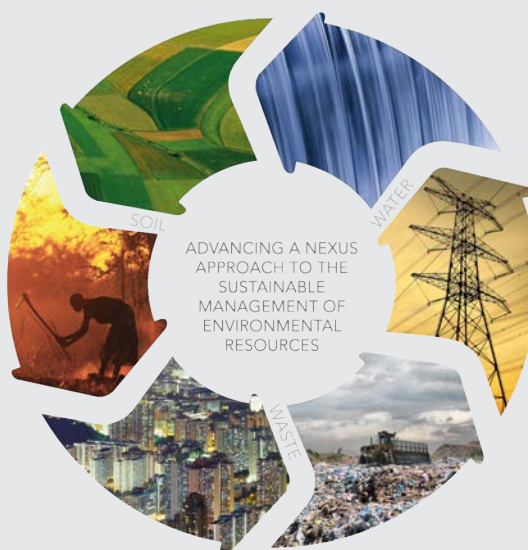
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ADMINISTRATIVE DEVELOPMENTS IN 2016

The solid and efficient administrative framework developed and implemented by UNU-FLORES over its first few years withstood a noteworthy test in 2016. In the spring UNU-FLORES successfully underwent an **external audit** performed by the **UN Board of Auditors**. Areas such as strategic and work plan, fundraising, finance, procurement, human resources operations as well as project management were looked into.

However, committed to continually improving our business model, UNU-FLORES unveiled two documents in 2016 which will strongly impact the institute's future activities: the **UNU-FLORES Quality Assurance Framework** and new **Fundraising Strategy**. The United Nations University as a whole has committed itself to improve indicators and monitoring processes across the organisation. The Framework developed by UNU-FLORES is a complimentary contribution to this process. The Quality Assurance Framework, which has been adopted by the Advisory Committee at its third annual session, sets a precedent for the future monitoring and evaluation of the Institute's projects and activities. The new Fundraising Strategy outlines plans for soliciting funds from third-party sources to achieve a more diverse funding base to support the execution of the Institute's undertakings.

Continuing our tradition of also constantly working to ensure a safe work environment for our employees, UNU-FLORES commenced a **Basic First Aid Training Course** and **Fire Brigade Training** at UNU-FLORES as a part of the safety and security training series at the UNU-FLORES.





Vision

UNU-FLORES acts at the forefront of initiatives promoting a Nexus Approach to the sustainable management of water, soil, and waste. The Institute supports the overall mission of UNU as a think tank for the United Nations and its Member States, in particular addressing the needs of developing countries and emerging economies. In this role, UNU-FLORES aspires to become an internationally recognised hub and intellectual focal point promoting integrated management strategies.

Additionally, UNU-FLORES engages in policy-relevant research, postgraduate education, and capacity development in a broad sense. The Institute attracts high-calibre students for postgraduate study and research programmes in cooperation with other research institutions. Furthermore, UNU-FLORES builds the capacity of future leaders in the area of environmental resources management and develops innovative concepts for target- and region-specific knowledge transfer.

Mission

“Advancing the Nexus Approach to the sustainable management of environmental resources”

In line with the general mission of UNU to foster sustainable development, UNU-FLORES aims to contribute to the resolution of pressing challenges to the sustainable use and integrated management of environmental resources, such as water, soil, and waste. UNU-FLORES strives to advance the development of integrated management strategies that take into consideration the impact of global change on the sustainable use of the environmental resources. To this end, the Institute engages in research, teaching, advanced training, capacity development, and dissemination of knowledge.

ADVISORY COMMITTEE

At the Third Annual Meeting (30 June–1 July 2016) of the UNU-FLORES International Advisory Committee (IAC) the Members had the opportunity to meet with UNU Rector Dr David Malone, all UNU-FLORES staff, and representatives of the German Federal and Saxon State governments to discuss the progress and plans of the Institute.

In addition to the traditional report on the activities of the Institute's activities, budget implementation, and staffing developments, the Committee adopted a new Fundraising Strategy and the UNU-FLORES Quality Assurance Framework. In their concluding remarks, all members of the IAC praised the considerable achievements of UNU-FLORES in the short period of three years and expressed clear support of the strategic plans and ongoing activities of the Institute.



Advisory Committee Meeting



Chair: Prof. Rattan Lal (USA)



Rattan Lal is a Distinguished University Professor of Soil Science and Director of the Carbon Management & Sequestration Center at the Ohio State University.



Prof. Karl-Heinz Feger (Germany)



Karl-Heinz Feger serves as Dean of the Faculty of Environmental Sciences at TU Dresden. He is director of the Institute of Soil Science and Site Ecology of TU Dresden.



Prof. Ana Mondjana (Mozambique)



Ana Maria da Graça Mondjana is Vice-Rector for Academic Affairs since May 2011 and is Assistant Professor at the Faculty of Agronomy and Forestry Engineering (FAEF) at Eduardo Mondlane University (UEM).



Prof. Adelaide Cassia Nardocci (Brazil)



Adelaide C. Nardocci is professor of environmental risk assessment and risk management in the Department of Environmental Health at the School of Public Health, University of São Paulo since 2001.



Prof. Wim van Vierssen (The Netherlands)



Wim van Vierssen is CEO of KWR Watercycle Research Institute, the research institute of the Dutch Drinking Water Utilities. He is Rathenau Professor at Delft University of Technology on Science System Assessment of Water-Related Research and was appointed IWA Fellow in 2016.

COMMUNICATIONS & ADVOCACY

The Communications and Advocacy (CommA) Unit steers UNU-FLORES's communications and dissemination endeavours, with the aim of increasing awareness, impact, communication, and outreach of policy-relevant research and capacity development activities of the Institute.

This is done through both print (see Publications) and digital media.



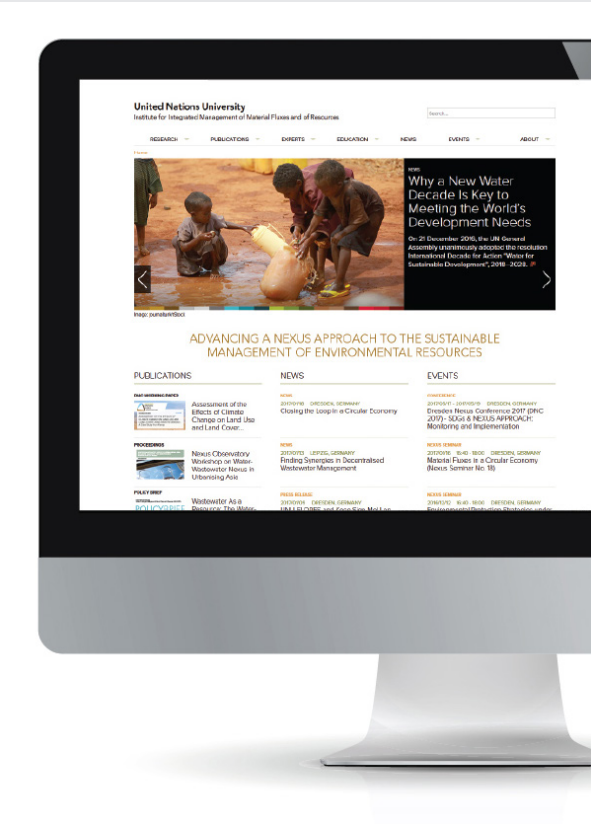
In 2016, UNU-FLORES launched the first issue of NexNews, a quarterly electronic newsletter keeping the community updated on the latest developments in the Institute's research and activities. Besides direct mailing, UNU-FLORES's digital presence is also manifest via the institutional website and social media. In 2016, UNU-FLORES received 114,869 page views by 32,882 users. Of these, 29% of visitors are from Germany, followed by the India, the United States, and Iran. On Facebook, UNU-FLORES's followership has grown by 95% during the year, attaining a total engagement of 5,737 and a reach of 64,445. UNU-FLORES's followers on Twitter have also increased by 181, attaining an engagement of 2,245 with a reach of 195,834. New videos have been uploaded on UNU-FLORES's YouTube channels.



In terms of media coverage, UNU-FLORES has made its appearance on various media outlets, such as The Huffington Post and Australian Broadcasting Company. In 2016, UNU-FLORES has been mentioned in 185 articles. In the same year, UNU-FLORES has also for the first time worked with the popular press to produce news articles for a wider audience. Following a news writing workshop for our researchers, the latter have worked with the team at The Conversation to get two articles published, that themselves reached 30,000 readers and were subsequently further republished by other platforms.

For media resources, see the Media section of the UNU-FLORES website:

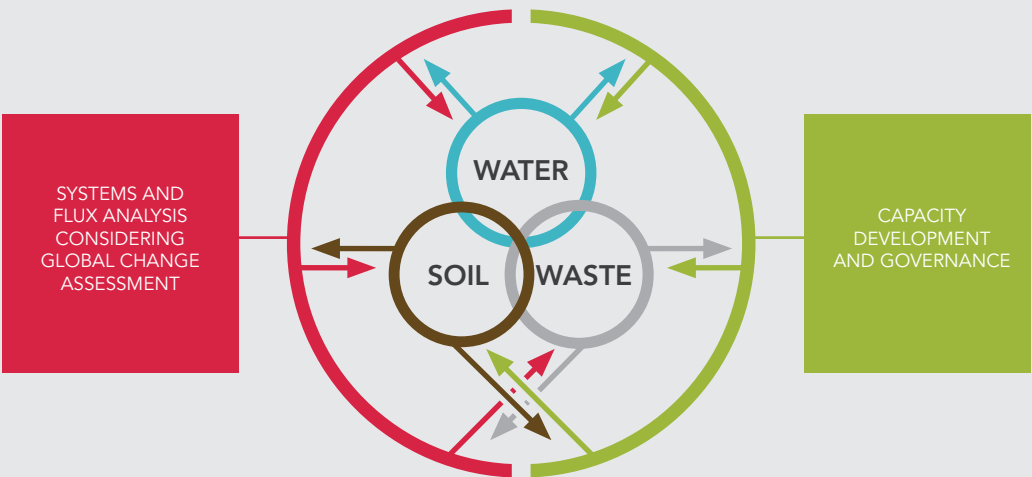
<https://flores.unu.edu/en/about/media>



ORGANISATIONAL STRUCTURE

In developing its functional structure, UNU-FLORES has positioned itself well to consolidate the scientific foundation of the Nexus Approach. The institutional arrangement is a direct response to critical knowledge gaps relating to integrated management of the environmental resources water, soil, and waste. The organisation of UNU-FLORES into five academic units – three core scientific units (Water Resources Management (WRM), Waste Management (WM), and Soil and Land-Use Management (SLM)) supported by two cross-cutting units (System Flux Analysis Considering Global Change Assessment (SFA) and Capacity Development and Governance (CDG)) – supports the think tank function of the Institute. All scientific units are supported by the operational support units, which consist of the Office of the Director, Finance and Administration, and Communications and Advocacy.

Functional Structure of Scientific Units



Functional Structure of Operational Support Units



OUR TEAM

Director – Prof. Reza Ardakanian (Iran)

Academic Units

- › Water Resources Management
 - › Dr Tamara Avellán (Uruguay)
Research Fellow
 - › Ms Sabrina Julie Kirschke (Germany)
Research Assistant
 - › Mr Agossu Gadejiso-Tossou (Togo)
PhD Fellow
- › Soil and Land-Use Management
 - › Dr Kai Schwärzel (Germany)
Academic Officer
 - › Dr Lulu Zhang (China)
Research Assistant
 - › Ms Parvathy Chandrasekhar (India)
PhD Fellow
 - › Mr Janis Kreiselmeier (Germany)
PhD Fellow
 - › Ms Anika Reetsch (Germany)
PhD Fellow
- › Waste Management
 - › Prof. Hiroshan Hettiarachchi (USA)
Academic Officer
 - › Ms Serena Caucci (Italy)
Research Assistant
 - › Ms Hoang Nguyen (Viet Nam)
PhD Fellow
- › Systems and Flux Analysis
 - › Dr Stephan Hülsmann (Germany)
Academic Officer
 - › Dr Ana Andreu Mendez (Spain)
Research Assistant

- › Mr Solomon Gebrechorkos (Ethiopia)
PhD Fellow
- › Mr Mahesh Jampani (India)
PhD Fellow
- › Capacity Development and Governance
 - › Dr Mathew Kurian (India)
Academic Officer
 - › Ms Kristin Meyer (Germany)
Research Assistant
 - › Ms Sekela Twisa (Tanzania)
PhD Fellow

Operational Support Units

- › Office of the Director
 - › Mr Mohamad Haroun (Lebanon)
Security and Front Desk Attendant
 - › Ms Rongxi Guo (China)
Programme Support Assistant
- › Finance and Administration
 - › Ms Maria Kauppinen (Finland)
Finance and Administrative Consultant
 - › Ms Julie Coulombe (Canada)
Administrative Assistant
- › Communications and Advocacy
 - › Ms Rachel Shindelar (USA)
Communications and Advocacy Officer
 - › Ms Claudia Matthias (Germany)
Graphic & Web Design Assistant
 - › Ms Atiqah Fairuz Salleh (Singapore)
Editorial Assistant

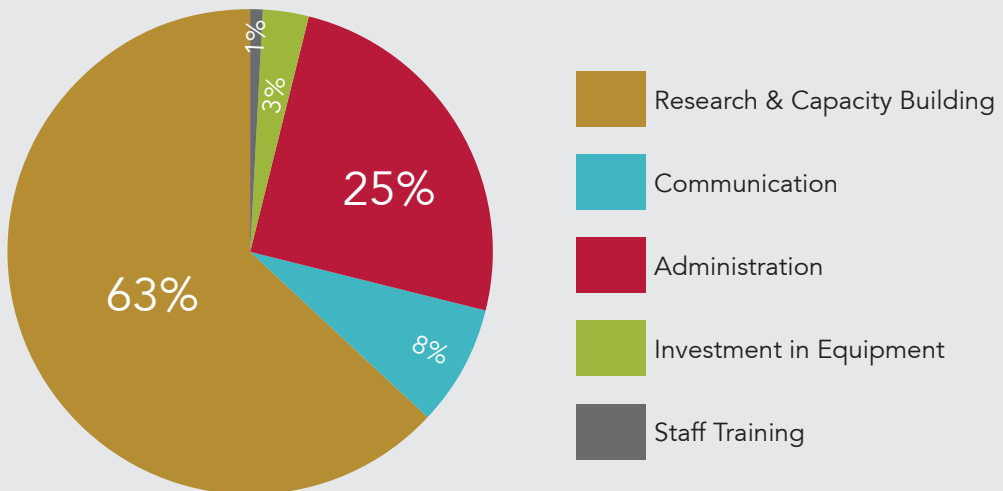
During 2016 UNU-FLORES was supported by a team of motivated and competent interns; they are listed in alphabetical order below.

- › Arjun Avasthy (India)
- › Kara Canlas (USA)
- › Soyoung Jung (Korea)
- › Eva Kimonye (Kenya)
- › Min Jung Kwon (Korea)
- › Joana Lapao Rocha (Portugal)
- › Hyo-Sun Lee (Korea)
- › Desamparados Martinez (Spain)
- › Diana Carolina Riano Guzman (Colombia)
- › Abtin Sharkoh (Iran)
- › Dong Ryun Shin (Korea)
- › Christian Thuss (Germany)

FINANCES

In 2016, the institute succeeded in achieving funding from third party amounting to approximately EUR 250,750, including about EUR 160,000 for research projects and about EUR 85,000 for its PhD programme. In addition, around EUR 5,500 could be earned from the Institute's e-Learning platform and through book royalties. All income contributes towards diverse academic and institutional activities, while the Institute continuously strives to maximise its academic endeavours while keeping administrative costs within budget.

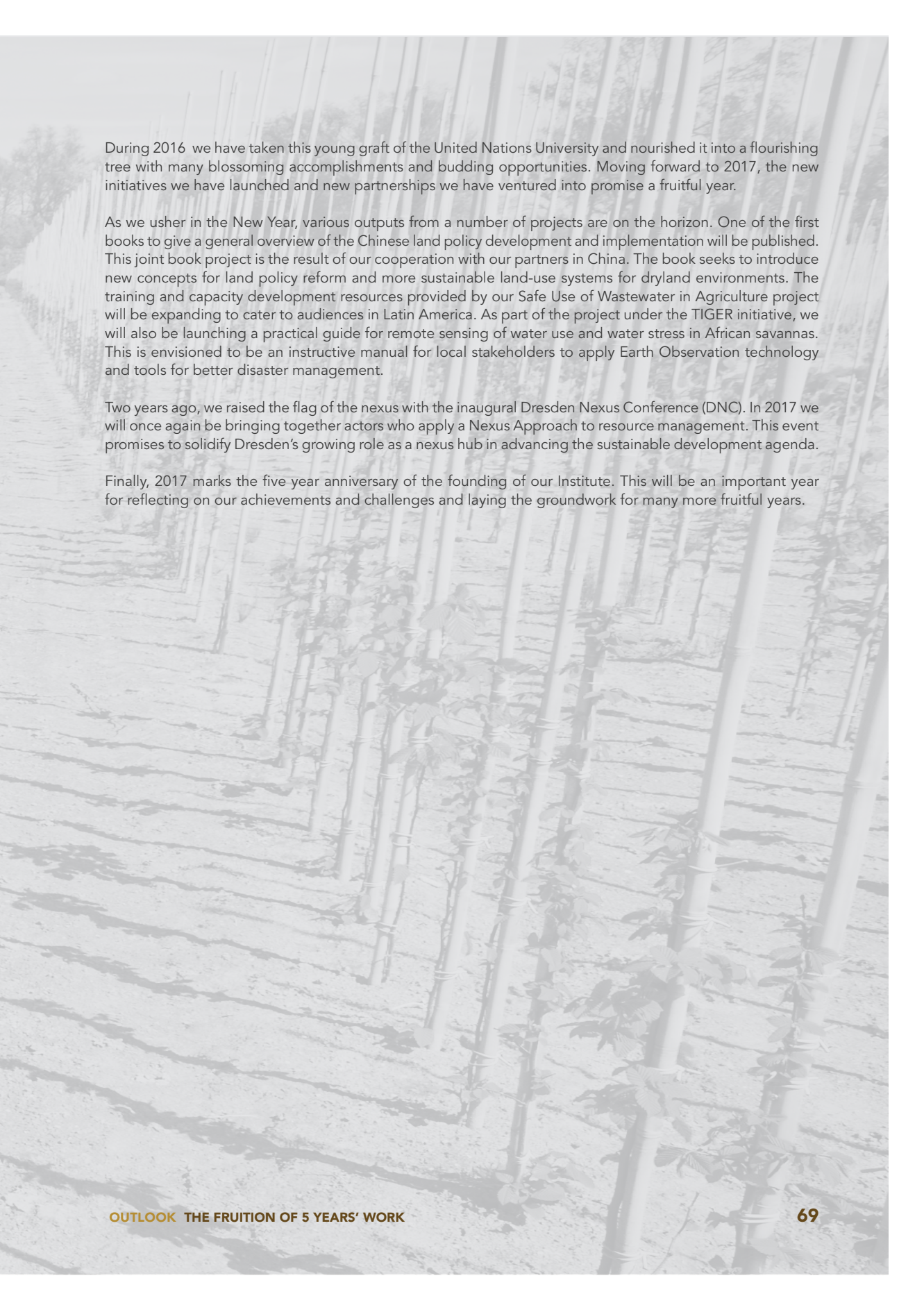
Total Expenses 2016 EUR 1,509,042





OUTLOOK

THE FRUITION OF 5 YEARS' WORK



During 2016 we have taken this young graft of the United Nations University and nourished it into a flourishing tree with many blossoming accomplishments and budding opportunities. Moving forward to 2017, the new initiatives we have launched and new partnerships we have ventured into promise a fruitful year.

As we usher in the New Year, various outputs from a number of projects are on the horizon. One of the first books to give a general overview of the Chinese land policy development and implementation will be published. This joint book project is the result of our cooperation with our partners in China. The book seeks to introduce new concepts for land policy reform and more sustainable land-use systems for dryland environments. The training and capacity development resources provided by our Safe Use of Wastewater in Agriculture project will be expanding to cater to audiences in Latin America. As part of the project under the TIGER initiative, we will also be launching a practical guide for remote sensing of water use and water stress in African savannas. This is envisioned to be an instructive manual for local stakeholders to apply Earth Observation technology and tools for better disaster management.

Two years ago, we raised the flag of the nexus with the inaugural Dresden Nexus Conference (DNC). In 2017 we will once again be bringing together actors who apply a Nexus Approach to resource management. This event promises to solidify Dresden's growing role as a nexus hub in advancing the sustainable development agenda.

Finally, 2017 marks the five year anniversary of the founding of our Institute. This will be an important year for reflecting on our achievements and challenges and laying the groundwork for many more fruitful years.

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**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 Higher Education, Research and the Arts (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 13 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 under: flores.unu.edu

ADVANCING A NEXUS APPROACH TO THE SUSTAINABLE MANAGEMENT OF ENVIRONMENTAL RESOURCES

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