

Arequipa Nexus Institute for Food, Energy, Water and the Environment

Science for a Sustainable Future

The *Universidad Nacional de San Agustín* (UNSA) in Arequipa, Peru and Purdue University in Indiana, USA through Discovery Park's Center for the Environment (C4E) have partnered to create a bold new research, education, and innovation institute to work together on key challenges for a sustainable future for the citizens of Arequipa. The Arequipa Nexus Institute for Sustainable Food, Energy, Water, and the Environment (The Nexus Institute) launched its multiphase collaboration in March 2018.

The Challenges Ahead

Urbanization, agricultural intensification, and the mining of metal ores brought many economic and social benefits to Arequipa, and to Peru in general. These activities have also contributed to the degradation of the region's air, soil, and water resources. Landscape-level changes in the form of desertification, soil erosion and rapidly melting glaciers further impact local livelihoods, economies, infrastructure, and ecosystems. Additionally, the region's changing and ambiguous natural resources ownership and use rights, inequitable development and high rates of poverty have resulted in increased food insecurity, overall socio-ecological vulnerability, and in some cases, social conflict.

These social, environmental, and economic challenges are interconnected in complex ways and demand innovative, multi-team approaches for effective change. Any truly effective solutions must be future-adaptive, explicit about trade-offs, and be grounded in the unique social-ecological systems that define the region's ecological conditions, physical infrastructure, social institutions, economies, regulatory and policy environments, as well as human attitudes, lifestyles, and behaviors.

The Nexus Institute applies collaborative, data-driven, interdisciplinary science, technology, and innovation to help chart anew course toward a sustainable future.

160 UNSA & PURDUE FACULTY & STAFF

The Arequipa Nexus Institute leverages the institution-level faculty, student, and infrastructure commitment of UNSA and the combined strengths of research faculty and infrastructure from Purdue's Colleges of Agriculture, Engineering, Health and Human Sciences, Liberal Arts, Science, the Purdue Polytechnic Institute, and the Purdue Libraries.

Additional Investigators

35+ Postdoctoral Researchers | **25+** UNSA Students | **25+** Purdue Students



Nexus Vision

To be a vibrant research, education, and innovation ecosystem where transformative solutions to grand challenges faced by Arequipa, Peru, and Latin America are explored.

Nexus Mission

To build capacity and the strategic, long-term collaborations needed to address key environmental, agro-economic and social challenges that will support development of adaptive, profitable and sustainable food-energy-water systems in the Arequipa region of Peru.

UNSA
UNIVERSIDAD NACIONAL DE SAN AGUSTÍN DE AREQUIPA

PURDUE
UNIVERSITY

Center for the Environment

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Four Integrated Centers will Support the Research Ecosystem within the Nexus Institute



The Center for Sustainable Watershed Management works with key stakeholder groups to develop data, simulation models, and decision support tools for watershed management through:

- ▶ State-of-the-art data sets; modeling laboratories including GIS and remote sensing labs;
- ▶ Environmental decision tools, that operate on a variety of computing desktop and mobile platforms, that address food-energy-water management in the region.



The Center for Soil and Water Quality addresses environmental and sustainability challenges throughout the Arequipa Region with research, education, and outreach activities such as:

- ▶ Establishment and support of soil, sediment, and water monitoring stations at locations critical to ground and surface water sources and at regions of agronomic importance;
- ▶ Creation of research facilities for analysis of soil and aquatic microbiology, geochemistry, and environmental contaminants as well as high resolution spatial mapping and visualization.



The Center for Social Sciences and the Environment applies innovative social science approaches, grounded in interdisciplinary socio-environmental research, to collect and analyze individual, household and community data in order to:

- ▶ Address pressing socio-environmental challenges related to extractive and agricultural activities, energy use, and food and water security;
- ▶ Empower local communities through discussion, problem-solving, and engagement in decision making at various scales.



The Center for Agricultural Innovation and Demonstration guides research to promote sustainable production of safe, healthy, low energy consumption, and profitable crop and animal agricultural products in Peru by:

- ▶ Using advanced technologies for planting, monitoring, and harvesting crops such as advanced phenotyping and genetics;
- ▶ Investigating the factors affecting contamination of agricultural products, as well as testing innovations in the storage and transport of foods to minimize loss by pest and physical damage.

About *Universidad Nacional de San Agustín* (UNSA)

UNSA was founded on Nov. 11, 1828, as a public university in Arequipa, Peru. Its mission is to train high-quality professionals to be competitive, capable of being agents of change and development in society, and excellent researchers capable of solving the problems that impact the environment.

About Purdue University's Discovery Park

Discovery Park is a place where researchers move beyond traditional boundaries, collaborating across disciplines and with policy makers and business leaders to create solutions for a better world. Grand challenges of global health, global conflict, and security, and those that lie at the nexus of sustainable energy, world food supply, water and the environment are the focus of researchers in Discovery Park.

Creating an Innovation and Capacity Building Ecosystem

Purdue University has a long tradition of global engagement promoting research, education, and capacity building. Purdue and UNSA partners will co-manage and co-develop customized workshops with technical training modules on food-energy-water systems, environmental management, and tools for microbiological, plant, geochemical and GIS analysis to be held at both Purdue and UNSA.

Contact

Lori Hoagland, & Walter D. Leon-Salas, Professors
Nexus Institute CoDirectors
Email: c4e-nexus@purdue.edu

Dennis Macedo Valdivia, Professor
Nexus Institute CoDirector
Email: dmacedova@unsa.edu.pe

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