



Collaboration between Mexico and Wageningen University & Research



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Preface

As the Rector Magnificus of Wageningen University & Research and Vice-President of the Executive Board, I, Carolien Kroeze, am thrilled to introduce this booklet. It's a showcase of the long, rich, and successful partnership between Wageningen University & Research (WUR) and Mexico. This bond isn't new; it has deep historical roots, from the Netherlands recognizing Mexico's independence way back in 1821, to pioneering agricultural studies by WUR's predecessors.

Today, that mission is an essential match for the big, complex challenges Mexico faces, be it water scarcity, climate change, or building sustainable food systems. This booklet takes you on a tour of our current impact: from tackling huge logistics puzzles at the Central de Abasto market and developing high-tech solutions like agrivoltaics for better farming and clean energy, to crucial work on human rights risks in commodity sectors and climate-resilient pastures. We are especially proud that Mexico is the second-largest source of Latin American students at WUR (academic year 2023-2024)! These collaborations underscore the WUR approach: they are balanced, long-term partnerships that demonstrate our commitment to creating real, tangible change together.

Carolien Kroeze
Rector Magnificus
Vice-President of the Executive Board



History of WUR in Mexico

The relations between the Netherlands and Mexico have been longstanding. The Netherlands was the second European country to recognize Mexico soon after gaining independence from Spain in 1821. That same year, the Netherlands began transporting goods between Mexico and Europe as the Netherlands was seen as a “neutral” nation during disputes between France and Spain. In 1826, the Netherlands appointed a consul-general in Mexico City.

The nations of Mexico and the Netherlands established diplomatic relations in 1827. Both nations are members of the Organisation for Economic Co-operation and Development (OECD) and the United Nations (UN).

The relationship of WUR and its predecessor, the Agricultural College (founded in 1876) and Mexico has existed for many years. Regular visits were made to Mexico by representatives of WUR and its predecessors. For example, in 1957/1958, on behalf of the FAO, a study was carried out by Professor Beukering on the possibilities of agricultural development of the Papaloapan area in Mexico.¹

Reports on Mexico were also regularly written. One of the reports that discusses Mexico in detail is the 1978 publication by Prof Dr Ir Klaas Jan Beek (1935-2019)

entitled: *Land Evaluation for Agricultural Development, some explorations of land-use systems analysis with particular reference to Latin America*. This study, which discusses the fieldwork he carried out since 1963 on the relationship between land qualities and crop requirements, also discusses in detail the potential for land use in Mexico.

Prof. Beek was instrumental in defining different types of land utilization which express the use of land in terms of produce, labor, capital, management, technology and scale of operations. His intensive work in Latin America including Mexico, has led towards new methods of land evaluation being introduced in that region, in which an interdisciplinary approach provides a basis for land use planning decisions that take into account the qualities and constraints of the physical and socio-economic environment.

The WUR Library shows in its Special Collections Wageningen's interest in historic works. One of our star pieces is a collection of exotic drawings of plants made by Alida Withoos in the seventeenthth century. One of these drawings is of a tomato plant.

The now worldwide-grown tomato originates from Mexico. The tomato plant was brought to Europe by the Spanish after

¹ Source: Agricultural Hogeschool te Wageningen, 1950-1960 part II, Dies- and Rectoral redes data relating to student promotions issued by the Senate of the Hogeschool)

the conquest of Mexico in the 16th century. In the Netherlands, the tomato plant was initially seen as an ornamental plant; people thought tomatoes were poisonous. This was still the case in the seventeenth century, when the Dutch artist Alida Withoos (1661 -1730) made the drawing of a tomato plant. As a painter's daughter, Alida built a successful career of her own as a botanical illustrator and painter of still lifes. Her drawings were not only beautiful, but also scientifically accurate. She also combined in one drawing the different growth and flowering stages of the plant so that they could be used for species identification. The drawing of the tomato plant is painted in opaque gouache and is part of a collection of 142 botanical gouaches and watercolors that once belonged to the seventeenth century collector, architect and garden designer Simon Schijnvoet (1652 -1727). This collection of drawings collected in an album, also known as *Het Konstboek van Simon Schijnvoet*, was bought by the Agricultural College (the predecessor of WUR) in 1948 and has served as inspiration for many a botanical draughtsman working here. From around 1900, the tomato also appeared on the menu in the Netherlands.

Anneke Groen

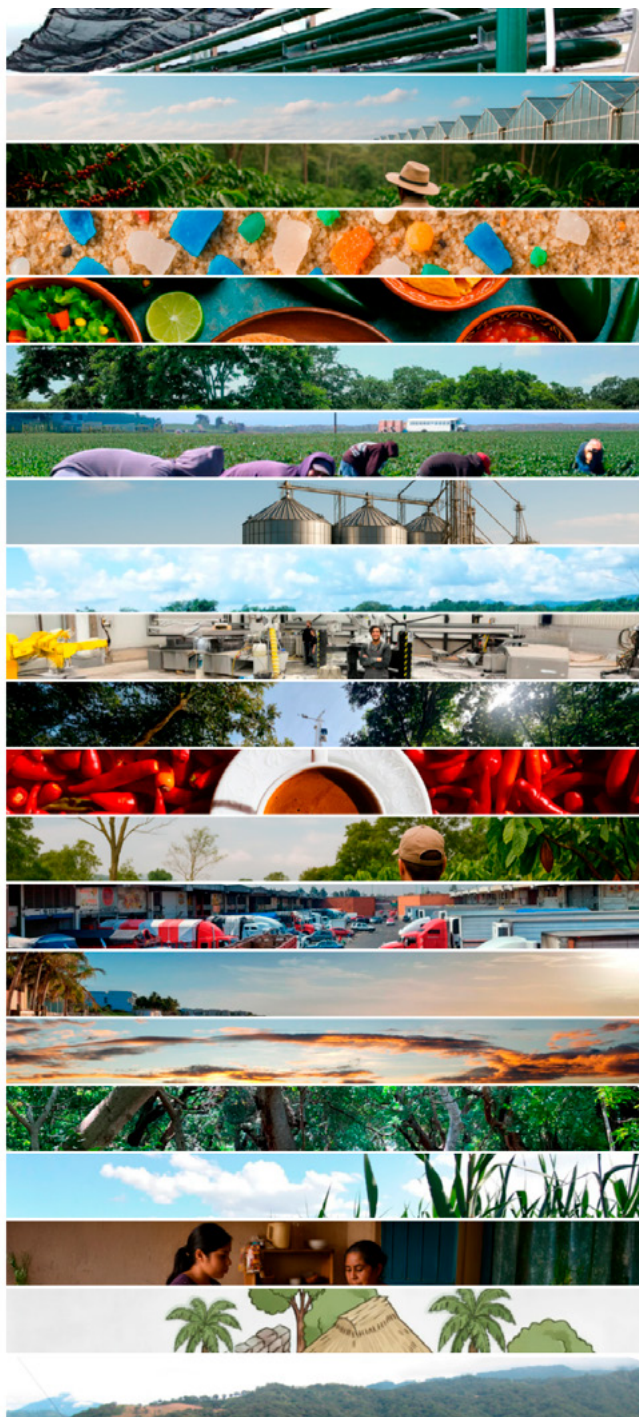
Curator, Special collections, heritage and art
@ library Wageningen University & Research



Withoos, A., *Solanum lycopersicum* L. (Tomaat), gouache, 38,2 x 24,5 cm,

Wageningen University & Research - Library, Special Collections

The drawings from the *Konstboek* can be viewed online: <https://images.wur.nl/digital/collection>



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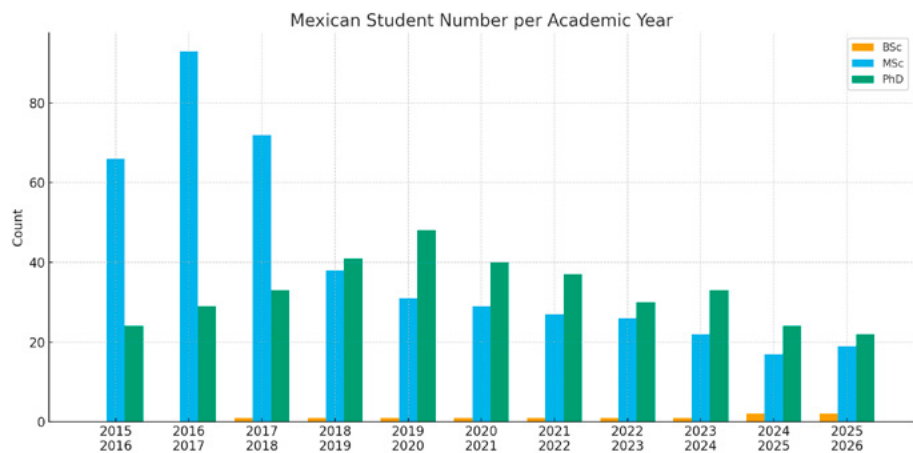
Mexican Students

“My name is Victoria Vargas Farías, I am a Mexican WUR student in the last year of my master’s in Sustainable Business and Innovation. I’ve had the privilege of meeting peers from many different backgrounds, and our shared passion for sustainability has been a powerful bridge. Through it, I’ve been able to build meaningful connections that have enriched both my academic and personal journey”



In the academic year 2025–2026, 43 students from Mexico were registered at Wageningen University: 2 BSc students, 19 MSc students, and 22 PhD candidates. The table below illustrates how the number of Mexican students at Wageningen University has developed over time. The decline in the number of Mexican master’s students is expected to be linked to the erosion of the scholarship’s value due to inflation provided by the Mexican Council for Science and Technology (CONAHCYT), alongside incremental tuition fee changes at Wageningen University.

In 2025, the university counted 333 Mexican alumni who have graduated from Wageningen University, and one alumnus became the Minister of Agriculture and Rural Development of Mexico in 2024. Among the Mexican alumni, the most frequently chosen MSc programs are Food Technology, Biotechnology, Plant Sciences, Nutrition and Health, and Environmental Sciences, which reflects the strong scientific and interdisciplinary interests of this community.





AlgaeLinkages

From: 2016–2021 | Total budget € 1,400,000

Nutrient reduction in discharge water of greenhouses and simultaneous algae production for chicken feed

With the aim of improving greenhouse discharge water quality and simultaneously producing omega-3-rich algae as feed for laying hens, Wageningen University and Research (WUR) and partners conducted a study integrating tomato greenhouse production with algae cultivation in the Querétaro region of Mexico.

The freshwater algae *Nannochloropsis limnetica* can reduce nitrogen and phosphorus levels in discharge water. Inclusion of dried algal biomass (up to 3%) in chicken feed significantly increases omega-3 levels in eggs.

The work was coordinated by WUR and carried out with Finka, United Farms, the University of Querétaro, Van Hall Larenstein, Schothorst Feed Research and Rondeel. WUR provided access to advanced knowledge on algae cultivation, animal feeding studies and process integration. The project was funded by TKI Agrifood using innovation resources from the Ministry of Agriculture, Nature and Food Quality.

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More Food per Unit of Water

From 2020 | Total budget € 39,000

Integration of greenhouse cultivation, land-based aquaculture [aquaponics] and microalgae production systems

In large parts of Mexico and many other regions worldwide, water is scarce and efficient use is essential. To reduce water consumption per kg of food and stimulate a circular economy, Wageningen University and Research (WUR) conducted a desk study on integrating tomato greenhouse production with land-based aquaculture and algae production in the Queretaro region of Mexico.

The study concluded that the most efficient configuration for combining water and nutrient flows among these three systems is:

An aquaculture system at the start of the water supply, followed by a greenhouse production system such as at United Farms (decoupled aquaponics).

Using discharge water for algae production in a photobioreactor.

The work was coordinated and carried out by WUR with input from the Mexican company Finka. WUR ensured access to advanced knowledge and technology on aquaculture, horticulture, algae cultivation and water management. The project was funded through the “Opportunities for Tomorrow” programme of the Ministry of Agriculture, Nature and Food Quality (LNV).

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Coffee Policies in Mexico

From 2017-2022 | Total budget € 57,552

Navigating Between Struggles and Contradictions

This PhD project studied the changes in coffee policies of the administration in Mexico led by President Andrés Manuel López Obrador (AMLO). The research involved an analysis of the evolution of these policies from the introduction of coffee in the country (18th century) to recent times. It paid particular attention to how the administration intended to improve farmers' participation in the market through two public programs: Sowing Lives from the Ministry of Well-being and Production for Wellbeing from the Ministry of Agriculture. The research also examined how the AMLO administration related to small farmers and the industry in formulating and implementing coffee policies; it analysed the interests of small farmers and the industry and assessed the extent to which their interests were addressed.

The main objective of the research was to unpack the struggles and contradictions that policymakers, farmers, and the industry faced in the design and implementation of coffee interventions in Mexico. The PhD project used a qualitative approach and focused on the region of Soconusco in the state of Chiapas, one of the country's main coffee-producing areas.

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The Case of Microplastics in Campeche

From 2017 | Total budget collaboration with El Colegio de la Frontera Sur

Assessment of pollutants along the terrestrial food chain

In the last 50 years due to consumption habits and agricultural management, the production of plastic waste has increased enormously. These wastes sooner or later end up in the surrounding soils of home gardens, parks and agricultural soils.

If waste management is inefficient, plastic debris fragments and they can be transported through the air, water, and through the terrestrial food chain. Soil invertebrates and vertebrates ingest plastic debris if soils are polluted with microplastics.

Thus, in the Yucatan peninsula, in recent years we have evaluated how microplastics together with other pollutants are spread along the terrestrial food chain, in sites where plastic waste is burned or buried, as well as in sites where plastic mulch has been used and not collected.

Together with El Colegio de la Frontera Sur (Research Institute in Campeche Mexico), we are trying to understand how microplastics are carriers of other soil stressors, and how those end in the food chain.

More information:

<https://doi.org/10.1038/s41598-017-14588-2>
<https://doi.org/10.1016/j.scitotenv.2021.149674>

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Economic Experiments to Achieve Healthier Diets

From 2018-2022 | Total budget € 77,000

Biases and heuristics in decision-making induce consumers to deviate from conscious food choices. These aspects intensify the influence of other constraints on food choice, such as availability, affordability, and knowledge of food. Multiple food system interventions are needed to achieve healthy diets at population level.

This project employed field and modeling experiments to propose mechanisms to achieve healthier diets in Mexico. The following studies were conducted in the project:

- 1 Estimation of demand for healthier processed foods in low-income communities of Mexico City. The aspects covered were a) the role of nutrition information, social externalities at the neighborhood level, and business opportunities; and b) the effect of financial stress on the demand for healthier foods.
- 2 School intervention in Oaxaca (Mexico) to assess the impact of meditation on the food choices of over 1400 children aged 9–12. The meditation program reduced chronic stress and increased healthy food choices among most children in the study.
- 3 Assessment of the impact of adopting a sustainable healthy diet on the economy, nutrition, and environment of Mexico by 2040. A menu of fiscal policies to reach such diet was identified. It was highlighted that Mexico would reverse decades-long of trade inflows of unhealthy foods from the United States if sustainable healthy diets are adopted.

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Climate Change Adaptation by Increasing Tree Diversity Conservation in Dry Tropical Pastures

From 2017-2022 | Total budget € 106,300

Climate warming increased the frequency and severity of droughts. We used a combination of methodological approaches to assess and understand the capacity of dry cattle pastures in the eastern zone of the state of Yucatán to cope and recover from drought.

Farmers retained dispersed trees and palms within their grazing paddocks for various cultural, economic, and ecological purposes. Understanding how farmers managed on-farm tree cover and how these decisions impacted the environmental and productive functions of pastures was key for biodiversity conservation and the development of climate-resilient production systems.

Our research demonstrated the importance of these trees for cattle pastures in the Yucatán state. Dry pastures maintained 45% of the tree species diversity of surrounding forests. Native palms and trees had important effects on the functioning of these cattle pastures and their resilience to drought. Palms improved the performance of grasses by providing sparse shade and increasing soil microbial diversity, while the deep shade of trees ameliorated heat stress of cattle during hot and windless days.

We worked with colleagues from the Universidad Autónoma de Yucatán (UADY) from México, including Javier Solorio Sánchez, Associate Professor at the Faculty of Veterinary Medicine and Animal Science.

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Needs Assessment Redesign Evaluation

From 2020-2022 | Total budget € 150,000

Fair Trade USA's (FTUSA) certification includes a requirement that producers conduct a needs assessment to collect and analyze the needs of the farmers and workers on their worksites. The insights gathered from the needs assessment inform how producers spend the additional funds (premium) earned through the sale of their certified products.

FTUSA redesigned this process, and WUR evaluated the new tools developed under this redesign process in three sectors in two countries: berries and tomatoes in Mexico, and coffee in Colombia. In both the berry and tomato sectors in Mexico, the Fair Trade Premium was spent on projects addressing the needs of farm workers.

WUR conducted surveys, interviews, and focus group discussions with these workers to determine their satisfaction with the new needs assessment process. As of August 2021, only the first deliverable, a desk review, was published in English and Spanish.

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Agrologistic Platform 2030

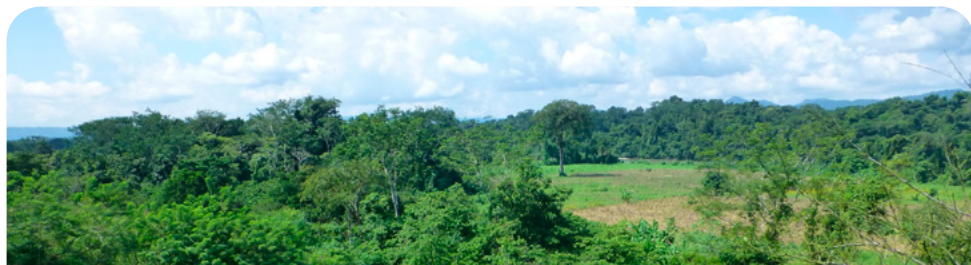
From 2020-2021 | Total budget € 75,000

Mexico is one of the chief economic and political forces in Latin America, with the agrifood sector as one of the most dynamic economic sectors, showing significant growth in recent years. In particular, the area of agrologistics has major potential to increase export capacity and domestic food security. Despite Mexico's successes in becoming the world's eleventh largest food producer and the eighth largest food exporter, there remains considerable room for improvement in agrologistics. Mexico currently sells most of its production to a single market, the United States, with low added value and high logistical costs and food losses.

There are large gaps in physical infrastructure and cold chain capacity, along with scarce availability and high costs of specialized freight and logistical services for small and medium-sized actors. Economic losses generated by food loss and waste in the supply chain can amount to 29% of the entire economic value of the sector. Agrologistics may therefore play a significant role in improving the efficiency and position of the sector, both domestically and internationally. The study analysed the potential of implementing a Mexican 'top sector model' for agrologistics based on learnings from the Dutch top sector model, including its origin, major successes and potential pitfalls, and reflected on the Mexican context to arrive at twelve initial general conclusions.

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Towards Multifunctional Landscapes in Tropical Deforestation Frontiers

From 2016-2021 | Total budget € 250,000

Most of the world's tropical forest is located inside landscapes that are heavily modified for human needs. We study a region in Chiapas called Marqués de Comillas, a dynamic agricultural frontier located in the Mesoamerican biodiversity hotspot of the Mexican humid tropics. The region was colonized by close to 40 agricultural settler communities (ejidos) that came from different parts of Mexico. We unravel the main social-ecological drivers of forest dynamics and the consequences for balancing conservation, restoration and agricultural productivity.

We found that communities differ in their possibilities, needs and interests to conserve and restore forest. Results suggest that stimulating private land ownership may cause remaining forest patches to be lost and that conservation initiatives should benefit the whole community. Forest regrowth competes with agricultural production and ensuring farmers have access to restoration benefits is key to restoration success.

This NWO-VENI project was a personal grant to Madelon Lohbeck, and builds on close collaborations with researchers from the Universidad Nacional Autónoma de México – Instituto de Investigaciones en Ecosistemas y Sustentabilidad (UNAM_IIES). The project is also closely linked to the FOREFRONT research programme (FOREFRONT).

More information

<https://doi.org/10.1002/rse2.262>

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To a circular future: Implementation of Additive Manufacturing and Circularity in Cities

From 2020-2025 | Total budget € 200,000

Nowadays, cities are based on a linear metabolism. Products end up in incinerators in high-income countries and landfills in middle- and low-income countries. The materials become waste without a new purpose after dumping, leading to pollution and a loss of resources along the value chain. This research aims to investigate Additive Manufacturing (AM) also known as 3D printing, in relation to waste in cities. The overall goal is to study secondary resource circularity by using AM in cities.

The creation of a solid network at a local level can serve as a platform to reach the regional level and bring change. The collaboration of international stakeholders such as policymakers, industry, companies, academia, NGOs, and citizens, in combination with disruptive technologies will introduce new options for businesses and collaboration between actors and industries. This research has a multidisciplinary approach in which experts on economic, social and technical aspects collaborate to find a holistic approach and solutions to complex problems in cities.

The main collaborators for this project are WUR, Delft University, CyBe Construction, Mirai Research Institute, Astro Mx, and Conahcyc. The innovative program was led by WUR and the Mexican government. The researcher ensured access to the most advanced knowledge and innovations around AM to provide business-oriented solutions to cities.

More information

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Interview of Elias Hernandez Valera (Youtube)

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Machine-learned Evapotranspiration over an Irrigated Orchard in Sonora

From 2018-2023 | Total budget € 250,000

The challenge for food production in semi-arid regions is to optimize crop irrigation without negatively affecting crop yield. There is therefore a need for accurate evapotranspiration (ET) estimates on the scale of individual fields.

Evapotranspiration constitutes the water loss of soil and vegetation to atmosphere.

The area of study is an irrigated pecan orchard (Nogal) in the Sonoran desert. Traditional methods to estimate ET based on standard meteorological data fail in these conditions due to the complexity of the land surface where warm and dry air from the surrounding desert aids the ET process over the relatively cool and wet vegetation. It is the goal of this project to provide accurate ET estimates in semi-arid regions using a new, innovative approach based on advanced machine learning techniques, which combines local observations, remote sensing data, and detailed weather model simulations.

The meteorology and air quality group of WUR conducts this research in close collaboration with Dr. Julio Cesar Rodriguez and Dr. Juan Saiz Hernández of the University of Sonora (Hermosillo, Sonora). This collaboration goes back to 1995 and has always revolved around the theme of water-use and land-atmosphere interactions in Sonora. This project is still ongoing.

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Human Rights Risk Assessment for Coffee and Chili Peppers in Mexico

From 2020 | Total budget € 58,000

The production of food brings benefits to all, but also comes with adverse social and environmental impacts, such as child labour, underpayment, and pollution. Issues that have not been properly addressed in the market thus far. To identify, prevent, and address adverse social impacts, Wageningen Economic Research developed a Human Rights Risk Assessment (HRRR). This HRRR maps potential human rights violations for eight human rights themes, which were selected based on their relevance for international standards and regulations in the field of sustainability reporting and corporate social responsibility (e.g., UN Guiding Principles, OECD Guidelines, CSRD, CSDDD).

Mexico is an important producer of coffee and chili peppers, among others. In our HRRR in 2020, we identified poverty of coffee farmers, discrimination of migrant workers, access to land, and child labour as the main risks in coffee production. In chili pepper production, child labour, forced labour, underpayment, and poor housing and sanitary conditions were the main risks for farm families and farm workers. These issues cannot be solved by the Mexican producers alone but require effort from all supply chain parties through fair and just trading principles, such as stable, long-term contracts, fair pricing, and inclusive chains that generate value for all supply chain actors. The HRRR is continuously improved within 'Wageningen Food Views' with updated risk scores and other commodity sectors.

The project's budget was € 58,000 (ex VAT) and included different activities (e.g. methodology development, multiple risk assessments). In 2025, WUR launched the Due Diligence Dashboard, which features a standardised social and environmental risk assessment for nearly 15 commodity sectors with almost global coverage.

More information

www.duediligencedashboard.com

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Ground Zero? Let's Get Real on Regeneration!

From 2022-2026 | Total budget € 1,300,000

Regenerative agriculture is promoted to combat climate change and produce food while reducing carbon emissions, improving soil health, and enhancing biodiversity. Yet, the evidence on the best practices to meet these objectives is incomplete or contradictory, and there are few suitable indicators and methods for monitoring progress towards them.

The Ground Zero project seeks to: 1. benchmark carbon footprints, soil health and biodiversity in cocoa and coffee production at source of origin. 2. provide robust, easily measurable and verifiable indicators and tools for monitoring in cocoa and coffee supply chains. 3. explore opportunities to achieve positive impacts on carbon footprints, soil health and biodiversity in cocoa and coffee production. The project conducts baseline field measurements and on-farm experiments with different fertilization treatments and organic amendments to determine greenhouse gas emission factors and monitor soil health and biodiversity in Chiapas, Mexico (Robusta coffee). Other sites include Colombia and Zambia (Arabica coffee), and Ecuador and Ivory Coast (cocoa).

The project is led by Wageningen University & Research and funded by Nestlé, in collaboration with the Nestlé Institute of Agricultural Sciences, Olam Food Ingredients, the Alliance of Bioversity International and CIAT, and ETH Zurich.

More information

<https://research.wur.nl/en/publications/ground-zero-lets-get-real-on-regeneration-report-1-state-of-the-a>

Contact

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Future-Oriented Agrologistics at CEDA MEXICO

From 2022 | Total budget € 10,000

The Central de Abasto (CEDA) in Mexico City is one of the largest wholesale markets in the world. It spans 327 hectares and hosts around 9,000 businesses, employing over 90,000 people that handle 30,000 tons of food products daily. CEDA serves more than 300,000 customers per day and supplies more than 80% of the food to Mexico City's inhabitants. Today, with all this magnitude, CEDA faces significant logistical challenges due to urban growth since its establishment 40 years ago.

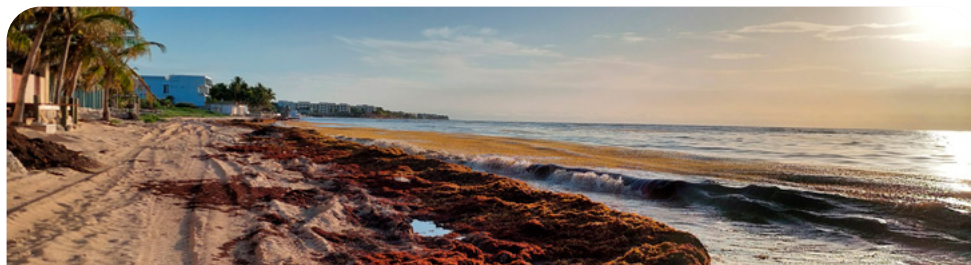
Wageningen Food & Biobased Research conducted a quick scoping study, based on literature, CEDA-provided information, and questionnaires from suppliers, buyers, staff, and local experts. From the analysis, researchers proposed scenarios for strategic reorientation to enhance agrologistics efficiency.

The recommended scenario involves relocating specific market segments (retail, wholesale, value-added logistics) beyond the current site. For this scenario, a roadmap was generated with key recommendations for improving agrologistics: identifying strategic information needs through data collection and trend analysis, developing a long-term strategy by prioritizing market segments, conducting spatial-economic analysis, and engaging stakeholders. Short and medium-term actions include improving infrastructure and traffic control. The ultimate goal is a long-term strategic re-orientation to ensure CEDA's relevance for the next 40 years.

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Sargassum in Mexico: From Environmental Problem to Valuable Resource

From 2021-2022 | Total budget € 40,000

In recent years, large amounts of floating species of Sargassum seaweeds have arrived on the coasts of some Caribbean islands, the Gulf of Mexico, Northern Brazil, and West Africa. These beaching events appear to be recurring almost every year and cause major environmental, health, and economic problems in the affected areas. These Sargassum influxes threaten the already fragile coastal ecosystems, such as coral reefs, mangroves, and seagrass beds; they also disrupt the livelihoods of communities, especially those associated with the tourism and fishing sectors. The project Valosarg developed strategies for valorization of the sargassum biomass that arrives to the coasts of the Gulf of Mexico.

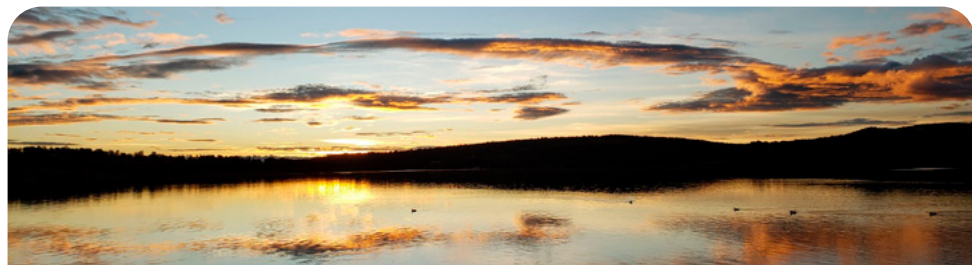
The project was carried out as a collaboration between Mexican researchers at IPICYT, WUR and the company AlIOptimal b.v. The project was coordinated by WUR and supervised by the Agriculture advisor of the Dutch Embassy in Mexico. During the project, data on sargassum origin, composition, policies, management, and uses, with a focus on the Mexican situation, were compiled. In addition, tests were carried out on the use of sargassum biomass for two applications considered to have the potential to be valuable in the Mexican situation: anaerobic digestion and composting.

More information

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Exploring Commoning Initiatives in the Alto-Atoyac Basin

From 2025-2029

Over the past decades, the Alto-Atoyac Basin, situated in the states of Tlaxcala and Puebla, Mexico, has faced water problems related to pollution, overextraction, enclosure, and marginalisation, among others. These problems result from complex social, technological, and ecological conflicts that are often treated as separate issues. This PhD project aims to understand and map the Alto-Atoyac Basin as a sociotechno-ecological system (territory) constantly co-created by humans and nonhumans linked through water.

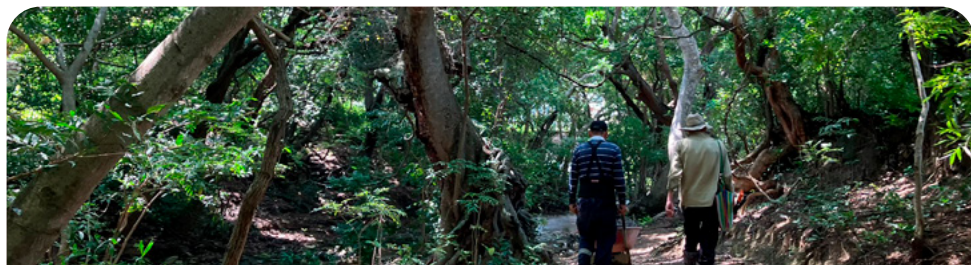
To do so, it explores theoretical and in situ initiatives that pursue water and water landscapes as Commons. The project has a special focus on the Atoyac-Zahuapan River and New Water Justice Movements, while its methodology includes transdisciplinary approaches and active participatory research. This PhD project is partially funded by Mexico's Ministry of Science, Humanities, Technology and Innovation (Secihti) and engages with local NGOs, universities, and other institutions.

More information

<https://movingrivers.org>

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Relationships Between People and Trees in Regenerating Forests

From 2025-2029

Tropical forests are essential for global biodiversity and climate cycles but are undergoing rapid, uncontrolled loss. Tropical forests are also places of rich relationships between people and nature. This PhD project investigates the relationships between people and trees in tropical forest landscapes.

Using ecological and social data, it will develop comprehensive ways to analyze local socio-ecological systems including their people-tree interactions. Building on the framings of People's Contributions to Nature (PCNs) and Nature's Contributions to People (NCPs), the project will create an integrated framework to capture human-nature relationships. This PCN-NCP framework will then be applied in a Mexican tropical forest landscape (Nizanda, Oaxaca) to study past, current, and future relationships between forests and people. Methods include interviews with local residents, ecological data analysis, and a co-produced 'futuring' process. Overall, the project maps PCNs and NCPs, learns from long-term people-forest relationships in Mexican tropical forests, and contributes to envisioning mutually beneficial futures for people and forests.

More information

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Impact of Climate Change on Food Security in Mexico

From 2025-2026 Total budget: € 90,000

This project provides an integrated assessment of the impact of climate change on food security in Mexico in the following 50 years. For this study, we focus on the impact of climate change on the prices of maize and beans. The analysis will be performed with the global macroeconomic model MAGNET, a simulation tool for long-term analysis of the food system. At the same time, the project aims to produce subnational results with impacts on poverty and food security for different regions in Mexico. Hotspots with higher future climate risks and larger shares of population with food security problems will be identified. Additionally, we will explore the role of changes in trade policies at the global level, as well as new food taxes (e.g., sugary drinks) and agricultural policies to boost agricultural self-sufficiency in the country. This is a collaboration of Wageningen Social & Economic Research with CIMMYT, Cornell University, and the National Institute of Public Health in Mexico, which is funded by the Wellcome foundation.

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A Time of Change: Iron Deficiency and Depression Among Mexican Adolescent Girls

From 2016-2022 Total budget: € 48,000

In 2016, the Global Nutrition group launched the Ten2Twenty project, implemented across several low- and middle-income countries, including Mexico. The Ten2Twenty project seeks to understand how nutritional, sociological and economic trajectories converge during adolescence, shaping health and wellbeing.

Adolescent nutrition in Mexico presents a complex challenge. Iron deficiency, anemia, overweight and obesity coexist, raising concerns about long-term health. Using national data shared by the National Institute for Public Health and Nutrition (INSP), we documented a steady decline in the age at menarche throughout the 20th century and found that earlier menarche is linked to a higher risk of chronic disease later in life. We also identified distinct dietary patterns among adolescents, showing that diets high in ultra-processed foods are associated with both excess bodyweight and anemia. Additionally, in partnership with Universidad de Monterrey, we engaged more than four hundred school-attending girls in Monterrey and Santa Catarina. The findings demonstrated an association between iron deficiency, lower hemoglobin levels and the presence of depressive symptoms.

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Homegardens as Social Practice: Sustainability by Flexibility of Intersecting Indigenous, Gender, and Ecological Aspects in Yucatán

Untill 2026 | Total budget € 39,495

This PhD research investigates traditional indigenous Yucatec-Maya homegardens in Mexico, highlighting the central role of gender relations in sustaining these systems amidst the rise of commercial agriculture. Using a mixed-methods approach, homegardens are highlighted as spaces in which women's knowledge, labour, and decision-making have long maintained essential functions such as the provision of food and medicinal plants.

That, through four guises: disentangling the relationships among structure, composition, and functions; situating homegardens within the broader Yucatec-Maya farming system and showing how gender complementarities sustain agrobiodiversity; exploring exchanges that emerge from homegardens and reinforce women's social capital; and examining the adaptability of spatial and functional arrangements that allow commercial activities to integrate with, rather than replace traditional practices.

The findings demonstrate that flexible gender dynamics and women's agency underpin the persistence of homegardens and their capacity to balance subsistence with market-oriented goals. Contrary to narratives that emphasize the displacement of women's authority and agrobiodiversity by agricultural commodity production, the Yucatec-Maya case presented here demonstrates that commercial and traditional imperatives can coexist and even create synergies when embedded in local social dynamics.

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FOREFRONT: Nature's Benefits in Agroforest Frontiers: Linking Actor Strategies, Functional Biodiversity, and Ecosystem Services

From 2015-2021 Total budget: € 2,300,000

Actors involved: Wageningen University, the Netherlands; Instituto de Investigaciones en Ecosistemas y Sustentabilidad, UNAM, Morelia, Mexico; El Colegio de la Frontera Sur, San Cristóbal de las Casas, Mexico; Federal University of Viçosa, Brazil

Tropical forested landscapes are globally being converted into agricultural landscapes. Current landscapes reflect the continuous changes in interactions between people and the environment. Understanding the mechanisms that underlie these social-ecological systems is crucial for designing, in close collaboration with local actors, strategies for land use that maintain biodiversity, supply a wide portfolio of ecosystem services, and meet the needs of local actors. This programme focuses on agro-forest frontier areas, the dynamic border between forested and agricultural land, in Mexico and Brazil. The programme has three objectives: (1) identify and understand ecological and social drivers that shape agro-forest frontier landscapes and their ecosystem services; (2) explain changes in the social-ecological system and their consequences for landscape configurations; (3) design adaptive strategies to balance and optimize the supply of ecosystem services in changing landscapes. FOREFRONT uses a comparative approach between sites in Mexico and Brazil that builds on the complementary expertise among the participating institutes and facilitates cross-country learning. Both countries face large land-use challenges, are role models for other Latin American countries, and have long-standing collaboration with Wageningen University.

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The mission of Wageningen University & Research is “To explore the potential of nature to improve the quality of life.” Under the banner of Wageningen University & Research, Wageningen University and the specialised research institutes of the Wageningen Research Foundation have joined forces to find solutions to important questions in the domain of healthy food and sustainable living environments. With students and researchers from all over the world, including a vibrant group from Mexico, WUR keeps working to foster an international environment where diverse perspectives come together to advance science and create meaningful impact.

More information

www.wur.eu



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