UC | Chile

SCIENTIFIC RESEARCH
FROM NORTH TO SOUTH

FIELD SCIENCE IN **CHILE**

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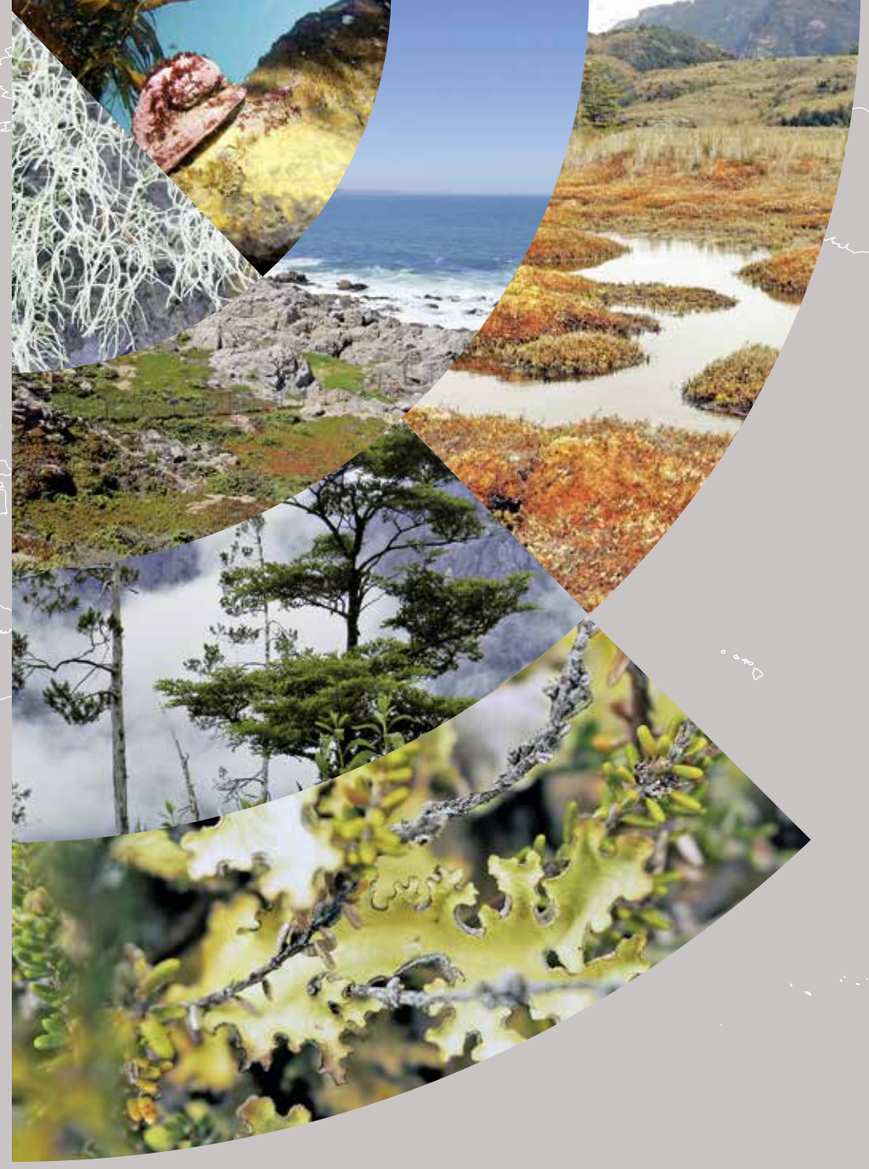
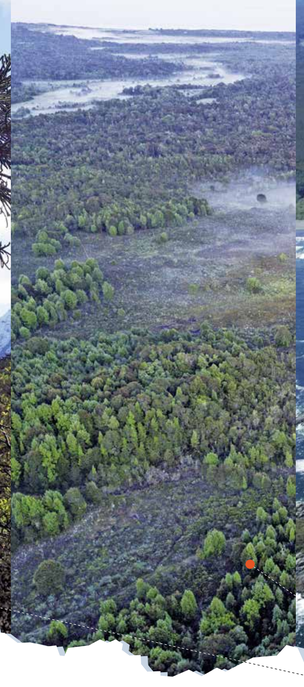


To the north, the Atacama Desert; to the south, Patagonia; to the east and west, the Andes and the Pacific Ocean: these are Chile's natural boundaries. The longest and narrowest country in the world offers an ideal terrain for scientific research: the variety of its climates and the diversity of its landscapes make Chile a country particularly rich in a wide range of ecosystems and natural resources.

UC CHILE FIELD STATION NETWORK



TARAPACÁ REGION
ALTO PATACHE
UC ATACAMA FIELD STATION
20° 49′ S
70° 09′ W

TARAPACÁ AND ANTOFAGASTA REGIONS
LOA RIVER MOUTH
UC LOA FIELD STATION
21° 25′ S
70° 03′ W

SANTIAGO

VALPARAÍSO REGION
LAS CRUCES
UC COASTAL MARINE RESEARCH STATION
33° 30′ S
71° 37′ W

ARAUCANÍA REGION
VILLARRICA
UC CENTER FOR LOCAL DEVELOPMENT
39° 16′ S
72° 13′ W

LOS LAGOS REGION
ANCUD, CHILOÉ
SENDA DARWIN BIOLOGICAL FIELD STATION
41° 53′ S
73° 39′ W

LOS LAGOS REGION
QUELLÓN, CHILOÉ
TANTAUCO RESERVE
43° 12′ S
74° 11′ W

AYSÉN DEL GENERAL CARLOS IBÁÑEZ DEL CAMPO REGION
BAHÍA EXPLORADORES
UC PATAGONIA FIELD STATION
46° 17′ S
73° 24′ W

MAGALLANES Y DE LA ANTÁRTICA CHILENA REGION
PUNTA ARENAS
MAGALLANES CENTER OF EXCELLENCE IN BIOMEDICINE
53° 09′ S
70° 54′ W

MAGALLANES Y DE LA ANTÁRTICA CHILENA REGION
PUERTO WILLIAMS
OMORA ETHNOBOTANICAL RESERVE
54° 56′ S
67° 36′ W

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N
S
W

PHOTOGRAPHS 1, 4, 7 AND 8, NICOLE SAFFIE; 2, LABORATORIO DE ANTROPOLOGÍA Y ARQUEOLOGÍA VISUAL; 3, CÉSAR DELLEPIANE; 5, DANIEL CASADO; 6, ARCHIVE TANTAUCO PARK; 9, YAMIL HUSSEIN.

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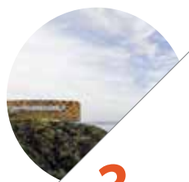

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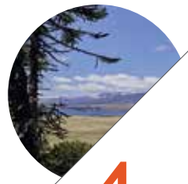

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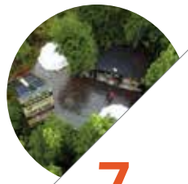

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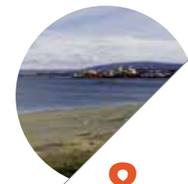

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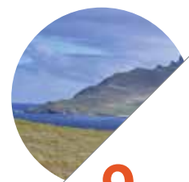

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SCIENTIFIC RESEARCH
FROM NORTH TO SOUTH

FIELD SCIENCE IN **CHILE**

FRONTIER KNOWLEDGE AT THE SERVICE OF THE COUNTRY

Ignacio Sánchez
President of Pontificia Universidad Católica de Chile

Chile's unique geography, stretching along a single meridian, encompasses an astonishing diversity of landscapes and ecosystems. From the aridity, fog, and hidden treasures of the Atacama Desert to over 6,000 km of coastline, two mountain ranges, diverse flora, fauna, and fungi, temperate forests, volcanoes, fjords, and the perpetual ice fields of the far south, Chile is home to magnificent natural laboratories.

This extraordinary natural heritage both inspires and challenges us, demanding constant efforts for its habitation and preservation. Our university is driven by the pressing questions this reality presents, seeking answers through field research. In 2016, in response to these challenges, Pontificia Universidad Católica de Chile created the UC Field Station Network (RCER, its acronym in Spanish) to study Chile's most representative ecosystems.

From north to south, in the Tarapacá region, we find the UC Atacama Field Station in the Alto Patache fog oasis. There, researchers installed fog catchers—devices that collect individual water droplets from the fog, extracting water in the world's driest desert. Their research also focuses on unconventional renewable energy, biodiversity, coastal climate, and architecture for extreme environments. UC Loa Field Station is located further south, at the junction of the Tarapacá and Antofagasta regions, traversed by the Loa River—the longest in Chile. This site, declared a Natural Sanctuary in 2024, hosts research and teaching in geography, archaeology, biodiversity, engineering, and more.

In Las Cruces, on Chile's central coast and at the edge of the majestic Pacific Ocean, the UC Coastal Marine Research Station took root in 1982. It established the first protected coastal area to study the effects of fishing and tourism on marine ecosystems and is now a pioneer in scientific diving in Latin America.

Further south, we find the UC's Villarrica Campus, the university's only campus outside the capital. Here, the UC Center for Local Development, CEDEL is dedicated to sustainability in socio-ecological systems, tourism, local economy, territorial planning and governance, and sustainability education. Continuing our journey, we arrive at Chiloé Island, where researchers at Senda Darwin study the monito del monte (*Dromiciops gliroides*), the chucao (*Scelorchilus rubecula*) and ralladito (Aphrastura spinicauda) birds, as well as native plant species like ulmo (*Eucryphia cordifolia*). They also monitor carbon dioxide emissions and tree growth over the long term, studying how forests respond to climate change and the role of peatlands in this transformation.

In 2024, Tantauco Reserve officially joined RCER. Located at the south end of Chiloé Island, it is open to research, environmental education, hiking, local culture, and conservation, with a focus on the Darwin's fox, Darwin's frog, and Guaitecas cypress.

In the heart of Patagonia, in a remote and pristine area, Bahía Exploradores hosts the UC Patagonia Field Station for Interdisciplinary Research. Here, researchers explore the biological history of the valley through mosses, lichens, river waters, glaciers, and tree rings, integrating a socio-ecological perspective.

In Punta Arenas, the Magallanes Center of Excellence in Biomedicine, CEBIMA has been operating since 2019. Its laboratories study natural extracts from regional algae and plants, seeking potential treatments for neurodegenerative diseases such as Alzheimer's and Parkinson's.

Beyond the Beagle Channel, at the southernmost tip of Chile and the Americas, lies Omora Ethnobotanical Reserve in the small town of Puerto Williams. After years of collaboration with UC in the fields of ecology and biodiversity, it will officially join RCER at the beginning of 2025.

Each of these field stations generates cutting-edge knowledge to address Chile's most pressing challenges while fostering education deeply rooted in the national territory. Knowledge Frontiers and Geographic Borders. As this book shows us, Chile is a land of breathtaking extremes—remote and untamed landscapes, as well as demanding and unforgiving conditions—challenging researchers and students to push the limits of their knowledge and skills. This process is mutually enriching, where academia and local communities engage in a virtuous exchange.

Throughout this vast and varied landscape, we uphold one of our core principles: interdisciplinarity. We are grateful for the invaluable contributions of state institutions, particularly the Ministry of National Assets, as well as national and international research centers. We also highlight the regional universities that partner in research projects within their territories. Thanks to all these collaborators, the pursuit of knowledge—one of the pillars of Pontificia Universidad Católica's identity—extends across the country.

The UC Field Station Network remains dedicated to advancing frontier research in these territories—not only to expand knowledge but also to foster a more prosperous, just, and equitable society.

UC CHILE IN THE FIELD

Pedro Bouchon

Vice President for Research

The UC Field Station Network (RCER, its acronym in Spanish) of Pontificia Universidad Católica de Chile (UC Chile) is a strategic platform that sets our institution apart at a national and international level. It strengthens research, teaching, and community engagement, in collaboration with the faculties, and positioning itself as a potential sixth university campus. RCER was officially established in 2016, inspired by the vision of UC Chile President Ignacio Sánchez.

Even before the university recognized the importance of creating a network, the directors of the field stations were leading projects throughout the different regions of the country. For example, in 2023, the UC Costal Marine Research Station (ECIM) celebrated its 40th anniversary, while RCER has yet to reach its 10-year milestone. The Field Station Network currently consists of four UC field stations—Atacama, Loa, ECIM, and Patagonia—as well as one UC center, CEDEL, and four associated entities: Senda Darwin, Tantauco Reserve, Magallanes Center of Excellence in Biomedicine (CEBIMA), and Omora Ethnobotanical Reserve.

RCER fosters relationships with regional universities, public institutions, and social organizations. The network also expands and strengthens international collaborations, explores opportunities for networked research, and implements global education initiatives at the field stations.

It is our goal to provide our students with opportunities for transformative learning experiences at one of RCER's nine research sites. To bridge theory and practice, RCER provides experiential learning laboratories throughout Chile, thus facilitating a more holistic education. The ecological and cultural diversity of each location inspires multiple disciplines, particularly in areas related to regional sustainable development and global challenges.

Field-based science fosters interdisciplinary and transdisciplinary projects that underscore the importance of collaboration across fields to address complex problems. Research at field stations is closely tied to the regions themselves, with a focus on long-term environmental changes and socio-environmental monitoring.

Field stations serve as hubs for interaction, dialogue, and collaboration with diverse communities. Some notable initiatives include the network of UC Comunity Libraries, "Biblioteca Escolar Futuro", student group visits, field trips, exhibitions, workshops, and public engagement activities.

We are weaving a network of networks along the Pacific Coast of the Americas by working together with key international partners to integrate knowledge in conservation, interdisciplinary and transdisciplinary research, long-term socio-ecological monitoring, global change, and social sciences—all to better understand the interactions between humans and the environment.

RCER embodies UC's commitment to working in and with our national territory. Chile's extraordinary natural and cultural wealth places a responsibility on our university to protect it and provide access to future generations of students and researchers. Building knowledge in close connection with the regions of our country is a defining hallmark of our university.

The desert, the islands, the native forests, and more than 6,000 kilometers of coastline present unique conditions for the study of climate change, the development of medicinal compounds, and the behavioral study of animals and plants in interaction with human beings. Thanks to its geography, climate, and above all its scientific community, Chile has become a full-scale natural laboratory.

FIELD STATIONS, FROM NORTH TO SOUTH

UC ATACAMA FIELD STATION

Atacama Desert: A Treasure for Science

1.

MINIMUM DWELLING prototype in Alto Patache.

UC ATACAMA FIELD STATION

ATACAMA DESERT: A TREASURE FOR SCIENCE

Improving people's quality of life by connecting research with societal needs is the mission UC Chile brings to life at the UC Atacama Field Station, pioneering sustainable solutions to critical issues like water, energy and ecosystems in the world's driest desert.

Known as a fog oasis, Alto Patache is located in the heart of the Atacama Desert, 65 km south of Iquique. The Field Station is close to communities, ports, fishing coves, metallic and non-metallic mining operations, and an industrial zone with pressing needs for energy and water. This proximity offers a significant opportunity to build connections between development, research, and environmental protection, fostering economic and social well-being. In 2007, after 10 years of research, the State granted 1,114 hectares to UC Chile as a National Protected Asset (BNP) to promote three core pillars: conservation, research, and education.

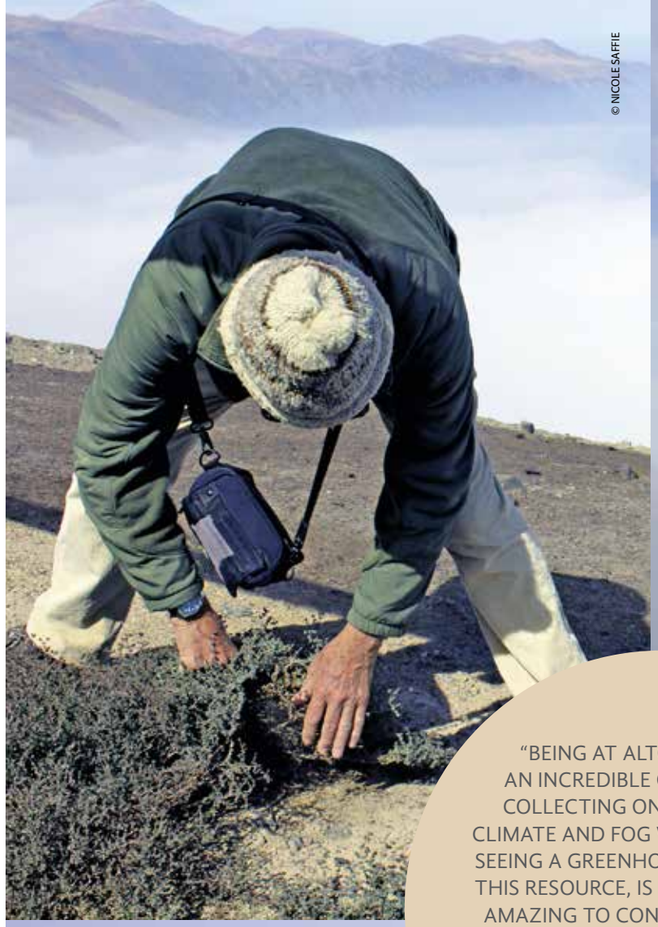
Alto Patache's extraordinary uniqueness lies in its primary water source: fog, which forms over the ocean and rises to the Coastal Mountain Range. This natural water source has sustained unique vegetation, much of it endemic or relict, along with distinctive insect, bird, and mammal species. It has also historically supported inhabitants and nomads who used the area for hunting, nourishment, hydration, and shelter.

Since 1997, the Field Station has been measuring fog water collection monthly using a standard fog collector (SFC). It has two productive fog collectors with a combined capture surface of 64 m². These devices collect water particles from clouds, which accumulate on a mesh, flow downward by gravity, and drip to produce approximately 600 liters of water daily. The design of fog collectors has been refined, and UC Chile now holds a patented technology born from its consistent work and real-world research.

Researchers use geographic and computational models to calculate the theoretical fog water potential in the region, helping meet the water needs of people and their activities. Fog collectors offer a sustainable, more affordable alternative to desalination plants, water trucks, or pipelines from the Tamarugal Pampa. Their implementation requires political will, technology, and teamwork.

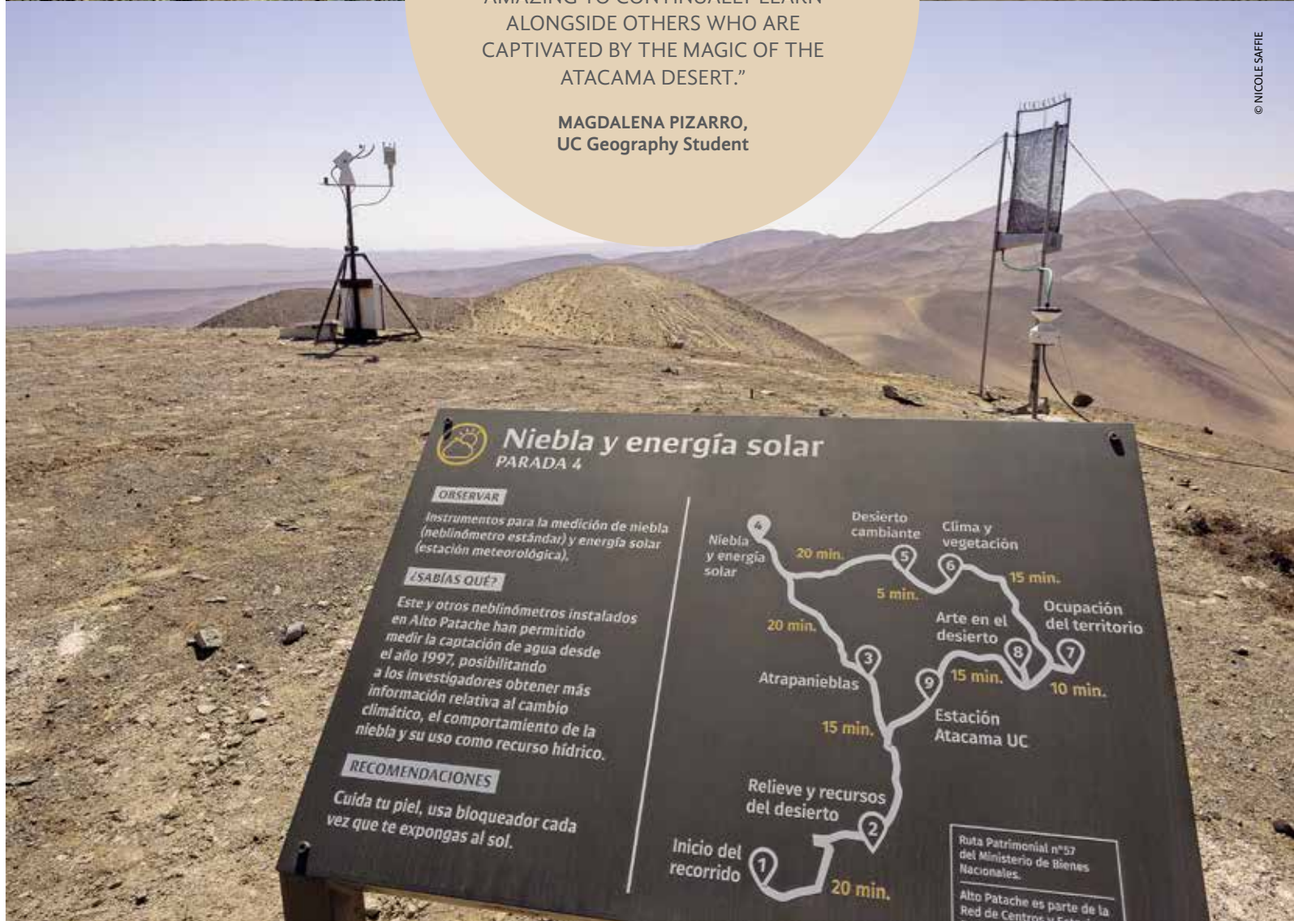
Research on fog, clouds, and climate has transcended national borders, contributing to global climate change studies and improving predictive capabilities. UC Atacama Field Station has accumulated 25 years of continuous data, providing cutting-edge research shared between the deserts of Namibia and Atacama, two of the least-studied regions in the Southern Hemisphere.

At UC Atacama Field Station, projects from UC, the Atacama Desert UC Center, and regional, national, and international universities investigate desert ecosystems, fog water, solar energy, microbiology, coastal populations and territories, climate trend projections, water availability forecasting, agricultural cultivation, and innovative architecture.



"BEING AT ALTO PATACHE IS AN INCREDIBLE OPPORTUNITY. COLLECTING ON-SITE DATA ON CLIMATE AND FOG WATER, AND EVEN SEEING A GREENHOUSE POWERED BY THIS RESOURCE, IS FASCINATING. IT'S AMAZING TO CONTINUALLY LEARN ALONGSIDE OTHERS WHO ARE CAPTIVATED BY THE MAGIC OF THE ATACAMA DESERT."

MAGDALENA PIZARRO,
UC Geography Student



"I'VE KNOWN THE UC ATACAMA STATION SINCE MY EARLY YEARS AS A GEOGRAPHER AT UC. I REMAIN CONNECTED TO ALTO PATACHE AS A RESEARCHER THROUGH MY SCIENTIFIC AND APPLIED WORK, WHICH PLAYS A KEY ROLE IN LINKING THE COMMUNITY WITH ACADEMIC EFFORTS. I STUDY THE CITY OF ALTO HOSPICIO IN TARAPACÁ, AND MY GOAL IS TO STRENGTHEN TRANSDISCIPLINARY COLLABORATION AT CDA AND ALTO PATACHE."

VIRGINIA CARTER,
UC Geographer, Professor,
Universidad Mayor

CAMANCHACA (local name for fog), entering Alto Patache.

PACIFIC COAST FOG AND CLIMATE MONITORING NETWORK
In 2015, the International Fog and Climate Monitoring Network was established at Alto Patache, supported by the Atacama Desert UC Center (CDA). This network focuses on climate change monitoring and the potential of fog as a water resource.

COMMUNITY ENGAGEMENT
The Field Station frequently hosts students and researchers. Activities include artistic residencies, architecture and design workshops, and scientific and technological outreach programs for children, youth, and adults. These participants gain insights into the desert, research methods, and fieldwork practices.

LIVING DESERT: PUBLIC SPACE FOR FOG WATER
Educational center that introduces fog water as a clean and freely accessible water source to communities facing water scarcity. It provides practical knowledge to enable the construction of fog collectors in their regions. This initiative was co-designed with local organizations in Alto Hospicio and Iquique, Tarapacá Region.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"MY TEACHING AND RESEARCH REVOLVE AROUND THE ATACAMA DESERT AND THE DESERTA PROJECT. IF DESERTS ARE INHOSPITABLE, WATERLESS, AND EXTREME, WHY DO PEOPLE LIVE THERE? HOW DOES ARCHITECTURE ADAPT TO THESE CONDITIONS? AT ALTO PATACHE, WE ARE DESIGNING AND BUILDING A MINIMAL LIVING PROTOTYPE: AN EXPERIMENTAL MODULE INTEGRATING SOLAR ENERGY AND FOG CATCHERS."

PEDRO ALONSO,
Professor, UC School of Architecture

They study solar radiation behavior in a cloudy environment, confirming that solar energy functions during the day while clouds dominate at night. Architects face challenges in designing for restrictive environments with strong winds, intense radiation, scarce water, and extreme temperature variations. This Field Station serves as a testing ground for undergraduate, master's, and doctoral students.

To expand arable land, supply local populations while reducing the carbon footprint, and establish a regional agri-food development hub, researchers explore fog water use for drought-resistant crops, both in open fields and greenhouses.

Community engagement is an ongoing process. The station aims to share its knowledge on fog water, solar energy, and ecosystems, contributing to a deeper understanding of Chile's arid regions, which make up 30% of the country. Their goal is to become a global benchmark for research in hyper-arid environments, particularly from the Southern Hemisphere.

Life on Earth emerged from oceans, through bacteria and water. The first transportation agents of these were likely rain and fog. Today, it is possible to explore how bacteria first conquered this desert environment, as the site remains protected and minimally impacted. Alto Patache is a world-class natural laboratory.


© PABLO OSSES

"WE ARE A GROUP OF COMMUNITY LEADERS FROM ALTO HOSPICIO. WE VISITED THE ATACAMA FIELD STATION TO LEARN ABOUT FOG CATCHERS AND THEIR FUNCTIONALITY. AS WE ARE EXPERIENCING A DROUGHT, THIS PROJECT IS CRITICAL AND COULD SOLVE THE WATER CRISIS IN OUR COMMUNITY."

ISABEL NOVOA,
President of El Boro Neighborhood Council

© PABLO OSSES

UC LOA FIELD STATION

Natural Heritage Management at Loa River Mouth

2.

STRATIGRAPHIC PROFILE, site Caleta Huelén 42.

"AS THE LOCAL LIAISON FOR RCER IN THE NORTH, I´M HAVING THE OPPORTUNITY TO COLLABORATE IN A FASCINATING SCIENTIFIC FIELD. EVEN THOUGH I KNOW OUR COASTLINE WELL, THIS EXPERIENCE HAS DEEPENED MY APPRECIATION FOR IT AND REINFORCED THE IMPORTANCE OF PRESERVING OUR CULTURAL HERITAGE."

MILTON AVILÉS,
North Local Liason, RCER

UC LOA FIELD STATION

NATURAL HERITAGE MANAGEMENT AT LOA RIVER MOUTH

The UC Loa Field Station is an interdisciplinary hub where science and local communities come together to conserve biodiversity and cultural heritage through a holistic management plan.

Stretching across more than 440 km from the Andes Mountains to the Pacific Ocean, the Loa River is Chile's longest waterway. It serves as an ecological corridor between the highlands and the coast. In its lower course, we find a rich ecotone featuring a marine-terrestrial wetland that plays a key role in biodiversity conservation. Just 2 kilometers from the shoreline, the Coastal Mountain Range rises abruptly, capturing fog and sustaining vulnerable fog-fed ecosystems.

This region is home to the Protected National Asset (BNP) at the Loa River Mouth, spanning 509 hectares across two regions: 194 hectares in Tarapacá and 314 hectares in Antofagasta. Humans have been drawn to this rich ecosystem for nearly 5,000 years. Early inhabitants adapted a maritime way of life but maintained connections with inland groups for trade and alliances. This continuous human presence left behind extensive archaeological evidence, revealing insights into their settlements, technologies, and interactions with the natural environment.

In 2021, Chile's Ministry of National Assets granted a 20-year concession of the BNP to UC Chile, which led tothe creation of UC Loa Field Station. Through its dedication to research, conservation, and knowledge dissemination, this initiative has transformed the area into a natural laboratory for disciplines such as archaeology, biodiversity, and engineering. The work carried out here seeks to foster innovation, artistic creation, education, and community collaboration. Researchers are also working to collect diagnostic information to deepen our understanding of the environmental and social dynamics affecting the Loa River's mouth and basin.

The station hopes that these contributions will benefit nearby communities, influence public policy, and strengthen partnerships with the private sector.

Since 2021, the Field Station has welcomed multidisciplinary teams and students of anthropology, archaeology, ecology, geology, architecture, and geography who participate in rotating field campaigns to help preserve this fragile ecosystem and its limited carrying capacity.

"WHEN I FIRST ARRIVED AT THE MOUTH OF THE LOA RIVER, I WAS ONLY THINKING ABOUT ARCHAEOLOGY, BUT BY THE TIME I LEFT THE EXCAVATION, MY PERSPECTIVE HAD COMPLETELY CHANGED. THE WETLANDS, THE COASTAL CLIFFS, THE ECOSYSTEMS, AND THE COMMUNITIES HAD ALL BECOME A PART OF ME. EXPERIENCING THIS PLACE EXPANDED MY VIEW AND CONNECTED ME TO WHAT WAS, WHAT IS, AND WHAT WILL BE IN THIS UNIQUE CORNER OF NORTHERN CHILE."

EDUARDO ORTEGA,
UC Archaeology student

LOA RIVER MOUTH Archeological Campaign. View of north terrace of the coastal cliff.

COMMUNITY ENGAGEMENT
Dedicated to creating a positive impact and fostering collaboration, the UC Loa Field Station carries out educational activities that highlight the site's natural and cultural heritage, with a strong focus on conservation and sustainability.

CALETA HUELÉN 42
Work at the Excavation Mound in the *Caleta Huelén* 42 archaeological site has uncovered evidence of ancient maritime hunter-gatherer communities with pre-Hispanic architecture. These discoveries provide crucial insights into the transformation of the arid landscape over time.

NATURE SANCTUARY
On August 9, 2024, Loa River Mouth was declared a Nature Sanctuary, marking a major step in protecting and managing one of northern Chile's most important ecosystems, known for its rich biodiversity and ecological fragility.

The protected area hosts advanced archaeology and bioarchaeology courses, where students contribute to the region's heritage database by conducting on-site fieldwork using records, photography, and GPS to document archaeological findings. Undergraduate and graduate students from various universities and disciplines also participate in internships, conduct thesis research, and engage in research seminars which generate key insights to support the area's management.

The Field Station is committed to strengthening ties with regional universities, local government, schools, key decision-makers, and the broader community to promote appreciation and participation in conservation efforts. Looking ahead, the goal is to transform the site into a sustainable archaeological and natural park that, by the end of its concession, will be returned to the country as a permanent space for conservation, education, and knowledge generation on the natural and cultural heritage of Chile's Norte Grande.

© LAAV

"THE UC LOA STATION IS ESSENTIAL TO THIS AREA, AS IT PROVIDES AN OPPORTUNITY FOR VARIOUS STAKEHOLDERS FROM ACADEMIA, THE STATE, COMMUNITIES, AND PUBLIC AND PRIVATE INSTITUTIONS TO WORK TOGETHER TO PROTECT THE NATURAL AND CULTURAL HERITAGE OF THIS AREA THROUGH MONITORING, RESEARCH, AND EDUCATION, USING A TRANSDISCIPLINARY APPROACH."

VÍCTOR MÉNDEZ,
Professor, UC School of Anthropology

© LAAV

"WHY ARE THE LOA RIVER, ITS MOUTH, AND THE SPECIES THAT LIVE THERE SO IMPORTANT? FOR THE DESIERTO DE ATACAMA FOUNDATION, THE PRESENCE AND SCIENTIFIC AND EDUCATIONAL SUPPORT OF THE UC LOA STATION ARE CRUCIAL. PROTECTING AND CONSERVING A TERRITORY MEANS CARING FOR BOTH ITS LANDSCAPES AND ITS BIODIVERSITY—WHICH ARE ESSENTIAL FOR SURVIVAL, HUMAN WELL-BEING, AND CULTURAL INSPIRATION."

ALEJANDRA MALINARICH,
Director, Desierto de Atacama Foundation

© LAAV

3.

UC COASTAL MARINE RESEARCH STATION

The Ocean under the Microscope

PUNTA DEL LACHO, Las Cruces.

UC COASTAL MARINE RESEARCH STATION / ECIM

THE OCEAN UNDER THE MICROSCOPE

Nestled in a stunning natural laboratory and surrounded by Latin America's oldest protected coastal marine area, the UC Coastal Marine Research Station (ECIM) of Pontificia Universidad Católica de Chile is a hub for marine science research, education, and outreach.

Located in the town of Las Cruces, Punta del Lacho is a rocky coastal area that perfectly represents Chile's central coastline. This made it the ideal site for establishing an innovative marine research center more than four decades ago. The founders of ECIM set out to study the impact of human activity on coastal ecosystems by restricting the access of fishers, shoreline harvesters, and tourists along a one-kilometer stretch of coastline. This initiative revealed how quickly marine resources could recover. For instance, populations of the Chilean abalone, or loco—a keystone species for maintaining biodiversity in these ecosystems—bounced back swiftly. Meanwhile, native birds like gulls and oystercatchers took nearly a decade to return to nesting within the reserve. Through this work, researchers gained valuable insights into the complex interactions and processes that shape coastal biodiversity and ecosystem functioning, including the role of humans.

The success of this small, protected area as a sustainable management tool led to its integration into Chile's Fisheries Law in 1991, which paved the way for the first Benthic Resources Management and Exploitation Areas (AMERB, by its Spanish acronym) in El Quisco and Quintay. Since then, ECIM has played a key role in establishing 50% of Chile's marine protected areas. The station also helped pioneer the field of socioecology, which examines the interplay between ecological, oceanographic, and social processes (such as cooperatives of artisanal fishers managing an AMERB) and the impact of these interactions on sustainable fishing practices and biodiversity conservation.

Over its 40-year history, ECIM has built one of the longest continuous datasets on coastal ecosystems in Chile and across the South Pacific. The reserve serves as a natural laboratory for studying local responses to global change—including climate change—free from the immediate impacts of human activity. Today, ECIM continues to push the boundaries of marine research. Its current work includes exploring mesophotic reefs (found at depths of 30 to 200 meters in temperate zones) and developing sustainable applications for marine resources, with a focus on ecological restoration and small-scale seaweed aquaculture.

Since its inception, ECIM has welcomed undergraduate and graduate students from biological sciences programs to conduct internships and theses in marine ecology. The Field Station's scientific achievements, dedication of its academic staff, and growing demand for undergraduate marine science education led to the creation of the Marine Biology degree program at UC Chile in 2008.

"THE COASTAL MARINE RESEARCH STATION HAS SIGNIFICANTLY STRENGTHENED OUR COLLABORATIVE WORK IN THE COMMUNITY THROUGH VARIOUS CREATIVE AND INNOVATIVE PROJECTS THAT INVOLVE COMMUNITY PARTICIPATION AND LOCAL CULTURAL ACTIVITIES."

TATIANA ORELLANA, Project Manager, Department of Culture, Municipality of El Tabo

"I STUDIED MARINE BIOLOGY AT UC CHILE, AND ECIM SHAPED ME AS A SCIENTIST. IT WAS THERE THAT THE IDEAS TO FOUND HUIRO REGENERATIVO WERE BORN—A COMPANY DEDICATED TO REGENERATIVE AND TRIPLE-IMPACT SEAWEED PRODUCTION. HAVING A CENTER HERE IS A MILESTONE, A RETURN TO MY ROOTS, AND A RECOGNITION. WE WORK TOGETHER TO REGENERATE MARINE ECOSYSTEMS AND FOSTER SUSTAINABLE DEVELOPMENT IN CHILE."

DRA. MARÍA JOSÉ DE LA FUENTE, Co-founder and General Manager of Huiro Regenerativo

CIENTIFIC DIVING in the Chilean coast.


© CELESTE KROEGER

"THE LEGACY THAT ECIM BUILT FOSTERS EPISTEMOLOGICAL OPENNESS. THE CO-OCCURRENCE OF DISCIPLINARY CULTURES IN COOPERATIVE WORK PROCESSES NOT ONLY FACILITATES THE EXCHANGE OF KNOWLEDGE AND LANGUAGE FRAMEWORKS BUT ALSO SHAPES THE STRATEGIES AND FLOWS FOR TACKLING NEW CHALLENGES AND FRONTIER RESEARCH."

ALEJANDRO DURÁN,
Professor, UC School of Design


© ARCHIVO ECIM

"ECIM IS NOT JUST A MARINE RESEARCH CENTER; IT'S A SPACE WHERE YOU CAN GROW AND DEVELOP AS A PROFESSIONAL, BRING THEORY INTO PRACTICE, EXPAND YOUR CREATIVITY, AND SHARE YOUR PASSION FOR THE SEA WITH RESEARCHERS, PEERS, AND COMMUNITY MEMBERS ALIKE."

SOFÍA CHACANO,
UC Marine Biology Student


© ALEJANDRO PÉREZ MATUS

With a flexible curriculum rich in biological sub-disciplines, hands-on practical activities, experimental ecology, resource management, and conservation, the program aims to bring students closer to the ocean and connect them with the social and economic issues surrounding the marine realm. ECIM serves as a hub for teaching, research, and community engagement. It hosts national and international master's and doctoral students and operates as an interdisciplinary and transdisciplinary unit, fostering collaboration across faculties. The Field Station also acts as a service platform, collaborating on applied research and productive development projects with local institutions.

At ECIM, researchers study phenomena that impact the region, such as coastal upwelling, artisanal fishing, aquaculture, urbanization, and tidal energy. This work reflects a science focused on humanity's pressing challenges—challenges that require diverse expertise, tools, and perspectives to be addressed effectively. Its main research areas include Marine Ecology, Coastal Oceanography, Marine Conservation, Coastal Engineering, Socioecology, Marine Agronomy, Biotechnology Geography, Veterinary Science, Scientific Diving, and Design and Arts.

The Field Station's strength in diverse scientific fields, robust research groups, collaborative networks, natural laboratory setting, and deep community ties position ECIM as a vital platform for advancing UC Chiles's integrated vision of coastal marine ecosystems. Through science and comprehensive education of students and professionals, it seeks to promote the sustainable use and preservation of these ecosystems.

CHILE ES MAR
Chile Es Mar [Chile is Ocean] is an environmental education platform aimed at connecting science with society and promoting ocean sustainability. Its mission is to ensure future generations can enjoy the many benefits that the sea offers: beauty, energy, climate regulation, transportation, diverse food sources, and recreational spaces.


©NUBELAB MEDUSA

COMMUNITY ENGAGEMENT
To contribute to an informed, committed, and active society, ECIM hosts a Community Library (*Biblioteca Escolar Futuro*) and conducts workshops, guided tours, and educational activities, including the creation of materials, games, and books to transfer scientific knowledge to the community, promote cultural change, and support ocean sustainability.

SCIENTIFIC DIVING
ECIM has developed advanced scientific diving capabilities, specializing in deep diving—a unique expertise in Chile. This has enabled the exploration of mesophotic ecosystems, which remain largely unknown globally and even more so in South America.

4.

UC CENTER FOR LOCAL DEVELOPMENT

Promoting Sustainability with the Territory

QUINQUÉN, Lonquimay commune, Araucanía Region.


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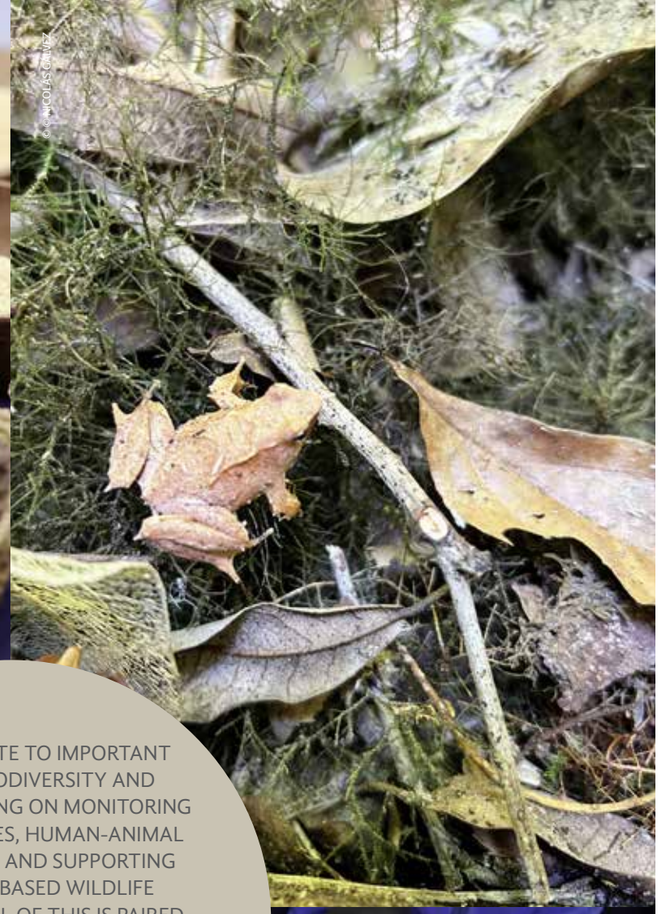
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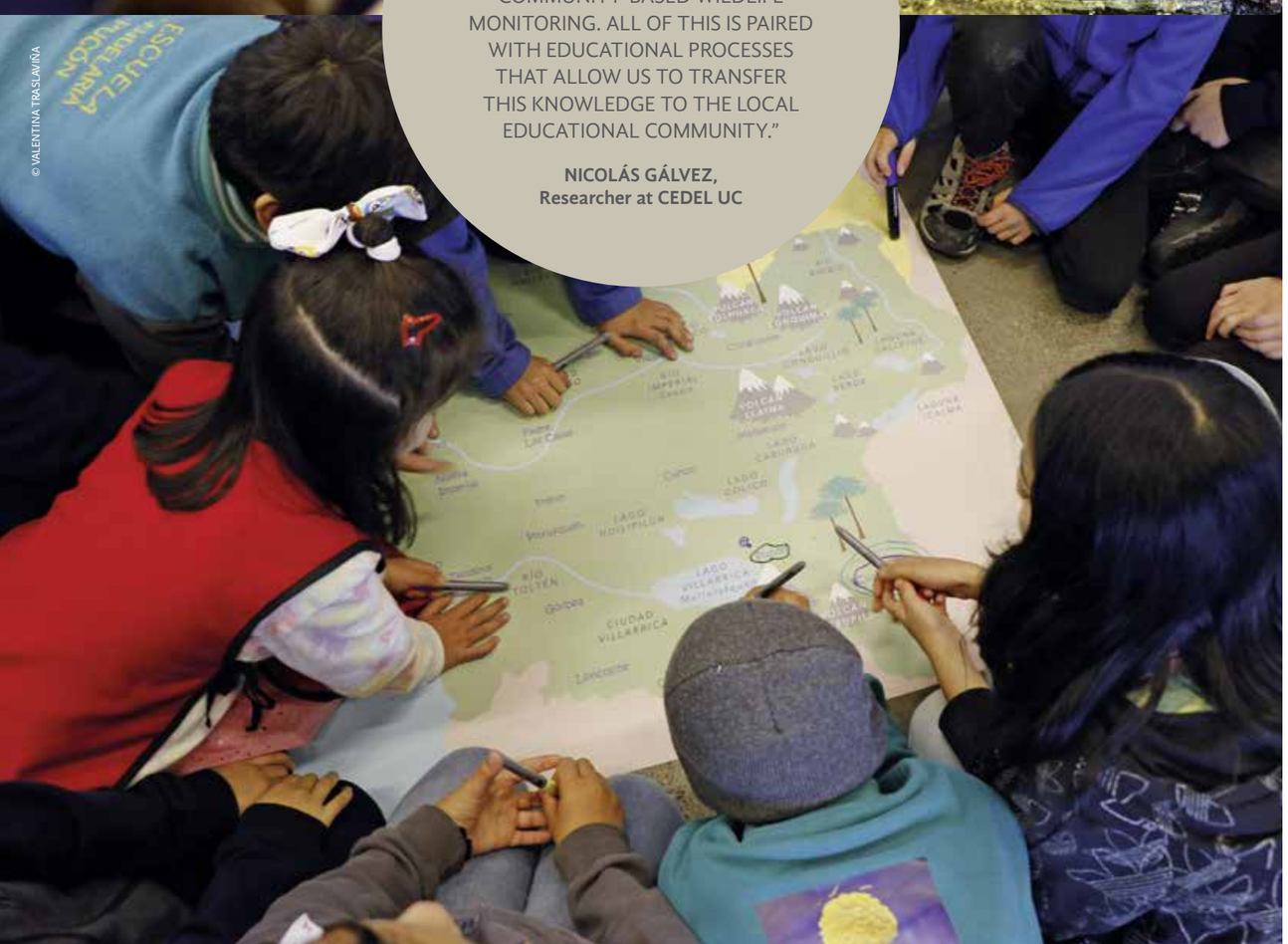
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"WE CONTRIBUTE TO IMPORTANT TOPICS ON BIODIVERSITY AND WILDLIFE, WORKING ON MONITORING MESOCARNIVORES, HUMAN-ANIMAL RELATIONSHIPS, AND SUPPORTING COMMUNITY-BASED WILDLIFE MONITORING. ALL OF THIS IS PAIRED WITH EDUCATIONAL PROCESSES THAT ALLOW US TO TRANSFER THIS KNOWLEDGE TO THE LOCAL EDUCATIONAL COMMUNITY."

NICOLÁS GÁLVEZ,
Researcher at CEDEL UC

UC CENTER FOR LOCAL DEVELOPMENT

/ CEDEL

PROMOTING SUSTAINABILITY WITH THE TERRITORY

Located in the lacustrine Araucanía, the UC Center for Local Development (CEDEL) focuses on sustainability to promote development and education based on interculturality, the diversity of socio-ecological systems, and the value of local knowledge.

The UC Center for Local Development, CEDEL, at UC Chile is located in the central-southern region of Chile, an area rich in ecological diversity, with a strong presence of Mapuche communities and one of the highest poverty rates in the country. Established in 2010, the center is part of the Villarrica campus, with participation from the Faculties of Agronomy and Natural Systems; Architecture, Design, and Urban Studies; History, Geography, and Political Science; Social Sciences; and Medicine.

Since its creation, the Center has sought to promote research, development projects, and educational programs that contribute to the theory and practice of sustainability, working from an interdisciplinary and intercultural perspective based in the territory. Through collaborative, multisectoral work, the Center aims to establish transdisciplinarity as a key factor in addressing local needs and global challenges in a relevant way.

Thanks to the success of its initiatives over the years, the Center has become a key platform for connecting the university with complex socio-ecological issues in central-southern Chile, contributing to understanding the challenges and opportunities for building a sustainable world.

The Center's research, development, and educational projects are organized into four action areas: Sustainability of Socio-Ecological Systems, Education for Sustainability, Sustainable Tourism and Local Economy, and Territorial Planning and Governance.

Since 2019, CEDEL has occupied and managed the Michel Durand Interdisciplinary Complex for Sustainable Development. The building is certified as a Sustainable Building (CES certification) and is located on the shores of Lake Villarrica, with infrastructure designed to facilitate research, outreach, and educational activities for university students, international researchers, and local stakeholders.

Currently, in addition to its professional staff, assistants, and students, the center has 23 faculty members from six university faculties. Since 2010, the center has executed more than 196 projects, all with an interdisciplinary and intercultural approach, directly involving researchers from fields such as environmental sciences, social sciences and humanities, education, urban-territorial studies, and medicine.

"CEDEL DEVELOPS SUSTAINABILITY PROGRAMS FOR THE UNIVERSITIES OF CALIFORNIA, WASHINGTON, AND NOTRE DAME. THEIR SUCCESS IS ROOTED IN THE EXPERIENCE GAINED FROM A BIOCULTURALLY RICH AND DIVERSE TERRITORY, A NATURAL LABORATORY FOR STUDYING SOCIO-ECOLOGICAL SYSTEMS, CONNECTING GLOBAL ISSUES WITH LOCAL CONTEXTS."

FRANCISCA SANTANA , Coordinator of International Alliances, CEDEL UC

MIRAS, open air museum in the heart of Araucanía.

INTERNATIONAL CONGRESS ON EDUCATION FOR SUSTAINABLE DEVELOPMENT
Since 2019, CEDEL has hosted this congress, a gathering focused on education, interculturality, and sustainability. The event encourages connections between academia and various social stakeholders.

COMMUNITY ENGAGEMENTS
Through programs and initiatives such as seed exchanges and garden meetings, the Center interacts with various social stakeholders, creating spaces for transdisciplinary engagement.

INTERACTIVE REGIONAL MUSEUM OF AGROECOLOGY AND SUSTAINABILITY (MIRAS)
An open and free museum that aims to bring people closer to the socio-ecosystems of the Villarrica Lake watershed. Its circuit includes the El Boldo Agroecological Garden.


© TOMÁS IBARRA

"THE COORDINATION AND JOINT EFFORT BETWEEN THE PUBLIC, PRIVATE, AND ACADEMIC SECTORS STRENGTHENS THE REGION, BOOSTING MANAGEMENT AIMED AT DIFFERENT AREAS OF LOCAL DEVELOPMENT. THE CENTER'S CONTRIBUTION TO THE DEVELOPMENT OF PROJECTS THAT ADD VALUE TO LOCAL TERRITORIES HELPS STRENGTHEN THE REGIONAL ECOSYSTEM."

EDUARDO FIGUEROA, Regional Director of CORFO Araucanía

To address its action areas, the Center develops various initiatives focused on providing tangible tools to local communities, particularly educational ones. Programs such as "*Explora La Araucanía*," which aims to strengthen scientific skills in educational communities in the region, and "*Valoras UC*", which addresses school coexistence, are initiatives that arise from the center, strengthening its work and positioning its scientific production in various local, regional, and national spaces.

The Center also collaborates with other organizations that expand its reach and impact communities across the country. This includes agreements with the Ibáñez Atkinson Foundation and the Siemens-Stiftung Foundation, fostering gatherings around environmental education, STEM+ education, and sustainability.

The Center also offers educational opportunities, such as the Minor in Sustainable Development, which is held every first semester and involves students from both Villarrica and Santiago. Additionally, the Center runs various programs for foreign university students, notably the Social-Ecological Sustainability program, aimed at students from the University of California System.

Through these initiatives, CEDEL contributes to the national and global sustainability challenge, putting research at the service of the region's socio-ecological issues and positioning UC Chile within the territory.


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"WE'VE BUILT A VERY COLLABORATIVE, RECIPROCAL RELATIONSHIP, PROVIDING SUPPORT AND TRUST TO THE WORK WE DO WITH JUNJI (STATE AGENCY IN CHARGE OF NURSERIES AND KINDERGARTENS IN CHILE) AROUND MORE SUSTAINABLE AND INTERCULTURAL EDUCATION. FROM THIS PERSPECTIVE, IT'S CRUCIAL TO HAVE PROFESSIONALS WHO CAN STRENGTHEN THE PEDAGOGICAL WORK WE DO IN KINDERGARTEN."

MARCELA GUERRERO, Educator at Ayün Newen Kindergarten, Padre Las Casas

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SENDA DARWIN BIOLOGICAL FIELD STATION

The Biodiversity of Chilean Forests

5.

DIVERSITY OF NATIVE FLORA in the forests of Senda Darwin.

SENDA DARWIN BIOLOGICAL FIELD STATION

THE BIODIVERSITY OF CHILEAN FORESTS

Located on a 115-hectare property, 15 km north of Ancud, this center promotes scientific knowledge and education on natural ecosystems, society, and sustainable local development in Chiloé. It welcomes anyone interested in using its facilities for study, research, or educational purposes.

Founded in 1996, the station is named after Charles Darwin, the renowned English scientist who revolutionized the world of science with his theories. During his voyage on the Beagle, Darwin documented his 1834 journey through the landscapes that are now home to the Senda Darwin Biological Field Station. Today, scientists at the station follow in Darwin's footsteps, observing, recording data, and asking key questions for their research in the same locations he explored.

The Field Station was established to expand scientific knowledge of Chiloé's temperate forests, as there was previously no suitable facility for conducting research, housing scientists and university students, measuring ecological processes, or promoting environmental education in schools and communities. The founders also sought to support sustainable public policy proposals for local development.

The Senda Darwin Biological Field Station is managed by the Senda Darwin Foundation and is open to anyone interested in using its facilities for study, research, or educational purposes. The station covers 60 hectares of native forest, 30 hectares of scrubland, and 12 hectares of millenary peatlands, untouched by human activity since 1996. It features a guesthouse for 20 people, a visitor center with a 40-person auditorium, a laboratory, and a small library. Long-term research projects are conducted here, using cutting-edge scientific instruments.

A 2024 study published in Biogeosciences confirmed that mature Chiloé forests, including the one at the Field Station, serve as critical carbon sinks that capture an average of 18 tons of CO_2 per hectare per year. The study estimated that the Senda Darwin forest has stored 1,073 tons of carbon per hectare over its lifetime, a process that would take over 200 years to replicate today.

In 2016, UC Chile signed an agreement with the Senda Darwin Foundation to collaborate on teaching and scientific research. This agreement formalized their existing academic ties that enabled undergraduate and graduate students to conduct theses in ecology and biodiversity.

Several institutions conduct research at the station. Some notable projects include: nocturnal raptor monitoring (Pontificia Universidad Católica de Valparaíso); plant-herbivore and pollinator interaction networks (Institute of Ecology and Biodiversity); productivity and ecology of peat moss ecosystems (Universidad Bernardo O'Higgins); climate variable monitoring (Center for Advanced Studies in Arid Zones); and macrofungi diversity and native species propagation (Senda Darwin Foundation).

"SENDA DARWIN BIOLOGICAL FIELD STATION, AT THE HEART OF CHILOÉ'S TEMPERATE RAINFOREST, IS A ONE OF A KIND LABORATORY. IT ALLOWS US TO STUDY BIODIVERSITY AND ECOSYSTEM DYNAMICS WHILE INTEGRATING SCIENCE, CONSERVATION, AND ENVIRONMENTAL EDUCATION."

AURORA GAXIOLA, PhD in Plant Ecology; Professor, UC Faculty of Biological Sciences

FLORA OBSERVATION at Senda Darwin.

"AT SENDA DARWIN, I WAS ABLE TO EXPERIENCE ECOLOGY IN ITS PUREST FORM. STUDYING PLANT AND INSECT DIVERSITY, ABUNDANCE, AND DISTRIBUTION PATTERNS HELPED ME UNDERSTAND THE DYNAMICS OF FOREST REGENERATION. IT'S BEEN A TRANSFORMATIVE JOURNEY—FROM MY FIRST FOREST ECOLOGY COURSE 10 YEARS AGO TO NOW, AS A POSTDOCTORAL RESEARCHER."

KARINA MADRIAZA,
UC PhD in Ecology; Researcher at the Institute of Ecology and Biodiversity (IEB)


© SENDA DARWIN

"WHAT I LOVE ABOUT THE STATION IS THAT IT'S FULL OF MAGICAL PLACES THAT CHANGE WITH THE SEASONS. STREAMS APPEAR AND DISAPPEAR, FLOWERS TURN INTO FRUITS, THEN INTO SEEDS. EVERY FIELD OUTING AND PROJECT HOLDS A SURPRISE. WORKING WITH DIFFERENT TEAMS IS FASCINATING—I'M ALWAYS LEARNING MORE ABOUT THE DYNAMICS OF THESE ECOSYSTEMS."

YALL ASENIE, Research Technician, Senda Darwin Biological Field Station

© SEBASTIÁN ARMESTO

THE FIRST EDDY COVARIANCE TOWERS IN CHILE
In 2013, two eddy covariance towers (one in a forest and one in a peatland) were installed at the station to study climate change by measuring CO_2 exchange between ecosystems and the atmosphere. This information can be used to help mitigate the current climate crisis.

© SEBASTIÁN ARMESTO

FOREST DYNAMICS PLOTS
For the past 10 years, researchers have studied forest structure and composition in one-hectare plots to better understand long-term ecological changes and processes and provide essential data for forest restoration.

© SCARLETT CÁRDENAS

ANCESTRAL KNOWLEDGE BOOKLETS
"Ancestral Knowledge: Preserving and Valuing Huilliche Heritage" is a collection of four booklets that blend scientific research with ancestral wisdom. These booklets are the result of an anthropological study conducted in collaboration with Huilliche communities.

For over 20 years, the Field Station has studied interaction networks between species in Chiloé's temperate forests and insects. It also measures carbon storage and flow in different ecosystems, such as forests and peatlands, that serve as key carbon sinks to help mitigate global warming. Additionally, researchers assess the impact of reduced summer rainfall on Chiloé's forests and biogeochemical cycles.

The long-term monitoring conducted at the Field Station helps us to understand and protect the valuable ecosystems of southern Chile and thus contribute to Senda Darwin's mission to apply scientific knowledge for the benefit of local communities. Through a long-standing collaboration with the Institute of Ecology and Biodiversity (IEB) and researchers from the Universidad de Chile and Universidad Católica, work has resumed on the permanent research plots established a decade ago at Senda Darwin.

Education plays a key role in Senda Darwin's partnership with UC Chile and other universities. Field courses are taught each summer for undergraduate and graduate students in biology-related fields including "Ecology and Biodiversity of Temperate Forests" and "Forest Ecology". Participants in these courses conduct hands-on research on biodiversity and ecosystem ecology.

For younger students, Senda Darwin offers the "Ecology in the Schoolyard" workshop for children, teachers, and students in Chiloé that explores ecological processes, local organisms, and human impact on the environment on a local, regional, and global scale. The Field Station also engages with the community by participating in local events such as "Science Seasons in Chiloé" and school science fairs focused on environmental education. It also hosts workshops, including "How to Make a Herbarium".


© ARCHIVO IEB

© SENDA DARWIN

"WORKING AT SENDA DARWIN IS NOT JUST A UNIQUE OPPORTUNITY FOR RESEARCH—IT'S ALSO A PLACE WHERE TEAMWORK THRIVES, FRIENDSHIPS GROW, AND NEW KNOWLEDGE IS BUILT ON THE LEGACY OF THOSE WHO HAVE SHAPED THE STATION."

PAULA FORMAS, PhD Student, UC Faculty of Biological Sciences, Ecology Major

© ARCHIVO IEB

© ARCHIVO IEB

TANTAUCO RESERVE

A Meeting Place and a Sustainable Nature Destination

6.

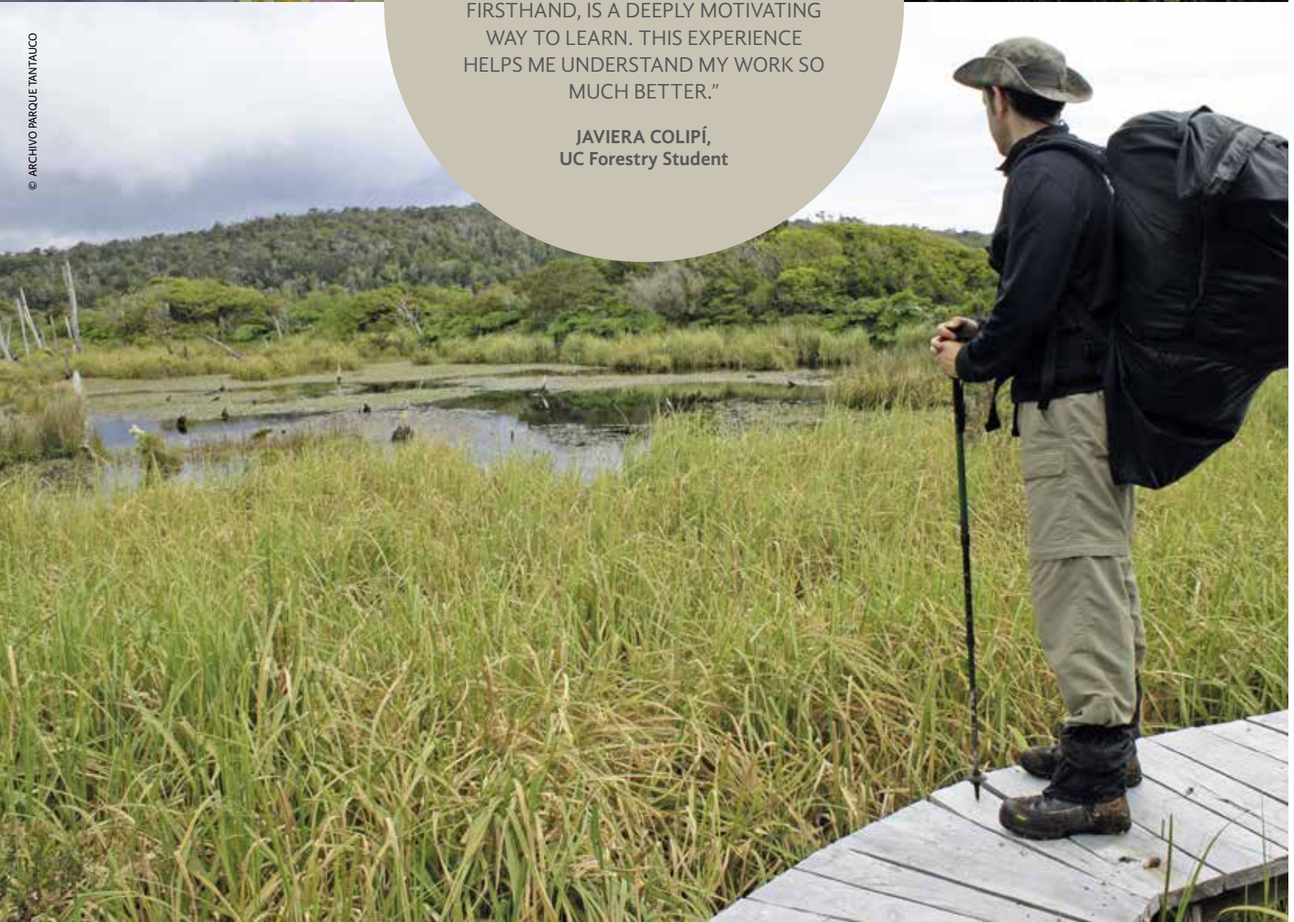
INÍO LIGHTHOUSE, PUNTA ROCOSA TRAIL, south end of Chiloé.


© ARCHIVO PARQUE TANTAUCO


© ARCHIVO PARQUE TANTAUCO

"VISITING TANTAUCO AND SEEING THE MAPS I'VE DEVELOPED ON THE COMPUTER COME TO LIFE IS SO EXCITING. LEAVING THEORY BEHIND AND IMMERSING MYSELF IN THE FOREST, OBSERVING THE VEGETATION FIRSTHAND, IS A DEEPLY MOTIVATING WAY TO LEARN. THIS EXPERIENCE HELPS ME UNDERSTAND MY WORK SO MUCH BETTER."

JAVIERA COLIPÍ,
UC Forestry Student


© ARCHIVO PARQUE TANTAUCO

TANTAUCO RESERVE

A MEETING PLACE AND A SUSTAINABLE NATURE DESTINATION

The protection of priority ecosystems, biodiversity research, environmental education, local culture, and community development are the foundations of Tantauco Reserve—a pioneering conservation initiative in Chile.

Tantauco is located in the southernmost part of Chiloé Island and spans over 110,000 hectares. The reserve is open year-round to both domestic and international visitors, offering the chance to experience the splendor of pristine, untamed landscapes and explore over 130 kilometers of trails teeming with diverse flora, fauna, and fungi.

The Reserve entrance is in the municipality of Quellón, 1,200 kilometers South from Santiago. Visitors reach the Portería Yaldad via 18 kilometers of gravel road, which features a visitor center and trails such as Río Yaldad, Siempreverde, and Darwin. From Yaldad, a 20-kilometer road leads to Chaiguata Lake, where vehicle access ends and where the domes, the campground, the fire pit and the *Bosque Hundido* and *Los Ñirres* trails are located. This area, the most visited during peak season, offers kayaking and sightings of species like the pudú and the southern river otter.

The Reserve's only village is Caleta Inío, which in the Huilliche language means "seaside." Caleta Inío, located at the southernmost point of the reserve, can be reached by municipal boat, by air from Castro, or on foot through a 52-kilometer, five-day trek starting from Chaiguata. Inío is home to approximately 60 people who harvest seaweed, sea urchins, and clams, work within the reserve, and offer services such as carpentry, cooking, grocery sale, camping, lodging, and whale watching near Boca del Guafo.

Inío is the most isolated area of Chiloé, with no electricity or drinking water. The village hosts the park administration, a guesthouse, a health post, a museum, a campsite, a diner, a nursery, and a dock. It also features a large plaza built with Guaitecas cypress and a small rural school, whose only teacher educates five children of varying ages. Historically, this region was home to the Chono people, and remnants of coastal caves inhabited over 500 years ago can still be found.

Since August 2024, UC Chile has been involved in Tantauco Reserve, conducting research on socioecology, forest ecosystems, fjords, and coastal environments. Social sciences are also integrated to better understand the relationship between humans and the environment, global change, and the land-sea connection. Research also examines the causes and effects of climate change on biodiversity, droughts, natural disasters, and ecosystem services. The concept of "One Health" serves as a guiding principle, which seeks nature-based solutions to balance and optimize the health of people, animals, and ecosystems, with a focus on preserving ecosystems.

This collaboration promotes cooperative programs for research and monitoring across various ecosystems and species, research residencies, short hands-on training courses, and joint publications on conservation, ecology, biodiversity, sustainable development, and environmental policies.

"AT THE SCHOOL OF ARCHITECTURE, WE'VE PROMOTED ACADEMIC OPPORTUNITIES TO EXPLORE HOW DESIGN IMPACTS THE CREATION OF MINIMAL SPACES AND PROGRAMS IN REMOTE AREAS. TANTAUCO OFFERS A UNIQUE SETTING TO TACKLE CHALLENGES LIKE INSULARITY, WATER RESOURCE MANAGEMENT, WASTE TREATMENT, MARITIME TRANSPORTATION, AND RENEWABLE ENERGY PRODUCTION."

GERMÁN GUZMÁN,
Professor, UC School of Architecture

TANTAUCO RESERVE ADMINISTRATION at Caleta Inío.

ENVIRONMENTAL EDUCATION
More than 8,000 students from the Chiloé archipelago have visited Tantauco to learn about charismatic species, fostering a sense of belonging and responsibility for their priority habitats.

CHONOS MUSEUM
The Inío museum offers a journey through time, showcasing artifacts and tools that reveal the lifestyle of the Chono people in this area since ancient times.

DARWIN'S FOX
As a key conservation priority of the Reserve, the Darwin's fox is one of the most monitored and studied species, with Tantauco being the protected area that hosts the highest population of this species worldwide.

"IN THE HUILLICHE LANGUAGE, TANTAUCO MEANS 'THE PLACE WHERE WATERS MEET,' WHICH IS EXACTLY WHAT WE ENVISION—A SPACE WHERE ACADEMIA, SCIENCE, CONSERVATION, AND COMMUNITY COME TOGETHER. ITS FOUNDER, SEBASTIÁN PIÑERA, INVITED US TO CONNECT WITH NATURE, REKINDLE OUR SPIRITS, LIFT OUR GAZE, AND TRULY APPRECIATE IT."

MAGDALENA PIÑERA,
Executive Director of Fundación Parque Tantauco

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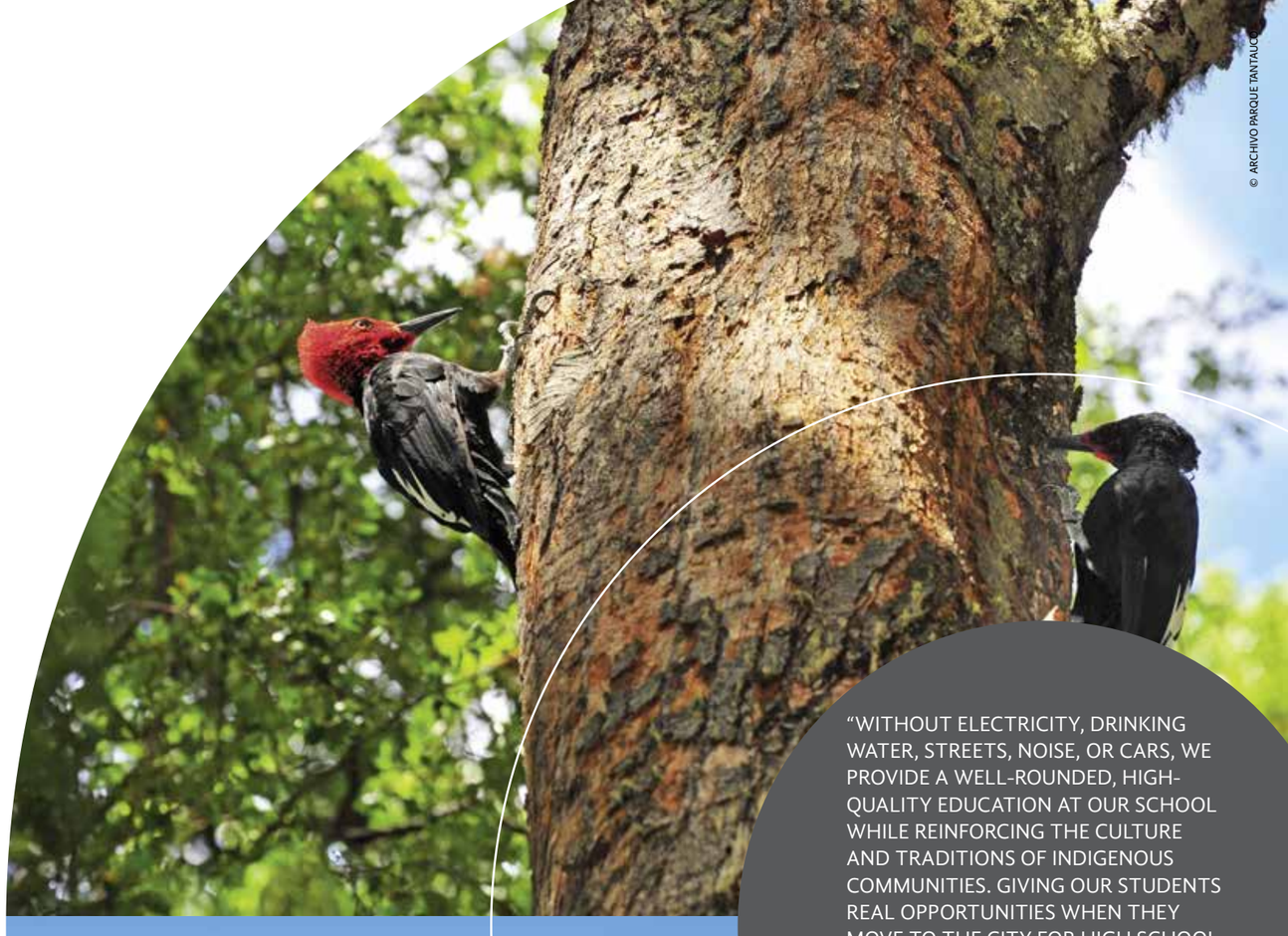
Tantauco's management plan focuses on five conservation priorities: the North Patagonian forest, the Guaitecas cypress, the peatlands, the Chiloé fox, and the Chono culture. The southernmost conifer in the world, the Guaitecas cypress, covers more than 29,000 hectares in Tantauco, facilitating the conservation and study of pristine forests over 800 years old. However, in Chiloé and Melinka, illegal logging has caused severe degradation of this species, presenting a significant challenge in such a vast territory. Restoring this megaforest is one of the conservation project's greatest objectives.

The peatlands are critical water reservoirs that host sphagnum moss and play a vital role in the island's hydrological cycle, especially during the summer water shortage shortage. Tantauco contains over 6,000 hectares of peatlands, which are highly vulnerable to climate change.

The Darwin's fox, an iconic species of the island, has one of its last remaining refuges in Tantauco. Monitoring and tracking are conducted using trail cameras and a satellite collar. Preserving this species is a top priority, as is protecting Darwin's frog—a fragile and endangered species threatened by rising temperatures and the chytrid fungus, which affects its skin.



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"WITHOUT ELECTRICITY, DRINKING WATER, STREETS, NOISE, OR CARS, WE PROVIDE A WELL-ROUNDED, HIGH-QUALITY EDUCATION AT OUR SCHOOL WHILE REINFORCING THE CULTURE AND TRADITIONS OF INDIGENOUS COMMUNITIES. GIVING OUR STUDENTS REAL OPPORTUNITIES WHEN THEY MOVE TO THE CITY FOR HIGH SCHOOL IS POSSIBLE WITH THE SUPPORT OF PARENTS, THE COMMUNITY, AND NETWORKS—LIKE TANTAUCO IN MY CASE."

ISABEL BUSTAMANTE, Teacher in charge of the rural school in Inío, Chiloé

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© ARCHIVO PARQUE TANTAUCO

UC PATAGONIA FIELD STATION FOR INTERDISCIPLINARY RESEARCH

Exploration and Interdisciplinarity in Frontier Territories

7.

UC PATAGONIA FIELD STATION WORK PLATAFORM, Bahía Exploradores.

UC PATAGONIA FIELD STATION FOR INTERDISCIPLINARY RESEARCH

EXPLORATION AND INTERDISCIPLINARITY IN FRONTIER TERRITORIES

In Valle Exploradores, at the northern edge of the Laguna San Rafael National Park, surrounded by fjords, forests, and bodies of water, lies the UC Patagonia Field Station for Interdisciplinary Research. It is a remote area, 80 km from Puerto Río Tranquilo and 300 km from Coyhaique, in the Aysén Region.

The Field Station is a long-term environmental monitoring platform that hosts projects focused on protecting the integrity of the area and its communities. It aims to understand how global change and human settlements affect the functioning of southern ecosystems in Patagonia, promoting interdisciplinary research, education, and scientific collaboration with local territories. The project began in 2009 when the Chilean Ministry of National Assets granted 5,079 hectares to UC Chile for scientific research and teaching activities, culminating in the creation of the Patagonia Field Station in 2015. In 2019, after extensive exploration, surveys, and station setup, the concession was extended until 2035.

With an interdisciplinary focus, UC Patagonia Field Station welcomes research from various fields through projects in Patagonia, collaborating with scientists from Chilean universities and institutions (CIEP, Universidad Mayor, Universidad Austral, USEK, and UFRO). In education, undergraduate theses on topics like biodiversity, ecology, microbiology, and geography are developed in the Aysén Region.

The faculties of History, Geography and Political Science, Biological Sciences, Agronomy and Natural Systems, Social Sciences, and Education at UC Chile participate in the Field Station. Researchers contribute to long-term monitoring and understanding of socio-environmental processes to aid in the management of Patagonian ecosystems, promoting surveys, disciplinary and interdisciplinary studies, and environmental education. They generate knowledge and information for decision-making in isolated territories.

Focusing on building a broad scientific view of Patagonia and its connection with the community, interdisciplinarity has been essential to addressing regional issues like water, land subdivision, the impact of nature tourism, pollution, and biological invasions. Environmental data monitoring and analysis are conducted, integrating reflection and critical thinking to understand the ecosystem and the changes it faces.

There is great international interest in studying climate change in the Southern Hemisphere and Chile, as its climatic and geographical conditions allow for analysis of the climate up to the last glacial maximum, 10,000 years ago. Local, situated case studies help understand how territories are reacting to change, with their regional particularities.

"IT'S BEEN AN INCREDIBLE AND UNIQUE OPPORTUNITY TO DEEPEN MY KNOWLEDGE ON A VARIETY OF TOPICS BEING EXPLORED IN THIS NEARLY UNTOUCHED NATURAL LABORATORY. AS A LOCAL LIAISON, I BRING MY KNOWLEDGE AND EXPERIENCE FROM RURAL LIFE, EMBRACING RESPONSIBILITIES AND COMMITMENTS. I'M TRULY HAPPY AND HONORED TO BE PART OF RCER."

RAQUEL GODOY,
South Local Liason, RCER

"GUIDED BY EXPERIENCED RESEARCHERS, EVERY DAY AT PATAGONIA FIELD STATION FEELS LIKE AN ADVENTURE, FILLED WITH OPPORTUNITIES TO GAIN VALUABLE SKILLS AND KNOWLEDGE. WE BUILD A DEEPER CONNECTION WITH THE ENVIRONMENT AND WORK TOWARD CONSERVING THESE UNIQUE ECOSYSTEMS WITHIN A COLLABORATIVE COMMUNITY WHERE IDEAS THRIVE. HERE, WE'RE SHAPING OURSELVES INTO MINDFUL, DEDICATED RESEARCHERS WHO ARE COMMITTED TO THE WORLD AROUND US."

JOSÉ GONZÁLEZ, Geographer, UC

VALLE EXPLORADORES, in the background, Monte San Valentín.

"PATAGONIA FIELD STATION IS AN EXCEPTIONAL HUB FOR FRONTIER RESEARCH. WORKING ALONGSIDE RESEARCHERS AND STUDENTS HAS GREATLY ENRICHED BOTH MY SCIENTIFIC KNOWLEDGE AND PERSONAL GROWTH. THE COOPERATIVE, WELCOMING, AND INSPIRING ENVIRONMENT HERE MOTIVATES US TO EXPLORE AND REFLECT DEEPLY ON THE ECOSYSTEM."

SOFÍA HERNÁNDEZ,
Marine Biologist, UC

"FIELD STATIONS ARE ESSENTIAL ON A GLOBAL SCALE, ESPECIALLY IN THE FACE OF CLIMATE CHANGE. WE NEED LONG-TERM OBSERVATION SYSTEMS TO TRACK CHANGES, THEIR PACE, AND THEIR IMPACT ACROSS THE PLANET. THIS IS WHY STATIONS ARE SO VITAL, AND THERE WAS A PARTICULAR NEED FOR ONE IN THE FAR SOUTHERN REACHES OF THE SOUTHERN HEMISPHERE."

DIDIER GALOP, PhD in Geography, Paleolimnologist, former Director of GEODE UMR 5602, CNRS, France†

ENGAGEMENT
In a remote territory, the Field Station connects with the community by collaborating with local stakeholders and institutions in scientific outreach initiatives, environmental education, citizen science, and regional and local research projects.

OHM-i
Since 2017, the UC Patagonia Field Station has been part of the International Human-Environment Observatory (OHM-i) Patagonia-Bahía Exploradores within the LabEx DRIHM (INEE) network of the National Center for Scientific Research (CNRS) of France, the only Latin American and hemispheric observatory in this international research network. With the support of this network, projects are developed to address environmental and social challenges in Patagonia.

PUBLICATIONS AND COLLABORATION
The Field Station promotes research development in Patagonia, generates knowledge, and communicates its relevance; it publishes books and academic articles; it fosters collaboration among researchers from different universities and centers, with projects that have led to undergraduate and master's theses.

UC Patagonia Field Station approaches its work with a geographic and local perspective, as each space has unique characteristics and processes. The Valley and Bay Exploradores are exceptional locations for identifying these. Its research topics include: Territorial and environmental dynamics and legacies; Global environmental change and glaciology; Biodiversity dynamics and disturbances; BioSocioCultural Perspective: Biodiversity and Gender.

Within the framework of international cooperation, UC Patagonia Field Station researchers, along with national counterparts, study socio-environmental processes in Patagonian ecosystems that span the last 200 years. This includes agricultural and tourism colonization processes, evidence of sudden glacial lake floods, and diagnosing biodiversity in the Valle Exploradores using environmental DNA. Additionally, they study antimicrobial resistance genes in microorganisms, analyze insects essential for pest control in southern forests, and explore the introduction of salmonid species. From a biosociocultural approach, they address the scientific knowledge produced and the multidimensional effects of the climate and gender crises.

The Field Station sets multiple challenges, such as advancing internationalization and forming new networks, strengthening connections with local and regional stakeholders, and opening new research lines, collaborations, and user engagement. The main goal is to be an interdisciplinary research station that fosters scientific collaboration and significantly contributes to global knowledge and informed decision-making for sustainable development in Chilean Patagonia.

MAGALLANES CENTER OF EXCELLENCE IN BIOMEDICINE

From Magallanes, Nature Contributes to Biomedicine

8.

STRAIT OF MAGALLEN, Magallanes y la Antártica Chilena Region

MAGALLANES CENTER OF EXCELLENCE IN BIOMEDICINE / CEBIMA

FROM MAGALLANES, NATURE CONTRIBUTES TO BIOMEDICINE

Becoming a hub of scientific excellence in the southernmost region of Chile, South America, and the world; researching the potential of Magellanic plants and algae to combat chronic and degenerative diseases; strengthening regional research capabilities; and improving the quality of life for its inhabitants are the driving goals of CEBIMA.

Located in Punta Arenas, facing the Strait of Magellan, is the building of the Teaching and Research Assistance Center (CADI) of the University of Magallanes, home to the Magallanes Center of Excellence in Biomedicine (CEBIMA). Inaugurated in 2019, its creation reflects a decentralizing approach aimed at identifying components in Patagonian plants and algae that could contribute to the treatment of chronic, neurodegenerative, and aging-related diseases.

This Research Center boasts robust infrastructure and state-of-the-art technological equipment, offering unique strengths in the region. Among its resources are a bioterium housing experimental animals, behavioral study rooms, and 10 laboratories, including those for physiology, molecular and cellular biology, a laboratory for the *C. elegans* worm, an electrophysiology lab for studying the hippocampus, and laboratories focused on muscle contraction and exercise studies.

Why does Magallanes have a high aging rate? What regional factors contribute to the high incidence of colon cancer, diabetes, and degenerative diseases? Since its foundation, CEBIMA's researchers have sought answers to these questions, working on characterizing natural products from the region's land and sea. These products, shaped by extreme temperatures, strong winds, and scarce sunlight, are subject to conditions that strengthen their biological material, potentially producing chemical compounds with medicinal properties for human ailments.

The causes of degenerative diseases like Alzheimer's and Parkinson's are only partially understood. Now, it is time to identify natural resources in the area that could intervene in aging processes and cellular regeneration associated with these pathologies, as well as their connection to cellular pathways such as the Wnt signaling pathway, which contains molecular components that influence proteins involved in neurodegenerative diseases.

CEBIMA secures funding from the Regional Government and national and international agencies to study endemic subantarctic and antarctic macroalgae, which are adapted to critical conditions of light and temperature. These adaptations have prompted the synthesis of biomolecules like fatty acids and sugars (fucoidans) in concentrations only recorded in high latitudes.

PEAT BOGS, DARWIN MOUNTAIN RANGE, Magallanes y de la Antártica Chilena Region.

"AT CEBIMA, WE USE THE NEMATODE C. ELEGANS AS A NEURODEGENERATION MODEL TO STUDY THE EFFECTS OF NATURAL PRODUCTS FROM THE REGION. BOTH THE GRACILEX EXTRACT AND HUPERZINE A HAVE SHOWN PROTECTIVE EFFECTS AGAINST THE TOXICITY OF PROTEINS RELATED TO PARKINSON'S AND ALZHEIMER'S DISEASES."

CRISTINA PINTO,
PhD in Cellular and Molecular Biology,
Postdoctoral Researcher at CEBIMA

CEBIMA BIOTERIUM
The bioterium is a facility that houses and provides experimental animals for research and control tests with reliable and reproducible results. It is equipped for behavioral studies, including a Barnes maze and a Morris water maze, enabling the analysis of the cognitive and memory abilities of mice with neurodegenerative diseases. These mice are administered natural regional products as part of the studies.

REGIONAL WEALTH
Among the Patagonian natural products studied by CEBIMA scientists is *Huperzia fuegiana*, a rare and vulnerable type of fern found in Chile at the Tyndall Glacier. From it, Huperzine A is extracted, a compound that may help combat Alzheimer's and Parkinson's diseases. Another notable example is *Gigartina skottsbergii*, a type of algae with potential anti-diabetic and neuroprotective effects, used in the production of Gracilex.

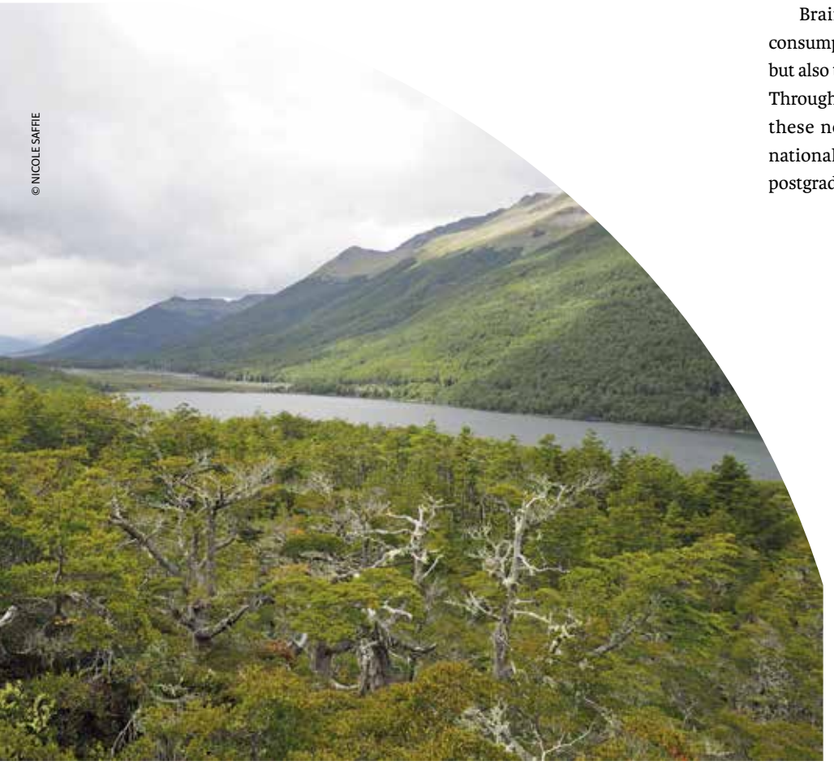
The CEBIMA facilities occupy one-third of the CADI building, which also includes meeting rooms and an auditorium. This infrastructure facilitates regional, national, and international courses, workshops, and conferences, such as the World Congress of Neurotoxicology in 2022.

At CEBIMA, research also focuses on characteristics of metabolic syndrome, diabetes, and menopause. To investigate menopause stages, researchers analyze the effects of a new experimental drug that induces menopause in mouse models. The goal is to understand the factors linking menopause to Alzheimer's disease, including mitochondrial alterations and protein misfolding repair mechanisms (UPR), which have recently been associated with the Wnt pathway.

In studies involving the 1.0 mm *C. elegans* worm carrying human genes related to neurodegenerative diseases, worms exhibiting alpha-synuclein (the protein responsible for most Parkinson's-related abnormalities) have been described. These studies have shown that *Huperzine* A can inhibit disease-specific changes such as *alpha-synuclein* aggregation.

To broaden the scope of its research, CEBIMA establishes agreements and collaborations with international entities, such as the Federal University of Minas Gerais in Brazil. Future research is aimed at evaluating the effects of subantarctic and Antarctic fungi associated with macroalgae, pioneering cutting-edge lines of inquiry in biomedicine.

Brain injuries caused by trauma and alcohol consumption—a toxin that affects not only the liver but also the brain—are also being studied at CEBIMA. Through theses and indexed scientific publications, these new discoveries are shaping regional and national research capacities at undergraduate and postgraduate levels.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"I HAVE WITNESSED THE POTENTIAL OF THIS CENTER TO BRING TOGETHER TOP-TIER SCIENTISTS AND EXPAND ITS SCOPE BEYOND BIOMEDICINE. THERE IS A UNIQUE AND INTERESTING SYNERGY BETWEEN THE INTERESTS OF UC AND UMAG, PAVING THE WAY FOR EVEN GREATER RESEARCH DEVELOPMENT AT CEBIMA, WITH REGIONAL AND INTERNATIONAL IMPACT."

MARÍA PAZ MARZOLO, Professor, UC Faculty of Biological Sciences, member of the CEBIMA Executive Committee


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OMORA
ETHNOBOTANICAL RESERVE

Biocultural Conservation from the Southernmost Region of the World

9.

CAPE HORN Biosphere Reserve.

"OMORA'S PARTNERSHIP WITH RCER INTEGRATES THE SOUTHERNMOST REGION INTO THE NETWORK. THIS COLLABORATION IS BOTH VALUABLE AND STRATEGIC, AS IT STRENGTHENS COMMUNITY ENGAGEMENT AND RAISES AWARENESS ABOUT THE BIOCULTURAL CONSERVATION OF CAPE HORN BIOSPHERE RESERVE."

SERGIO GUITART, Executive Officer, UC Field Station Network, RCER

OMORA ETHNOBOTANICAL RESERVE

BIOCULTURAL CONSERVATION FROM THE SOUTHERNMOST REGION OF THE WORLD

Located in the Cape Horn Biosphere Reserve in Chile's Magallanes and Antarctic Region, Omora Ethnobotanical Reserve sits in the mountainous landscape of northern Navarino Island. Open year-round, it welcomes scientific research, education, biocultural conservation, and ecotourism initiatives.

Established in 2000, Omora Reserve spans 1,070 hectares along the southern coast of the Beagle Channel, just 3 km from Puerto Williams on Navarino Island. It is a concession of the Chilean Ministry of National Assets that is co-managed by the Omora Foundation and the Universidad de Magallanes (UMAG). As a key site within the Cape Horn Biosphere Reserve, Omora hosts research, education, and conservation projects. In 2008, it became home to Chile's Long-Term Socioecological Research Network (LTSER-Chile) and joined the International Long-Term Ecological Research (ILTER) Network in 2011.

Named after the Yaghan word for hummingbird, Omora protects threatened species such as the Magellanic woodpecker and the rufous-legged owl, as well as key plant species like lenga (*Nothofagus pumilio*) and ñirre (*Nothofagus antarctica*) trees, and a great variety of bryophytes (mosses and liverworts) and lichens. Cape Horn is a global biodiversity hotspot for bryophytes, containing over 5% of the world's species in an area covering less than 0.01% of Earth's land surface.

Each year, more than 200 researchers, along with undergraduate and graduate students, visit Omora Reserve. Since 2000, the reserve has partnered with the University of North Texas to offer field courses in biocultural conservation, environmental philosophy, biocultural ethics, ecological sciences, and the arts—an initiative developed with national and international scientists.

In 2016, the Omora Foundation expanded its collaboration with Chilean universities, integrating Pontificia Universidad Católica de Chile and Universidad de Chile (through the Institute of Ecology and Biodiversity). Since then, Omora Reserve has strengthened ties with UC Chile, particularly with its Faculty of Philosophy in bioethics and environmental philosophy, the Faculty of Theology in environmental ethics, the Faculty of Medicine, including the Schools of Veterinary Science and Public Health, the Faculty of Agriculture and Natural Systems, and more recently, the Faculty of Education and the Villarrica Campus.

Omora Ethnobotanical Reserve has a guesthouse, laboratory, classroom, visitor center, monitoring stations, and interpretive trails, facilities with the capacity to simultaneously host 24 people in workshops, seminars, conferences, and research residencies.

“OMORA IS IN A UNIQUE GEOGRAPHIC LOCATION, OFFERING A COMPARATIVE ADVANTAGE FOR STUDYING CLIMATE CHANGE AND DEVELOPING EDUCATIONAL AND BIOCULTURAL CONSERVATION MODELS. THESE INITIATIVES ENCOURAGE SOCIETY TO COEXIST RESPONSIBLY, WITH GREATER KNOWLEDGE AND RESPECT FOR THE BIOLOGICAL AND CULTURAL DIVERSITY THAT SUSTAINS LIFE IN CHILE AND AROUND THE WORLD.”

RICARDO ROZZI, Founder of Omora Reserve, Professor at the Universidad de Magallanes (Chile) and the University of North Texas (USA).

ECOTURISM WITH MAGNIFYING GLASS at Omora Reserve.

FIELD ENVIRONMENTAL PHILOSOPHY
An educational and biocultural approach developed by Omora Reserve's multidisciplinary team. Its first 25 years are documented in Volume 5 of the *Ecology and Ethics* book series.

BIRD STUDIES PROGRAM
A globally recognized ornithological research initiative, it is the longest-running study in subpolar latitudes of the Southern Hemisphere. For 25 years, researchers have conducted bird banding, capture, and recapture studies in the park's forests.

CLIMATE CHANGE SENTINELS
Freshwater insects in rivers and lagoons serve as exceptional climate change sentinels due to their sensitivity to temperature fluctuations. Omora Reserve researchers have demonstrated that the Cape Horn Biosphere Reserve receives some of the purest rainfall on the planet.

Since 1999, Omora has brought together scientists, philosophers, and artists in a transdisciplinary approach known as Field Environmental Philosophy. This perspective integrates environmental ethics and ecology to protect both biological and cultural diversity. Designed as a natural laboratory, Omora Reserve serves as a sentinel for global change at the southernmost tip of the Americas.

Its research spans three key areas: long-term studies on fresh water invertebrates, bird monitoring, and "microscopic ecotourism." Its programs are closely linked to education and biocultural conservation.

Long-term research on the ecology and physiology of freshwater insects and invertebrates in subantarctic and Antarctic rivers and lagoons are conducted using photography and other non-extractive methods to study these organisms. These species play a crucial role in maintaining water quality and have life cycles highly sensitive to global warming. At Omora, the Antarctic midge (*Belgica antarctica*) has been identified as a sentinel species for climate change.

The forests of the Cape Horn Biosphere Reserve are a paradise for birdwatchers and ornithologists, as South America's migratory routes converge here. Omora Reserve hosts the longest-running bird monitoring program in the subantarctic latitudes of the Southern Hemisphere. Researchers focus on early detection of epidemics such as avian malaria and influenza, as well as climate change-related disruptions in migratory patterns.

Omora also pioneered an innovative form of sustainable and ethical tourism known as "microscopic ecotourism." This approach highlights the aesthetic, ecological, ethical, and economic value of the tiny organisms that form the "miniature forests of Cape Horn." Schoolchildren and local communities can experience these ecosystems up close, while scientists, artists, and philosophers study them. The Reserve trains local ecotourism guides, fostering collaboration between science and the region's tourism industry.

Throughout its history, Omora Reserve has developed concepts and methodologies to observe, appreciate, and protect biological and cultural diversity. From the vast planetary scale to the micro-world of tiny living beings, its work provides knowledge and values that inspire Chilean and global society to care for the delicate webs of life we share on Earth.


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SANTIAGO DE CHILE, 2025

SCIENTIFIC RESEARCH
FROM NORTH TO SOUTH

FIELD SCIENCE IN **CHILE**