Nicolás Emanuel Vidal Quini

BACHELOR'S GEOGRAPHY AND PHD IN GEOGRAPHY

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## BACHELOR'S GEOGRAPHY AND PHD IN GEOGRAPHY

SUMMARY

Geographer focusing on remote sensing, GIS, and environmental modeling, specializing in medium-resolution optical and SAR images. Over the past 6 years, I dedicated myself to my doctoral thesis work, emphasizing expertise in assessing environmental risks and Wetlands.

MOTIVATION

Dedicated to team growth and development, actively sharing knowledge to strengthen the team. Passionate about introducing innovative ideas and technologies, particularly in environmental modeling. Committed to staying at the forefront, innovating, and applying future technologies to address challenges in a sustainable world.

Education and Training
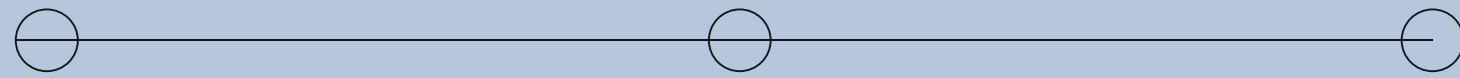
B. S in Geography

2012-2018
Universidad Nacional del Sur

Phd in Geography

Doctoral Fellow by Consejo
Nacional de Investigaciones
Científicas y Técnicas
(CONICET)- Instituto
Argentino de Oceanografía
2018-2024

Postgraduate program, Universidad Nacional del Sur.

Over 300 hours in
postgraduate courses
focused on Geography,
Remote Sensing, GIS, and
Data Analysis and Modeling

Professional Experience

Publication in Peer-Reviewed Journals

Production article about application of optical images and Radar to the space-time analysis of the anthropogenic incidence and climatic variability

Collaborations on Projects and Research Projects

Application of geographic information technologies to the comprehensive and comparative study of environmental problems

Researcher in Geotechnology Laboratory

Organize geographic information in an interoperable and high-quality manner, facilitating the efficient management and planning of geographic space. Committed to optimizing resource utilization in alignment with the goals of sustainable development within the framework of the 2030 SDGs.

Professional Training

Professional training with students and teachers from Agrarian Secondary Education School No. 1 in Bajo Hondo, Province of Buenos Aires. Geotechnologies and their agricultural applications.

Map Production

Land use and change maps, crop maps, Environmental risk maps Thematic Maps

What I Offer...

Geographic and Environmental Analysis

- **Geospatial Data Analysis**: Expertise in processing and analyzing large-scale geospatial datasets using GIS, remote sensing software, and Google Earth Engine Code.

- **Remote Sensing**: Skilled in optical and SAR remote sensing techniques for satellite imagery and spatial data processing.

- **Hydrometeorological Analysis**: Proficient in Python and R for hydrometeorological and spatial analysis.

Risk and Vulnerability Assessment

- **Environmental Risk Assessment**: Experienced in hazard, vulnerability, and risk modeling for flood and drought scenarios.

- **Socio-Economic Indexing**: Development of vulnerability socio-economic indexes.

Data Management and Visualization

- **Data Standardization**: Management and standardization of vector and raster data according to ISO standards and 2030 SDGs.

- **Data Visualization**: Competent with various data visualization tools and techniques for map production.

Additional Skills

- **Analytical and Problem-Solving**: Strong analytical and problem-solving abilities.

- **Communication and Collaboration**: Excellent communication and collaboration skills.

- **Scientific Writing**: Proficient in writing scientific projects, articles, and technical reports.

Environment Hazards, vulnerability and Risk

Development of advanced techniques and methodologies in optical and Synthetic Aperture Radar (SAR) remote sensing, complemented by geospatial analysis, for the creation of environmental risk models. These models address floods, droughts, and the status and condition of wetlands, and are translated into detailed cartographic outputs.

Socioeconomic Vulnerability

Creation of socioeconomic vulnerability maps using vector data and population statistics and indicators derived from the census. Data processing was conducted using R Studio packages, complemented by statistical analysis, to implement the "PIRNA Methodology for Social Vulnerability Assessment for Disaster Risk Management" and link it to vector information.

Data Scientist and Data Analysis

Experience in analyzing hydrometeorological data related to extreme events, climate variability, and climate change using R packages. Integration with geographic information from remote sensors through optical indices and backscatter parameters in SAR imagery.

Environmental models and Maps production

Representation of environmental models, creation of crop maps, fieldwork, and cartography for scientific articles.
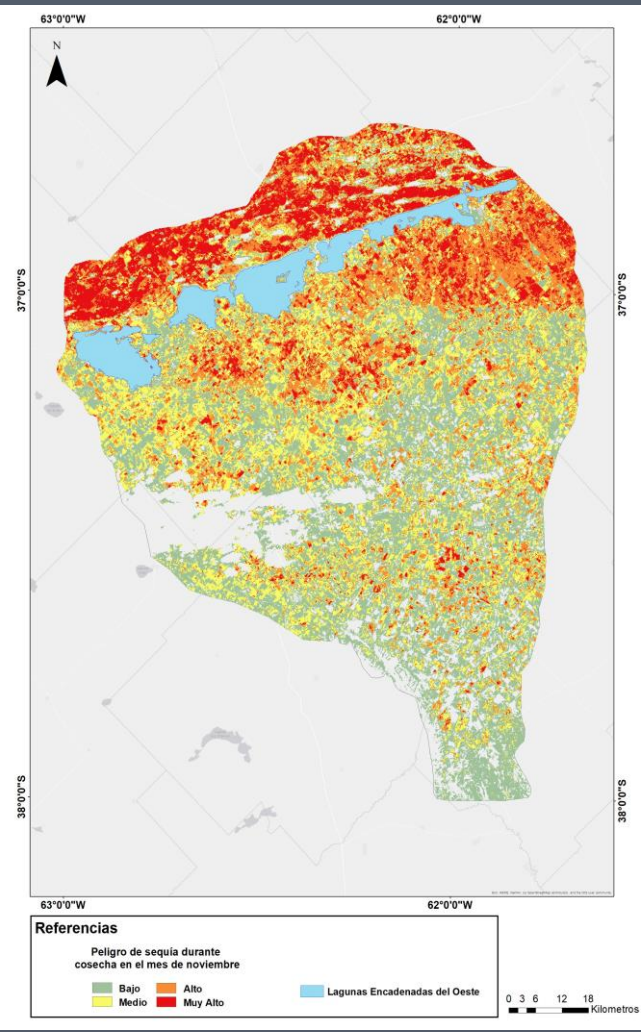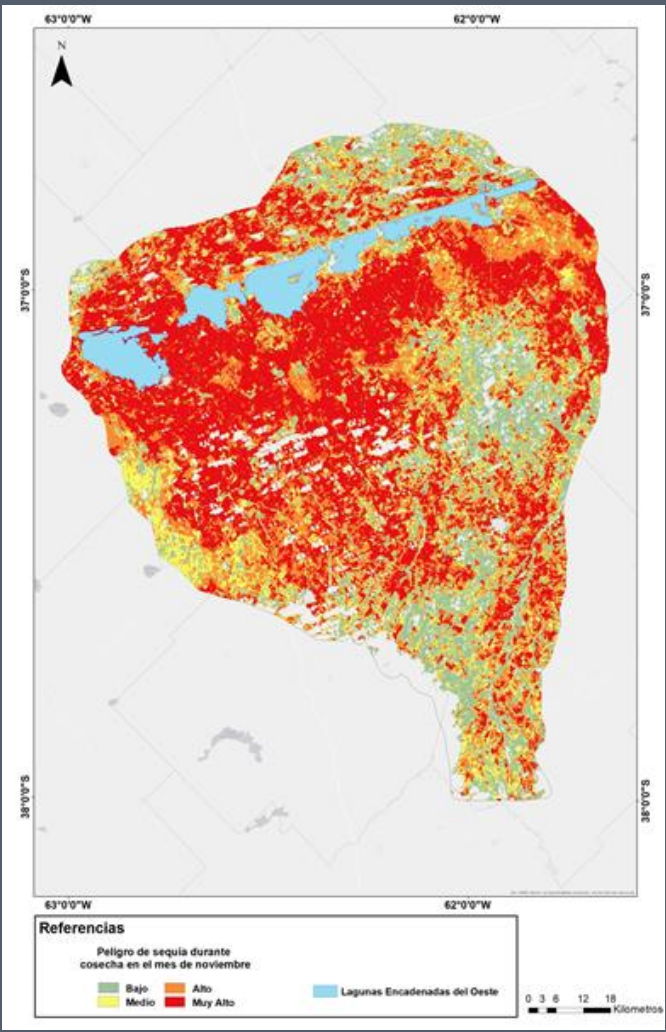
Completed Work and Projects

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Floods: Implementation of integrated methodologies combining medium-resolution optical sensors and SAR imagery for the generation of flood risk models and maps.
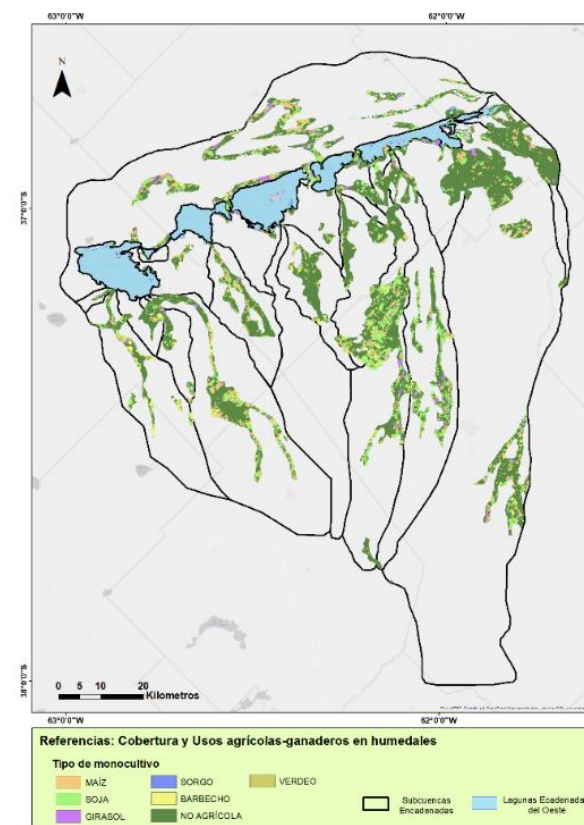
Drought: Implementation of Integrated Methodologies Combining Medium-Resolution Optical Indices, Specifically the TDVI, for Generating Water Stress Models and Drought Risk Maps
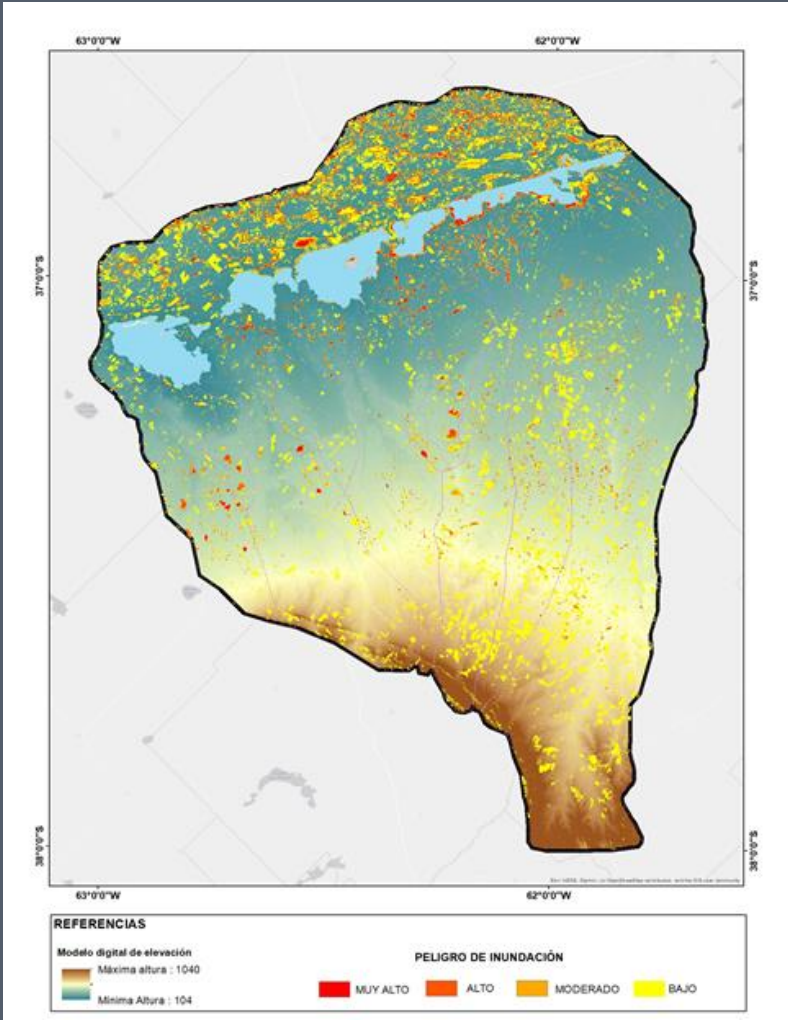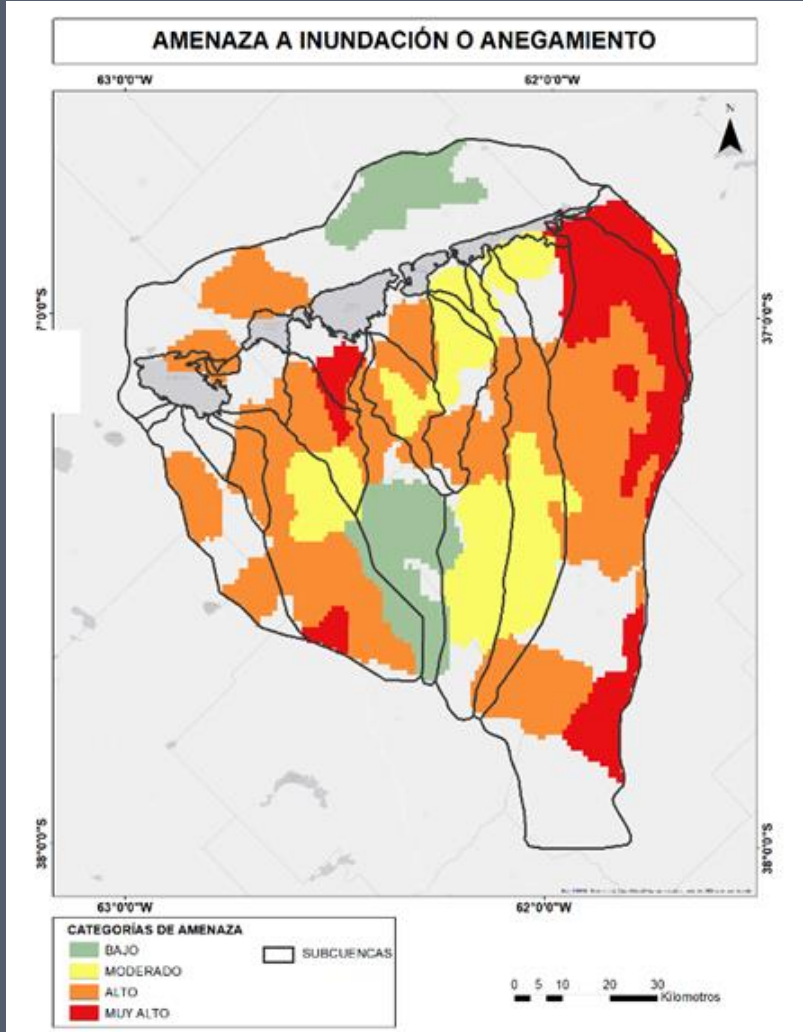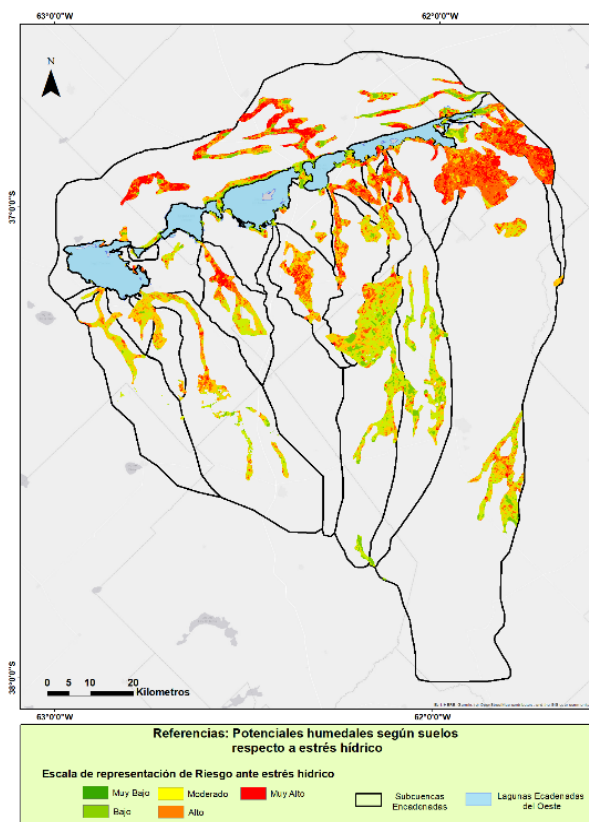

Assessing soil saturation risk using SAR SAOCOM soil moisture data from CONAE and flood risk through the synergy of Sentinel 1, Sentinel 2, and Landsat 5 and 8 data.

The Temperature Vegetation Dryness Index (TVDI) shows surface moisture trends by combining EVI and LST data from Landsat 8.
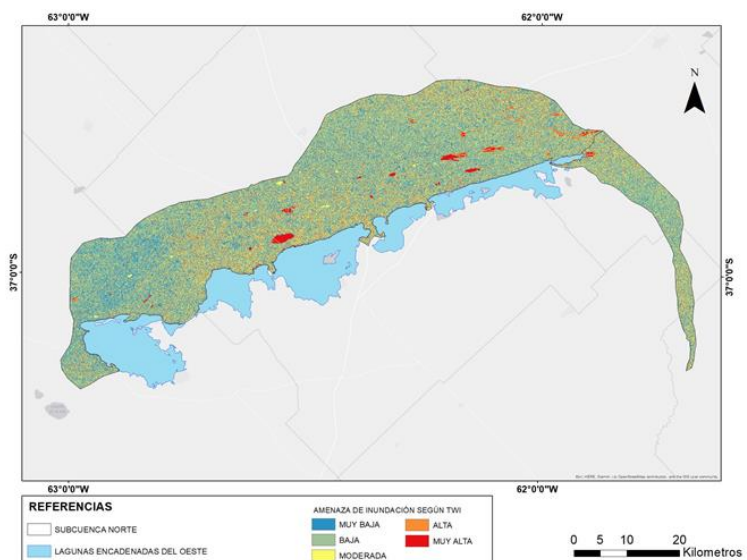
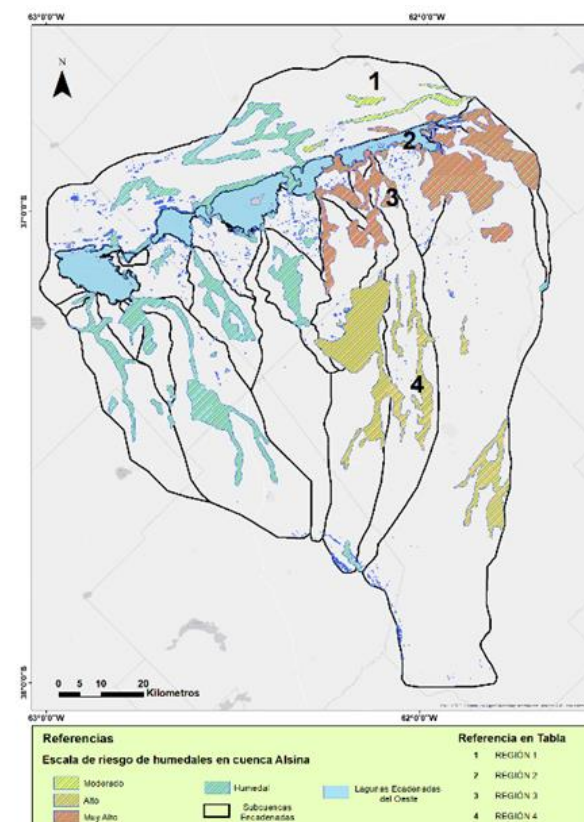Topographic Wetness Index derived from ALOS PALSAR DEM

Agricultural activities on potential wetland soils

# Wetlands hazard, vulnerability and risk

Implementation of integrated methodologies combining medium-resolution optical sensors and SAR images for wetland detection and the generation of models and maps of environmental risks related to these ecosystems, through geospatial analysis and remote sensing methodologies.

Wetlands play crucial roles in environmental management, risk mitigation, climate change adaptation, and territorial planning. In complex systems, the vulnerabilities of the population can become threats to the wetlands, and these threats can, in turn, negatively impact the community.
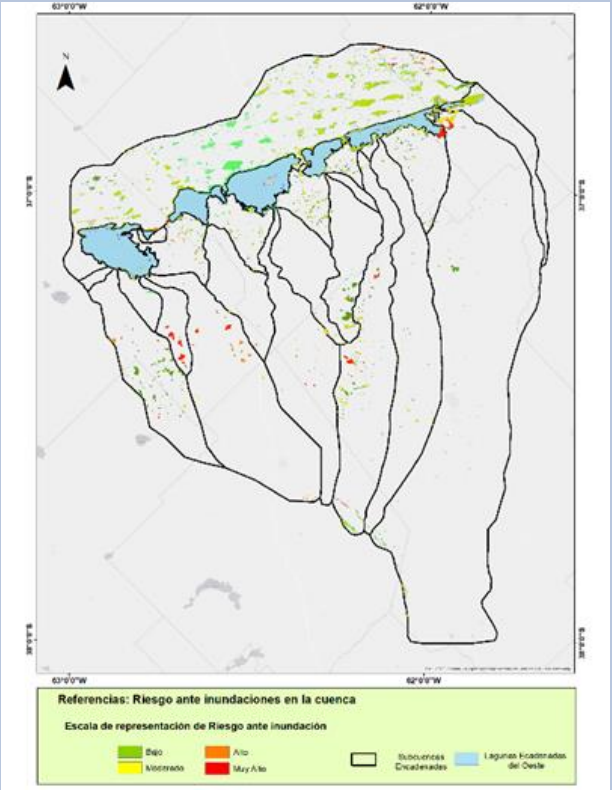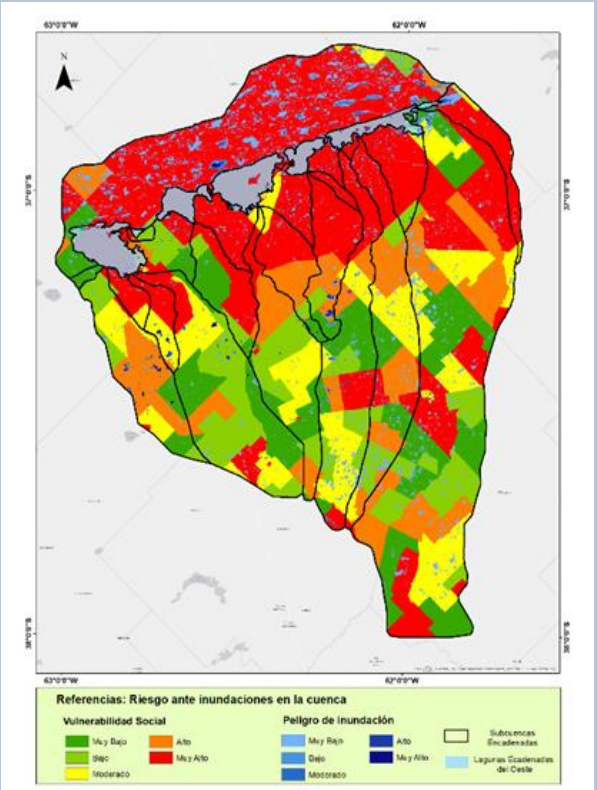

Drought Risk in Wetlands

Levels of Environmental Risk in Wetlands According to
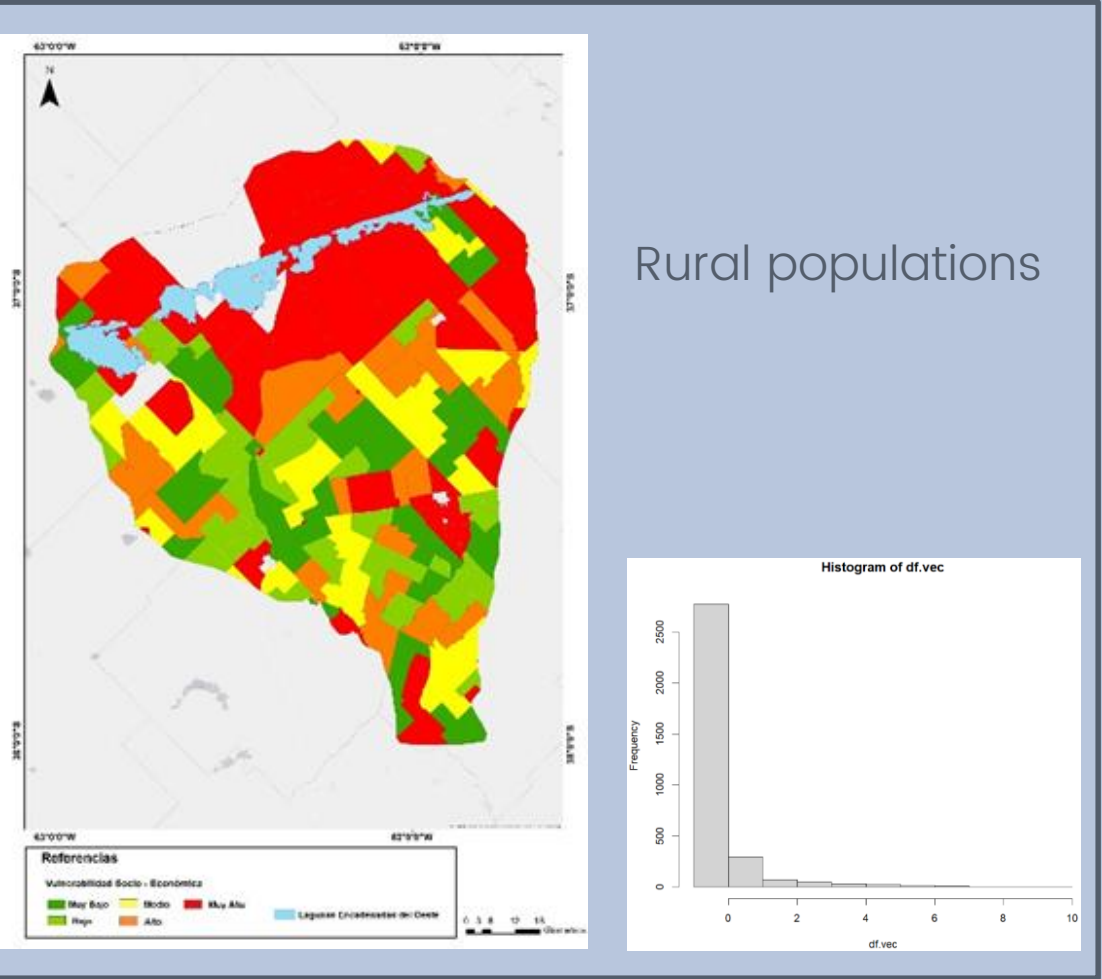
Rural populations

Urban populations

Corrected Social Vulnerability Index
Based on Asymmetric Data.
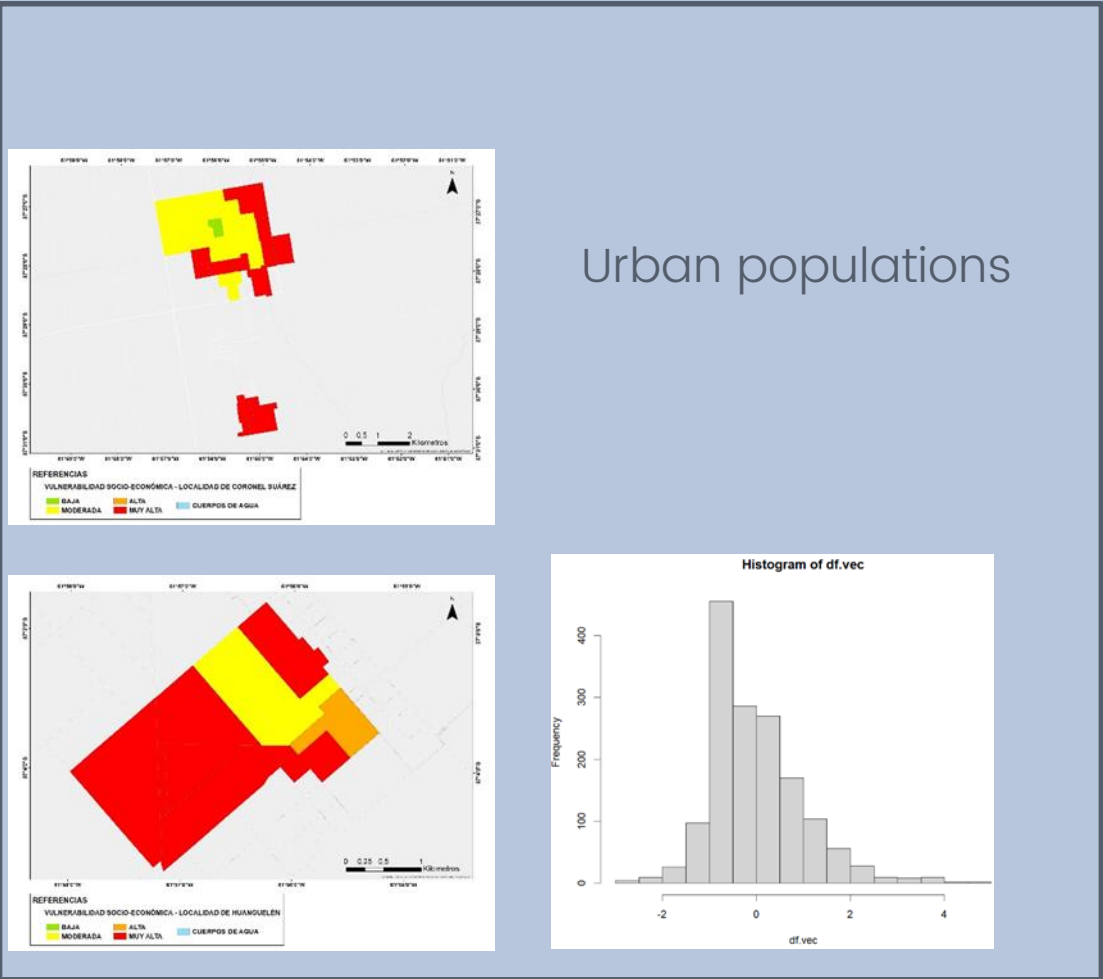
Social Vulnerability Index Based on
Symmetric Data. urban populations

Vulnerability socio-economic

Social vulnerability was addressed by adapting the Social Vulnerability Index to Disasters (IVSD). This index originates from the Social Vulnerability, Threats, and Risks to Climate Change in the Greater Buenos Aires Agglomeration document of the Cities Program belonging to the Economic Development area
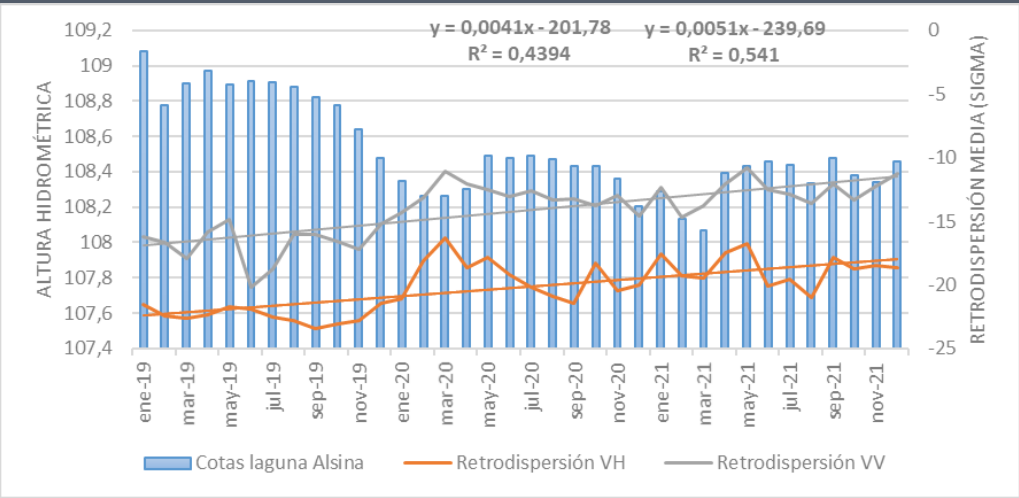
Enhancing Flood Resilience: Socioeconomic Assessment and Frequency Mapping of Floods with Optical and SAR Images

Revealing Socio-Spatial Asymmetries: Examining the Spatial Association between Socioeconomic Vulnerability and Flood-Prone Areas, Highlighting Diverse Risk Levels Despite Shared Threats.
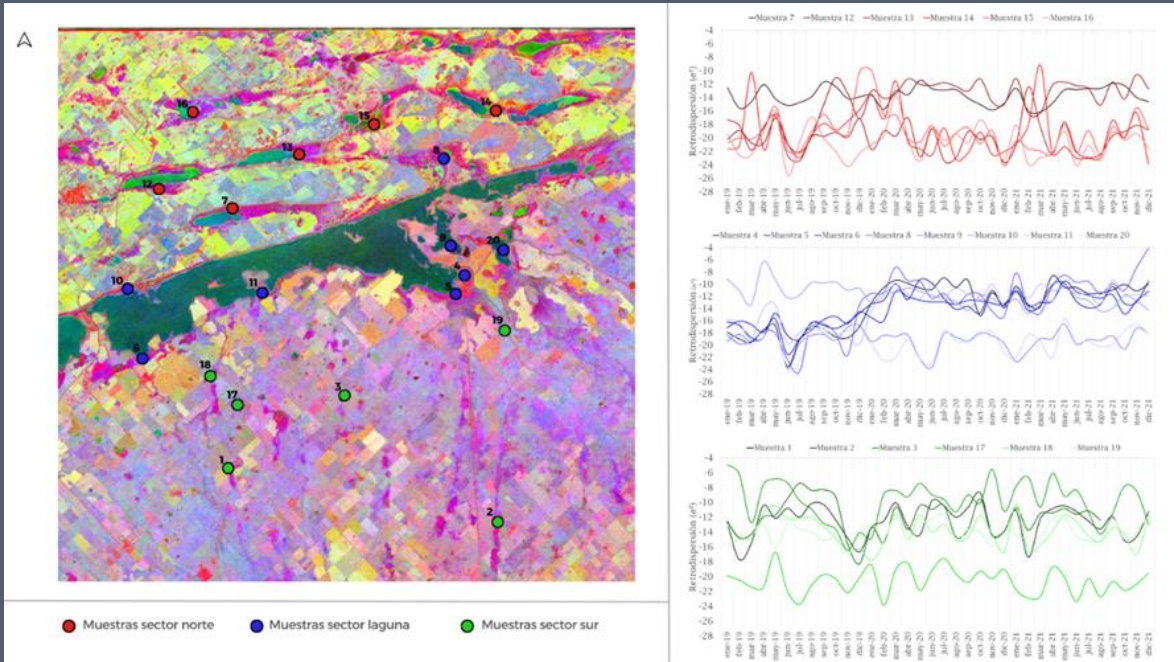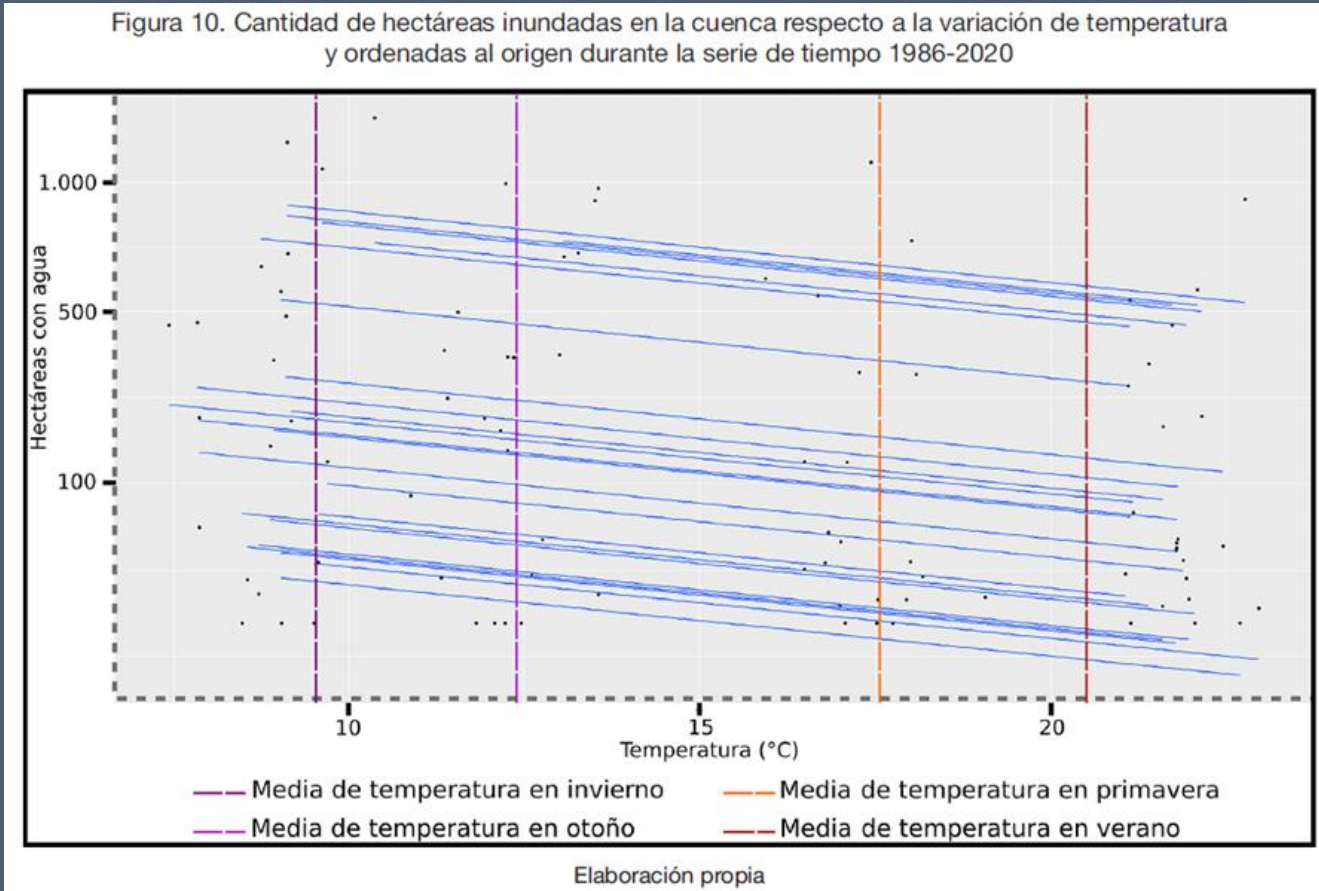
RGB composition of Principal Component Analysis (PCA) on VV polarization Sentinel 1 C. Sampling points of backscattering signatures in potential wetlands.


Evolution of VH and VV polarization backscattering in peri-lagoon sectors and hydrometric heights

Experiences in the Analysis of Hydrometeorological Data Related to Extreme Phenomena, Climate Variability, and Climate Change through the Integration of R Packages. Multivariate Analysis Techniques in Remote Sensing.

Experience in handling qualitative data collected from interviews and field observations for the development of a SWOT matrix.

Amount of hectares flooded in the basin relative to temperature variation, plotted against the origin during the time series 1986-2020.

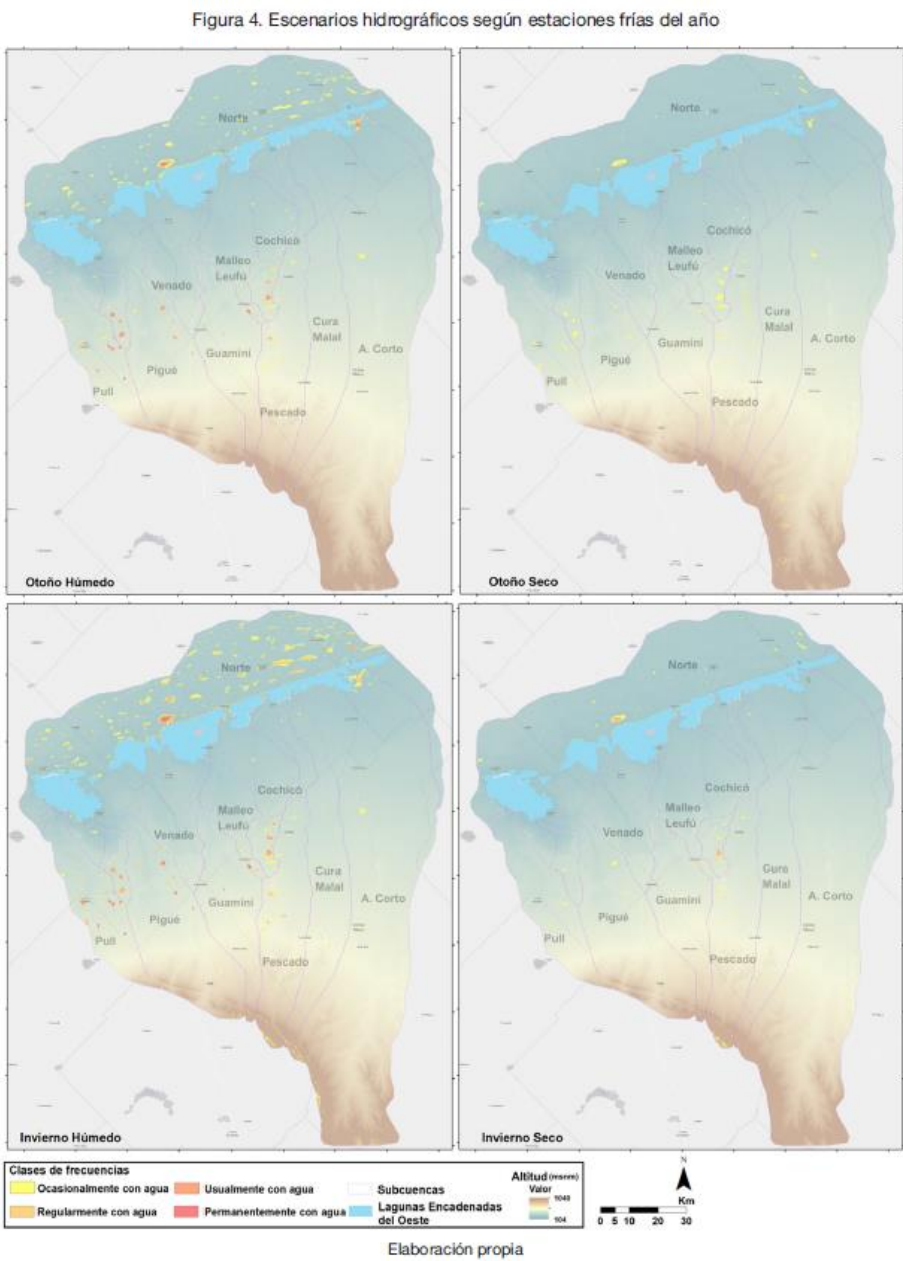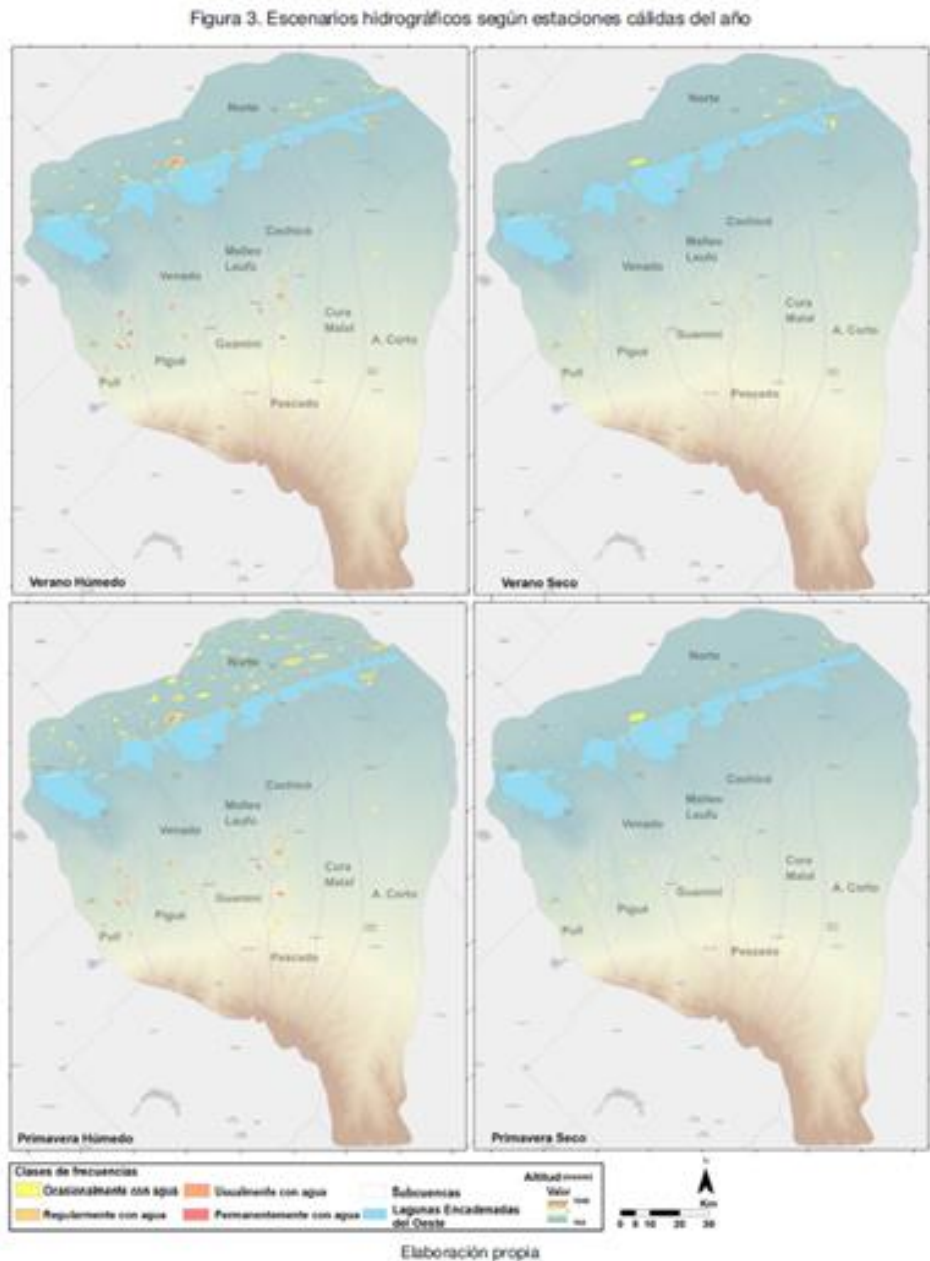| Variable	Estimación	Std. Error	T valor	Pr(>|t|)
Precipitaciones	0,005467	0,008171	0,669	0,505852
Temperatura	-0,595072	0,178467	-3,334	0,001425
Error estándar residual: 5,884 en 64 grados de libertad (2 observaciones eliminadas debido a faltantes).				
Múltiples R-cuadrado: 0,7817	R-cuadrado ajustado: 0,6998	Estadística-F: 9,549 en 24 y 64 DF	p-valor: 2,985e-13	

Linear regressions and an ANCOVA model were used to estimate the relationship between water-covered hectares, temperature, and precipitation over the time series. Water-covered hectares were treated as the response variable (Y), with temperature and precipitation as predictors, alongside the categorical variable of years. A parallel lines configuration was applied for different years, and a square root transformation was applied to the response variable to meet assumptions of normality and homoscedasticity. R packages
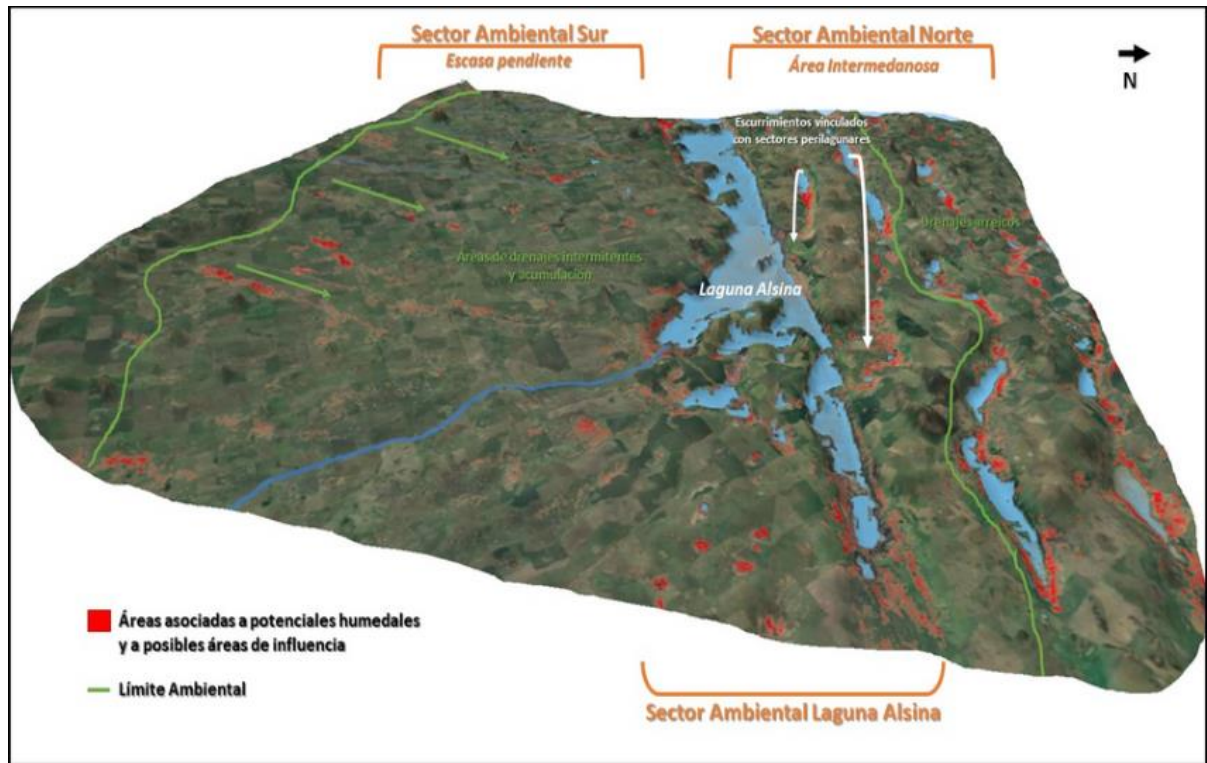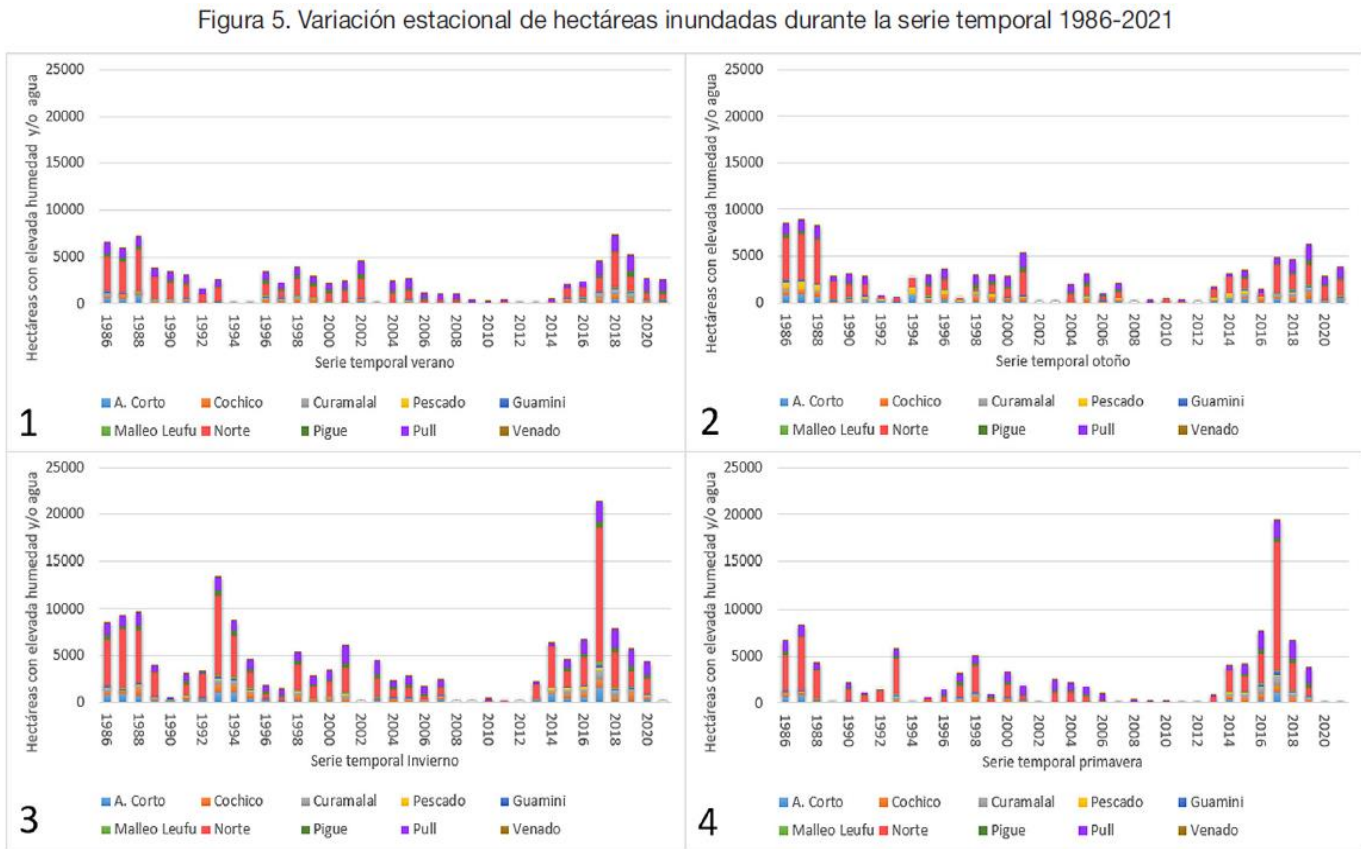
A 3D environmental description model of Laguna Alsina was created using the Qgis2threejs plugin. This model integrates the ALOS PALSAR DEM, PCA time series from Sentinel 1 C, and water indices for the detection and identification of wetlands and hydraulic connectivity in a peri-lagoon environment
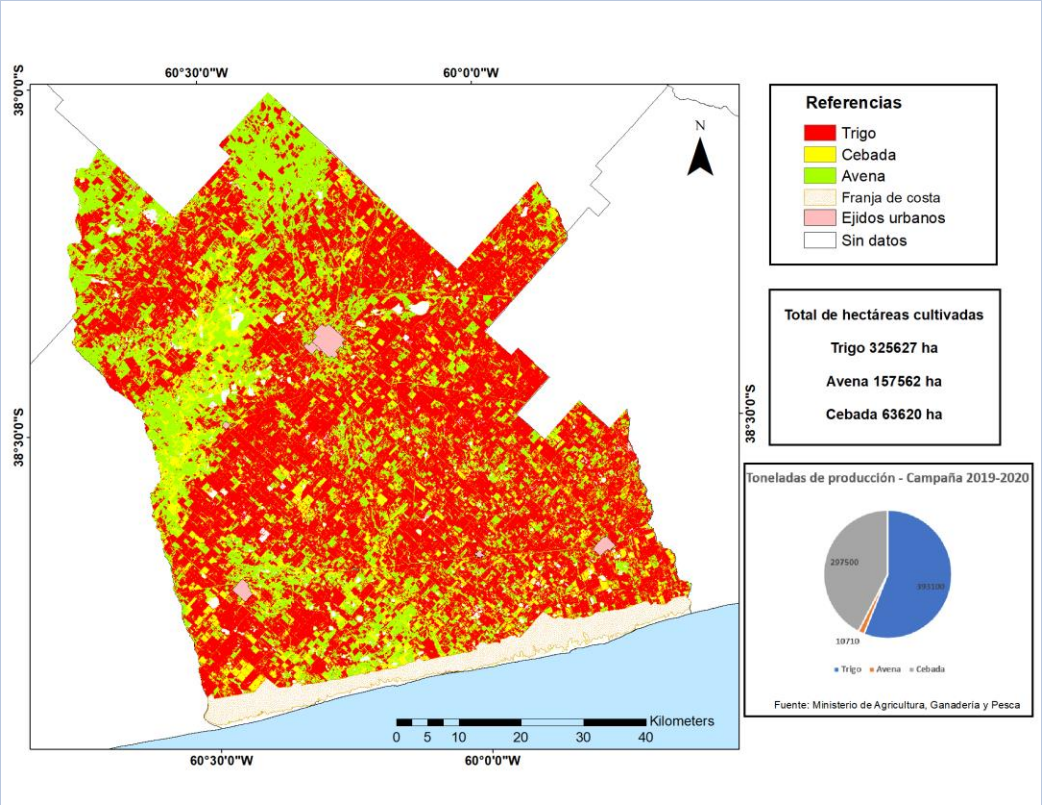
Environmental models

Developing environmental models through the synergy of optical and SAR imagery for studying shallow lakes, wetlands, threats, vulnerabilities, and environmental risks in Pampean environments.

Figura 3. Escenarios hidrográficos según estaciones cálidas del año

Figura 4. Escenarios hidrográficos según estaciones frías del año

Hydrographic scenarios according to cold and warm seasons of the year. Modeling the spatial variation of water bodies according to climatic variability during the period 1986-2022.

Figura 5. Variación estacional de hectáreas inundadas durante la serie temporal 1986-2021

1) verano. 2) otoño. 3) invierno. 4) primavera.

Elaboración propia

SAM Classifications with control points. Development of a crop map in the Tres Arroyos district in collaboration with INTA Barrow.
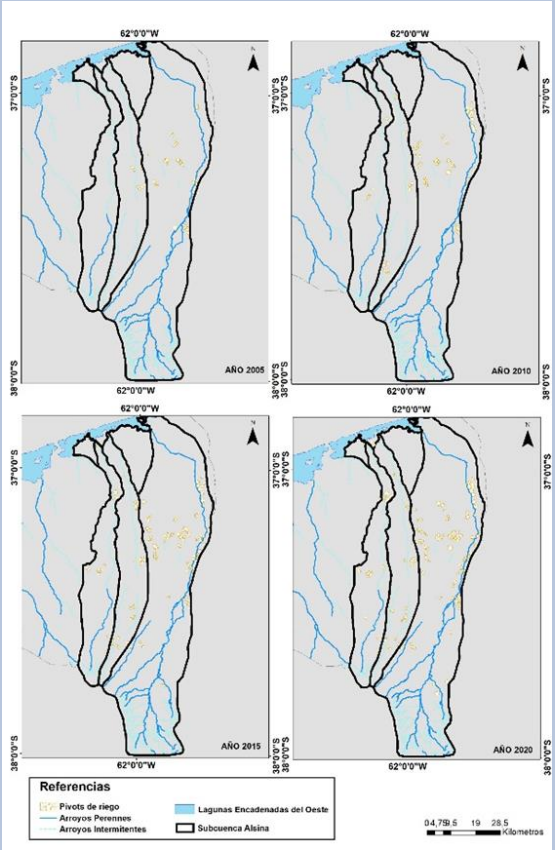

Utilization of the GeoAI plugin for QGIS for image segmentation with Segment Anything (SAM) to identify irrigation pivots as indicators of groundwater consumption.


Field Spectroradiometry

Field Spectroradiometry and crop maps

Development of crop maps using geographic information and Segment Anything Model (SAM) methodologies, incorporating control points and spectroradiometry, in collaboration with studies from INTA Barrow
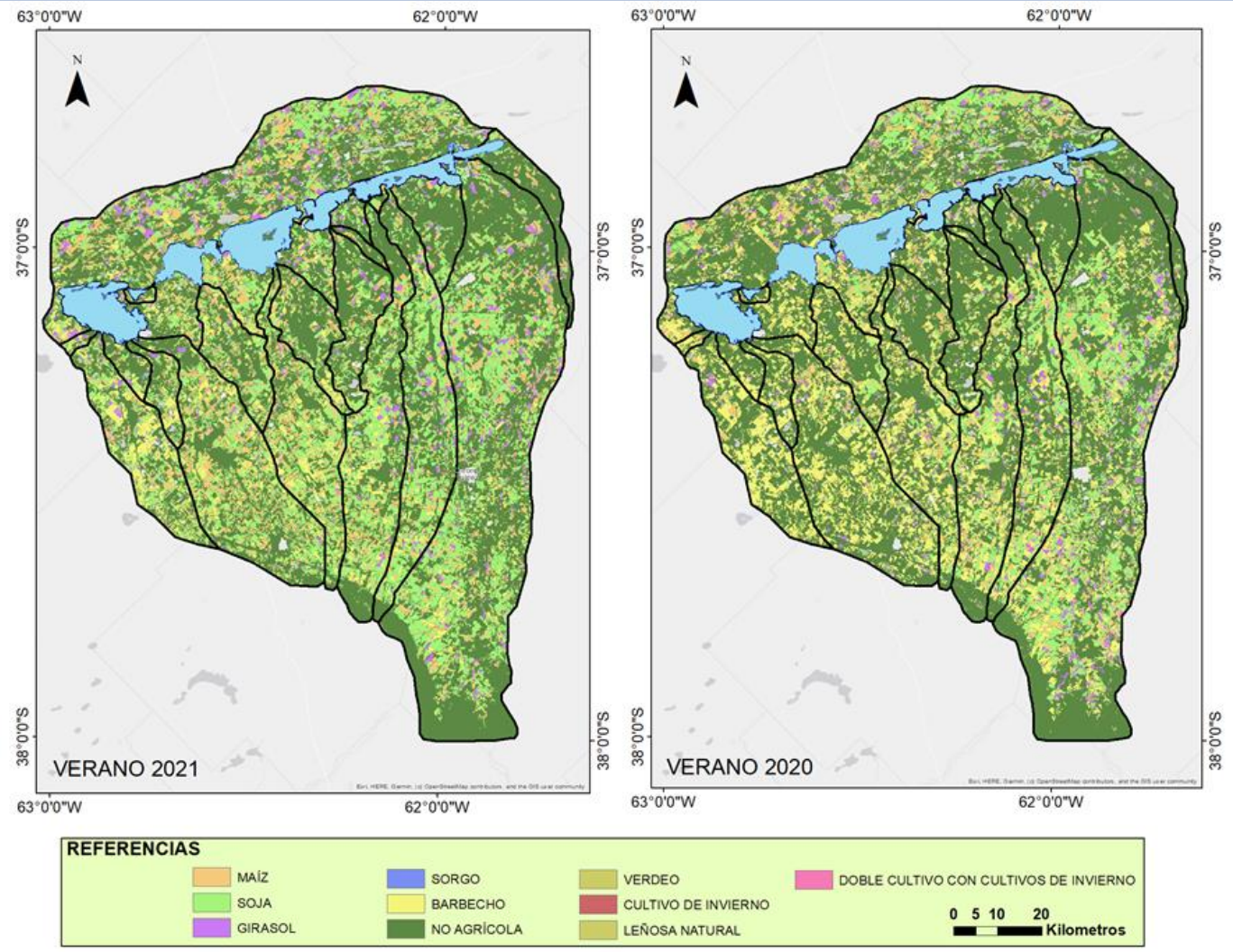
Development of a crop map using geographic information from INTA

Participation in Projects
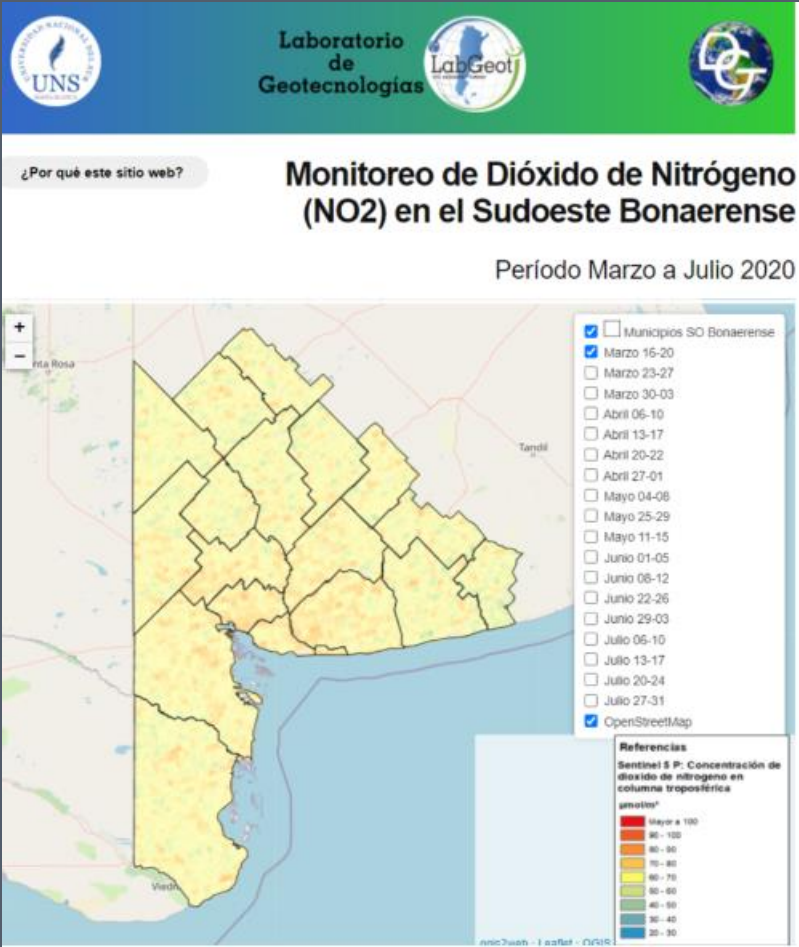
ASPO effect (Preventive and Mandatory Social Isolation) in the atmosphere of the southwest of the province of Buenos Aires, Argentine Republic.

The web visualizer is used to display the results of nitrogen dioxide (NO2) monitoring in the southwest of Buenos Aires province during the period from March to July 2020 using images from the Sentinel 5-P satellite.

Southwest Buenos Aires Geographic Information Catalog

Normalization of vector and raster data for the Southwest of Buenos Aires province according to the Argentinian Infrastructure Spatial Data. With the aim of surveying the distribution of shallow water bodies and potential wetlands in the Encadenadas del Oeste basin, a methodology was developed to show the frequency distribution of the presence and/or absence of water during dry and wet periods from 1986 to 2021 using NDWI from Landsat images.

Contact

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Web Site

https://nicolasvidal93.github.io/portfolio/