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WE PROVIDE INNOVATIVE SOLUTIONS TO ENVIRONMENTAL AND SOCIAL PROBLEMS USING, AND GENERATING, SCIENTIFIC EVIDENCE.

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Empresa B Certificada

Strategic Consultancy

ATUK is a certified B Corp based in Cuenca, Ecuador. Our professional team is committed to sustainable development. We are specialists in environmental sciences, economics, data sciences, circular economy, environmental monitoring, strategic planning and land planning.

ATUK's CEO is Dr Boris F. Ochoa-Tocachi, PhD in Civil and Environmental Engineering (2019) from Imperial College London (UK).

General Data

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Commercial Registry of Cuenca County. Repertory Number: 15321, File Number: 316464, Company Registration Number: 216, Registry: Commercial Subjects Book, Date: December 16, 2019.

Project Portfolio

Project: Generate and update hydro-physical, hydrometric, hydro-informatic, and hydro-economic inputs and tools to support decision-making for FONAG's water planning. **Client:** FONAG, Water Protection Fund. Quito, Ecuador. **Year:** 2020.

We developed soil studies to evaluate the impacts of the conservation and restoration of water sources, calibrated flow gauging stations, built a custom hydrological model, and analysed the hydro-economic benefits of FONAG's water source conservation actions for the Electric Company of Quito (EEQ).

We updated FONAPA's Strategic Plan for the period 2021–2025, including a problem analysis of water security, a portfolio of interventions, and the strategic plan with objectives, critical path, budget and indicators.

Project: Strategic plan of the Water Fund for the Conservation of the Paute River – FONAPA. **Client:** TNC, The Nature Conservancy. Cuenca, Ecuador. **Year:** 2020.

Project: Land planning and development plan of the province of Cañar. **Client:** Regional Government of Cañar. Azogues, Ecuador. **Year:** 2020.

We completed the process of updating the land development plan for the Provincial GAD of Cañar, southern Ecuador, including its biophysical, sociocultural, human, mobility, energy, economic-productive and political-institutional diagnosis, and a proposal for development projects and management model.

We estimated the climate change mitigation and carbon capture and storage potential of landscape restoration options, as well as the viability of nature-based solutions (NbS) in two productive landscapes (Andean chakras in Cotacachi – UNORCAC; and Amazonian chakras in the Amazon – WIÑAK), within the framework of the FAO Forests and Farms Mechanism (FFF).

Project: Application of IUCN's guides for estimating the mitigation potential of landscape restoration options at spatial level, and the viability of nature-based solutions in two productive landscapes in Ecuador. **Client:** IUCN, International Union for the Conservation of Nature. Quito, Ecuador. **Year:** 2021.

Redefining the relationship between humankind and nature

Our vision

Project Portfolio

Project: Design and implementation of an information system for data processing. **Client:** FONAG, Water Protection Fund. Quito, Ecuador. **Year:** 2021.

We built and implemented an information system for the processing of data from the Environmental Education Program (PEA) of Water Protection Fund of Quito (FONAG), including computer and mathematical technology for the consumption and production of information and its technical support.

We evaluated sustainable investment opportunities for the nine transboundary basins between Ecuador and Peru, including potential, weaknesses and gaps for sustainable production, as well as recommendations to promote their scaling within the framework of the Binational Plan.

Project: Evaluate sustainable investment opportunities for the 9 hydrographic basins shared between Ecuador and Peru. **Client:** IUCN, International Union for Conservation of Nature. Quito, Ecuador. **Year:** 2021.

Project: Development of a portfolio of prioritised areas for conservation and restoration in the Daule river basin. **Client:** TNC, The Nature Conservancy. Guayaquil, Ecuador. **Year:** 2021.

Based on the ecosystem services of water retention and erosion control, we developed a portfolio for the conservation and restoration of the Daule River Basin for the Water Fund of Guayaquil (FONDAGUA), including a costing analysis, recommendations and a critical path for its implementation.

We estimated the economic impact of the strategies implemented by the Water Protection Fund of Quito (FONAG) for the conservation and restoration of water sources in the Pichincha Sur and Atacazo filter systems, which supply drinking water to the Metropolitan District of Quito.

Project: Hydro-economic analysis of strategies implemented by FONAG for the conservation and restoration of water sources that supply water to the filtration systems Pichincha Sur and Atacazo. **Client:** FONAG, Water Protection Fund. Quito, Ecuador. **Year:** 2021.

Project Portfolio

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Project: Analysis and proposal of a financial mechanism for water security in the Departament of Santa Cruz. **Client:** AKUT Umweltschutz Ingenieure Burkard und Partner mbB. **Ally:** Agua Sustentable. Santa Cruz, Bolivia. **Year:** 2021.

We analysed and proposed a financial mechanism for water security in the Department of Santa Cruz, Bolivia, through an approach to integrated and sustainable landscape management and population resilience to climate change.

We taught a course on hydrological modelling with SWAT to provide solid conceptual bases on hydrological modelling, strengthen technical capacities in the use of the model, and use it under climate change and land use change scenarios.

Project: Hydrological modelling training course with SWAT (Soil & Water Assessment Tool). **Client:** GLOWA Technology and Sustainability Center. Lima, Peru. **Year:** 2021.

Project: Strengthening capacities on the use of tools for the monetization of water benefits and calculation of hydro-economic indicators, such as ROI, applied to investments by FONAG and its constituents. **Client:** FONAG, Water Protection Fund. Quito, Ecuador. **Year:** 2022

We provided a training workshop to the technical and administrative team of FONAG and the Metropolitan Public Company of Drinking Water and Sanitation of Quito (EPMAPS) in three sessions: (i) monetisation of water benefits, (ii) financial flow and return on investment (ROI), and (iii) sensitivity analysis of the return on investment in nature-based solutions.

We determined a baseline of Ecuador's water security at the national level and critical areas of action, divided into five dimensions: environmental, domestic, economic, social and disaster resilience water security.

Project: Baseline study on water security in Ecuador. **Client:** TNC, The Nature Conservancy. Quito, Ecuador. **Year:** 2022.

Project Portfolio

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Project: Strengthen the data collection process, expand and add new techniques and methods of analysis of the data obtained from the evaluation system. **Client:** FONAG, Water Protection Fund. Quito, Ecuador. **Year:** 2022.

We continued the development of the information system for data processing of the Environmental Education Program (PEA) of FONAG, including migration of interventions with the purpose of training PEA – FONAG staff, refinement of analysis of its evaluations and a pilot execution that allows for empirical refinement.

We implemented and taught a course on hydrological modelling with InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs) and on policy development in Zambia, Africa, for the Landscape Approaches Training Series of the BELA (Biodiversity, Ecosystems, and Landscape Assessment) initiative of the World Bank.

Project: Developing and facilitating an ecosystem service assessment training series – Pre-training process. **Client:** World Bank Group. Washington, DC, USA. **Year:** 2022.

Project: Hydrological and climate scenario modelling for the evaluation of bio-businesses and ecosystems of the Datem Wetlands Project, Marañón, Loreto. **Client:** PROFONANPE, Environmental Fund of Peru. Iquitos, Peru. **Year:** 2022.

We identified the availability of geographic, ecological, hydrological and carbon information, and generated potential future climate and land use scenarios to evaluate bio-businesses and ecosystems in the Peruvian jungle. We modelled its benefits in terms of carbon capture and storage, greenhouse gas emissions, and hydrological processes in the middle sub-basin of the Pastaza River in Peru.

We defined the hydro-economic relationships of key areas in the Pastaza River basin from a comprehensive approach, in order to generate cost-effectiveness indicators that substantially contribute to decision-making within a framework of water resource use and conservation.

Project: Hydro-economic analysis of the central Amazon landscape (basins associated with the presence of protected areas). **Client:** Conservation International. Central Amazon, Ecuador. **Year:** 2023.

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Project Portfolio

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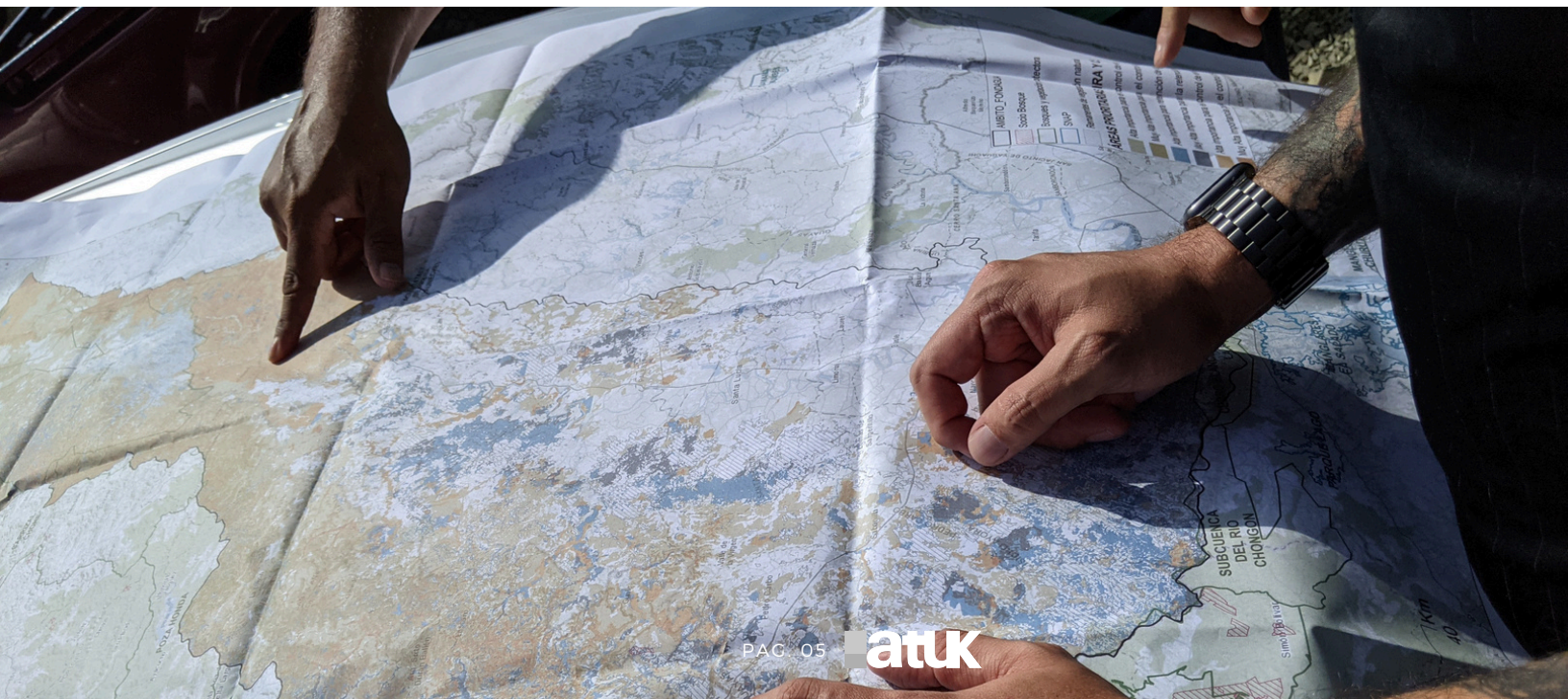
Project: Cost-benefit and geospatial multi-criteria analysis of ecosystem-based adaptation measures to climate change in Manabí, Ecuador. **Client:** IUCN, International Union for Conservation of Nature, San José, Costa Rica. **Year:** 2023.

We evaluated and compared the financial performance of ecosystem-based adaptation measures (ACC-AbE). We analysed the impact of climate change and ACC-AbE on the provision of ecosystem services using the InVEST tool. We developed a geospatial multi-criteria analysis on the costs and benefits of ACC-AbE implementation and scaling.

We applied an analysis methodology based on mental planning and strengthening schemes in information management. Annual subscription for 1 year to ATUK Cloud® for FONAG's Environmental Education Program (PEA).

Project: Strengthen the data collection process, expand and add new techniques and methods of analysis of data obtained from the evaluation system. **Client:** FONAG, Water Protection Fund. Quito, Ecuador. **Year:** 2023.

Project: Developing and facilitating training sessions for the Embedding Ecosystem Services into Policy (EESP) in Malawi . **Client:** World Bank Group. Washington, DC, USA. **Year:** 2023.

We trained officials and technicians in Malawi, Africa, in ecosystem services and natural capital, demonstrating the value of biodiversity, ecosystems, their services and landscape assessments to inform more effective and resilient policies, with the EESP team (Embedding Ecosystems Services into Policy) of the World Bank.

We evaluated the costs and benefits of a portfolio of spatialised interventions for water security in strategic areas of the San Martin and Paragua River basins, with the aim that their results serve as inputs for the design of a financial mechanism for water security in the northern region of Chiquitanía in Bolivia.

Project: Portfolio of prioritized actions spatialised in the sub-basins of Zapocó, Guapomó and El Tarvo. **Client:** AKUT Umweltschutz Ingenieure Burkard und Partner mbB. Berlín, Germany. **Year:** 2023.
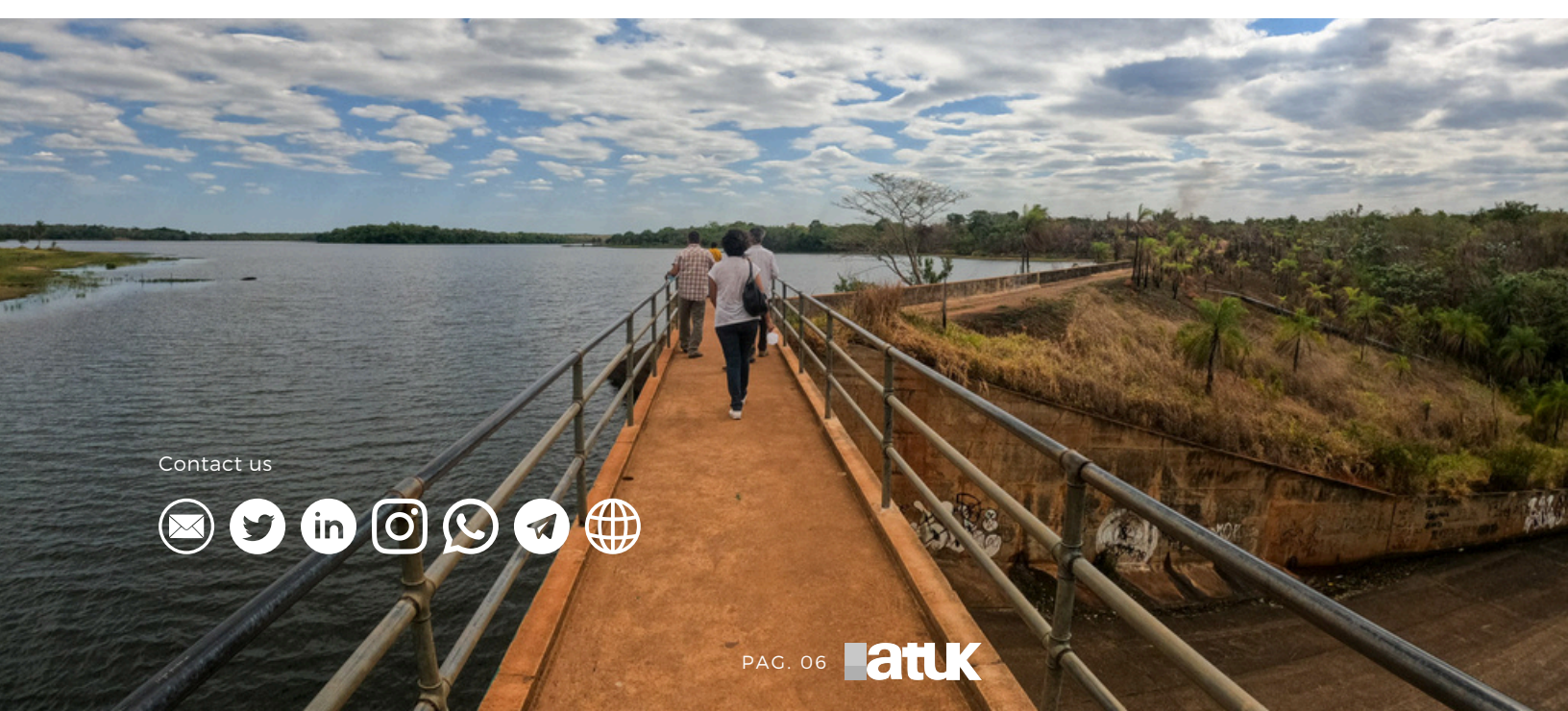
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Project Portfolio

Project: Evaluate the use of natural ingredients as raw materials in the manufacturing of INTIAROMË products. **Client:** Corporación Sistema B Ecuador (B Corp). Quito, Ecuador. **Year:** 2023.

We estimated the environmental impact of the Life-Cycle Assessment (LCA) of a LULË product from INTIAROMË, and compared it with a generic competing product, in order to evaluate its effects on the environment during its life period, and recommended how to increase its efficiency in the use of resources and reduce negative impacts.

We evaluated the impact of the conservation, protection and restoration strategies implemented in the Water Conservation Areas (ACH) managed by EPMAPS and FONAG, using an impact monitoring methodology and with a focus on the ecosystems characteristics.

Project: Evaluation of the impact monitoring system in EPMAPS–FONAG water conservation areas. **Client:** EPMAPS, Metropolitan Public Company for Drinking Water and Sanitation. Quito, Ecuador. **Year:** 2023.

Project: Technical support for the evaluation system of FONAG's Environmental Education Program. **Client:** FONAG, Water Protection Fund. Quito, Ecuador. **Year:** 2023

We reviewed the global formats and data dictionaries of ATUK Answer service; programmed and configured forms of ATUK Answer service; reviewed the figures and statistical graphs of ATUK Analysis service dashboards; and, provided advice on the evaluation methodology of PEA–FONAG educational interventions.

We updated FONAG's return on investment (ROI) calculation based on the modelling of the impacts of interventions to protect water sources and nature-based solutions, and generated a systematised document of the results for public dissemination. .

Project: Systematisation of updates and results related to the estimation of the return on investment (ROI) of FONAG interventions. **Client:** FONAG, Water Protection Fund. Quito, Ecuador. **Year:** 2023.

Project Portfolio

https://atuk.com.ec/proyectos-atuk/

Project: Systematisation of a final document and digital tool of the Conservation Portfolio for the Amazon Biocorridor. **Client:** TNC, The Nature Conservancy. Quito, Ecuador. **Año:** 2023.

We prepared a consolidated document, condensed versions and a digital tool (StoryMaps) of the Conservation Portfolio for the Amazon Biocorridor (BCA) that integrates priorities at the terrestrial and aquatic level in the Ecuadorian Amazon.

We contributed to integrating and strengthening the adaptation to climate change component in the sectors of natural system, water system, food security, agriculture and livestock, during the process of updating the Development and Land Planning Tools (PDOT) of 14 Decentralized Autonomous Governments (GAD) at the parish, municipal and provincial levels within the intervention scope of the EbA LAC Program.

Project: Strengthening adaptation to climate change in the Development and Land Planning Tools in the areas of implementation of the EbA LAC Program, Manabí, Ecuador. **Client:** IUCN, International Union for Conservation of Nature. Quito, Ecuador. **Year:** 2024.

Project: Technical support for the evaluation system of FONAG's Environmental Education Program and annual subscription to ATUK Cloud®. **Client:** FONAG, Water Protection Fund. Quito, Ecuador. **Year:** 2024.

We provided hourly technical support service for the evaluation system of the Environmental Education Program (PEA) of the Water Protection Fund of Quito (FONAG) and an annual subscription to ATUK Cloud®, an educational data management and analysis platform.

We contributed to the high-level analysis and prioritization process of the CIF (Climate Investment Funds) NPC (Nature People Climate) Project options for Kenya, modeling the hydrological benefits of its interventions in InVEST.

Proyecto: Developing the CIF NPC Project Options Report for Kenya. **Cliente:** ANCHOR Environmental Consultants. Cape Town, South Africa. **Año:** 2024.

Shared value

- ATUK supports the project "Mujeres Rurales de Pakariñan" to bring technology and scientific knowledge closer to more rural girls, boys and women in southern Ecuador.

- In alliance with Primero.Digital, we promote knowledge dissemination on topics around science, economy, environment, technology and society through ATUK's Podcast and Blog.

- Through Fundación BINARA, non-profit initiative, we invest in the protection of Ecuador's biodiversity and communities that depend on it.
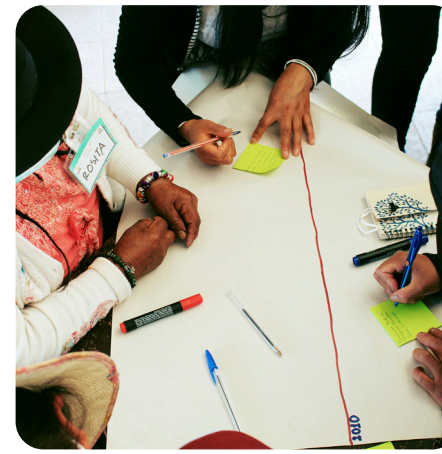
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Established by UN Women and the UN Global Compact Office

BUENAS PRÁCTICAS | en Conservación y Restauración de HUMEDALES ALTOANDINOS

FUNDACIÓN
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BENEFICIOS MODELADOS EN CARBONO E HIDROLOGÍA DE LOS BIONEGOCIOS Y ECOSISTEMAS

- ATUK Consultoría Estratégica
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- Profonanpe

Publications

https://atuk.com.ec/publicaciones-atuk/

Patiño et al., 2021. **Influence of land use on the hydro-physical soil properties of Andean páramo and its effect on streamflow buffering**. Catena 202, 105227.

Coloma et al., 2021. **Fractional elementary bicomplex functions in the Riemann–Liouville sense**. Advances in Applied Clifford Algebras 31, 63.

Ochoa-Tocachi, E. 2021. **Valoración del agua en el mercado de futuros**. Agua A Fondo 46, 3.

Ochoa-Tocachi et al., 2021. **Humedales y la importancia de conservar y restaurarlos**. Agua A Fondo 46, 6–7.

Brauman et al., 2021. **Producing valuable information from hydrologic models of nature-based solutions for water**. Integrated Environmental Assessment and Management 18, 135–147.

Ochoa-Sánchez et al., 2021. **Buenas prácticas en conservación y restauración de humedales altoandinos**. ISBN: 978-9942-8807-1-0.

Molina et al., 2021. **Infraestructura natural para la gestión de riesgos de erosión e inundaciones en los Andes: ¿Qué sabemos?** Forest Trends, Lima, Perú.

Mosquera et al., 2021. **Progress in understanding the hydrology of high-elevation Andean grasslands under changing land use**. Science of The Total Environment 804, 150112.

Cassin & Ochoa-Tocachi, 2021. **Learning from indigenous and local knowledge: The deep history of nature-based solutions**. Nature-based Solutions and Water Security An Action Agenda for the 21st Century, Chapter 13, 283–335.

Ochoa-Tocachi et al., 2022. **Guia de Modelación Hidrológica para la Infraestructura Natural.** Forest Trends, Lima, Perú.

Vanacker et al., 2022. **The effect of natural infrastructure on water erosion mitigation in the Andes**. SOIL 8, 133–147.

Mosquera et al., 2022. **Servicios ecosistémicos hídricos de los pajonales altoandinos: ¿Qué sabemos?** Forest Trends, Lima, Perú.

Ceballos et al., 2022. **Fractional Multicomplex Polynomials**. Complex Analysis and Operator Theory 16, 60.

Monge-Salazar et al., 2022. **Ecohydrology and ecosystem services of a natural and an artificial bofedal wetland in the central Andes**. Science of The Total Environment 838, 155968.

Huerta et al., 2022. **PISCOeo_pm, a reference evapotranspiration gridded database based on FAO Penman-Monteith in Peru**. Scientific Data 9, 328.

Chou et al., 2022. **Parameterizing the JULES land surface model for different land covers in the tropical Andes**. Hydrological Sciences Journal 67, 1516-1526.

Veness et al., 2022. **Localizing Hydrological Drought Early Warning Using In Situ Groundwater Sensors**. Water Resources Research 58, e2022WR032165.

Ochoa-Tocachi et al., 2022. **CUBHIC 2.0: Cuantificación de Beneficios Hidrológicos de Intervenciones en Cuencas**. Forest Trends, Lima, Perú.

Peñailillo et al., 2022. **Nature-based solutions to mitigate impacts of droughts**. Deltares, Delft, The Netherlands.

Di Teodoro et al., 2023. **Sliding-Mode Controller Based on Fractional Order Calculus for Chemical Processes**. IEEE (ICA-ACCA 2022), Curicó, Chile.

Miralles-Wilhelm et al., 2023. **Emerging themes and future directions in watershed resilience research**. Water Security 18, 100132.

Di Teodoro et al., 2023. **Sliding Mode Control Based on a Generalized Reduced Fractional Order Model: Theoretical Approach**. LACC 2020. Studies in Systems, Decision and Control, 464. Springer, Cham.

Ochoa-Tocachi et al., 2023. **Beneficios modelados en carbono e hidrología de los bionegocios y ecosistemas**. PROFONANPE, Iquitos, Perú.

Mosquera et al., 2023. **Hidrología de los páramos en el Ecuador**. Los páramos del Ecuador: Pasado, presente y futuro, Capítulo 3, 76–103.

Moya et al., 2023. **A Methodology to Estimate High-Resolution Gridded Datasets on Energy Consumption Drivers in Ecuador's Residential Sector during the 2010–2020 Period**. Energies, 16, 3973.

Patiño et al., 2024. **Effects of rainfall seasonality and land use change on soil hydrophysical properties of high-Andean dry páramo grasslands**. Catena 202, 107866.

Moya et al., 2024. **Long-Term Sustainable Energy Transition of Ecuador's Residential Sector Using a National Survey, Geospatial Analysis with Machine Learning, and Agent-Based Modeling**. Congress on Research, Development, and Innovation in Renewable Energies. Springer, Cham, 23–40.

Expertise

Hydrology and Meteorology

Water cycle process studies
Hydrometeorological monitoring networks design, implementation and operation
Surface and subsurface hydrological modelling
Integrated hydrographic basin management
Identification of water sources and uses
Land use change and climate change scenarios
Remote sensing and satellite products
Early warning system design and implementation

Water Quality and Ecohydrology

Surface and subsurface water quality
Monitoring of physical, chemical and biological properties
Water quality indicators
Pollution identification and tracing
Soil water, river and reservoir quality monitoring
Soil–water–plant–atmosphere relationships
Nature-based solutions

Data sciences

Process optimization
Non-linear data analysis
Stochastic modelling of time series
Statistics and industrial models
Data mining
Machine learning and big data
Phenomena prediction with artificial intelligence
Information classification and processing
Knowledge engineering and management
Smart systems, neural networks
Programming languages

Environmental Economics and Financial Strategy

Ecosystem service quantification and valuing
Monetization of environmental and social benefits
Estimation and calculation of return-on-investment in natural infrastructure projects
Economic impact evaluation of climate change adaptation measures
Project design, execution and evaluation
Financial mechanisms for environmental conservation
Budget optimization and financial performance

Carbon and Soils

Edaphological studies under different land uses and vegetation covers
Soil hydro-physical property determination
Soil laboratory and field experiments
Characterization of organic matter and carbon content, and compound and nutrient flux
Soil water balance
Carbon stocks and carbon capture quantification
Mitigation potencial for climate change

Geography and Land Planning

Geographical information systems
Land development and planning
Spatial design, modelling and planning
Natural and anthropic area zonification and spatialization
Intervention area priorization
Development models for urban and rural areas
Agricultural and tourism production models
Landscape conservation and restoration
Policy-institutional analysis and planning

Renewable Energy and Circular Economy

Energy planning and modelling
Energy policy and transitions
Life Cycle Assessments (LCA)
Sustainable development and geopolitics
Circular economy
Degrowth

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Staff

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Empresa **B** Certificada