



PART 1: Description and all information of the outcome/impact reported

TYPE

OICR: Outcome Impact Case Report

TITLE

Adoption of new flood forecasting technologies has improved Ecuador's resilience and reduced the damage from extreme hydrological events.

STATUS

New

YEAR

2022

OUTCOME IMPACT CASE REPORT

Study #4710

Stage of Maturity of change reported: stage 1

GEOGRAPHIC SCOPE: NATIONAL



COUNTRY: Ecuador

Comments: Amazon and being extended to other regional nodes

OUTCOME STORY/IMPACT STATEMENT

INAMHI- the National Institute and governing body of Meteorology and Hydrology of Ecuador – produces better flood forecasts with more accurate information on their timing, magnitude and impact. The Alliance, through SERVIR-Amaozonia, contributed by training technicians from INAMHI and other Ecuadorian institutions to use the Tethys platform. This improved platform and training developed the organization's flood forecasting practices, including the provision of more accurate information on the likely timing, magnitude and impact of floods, benefitting people across boundaries in the Amazon region.

The INAMHI Outcome also came from a technical user request, and has been helpful for us in reaffirming the importance of demand-led service design. Before contacting SERVIR-Amaozonia, INAMHI had no installed capacity, it did not know about the Tethys platform, and did not comply with WMO data sharing standards. In addition, they did not have sufficient budget to carry out their activities, even though it is the national institution responsible for hydro-meteorological issues. Using this service, INAMHI have improved their flood forecasting capabilities, that now include more accurate information on timing, magnitude, and the impact of floods. The service introduced these innovative forecasting, hydrological and data visualization applications, methodologies, and tools (hosted on the Tethys platform), to academic, technical and governmental users in the region. The hydro informatics tools are also being used to support the training of local parties to understand past river flooding patterns and how the watershed integrates across political boundaries. Bolivar Erazo, Executive Director of INAMHI, said services will improve INAMHI's capabilities to provide hydro- meteorological forecasting services in the country and will facilitate access and friendly interaction with INAMHI's data, both for technicians and the public. INAMHI is also championing others to use the tools: the District Government Office in Imbabura, northern Ecuador, is an example. In recent years, the area has been affected by the flooding of the Apaquí and Chota rivers. Since there is no data and therefore no flood forecasts, the population and crop production have been affected, with those living along the riverbanks being particularly at risk. With INAMHI's authorization, the Provincial Government of Imbabura accessed applications hosted on the Tethys platform. These also include hydrological applications such as Hydroviewer, National Water Level Forecast and a Historical Validation Tool.

Contributing external partners:

- CIAT/SERVIR Amazonia; EcoCiencia, NASA (United States National Aeronautics and Space Administration) AST (Applied Sciences Team)
- Brigham Young University (BYU)-
- Environmental Modeling Laboratory (EMRL) - USA

CGIAR INNOVATION(S) OR FINDINGS THAT HAVE RESULTED IN THIS OUTCOME OR IMPACT

This research innovation happened in SERVIR Amazonia's Service Improving Resilience and Reducing Risk of Extreme Hydrological Events, with customization and use of the hydrological apps Hydroviewer, Historical Validation Tool (HVT) and National Water Level Forecast (NWLF) applications, hosted in [Tethys](#) platform [2], a free and open-source software platform for developing and hosting web applications that use spatial data. The Tethys Platform is a powerful tool that can be used to create a wide variety of web applications that allow users to explore and visualize spatial data and decision support applications that help users make decisions based on spatial data. The final product is a hydrological forecasting service that uses innovative tools and methodologies to improve the accuracy of flood forecasts in the Amazon region.

A complete summary of this service can be found here (taken from [SAMZ Service Catalogue](#)) [3]

GENDER, YOUTH, CAPACITY DEVELOPMENT AND CLIMATE CHANGE

- **Climate change relevance:** 1 - Significant.
This Program reports on Climate Change indicators to USAID

ELABORATION OF OUTCOME/IMPACT STATEMENT

INAMHI, the National Institute and governing body of Meteorology and Hydrology of Ecuador, is the main provider and user of hydrological forecasting services. It is currently attached to the Ministry of Environment, Water and Ecological Transition (MAATE). INAMHI generates information, studies and forecasts on weather, climate and water of the past, present and future. This intelligence has a large impact on the quality of life and livelihoods of the Ecuadorian population, as it is the main input for the planning and development of strategic sectors of the economy, integrated management of water resources, risk management, mitigation and adaptation to climate change.



This outcome, the use and institutionalization in IHNAMI of the innovative forecasting, hydrological and data visualization applications, methodologies, and tools [5] was realized working with INAMHI's three technical directorates to generate weather, water and climate information and products: the Directorates of Forecasts and Alerts, Directorate of Hydrometeorological Information and Studies and Research. INAMHI now provides improved hydrological forecasting services, including more accurate information on timing of IHNAMI reports, and magnitude and impact of incoming flood disasters. In addition, historical flow data for the last 40 years is available and is being used by IHNAMI. In addition, through INAMHI's participation in 8 training courses, including as a trainer for its partners (4), the hydro-informatics tools were co-developed and institutionalized with the support of the Alliance through SERVIR Amazonia, and are now training local parties to understand past river flooding patterns and how the watershed integrates across political boundaries. This service has enabled IHNAMI to investigate forecast-supported funding sources, increasing its ability to prepare for and respond to flood disasters. In addition, hydro-informatics tools are being used to train local parties to understand past river flooding patterns and how the watershed integrates across political boundaries. Several technicians have been trained, trained colleagues and presented the Tethys platform to other institutions, reaching other experts in the region. Before the SERVIR program, these Directorates did not have installed capacity, did not know the Tethys platform, and did not comply with WMO standards for data sharing. In addition, they did not have sufficient budget to carry out their activities, even being the national reference institution on hydrometeorological issues. IHNAMI now has improved flood forecasting capabilities and is producing forecasts with more accurate information on timing, magnitude and impact of flooding events. These improved forecasts allow INAMHI end-users, groups in the thousands of local populations according to the area of the country experimenting impacts of flooding at any given moment - greater understanding of risks and increasing their resilience to flood disasters. INAMHI has been collaborating in further connecting with potential users of the applications and facilitated interactions with outside users. For example, Service researchers have been invited to meetings with governmental institutions such as the National Risk Management Service (SNGR) to not only show them the applications but also so that in the future they can improve the tools with possible co-development collaborations. Finally, they have collaborated in the customization of the applications by sharing data.

PART 2: Mapping to Alliance strategy and structure

KEY CONTRIBUTORS



Lever 2 – Multifunctional Landscapes

SDG TARGETS



- **13.2** – Integrate climate change measures into national policies, strategies and planning
- **13.3** – Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
- **13.1** – Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

REFERENCES

1. Swain, N. R., Latu, K., Christensen, S. D., Jones, N. L., Nelson, E. J., Ames, D. P., & Williams, G. P. (2015). A review of open source software solutions for developing water resources web applications. *Environmental Modelling & Software*, 67, 108-117.
2. Tethys Platform - Welcome!. (2023). Retrieved 15 May 2023, from <https://www.tethysplatform.org/>
3. Service Catalogue. (2023). Retrieved 15 May 2023, from [here](#)
4. Workshop INAMHI participated as trainer [here](#)
5. SA_REPORTE_TETHYS_INAMHI_JUL2022.pdf. (2023). [here](#)

CONTACT PERSON

José Fernandes,

User Engagement Leader for SERVIR Amazonia,

j.fernandes@cgiar.org

Sophie Alvarez,

MEL Specialist, SERVIR Amazonia

b.sophie.alvarez@gmail.com



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The Alliance of Bioversity International and the International Center for Tropical Agriculture (CIAT) delivers research-based solutions that harness agricultural biodiversity and sustainably transform food systems to improve people's lives. Alliance solutions address the global crises of malnutrition, climate change, biodiversity loss, and environmental degradation.

The Alliance is part of CGIAR, a global research partnership for a food-secure future.



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