

GEOSPATIAL INFORMATION FOR IMPROVED ENVIRONMENTAL DECISION-MAKING

CONNECTING SPACE TO VILLAGE

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GEOSPATIAL TECH INNOVATIONS ALLOW DECISION-MAKERS TO ACT FASTER IN PREVENTING ENVIRONMENTAL DISASTERS AND MITIGATING CLIMATE CHANGE

Earth Observations (EO) and geospatial decision-support systems play an increasingly critical role in reducing greenhouse gas emissions and the impacts of climate change, monitoring deforestation and its causes, and improving the management of protected areas and other conservation units. These systems can provide solutions to development problems in the Amazon as they bring together remote communities and marginalized groups with data and information providers in governments, the private sector and NGOs. Recent advances in remote-sensing technologies increase the coverage, timeliness and precision of the data and information that allow decision-makers to act faster in preventing disasters and illegal activities in the Amazon. Several remote sensing platforms are available, with short revisit times and high spatial resolution, to provide frequent, reliable data about the Amazon. The limitation of frequent cloud cover can now be overcome with the availability of cloud-penetrating RADAR images or high cadence optical images. The suite of information includes continuous historic data from Landsat platforms, higher resolution Planet images

supported by NICFI, the high resolution and cadence of Sentinel-2, and RADAR data from Sentinel-1. In addition, cloud-based processing platforms eliminate the need for costly in-office computer infrastructure to process raw data and provide analysis.

THE FIVE KEY CHALLENGES

Serious challenges remain to effectively connect Space to village and scale up the use of Earth observation and satellite imagery to reach its full potential. The five key challenges are:

1. The effectiveness of geospatial data and information value chains, and the connectedness of all relevant actors.
2. The capacity of national and subnational organizations when it comes to understanding, contributing to and using the latest technologies.
3. The interoperability and sustainability of existing information platforms.
4. The access to internet for local, and often isolated communities that would allow them to contribute, receive and act upon valuable information.
5. Our understanding of social inclusion issues that could boost the participation of women and marginalized communities in the monitoring of their territories.



BOX 1. SERVIR-AMAZONIA: GEOSPATIAL INNOVATIONS THAT SUPPORT LOCAL SOLUTIONS

ABOUT SERVIR

A joint initiative of NASA, USAID and leading geospatial organizations in Asia, Africa and Latin America, SERVIR partners with countries in these regions to address critical challenges in climate change, food security, water and related disasters, land use, drought, fires and air quality. Using satellite data and geospatial technology, SERVIR co-develops innovative geospatial applications to support local solutions through a network of regional hubs, to improve resilience and sustainable resource management at local, national and regional scales.

ABOUT SERVIR-AMAZONIA

Operating as a regional hub, SERVIR-Amazonia promotes collaboration among governments, universities, non-governmental organizations, community groups and scientists. The ultimate goal is to improve local capacity to harness satellite data and geospatial information, to foster sustainable natural resource management throughout the Amazon Basin.

SERVIR-Amazonia uses a service approach that brings diverse stakeholders together to identify local development problems and codesign sustainable decision-support services with implementing partners, in the form of geospatial tools, data sets or capacity building resources and activities. Currently SERVIR-Amazonia is implementing 11 services in 5 countries with 18 partners.

The Program is implemented by the Alliance of Bioversity International and the International Center for Tropical Agriculture ([CIAT](#)), along with a network of local and international partners serving the Amazon region, mainly the Spatial Informatics Group ([SIG](#)), Conservación Amazónica ([ACCA](#)), the Institute for Forest and Agriculture Management and Certification ([IMAFLORA](#)) and [Fundación EcoCiencia](#).



Illustration: The SERVIR-Amazonia service approach

THE WAY FORWARD

The SERVIR-Amazonia consortium broadly aims to: (1) establish a strong partner network, prioritize user needs and engage stakeholders; (2) build networks and capacity to design and develop services and share data; and (3) support improved decision-making across the Amazon. Effecting change is not simply about the building a new tool; it is also about changing culture. SERVIR-Amazonia is working to change the way people and institutions approach information for development purposes, by emphasizing open data principles, transparency and a service ethic.

To effectively connect Space to Village, so that Earth Observation and satellite imagery are used to their fullest potential, both the strengthening of existing initiatives as well as new concrete measures are required, mainly:

- Including geospatial technology analysis so that regional initiatives and agreements, like the Pacto de Leticia and Acuerdo de Escazú, can be effectively implemented.
- Working with Indigenous Peoples Organizations on an action plan to empower them with geospatial technologies and enable their full participation in the protection of their territories.

Box 2. Examples of geospatial services and what they do

Name of service	Deforestation monitoring and reporting in Ecuador	Monitoring of gold mining in the Peruvian Amazon - RAMI	TERRA ON TRACK
What the service does	Ecuador's greenhouse gas inventory now has greater precision and accuracy in its emissions estimates and its documentation of conservation practices, which will move the country closer to receiving payments for results.	The near real-time information on deforestation and mining activity in the southern Peruvian Amazon, allows authorities to quickly identify possible new illegal mining fronts and to better understand how legal mining impacts the forest.	The application provides a tool for community-based initiatives in the Brazilian Amazon to improve the monitoring and protection of their forests.
Partners who co-developed the service	<ul style="list-style-type: none"> • Ministerio del Ambiente, Agua y Transición Ecológica (MAATE) • Spatial Informatics Group (SIG) • Food and Agriculture Organization (FAO) 	<ul style="list-style-type: none"> • Ministerio del Medio Ambiente del Perú (MINAM) • Programa Nacional de Conservación del Bosques y Cambio Climático (PNCBMCC) • Asociación para la Conservación de la Cuenca Amazónica (ACCA) • Spatial Informatics Group (SIG) 	<ul style="list-style-type: none"> • Instituto de Manejo e Certificação Florestal e Agrícola (Imaflora) • Spatial Informatics Group (SIG)

- Promoting public sector investments to improve internet connectivity in remote areas.
- Engaging further in public-private sector partnerships to increase the capacity of national and subnational organizations in geospatial technologies.

Policymakers should consider the evidence that geospatial science and technology can provide and channel resources to regional, national and subnational agencies so that they can increase the effectiveness, efficiency and equity of environmental decision-support systems.

REFERENCES AND BACKGROUND DOCUMENTS

- SERVIR-Amazonia:
<https://servir.ciat.cgiar.org/>
- NASA SERVIR Global:
<https://www.servirglobal.net/>
- Service Planning Toolkit:
<https://www.servirglobal.net/LinkClick.aspx?fileticket=sMApOmVxjms%3d&portalid=0>

SERVIR AMAZONIA

Service Catalogue

SERVIR uses a service approach to bring diverse stakeholders together to identify local development problems and co-design solutions that use satellite data, Earth science, and geospatial technologies. The resulting solutions are tailored, need-based decision-support products (tools, data sets, training resources and capacity building activities). SERVIR calls these solutions "services" because they are more than standalone geospatial products and expected to be sustainable and evolve as a long-term service offered by the implementing partners to improve environmental decision-making.

Land Cover Land Use Change & Ecosystems **Water & Water Related Disasters** **Weather & Climate** **Drought & Fire Risk** **Number of Services**

Service	Goal	Co-developers
Deforestation Monitoring & Reporting Ecuador	Provide continuous and rigorous information about the forest and other ecosystems' status and changes.	<ul style="list-style-type: none"> Spatial Informatics Group (SIG) Ministerio del Ambiente, Agua y Transición Ecológica de Ecuador (MAATE) FAO Consortio de Gobiernos Autónomos Provinciales del Ecuador (CONGOPE)
Mapping of Soil Fertility Ecuador	Generate high-resolution digital soil maps to support efforts in maintaining rural soil fertility, increasing productivity, and preventing contamination contributing to reduce soil desertification and degradation in Ecuador.	<ul style="list-style-type: none"> Alliance Bioversity International-CIAT Ministerio de Agricultura y Ganadería (MAG)
Monitoring of Gold Mining in the Peruvian Amazon Peru	Quickly identify possible new illegal mining fronts in priority areas, such as protected area buffer zones, and persistent activity in degraded areas.	<ul style="list-style-type: none"> Conservación Amazónica (ACCA) Ministerio del Ambiente (MINAM) Programa Nacional de Conservación de Bosques para la Mitigación del Cambio Climático (PNCCBMCC) Spatial Informatics Group (SIG)
Improving Resilience and Reducing Risk of Extreme Hydrological Events Peru, Colombia, Brazil	Provide stakeholders in the Amazon Basin region with improved flood forecasting ability, including more accurate information about timing, magnitude and impact, to increase their understanding of risks and support greater resiliency to flood disasters.	<ul style="list-style-type: none"> Brigham Young University (NASA/AST J. Nelson) Environmental Modeling Laboratory (EMBL) Servicio Nacional de Meteorología e Hidrología (SENAMHI) Instituto de Hidrología, Meteorología y Estudios Ambientales (IDEAM) Centro Nacional de Monitoreo y Alertas de Desastres Naturales (CEMADEN)
Forecasting Seasonal to Sub-Seasonal Fire & Agricultural Risk from Drought Colombia, Brazil	Provide information for mitigating the negative impacts of drought and fire on forest and agriculture in the Amazon basin, evaluating drought conditions at temporal and spatial resolution to predict fire vulnerability.	<ul style="list-style-type: none"> Goddard Space Flight Center (NASA/AST D. Morton) Instituto de Hidrología, Meteorología y Estudios Ambientales (IDEAM) Secretaría de Estado de Meio Ambiente (SEMA-Acre) Centro Gestor e Operacional do Sistema de Proteção da Amazônia (CENSIPAM)
Monitoring and Evaluation of Mangroves Guyana	Provide a platform for automating the analysis of radar and optical imagery going back several years and setting a year-2020 baseline for future analysis. This service makes mangrove-related land-use change transparent and the resulting analysis publicly available for use by government and civil society.	<ul style="list-style-type: none"> National Agricultural Research and Extension Institute (MAREI) University of Guyana (UG) Alliance Bioversity International-CIAT Spatial Informatics Group (SIG)
Monitoring forest dynamics to enable biodiversity conservation in the Amazon Brazil	Assess the impact of private sector engagement on biodiversity conservation in the Amazon by characterizing forest and habitat dynamics.	<ul style="list-style-type: none"> Alliance Bioversity International-CIAT / CAL-PSE Spatial Informatics Group (SIG) Instituto de Manejo e Certificação Florestal e Agrícola (Imaflora)
TerraOnTrack - Monitoring Community Lands, Protecting Forests and People Brazil	Contribute to community-based initiatives working within the Brazilian Amazon by introducing technological resources that will allow them to quickly identify potential threats to their territories and monitor illegal activities on the ground, which in turn will increase their territorial management capacities and protect forests.	<ul style="list-style-type: none"> Instituto de Manejo e Certificação Florestal e Agrícola (Imaflora) Spatial Informatics Group (SIG)
Ecosystem Services Modeling in the Amazon's Forest-Agricultural Interface Brazil and Peru	Provide accurate maps for stakeholders and decision-makers to understand the policy and economic scenarios that tip agricultural production systems towards deforestation, particularly due to palm oil and cocoa production.	<ul style="list-style-type: none"> NASA Jet Propulsion Lab (NASA/AST N. Pinto) Alanza Cacao Servicio Nacional de Áreas Naturales Protegidas por el Estado (SERNANP) EMBRAPA - Unidade Amazônia Oriental (Estado do Pará) Centro de Conservación, Investigación y Manejo de Áreas Naturales - Cordillera Azul (CIMA)
Quantifying the Effects of Forest Changes on Provisioning & Regulating Ecosystem Services Brazil and Peru	Allow regional and local planners and decision-makers, and citizens of Acre and Ucayali to better understand the tradeoffs between development activities and ecosystem services.	<ul style="list-style-type: none"> University of Richmond (NASA/AST S. Spera) Spatial Informatics Group (SIG) Universidade Federal do Acre (UFAC) Secretaria de Estado de Meio Ambiente (SEMA-Acre) Comissão Pró-Índio do Acre (CPI-Acre) Conservación Amazónica (ACCA) Universidad Nacional de Ucayali (UNU) Servicio Nacional de Áreas Naturales Protegidas por el Estado (SERNANP)

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GLOBAL LANDSCAPES FORUM

The [Global Landscapes Forum \(GLF\)](#) is the world's largest knowledge-led platform on integrated land use, dedicated to achieving the Sustainable Development Goals and Paris Climate Agreement. The Forum takes a holistic approach to create sustainable landscapes that are productive, prosperous, equitable and resilient and considers five cohesive themes of food and livelihood, landscape restoration, rights, finance and measuring progress. It is led by the Center for International Forestry Research (CIFOR), in collaboration with its co-founders UN Environment Programme and the World Bank and Charter Members.

[Charter Members](#): CIAT, CIFOR, CIRAD, Climate Focus, Conservation International, Crop Trust, EcoAgriculture Partners, EFI, Evergreen Agriculture, FSC, GEF, GIZ, ICIMOD, IFOAM - Organics International, ILRI, INBAR, IPMG, IUFRO, Rainforest Alliance, Rare, RRI, SAN, UN Environment Programme, Wageningen Centre for Development Innovation, part of Wageningen Research, WFO, World Agroforestry, World Bank Group, WRI, WWF International, Youth in Landscapes Initiative

TIPPINGPOINT

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Funding partners



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