SERVIR AMAZONIA

Report of the Brazilian User Needs Assessment Workshop, held in Brasília-DF on October 23-24, 2019

December 2019

USAID FROM THE AMERICAN PEOPLE · NASA · CIAT International Center for Tropical Agriculture Since 1967 Science to cultivate change · Spatial Informatics Group · imaflora · ACCA

Summary

- The User Needs Assessment Workshop in Brasília-DF was attended by 71 representatives (43 men and 28 women) from 36 organizations.
- Objectives: Understand the main problems/threats affecting the Amazon in the 4 thematic areas; Identify needs and opportunities for geospatial information that can improve environmental decision-making.
- 5 different needs identified: database and information integration; improvement of monitoring technologies; articulation of institutional actors; standardization of information; and capacity building and training.
- 11 geospatial service ideas in the four service areas identified.
- Brazil has strong spatial data infrastructure and communities of remote sensing and geospatial professionals.

Summary

- Brazil serves MODIS or VIIRS data (through PRODES-INPE system) for fire hotspot analysis. Opportunities for seasonal forecasting, fire vulnerability mapping and mapping burn scars.
- Brazil serves weather station data, with short-term large-area forecasts available. INMET follows WMO standards. CEMADEN provides precipitation measurements with a focus on pre-mapped risk areas. SIPAM uses weather radar that measures precipitation by remote sensing. Less mature hydrological monitoring and forecasting, as well as forecasting for natural disaster risk management in Amazon municipalities.
- Ecosystem management and land-use work well-established for deforestation, less so for forest degradation and forest restoration. Brazil is beginning to do land-use mapping using categories beyond forest/non-forest.

Content

1. Improved geospatial information-based environmental decision making - achievements and challenges
2. Needs identified by users
3. Service ideas identified

Cross-cutting themes

1. Cross-country collaborations
2. Indigenous Peoples & Gender

Improved geospatial information-based environmental decision making: Achievements and challenges

Discussion around a live survey

- The level of use of geospatial information for decision-making in the Brazilian Amazon is intermediate.
- The use of the information is slightly better for the "Weather and Climate" service area, although the Amazon region lacks active weather stations.
- Regarding the service area “Water resources management and hydroclimatic events”, existing databases are not broadly disseminated. Known databases are difficult to access and have insufficient coverage for the broad territory of the Amazon.
- Regarding the “Ecosystem Management” service area, PRODES allows the visualization of deforestation, but there are complaints about the lack of integration or correlation between information sources.
- Regarding the service area “Drought and Forest Fire Risks”: (i) modeling efforts exist, but for some states (such as Roraima) they are lacking; (ii) professionals need training on the use of these models; (iii) no single defined model allows mapping of these risks in detail, mapping that supports long-term vegetation recovery efforts; (iv) fire hotspot data needs better processing to avoid duplication of alerts; and (v) the typology of drought risk categories may not be appropriate for the analysis, suggesting the need to review and revise these models.

How to improve the applicability of geospatial information

- Increase technical capacity and number of technicians to analyze data and information
- Increase level of analysis at local and municipal levels
- Better articulation and communication between actors
- Increase visibility of existing information at local and municipal levels
- Make existing systems and tools interoperable

Improved geospatial information-based environmental decision making - achievements and challenges

Continued discussion around a live survey

- (vi) Existing data is underutilized due to the lack of technical and human resources; and (v) active fire hotspot data are considered good, having existed since 1998 (that data may underestimate conditions for the Cerrado). In the Amazon, hot spots are linked to deforestation. In the Cerrado, there are large gaps in knowledge about burned areas and how lands are managed, compared to knowledge about the Amazon biome.
- Data availability is considered good, but greater investment is needed in policy coordination and data generation between different organizations. Each entity has its goal, its priorities, and the results are not always coordinated.
- The most important determinant for improving the applicability of geospatial information is the articulation of actors. Communication is important. Potential users need to be aware of available information initiatives and resources, to give visibility and accessibility to existing information. It is necessary to find a creative way to reach the user; bring information to the level of the territory and to the municipality; that is, the municipal public managers and farmers.

Improved geospatial information-based environmental decision making - achievements and challenges

Continued discussion around a live survey

- Broadly, communication should be improved among organizations that collect, process, analyze and systematize information, as well as among decision-makers who use the information.
- In general, although data availability is considered good, further analysis at the territorial level is lacking. Whether data are up-to-date is another important aspect to consider, as decisions are sometimes made with outdated information. Improved documentation and APIs (Application Program Interface) can support easier integration with other information systems. Open data will facilitate a higher level of consultation.
- The interoperability of existing systems and tools was the second major determining factor for improving the applicability of geospatial information.
- Items such as connectivity, accuracy, and availability refer more to the information itself, and appear as less determinant. Governance and management of information use, articulation and interoperability of systems have appeared as the most relevant topics.

Improved geospatial information-based environmental decision making - achievements and challenges

- Two themes were raised as fundamental: (i) technical capacity - there is quality data, but there is little ability to use this data to generate useful information. It is difficult to apply and generate information; Thus, technical capacity was cited as extremely important, as it is interpreted as a continuous learning process, since there is always the diffusion of new systems; (ii) actors articulation - there are many entities working in geospatial systems, but meetings are rare, do not happen periodically; articulation needs to be done, as it is difficult to understand what other entities are doing and practicing; both government and academia and non-governmental organizations; this barrier limits the application; thus, the articulation of the actors was a determining factor to improve the applicability of geospatial information.

Needs identified by users

Small group discussions revealed 5 categories of needs:

1. Database and information integration
2. Enhancement of monitoring technologies
3. Capacity building and training
4. Articulation of institutional actors
5. Standardization of information

Needs identified by users

The needs discussed in each category:

Database and Information Integration

- Grouping of public links without the need for formal "authorization"
- Integrated database / access
- Start data integration in steps and by areas
- Unified geospatial product presentation platform
- Integration of SINAFLOR with CAR bases
- Landscape dynamics database (habitat fragmentation and edge reduction)
- Integrated official and scientific data
- Integration of the SINAFLOR-DOF system with the IRS electronic invoices.
- Develop an automated geospatial analysis routine within SINAFLOR to monitor sustainable forest management plans.
- Information Sharing (Unified Data Platform)
- Database unified with methodology and error (reliability - validation)
- Need for integrated deforestation monitoring system
- Cross data for environmental monitoring
- Unification of hydrological and meteorological products for joint climate forecasting in the Amazon
- Integrated database and generate services from this integrated database (analysis and production of information)

Needs identified by users

The needs discussed in each category:

Enhancement of monitoring technologies

- Development and continuous improvement of technologies and infrastructure
- Use of radar for risk monitoring and landscape planning
- Hydrological risk management system in the Amazon basin
- High-resolution land-use dynamics, considering agricultural crops, degraded pastures, and forest regeneration
- Monitoring of natural resources (water) impacted by mineral extraction (Peru border)
- Border monitoring for the identification of timber traffic routes, etc.
- Development of products that support decision making and legislation (forest code)
- Monitoring of environmental degradation
- Regeneration area monitoring methodology
- Hydrometeorological modeling (climate risks)
- National mapping of agricultural crops
- Productive risk models
- Use of high temporal resolution NASA data to run hydrological models in Amazonian rivers
- Refined Land Use Data
- Selective cut monitoring

Needs identified by users

The needs discussed in each category:

Enhancement of monitoring technologies (Cont.)
- Improved climate change data
- Prediction of hydrological extremes for the entire Amazon (risk of droughts and floods)
- Validation of degraded pasture information in the Amazon biome
- Time series of the burned area of 30 meters or less
- Amazon Basin Risk Management System
- Selective exploration area monitoring tool
- Risk models for institutional use (deforestation, fire, and extreme events)
- Need for geospatial data with finer land use scales
- Forestry Initiative Management Platform
- Seek improvements to climate change databases

Capacity building and training
- Mapping the training needs of network actors
- Online training/themes structure (announcement of opportunities)
- Interinstitutional thematic groups: training/technical leveling
- Training in unified methodologies focused on information for decision making

Needs identified by users

The needs discussed in each category:

Articulation of institutional actors
- Articulation and engagement
- Interinstitutional Partnerships
- Interinstitutional local events for knowledge exchange
- Expand partnerships
- Partnerships for improvements and innovation in ecosystem services
- Expand partnerships between federative entities (Union, states, and municipalities) involved in both generation and monitoring

Standardization of information
- Making information available in large-scale dissemination formats
- Friendly to different users. Reliable: with methodology, validation, accuracy
- Strengthening of the national forest inventory as a reference base for forestry licensing
- Interactive and user-friendly apps
- Systematization of different databases
- Systematization of databases from different sources to facilitate access to information by different users.
- Allow cross data for environmental monitoring
- Data Analysis-Simplification (HIDROWEB/INPE/ANA)

Identified Service Ideas

1. Refined Fire Monitoring and Forecasting
2. Implementing New Technologies - Purple Air
3. Hydrological Monitoring and Forecasting of the Pan-Amazon Basin
4. Natural Disaster Risk Management Forecast for Pan-Amazon Municipalities
5. Air, River, and Sea Navigation Support System
6. Exclusive portal for data and information integration for use by traditional peoples and communities
7. Automated Geospatial Analysis that Integrates Remote Sensing in SINAFLOR
8. Technical Training for All Amazon States / State Environmental Agencies - Methodology, Software, Techniques for Using Geospatial Data
9. Spatialized repository of environmental impact studies (EIA)
10. Qualifying the Ecological and Economic Zoning (ZEES)
11. Environmental Recovery and Conversion Map

Risk of droughts and forest fires	Water resource management and hydroclimatic disasters	Weather and climate	Ecosystem Management
- Refined Fire Monitoring and Forecasting - Implementing New Technologies - Purple Air	- Hydrological Monitoring and Forecasting of the Pan-Amazon Basin - Natural Disaster Risk Management Forecast for Pan-Amazon Municipalities	- Air, River, and Sea Navigation Support System - Exclusive portal for data and information integration for use by traditional peoples and communities	- Automated Geospatial Analysis that Integrates Remote Sensing in SINAFLOR - Technical Training for All Amazon States / State Environmental Agencies - Spatialized repository of environmental impact studies (EIA) - Qualifying the Ecological and Economic Zoning (ZEES) - Environmental Recovery and Conversion Map

Fire and Drought

Service Area: Fire and Drought

Service Idea # 1: Refined Fire Monitoring and Forecasting

The National Institute for Space Research (INPE) provides various fire risk monitoring and forecasting products (http://queimadas.dgi.inpe.br/queimadas/portal) for up to 3 days. These and other INPE products are a reference for fire prevention and fire fighting and are used by agencies such as IBAMA-PrevFogo and the CIMAN (Integrated Multi-Agency Center) initiative, which coordinates efforts of various agencies (Civil Defense, Federal Police, ICMBio, etc.) for firefighting. Among the gaps identified:

- Focus on monitoring techniques unconstrained by cloud cover, such as RADAR technologies;
- Better understanding and modeling of fire spread for active fire response and preventing further expansion of the fires.
- Medium-term (weeks) long-term (seasonal) fire risk prediction for the planning and management of legal burning activities;
- Accurate identification of the source of fires for surveillance purposes.

Service Area: Fire and Drought

Service Idea # 2: Implementing New Technologies - Purple Air

Recently, a network of air quality monitors were installed in the state of Acre (https://www.purpleair.com/) with the ability to measure and store information on particulate matter.

Participants suggested that this new feature could serve as a complement to fire monitoring and fire spread models, as well as producing new public health-relevant information on the population's level of exposure to smoke contaminants.

Water Resource Management and Hydroclimatic Events

Service Area: Water Resource Management and Hydroclimatic Events

Service Idea # 3: Hydrological Monitoring and Forecasting of the Pan-Amazon Basin

According to CEMADEN experts, there are currently no hydrological monitoring and forecasting tools available that cover the entire Amazon region across national borders borders. The absence of such a mechanism impairs the decision-making of federal, state and municipal agencies in the event of possible natural disasters.

Service Area: Water Resource Management and Hydroclimatic Events

Service Idea # 4: Natural Disaster Risk Management Forecast for Pan-Amazon Municipalities

In Brazil, predictions, monitoring and natural hazard alerts are made by CEMADEN which, in case of disaster risk identification, sends alerts to civil defense through CENAD (National Center for Natural Disaster Monitoring and Alerts) so that the actions of accident prevention or containment (mobilization and response) occur within a short time (3 days).
Currently, from the 5560 municipalities in Brazil, the national risk management system and alerts cover only 958 cities, focused on large cities and with very low performance in the Amazon region. The relevance of expanding the forecast of droughts and floods will result in concrete actions with the municipalities of northern Brazil where the most vulnerable populations are present.

Weather and Climate

Service Area: Weather and Climate

Service Idea # 5: Air, River, and Sea Navigation Support System

River and sea navigation, and transportation by small airplanes and airstrips are among the main means of transportation in the Amazon, which have been deeply affected by climatic and hydrological conditions. The operation and safety of navigation and transport depend entirely on weather conditions and river flow. Riverbanks can also make river navigation difficult. However, the decision to make a flight or boat trip is difficult without the support of appropriate weather information.

This service would gather information and forecast weather and navigability of rivers to support navigation and air transport in the Amazon. Existing accurate information would be disseminated virtually to communities and populations that depend on the river and air transport. The information would also be delivered to regional and local rivers, sea and air transportation companies.

Service Area: Weather and Climate

Service Idea # 6: Exclusive portal for data and information integration for use by traditional peoples and communities

Several actors at the federal, state, and municipal level as well as universities and research entities generate meteorological and hydrological data and information, which is often poorly organized. This service, translated as a portal that integrates and transforms the mass of collected data into useful information, will collect and group data from various sources, enabling the use of this tool for traditional peoples and communities for disaster prevention, mobility planning, and agricultural planning.
This service provides for the gathering of all-weather and hydrological and weather and climate information in a single portal. In these, the data would be standardized in relation to the form of collection and unit. The data would be easily available for consultation and use. For correct and efficient use, the service includes training information users and decision-makers about the portal and their information, including local communities.

Ecosystem Management

Service Area: Ecosystem Management

Service Idea # 7: Automated Geospatial Analysis that Integrates Remote Sensing in SINAFLOR

Refers to the development and installation of remote sensing tools in the National Forest Products Origin Control System (Sinaflor), which integrates all control of the origin of wood, charcoal and other forest products or by-products, under IBAMA's coordination, supervision and regulation.

Sinaflor has already established systems whose current operations do not have automation or integration between different available data and information. That is, the current structure of Sinaflor does not allow swift and assertive action by the Brazilian Government to monitor forest exploitation and curb illegal practices in the national territory. So the automation of Sinaflor, integrating remote sensing modeling, aims to address current weaknesses. Associated with this service, it is intended to integrate it with Sicar (National System of Rural Environmental Registry), seeking the qualification of control of forest resources in private areas and with an aptitude for forest production. Another system to be integrated with Sinaflor is DETEX (Selective Exploration Detection), a system in which information on forest degradation can be observed. These systems offer technical support for remote assessment of ongoing deforestation processes, whether in forest concession areas or in illegal and predatory activities. Finally, the National Forest Inventory (IFN) would be integrated, in addition to this Sinaflor enhancement, and would provide the Brazilian forest resource database for the qualitative analysis of forestry in Brazil.

Service Area: Ecosystem Management

Service Idea # 8: Technical Training for All Amazon States / State Environmental Agencies - Methodology, Software, Techniques for Using Geospatial Data

Refers to a Technical Training in all Amazonian States for the State Environmental Bodies (OEMAS), addressing methodologies, software, techniques for the use of geospatial data. The goals for this service are:

- Strengthen state autonomy in the use of enforcement systems and practices;
- Improve technical aspects of producing legality decision-making reports;
- Equalize knowledge and evaluation of technical criteria for decision making.

This technical training service seeks to generate a capacity of state civil servants and associated employees to operate platforms and geospatial base systems already installed and to be developed. It is inserted in a context of low capacity and maintenance of the technical staff, and in the perspective of empowering these professionals to perform their activities in the management and control of state territories, as well as in conserved and recovering ecosystems, in protected public areas and in private areas, both governed by specific and complementary environmental legislation.

Service Area: Ecosystem Management

Service Idea # 9: Spatialized repository of environmental impact studies (EIA)

This service idea is centered on developing a platform that organizes a repository of environmental impact studies (EIA) of infrastructure projects or large scale in the Brazilian Amazon territory, such as hydroelectric plants, waterways, highways, etc.

These EIA documents are scattered across the various state and federal environmental agencies, with information collected and contained in these documents not readily available for consultation.
This service aims to organize the information produced by these technical studies, orienting them in consultation platforms for state, municipal and federal servers. The service will allow qualified and objective technical action, streamline environmental licensing processes, with the territorialization of the information (scaled information with greater refinement for decision making).

Service Area: Ecosystem Management

Service Idea # 10: Qualifying the Ecological and Economic Zoning (ZEES)

The focus of this service is to reestablish the territorial planning initiative organized by the PPG7 (Pilot Program for the Protection of Tropical Forests of Brazil) for the Brazilian Amazon in the 1990s and 2000s (operated until September 2009), an initiative known as Ecological and Economic Zoning (EEZ). The service aims to characterize, qualify and update (by means of the latest data and geospatial platforms) the results achieved, and to be sought, in the orientation of land use and occupation. It also proposes to promote new instruments for monitoring and evaluation of the EEZs, within the states and municipalities of the Brazilian Amazon, to be established for their full implementation. The service would:

- Identify areas vulnerable to contamination by pesticides and heavy metals;
- Improve land use maps (at territorial-municipal level);
- Evaluate environmental damage and assign values for damage compensation;
- Monitor areas under regeneration of native vegetation for PSA purposes (payment for environmental services);
- Establishment of soil degradation maps to guide recovery actions as well as target land uses based on suitability.

Service Area: Ecosystem Management

Service Idea # 11: Environmental Recovery and Conversion Map

Such a service could be adopted as an important criterion to guide the payment for environmental services advocated by Bill 312/15, which creates the National Policy for Payment for Environmental Services (PNPSA), aimed at helping producers, indigenous people, quilombolas and traditional communities to conserve preservation areas. This bill was approved by the House of Representatives in September 2019 and is currently under consideration in the Federal Senate. If approved, the federal government will implement a program focusing on the maintenance, restoration or improvement of vegetation cover in areas considered a priority for conservation, actions to combat habitat fragmentation and the formation of biodiversity corridors and conservation of water resources.

Special priority will be allocated to environmental services provided by traditional communities, indigenous peoples and family farmers, and the participant's framework will be linked to enrollment in the Rural Environmental Registry (CAR), etc. IBAMA will be the managing body of PNPSA. The Environmental Recovery and Reconversion Map will serve to map, identify and quantify the evolution of degraded land reclamation as well as ecosystem restoration in priority conservation areas, permanent preservation areas (APPs) and legal reserves in river basins. considered critical, with a preliminary focus on the Amazon biome and transition areas from the Cerrado to the Amazon biome, with the possibility of expa[illegible] other national and regional territories.

Cross-cutting Topics Across Service Areas

Organizations and activities to explore for cross-border collaboration

- OTCA - Amazon Cooperation Treaty Organization, a potential institution with influence in the region could contribute to the development and delivery of services among the focus countries of SERVIR-Amazonia.
- MAPBIOMAS - land use and land cover mapping initiative for Brazil, expanding to other Amazon countries. For the post needs assessment meetings in Brazil, consideration should be given to dialogue with organizations that run MapBiomas, as well as how to combine MapBiomas methodologies and the methodologies to be considered by service ideas.
- RAISG - socio-environmental geo-referenced information network produced by a consortium comprising of MAPBIOMAS and affiliated organizations. ISA (Instituto Socioambiental) coordinates RAISG's geoprocessing activities and will be an important partner in the communication and practices of the use of SERVIR-Amazonia services by organizations from RAISG network countries. Relevance to a potential partnership with ISA for co-development of IPO needs-centric services.

Organizations and activities to explore for cross-border collaboration

- Brazil to Peru collaborations on a number of technical products, for example, a short-term precipitation forecast by INPE. As well as with the service idea of qualifying the Ecological and Economic Zoning between Acre, Brazil, and Ucayali, Peru (with the potential participation of Ecuador, since CONGOPE is moving forward with the revision of its territorial planning program).
- Brazil to Colombia collaborations for the service idea of creating the National System of Rural Environmental Cadastre in Amazonia. This service responds to a critical need to generate information about land tenure in the Colombian Amazon. Brazil has a great experience with its SICAR (National System of Rural Environmental Cadaster) throughout its territory.

Context for improved environmental decision-making based on geospatial information centered on the indigenous and gender context

A live survey facilitated a discussion on participants' perceptions of the current state of environmental decision making based on geospatial information in Brazil.

- Geospatial information should be translated to all types of public, indigenous peoples and traditional communities, for example. More than lack of technology, it is necessary to invest in the social part, given the weakness of dynamism to reach the territories at different scales (interaction between Brasilia-DF and the capital cities of the Brazilian Amazon).
- There is a lack of platforms for participation and consultation to ensure the voice of underrepresented communities. In this sense, and in order to facilitate participation, capacity building and training is required to ensure effective participation. Additionally, it is necessary to guarantee the use of technologies, as well as their construction, and public policies.
- Regarding the issue of connectivity in remote areas, the ISA seeks to bring tools to Amazonian populations through partnerships with institutions representing indigenous peoples, for example, by promoting organizational strengthening. EMBRAPA Acre, on the other hand, has been working with FUNAI on empowering and involving indigenous peoples through the Ethno-zoning tool, which integrates local scale with global data using traditional knowledge.

Context for improved environmental decision-making based on geospatial information centered on the indigenous and gender context

Through a live survey, a discussion on participants' perceptions of the current state of environmental decision making based on geospatial information in Brazil was facilitated.

- Emphasis was given to the need to encourage and promote participation and do everything possible to understand the vision and views of indigenous peoples and representative organizations. It is necessary to guarantee the participation of indigenous organizations in the conception of the services from the beginning and to consider exclusive projects, oriented to their communities, incorporating local knowledge about the use of the territory and acting differently according to their languages, ethnicities, usages, customs, and practices.
- There is a need to strengthen territorial governance by incorporating indigenous people ecosystem management practices into territorial planning. Similarly, two other requirements were indicated: (i) technical training on opportunities to improve decision making using geospatial information, and (ii) the need to bring explicit and easily understandable knowledge to indigenous communities so that informed decisions can be made under hard facts, not assumptions. Services should take into account their information consumption habits. It was pointed out that these recommendations are not only valid for indigenous communities, but also consider small farmers, *quilombolas*, riverine people and all forest-dependent populations.

Context for improved environmental decision-making based on geospatial information centered on the indigenous and gender context

Through a live survey, a discussion on participants' perceptions of the current state of environmental decision making based on geospatial information in Brazil was facilitated.

- Regarding the situation of women in the organizations represented, the majority of participants (34%) confirmed that their institutions do not have a gender equality promotion policy. Another 34% said they did not know if their organizations had such a policy. On the other hand, 31% indicated that their organizations have this gender equity policy. Additionally, the live-survey allowed us to know that while there is a significant presence of women in georeferencing teams, there are few cases where women occupy management positions.

Next steps

The user needs and opportunity assessment provides an initial overview of the service ideas to be explored. The next steps are:

- **Conduct post-needs assessment meetings with key institutions to refine and interpret the service ideas that were identified during the workshop (from their perspective)**
- **Plan next steps towards joint collaboration and the way in which Brazilian organizations and SERVIR-Amazonia can co-develop part identified service ideas.**
- **Map stakeholders to analyze the information flow between actors and spot opportunities for developing targeted, high impact services.**
- **Re-assess user needs and opportunities to synthesize previous activities and inform service selection.**
- **Prioritize within service areas and select services for implementation of the SERVIR-Amazonia program in Brazil.**


SERVIR AMAZONIA
USAID
FROM THE AMERICAN PEOPLE
NASA
CIAT
International Center for Tropical Agriculture
Since 1967 Science to cultivate change
Spatial Informatics Group
imaflora
CONSERVACIÓN AMAZÓNICA
ACCA
www.servir.ciat.cgiar.org
#SERVIRamazonia