

SPACE AS A TOOL TO ADDRESS CLIMATE CHALLENGES: EXAMPLES FROM LOCAL COMMUNITIES

Abstract

The risks related to climate variability will increase, and future actions should be focused on strengthening capacities to face climate change. This could be addressed through the use of satellite data, which are effective tools for monitoring. In Paraguay, native communities are the most vulnerable to climate variability and are highly dependent on forest and the goods and services derived from them. The accelerated dynamics of land use change and ecosystem connectivity loss are the main problems that contribute to climate change at national level, increasing the challenges that local populations must face in terms of adaptability and resilience.

Introduction

The United Nations Framework Convention on Climate Change (UNFCCC), defines in its article 1 “climate change”, as a climate change attributed directly or indirectly to human activity. For the future, climate-related risks are projected to increase with global warming (UNFCCC 1992, p. 3; IPCC 2019, p. 11).

SDG 13 "Climate Action" focuses on strengthening the global response to the threat of climate change, and for this, the use of spatial data can contribute to "promoting effective planning and management, emphasizing women, children and local and marginalized communities”, which is one of the goals to be achieved with this objective.

Satellite images are important for monitoring dynamic geographic changes on a global, regional and local scale (Núñez-Villalba 2018, p. 13). Global warming constitutes a challenge for updating traditional knowledges, culture and practices, from the community's own perspective, and based on local experiences, proposing actions aimed at mitigation, adaptation and resilience.

Paraguay is a country located in South America and is particularly vulnerable to climate change. The lack of strategies and the weak institutional efforts to face the impacts produced by this phenomenon causes environmental, politicians, social and economic problems, where women, children and the elderly population are the most vulnerable, putting their own permanence and survival at risk, mainly in rural areas (Fundación Plurales, 2019).

Satellite data applied to monitoring emissions from Deforestation and Degradation

The United Nations UN-REDD Program is a collaborative initiative to Reduce Emissions from Forest Deforestation and Degradation (REDD) in developing countries. Paraguay joined the Program in 2008 to implement REDD+, that consider the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries, with special attention to forest-dependent communities and indigenous populations, developing capabilities for integrated environmental management. (Walcott et al. 2014, p. 3).

Satellite data is used as a tool to monitor degradation and deforestation at the country level. Llamas (2019), carried out a spatial analysis of the degradation in San Rafael

Reserve located in Itapúa, Paraguay, between the period 2005-2019. The study has found that one of the main causes of forest formation degradation is the installation of illegal crops of *Cannabis* sp. Local people are strongly linked to these activities, either due to scarce job opportunities and/or low profitability of other crops, exposing great social and economic problems. This demonstrates the need to implement and/or strengthen programs that promote the sustainable development of indigenous and local communities both within the Reserve and in its buffer zone.

In this context, currently the National Forest Institute of Paraguay (INFONA), in conjunction with WWF Paraguay, is in the initial phase for the implementation of “spatial prioritization of deforestation alerts”, that uses data available on Global Forest Watch platform, to monitor the Upper Parana Atlantic Forest Ecoregion (BAAPA), within which are San Rafael Reserve and other important Protected Areas. This tool will identify land use changes in priority areas for conservation, making it possible to monitor high-value forested areas in the Eastern Region.

Satellite data in climate scenarios

In the Western Region of Paraguay, the main problem is due to high temperatures and an unequal distribution of average annual precipitation. TRMM (Multi-Satellite Precipitation Analysis) or CHIRPS (Climate Hazards Group InfraRed Precipitation with Station data), deliver satellite data to globally monitor rainfall and drought regimes. These data can be adapted locally and managed in data reception and processing centers to keep producers in the area informed, so that they can analyze other livelihood alternatives or identify how to make essential processes effective in their productive activities, for example, improvement in infrastructure for water collection, storage and distribution.

In the Department of Boquerón, great transformation of natural landscapes is observed, mainly due to livestock activities. The remaining forest are concentrated in the north of the Department, and native peoples depend mainly on the ecosystem services that these forests provide.

In this case, the joint efforts of organizations such as Guyra Paraguay, IUCN and Ellipsis Earth Intelligence, which are implementing the SIIDiT Chaco platform to monitor the transformation of natural areas in the Great American Chaco, are advantageous, allowing viewing and downloading polygons of land use change. These data could contribute to prioritizing areas inhabited by indigenous communities as a strategy to reduce the fragmentation of the forests to which these peoples are linked.

Spatial data for flood monitoring

In 2019 in the Lower Chaco of Paraguay more than 2.300 indigenous families were affected by several storms and floods. This scenario subsequently got worse because erroneous weather forecasts. In the same year, approximately 22.000 families were affected by floods in the city of Asunción and 13.000 families were displaced. This glimpses the extreme need to start first from:

Correct management of water resources and monitoring of their dynamics, as well as optimizing the use of satellites tools to:

- Determine optimal areas for the establishment of settlements, analyzing variables such as maximum rainfall, risks of overflowing water channels, response levels of local authorities to assist victims, etc.
- Increase the accuracy in the interpretation of meteorological data in real time in order to prevent/reduce/mitigate the potential impacts of this phenomenon on the local population.

Conclusion

With the foray into the new information age, satellite products have become a transversal tool for almost any area. The data can be used on the identification and search for solutions to specific problems that are diagnosed either locally, regionally or globally scale. Indigenous and local communities are the most vulnerable to climate change and must face great challenges and changing situations, that is why as a country it's important to be focused significantly on national policies and efforts in order to successfully contribute in adaptation processes and also, to form an interconnected work network between all the countries that concentrate their efforts towards a sustainable scenario.

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