



Rainforest Foundation US and the Organization of the Indigenous Peoples of the Eastern Amazon (ORPIO)'s Rainforest Alert

ORGANISATION

Rainforest Foundation US / ORPIO

LOCATION

Americas

INNOVATION SPECTRUM

Data lakes

MATURITY LEVEL

Established

The organisation

[Rainforest Foundation US](#) protects rainforests in Central and South America by securing and promoting the rights of the indigenous peoples whose lives and livelihoods are inextricably linked to those lands. The organisation sees substantial scope to reduce deforestation by actively recognising the rights of indigenous peoples in forest and climate policy, and involving indigenous communities in a wide range of forest management and deforestation programmes.

[Organization of the Indigenous Peoples of the Eastern Amazon \(Organización Regional de los Pueblos Indígenas del Oriente, ORPIO\)](#) is the indigenous peoples' representative organisation in the Amazonian department of Loreto in Peru, representing 430 indigenous communities. ORPIO engages in protecting their territories, promoting human development, and defending their rights and governance.

The big idea

Community-based forest monitoring may be one of the key solutions to curbing the devastating impacts of the climate crisis around the world. While remote forest communities wish—and are best situated—to deter illegal deforestation on their lands, many lack access to readily available technologies that enable them to take immediate action. To find a solution, Rainforest Foundation US facilitated a study to analyse whether indigenous communities in the Peruvian Amazon with direct access to satellite-based deforestation alerts could curb deforestation, when trained and incentivised to patrol forests and investigate the alerts they receive.

The [landmark study](#), published in the peer-reviewed Proceedings of the National Academy of Sciences, found that indigenous communities can significantly reduce deforestation when equipped with remote sensing technology.

[Rainforest Alert](#) democratises data management, representation, insights and analysis for community action. Although fitting the 'data lakes' element of the innovation spectrum used in this report, the system also has strong digital equity and frontier tech components.

The challenge and the power dynamics of the system

Across the world, forests on indigenous peoples' lands contain 37.7 billion tons of carbon. In the Amazon, accelerated deforestation - which releases vast amounts of carbon dioxide into the atmosphere - poses a major threat to local ecosystems with global consequences for biodiversity and the ongoing climate crisis.

From 2000-2015, 17% of deforestation in the Amazon occurred in government-protected areas or territories registered to indigenous people. Indigenous communities in Peru depend on natural river and forest resources for their livelihoods and sustenance. Deforestation and degradation from timber extraction, agricultural expansion and the illicit cultivation of coca variants (used to make cocaine) threatens the long-term survival of these communities. If no intervention to curb deforestation occurs within the next decade, indigenous peoples in the Amazon Basin may lose an estimated 4.4 million hectares of rainforest.

More than one-third of the Amazon rainforest falls within the approximately 3,344 formally recognised indigenous peoples' territories. Although formal recognition of indigenous peoples' land tenure is key to protecting their lands from deforestation, it is most effective when combined with active forest management and robust community and local governance. The management of common resources relies deeply on community participation, and providing the people most directly affected by deforestation with effective tools and data to monitor change - and take action to stop it - greatly increases the efficiency of environmental protection efforts.

Tropical forest protection policies in the Amazon have had limited efficacy due to a number of challenges. National policies prioritise the prevention of deforestation and anti-deforestation laws at the state level - over community interventions - but enforcement of these laws is resource-intensive and there is limited capacity at state level. This leaves indigenous communities at the forefront of deforestation - unaccompanied and with limited resources themselves - carrying a disproportionate burden of confronting often armed and violent actors, in order to curtail forest cover loss.

The governments of Brazil, Peru, and Colombia have invested in the use of satellite remote-sensed alerts to monitor and deliver high frequency information on tree cover loss. However, national investments in early deforestation alerts remain inaccessible to the communities most affected and who can take more immediate action. As a result, communities do not get critical information of where deforestation is occurring in their vast communal forests until it is well underway and, by then, difficult to intervene.

By putting high-quality satellite technology into the hands of those holding the lands subjected to illegal deforestation, this programme has democratised information access and shifted the power of intervention from the state to community levels, where there is stronger self-interest to keep forests standing. It has developed a community-based monitoring system in the Peruvian Amazon to address national policy shortcomings by making alerts available to communities, and strengthening their capacity for monitoring with training and incentives.

Intervening in the power dynamics

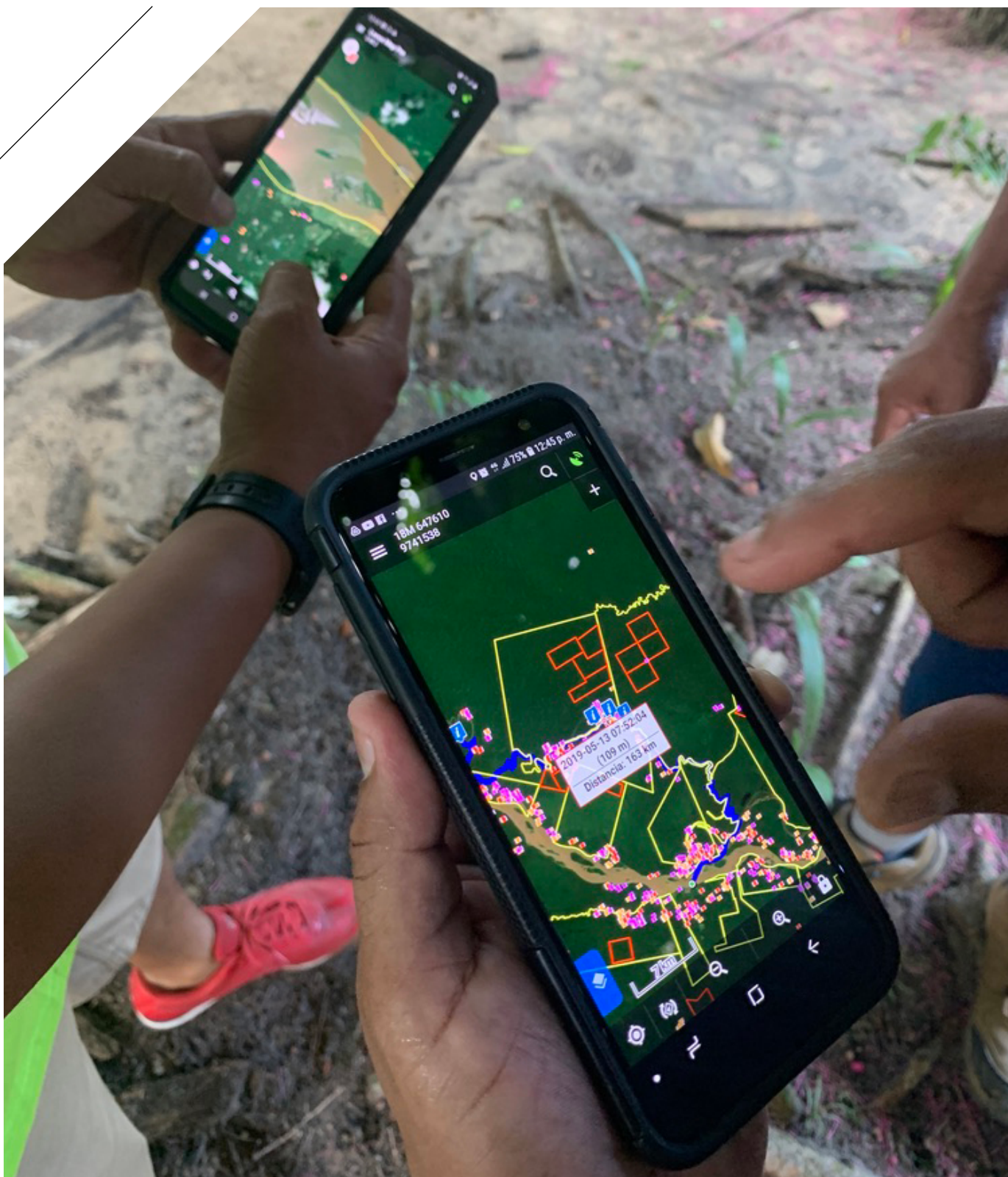
Rainforest Foundation US and ORPIO worked with the World Resources Institute (WRI) to develop a community monitoring system, where satellite detected deforestation alerts were combined with training and incentives for communities to patrol their forests. Researchers from US academic institutions - Columbia University, later New York University (NYU) and John's Hopkins University - studied the effectiveness of this system.

A free online forest data collection system from WRI's Global Forest Watch was critical to the model analysed by the study. Satellite images record changes in forest cover and an algorithm (developed in partnership with the University of Maryland) detects those changes and issues deforestation alerts which are made available on the Global Forest Watch online platform and the Forest Watcher mobile app.

The monitoring programme was randomly assigned to 39 out of 76 communities in the north-eastern department of Loreto in the Peruvian Amazon. The remaining communities acted as the control group where monitoring continued with no tech intervention. Each of the 39 participating communities identified three representatives who were trained as monitors, or forest patrollers, to receive monthly alerts and use satellite imagery and GPS information to conduct foot patrols in community forests to investigate suspected deforestation. Although the alerts themselves are ostensibly free, incentivising the monitors and providing the necessary smart-phone equipment to access these alerts has a cost. The programme addressed this challenge by instituting 'data hubs' where data managers downloaded the alerts onto USB drives and transported them to the monitors in the remote communities. The monitors then downloaded the information to specialised apps on smart-phones to guide their patrols to the reported forest disturbances.

Where the deforestation was determined to be unauthorised, the monitors presented their findings to a general assembly of community members for collective consideration of further action. Where there was no criminal threat, communities intervened directly to drive offenders off their lands.

In some instances, communities decided to report their evidence to law enforcement authorities. In the Napo River valley of Loreto, illegal alluvial (riverine) mining has been a growing threat. These operations are mobile and the many tributaries to the Napo River offer limitless places for small boats and dredges to hide, making law enforcement incredibly difficult. On one occasion, the monitoring team was able to detect and locate a large illegal mining operation and coordinated with law enforcement to track the dredge to ultimately both apprehend the miners and destroy their equipment. On another occasion, monitors detected a raft of illegally logged trees and, using hidden body cameras, safely approached and identified the perpetrators and collected adequate evidence for law enforcement to prosecute them.



Monitors use the smartphone app Locus Map to identify GPS coordinates of deforestation for their regular patrols.

Aspects underpinning innovation

Rainforest Foundation has the advantage of being a nimble CSO able to innovate and test new technologies, see what works, demonstrate proof of concept and consider improvements for scaling. Also, being a science-based organisation meant it had the foresight to partner with the academic community to conduct baseline assessments and build a way to measure and track metrics into the programme which have allowed the pilot to be supported by peer-reviewed science, demonstrating a model of impact that other stakeholders can learn from. For its part, ORPIO and participating federations closer to the community level were well equipped to lead this effort from the user perspective following a number of years under exceptionally strong, charismatic, and coordinated leadership, which facilitated community ownership and close relationships with local law enforcement.

The insights that this study brings to light is that - relative to state-driven interventions - creating monitoring systems in remote communities increases awareness and collective response to deforestation threats while lowering the cost of collective action. It also shows that appointing community monitors to function as 'bureaucrats' delivering public goods is one potential solution to promote community action to address deforestation.

While the primary innovation aspect is drastically increasing access to low-cost data and technology, other important social and governance elements are also integrated. Chief among these include broadening awareness that forest resources are finite and vulnerable, and increasing the levels of organisation at regional and federation levels. These factors enabled small remote communities to achieve economies of scale when training monitors, data managers, and advocacy experts. Individually, it is very difficult for a community of around only 200 people to support all the technical skills required to make a monitoring programme like this successful. But as groups of participating communities coalesced along ethnic and geographic lines, they were able to collectively support these technical skills and thereby wield higher levels of political power with the relevant state agencies and law enforcement. The work has also created 'horizontal' training dynamics, whereby members of communities and federations can now train each other in the equipment and techniques, so the impacts will last beyond the immediate programme.

The skills and tools have shown their potential for wider beneficial use by communities beyond this initial application. Community members skilled in mobile phone use, gathering data, and working with maps and geographic information systems can apply these to other issues like formal land rights, expanding land titling efforts, addressing conflicts over boundaries between forest concession and community lands, and tracking and reporting COVID cases and information to public health officials.

Impact and influence

IMPACT AND INFLUENCE ON FOREST PROTECTION

The results of the randomised control trial with researchers from three US universities - Columbia, Johns Hopkins and New York University (NYU) looked at the impact over two years in the 39 communities across 250,000 hectares in Peru. After one year of implementation, there was a more than 50% decrease in deforestation in the treatment versus control communities, and decreases continued in the second year.

The study estimates that the introduction of community monitoring saved 456 hectares of rainforest which avoided the release of over 234,000 tons of carbon dioxide emissions. The estimated implementation cost was found to be US\$5/ton or US\$0.40/hectare per year. Throughout the two years of the programme, the efficiency of locating forest degradation increased, along with the demand from new communities to join the programme. In severely threatened areas, monitoring averted more tree cover loss compared with places that did not face imminent threats.

The public good of this programme was recognised by regional indigenous peoples' representatives' organisations. Gregorio Mirabal, general coordinator of the Coordination of Indigenous Organizations of the Amazon Basin (COICA), the umbrella of indigenous peoples' representative organisations in the Amazon's nine countries, has recognised the programme's: "vast implications for the survival of indigenous-managed forests across the Amazon...Our network is ready to partner with Rainforest Foundation US to apply this technology-enabled model to our community forest protection initiatives basin-wide."

It is clear that similar efforts to reduce tree cover loss can be scaled. Assessing the results from the two-year study, Rainforest Foundation US estimates that in Brazil, community-based forest monitoring could save 18.8% of the 2.2 million hectares of rainforest located in indigenous people's territories at risk of loss in the next decade. In Peru, 37.2% of 500,000 hectares of indigenous rainforests could be saved.

Less than 1% of all the international climate financing available is reaching local community-level for forest protection and other measures. This programme shows that investing at the local level works, can be very cost-effective - avoiding deforestation at 5 US\$ per ton of CO₂, and has significant potential for sustainable implementation at scale.

Impact and influence on local governance

Community-level decision-making is changing with this new information – for instance, some new village-level policies have been introduced for any new agricultural fields not being opened up on primary forest, and only on previously used forest land. There has also been a positive influence on community engagement in local governance, such as attendance at community council meetings, as more community members want to be involved in monitoring what is happening in their territory and join the responses to any identified threats.

There are positive effects in strengthening relationships between communities and local government as a result of the indigenous leadership collaborating with law enforcement using the monitoring information, and a growing appreciation for the skills and tools which the communities can lend to government actions. In some cases, for instance, local government agencies have been hiring the indigenous monitors to help act as rangers for national parks in buffer areas.

Ultimately, in terms of long-term impact, the strengthened governance of communities facilitated through the programme could be more significant than the technology it introduced, better equipping them to address other issues and priorities. This stronger community unity and collective visioning might better position them to respond to new project proposals and negotiate to ensure their terms are met, or identify when some opportunities are presented in bad faith or might harm them or their territory - in the case of logging contracts or using land for illegal activities.



“ It’s putting information that currently was held primarily by governments into the hands of people at the community level that can actually take action on this information and stop deforestation. ”

SUZANNE PELLETIER, EXECUTIVE DIRECTOR, RAINFOREST FOUNDATION US

LISTEN TO THE PODCAST AT:

<https://icscentre.org/resources/innovation-report>

Key takeaways

First, technology is a powerful tool, but it's just that - a tool; any climate or sustainable development solution needs to connect technology with governance while respecting and recognising the local cultural context. Ally CSOs shouldn't simply parachute in new tools, they also need to provide ongoing accompaniment to maximise the long-term impact they can bring. Technology can support governance, but ultimately won't achieve its full impact potential without sustained investment in the people putting it to use. Projects need to be fully co-designed with local/indigenous communities to take comprehensive account of small nuances and understand contextual threats and constraints, so ally CSOs can build data approaches and tools which reflect these. And ally CSOs also need to keep an open mind about how these might be used by communities beyond their initial intended application.

Second, promoting local leadership is key to the sustainability of a programme, which requires an ally CSO to make itself as small as possible in its implementation. Working with local leaders to co-create and promote the programme creates buy-in and locates the responsibility for it at the local level. Such an approach also strengthens the local capacities and institutions that will carry the programme forward, helps adjust and reformulate programme strategies for stronger impact, and allows communities to derive greater benefits from programme outcomes over the long term.

Finally, new technologies need to be linked in some way to a sustainable income source for impoverished communities, building them into the local economy. This is a key dimension of the work that Rainforest Foundation US is exploring through a number of approaches: collaborating with specialised partners, enrolling communities in relevant government programmes, and/or providing communities with financial and technical support to leverage new capacities and identify new opportunities to integrate themselves into local, national and international markets.

The next 5+ years...

Sustainability and expansion plans to reach more communities with this cost-effective model include strategic placement of the 'data hubs' at the regional level, with trained indigenous leadership in locations where the system can help save most forest across the Amazon basin. This involves not just building on the significant interest at community level, but also leveraging the strong partnerships with indigenous federations at the regional and national level. There is also the opportunity to use the tools, approach, and strengthened governance achieved so far for other initiatives on other areas around territorial management and land rights. The organisations are also looking at ways to develop a sustainable economic model as well – individual community patrollers are currently compensated for their time, opening up opportunities for future models where communities could be paid for their work protecting forests.

Political turnover of local or sub-national organisations can significantly influence longer-term impact, both positively and negatively. Rainforest Foundation US and ORPIO have seen both early adopters of technologies rising to become village or community chiefs or federation leaders, building investment in the programme among and across communities, to changes of leadership with less interest in programmes and technologies. The future holds both potentialities, which will play a major role in influencing how the work will continue to be implemented and possibly expand.

Growing interest in single-source raw materials is also an emerging opportunity communities could tap into using these same technologies. Similar to the way monitors track deforestation points on maps, they could log data at every point of a harvest, proving the origin and authenticity of a product. In this way, the technology could support communities to improve their economic livelihoods by selling to producers who are willing to pay a premium for a higher calibre product. Once the community capability for this kind of data tracking is established, they can also monitor not only for productive crops but also to sell other types of ecosystem services, such as biodiversity monitoring and/or carbon credit schemes.

Rainforest Foundation US and ORPIO are exploring the potential of this technology-enabled system to be adopted or supported by governments for application at greater scale, as its impact has now been demonstrated through scientific peer review. The organisation will explore what level of support governments may be interested in engaging via this system to meet their commitments around climate action, human rights, and biodiversity conservation. Most of the Amazon falls outside of indigenous communities with formally recognised land tenure (which was the main focus of this programme) so further study will still be needed to assess any differences in impact between titled and non-titled forests where state monitoring interventions are necessary.

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The lead author of this report was Nyambura Mbugua, Communications Consultant, with Vicky Tongue from the International Civil Society Centre as the lead editor and Chris Worman, then of TechSoup, contributing the innovation framework. Case studies were co-created with the contributing organisations.

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