International Union for Conservation of Nature

Geospatial Tools Catalog

Tools to Support Indigenous Territories Management

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Copyright © Cristina Mittermeier; Portrait of a Kayapo woman in the village of Ayukre, Xingu Region, Brazil.

International Union for Conservation of Nature

Background

Indigenous Peoples and Local Communities (IPLCs) use geospatial technologies to help secure their land rights and protect and manage their natural resources. These technologies can effectively capture diverse knowledge systems, help safeguard traditional knowledge, and generate data to support full and effective participation by IPLCs in decision-making processes. Remotely sensed and in situ monitoring data can help alert to threats to community lands from extractive and development pressures and measure the progress of ecological restoration and the status of biodiversity conservation.

This catalog contains a list of geospatial tools currently used by IPLCs for data collection, mapping, and monitoring of their lands and resources. Some tools were co-designed with IPLCs while other were developed for a more general audience but are used by IPLCs to support their land and resources management decisions.

Drones

UAV (drone) technology was originally developed for military use and has become widely applicable across every sector ranging from recreational to conservation.

Drones have emerged as the most popular near-earth observation technology in recent years, as they provide affordable, adaptable platforms from which a variety of sensing systems can be deployed. Drones allow for the collection of frequent, cloud-free images at a high enough spatial resolution to make field-level decisions. This allows observation and monitoring abilities that were previously impossible to be fairly routine for many users around the world.

Drones allow users the opportunity to make accurate field-level decisions due to the high-resolution data and the ability to collect data. Uses for drones include monitoring land cover changes, tracking illegal activity, and measuring canopy structure. This can lead to improvements in local policy, quick responses from authorities to respond to illegal extraction, and new understandings of localized environments and ecology.

The versatility of drones has been one of the reasons for their increasing popularity. Drones are currently being used around the world in a variety of environments for monitoring efforts and data collection. The two different models of drones, multi-rotor and fixed-wing, present different options for geographic coverage. Multi-rotor drones can move in any direction, allowing a user to perform more complex missions in difficult terrains, while fixed-wing drones have wings similar to an airplane and allow for a longer flight time and a greater range.

UAVs are publicly available on a global scale in several languages, however, there are global and regional regulations to consider, such as the FAA prohibited and restricted airspace above the DC area.

Website: conservationdrones.org

Copyright © Jeremy Holden; Cardamom Mountains, Cambodia.

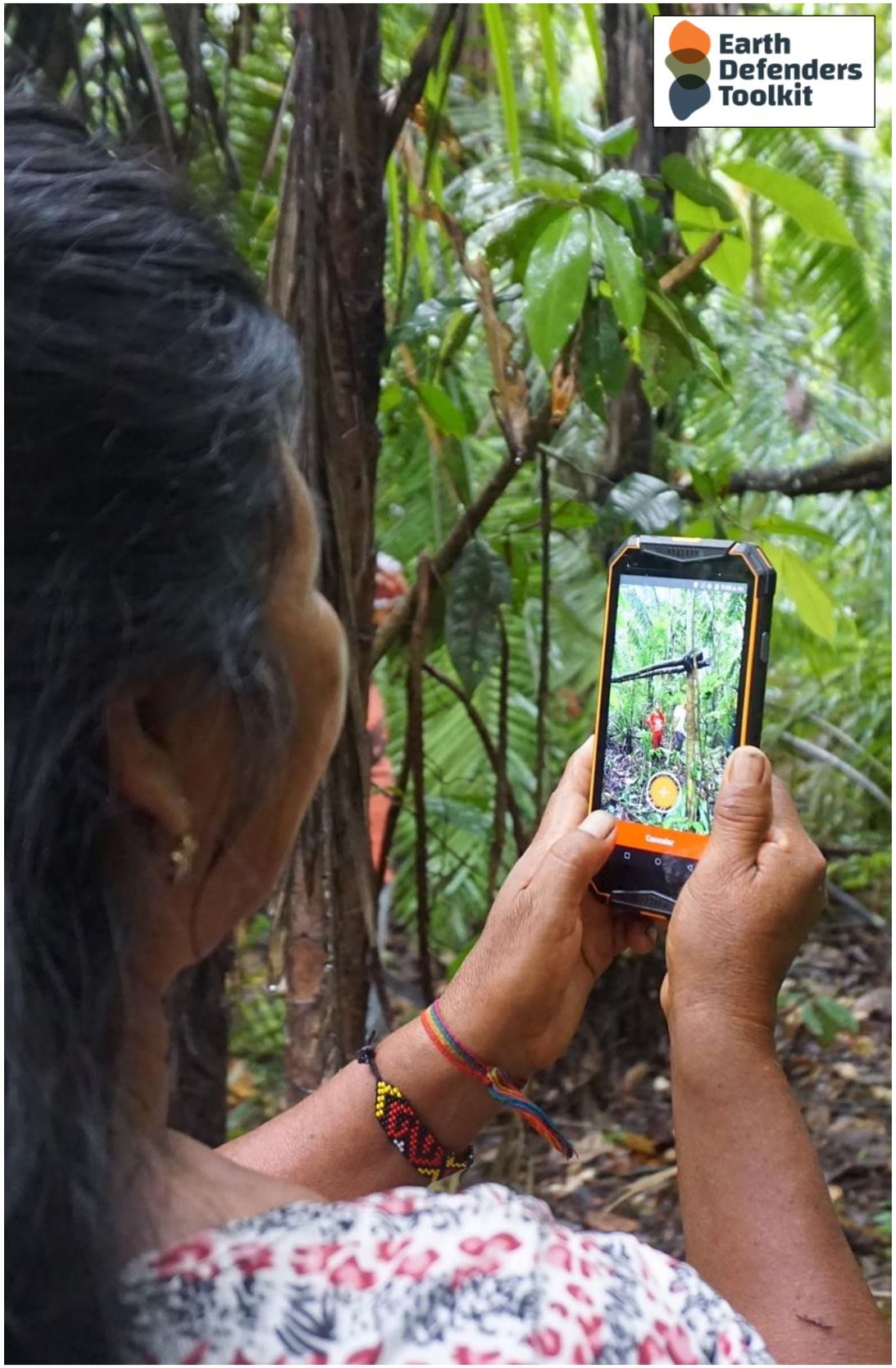


Photo credit: Digital Democracy.

EARTH DEFENDERS TOOLKIT

The Earth Defenders Toolkit is a collaborative space for Earth defenders and their allies. The Toolkit provides a growing collection of resources and training materials for communities on the frontlines of the struggle to defend critical ecosystems around the world, and community networks for users to connect and share their experiences.

The mission of the Earth Defenders Toolkit is to provide and promote approaches to using technology in a way that supports local autonomy and ownership over tools and data and reduces reliance on outside support.

The Earth Defenders Toolkit is an evolving resource and expanding community. This first version focuses on a select number of tasks and needs that partner communities facing urgent threats have highlighted as being among the most important. These include:

- Documenting & understanding rapid changes & threats to territory
- Creating maps to communicate history & connection to land
- Documenting human rights & environmental abuses
- Reinforcing local voices with concrete evidence

There is also an interactive toolfinder which helps users find the right tool by answering a few questions that are tailored to Earth defender work. Future materials will address other pressing needs, such as language revitalization and loss, environmental data collection, advocacy and storytelling, and secure offline communications.

Geographic coverage of the tool is Global, and it is available in English, Spanish, Portuguese, French, with the possibility to translate to any other language.

Website: https://earthdefenderstoolkit.com

The Earth Defenders Toolkit is a project of Digital Democracy and co-created by Alianza Ceibo, Amazon Conservation Team, Amazon Frontlines, ECA Amarakaeri, Forest Peoples Programme, Open Development Initiative, Raks Thai, and South Rupununi District Council.

FIRECAST

Conservation International's Firecast system provides timely fire and forest disturbance information from satellites, enabling government agencies, civil society organizations, and grassroots community organizations to minimize the degradation of carbon-rich and biodiverse tropical forests and other ecosystems.

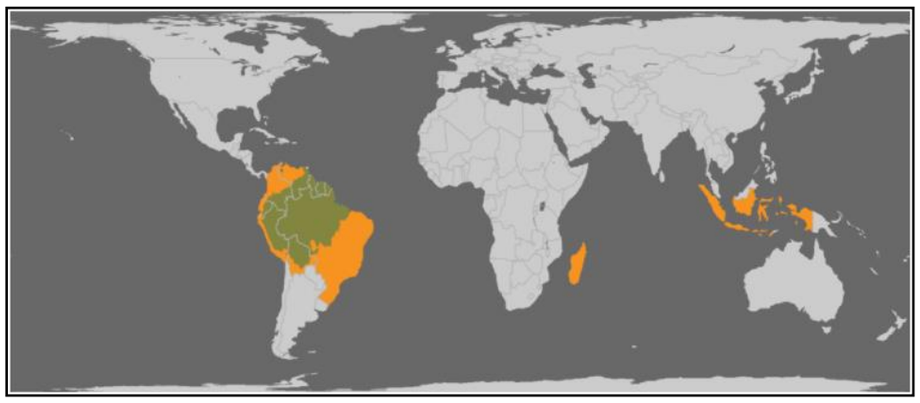
Firecast aims to improve access to and interpretability of satellite monitoring data for fires and forest disturbances by delivering customized information to decision-makers through email alerts and mobile messaging.

Firecast supports on-the-ground decisions ranging from fire management and prevention to land-use policies. On-demand queries of near-real-time fire data from Firecast's interactive dashboard provide valuable insights on ecosystem trends to support strategic land-use policies and conservation interventions.

Customized active fire alerts are available for all 9 Amazonia countries, Madagascar and Indonesia. The integrated forest disturbance alerts will be available for the Amazonia countries in September of 2021. The tool is available in English, Spanish, French, Portuguese, Indonesian.

Website: https://firecast.conservation.org/

Firecast was developed by Conservation International with support from NASA and Logi Analytics.



FIRECAST

Real-time data solutions for better land management

Firecast is...

- strategically located in seven countries based on need and capacity for local engagement;
- targeted fire-related information that can be customized to your needs to maximize its impact;
- designed in consultation with local audiences who need it most;
- translated into the languages of the countries where Firecast is used;
- an enabler for technology transfer to help nations build their capacity;
- maintained by CI for long-term stability.

Using emerging technologies and cutting-edge research, Firecast empowers users with timely and customized monitoring and forecasting information.

Firecast uses satellite observations to track ecosystem disturbances such as fires, fire risk conditions, deforestation, and protected area encroachment; and delivers this time-sensitive information to decision makers through email alerts, maps, and reports.

We aim to support in-country needs focusing on strengthened forest surveillance and monitoring, fire management and prevention, protected areas management, and sustainable land use planning. Near real-time monitoring from Firecast also provides invaluable information on ecosystem status and trends for targeting and implementing conservation efforts and measuring the success of those interventions.

Photo credit: Ashley Sullivan, Jane Goodall Institute

FOREST WATCHER MOBILE APP

The Forest Watcher mobile application enables offline use of Global Forest Watch's spatial data, so you can monitor and manage forests while in the field, directly from a smartphone. By setting up an area to monitor and downloading deforestation and fire alerts, you can take this information with you to help investigate and report on what you find, regardless of Internet connectivity.

Delivering near real-time deforestation alerts, fire alerts, and annual tree cover loss data—even when internet connectivity is poor or non-existent—Forest Watcher can be used offline to access information, verify forest loss alerts, and collect evidence of illegal logging activity.

This tool is designed for use by community forest monitors, park rangers, conservation organizations, protected area managers, journalists and environmental police who use Forest Watcher to detect areas of forest disturbance, inform their patrol routes and collect digital information about their observations.

Geographic coverage of the tool is Global, and it is available in various languages.

Powered by Global Forest Watch, the Forest Watcher mobile app is open source, free to use, and global in scope. Forest Watcher extends the power of Global Forest Watch, which brings together satellite technology, open data and human networks.

Website: https://www.globalforestwatch.org/help/forest-watcher/

This tool was developed by the Jane Goodall Institute and the World Resources Institute (WRI), with support from Google Earth Outreach.

GLOBAL FOREST WATCH

Global Forest Watch is a groundbreaking initiative to monitor the worlds' forests in near-real time. Forest monitoring designed for action, GFW offers the latest data, technology and tools that empower people everywhere to better protect forests.

Cutting edge algorithms harness the power of satellite technology and cloud computing to identify where trees are growing and disappearing. GFW offers the ability to see where forest clearing is happening in near real time or sign-up to receive automatic alerts. GFW works to help monitor biodiversity, climate, commodities, water, and fire.

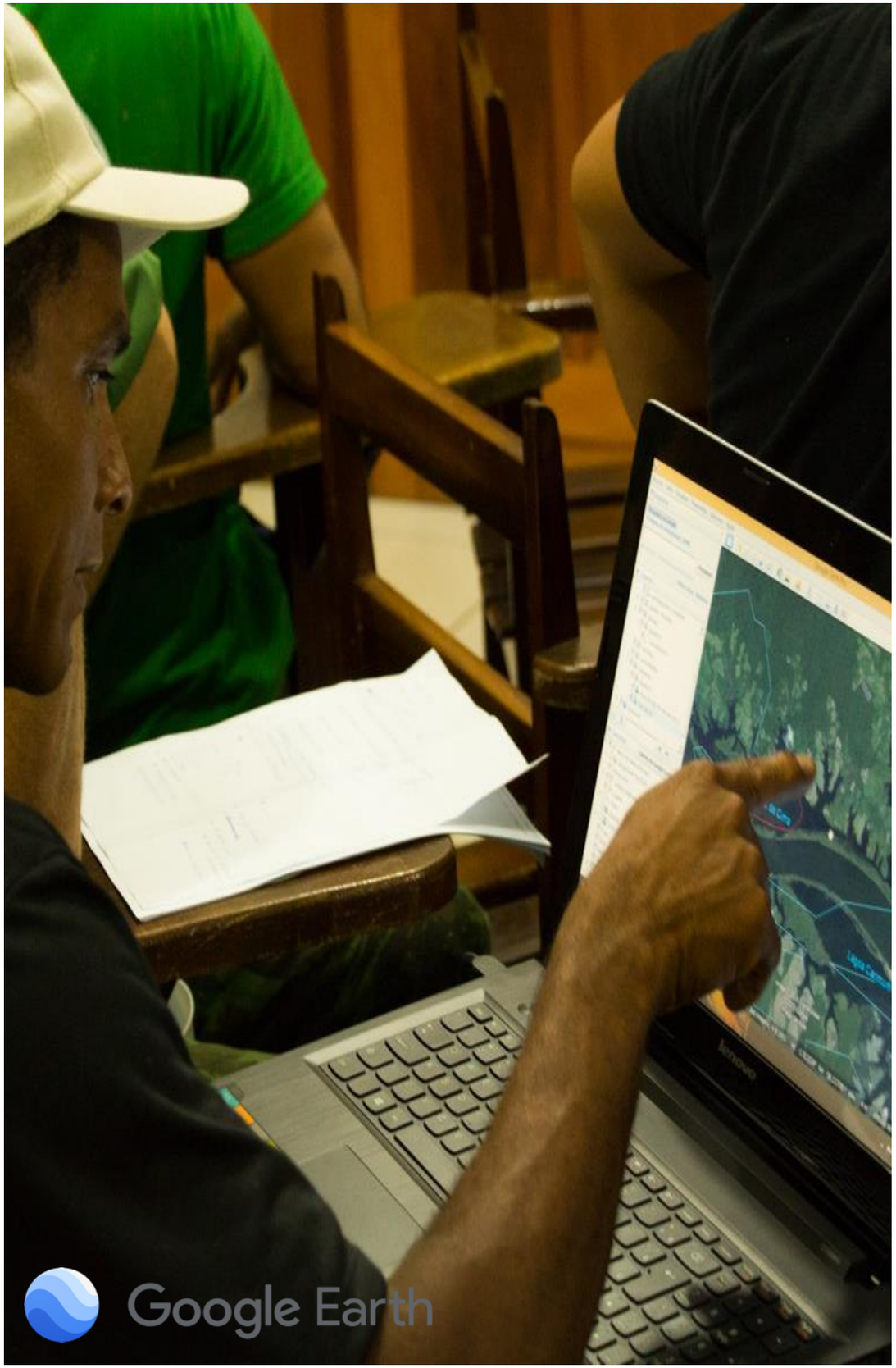
Better information supports smarter decisions about how to manage and protect forests for current and future generations. Greater transparency helps the public hold governments and companies accountable for how their decisions impact forests. Global Forest Watch data is accessed daily by governments, companies, civil society organizations, journalists, and everyday people who care about their local forests.

Thousands of people around the world use Global Forest Watch every day to monitor and manage forests, stop illegal deforestation and fires, call out unsustainable activities, defend their land and resources, sustainably source commodities, and conduct research at the forefront of conservation.

Geographic coverage of the tool is Global, and it is available in various languages.

Website: https://globalforestwatch.org

The World Resources Institute (WRI) established Global Forest Watch in 1997 as part of the Forest Frontiers Initiative. It started as a network of NGOs producing up-to-date reports about the state of forests in four pilot countries, Cameroon, Canada, Gabon, and Indonesia.



GOOGLE EARTH PRO

Google Earth Pro is a free software application you install on your PC or Mac computer, which allows you to explore the world and its rich geographic information electronically. Much of the data, including the imagery, roads, borders, and other information are stored on Google servers and the software dynamically downloads only the data you are viewing.

Google Earth is a virtual globe which maps satellite imagery, aerial photography and geographic information systems (GIS) onto a 3D sphere. Google Earth is created by piecing together millions of images taken of Earth from space.

With Google Earth Pro, you can view the world in immersive 3D, explore historical imagery, and take people on virtual visits to land and water. You can add placemarks, lines and shapes anywhere on the map, measure distances and areas, and import and overlay other geographic information such as historical maps, spreadsheets, and GIS layers.

As a free, publicly available, and easy-to-learn technology, Google Earth can be leveraged by communities for participatory mapping activities to collect, record and share community knowledge. During these activities, a mapper can take a knowledge holder on a virtual visit of the land via Google Earth and use Earth's annotation tools to record sites of significance on the map. The community can use their maps to facilitate conversations and decision-making about land management.

Geographic coverage of the tool is Global, and it is available in Arabic, Bulgarian, Catalan, Czech, Danish, German, Greek, English, Spanish, Farsi, Finnish, Filipino, French, Hebrew, Hindi, Croatian, Hungarian, Indonesian, Italian, Japanese, Korean, Lithuanian, Latvian, Dutch, Norwegian, Polish, Portuguese, Romanian, Russian, Slovakian, Slovenian, Cyrillic Serbian, Swedish, Thai, Turkish, Ukrainian, Vietnamese, and Chinese.

Website: https://www.google.com/earth/versions/#download-pro

This tool was developed by Google.

LANDMARK MAPPING DATABASE

LandMark is the first online, interactive global platform to provide maps and other critical information on lands that are collectively held and used by Indigenous Peoples and local communities (IPLCs). LandMark was developed to fill a critical gap in information on Indigenous and community land rights in the absence of existing publicly available information, many Indigenous and community lands are invisible and therefore vulnerable.

Up to 65% of the world's land is held by Indigenous peoples and communities, but only 10% is recognized by governments. The global platform is designed to help Indigenous peoples and communities protect their land rights and secure tenure over their lands by making it clear to governments, investors, and all other parties that these lands are not vacant, idle or openly available for outsiders. LandMark provides them the opportunity to be proactive in their efforts to protect their lands and not just reactive to imminent threats that often emerge without warning and with little time to respond in effective ways.

The analytical tools on LandMark support IPLCs and their supporters in estimating carbon sequestration of IPLC lands and tree cover protection over time; legal security of individual lands and within a national context; pressures faced by industrial sectors like mining, forest concessions, oil palm and dams; and others.

Geographic coverage of tool is Global, and it is available in English.

Website: http://www.landmarkmap.org/

Organizations responsible for the development of the Landmark Mapping Database include LandMark Steering Group: ILC, WRI, AMAN, CENESTA/UNINOMAD, FES, IBC, PAFID, RAISG, RFUK, RRI, and more.

Photo credit: Ghanimat Azhdari, CENESTA

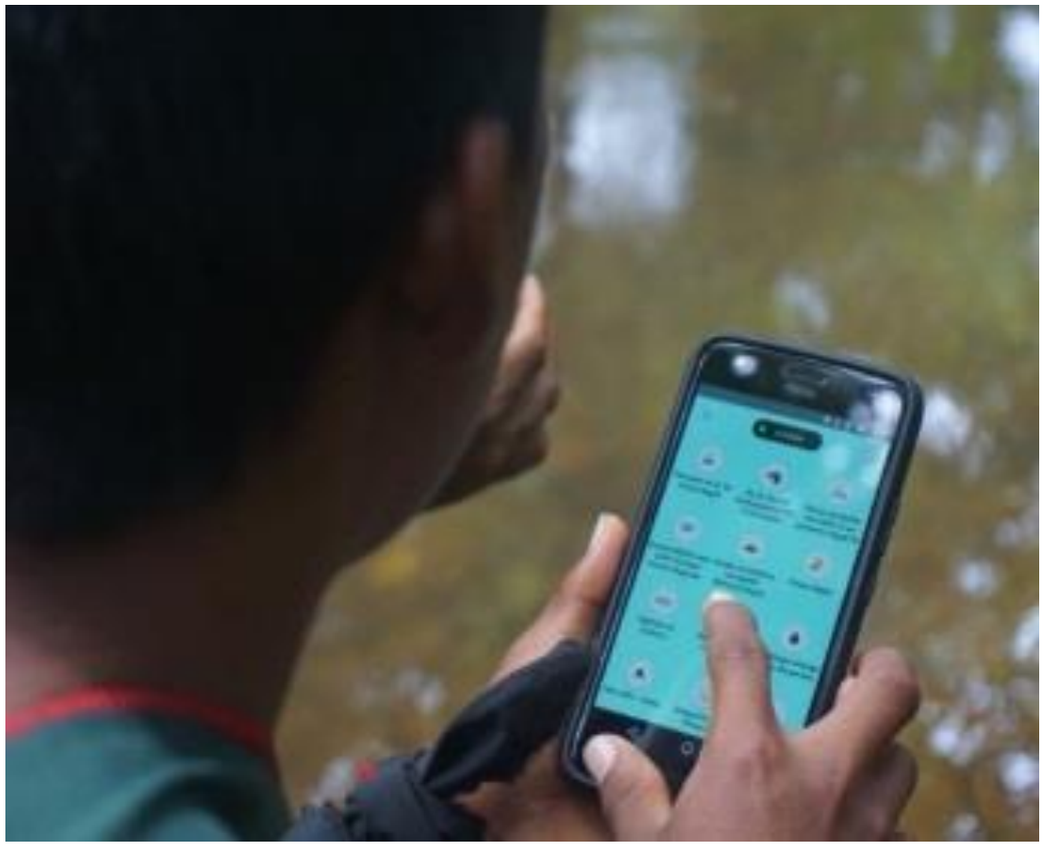


Photo Credit: Digital Democracy; Mapeo Mobile being used by the Kofan land patrol in Sinangoe, Northern Ecuador.

MAPEO MOBILE

Mapeo was built with and for earth defenders to easily document environmental and human rights information and to collect data about their land.

It can be used by individuals or by teams who want to collaborate and share information and is particularly good at working in offline and remote environments. It is simple to use, free and accessible, and can be customized with local languages and settings.

There is a Mapeo Mobile app, used to gather evidence in the field, to take photographs or record GPS points of significant places; and there is a Mapeo Desktop app, used to organize data collected on mobile or GPS, and to visualize, edit and create reports on which action can be taken which would be hard to do on a mobile. Both tools can work for individual or team projects as you can synchronize data between mobile devices, and from mobile to computer, and computer to computer.

Mapeo was co-designed and developed with Indigenous communities who face threats to their land such as illegal gold mining, oil contamination and poaching. It was built to support them to document these activities in order to take community action against them, to report them to authorities, file lawsuits, launch media campaigns, or create maps for land claims.

Mapeo can and has been used by frontline communities to support their decision making around threats to their land and territory defense. For example, if evidence of illegal activities is collected using Mapeo Mobile, then this can be shared within the community, or with local or regional representative organizations, in order to decide what actions to take. Data, including photos, GPS locations and questionnaire results can then be shared, if agreed, with external authorities, media, legal teams etc.

Mapeo can also be used to support internal community decisions about landuse, such as resource management plans, where existing resources can be mapped out and zones can be drawn with wide community participation.

Geographic coverage of tool is Global and it can be translated into any language. Currently Mapeo Mobile is available in Burmese, Dutch, English, French, German, Hindi, Indonesian, Khmer, Malay, Nepali, Portuguese, Spanish, Swahili, Thai, and Vietnamese.

Website: https://www.mapeo.app/

Codeveloped by Digital Democracy with indigenous partners in the Amazon, including Achuar, Cocama, Harakbut, Kofan, Kichwa, Matsiguenka, Siekopai, Wapichana, Waorani and Yine peoples.

SAPELLI

Sapelli was created after a working with non-literate BaYaka hunter-gatherers in Congo and discovering that no appropriate tools were available for resource conservation mapping. Sapelli makes data collection as easy as possible by enabling a pictorial interface, whereby participants can simply press on icons to take data points and media. The aim of Sapelli is to extend the limits of inclusion to any community, anywhere, by being highly configurable and as adaptable as possible (text can be included if desired, as well as videos, websites, and audio tags for icons), and in some communities Sapelli interfaces are being created with icons designed by participants themselves who also have the final say on the overall user interface. Data can be sent automatically to an online GIS platform or downloaded directly from the device.

The tool was developed by the Extreme Citizen Science group (ExCiteS) at University College London and is available for Android phones free on the Google Play store. The methodology of extreme citizen science is encouraged; this centers on a process of free, prior, and informed consent (FPIC) and co-design alongside participants, ensuring that a genuine bottom-up approach is achieved which prioritizes local concerns and knowledge rather than those of the researchers, and data sovereignty by communities.

The idea behind Sapelli is for ultimate adaptability, so what data is taken and what it's used for is entirely up in the air. There are a huge variety of ongoing projects around the world using Sapelli, some run by the ExCiteS group and others independently run, although most often these relate to conservation, natural resource management, or biocultural heritage. In Africa, for example, Sapelli is being utilized by Indigenous and local communities to report wildlife crime and territory invasions, engage in ecological and climatic monitoring, record human-wildlife conflicts and botanical knowledge, and document human rights abuses and spiritual ceremonies, amongst many other uses. Based on the decisions of each community, such data is often forwarded on to collaborating NGOs or government bodies who use the maps to gain spatial insights on what is happening on the ground. This is a powerful process which can empower participating communities and transform collaborators into more just, open, community-led approaches.

Geographic coverage of the tool is Global, and it is available in English or French. The user interface can be text-free.

Website: http://www.sapelli.org

This tool was developed by Extreme Citizen Science research group (ExCiteS), University College London. Each Sapelli project is designed bespoke by facilitators and/or community members.

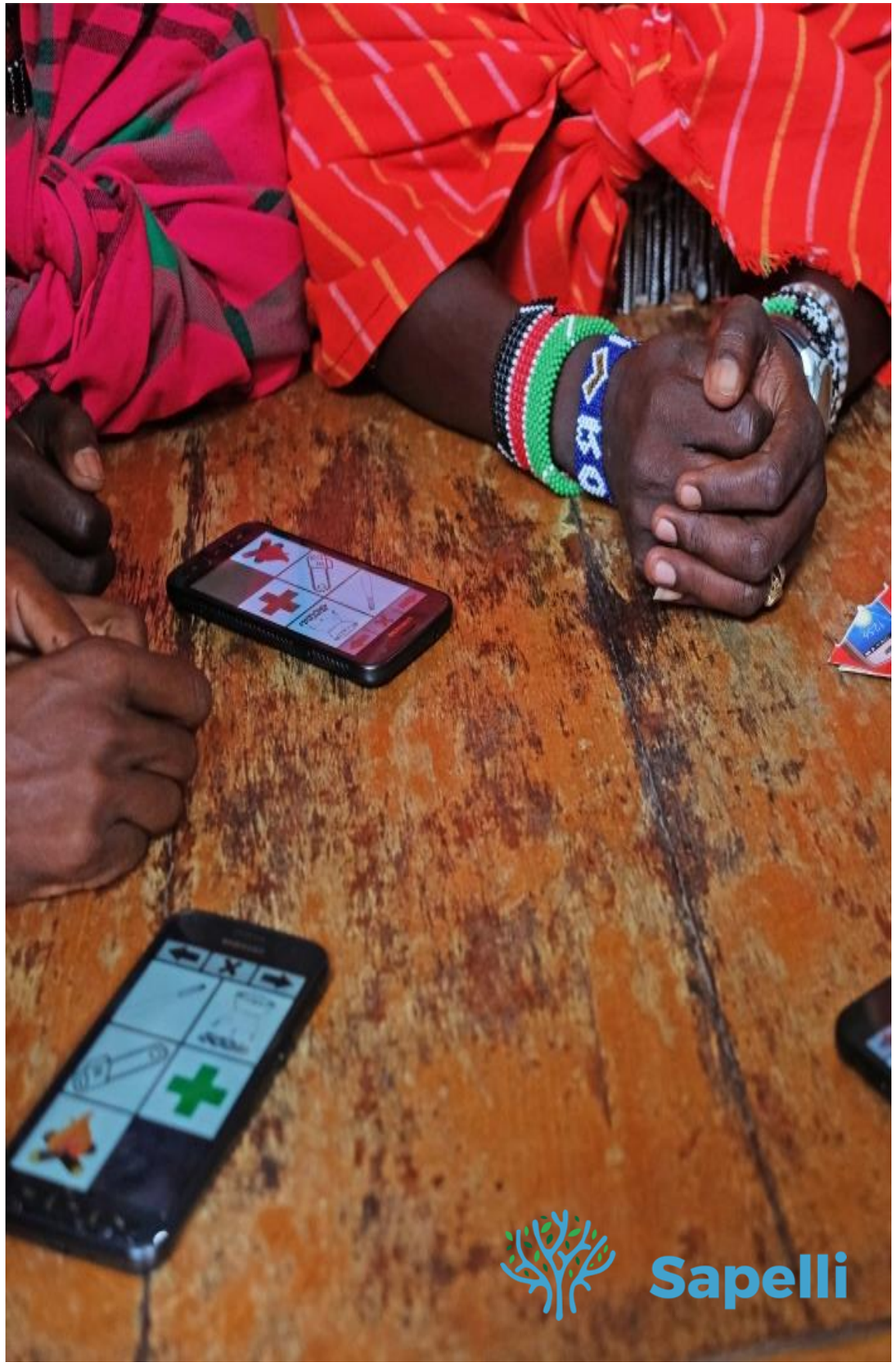


Photo credit: Megan Laws

Photo credit: Amazon Conservation Team

TERRASTORIES

Terrastories is an application for communities to map, protect, and share stories about their land. It can be used by individuals or communities who want to connect audio or video content to places on a map. It is designed to be user-friendly and fun to interact with, allowing community members to freely explore without needing any technical background.

Terrastories began when a team of geographers and software developers decided to start building Terrastories to help a community in South America map their place-based oral histories. The Matawai Maroons of Suriname, a community of formerly enslaved Africans who fled into the forests over three centuries ago and reside there today, wanted to map oral histories about when their ancestors first arrived in these lands (read more about the Matawai and their story here). The community leaders were interested in having a tool that helps the young people get to know these places, their history, their culture, and who they are as a people. Terrastories was built to accommodate that need, which the team also heard about from other Indigenous communities across the globe.

If you have maps of your land, and oral histories you want to add to it, then Terrastories could be a good tool for your needs. Another perspective is that since Terrastories is basically a media content management system built on top of a map, it can be used to map any kind of media content that has a relationship with a place.

Geographic coverage is Global, and the tool is available in English, Spanish, Portuguese, Dutch, Japanese; possibility to translate to any other language.

Website: https://terrastories.io/

Terrastories is a volunteer-stewarded open-source application. Organizations that have supported the development of Terrastories include Ruby for Good, Amazon Conservation Team, Mapbox, Tech Matters, and Digital Democracy.

UN Biodiversity Lab

The UN Biodiversity Lab (UNBL) provides access to global public data on people and the planet in new ways to generate insight and impact for conservation and sustainable development. Our mission is three-fold: (1) to democratize access to spatial data and analytic tools as a global public good; (2) to support decision-makers to leverage spatial data for insight, priority-setting, and implementation; and (3) to empower stakeholders to use spatial data for monitoring and reporting.

The platform provides the ability for users to:

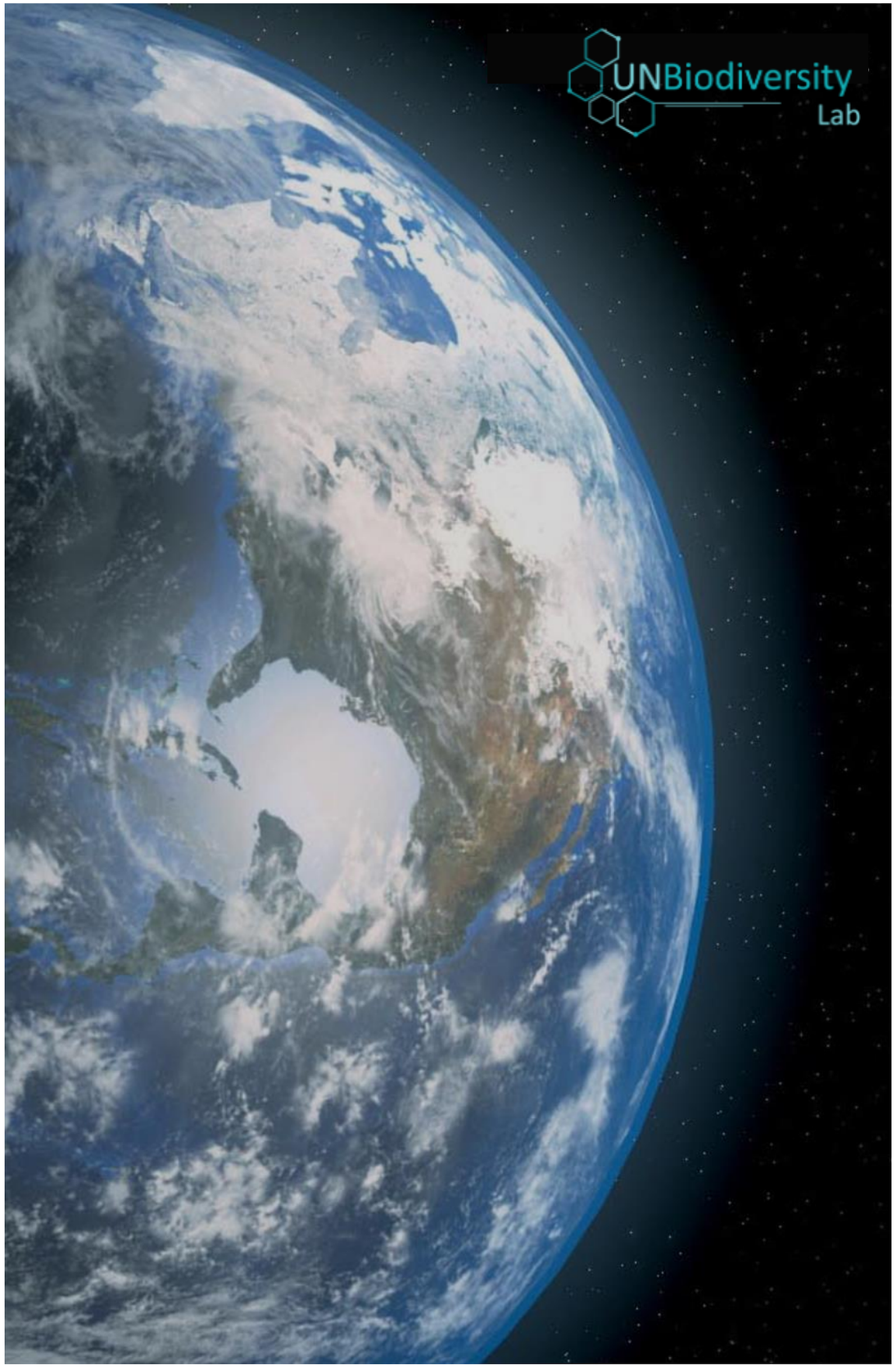
- Visualize core global public good datasets at the heart of decision-making on nature and sustainable development
- Access curated collections that integrate spatial data for insight and action
- View and download dynamic indicators of change for any country in the world
- Create workspaces to securely upload national data and analyze it alongside global data
- Develop communities of practice that nurture data transparency and cross-sectoral collaboration
- Draw on the expertise of UNBL partners to develop national strategies and plans
- UNBL is a free, open-source environment that does not require any previous GIS experience.

UNBL is designed to support diverse stakeholders to plan, monitor, and report on the state of nature in their country. Originally launched to support the production of Sixth National Reports to the Convention on Biological Diversity, UNBL has evolved to support implementation and reporting for the CBD post-2020 Global Biodiversity Framework and the 2030 Agenda for Sustainable Development.

UNBL offers over 400 data layers with global coverage. In addition, users can create their own UNBL workspace where they can upload regional, national, or sub-national data layers in a secure, password-controlled space. It is available in English, French, Portuguese, Spanish, Russian

Website: www.unbiodiversitylab.org

Convening partners: Global Environment Facility (GEF), Secretariat of the Convention on Biological Diversity (CBD), United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), and the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC). Technical partners: Impact Observatory (IO), NASA, and the United Nations International Computing Centre (UNICC). Donors: Ministry of Foreign Affairs of Denmark, Government of Flanders, the GEF, Gordon and Betty Moore Foundation, Microsoft, One Earth, the Swedish International Development Cooperation Agency (Sida), and the Swedish Postcode.



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Additional Resources

Fire and Forest Monitoring

- Global Forest Change — https://earthenginpartners.appspot.com/
- Fire Information for Resource Management System (FIRMS) — https://earthdata.nasa.gov/

Illegal Extractives

- Map for Environment — https://mapforenvironment.org
- Rainforest Connection — https://rfcx.org/

Land Tenure

- Human Footprint — https://wcshumanfootprint.org/