Collect Earth Online

INTELLIGENCE REPORT

Based on User Feedback

May 2021

On this page: The Challenge | The Solution | Executive Summary | Key Findings

ABOUT COLLECT EARTH ONLINE

THE CHALLENGE

Given the pace and extent of land cover change across the globe and widespread concern about climate change, governments and other landowners have implemented policies to better understand how land is being used—an endeavor for which tracking and mapping is crucial.

However, gaining access to land cover data, acquiring the software required to stay on top of land monitoring, and interpreting remotely sensed data traditionally required expensive infrastructure and expertise. Additionally, the manual collection of field data involved made the process time consuming.

THE SOLUTION

To address these challenges, a group of organizations collaborated to reimagine the current land classification and monitoring process, and create Collect Earth Online (CEO), cloud-based software that's open and accessible to all.

Collect Earth Online (CEO), enables users to efficiently collect up-to-date data about their environment, see changes over time, and use data to implement and enforce conservation policy. The software promotes consistency in locating, interpreting, and labeling reference data plots, as well as an intuitive, web-based collection interface that enables multiple users to contribute to labeling the landscape. Additionally, users gain access to multiple sources of satellite imagery for any location on Earth.

EXECUTIVE SUMMARY

CEO was developed to help organizations across the world detect the effects of deforestation, forest degradation, crop loss, and other changes in land use that negatively impact the environment. Using CEO, users gain an accurate picture of what's happening on the ground, as well as the ability to detect changes in near real time. Best of all, CEO is free and accessible to all through a web-based platform.

In order to better understand CEO users, the impact our software enables, and to gauge overall satisfaction levels with the product, the CEO team conducted a survey of its user base in March 2021. This document reports the results of that survey.

Survey respondents reported that access to high-resolution and near-real-time satellite imagery, such as that provided by Planet and Norway's International Climate & Forests Initiative (NICFI), was the most important feature in CEO, while collaborative, web-based data collection was the second most important.

Key findings include:

88+

CEO is used to power initiatives in more than 88 organizations and governments around, including the Association for the Conservation of the Amazon Basin, NASA's Jet Propulsion Laboratory, World Agroforestry, World Resources Institute, and the governments of the Democratic Republic of the Congo, Botswana, and Nepal.

Survey respondents reported that access to high-resolution and near-real-time satellite imagery was the most important feature in CEO, while collaborative, web-based data collection was the second-most important.

Remarkable use cases were reported. Example use cases include: understanding emission levels in the Peruvian Amazon and in the Commonwealth of Dominica; understanding land cover types in Nepal; understanding the impacts of mining and other industry on vegetation and protected tree species in South Africa; assessment of forest resources in Madagascar and Kenya - and many more.

Users offered praise for the tools and technical support offered by the CEO development team. They also offered many suggestions for improvements. Based on feedback, we developed a list of most requested features that we're committed to implementing over time, including editing questions in surveys.

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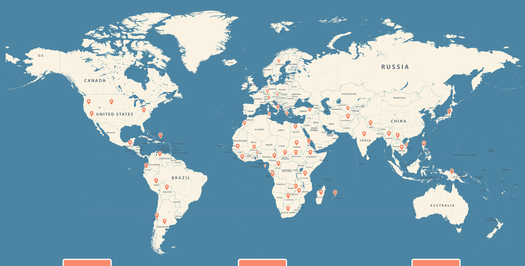
Understanding CEO Users

On this page: Organizations | Sector | Job Titles | Additional Users | Software | Ability to Use CEO On-Demand

ORGANIZATIONS

110 CEO users from 58 countries across the globe submitted feedback through our recent survey.

Representing a truly international user base, survey respondents reported that they use CEO within 88 organizations worldwide.



110 CEO Users

88 Organizations Worldwide

58 Countries

SECTOR

The CEO administrators who participated in our survey work across 13 sectors.

- Climate Change
- Agriculture
- Scientific Research
- Government
- Education/Academia
- Forestry/Agroforestry
- Geohealth
- Water resources
- Environment
- Ecosystem
- Land Cover
- REDD+ (Reducing Emission from Degradation and Deforestation)

JOB TITLES

Titles held by survey respondents fall into three categories: academics, technical experts, and scientists.

ACADEMICS

- Academic Staff
- Assistant/Associate Professor
- Assistant Research Officer
- Instructor, Science Lead for Land Cover in GLOBE Observer (app)
- Teacher/Lecturer
- Student/Phd
- Professor of Forestry
- Researcher/Lecturer

TECHNICAL EXPERTS

- Data Processing Specialist
- Data Science Associate
- Remote Sensing Expert
- Geoinformation Officer
- Geospatial Specialist/Coordinator
- GIS and Remote Sensing Analyst/ Officer/Specialist
- Chief of Laboratory
- Mapping and Inventory Officer
- Project/Technology Manager
- Remote Sensing and Geoinformation Analyst
- Remote Sensing Technician
- Spatial Planning and GIS Manager
- Spatial Platforms Tech Lead
- MRV Specialist
- Survey Officer

SCIENTISTS

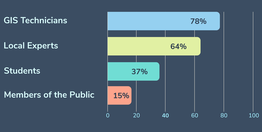
- Senior Scientist
- Science Lead for land cover in GLOBE Observer citizen science project
- Ecologist
- Agroforestry Engineer
- Chief Forester: NFA Regulations
- Forest Engineer
- Forest Inspector
- Forestry Officer/Forest Research Officer/Forestry Technical officer
- Illegal Logging Program Specialist
- Deputy Director of Land Planning
- Dam and Diversion Unit Head
- Chief Engineer of Water and Forests

DATA COLLECTORS

What types of users collect data for your projects?

Administrators often rely on collaborative input, or community science, to collect the data they need on the ground. According to respondents, the vast majority of data is contributed to projects by GIS technicians (77.9%), followed by local experts (63.7%), students (36.3%), and members of the public (15.0%).

- Forest Rangers
- Forest Scientists
- Research Assistants
- In-house Experts
- Faculty
- Senior Experts
- Government Agencies



SOFTWARE USED FOR DATA ANALYSIS

After data has been collected in CEO, what type of analysis do you perform?

After collecting data from CEO, survey respondents use GIS desktop tools, coding environments, and a variety of software programs to perform analysis.

Among other things, users were looking to:

- "Produce land cover."
- "Assess forest degradation."
- "Perform nearest-neighbor analysis."
- "Perform zonal statistics to extract remote sensing signatures."
- "Provide summaries across ecological areas."
- "Provide summaries across ecological areas."
- "Validate the accuracy of change detection."

CODING LANGUAGES AND ENVIRONMENTS

GIS DESKTOP TOOLS

ArcMap
ArcGIS
QGIS
TerrSet
SAGA
ENVI
ERDAS IMAGINE

LANGUAGES

GEE
Python
SPSS
R

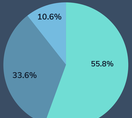
OTHER SOFTWARE

SAIKU
Google Earth
Microsoft Excel
Visioterra
SEPAL

ABILITY TO USE CEO ON-DEMAND

How stable is your internet connection?

Of survey respondents, slightly more than half (55.8%) have consistent access to the internet. About one third (33.6%) have intermittent access, and 10.6% have a very unstable connection. Unsteady internet access, as you'll see later in this report, is a driving factor for a commonly requested feature: the ability to work in CEO offline.



- Stable internet access
- Intermittent /Spotty internet access
- Very Unstable internet access

Product Feedback

On this page: Satisfaction Levels | Technical Support | Product Feedback | Favorite Feature | Improvements & Feature Requests

SATISFACTION LEVELS

What is your current level of satisfaction with CEO?

85.9% of survey respondents reported being "very" or "somewhat" satisfied with the CEO user experience.

While the majority of survey respondents report being satisfied, we value all user feedback, and plan to follow up directly with the 16 users who reported a neutral or below experience.

Overall, our users are satisfied with the level of technical support they receive from the CEO team.

86%
"Very" or "somewhat" Satisfied

48% Very Satisfied | **38% Somewhat Satisfied** | **13% Neutral** | **0.8 % Unsatisfied**

TECHNICAL SUPPORT SATISFACTION

What is your satisfaction level with the technical support available to you when using CEO?

Have you been able to get help troubleshooting using our manuals and training?

"Very satisfied. I received excellent support by email. I also used the manuals. Thanks!"
- Pedro Vivar, Geospatial Analyst, FRA2020 RSS

"Both the manuals and the training are useful for beginner and intermediate users."
- Milagros Becerra, Project Assistant, Conservación Amazónica – ACCA, SERVIR-Amazonia

"Satisfied. I was able to troubleshoot using the manuals."
- Yunuen Reygadas Langarica, Post-doc Research Associate, University of Richmond, SERVIR-Amazonia Applied Science Team

"Excellent, I helped the team identify one bug which was patched quickly."
- Muhammad N Ahmad, Spatial Platforms Tech Lead, World Agroforestry

PRODUCT FEEDBACK

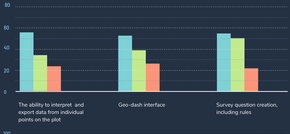
Please indicate how important each of the below features are to you

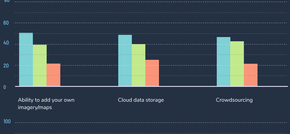
(1=very important; 2=important; 3=not important).

Survey respondents found access to high-resolution and near-real-time satellite imagery the most important feature in CEO. Access is courtesy of the government of Norway, which contracted with Kongsberg Satellite Services (KSAT), Planet, and Airbus to make this imagery available. The project is part of Norway's International Climate & Forests Initiative (NICFI), an effort to stop deforestation and save the world's tropical forests while offering sustainable pathways to economic development.

Collaborative, web-based data collection was the second-most important feature, followed by user-defined sampling design and the ability to interpret and export data from individual points on the plot.

Rounding out the top five is the Geo-Dash interface, which leverages Google Earth Engine to calculate important metrics for each plot.





FAVORITE FEATURE

What is your favorite feature within CEO? How does this feature help you?

Elaborating on their favorite features, users pointed to ease of use of the software over traditional methods of land classification and monitoring. Through access to high resolution imagery and easy to understand visual analysis of land use change, users report that they're able to make fast decisions, even if they aren't trained in remote sensing. They report saving time with the ability to sample and label in our browser-based environment, and appreciate that no specialized software is required.

ACCESS TO HIGH-RESOLUTION AND NEAR-REAL-TIME SATELLITE IMAGERY

"Geo-dash interface - It helps to use various information like Google Earth, NDVI value from Landsat and Sentinel Imagery."
- Amul Kumar Acharya, Assistant Research Officer, Forest Research and Training Centre, Ministry of Forests and Environment, Nepal

"The dashboard. It easily shows statistics and data across time."
- Leizel Dela Cruz, Data Processing Specialist, Protect Wildlife, Philippines

"The ability to perform a visual interpretation on high and medium resolution images, such as NICFI Planet, and complement it with time series, which allow us to accurately monitor land cover and land use change."
- Freddy Argotty, Agroforestry Engineer, General Directorate of Climate Change and Desertification, Peru

"Ability to access high resolution time series imagery, like what is available from the NICFI Planet data. It helps the interpreter make fast decisions.
- Hout Naborey, Chief of Office, Ministry of Environment, Cambodia

"Web-based, multi-user, satellite images - no specialized software or data required."
- Kevin Dawes, Researcher, University of Sydney

"Having the different images available in one place, and being able to use these images even if the people are not heavily trained in remote sensing."
- Trina Isorena, Protect Wildlife, Spatial Planning and GIS Manager, Philippine

My favorite feature is the one that allows you to align Radar and Optical images at the same time to bypass the cloud cover. Also, the ability to view images in several spatial resolutions. These functions really help me make a good photo interpretation."
- Tanougong Armand, GIS and Remote Sensing Officer, FOKABS, Cameroon

The integration with PLANET time-stamped imagery, and the integration of GEE data to help understand the past status of LU/LC."
- Rodrigo Torres, GIS Coordinator, EcoCiencia, SERVIR-Amazonia, Ecuador

"The ability to copy from an existing project is really handy."
- Naiara Pinto, Scientist, Caltech / NASA Jet Propulsion Laboratory, SERVIR-Amazonia Applied Science Team

"Project duplication saves me time."
- Pedro Vivar, Geospatial Analyst, FRA2020 RSS

"Sampling and labeling. It saves time with other software to have this in a browser based environment."
- Peder Nelson, Instructor, Science Lead for Land Cover in GLOBE Observer, Oregon State University

"The interface, which is easy to use."
- Sebastian Dueñas Oviedo, Remote Sensing Technician, Ministry of the Environment and Water of Ecuador

"Integration of multiple data sources, and the web access."
- Phoebe Oduor, Thematic Lead Land Use Land Cover, Regional Center for Mapping of Resources for Development, SERVIR E&S Africa (Kenya)

IMPROVEMENTS AND NEW FEATURE REQUESTS

Any improvements to current functionality or additional functionality that you would like to see us make?

You asked, we listened. Below are user requested features that we're committed to adding to CEO over time.

EASE OF USE

- Continue improving ease of use for survey and project creation, including editing questions in surveys.
- Allow drawing and uploading polygons to define project AOIs
- Offer additional languages
- Improve ability to edit Geo-Dash widgets
- Add the ability to access CEO while offline

IMPROVED DATA EXPORT

- Download the sample and plot boundaries using shapefiles (SHP)
- Add metadata to exported imagery

COLLECTING PLOTS

- Enable Quality Control verification of collected plots
- Add comments to collected plots

Impact on the Ground

On this page: Goals & Objectives | Actions Taken | Use Case |

GOALS AND OBJECTIVES

What are the most important things your organization wants to understand about the land you classify and monitor?

While the majority of survey respondents report being satisfied, we value all user feedback, and plan to follow up directly with the 16 users who reported a neutral or below experience.

Respondents indicated they rely on CEO to help them understand how land is being used currently and to view change over time.

Using satellite images, including date-stamped imagery of the Tropics provided by Planet and funded and funded by NICFI, users can zoom in to get a picture of what's happening on the ground.

Having near real-time insight enables timely detection of degradation, deforestation, and potential illegal activity.

63 (55.8%)
How land is being used

105 (92.9%)
Land use/cover dynamics

83 (73.5%)
When forest or other environmental degradation has occurred

75 (66.4%)
Understand the current LU/LC composition

ACTIONS TAKEN

What are the most important things your organization wants to understand about the land you classify and monitor?

Users leverage CEO to understand what's happening on the ground, develop compelling reports, and promote effective land use monitoring and conservation policy.

UNDERSTAND

- Analyze losses and gains in forestland
- Validate land cover change
- Create reforestation plans and environmental conservation plans
- Build capacity, sensitize the community

REPORT

- Report results to authorities and NGOs
- Use data to communicate findings to policy makers
- Report compliance with IPCC for the UNFCCC greenhouse gas inventory for AFOLU, Forest Reference levels, REDD+ results, NDCs for AFOLU
- Report LU/LC to the government to drive land use/forest management development strategy and decision
- Account for the carbon reduction performance in the REDD+ projects, and write reports to be submitted to verifiers
- Report to the MEAs, especially for Climate Change & Land Degradation

TAKE ACTION

- Promote effective monitoring of licensed and unlicensed area
- Prevent environmental degradation
- Guide forest restoration processes
- Implement REDD+ Strategy
- Create forest policy and legislation
- Create state programs for land monitoring
- Enforce policy for land protection
- Detect illegal activity
- Reform policies, laws, and legislation
- Train students to enable a new, technologically-empowered generation to create positive impacts on land use planning

USE CASE

Please provide a short overview of how you are using (or have used) CEO to better understand your land and the objectives it helped you meet.

More than 100 users submitted detail on the ways in which they use CEO to understand land usage, view land change over time, and enable timely and effective decisions for improved resource management. Below are 20+ quotes from users detailing how they use CEO to drive impact on the ground, across the globe.

"We used CEO for the development of the historical analysis of deforestation (2010-2019) for the Forest Reference Emissions Level (FREL) of the Peruvian Amazon."
- Freddy Argotty, Agroforestry Engineer, General Directorate of Climate Change and Desertification, Peru

"I have been using CEO for data collection on different land covers types of Nepal. It helped me to increase the sample plots. Data collection in the field is rather difficult in the case of Nepal due to tough geographic terrain. Therefore, CEO proved to be very useful for me."
- Dipesh Kumar Sharma, Assistant Research Officer, Forest Research and Training Centre of Nepal

"I work in the arid region of South Africa, but mining and renewable energy facilities causes large-scale clearing of natural vegetation and loss of thousands of protected tree species. With CEO I could detect change over time."
-Jacoline Mans, Chief Forester; NFA Regulations, Department of Environment, Forestry and Fisheries (South Africa)

"In 2019, we used CEO during the Global Forest Resources Assessment to collect data in Madagascar. There are four ecoregions in Madagascar: humid forest, dry forest, spiny forest and mangroves. For the 22 administrative subdivisions of the country, we interpreted the satellite images in CEO. Now, CEO is being used to estimate the carbon reduction performance in the context of REDD+ projects and also, to generate statistical data on Madagascar's national forest cover and this since the year 2018."
-Carole Andrianirina, Chief of Laboratory, Ministry of Environment and Sustainable Development, BNCCREDD+ Madagascar

"We are using CEO as a tool for citizen scientists to monitor and ground-truth land cover."
- Michael Jabot, SUNY Distinguished Professor, Science Education, SUNY Fredonia

"We use CEO to prepare our NFI REDD+ Grid to calculate our National Forest Reference Level & National Emission for the AFOLU Sector."
- Bradley Guye, Forest Research Officer, Dominica Forestry, Wildlife & Parks Division, Commonwealth of Dominica

"We use CEO to monitor forest cover changes and examine the location of cleared forest land."
- Pak Chealy, Deputy Director, Forestry Administration, Cambodia

"We're able to know the trends in terms of LU/LC, degradation, and the dynamics involving land/forest for a timely, effective and economical decision making for a better resource management."
- Kioko Nzioka, Geo-Information Officer, Kenya Forest Service

"During a NASA funded summer internship for high school students to learn about remote sensing and connect their ground reference photos to the satellite view. Also highlighted the tool for students to use in Trees Around the GLOBE student research."
- Peder Nelson, Instructor, Science Lead for Land Cover in GLOBE Observer, Oregon State University

"We use CEO to collect information for the six IPCC land use categories and the 36 possible transitions between one class to the other at national level for a long period of time (10-30 years). We also use it to interpret drivers of biomass losses by degradation and conversions, for example: logging, fires, hurricane path, etc."
- Eloise Guidi, Coalition for Rainforest Nations

"We use CEO to perform photo interpretation of land use classes in our target landscapes."
- Tanougong Armand, GIS and Remote Sensing Officer, FOKABS, Cameroon

"We used CEO for assessing forest degradation dynamics in South Cameroon."
- Tatiana Nana, MRV specialist, REDD+ Coordination, Ministry of Environment, Cameroon

"We use Collect Earth Online for land cover and land use information and data collection within the context of the creation of an Inventory of Forest, Pastoral and Olive Growing Resources in Tunisia."
- Karem Saad, Junior Expert in Forestry and Natural resources, FAO Subregional Office for North Africa (Tunisia)

"We use CEO to collect ground truthing data via visual interpretation."
- Sovann Chansophaktra, Lecturer on Environmental Science, Royal University of Phnom Penh, Cambodia

"We will use CEO for monitoring and oversight of illegal activities in natural protected areas."
- Victor Miyakawa, Program Manager, USAID-USFS Forest, Peru

"We have collected data using this tool for land cover classification from 2000-2018. This tool has saved time and money as we no longer need to go into the field, and it even makes it possible to collect data for past years."
- Sajana Maharjan, Remote Sensing and Geoinformation Analyst, ICIMOD, SERVIR HinduKush Himalaya

"CEO information helps us to confirm new hot spots of mining activities. In addition, one of the advantages of CEO and its visualization is that it enables quick interpretation by non GIS specialists, local decision-makers, and users who are not experts in visual interpretation."
- Milagros Becerra, Project Assistant, Conservación Amazónica – ACCA, SERVIR-Amazonia

"CEO has been instrumental in the acquisition of plot level data on land cover and woody and herbaceous cover. By this has been useful for a variety of our projects involving mapping vegetation in African savannas."
- Julius Anchang, Research Assistant Professor, Plant and Environmental Sciences, New Mexico State University

"We have been using CEO for a national-scale, systematic, sample-based visual assessment of land cover in Nepal. We also used CEO to validate earlier results where estimates of forest cover has been wrongly interpreted, or where stakeholders wanted more information about the drivers of land cover change. I coordinated the department's project to conduct this national land cover assessment."
- Shiva Khanal, Researcher, Ministry of Forests and Environment, Nepal

"We want to understand the dynamics of forest degradation and trends in how land is being used at provincial and municipal level in the Philippines. This will help in prioritizing areas where limited funds are needed to protect remaining forests or assist in the restoration of the other parts where it is needed."
- Trina Isorena, Spatial Planning and GIS Manager, Protect Wildlife, Philippines

Partnerships

PARTNERSHIPS

Collect Earth Online was developed with input, resources and funding from the following organizations:

SERVIR is a joint development initiative of NASA and USAID. SERVIR works in partnership with leading regional organizations world-wide to help developing countries use information provided by Earth observing satellites and geospatial technologies for managing climate risks and land use.

FAO is a specialized agency of the United Nations that leads international efforts to defeat hunger and improve nutrition and food security.

This interagency program was launched by the US Government, and is focused on enhancing tropical forested countries' capacity to monitor, measure, and report carbon. SilvaCarbon is implemented by the US Forest Service and the US Geological Survey with funding from the US Agency for International Development and the US Department of State.

Norway's International Climate & Forests Initiative: NICFI is an international development fund dedicated to helping save the world's tropical forests and improving the livelihoods of those who live off, in, and near these forests.

Planet is a mission-driven aerospace and data analytics company, imaging the full Earth daily in order to make global change visible, accessible, and actionable. In September 2020, Planet, KSAT, and Airbus were awarded a contract by Norway's Ministry of Climate and Environment to provide high-resolution satellite monitoring of the world's tropics in support of Norway's International Climate and Forests Initiative. The resulting NICFI Data Program provides comprehensive <5m resolution Planet Basemaps of the tropics to all users helping reduce and reverse tropical forest loss.

Google Earth Engine combines a catalog of satellite imagery and geospatial datasets with planetary-scale analysis capabilities. Using Google Earth Engine, scientists, researchers, and developers detect changes, map trends, and quantify differences on the Earth's surface.

SIG is an environmental think-tank consultancy with expertise in turning geospatial data into actionable knowledge.

SIG-NAL is a nonprofit organization established in 2012 that uses science to connect economic and environmental interests by accounting for the full value of natural assets.