

Ecological Conservation

Biodiversity and Ecosystems

Introduction to the Integration of Animal Tracking and Remote Sensing



Animals are sentinels of environmental change, and animal telemetry is a commonly used tool to quantify habitat use and help understand environmental changes. NASA data can be used to characterize the environmental parameters that infer the habitats that animals use. This training provides participants with an overview of animal tracking sensors, NASA's history of animal tracking, NASA's Internet of Animals project, and the types of remote sensing data that can be paired with animal telemetry.

Introductory
2025

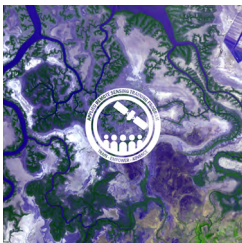
Invasive Species Monitoring with Remote Sensing



This training highlights project-based applications of remote sensing for plant species of interest, especially those affecting grasslands, aquatic inland lakes, and waterbodies, and more, with a lens towards innovative uses of hyperspectral data for additional invasive species detection.

Introductory
2024

Evaluating Ecosystem Services with Remote Sensing



This training outlines the basics of ecosystem services and natural capital accounting. It also provides an overview of how Earth Observations (EO) can be used to support global frameworks and initiatives such as standards set by the United Nation's System of Environmental Economic Accounting (UN-SEEA). Case-study examples are provided to highlight locally specific efforts such as valuation of native pollinators, urban ecosystem accounts, valuation of coastal resilience and coral reef habitats, and forest conservation and carbon sequestration.

Introductory
2022

Using the UN Biodiversity Lab to Support National Conservation and SDGs



There is a global demand for more NASA ARSET trainings focused on biodiversity, conservation, the UN Sustainable Development Goals (SDGs), and how to link NASA satellite data to ecological and human-influenced systems. This training aims to fill that gap by extending the influence of this NASA-supported tool and increasing its dissemination, use, and overall success. UN Biodiversity Lab makes global datasets on biodiversity and sustainable development easily accessible, supporting our broad audience.

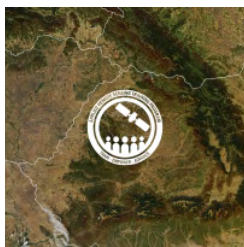
Introductory
Multilingual (Sp., Fr.)
2020



Ecological Conservation

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Understanding Phenology with Remote Sensing



This training focuses on the use of remote sensing to understand phenology: the study of life-cycle events. Phenological patterns and processes can vary greatly across a range of spatial and temporal scales, and can provide insights about ecological processes like invasive species encroachment, drought, wildlife habitat, and wildfire potential.

Introductory
2020

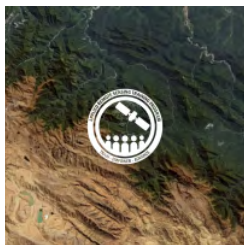
New Sensor Highlight: ECOSTRESS



This webinar focuses on a NASA instrument that was launched and installed on the International Space Station in Summer 2018. Designed to study terrestrial ecosystems and plant water stress from the ISS, ECOSTRESS can also be used to better understand crop health, volcanoes, urban heat, wildland fires, coastal systems, and much more.

Introductory
2019

Earth Observations for Indigenous-Led Land Management



This introductory training shares lectures, case studies, and demonstrations with representatives of indigenous peoples' organizations and focuses on how Earth observations (EO) data and tools can provide spatial information for forest monitoring, mapping, and responding to ecosystem threats. This series helps attendees strengthen their technical capacities to use EO data and tools to enhance their sustainable land management practices.

Introductory
Bilingual (Spanish)
2019

Remote Sensing for Conservation and Biodiversity



Conservation and biodiversity management play important roles in maintaining healthy ecosystems. Earth observations can help with these efforts. This online training introduces participants to the use of satellite data for conservation and biodiversity applications. The training will highlight specific projects that have successfully used satellite data.

Introductory
2019



Ecological Conservation

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Introduction to Remote Sensing for Scenario-Based Ecoforecasting



Assessing the ecological impacts of a changing climate is crucial for natural resource management decision-making. NASA Earth observations can be used to help make these decisions. This four-part training series, in collaboration with the USGS North Central Climate Center, includes an overview of the satellites, sensors, and tools relevant to ecological forecasting; available climate products and data for ecological modeling; scenario planning; and the application of modeling for species distribution and state-and-transition simulations.

Introductory
2017

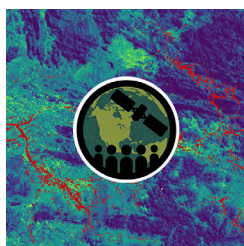
Introduction to Remote Sensing for Conservation Management



This training series focuses on regional and global observation resources for conservation management. It provides a basic overview of remote sensing, tools for accessing and visualizing relevant NASA Earth science data, and case study applications for utilizing these tools for conservation management. The target audience for this series are NGOs (national and international) focused on conservation and biodiversity issues.

Introductory
2015

Species Distribution Modeling with Google Earth Engine



This course begins by introducing key species distribution modeling (SDM) concepts for participants working in ecology, conservation, or wildlife biology. The course then provides a basic introduction to Google Earth Engine (GEE) and JavaScript coding, before moving on to spatial data manipulation and example workflows for species distribution mapping in GEE.

Intermediate
2026

Estimating Biomass and Change with GEDI and the OBIWAN API



This intermediate training introduces key concepts in carbon monitoring, including system requirements, decision-making needs, and the concept of additionality. Participants learn how the OBIWAN application builds on GEDI's model-based statistical framework and underlying data infrastructure to generate biomass change estimates, along with associated uncertainties, for user-defined areas and time periods. The training also covers validation approaches, including the use of U.S. Forest Service inventory data.

Intermediate
Bilingual (Spanish)
2026



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Biodiversity and Ecosystems

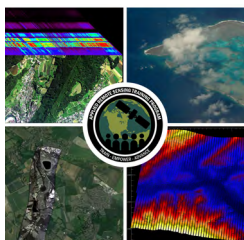
Spaceborne Lidar for Monitoring Vegetation Structure and Biomass using GEDI



This two-part, bilingual (English and Spanish) training builds on a fundamental understanding of light detection and ranging (lidar), including its strengths, limitations, and distinguishing characteristics compared to other active and passive remote sensing observations. A central focus of the training is NASA's Global Ecosystem Dynamics Investigation (GEDI) mission, a novel spaceborne lidar sensor that began collecting data in April 2019.

Intermediate
Bilingual (Spanish)
2025

Biodiversity Applications for Airborne Imaging Systems



This training series highlights the use of hyperspectral Visible to Shortwave Infrared (VSWIR) imaging spectroscopy data for measuring and monitoring terrestrial and aquatic biodiversity and focuses on using thermal and LiDAR data for characterizing the structure and function of ecosystems using airborne campaigns. This training prepares participants to use data from upcoming NASA satellite missions and airborne campaigns.

Intermediate
2023

Using the UN Biodiversity Lab to Monitor the Pulse of the Planet



This training focuses on using remote sensing and geospatial data within the NASA-supported UN Biodiversity Lab (UNBL) to take action on national conservation and sustainable development priorities. With over 400 of the world's best global data layers on biodiversity, ecosystem services, and sustainable development, UNBL enables decision-makers and policymakers to access essential global data, upload national datasets, and calculate dynamic indicators for any area of interest, all without any background in remote sensing and GIS.

Intermediate
Multilingual (Sp., Fr.)
2022

Species Distribution Modeling with Remote Sensing



SDMs contextualize future scenarios based on known or projected ecological parameters and are the cornerstone for adaptive management planning around short- and long-term changes to complex landscapes. This training provides an overview of SDMs, shows how to use remote sensing data for landscape characterization, and highlights multiple Applied Sciences projects that have developed tools for conducting SDM for a variety of ecosystems.

Intermediate
2021



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Remote Sensing for Freshwater Habitats



This webinar series guides participants through using NASA Earth observations for habitat monitoring, specifically for freshwater fish and other species. This training also provides a conceptual overview, as well as the tools and techniques for applying landscape environmental variables to genetic and habitat diversity in species.

Intermediate
2019

Airborne Data Applications for Invasive Species Mapping

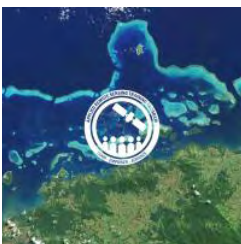


This one-part training introduces airborne and in situ field data applications for invasive species mapping utilizing datasets acquired during the BioSCAPE campaign in South Africa. This training is a collaboration between ARSET and the Oak Ridge National Laboratory (ORNL) DAAC.

Advanced
2025

Coastal and Oceans

Monitoring Aquatic Vegetation with Remote Sensing



This training combines basic information on the remote sensing of AVs, spectrometry of aquatic/coastal vegetation, and a demonstration of the NASA-funded Floating Forests citizen science tool.

Introductory
Bilingual (Spanish)
2022

Remote Sensing for Mangroves in Support of the UN Sustainable Development Goals



This training focuses on mapping and monitoring mangroves and how it relates to UN sustainable development indicator 6.6.1: Change in the extent of water-related ecosystems over time. Indicator 6.6.1 is used in determining progress toward meeting Sustainable Development Goal 6, which is to "Ensure availability and sustainable management of water and sanitation for all."

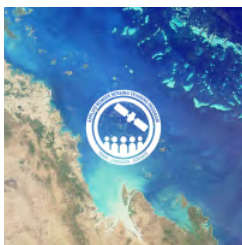
Introductory
2020



Ecological Conservation

Coastal and Oceans

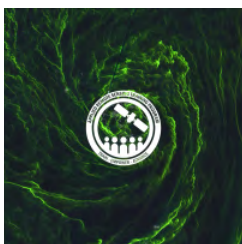
Remote Sensing of Coastal Ecosystems



Coastal and marine ecosystems serve key roles for carbon storage, nutrients and materials cycling, and serve as reservoirs of biodiversity. They also provide ecosystems services such as sustenance for millions of people, coastal protection against wave action, and recreational activities. Users, particularly those with little remote sensing experience, stand to benefit from this training covering some of the difficulties associated with remote sensing of coastal ecosystems, particularly beaches and benthic communities such as coral reefs and seagrass.

Introductory
Bilingual (Spanish)
2020

Introduction to Remote Sensing for Coastal and Ocean Applications

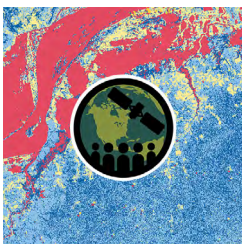


In this intermediate training, participants are provided with an overview of remote sensing for coastal and ocean applications. This includes a background in aquatic remote sensing, data access and tools for processing and analyzing imagery, and examples and live demonstrations of tools that have been developed for NASA and partner organizations. This training covers data products from MODIS, VIIRS, HICO, and other sensors commonly used for ocean applications.

Intermediate
2016

Land Cover and Change Detection

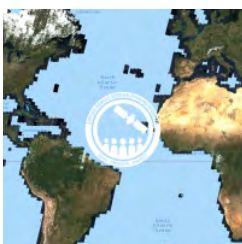
Visualizing Land Cover and Land Use Change with NASA Satellite Imagery



This training covers some of the ways that we can use NASA data to determine what is happening on the ground and how that changes over time. Participants see examples of supervised and unsupervised classification models implemented in the R statistical coding language, and improve their understanding of how these models can be used to produce maps and metrics of LCLUC.

Intermediate
2026

Using Google Earth Engine for Land Monitoring Applications



This training covers the GEE Code Editor, hands-on exercises on change detection, time series analysis, land cover classification, and accuracy assessment of optical imagery. These processes are an integral part of optical imagery analysis for many applications, including monitoring forest disturbance, wildfire mapping, identifying land cover degradation, mapping ecosystem connectivity, and identification of land surface changes due to urban growth.

Intermediate
2021



Ecological Conservation

Land Cover and Change Detection

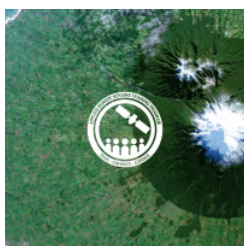
Remote Sensing of Land Indicators for Sustainable Development Goal 15



In this training, participants learn how to access and apply satellite data relevant to land indicators, such as estimating total forest area and forest change. The training includes an overview of the SDGs, as well as an introduction to image classification and change detection.

Intermediate
2017

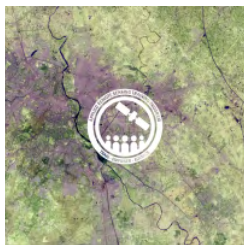
Remote Sensing of Forest Cover and Change Assessment for Carbon Monitoring



In this training, participants are provided with an overview of carbon monitoring for terrestrial ecosystems. This includes background information about the Intergovernmental Panel on Climate Change (IPCC), Greenhouse Gas (GHG) inventories, the United Nations Framework Convention on Climate Change (UNFCCC), and development of the Reducing Emissions from Deforestation and Degradation (REDD+) program. This training covers products from Landsat, MODIS, Sentinel, and other sensors commonly used for land management applications.

Intermediate
2016

Remote Sensing for Monitoring Land Degradation and Sustainable Cities SDGs



In this training, attendees learn to use a freely-available QGIS plugin, Trends.Earth, created by Conservation International (CI). It includes special guest speakers from the United Nations Convention to Combat Desertification (UNCCD) and UN Habitat. Trends.Earth allows users to plot time series of key land change indicators. Attendees learn to produce maps and figures to support monitoring and reporting on land degradation, improvement, and urbanization for SDG indicators 15.3.1 and 11.3.1.

Advanced
Bilingual (Spanish)
2019

Investigating Time Series' of Satellite Imagery



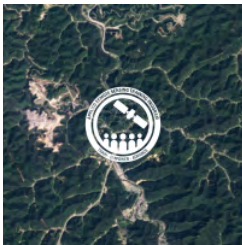
This training focuses on two tools, AppEEARS from the LPDAAC, and LandTrendr via Google Earth Engine (GEE). AppEEARS enables users to integrate point or polygon ground-based data with satellite imagery. The GEE implementation of LandTrendr enables users to analyze land cover dynamics, including short-term disturbances and long-term trends.

Advanced
2019

Ecological Conservation

Land Cover and Change Detection

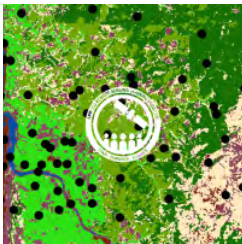
Change Detection for Land Cover Mapping



This advanced training focuses on using satellite imagery to map changes in land cover. Attendees learn change detection methods, including image subtraction and classification. They also conduct their own change detection analysis. This training uses QGIS, the R statistical program, and the Random Forest algorithm.

**Advanced
2018**

Accuracy Assessment of a Land Cover Classification



The next step to using land cover classifications is being able to evaluate the performance of a land cover map using accuracy assessments. This training equips attendees with the skills necessary to conduct an accuracy assessment on a land cover map and identify which classes might be misrepresented.

**Advanced
2018**

Land Cover Classification with Satellite Imagery



Land cover classification is an important first step to assessing land cover and land use. This advanced training provides lectures and hands-on activities focused on using satellite imagery for land cover classification. In two four-hour sessions, attendees learn how to acquire Landsat imagery, display it in an open-source Geographic Information System (GIS), analyze spectral signatures of land cover types, and conduct a supervised land cover classification.

**Advanced
2017**



Ecological Conservation

Spectral Indices

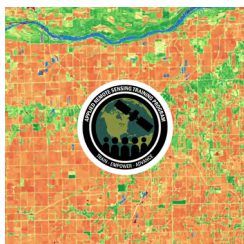
Calculating Spectral Indices for Land and Aquatic Applications using QGIS



This one-part, bilingual training provides an overview of spectral indices for land and aquatic applications as they are calculated within QGIS. Specifically, this training begins with an introduction to the Normalized Difference Vegetation Index (NDVI), along with its calculation, uses, and applications in diverse thematic areas (agriculture, disasters, etc.). We also review many additional land- and aquatic-based indices.

Introductory
Bilingual (Spanish)
2025

Spectral Indices for Land and Aquatic Applications

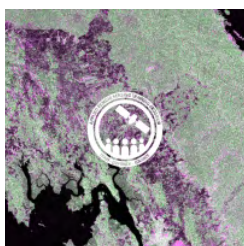


This training provides an overview of spectral indices for land and aquatic applications. Not only do these sessions discuss the correct circumstances under which to use these indices, but participants also take part in hands-on indices calculation over relevant study areas.

Introductory
2023

Synthetic Aperture Radar (SAR)

Forest Mapping and Monitoring with SAR Data



This advanced training series introduces participants to 1.) SAR time series analysis of forest change using Google Earth Engine (GEE), 2.) land cover classification with radar and optical data with GEE, 3.) mapping mangroves with SAR, and 4.) forest stand height estimation with SAR.

Advanced
Bilingual (Spanish)
2020



Ecological Conservation

Other

Connecting Citizen Science with Remote Sensing



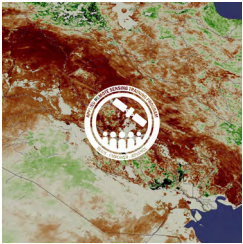
This training provides attendees an overview of citizen science efforts that use Earth Observations, and shows how to engage with community members in a supportive and meaningful manner to achieve project goals. Attendees are also provided with case-study examples of successful citizen science projects, with some examples from NASA supported projects and activities.

Introductory

Bilingual (Spanish)

2023

Remote Sensing of Drought



Prolonged drought can result in economic, environmental, and health-related impacts. In this training, participants learn how to monitor drought conditions and assess impacts on the ecosystem using precipitation, soil moisture, and vegetation data. The training provides an overview of drought classification, as well as an introduction to web-based tools for drought monitoring and visualization.

Advanced

2017

