



**WELCOME TO  
NASA APPLIED REMOTE SENSING TRAINING  
(ARSET)  
WEBINAR SERIES**

**INTRODUCTION TO REMOTE SENSING FOR  
CONSERVATION MANAGEMENT**

**COURSE DATES: EVERY TUESDAY, MAY 5 – JUNE 2**

**TIME: 12:00 – 1:00 PM EDT (GMT-04:00)**

**OR**

**10:00 – 11:00 PM EDT**



# Course Structure

- This is the final week!
  - Every Tuesday May 5 to June 2
  - 12:00 – 1:00 PM EDT (GMT-04:00) (Session 1)
  - 10:00 – 11:00 PM EDT (Session 2)
  
- Webinar recordings, PowerPoint presentations, and homework assignments can be found after each session at:  
<https://arset.gsfc.nasa.gov/ecoforecasting/webinars/introduction-remote-sensing-conservation-management>
  
- Certificate of Completion
  - Attend 4 out of 5 webinars
  - Assignment 1 and 2 – access from the ARSET Conservation Management webinar website (above)
  - You will receive certificates approximately 1 month after the completion of the course from:  
[marines.martins@ssaihq.com](mailto:marines.martins@ssaihq.com)
  
- Course survey
  - Will provide link at end of session today and allow for approximately 10 minutes to complete.
  
- Q/A: email ([cynthia.l.schmidt@nasa.gov](mailto:cynthia.l.schmidt@nasa.gov))



# ARSET Conservation Management

The screenshot shows the ARSET (Applied Remote Sensing Training) website. The header includes the NASA logo, the text 'ARSET Applied Remote Sensing Training', and navigation links for 'Earth Science Division', 'Applied Sciences', and 'ASP Water Resources'. A search bar is located on the right. Below the header is a navigation menu with categories: 'DISASTERS', 'ECO FORECASTING', 'HEALTH & AIR QUALITY', and 'WATER RESOURCES'. The main content area is titled 'Introduction to Remote Sensing for Conservation Management' and includes the following information:


- Course Dates:** 05/05/2015 to 06/02/2015
- Course Dates:**
  - Five 1-hour sessions, each session will be held two times a day to allow for national and international participation from different times zones.
  - Each Tuesday from May 5 - June 2 at 12:00-1:00pm and at 10:00-11:00pm (GMT-04:00) Eastern Time (US and Canada)
  - Please only sign up for and attend one of the session times.
- Course Objectives:**
  - Provide an overview of remote sensing, details on how to access and visualize relevant NASA Earth science data, and how to use these data for conservation and biodiversity issues.
  - Assist NGOs and land management professionals in decision-making through the use of NASA data, relevant tools, and assessment methods.
- Course Participants:**
  - This course is intended for national and international NGOs and land managers at the local, state, and federal level, focused on conservation and biodiversity issues. **Space is limited. Preference will be given to the organization types listed above.**
- Course Agenda:**
  - Week 1 (May 5): Overview of remote sensing and conservation applications
  - Week 2 (May 12): Satellite sensors and aircraft platforms and access tools
  - Week 3 (May 19): Habitat monitoring
  - Week 4 (May 26): Animal movement
  - Week 5 (June 2): Near-real time monitoring
- All training materials will be available in English and Spanish.
- Certificates will be provided for those who attend 4 out of 5 weeks (of the same session time) and complete all homework assignments.**
- Register for one of the session times below:**  
[Click here to register for the 12:00-1:00pm \(EDT\) session](#)


<https://arset.gsfc.nasa.gov/ecoforecasting/webinars/introduction-remote-sensing-conservation-management>



# Accessing the Recordings

ADOBE® CONNECT™ 🕒 TimeZone (US/Pacific-New) ▼

**ARSET**  
Applied Remote Sensing Training 



Event Info | **Event Registration**

**RS for Conservation Management Week 2 Recording**  
In case you have not registered for this event before [please click here to register](#)

Login using Email

E-mail Address:

Login



You must register to access the recordings!  
This is different from your webinar registration.



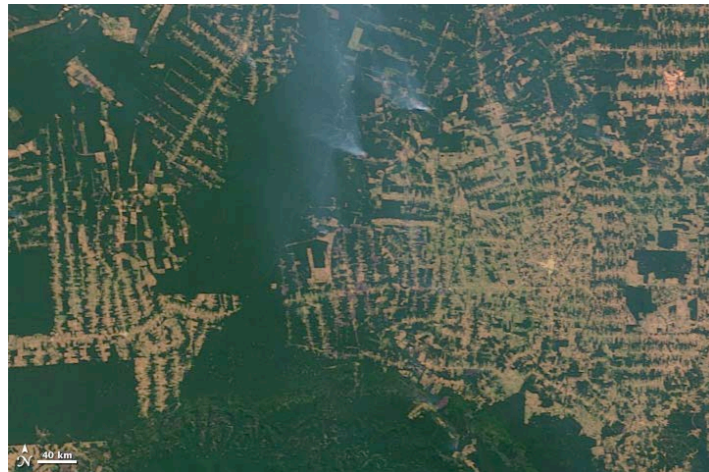
# Your Course Instructors

- ❑ Cindy Schmidt (ARSET): [cynthia.l.schmidt@nasa.gov](mailto:cynthia.l.schmidt@nasa.gov)
- ❑ Amber Kuss (ARSET): [amberjean.m.kuss@nasa.gov](mailto:amberjean.m.kuss@nasa.gov)
- ❑ Guest Speakers:
  - ❑ Walter Jetz – Yale University (week 3)
  - ❑ Jeff Cavner – University of Kansas (week 4)
  - ❑ Karyn Tabor – Conservation International (week 5)

General inquiries about ARSET: Ana Prados (ARSET)  
[aprados@umbc.edu](mailto:aprados@umbc.edu)

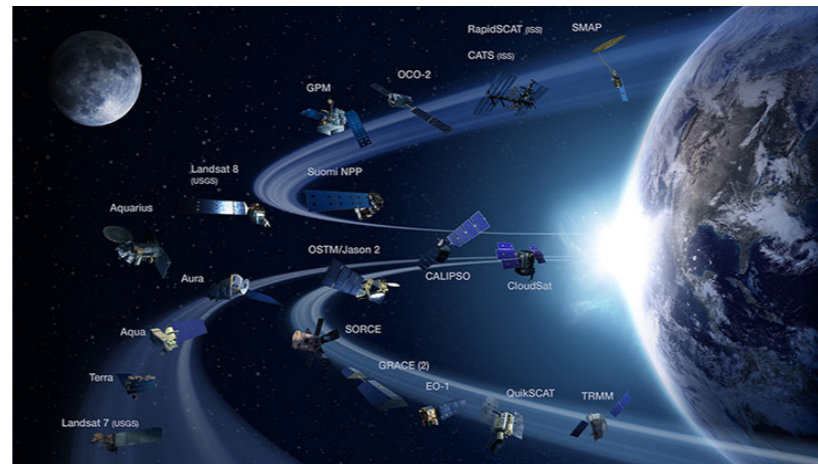
# Course Outline

## Week 1



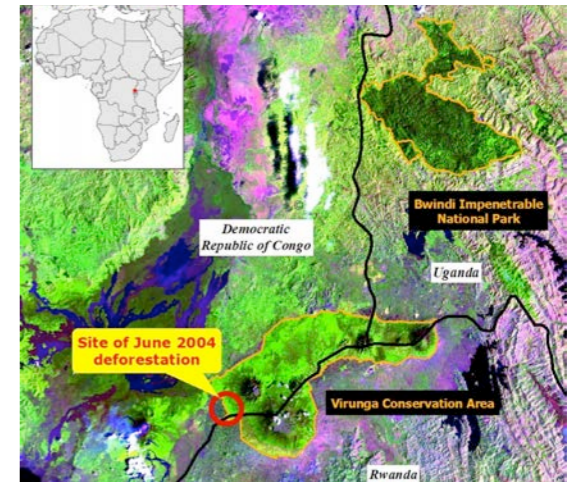
Overview of satellite remote sensing

## Week 2



Platforms and sensors for conservation

## Week 3



Habitat monitoring

## Week 4



Animal movement

## Week 5



Near-real time data



# Week 5 Agenda

- Review of Week 4
- Guest Speaker: Karyn Tabor, Director of Ecosystem Modeling and Early Warning Systems at Conservation International
  - Overview of near real-time (NRT) monitoring
  - Overview of satellite sources of NRT monitoring
  - How NRT monitoring is used in conservation
    - Governments
    - Communities
    - Conservation organizations
  - Examples of uses in forest systems
  - Live demo
    - Firecast
  - Survey information and link



# Review of Week 4



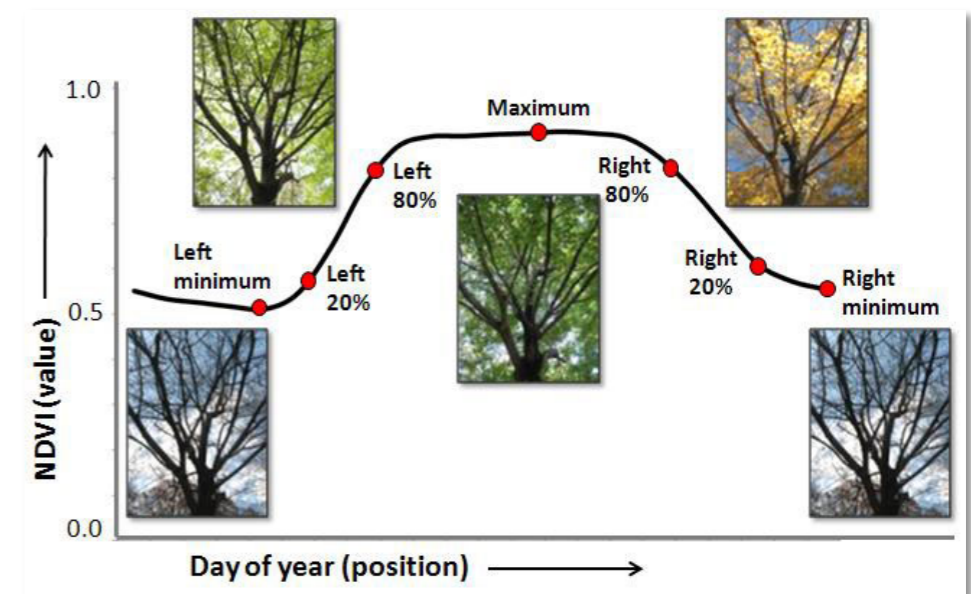


# Remote Sensing and Animal Movement

- Remote sensing can capture characteristics about the environment at different scales
  - Animal locational data are combined with remote sensing data
  - Determine why and when animals move
- Uses of vegetation indices (NDVI and EVI) to track phenology
- Movebank
  - Online database of animal tracking data
- Live demo
  - Lifemapper: Jeff Cavner, University of Kansas



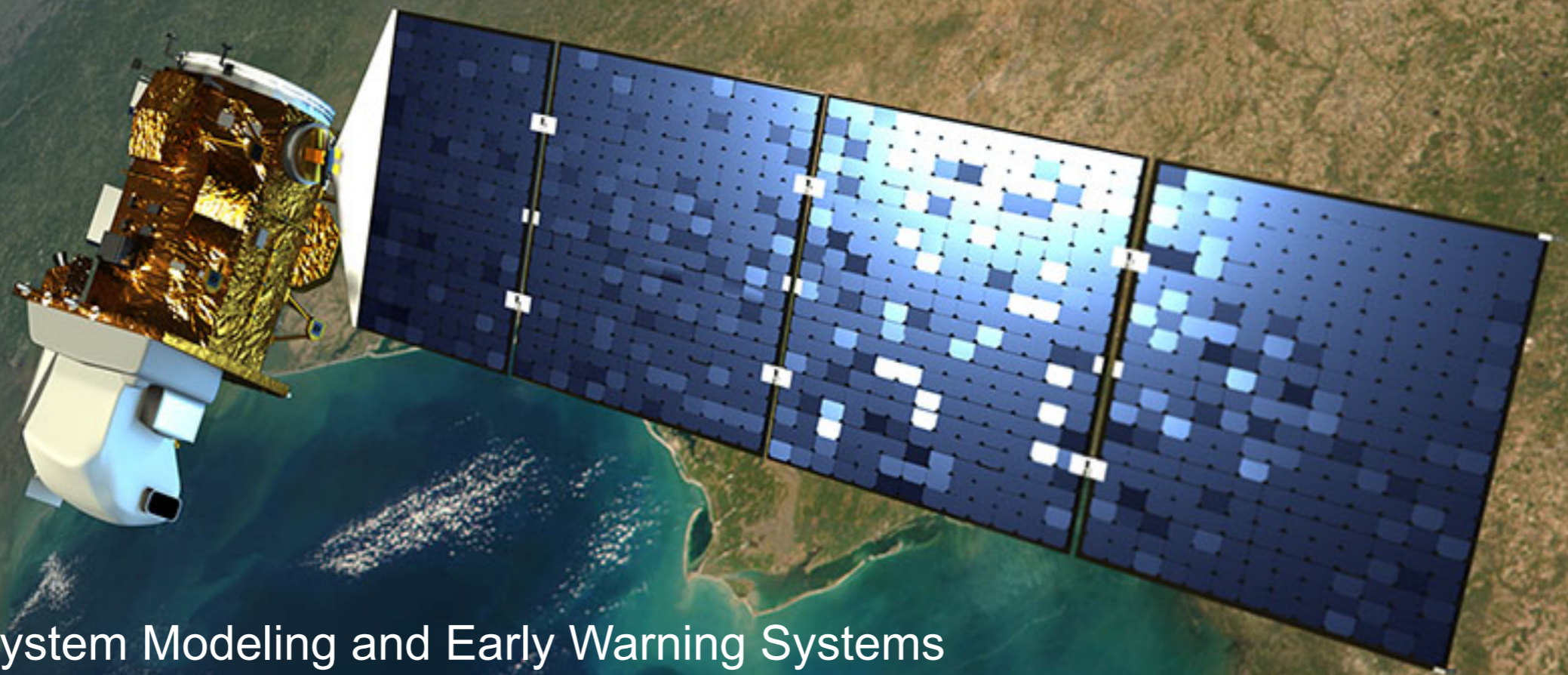
Wildebeest migration, Image credit: tanzaniaonfoot.com (left) Elizabeth Gordon (right).





Guest Speaker: Karyn Tabor

# Near real-time monitoring for conservation management



Karyn Tabor

Director of Ecosystem Modeling and Early Warning Systems

Betty and Gordon Moore Center for Science and Oceans

Conservation International

Arlington, VA USA

[ktabor@conservation.org](mailto:ktabor@conservation.org)

An aerial photograph showing a vast, dense forest with a uniform green canopy. The trees are packed closely together, creating a textured, mosaic-like appearance from above. The lighting is bright, highlighting the vibrant green of the foliage.

# Objective

*To learn how to use near real-time monitoring and alert systems to track and extinguish emerging threats to forests, natural resources, and communities.*



# Outline

1. What is Near Real-Time (NRT) monitoring
2. Review of NRT satellite-derived sources
3. How NRT monitoring is used for conservation
4. Examples of NRT forest monitoring systems
5. Choosing the right NRT monitoring system
6. Demonstration of Firecast

An aerial photograph showing a vast, dense forest with a uniform green canopy. The trees are packed closely together, creating a textured, mosaic-like pattern of green. The lighting is bright, highlighting the vibrant color of the foliage.

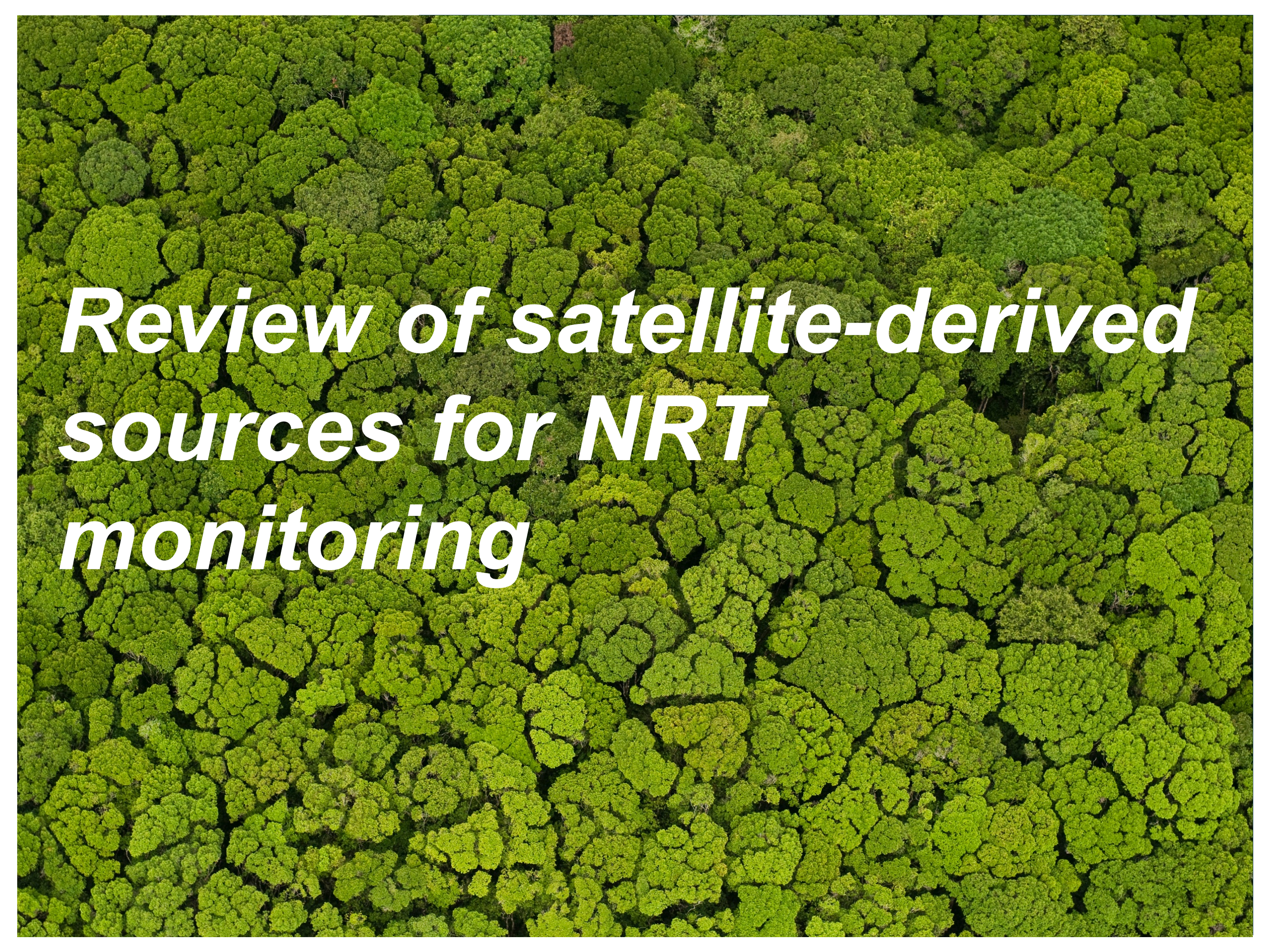
**What is near real-time  
monitoring?**



“**Real-Time**” = tracking status and changes as they happen


“**Near Real-Time**” = lag between observation and delivery of the information for decisions

Monitoring can be from satellite, drones, mobile devices, cameras, sound recorders

An aerial photograph showing a vast, dense forest with a uniform green canopy. The trees are packed closely together, creating a textured, mosaic-like appearance from above. The lighting is bright, highlighting the vibrant green of the foliage.

***Review of satellite-derived  
sources for NRT  
monitoring***





# Use of NRT data for effective conservation require...

- **Data access**
- **Appropriate spatial resolution**
- **Delivery time**
- **Precision**

# Example sources of NRT data

Polar orbiting – Landsat, MODIS, CBERS, VIIRS, AVHRR

Daily to 2 week repeat, higher resolution

Low inclination orbit - merged optical and radar

TRMM and GPM missions  
3-hourly

Geosynchronous- GOES

Continuous monitoring, low resolution



An aerial photograph showing a vast, dense forest with a uniform green canopy. The trees are packed closely together, creating a textured, mosaic-like appearance from above. The lighting is bright, highlighting the vibrant green of the leaves.

**How near real-time  
monitoring is used for  
conservation**



# National and Local Governments

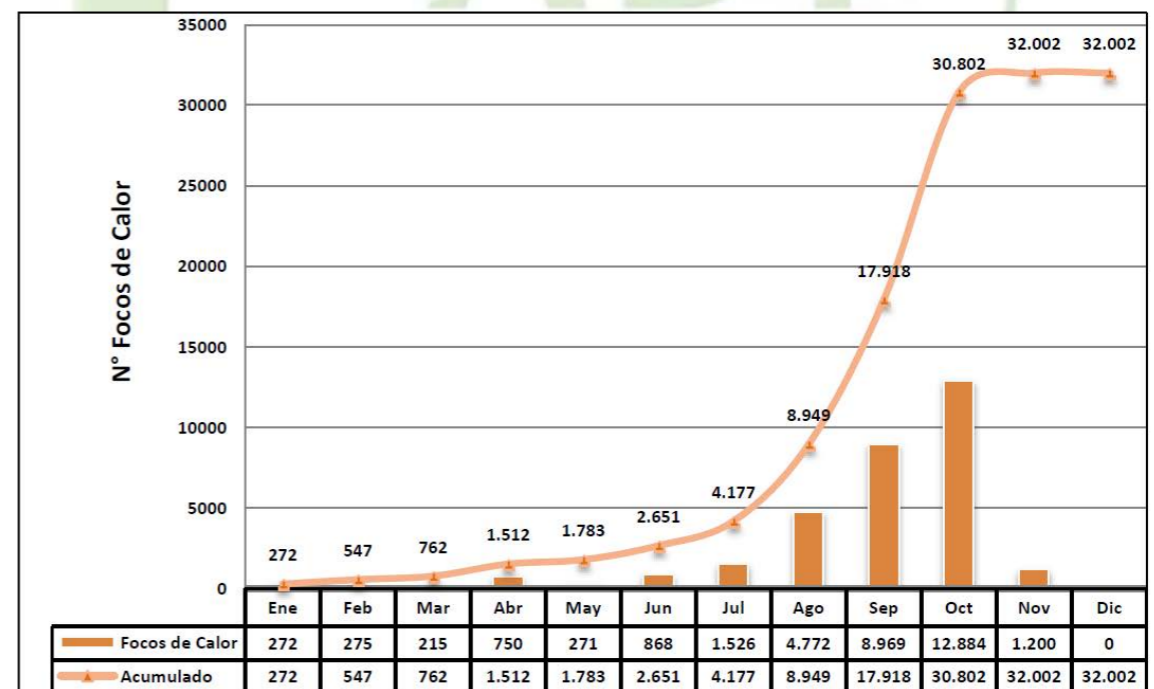
- Transparency
- Responding to threats
- Active fire control
- Support enforcement activities
- Strategize patrols and deter illegal activities
- Collect fines
- Reducing Emissions from Deforestation and forest Degradation (REDD+)
- National adaptation plans
- Sustainable development

# Use case: National and Local Governments

## Autoridad de fiscalización y control social de Bosque y Tierras (ABT) - Bolivia

- Uses MODIS and VIIRS active fire and burn scar data to enforce land use policies
- Monitor and investigate illegal burning
- Fine land owners

El **Gráfico 3** permite visualizar la evolución de la magnitud de focos de calor mensual y acumulada durante la gestión 2014.



**Gráfico 3.** Registro mensual de focos de calor en territorio nacional. Gestión 2014.  
Incluye datos del día 13/11/2014 descargados hasta 06:30 am.



# Communities

- Manage natural resources
- Community action and empowerment
- Community-based monitoring
- Respond to threats to property (buildings, livestock)

# Use case: Communities

## Baly Bay, Madagascar

- Fire is a serious threat to the native habitat
- Angonoka tortoise is one of world's most endangered tortoises
- Friendly village competition using CI's fire alerts
- Cash prize used for development projects
  - Improve school buildings
  - Build wells for clean water
  - Purchase solar panels



Angonoka tortoise



# Conservation Organizations

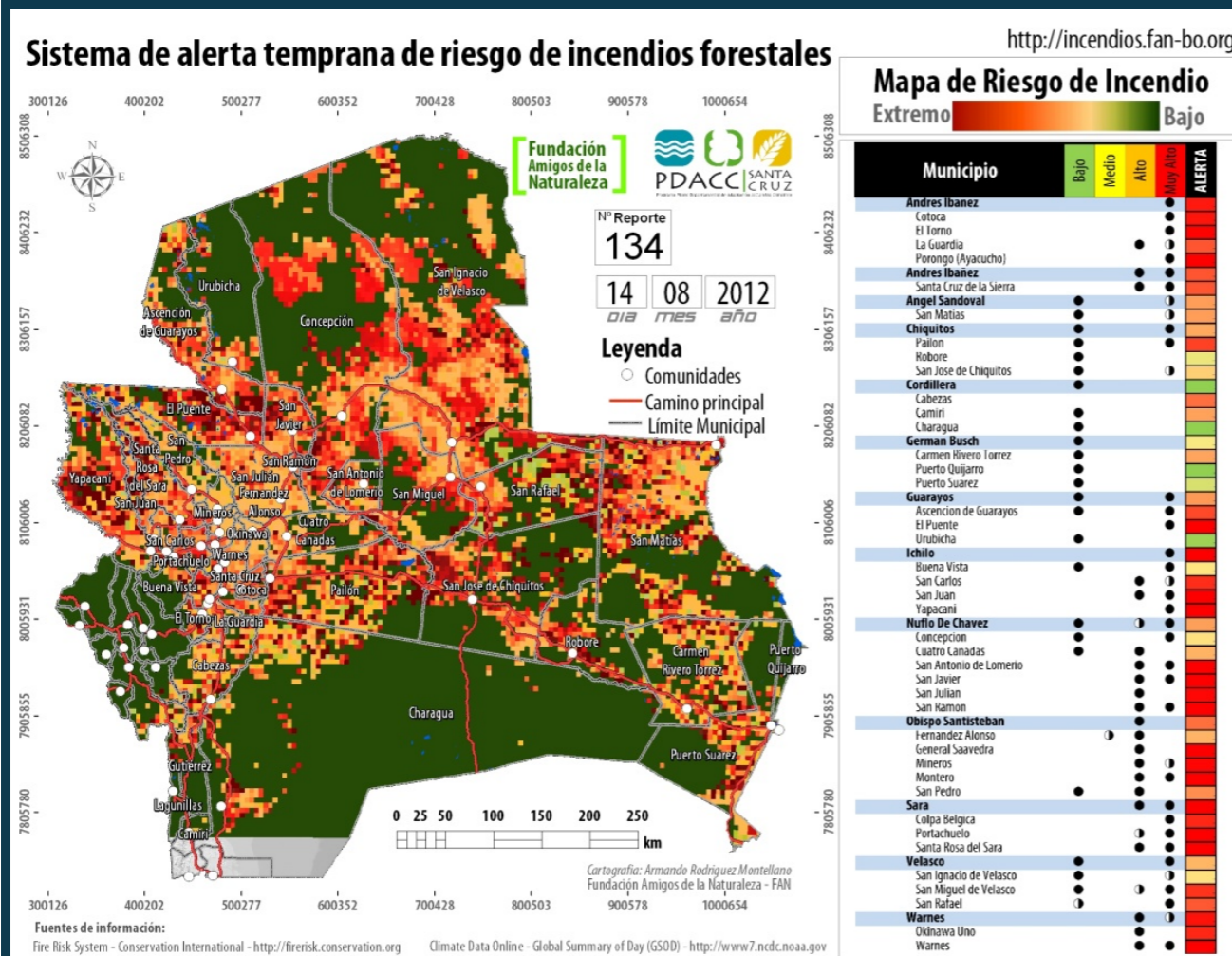
- Prioritization of investments
- Education and awareness
- Disseminate data
- Promote systems for policy decisions
- Capacity building



# Use Case: Conservation Organizations

## Fundación Amigos de la Naturaleza (FAN), Bolivia

FAN sends alerts and provides outreach and education to warn farming communities of dangerous fire conditions



SATRIF- FAN adds wind speed (spread) and density of historical fires (for increased risk of fire) to enhance the model with local information

FAN engages 34 indigenous and 4 Mennonite communities in Santa Cruz, Bolivia (~10,000 people)

An aerial photograph of a dense forest, showing a vast expanse of green tree canopies. The trees are packed closely together, creating a textured, mosaic-like appearance of various shades of green. The lighting is bright, highlighting the individual crowns of the trees. Centered over the image is the text "Example NRT Forest Monitoring Systems" in a large, white, sans-serif font.

# Example NRT Forest Monitoring Systems

# Fire Information for Resource Management System (FIRMS / GFIMS)

**Data & resolution:** daily active fire (1-km), monthly burned area (500-m)

**Data Source:** MODIS

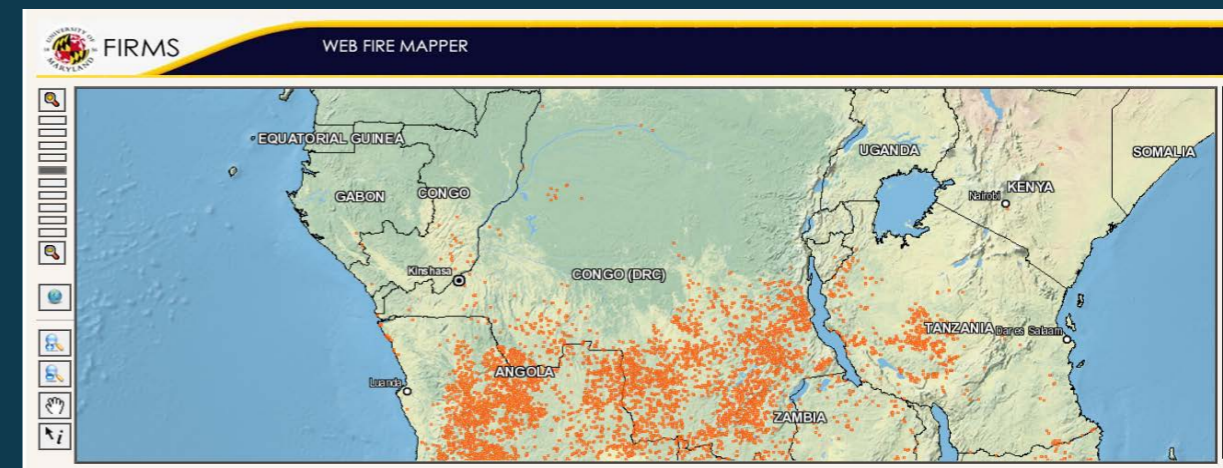
**Geographic Coverage:** global

**Focus:** protected areas

**Information delivery:** email alerts, web map, website download

**Target User:** researchers, data distributors, protected area managers, national and local governments

**Organization:** NASA/Food & Agriculture Organization (FAO)



**FIRMS:** [earthdata.nasa.gov/data/near-real-time-data/firms](http://earthdata.nasa.gov/data/near-real-time-data/firms)



**GFIMS:** <http://www.fao.org/nr/gfims/gf-home/en/>

# Advanced Fire Information System (AFIS)

**Data & resolution:** daily active fire (1-km, 750-m, 375-m), monthly burned area (500-m), fire risk, fire danger

**Data Source:** MODIS, VIIRS, MSG-GOES

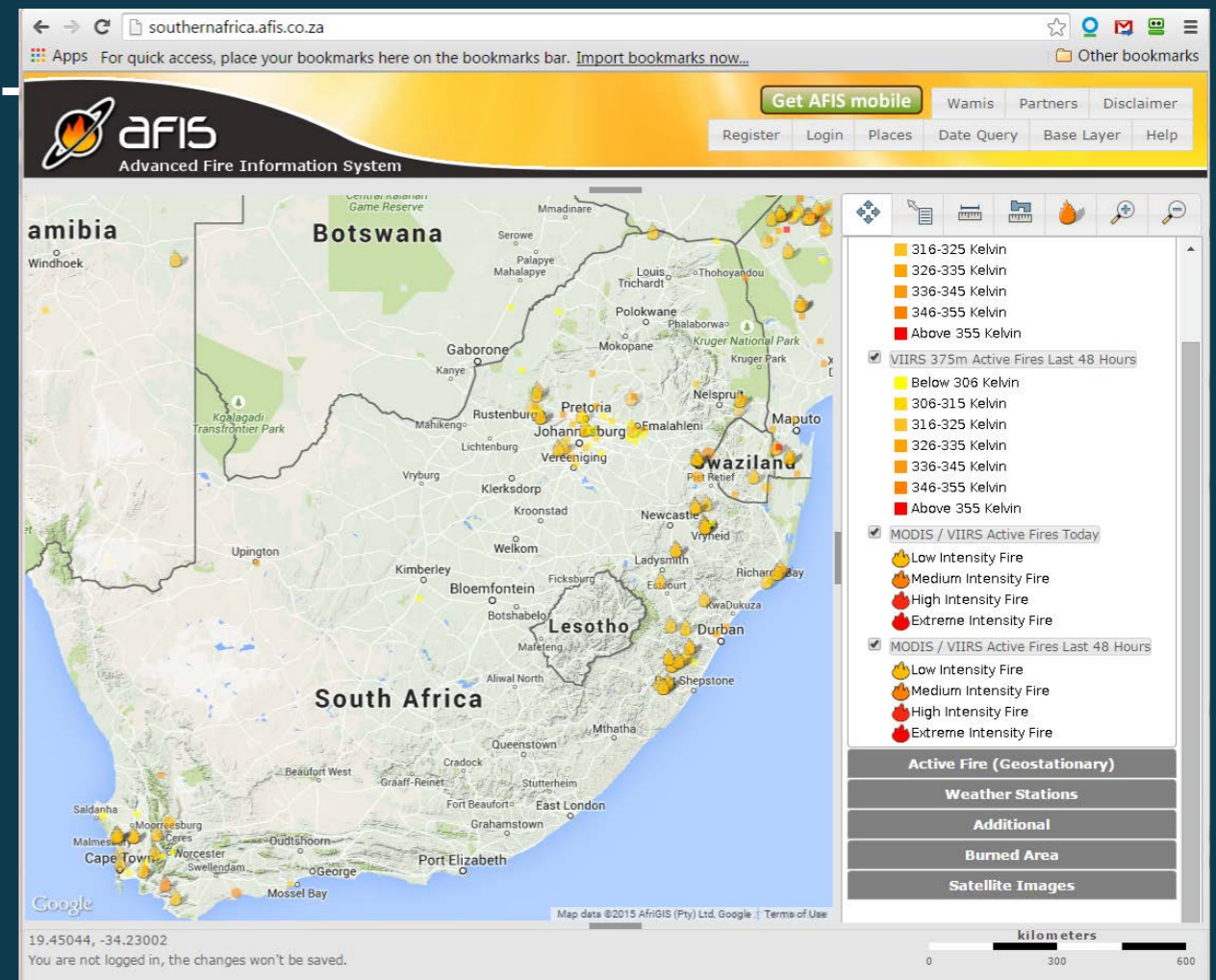
**Geographic Coverage:** global

**Focus:** Fire Management

**Information delivery:** email alerts, web map, mobile app

**Target User:** national and local governments, forest and fire service, general public

**Organization:** Council for Scientific and Industrial Research (CSIR)



<http://southernafrica.afis.co.za/>

# DETER, PROARCO, and PRODES

**Data & resolution:** daily active fire (1-km, 5-km), monthly burned area (500-m), 250-m deforestation, 30-m deforestation

**Data Source:** MODIS, AVHRR, GOES, Landsat, CBERS

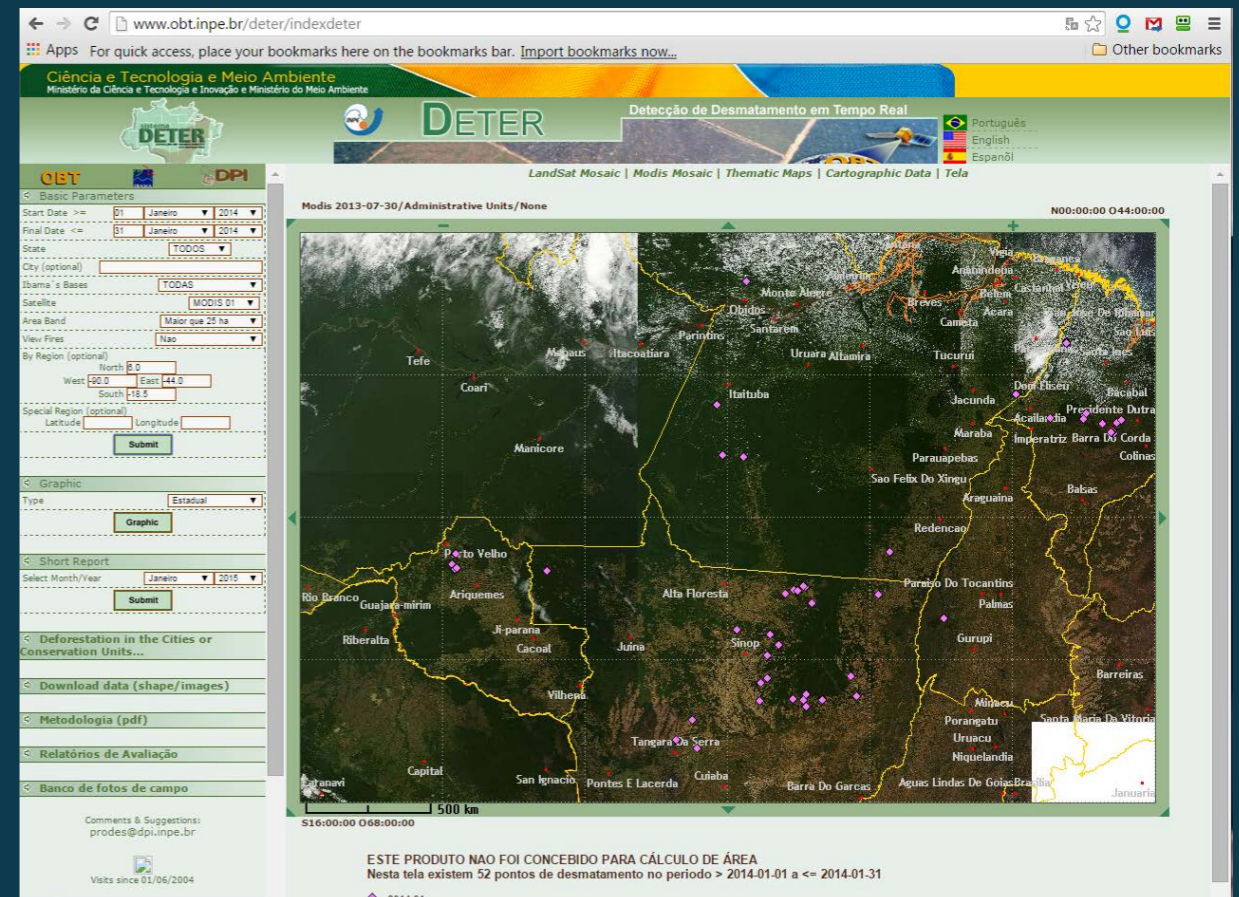
**Geographic Coverage:** Brazilian Amazon

**Focus:** protected areas, political units

**Information delivery:** email alerts, web map

**Target User:** researchers, national and local governments

**Organization:** National Institute for Space Research (INPE)



<http://www.obt.inpe.br/deter/indexdeter>

<http://www.dpi.inpe.br/proarco/bdqueimadas/>

<http://www.obt.inpe.br/prodes>

# SAD (Sistema de Alertas de Desmatamento) & ImazonGEO

**Data & resolution:** monthly 250-m deforestation and degradation (NDFI), annual deforestation daily active fires (1-km)

**Data Source:** MODIS

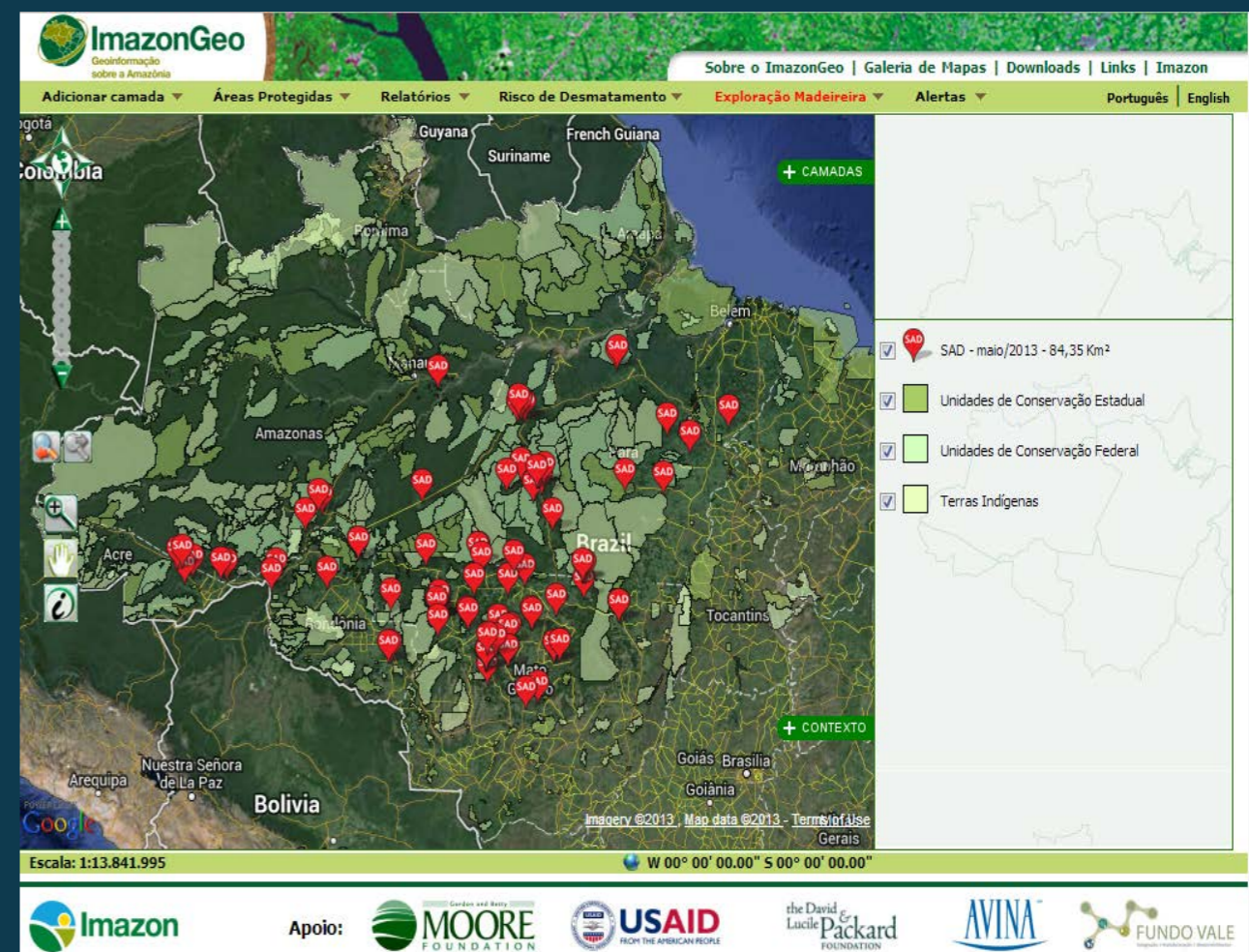
**Geographic Coverage:** Brazilian Amazon

**Focus:** protected areas, forest concessions, political units

**Information delivery:** email alerts, mobile alerts, downloadable reports, web map

**Target User:** protected area managers, national and local governments

**Organization:** IMAZON



<http://www.imazongeo.org.br>

<http://www.imazon.org.br/publications/forest-transparency>

# Global Forest Disturbance Alert System (GloF-DAS) / Quarterly Indicator of Cover Change (QUICC)

**Data & resolution:** quarterly disturbance (5-km)

**Data Source:** MODIS

**Geographic Coverage:** Global

**Focus:** political units

**Information delivery:** web map, summary reports

**Target User:** researchers, data distributors, national and local governments

**Organization:** NASA Ames/  
California State University  
Monterey Bay

rainforests.mongabay.com/deforestation-tracker/

MONGABAY.COM

About | Contact | Rainforests

### Global Forest Disturbance Alert System

The Global Forest Disturbance Alert System (GloF-DAS) provides data on forest disturbance globally on a quarterly basis. [\[news release\]](#)

Reliable maps of global forest cover change are frequently years out-of-date. Consequently, there is a pressing need to develop techniques for monitoring and verifying land cover change and forest disturbances in a timely, low-cost, and accurate manner. Satellite remote sensing from instruments such as NASA's Moderate Resolution Imaging Spectroradiometer (MODIS) offers a consistent and cost-effective method for mapping forest cover change. MODIS data are obtained freely with global daily cover products.

A new MODIS product called the "Quarterly Indicator of Cover Change" (QUICC) has been developed at NASA Ames Research Center by the CASA ecosystem modeling team. The QUICC product is based on comparison of MODIS global vegetation index images at the exact same time period each year (ending of March, June, September, and December) in consecutive years. The CASA team updates its global QUICC products as soon as the newest quarterly MODIS worldwide VI image at 5-km spatial resolution is available.

[Download data](#)

+ Additional details >>  
+ FAQs >>  
+ Feedback >>  
+ Alert system >>

GloF-DAS is done in partnership with Cal State Monterey Bay and NASA Ames Research Center.

CALIFORNIA STATE UNIVERSITY  
Monterey Bay

Related sections and articles

- [Deforestation news feed](#)
- [How satellites are used in conservation](#)
- [Breakthrough technology enables 3D mapping of rainforests, tree by tree](#)
- [Deforestation statistics for selected countries](#)
- [An overview of deforestation](#)

INSTRUCTIONS: (1) Select the "Disturbance Period" (2) select the "Country"

[Click here](#) to download shape data files for specific countries.

NOTE: The underlying satellite imagery is generally older than the MODIS-based GloF-DAS data, so Google Earth's image may not reflect the current state of forest cover.

Tweet 154 +1 50

<http://rainforests.mongabay.com/deforestation-tracker/>

# Center for International Forestry Research (CIFOR) Fire Tool

**Data & resolution:** daily active fire (1-km), quarterly burned area (500-m)

**Data Source:** MODIS, Landsat

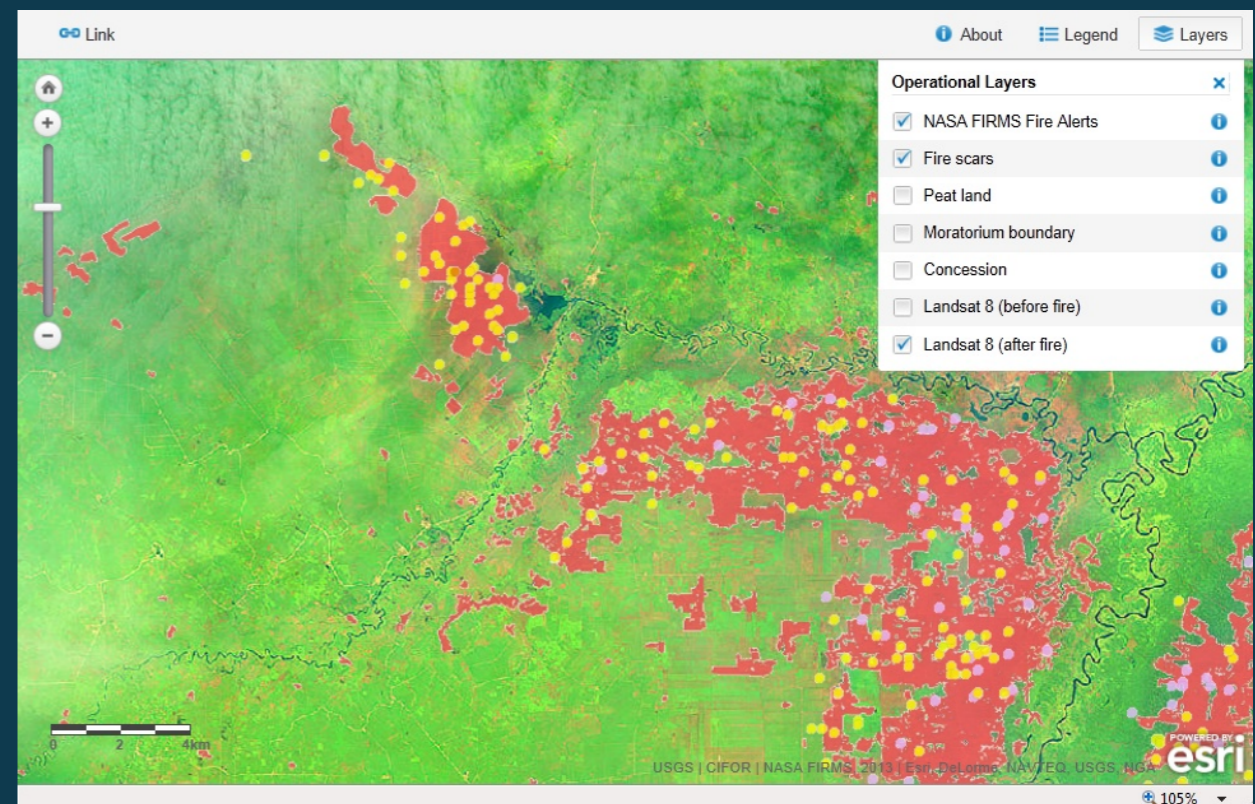
**Geographic Coverage:** Indonesia

**Focus:** peatlands, logging concessions

**Information delivery:** web map

**Target User:** researchers, data distributors, GIS technicians, protected area managers, national and local governments

**Organization:** CIFOR



<http://www.cifor.org/map/fire/>



# Terra-i

**Data & resolution:** bi-monthly, semi-annual, annual, habitat change (250-m)

**Data Source:** MODIS, Landsat

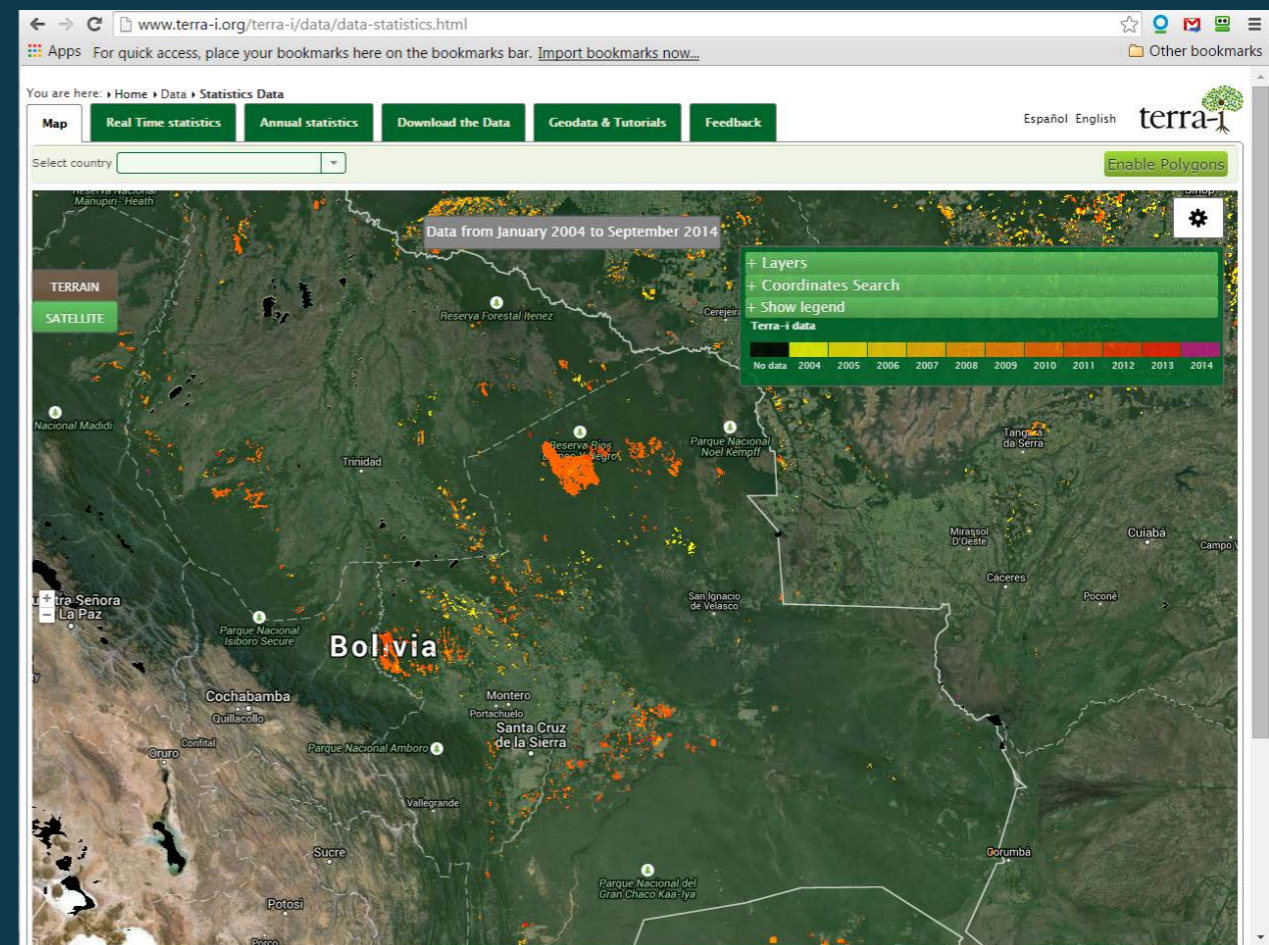
**Geographic Coverage:** South America

**Focus:** ecoregion, protected areas, indigenous areas, political units

**Information delivery:** summary report, web map

**Target User:** researchers, data distributors, GIS technicians, protected area managers, national and local governments

**Organization:** International Center for Tropical Agriculture (CIAT-DAPA), The program for Forestry, Trees and Agroforestry (FTA), The Nature Conservancy (TNC), School of Business and Engineering (HEIG-VD), King's College London (KCL)



<http://www.terra-i.org>

# Firecast

**Data & resolution:** daily active fire (1-km, 375-m coming soon), daily fire risk (5-km), annual fire season severity forecasts (national-level)

**Data Source:** MODIS, VIIRS, TRMM

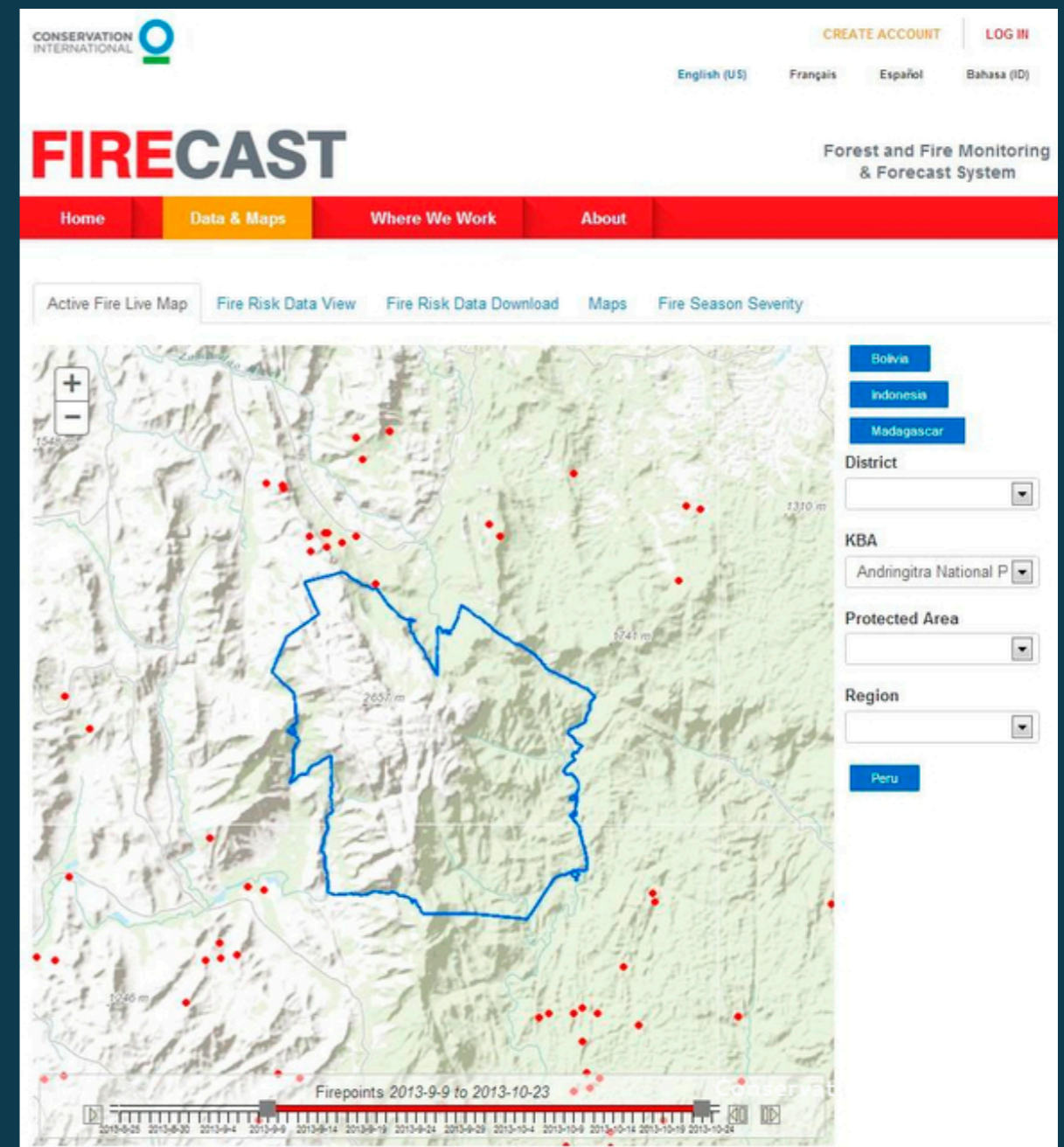
**Geographic Coverage:** Colombia, Peru, Bolivia, Madagascar, Indonesia

**Focus:** biodiversity, indigenous areas, political units, forestry units

**Information delivery:** email alerts, web map, mobile app coming soon

**Target User:** protected area managers, government and NGO

**Organization:** Conservation International



<http://firecast.conservation.org>

# Global Forest Watch/ Global Fires

**Data & resolution:** daily 1-km active fires, annual 30-m forest cover gain and loss; 5-km QUICC quarterly disturbance; monthly 250-m SAD; monthly 250m terra-I; monthly 500-m tree cover loss (FORMA)

**Data Source:** MODIS, Landsat, NOAA-18

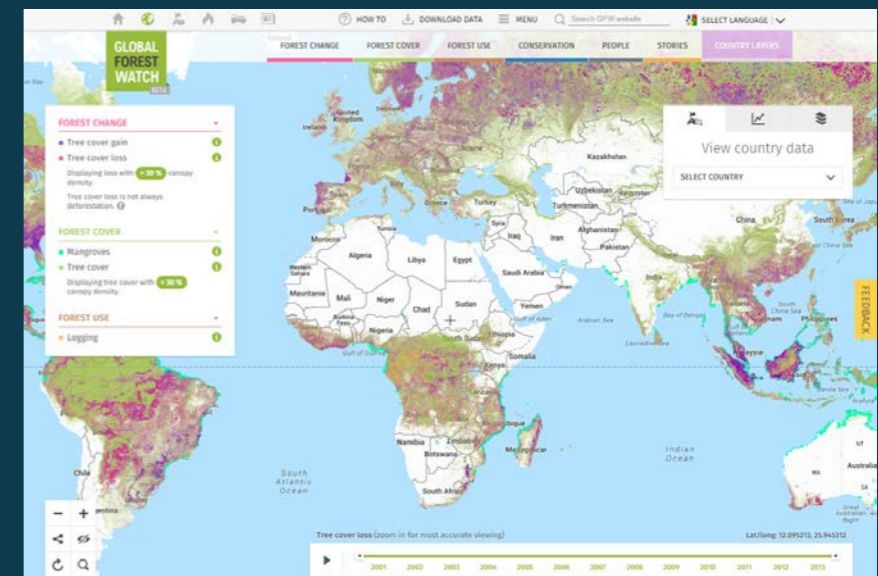
**Geographic Coverage:** Global

**Focus:** biodiversity, concessions, infrastructure, indigenous communities

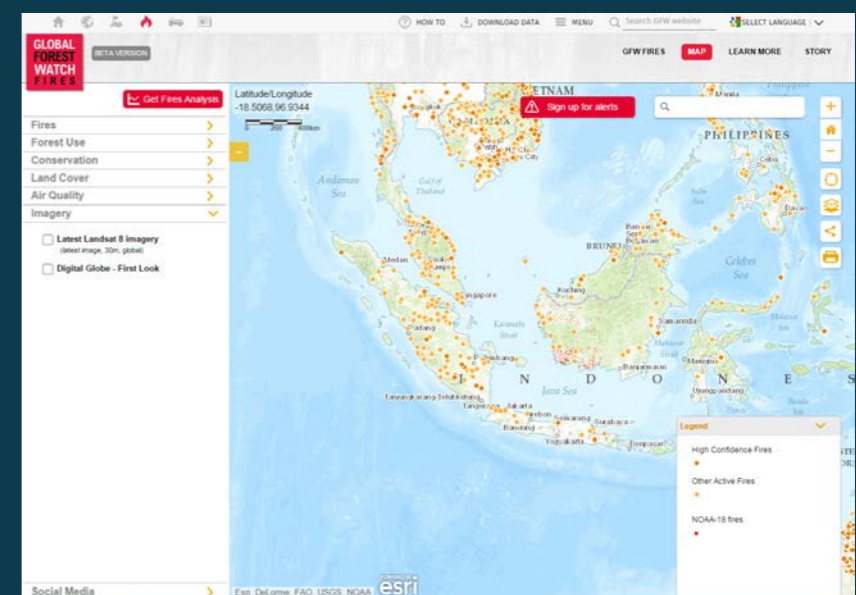
**Information delivery:** web map, email or SMS alerts, mobile app *coming soon*

**Target User:** policy makers, civil society, media, public

**Organization:** World Resources Institute (WRI)



<http://globalforestwatch.org/>



<http://fires.globalforestwatch.org/>

# Monitoring of the Andean Amazon (MAAP)

**Data & resolution:** WRI FORMA, Terra-i deforestation alerts

**Data Source:** MODIS, Landsat

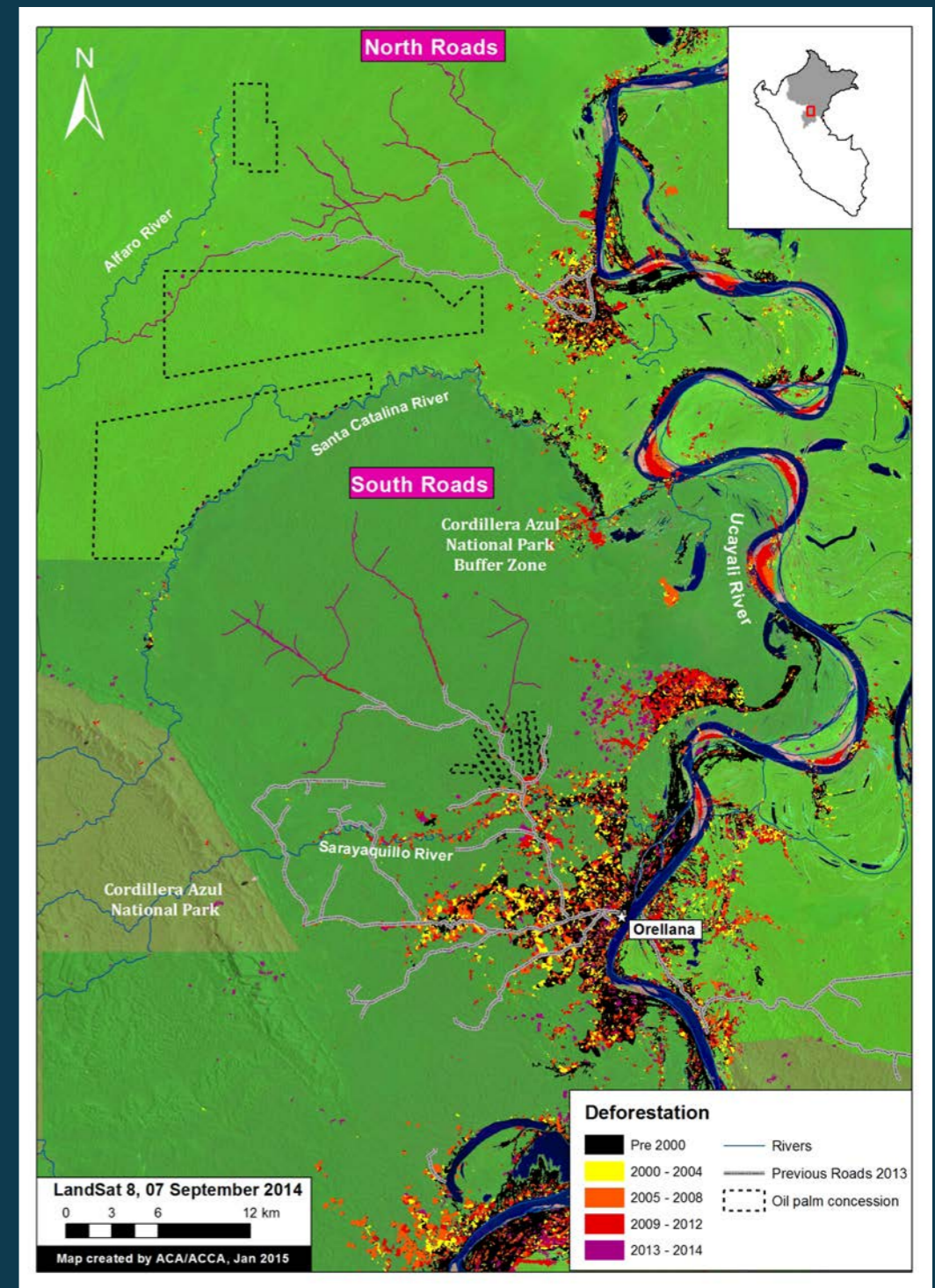
**Geographic Coverage:** Amazon

**Focus:** mining, logging, oil palm plantations, hydroelectric dams, oil and gas development, coca cultivation

**Information delivery:** web portal, “image of the week”

**Target User:** policy makers, civil society, media, public

**Organization:** Amazon Conservation Association



<http://maaproject.org/en/>


An aerial photograph of a dense forest, showing a vast expanse of green tree canopies. The trees are packed closely together, creating a textured, mosaic-like pattern of green. The lighting is bright, highlighting the vibrant colors of the foliage. In the center of the image, the text "Choosing the right system" is written in a large, white, sans-serif font, standing out against the green background.

**Choosing the right system**



# There is no one system that will fit all solutions

1. Geography
2. Response Time
3. Data format
4. Information Delivery
5. Automatic/manual



# Where to get more information on NRT monitoring

Musinsky, J. “Near Real-Time Monitoring and Alert Systems.” *REDD+ Measurement, Reporting and Verification (MRV) Manual, Version 2.0*. Eds. J. Hewson et al. USAID-supported Forest Carbon, Markets, and Communities Program, 2014. Washington, DC, USA.

[http://www.fcmcglobal.org/documents/mrvmanual/MRV\\_Manual\\_Chapter7.pdf](http://www.fcmcglobal.org/documents/mrvmanual/MRV_Manual_Chapter7.pdf)

An aerial photograph showing a vast, dense forest with a uniform green canopy. The trees are packed closely together, creating a textured, mosaic-like appearance from above. The lighting is bright, highlighting the vibrant green of the leaves.

# Demonstration of Firecast





# Final Reminders/Survey

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- ❑ Conservation Webinar Survey

Baobab  
Trees,  
Madagascar.  
Image  
credit:  
Cristina  
Mittermeier



**Thank You!!**

**Cindy Schmidt**

**[Cynthia.L.Schmidt@nasa.gov](mailto:Cynthia.L.Schmidt@nasa.gov)**