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

Applied Remote Sensing Training

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

- 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)

ARSET Conservation Management

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

Accessing the Recordings

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
- Amber Kuss (ARSET): 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

Course Outline

Week 1
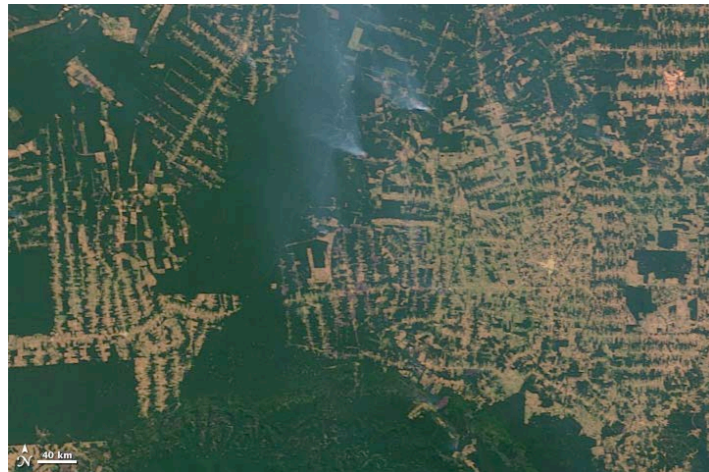
Overview of satellite remote sensing

Week 2
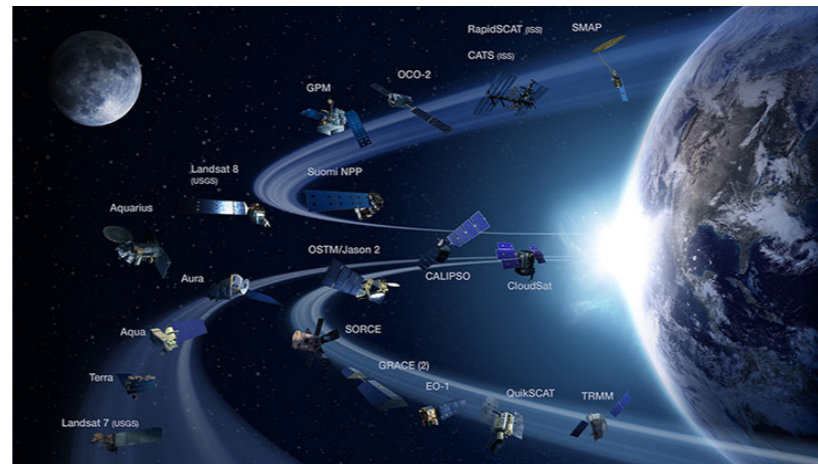
Platforms and sensors for conservation

Week 3
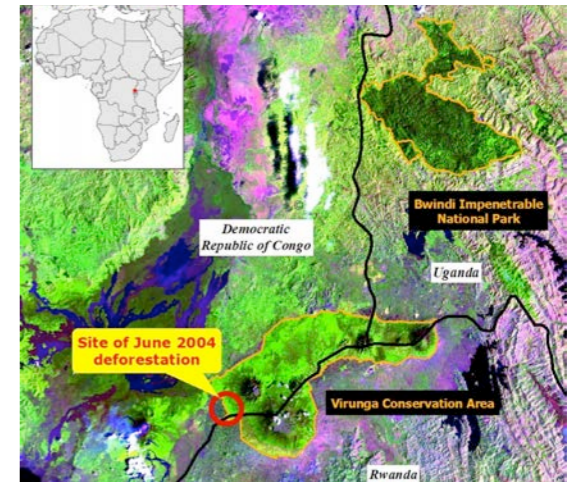
Habitat monitoring

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).
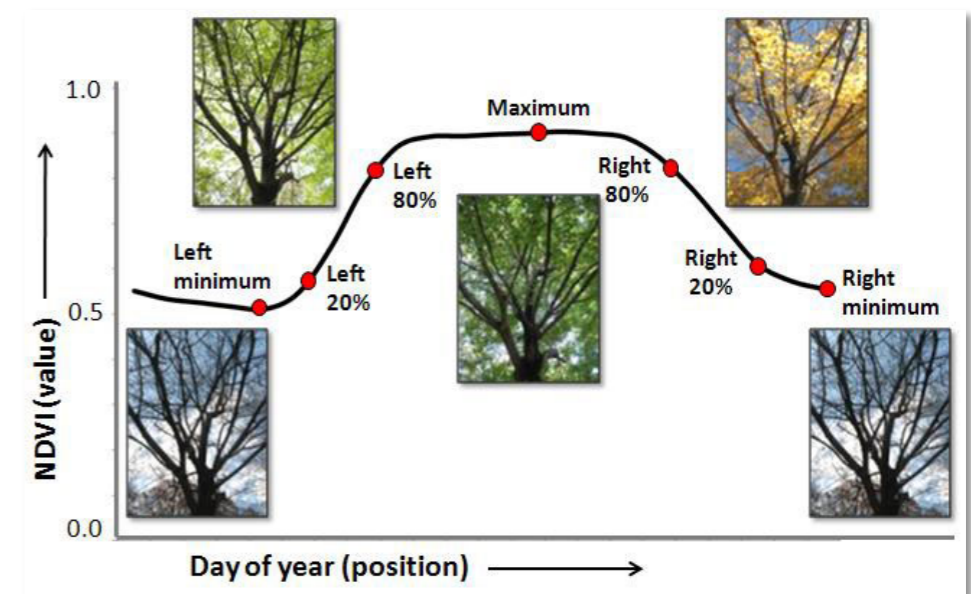
Guest Speaker: Karyn Tabor

Near real-time monitoring for conservation management
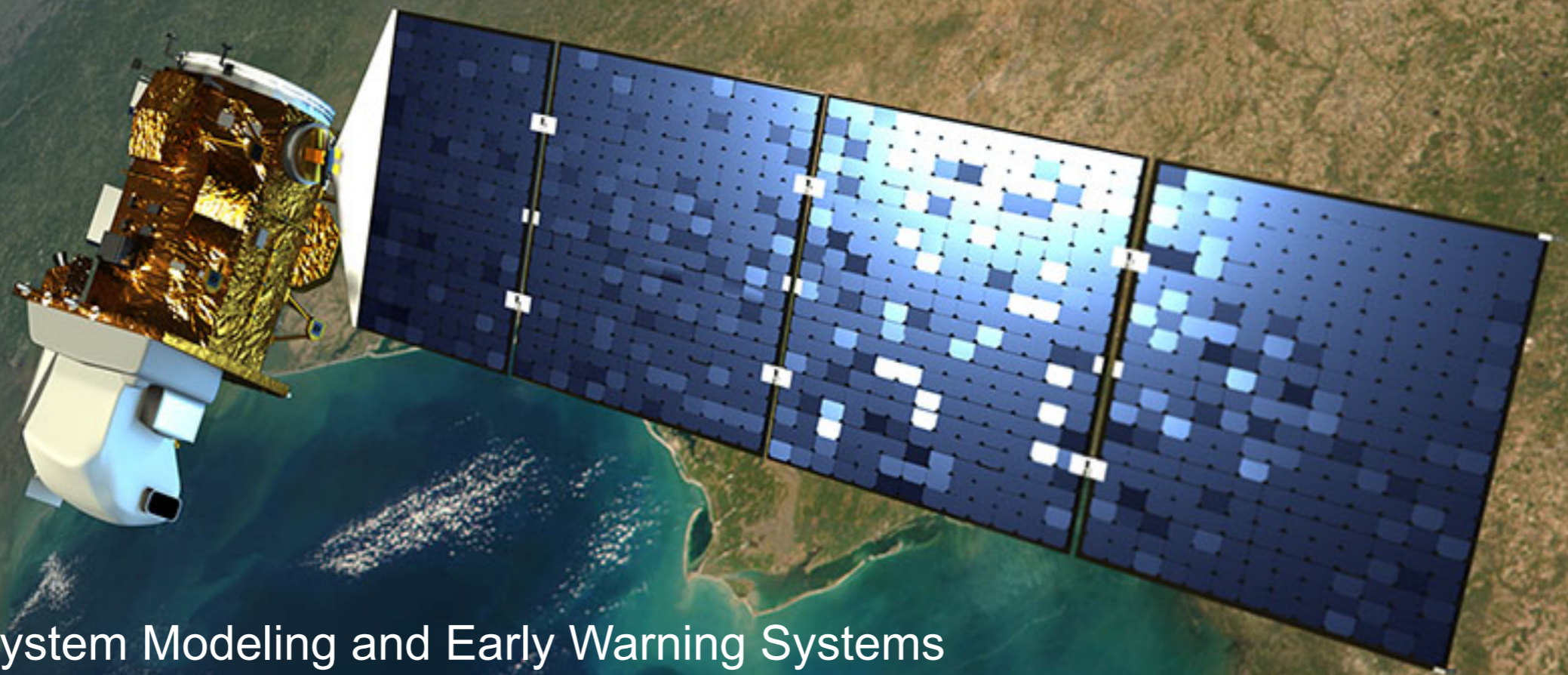
Karyn Tabor
Director of Ecosystem Modeling and Early Warning Systems
Betty and Gordon Moore Center for Science and Oceans
Conservation International
Arlington, VA USA
ktabor@conservation.org

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
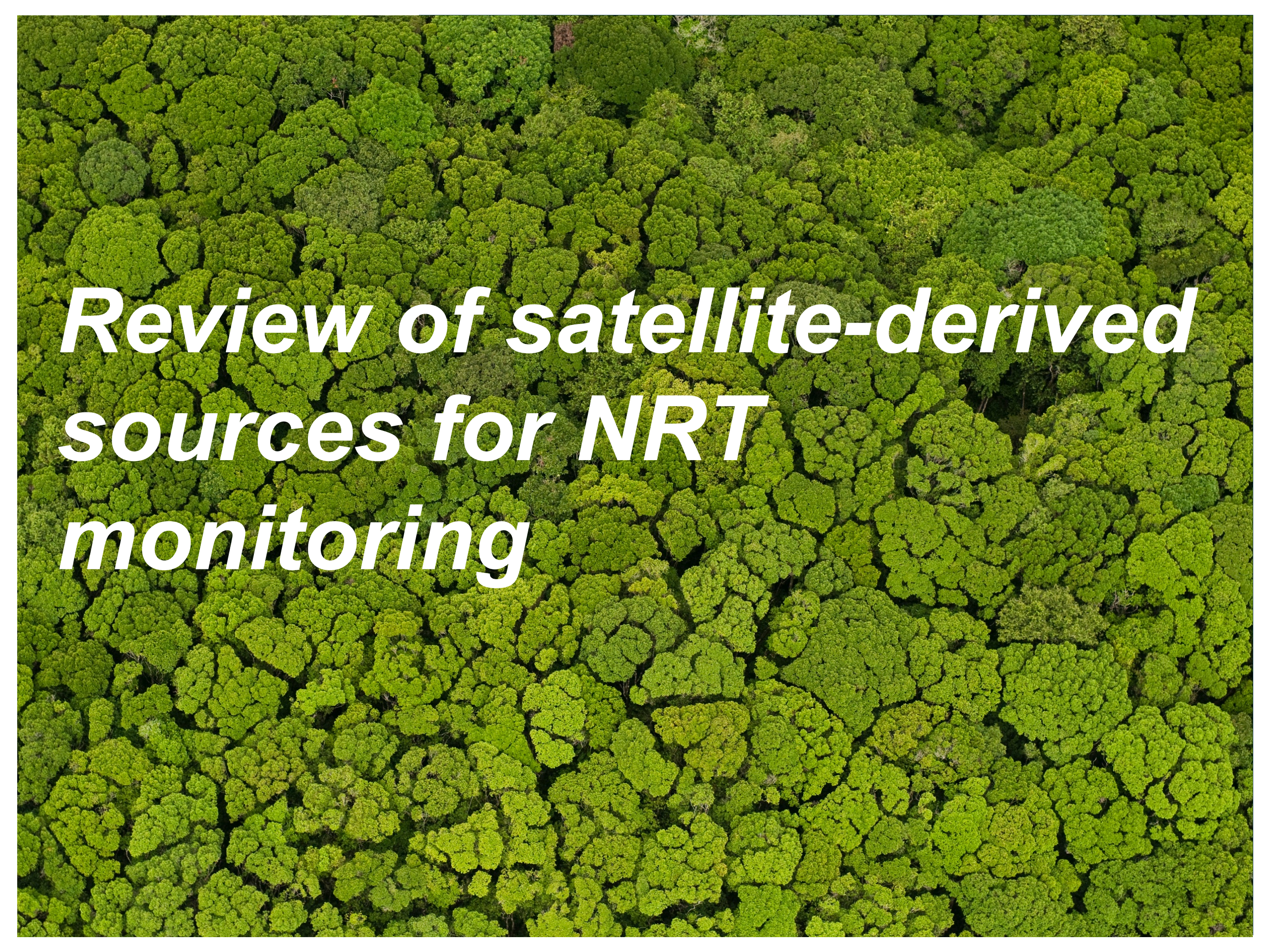
What is near real-time monitoring?

"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

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

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
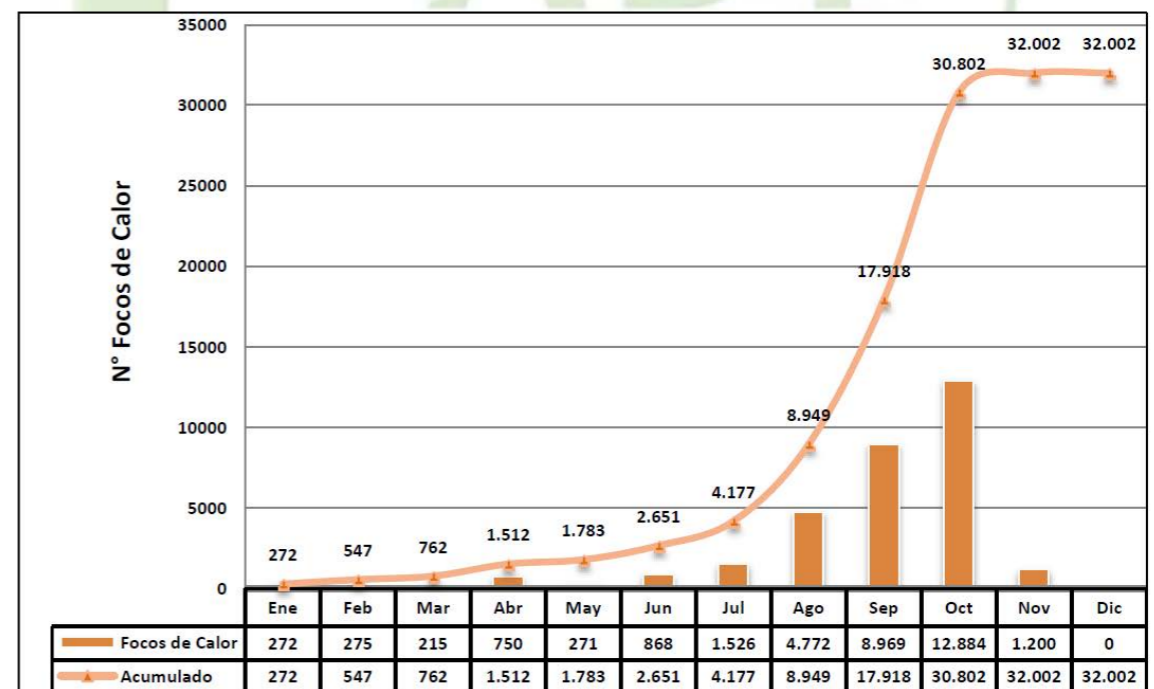- Collect fines
- Reducing Emissions from Deforestation and forest Degradation (REDD+)
- National adaptation plans
- Sustainable development

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.

	Ene	Feb	Mar	Abr	May	Jun	Jul	Ago	Sep	Oct	Nov	Dic
Focos de Calor	272	275	215	750	271	868	1.526	4.772	8.969	12.884	1.200	0
Acumulado	272	547	762	1.512	1.783	2.651	4.177	8.949	17.918	30.802	32.002	32.002

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
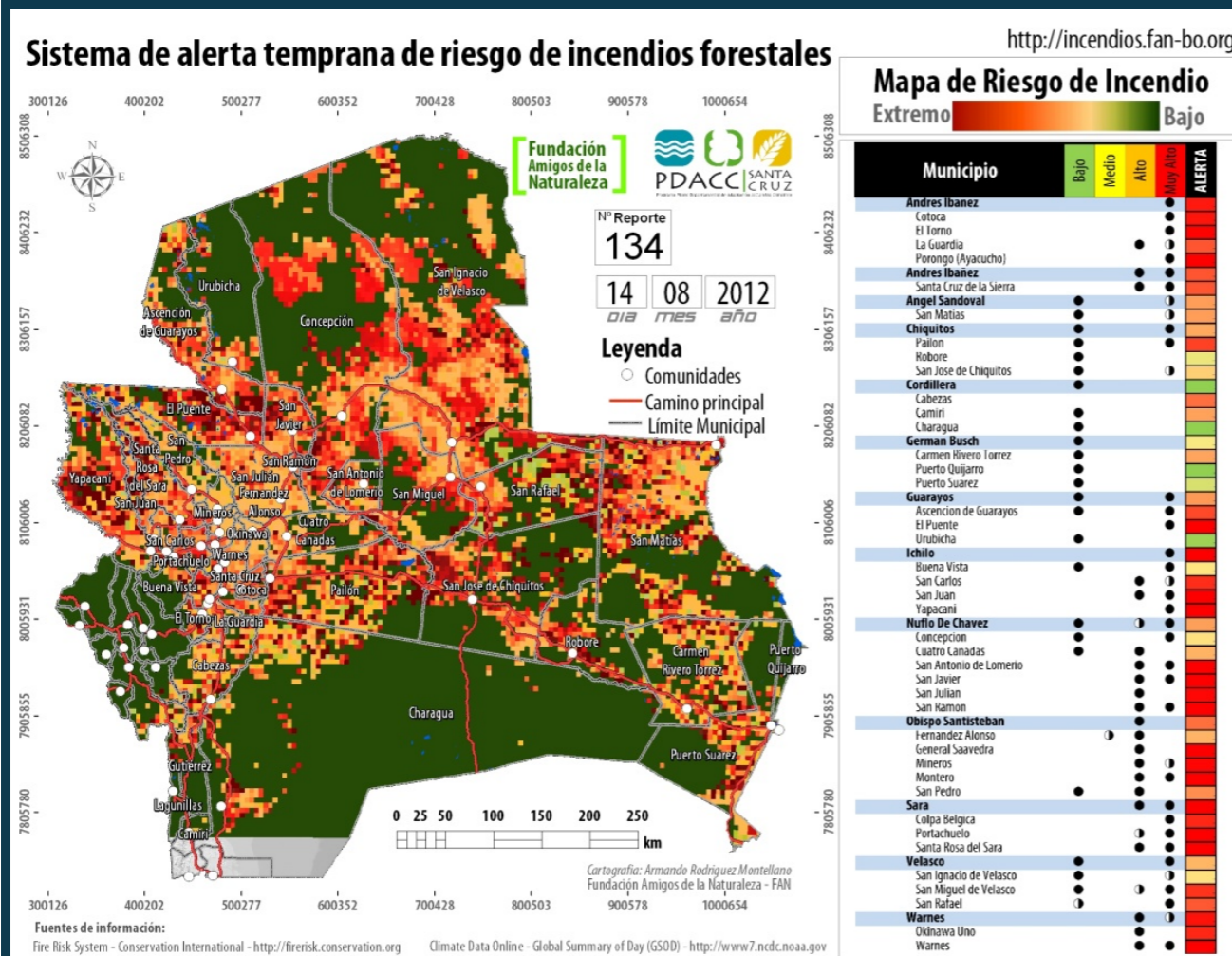
Conservation Organizations

- 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

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

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

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

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)
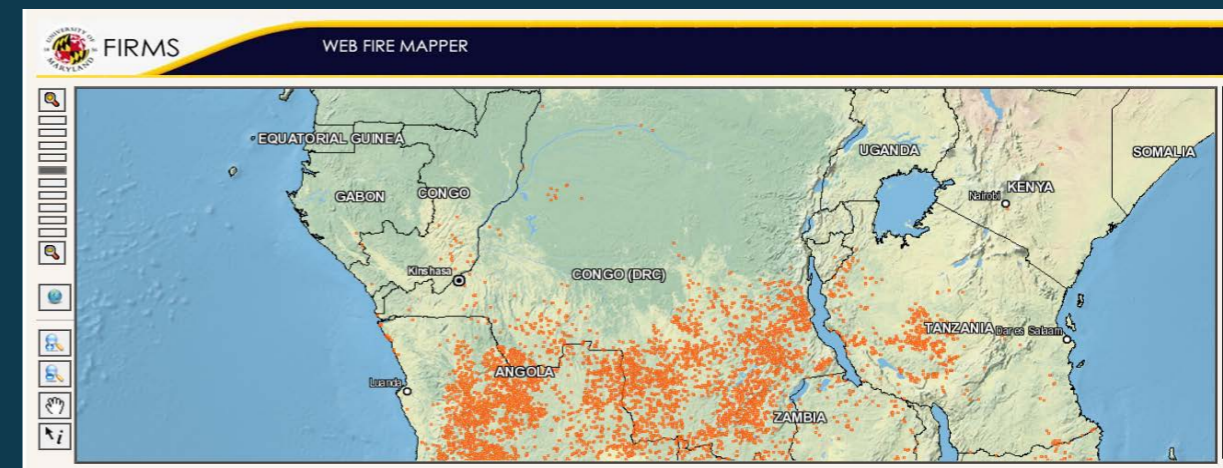
Data Source: MODIS

Geographic Coverage: global

Focus: protected areas

Information delivery: email alerts, web map, website download

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

Organization: NASA/Food & Agriculture Organization (FAO)

FIRMS: 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

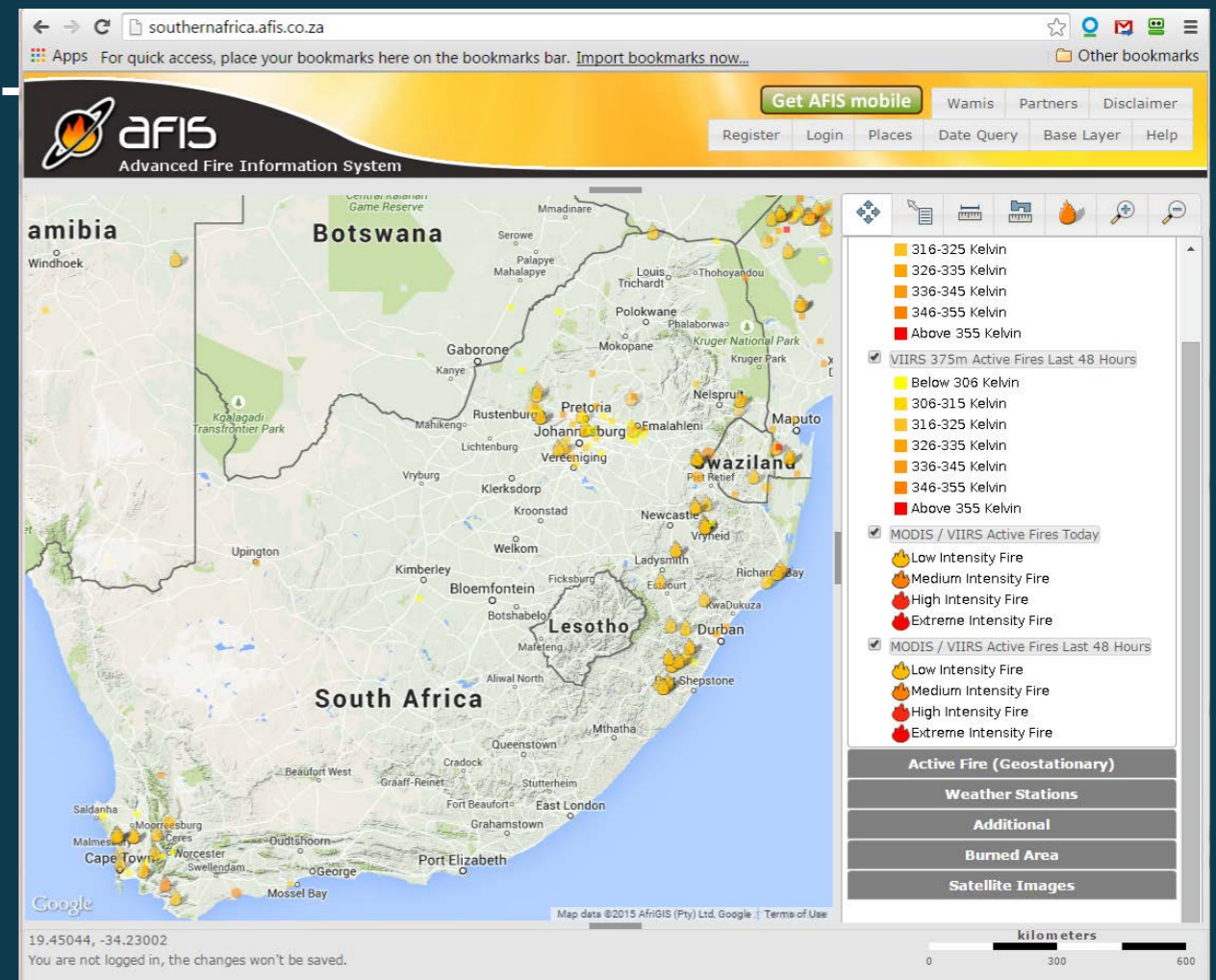**Data Source:** MODIS, VIIRS, MSG-GOES

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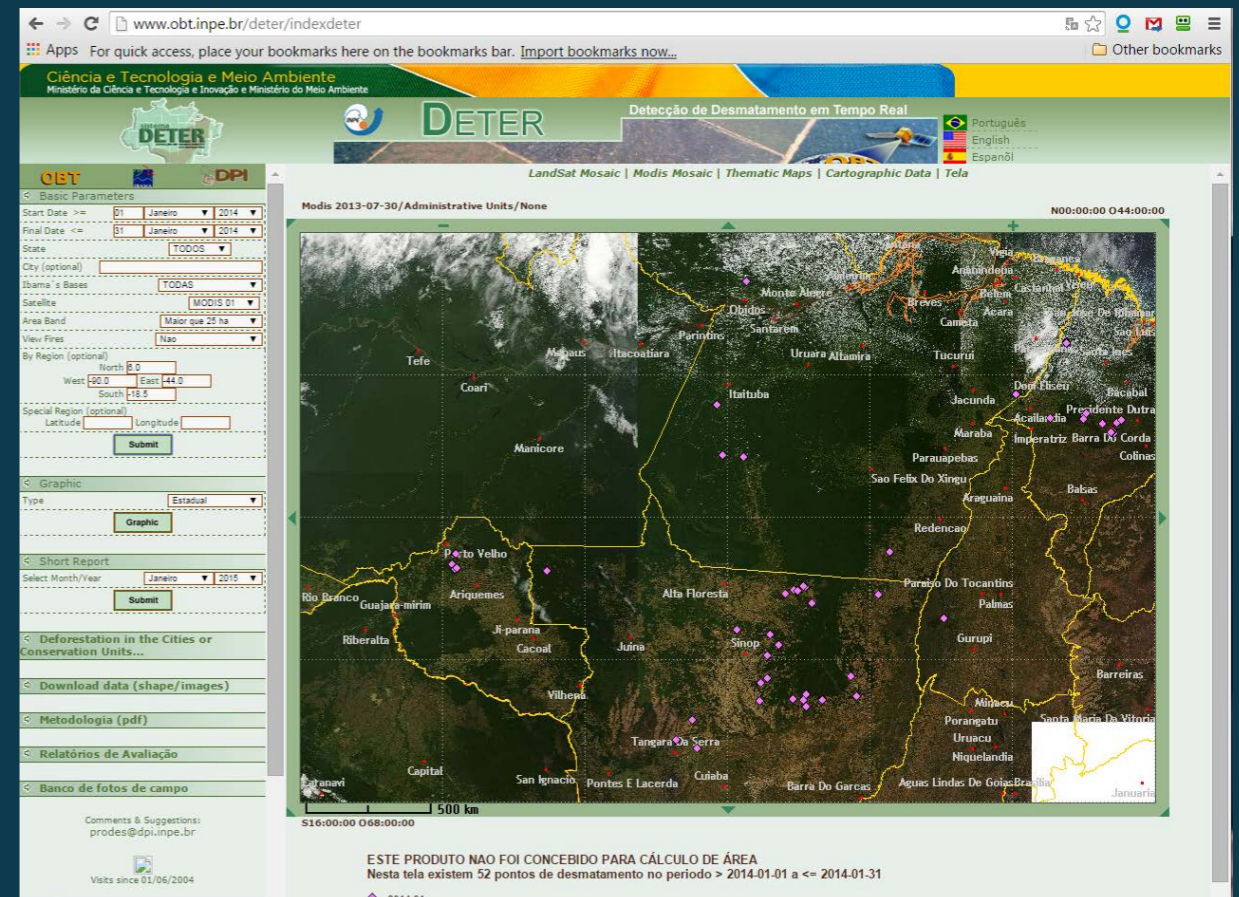
Data Source: MODIS, AVHRR, GOES, Landsat, CBERS

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)
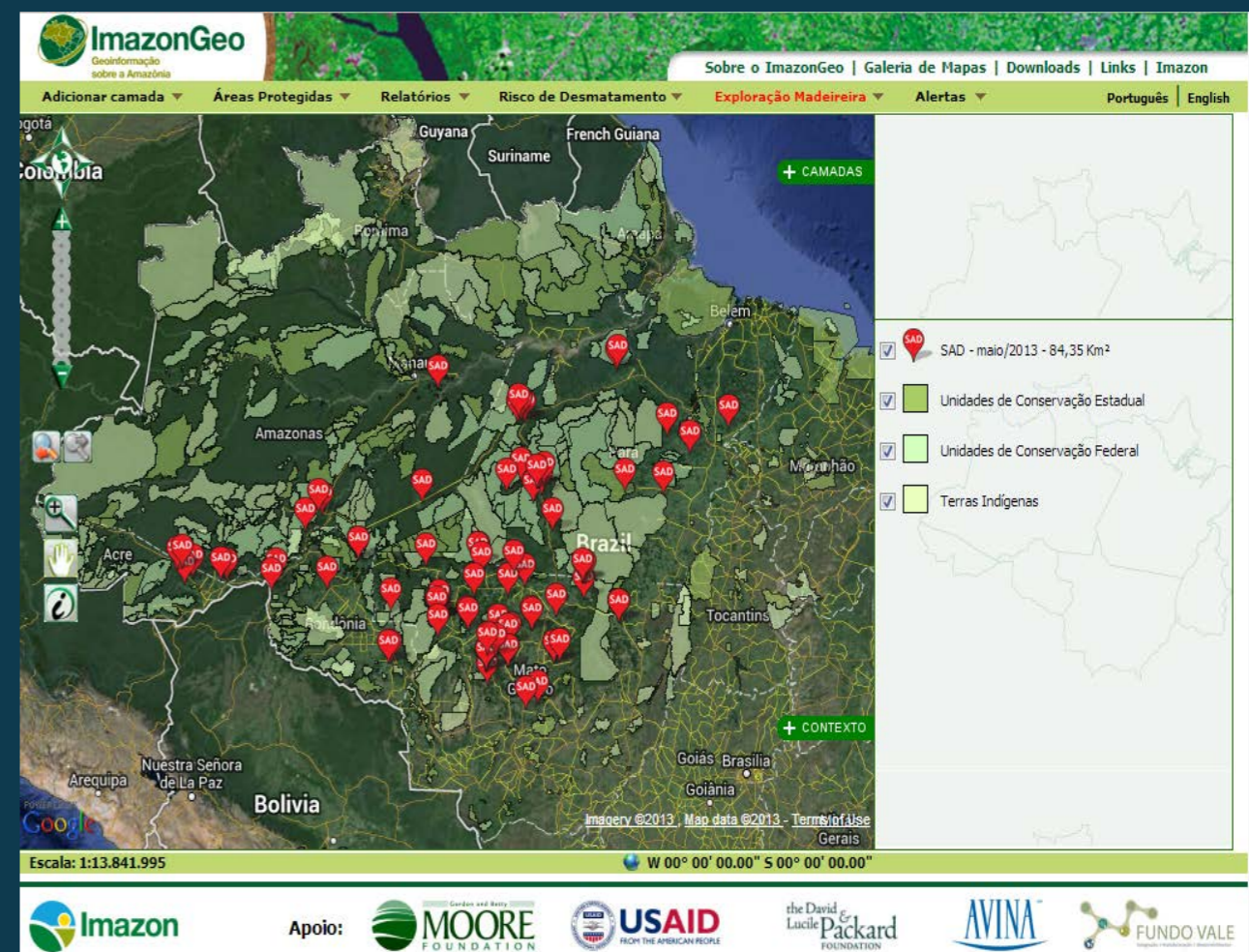
Data Source: MODIS

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 distributers, national and local governments

Organization: NASA Ames/California State University Monterey Bay

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)
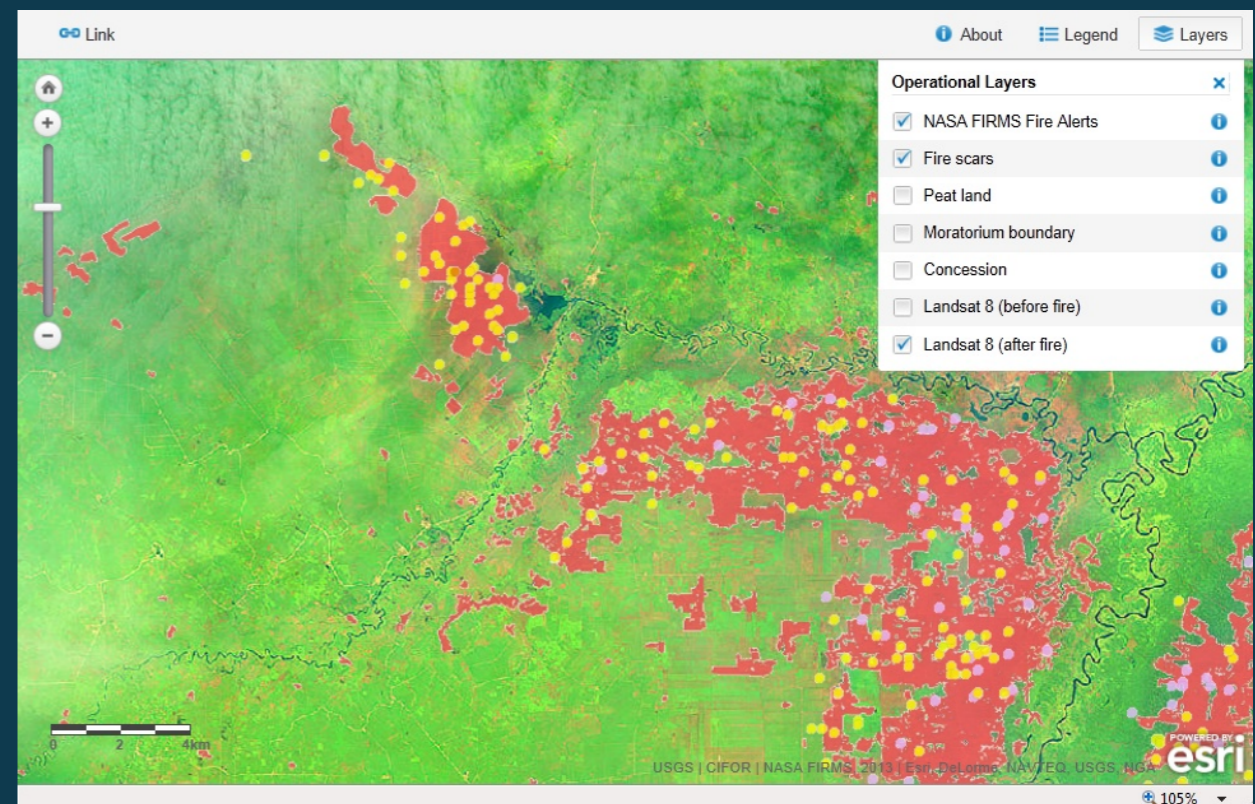
Data Source: MODIS, Landsat

Geographic Coverage: Indonesia

Focus: peatlands, logging concessions

Information delivery: web map

Target User: researchers, data distributers, 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)
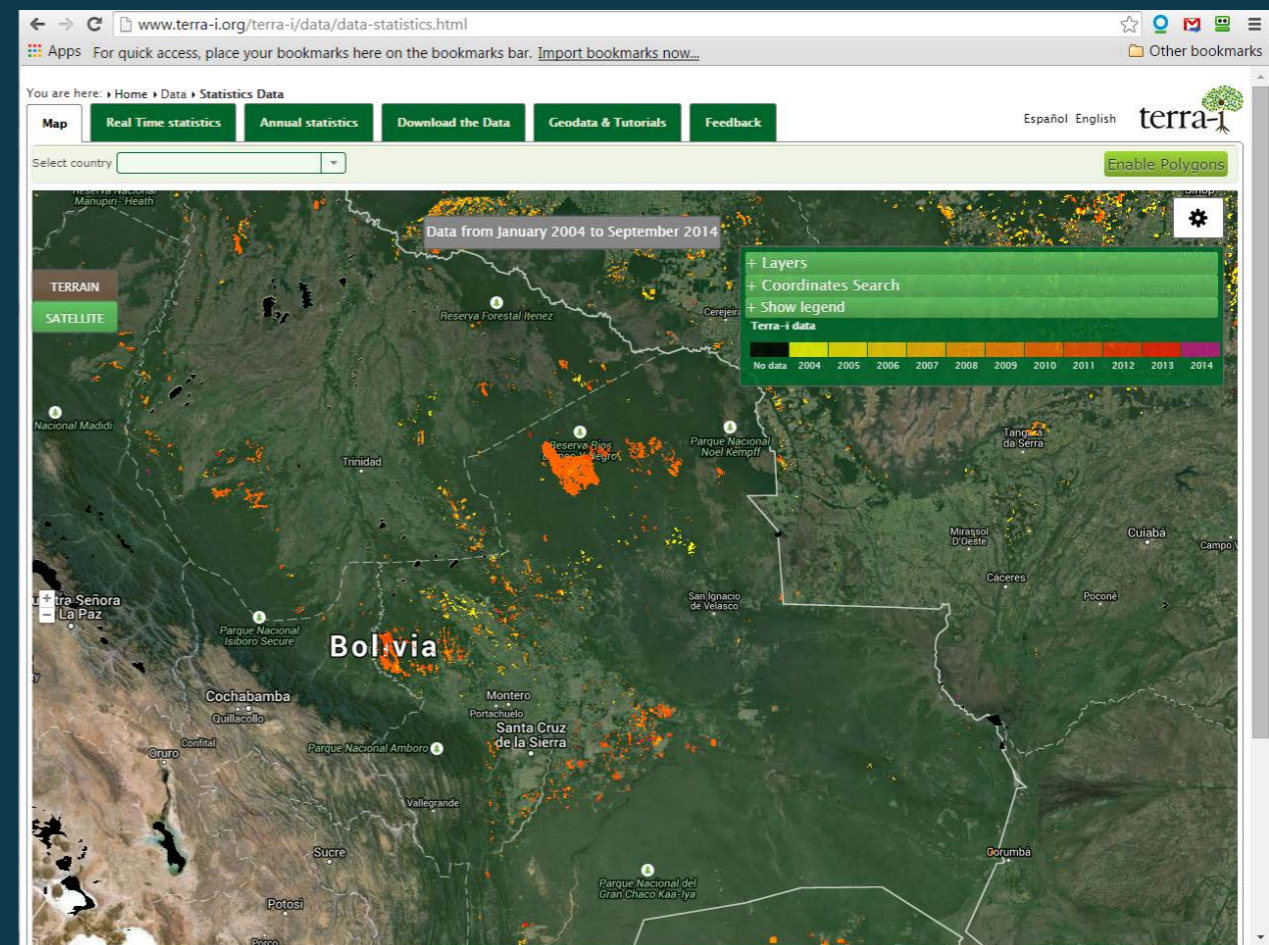
Data Source: MODIS, Landsat

Geographic Coverage: South America

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

Information delivery: summary report, web map

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

http://www.terra-i.org

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)

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
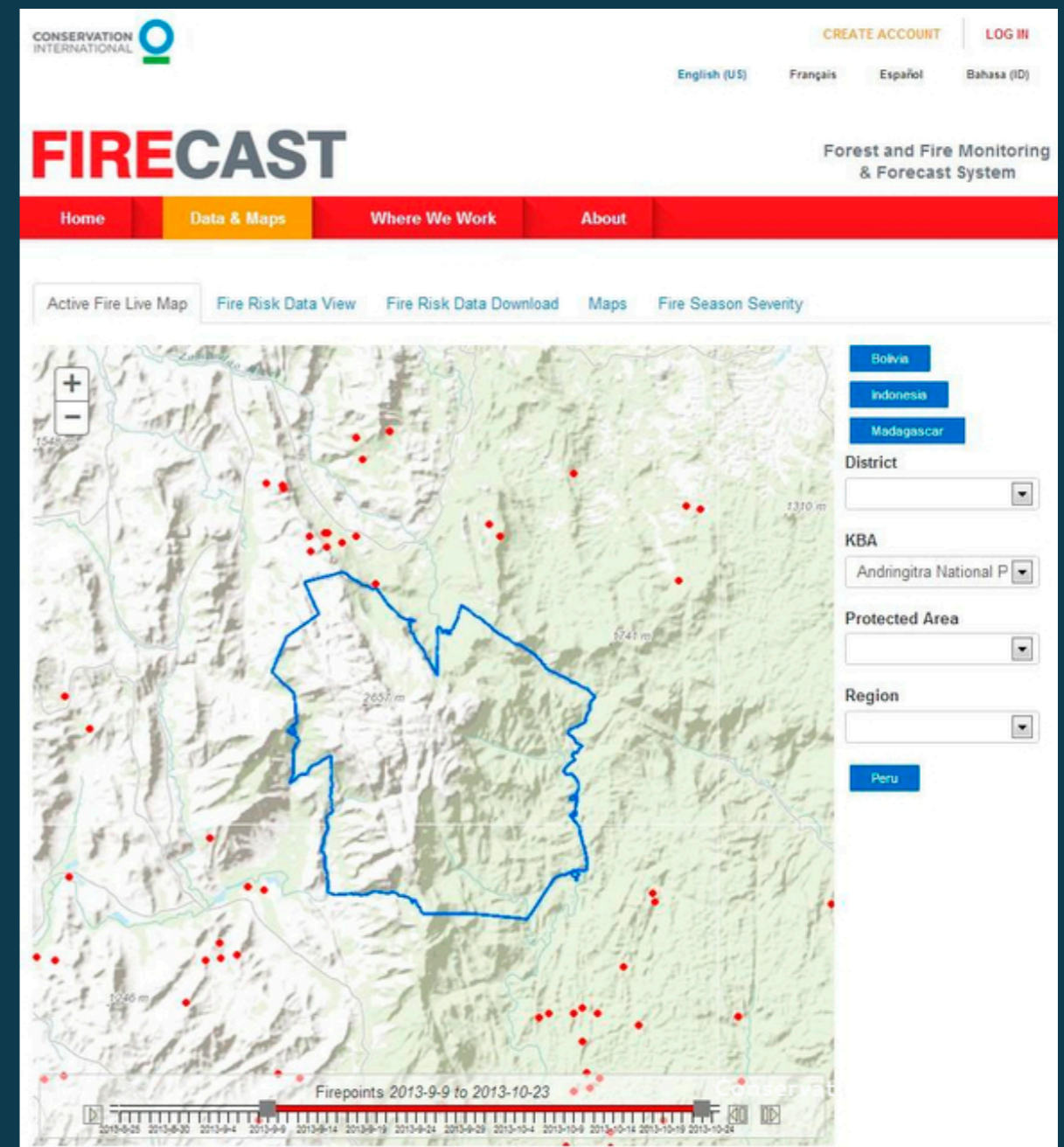
Global Forest Watch/ Global Fires

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)
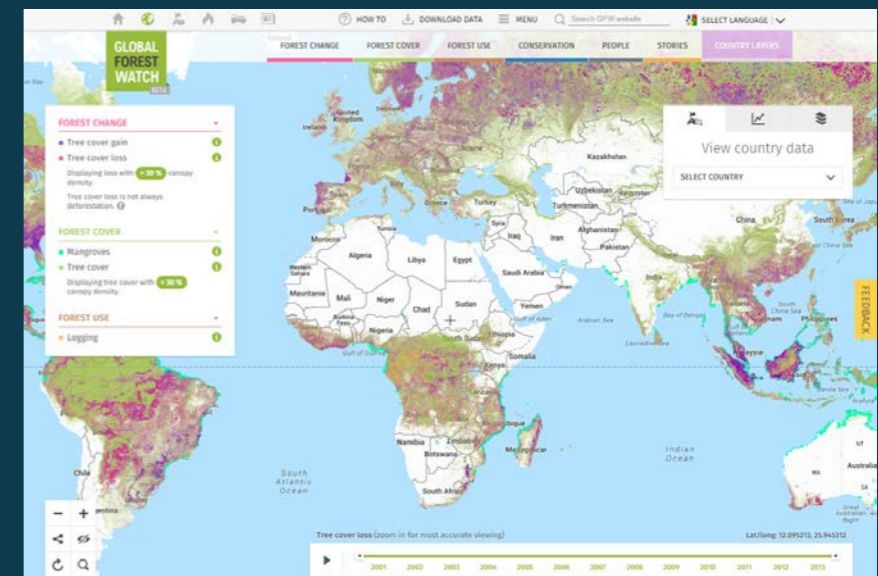
Data Source: MODIS, Landsat, NOAA-18

Geographic Coverage: Global

Focus: biodiversity, concessions, infrastructure, indigenous communities
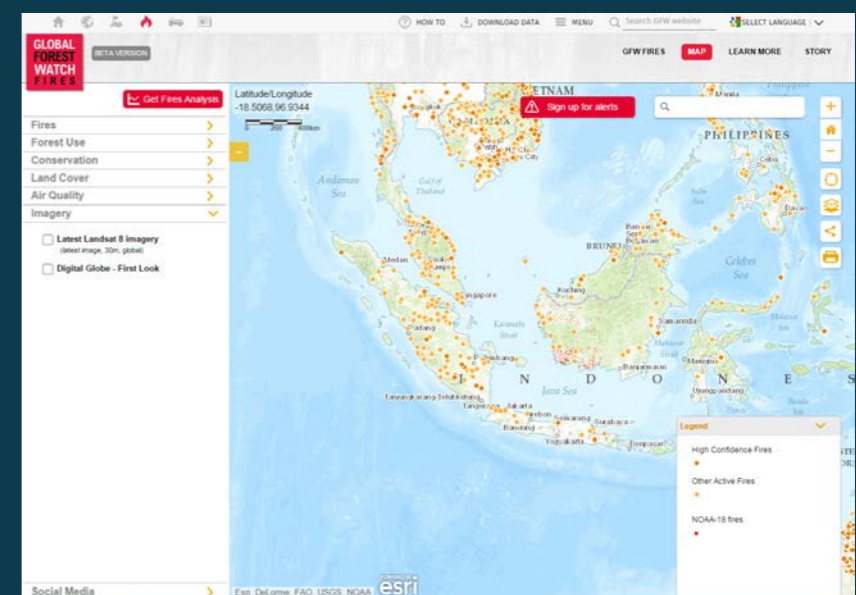
Information delivery: web map, email or SMS alerts, mobile app *coming soon*

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, pol 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
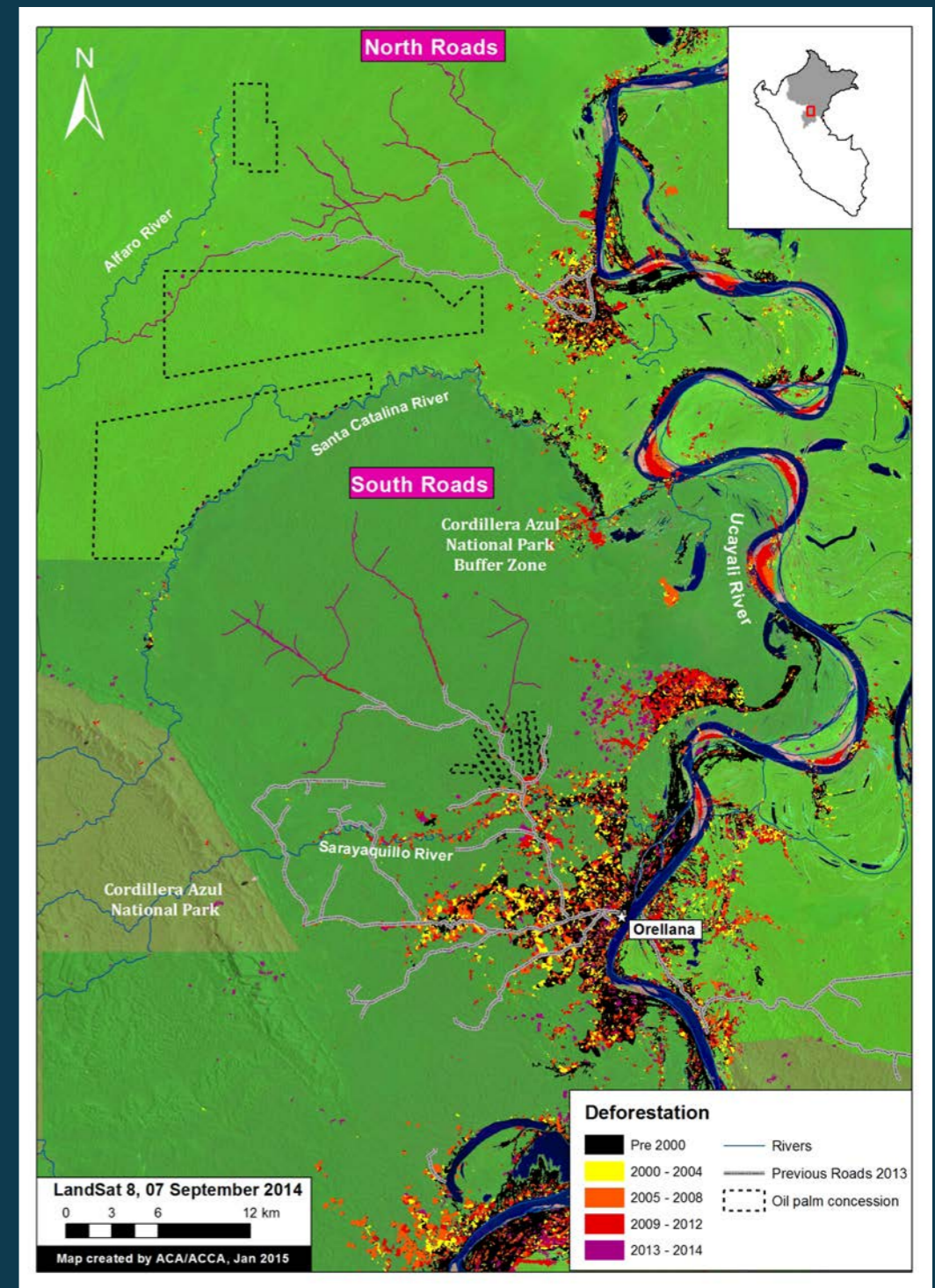
http://maaproject.org/en/

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

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