MONITORING TROPICAL DEFORESTATION IN SUPPORT OF REDD+

SUMMARY

Title
Monitoring global deforestation in support of REDD+

Service
- Maps for forest cover and forest-cover change (on a sample basis (JRC/FAO), or wall-to-wall approach (UMD/Google))
- Global maps of forest cover and deforestation available from Global Forest Watch service of the World Resources Institute (WRI-GFW)

End users
European policy entities (DG CLIMA, DG DEVCO) and development funds providers, national and local authorities in the regions concerned

Intermediate users
World Resources Institute, FAO (Global Forest Resources Assessment program), FAO/UNEP/UNDP (UN-REDD programme), EC–JRC

Application(s)
- Timely and up-to-date information on the location and condition of forest resources, forest change based on multiple snapshots, forest tracks, deforestation analyses
- Climate change mitigation

Models used
Status and trends, derived from remote sensing imagery, forest models, multi-sectoral sources comprising ground networks and partnerships with international bodies, consolidated in information systems

Climate data records used
Global land cover and forest validated distribution for tropical belt

Satellite observations used
- Multi-spectral optical imagery for mapping and monitoring: mainly Landsat satellite imagery (TM/ETM+ sensors at 30m resolution), complemented by similar types of satellite imagery, e.g. SPOT (20–10m resolution), ALOS (AVNIR-2 sensor) and RapidEye (6m resolution). From end of 2015: Sentinel-2 (10 m resolution)
- Multi-spectral optical imagery at very fine resolution for validation (e.g. visual interpretation from GoogleEarth imagery, Rapideye, Quickbird)
- Complementary radar-based forest mosaics at 50–100m resolution (ALOS PALSAR)

Agencies that produce records
- USGS (Landsat), SPOT-Image (SPOT), JAXA (ALOS), EC/ESA (Sentinel-2), Private operators (Rapideye)
- EC-JRC (crop products)
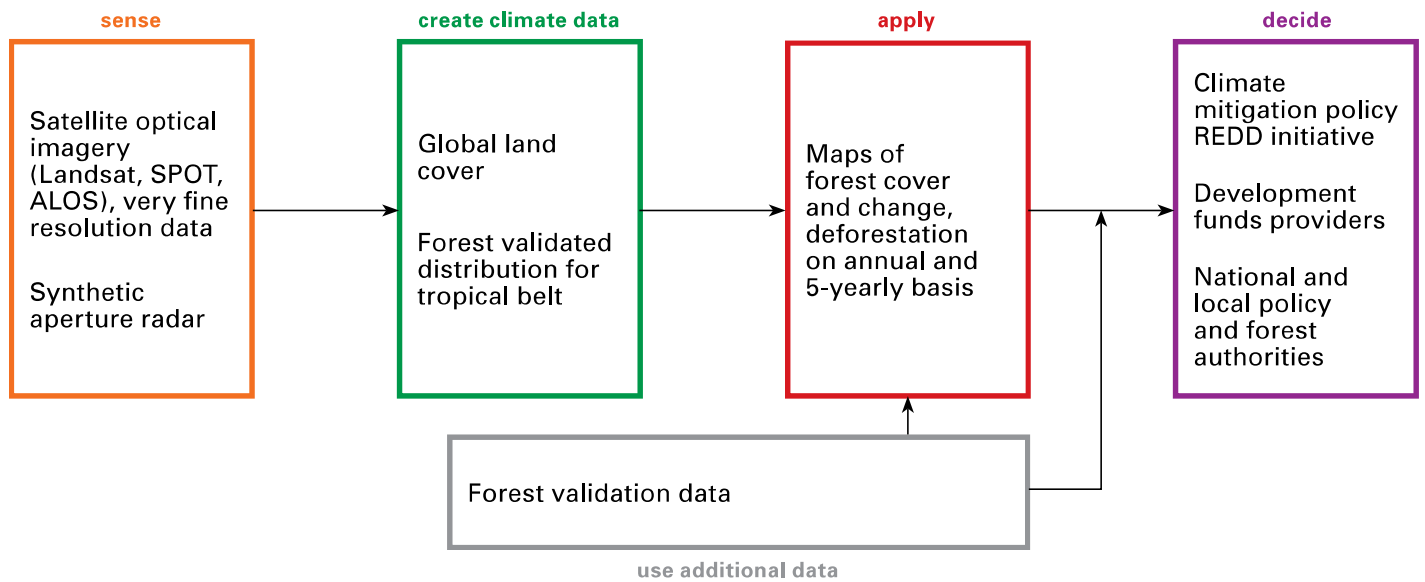- University of Maryland (UMD)/Google for WRI-GFW service

Sustainability of service (demonstration or ongoing)
Sustainable operational service providing periodic multi-annual assessments (5-years) or annual assessments

Logging road in East Kalimantan, Indonesian Borneo

NEIL PALMER (CIAT)

INFORMATION FLOW

sense → **create climate data** → **apply** → **decide**

sense	create climate data	apply	decide
Satellite optical imagery (Landsat, SPOT, ALOS), very fine resolution data Synthetic aperture radar	Global land cover Forest validated distribution for tropical belt	Maps of forest cover and change, deforestation on annual and 5-yearly basis	Climate mitigation policy REDD initiative Development funds providers National and local policy and forest authorities

Forest validation data

use additional data

DESCRIPTION

As global environmental problems affect the security and prosperity of European Union (EU) citizens, the EU is a key player in global efforts towards sustainable development and climate change mitigation. The EU uses its various instruments which facilitate its engagement with third world countries on issues that are of global concern, such as climate change and environmental protection.

The outcome documents of the Rio+20 United Nations Conference on Sustainable Development include a frame-work for action on forests (UN, 2012). The framework includes three elements. First, it calls for enhanced efforts to achieve sustainable forest management, reforestation, restoration and afforestation. Second, it supports all efforts that slow, halt and reverse deforestation and forest degradation in an effective manner. Third, it notes the importance of ongoing international initiatives such as activities for Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD+) under the United Nations Framework Convention on Climate Change (UNFCCC).

The service presented here contributes to the assessment of EU and global forest resources. Timely and up-to-date infor-mation on the location and condition of forest resources, and internationally-agreed methods for the monitoring, reporting and verification component of REDD+ are needed to properly define, target, implement and evaluate policies related to the UNFCCC and the EU Forest Law Enforcement Governance and Trade scheme (FLEGT).

The information derived provides quantitative measure-ments of changes in global forest resources with a focus on Eurasia and the tropics. A single system consolidates information on status and trends derived from remote sensing, forest models, multi-sectoral sources comprising ground networks, and partnerships with international bodies. These can be synthesised into data maps such as those in Figure 1. From a technical aspect, the European Commission Joint Research Centre provides tools for the monitoring of forest ecosystems which rely heavily on data from Earth-observing satellites. The system generates regional forest maps, tracks areas of rapid forest change and produces estimates of changes in forest cover for the current and previous decades. Other forest monitoring initiatives using satellite data, such as the DETER and PRODES programmes of the Brazilian National Institute for Space Research (INPE) and the World Resources Institute (using MODIS, CBERS and Landsat data) are complemented by the service.

The service supports the development of the European climate change policy, especially concerning REDD+. Biomass maps and carbon emission estimates will be produced for selected tropical forest ecosystems. The Joint Research Centre products will be made available as input to future climate change impact scenarios in support of the UNFCCC. The products also play a role in developing internationally-agreed methods to estimate greenhouse gas emissions that result from deforestation in developing countries.

The Joint Research Centre's activities, products and services presented here also support the EuropeAid programme of the European Commission Directorate-General for Development and Cooperation (DG DEVCO). The Centre's objectives for EuropeAid are to strengthen the capacity of tropical countries and the tropical region to monitor forest resources (in the framework of REDD+ or FLEGT).

Remote sensing data is essential in monitoring deforestation. Deforestation monitoring is crucial so that countries may benefit from REDD+. Products and services derived from remote sensing data provide vital information that can be used for the National Greenhouse Gas Inventories in the forestry sector and that will contribute to spatially explicit national reporting in line with IPCC guidelines.

To enhance the Global Forest Resource Assessment using satellite data, FAO and the Joint Research Centre produced the Global Remote Sensing Survey (FAO, 2009; 2015). Remote sensing is complementary to Forest Resource Assessments: until 2015 they have mainly been based on national data that countries have provided to FAO in response to a common questionnaire. FAO would then compile and analyse the information and present the current status of the world's forest resources and their changes over time. The assessments have a wide scope and a comprehensive perspective on global forest resources, their management and use.

References

FAO, EC-JRC, SDSU and UCL, 2009: The 2010 Global Forest Resources Assessment Remote Sensing Survey: an outline of the objectives, data, methods and approach. Forest Resources Assessment Working Paper 155. Rome, FAO and FRA RSS partners.

FAO, 2015: Global Forest Resources Assessment – The Global Remote Sensing Survey, http://www.fao.org/forestry/fra/remotesensingsurvey/en/.

United Nations, 2012: The future we want. United Nations General Assembly Resolution 66/288, http://sustainabledevelopment.un.org/futurewewant.html.
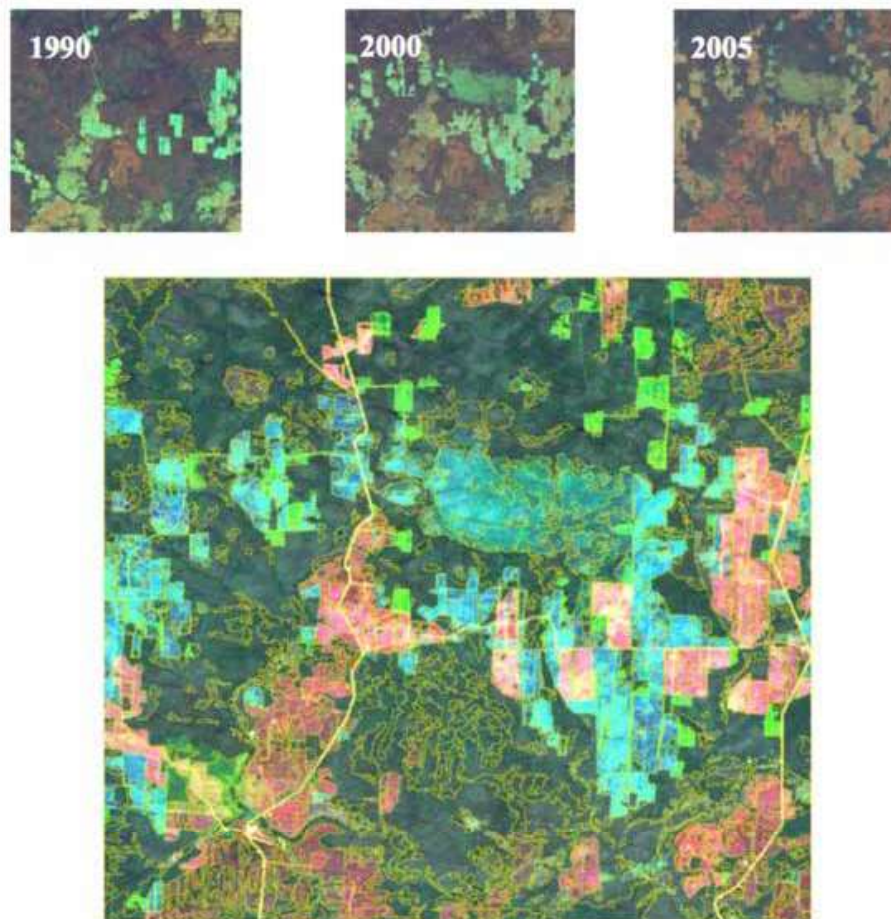
Figure 1. Time 1, 2 and 3 imagery (above) combined into a multi-data image (below) with segmentation polygons overlaid (in yellow). Clearings present in time 1 (1990) appear red, new clearings in time 2 (2000) appear blue, and new clearings in time 3 (2005) appear light green. The single polygon layer from segmentation includes all of this information and will contain classification labels for each time period.