



Technical Feasibility of REDD Mapping and Monitoring

Scientists have agreed, and the UNFCCC has formally recognized, that limitations in the science and technology of forest monitoring can no longer delay action on REDD. The research community has made impressive progress in recent years in the field of mapping forests with remote sensing, and its integration with forest inventory data.

Improvements in remote sensing now make forest monitoring on a national, sub-national, and global scale a realistic option for countries without traditions of extensive ground-based inventory systems. Improvements in wall-to-wall mapping of forest cover allow governments, indigenous and forest-dwelling communities, and other stakeholders to see the extent of their forests and the changes occurring, and more importantly, for forest communities to contribute to the verification and improvement of forest maps through participatory mapping processes that combine technology with local expertise to create the most accurate maps possible.

Where do things stand with satellite monitoring technology at the moment?

Although there are still a few limitations of satellite-based monitoring approaches for REDD, the existing approaches have already been demonstrated to be practical for determining baseline deforestation rates against which future rates of change can be assessed. Methods to map and monitor forest degradation, in which only a portion of the forest stock is removed, have also been developed that allow large-scale and relatively cost-effective monitoring of selective logging activities. Semi-automated degradation mapping is under development, and has been demonstrated to be a reliable method to further reduce the cost of degradation monitoring when tailored to specific conditions.

Satellite monitoring of changes in carbon stocks has advanced substantially in recent years, with the development of new data mining techniques and the advent of a range of new (and planned) satellite sensors that provide unique information about vegetation structure and aboveground biomass. These methods are expected to reduce, but not eliminate, the need for rigorous field inventory data.

Today, a wide range of optical, radar, and lidar satellite sensors with high, medium, and low resolution, are available to inform tropical forest monitoring efforts, and new satellites specifically designed for biomass mapping will become operational within the next few years.

Work to support countries in their efforts to establish forest monitoring systems and to link ground-based inventories with satellite data has been undertaken by several international initiatives:

- GOF-C-GOLD has produced a handbook to identify methods for monitoring and carbon stock assessments. The handbook is a living document that is updated with new methods and technology.
- The Group on Earth Observation (GEO) has initiated a Task for Forest Carbon Tracking which has also a focus on coordinating satellite observation strategies optimized for global forest monitoring.
- A Carbon Measurement Collaborative has been formed within the framework of the Clinton Global Initiative to convene remote sensing and carbon modeling experts with data providers and disseminators to support the building of National Carbon Accounting Systems.

What further progress on comprehensive REDD monitoring is needed?

While the aforementioned initiatives continue to encourage research and collaboration, and national-level programs in countries such as Australia, Brazil, India, and others demonstrate their feasibility, there remains a capacity gap in many developing countries to be able to apply these systems to their national circumstances. Therefore, more support is needed to build capacity in these key areas:

- **Provide support needed to developing countries to implement and expand forest inventories.** Field inventories are a core need for all countries engaging in REDD. The Food and Agricultural Organization indicates that many countries have not yet established field monitoring sites. Forestry research and the IPCC have set forth robust field measurement protocols, but the cost of labor, equipment, and materials prevent many countries from conducting systematic forest inventories. Technical and financial support should be provided immediately to create or improve standardized national inventory systems for application to REDD.
- **Adopt the updated 2006 IPCC National Greenhouse Gas Inventory Guidelines and train technical staff in developing countries in the use of those guidelines.** UNFCCC parties decided that the UNFCCC National Greenhouse Gas Inventories will provide the data for an eventual reduced deforestation and degradation (REDD) mechanism. The 2006 IPCC National Greenhouse Gas Inventory Guidelines provide the latest science on calculating greenhouse gas emissions. Adoption of the 2006 IPCC Guidelines would provide the latest scientific methods to a future REDD mechanism. IPCC has a small program to train staff from countries in the use of the IPCC guidelines. We recommend additional funding to extend the reach of this program.
- **Build capacity in forest monitoring via remote sensing data.** Many countries do not have staff who are sufficiently trained in remote sensing analysis to determine the patterns and amount of forest change from the available data. This could be addressed through international partnerships or monitoring programs at the regional level until national-level agencies have sufficient capacity for independent monitoring. In addition, training on the application of GIS modeling for reference scenarios is needed for many countries.
- **A thorough assessment of what efforts both at the sub-national and national levels have been successful in slowing or preventing deforestation and why they have been successful is needed.** This would help countries understand what actions would work best to mitigate drivers of deforestation and achieve emissions reduction goals.