



# Activities and research priorities of the GFOI R&D Coordination Component 2021

Sarah Carter, Martin Herold

The [Research and Development Coordination Component](#) of the [Global Forest Observations Initiative](#) works to address methodological and technical issues that are obstacles to progress in developing countries' forest monitoring and GHG accounting efforts. The Component fosters a community of experts to identify science and technologies that can reduce uncertainties and improve the efficiency of forest monitoring efforts; thus addressing unmet country needs.

This document sets out recent **activities**, and future **next steps** including a list of **priority research topics** which will be the focus of the R&D activities for the coming year:

- **Leading the R&D Coordination Component** and engaging with other aspects of GFOI including in the **GFOI Plenary 2022**, where a Component meeting will be held to discuss plans for 2022 and beyond. In the [Plenary of 2021](#), the R&D Coordination Component presented its plans and gathered feedback on its activities and the list of priority research topics (see [presentations day 2](#)). Engaging with other components of GFOI will also be a priority:
  - Contributing to GFOI Methods and Guidance Documentation (MGD) in order to incorporate new research identified through its activities. The R&D Component contributed to the latest revision in 2020 – [MGD3](#)
  - Contributing to the GFOI Registry of Tools through the REDDCopernicus project, where an assessment of available forest monitoring space-assets, tools, data and infrastructures was conducted.
- **Assessing and tracking the operationality of new and existing methods, tools, data and platforms** (concepts) using the CALM tool, which uses a Technical Readiness Level approach based on three main levels: research, pre-operational and operational. Concepts are considered in light of their stage of operationality; 'research' concepts require further testing and development and 'operational' concepts require guidance documentation on their use in practice.
- **Promoting several priority research topics**, identified through stakeholder interactions including the GFOI Plenary 2021, the [REDDCopernicus - GFOI R&D workshop 2021](#), other activities of the [REDDCopernicus project](#), and a [Special Issue in Remote Sensing on National REDD+ Monitoring and Reporting](#):
  - **Focus on six key monitoring themes**, and specific priorities identified within these themes: **Degradation and Regrowth, Biomass, Forest Area / Land Cover change, Land Use and GHGs, Early Warning systems and Uncertainty analysis** (Table 1).
  - Ensure research is useful for reporting on relevant policies – with a focus on distinguishing between different land use types, specifically **managed lands** (pasture, plantation forests, and the difference between natural and anthropogenic disturbances)
  - Use of data from **new satellite missions** including for **biomass mapping from space** taking advantage of 6-7 upcoming missions
  - Integration of **Sentinel data** along with Landsat data for example (integration of optical and radar data), in contexts including early warning
  - Use of ground/reference data including **high resolution EO data** for targeted sampling in stratified area change estimation (for long-term monitoring)
  - Exploring the idea of **super-sites for key research activities**, which can demonstrate operational use of new methods and technologies – these might cover specific forest types /ecosystems including dry forests, wetlands (including mangroves and peatlands), and agroforestry systems
  - Encouraging **country-led research** in order to ensure research is demand-driven and the uptake of new research.

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Table 1: Top three priorities for five key Forest Monitoring themes, plus a 6th topic for which priorities within it were not discussed specifically. Numbers are used to indicate orders of priority within each topic, and bullets have been used to indicate no clear preference

<b>Degradation and Regrowth</b>	<ol style="list-style-type: none"> <li>1. Develop appropriate <b>methods for validating forest regrowth and degradation</b> with specific reference to the quality/relevance of the reference data as extracted from VHSR imagery           <ul style="list-style-type: none"> <li>• Improve approaches to assess the <b>type of forest regrowth</b> (age, natural versus plantations)</li> <li>• Improved assessment of <b>degradation definitions versus EO data</b>, in particular linking functional RS-based definitions and ecological / country-specific definitions and processes (shifting cultivation etc.)</li> </ul> </li> </ol>
<b>Biomass</b>	<ul style="list-style-type: none"> <li>• Assess and consolidate techniques (methods, gain-loss/stock-change) and technical characteristics (spatial/temporal resolution) for <b>biomass change analysis</b></li> <li>• Improve <b>reference data and uncertainty analysis/error propagation</b> for improved biomass estimation</li> <li>• Demonstrate suitable approaches for uptake of space-based biomass data by <b>countries of different characteristics (types of forests, available reference data, NFI designs etc.)</b></li> </ul>
<b>Forest area / Land Cover change</b>	<i>Specific priorities were not discussed.</i>
<b>Land Use and GHGs</b>	<ul style="list-style-type: none"> <li>• <b>Separating anthropogenic and natural emissions</b> from disturbance and degradation (for example, for fires)</li> <li>• Rigorously <b>calculating uncertainty</b> and the <b>lack of availability of reference data</b> for emissions and removals</li> <li>• Comparing, reconciling, and combining different kinds of <b>GHG flux models</b> (process-based, inventory, top-down, Earth observation, etc.)</li> </ul>
<b>Early Warning Systems</b>	<ol style="list-style-type: none"> <li>1. Increasing use of early warning. Making information <b>actionable, promote institutional uptake and improve recognition.</b></li> <li>2. Prediction of future deforestation</li> <li>3. Near Real Time degradation monitoring</li> </ol>
<b>Uncertainty Analysis</b>	<ol style="list-style-type: none"> <li>1. Assist countries with <b>suitable approaches for estimating/communicating uncertainty</b> ensuring their applicability with suitable methods for response design.</li> <li>2. Develop <b>rigorous methods for correctly estimating uncertainty</b> especially for emission and removal factors.</li> <li>3. Provide <b>a catalogue of empirical examples</b> for countries to implement and select the most appropriate methods based on their circumstances</li> </ol>

- **Gathering information on user needs** (particularly from the tropical countries themselves), through activities such as the forthcoming GFOI **Country Led Planning** activities. This will feed into the list of priority R&D topics.
- **Holding dedicated expert workshops** on **research priorities**, which synthesize the state-of-the-art of forest monitoring methods, as an input to stand-alone **guidance documents**, that can be ultimately incorporated into the MGD.
- **Engaging with international fora such as the UNFCCC**. In 2021 at COP26, presentations were made at the sessions [UNFCCC, Transparency: Curtail deforestation: how to measure progress? REDD+ tools and methodologies](#) and [EO for Climate Action: Mitigation, REDD+, and the Global Stocktake](#).
- **Working more closely with World Resources Institute, through the GFOI Early Warning Working Group** on [joint R&D activities](#), and contributing to **examples showcasing the use of Early Warning data in the context of tracking selective logging in the Congo basin and other tropical regions**. These demonstrations will be developed as part of the [Earth Observation for Sustainable Development – Forest Management](#) project.
- **Building science networks**, at through a **presentation at the 2022 [ESA Living Planet Symposium](#)** in the session “Forest Monitoring” organized by GFZ (German Research Centre for Geosciences), ESA and Wageningen University.

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