National Forest Measurement, Reporting and Verification, and linkages to the UNFCCC Process

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Why forests?

- A large proportion of global emissions are thought to arise from tropical deforestation
- Reduced deforestation and increased reforestation is a rapid response to reducing emissions
- There are very significant environmental and economic implications that parallel the climate implications

The UNFCCC policy context

- The Kyoto Protocol has limited treatment of forests
  - only post-1990 afforestation, reforestation and deforestation for developed countries
  - only reforestation projects for developing countries
  - Article 3.7 includes national reductions in deforestation against 1990 baseline
    - this is similar to a national reduction in deforestation
- The post-2012 international negotiations are considering broader inclusion of ‘land use, land use change and forestry’
  - The Copenhagen Conference of the Parties in Dec 2009 will be the key negotiation to advance land sector policy

Barriers to inclusion of forests

- **Leakage:** the potential for a climate mitigation project in one area to displace activity to another area, rather than abate emissions.
- **Permanence:** the persistence of emissions reduction made in forest carbon projects.
- **Baselines:** time-series consistent monitoring from archival data can provide a baseline of historical trends. Spatially explicit baselines also allow for insights into sub-national trends.
- **Additionality:** where policy frameworks call for additionality, one or both of two key tests usually apply (1) activity will have effect beyond BAU projections (2) activity would not be otherwise economically viable
- Absence of comprehensive monitoring during Kyoto negotiations was a determining factor in the limited treatment of forests

What is required?

- A focus on operations/logistics
- Coordination of new (often non-government) players
- Capacity building
- Policy relevance
- Integration with other tools

What sets the monitoring requirements?

- The forest international inventory reporting answer lies in analysis of:
  - The **policy frameworks** that have
  - **accounting rules** which is supported by
  - guidelines for **estimation methods** that produce
  - **reporting formats**.
- Science questions and applications are not driven by these same processes – they do not have **accounting** structures

Recurring policy questions determining monitoring need

- Baselines (references scenarios)
- Projections (future scenarios)
- Additionality (additional to BAU)
- Leakage (displacement rather than mitigation)
- Permanence (persistence of gains)
- Transparency
- Verifiability

Benefits of wall-to-wall remote sensing

- Remote sensing aids in addressing each of the previous key policy issues
  - For each of the policy issues, times-series, wall-to-wall remote sensing provides a sound method for land representation
  - The choice of sensor must be matched to country circumstance and performance needs

Global or National?

- Global solutions have been tried before, and would be easier to implement, but:
  - countries have shown they want sovereign control over reporting systems
  - this makes the capacity building task more challenging
  - coordination is required to have a global network of national systems

What is needed?

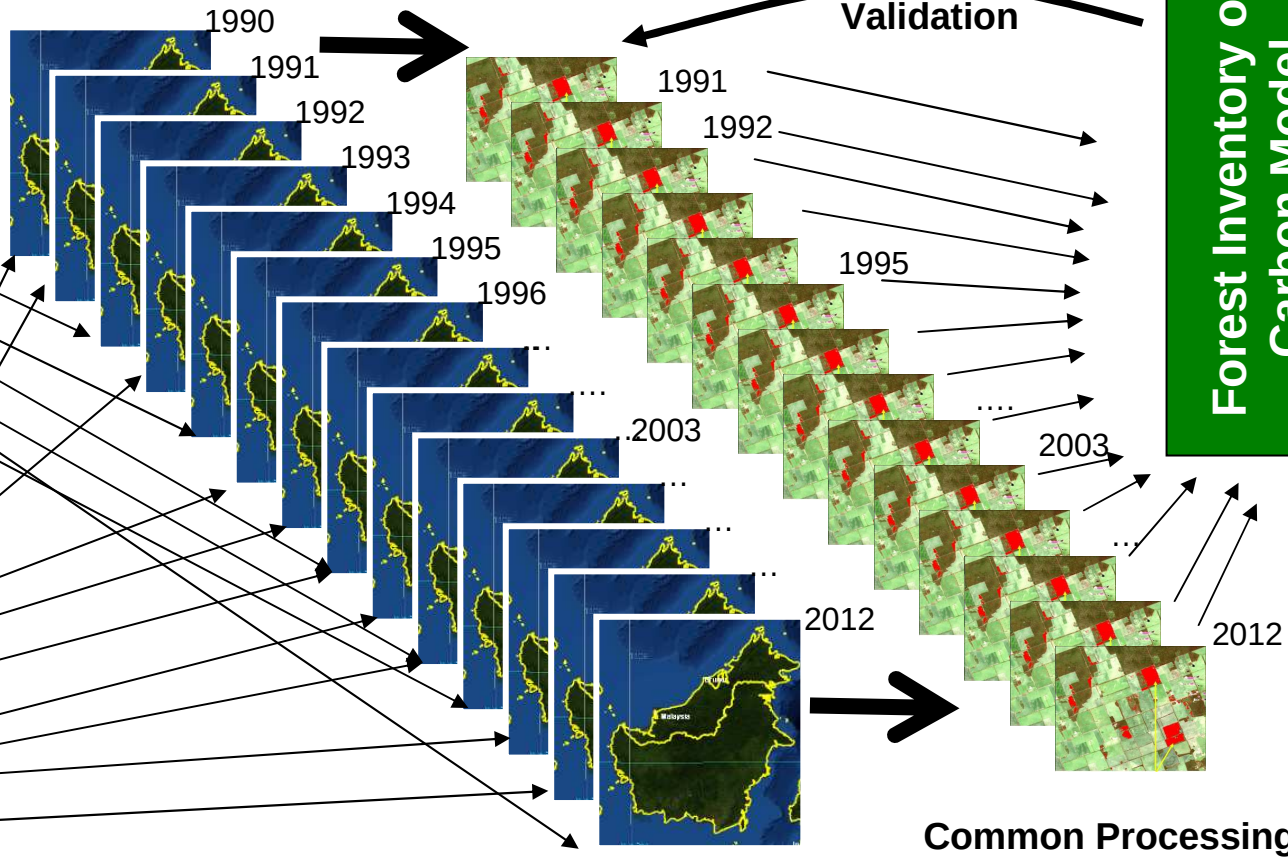
- To deliver wall-to-wall monitoring there are 4 key outcomes that need to be ‘secured’ so that negotiations can proceed with an understanding of potential monitoring approaches

Interoperability in Source of Data

Systematic Satellite Data Acquisitions

SAR

Optical



Time series consistency Is critical

1. Systematic Data Acquisition and Processing

- Affordable, continuous, accessible supply of mid-resolution satellite data, both optical and radar, supported by processing to relevant forest cover information (areas of deforestation and degradation)
- Surety of information supply is the 1st step to showing the policy community both feasibility and commitment

2. Interoperability in Data and Processing

- Debates about ‘best’ sensor or sensor types may be worthwhile scientific debates, but the operational questions are; what instruments are fit-for-purpose, and how can they be made interoperable
- The need to determine past trends will rely on optical instruments while, particularly for many cloud covered countries, radar may be a preferred current option – interoperability is needed to meet the dual goals

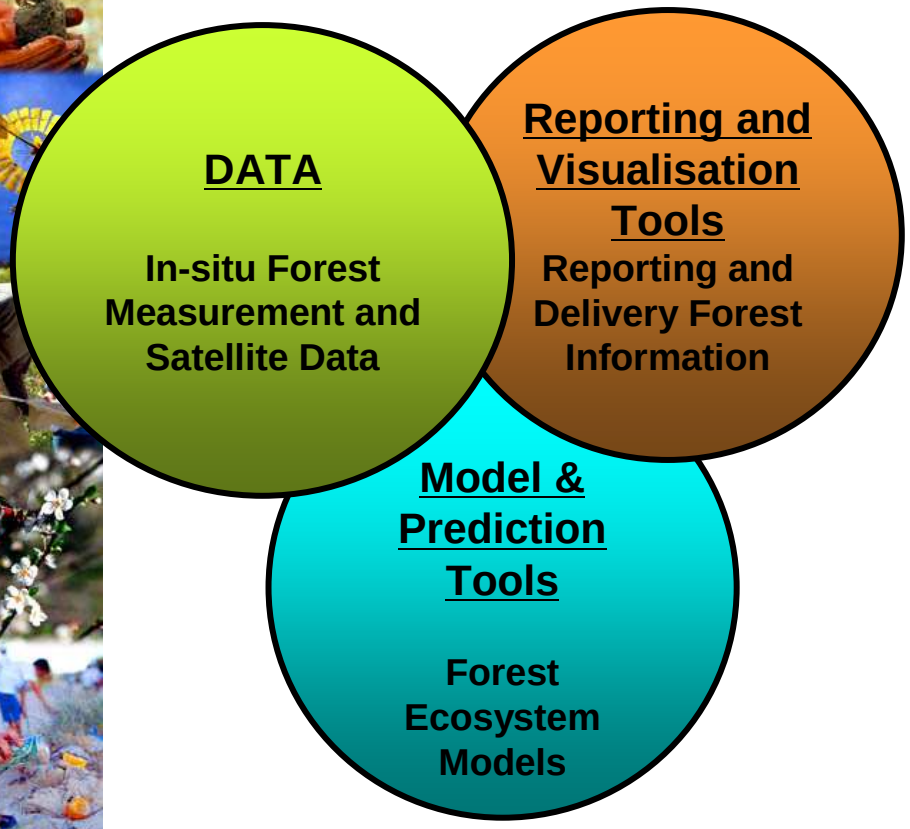
3. Linking in-situ measurement, and remote sensing to emissions estimation

- There are three ways:
  - traditional forest inventories
  - ecosystem models
  - direct satellite measures
- Methods and protocols for this linking should be ‘standardised’ to the extent that users can presume robustness in technical applications

4. Validation procedures

- Protocols and practices for validation need to be developed so that users can presume consistency and accuracy in standards derived
  - The way these accuracies are dealt with in accounting policy is a matter for the user community
  - The technical community should provide information that is consistent and can robustly support the accounting policy rules that will be negotiated

Possible Elements of National Forest Monitoring Systems



The core elements of sovereign national forest monitoring systems are likely to include:

1. Earth observing (satellite) data to monitor areas of forest, deforestation and forest degradation as well as afforestation and reforestation;
2. Land use mapping to determine post deforestation land use;
3. Ground measurements for model calibration, validation and verification;
4. Models to estimate forest ecology or carbon stocks and greenhouse gas emissions from trees, forest floor litter and soils; and
5. GIS systems to hold and present maps, and to produce reports according to prescribed UNFCCC accounting and reporting rules.

The emphasis on each element will change according to national circumstances

Key risks

- Organisational
  - Disorganisation detracting from consistency, interoperability or full systems implementation
- Competition
  - risks ‘best’ defeating consistency

Where does the Research Community fit in?

- As operational considerations come into focus, critical research needs emerge around:
  - interoperability between sensors
  - accuracy assessment
  - linking to emissions estimating tools

The future view

- Aspirational
  - within 5 years a global network of national forest monitoring systems with international coordination and acceptance akin to weather monitoring and forecasting
- Worst-case
  - failure to arrive at standards and interoperability leading to competition between sensors and methods undermining user confidence