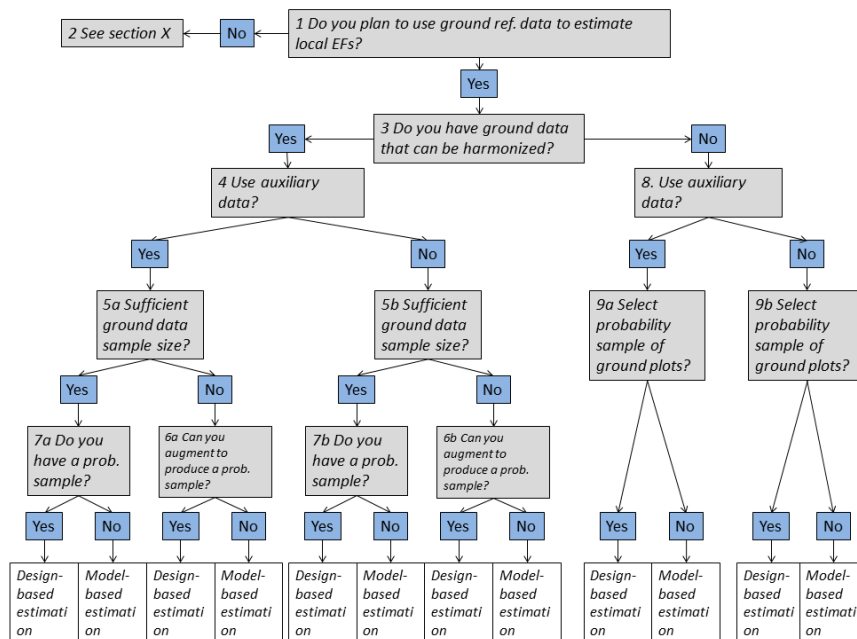


BIOMASS session discussion (synthesis to country):



- 1) Biomass maps can be useful in national estimation:
 - a. Using biomass maps to improve EF (Oslo w/s flowchart) – similar to gain/loss
 - b. Estimating emissions/removals on pixel level – similar to stock change
- 2) More guidance on the use of biomass maps for country GHG inventory estimations needed; growing evidence of approaches but very few concrete country examples – more demonstration and guidance on how to do uncertainty analysis needed that can underpin better guidance to countries
- 3) Oslo flowchart could use expansion to include country situations that are progressing towards a collection more ground reference data/NFI
- 4) Provide guidance towards pixel-based approaches for emissions and removals – not required and do not necessarily comply to IPCC GPG
- 5) How to combine the spatially explicit biomass (change) estimations together with activity information:
 - a. Both have uncertainties that need to be taken into account
- 6) Idea: first order understanding on what the key uncertainties in the data are and how they affect the emissions estimation ... could be put in a decision support tool to explore different uncertainty scenarios in data (sensitivity analysis)
- 7) Uncertainty assessment should aim to assess effects on overall emissions estimations; understanding of the uncertainties of the various input data is essential to achieve that
- 8) When choosing data and methods for estimating biomass and EF, considerations on approaches and efforts needed to estimate the uncertainties need to be taken into account:
 - a. Designed-based NFI
 - b. Biomass maps
 - c. Biomass change predictions
 - d. Spatially-explicit models: the more complex the model the harder it will be to quantify uncertainty and bias
 - e. Need to explain on how to do it/more guidance needed – in many cases this is still a research objective
- 9) Ranked list of quality/uncertainty metrics with different complexities of providing/estimation uncertainties (different readiness levels of countries)
- 10) Efforts are (also) needed to improve ground measurements, allometries etc. (i.e. from TLS)

- 11) Development of a bibliography of methods, examples, case studies, ... check if explanation of terms of MGD needs updating

Guidance to data producers

Biomass mapping:

- 1) Very little usefulness of biomass maps without uncertainties being estimated:
 - a. Uncertainties from the model predictions/estimations
 - b. Global and regional assessments using independent reference data
 - c. More than just r^2 , need to estimate bias (at scale), i.e. on country level
 - d. For both biomass and biomass change estimations
- 2) Uncertainties should be provided and used in estimation
- 3) Need to produce more guidance on how to estimate uncertainties
- 4) Requires ground reference data:
 - a. Global reference databases
 - b. Data from (regional/national) users (also to adjust estimates/reduce bias)
 - c. Reference data availability varies and are scale dependent (plots, ALS)
 - d. Reference data are uncertain as well
- 5) Three satellite missions planned to estimate biomass (BIOMASS, GEDI, NISAR):
 - a. Option to get away of the one sensor/one map approach, strength is in the combination
 - b. Potential of these will be limited for REDD+ if not supported by adequate ground reference data for calibration and validation

Reducing uncertainties in ground data:

- 6) Quality criteria for (re-using) plot data are needed
- 7) Larger plots tend to be more suited to be integrated with remote sensing estimation, given that many NFIs nowadays aim for small plots, important for countries intending to use both ground and RS data for biomass estimation
- 8) Potential of terrestrial laser scanning:
 - a. Improve allometry for tropical trees, reduce underestimation of biomass for large trees given that many countries are using Chave's equation
 - b. Increase transparency and traceability, and ability to produce long-term records of change in canopies and wood damage
 - c. Better data to calibrate remote sensing based estimation, plot scale relationships between height, structure and biomass – research topic
 - d. Interest for TLS to be tested in/with countries (ie. Guatemala)
 - e. TLS community effort to make use of already acquired data across tropics to provide more empirical evidence