How to Do an NFI in 20 Steps

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Topics

- **Overview of Monitoring Steps**
- First Step: Information Needs

Monitoring Phases

- NIMAC and FAO have used similar approaches over the years. We merged the steps into four categories:
  1. Planning (x4)
  2. Remote Sensing (x5)
  3. Inventory Design and Data Collection (x5)
  4. Processing, Reporting and Dissemination (x6)

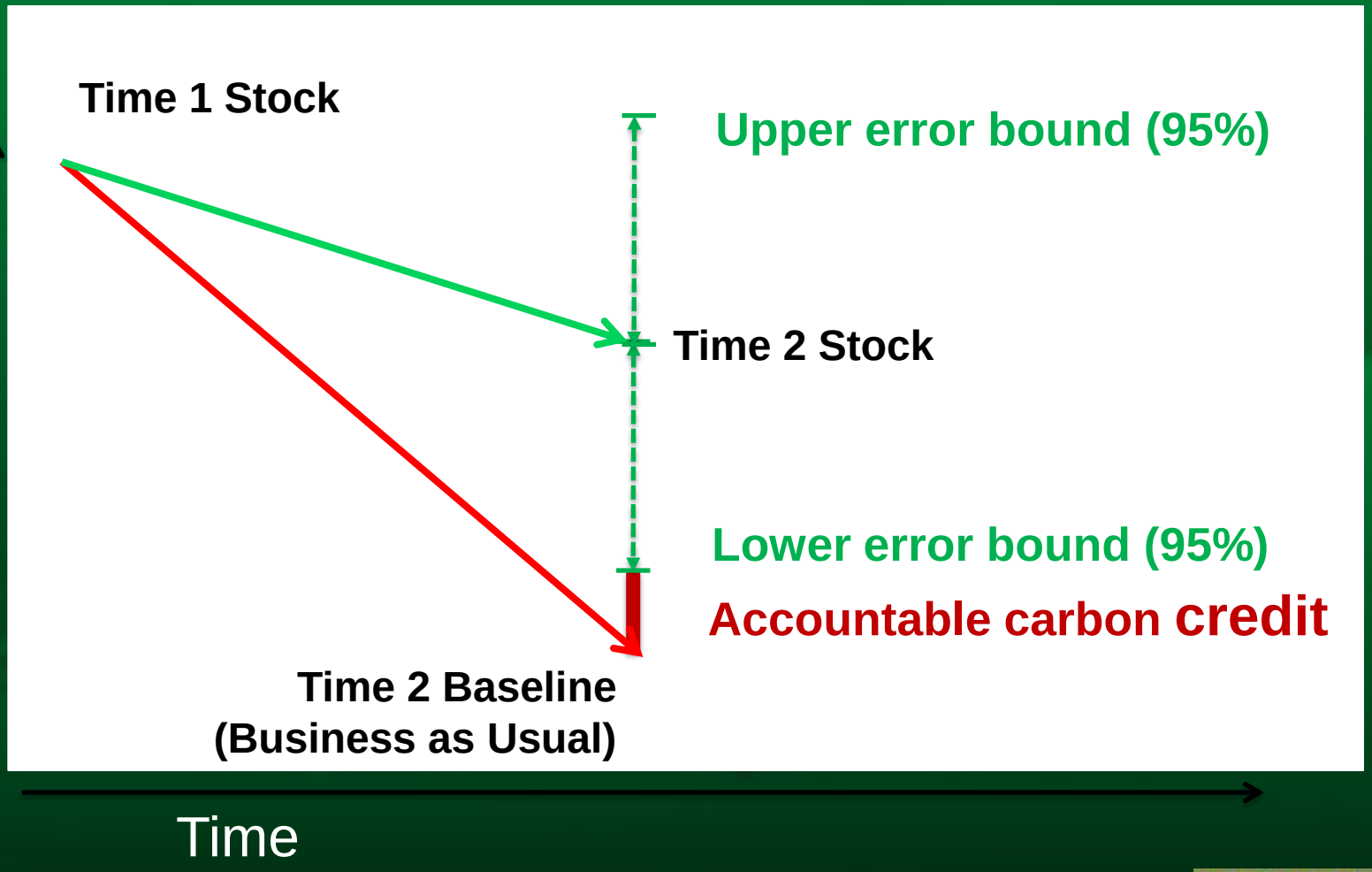
A. Planning Steps

1. Information needs and priorities – determine the information needed to make management and policy decisions.
   a. Identify the stakeholders and customers
   b. The stakeholders identify their broad objectives and those of their customers
   c. Select the monitoring questions to address the objectives
   d. Select metrics (indicators) to answer the questions.

A. Planning Steps (cont.)

2. Assemble and evaluate existing data to answer the questions – Identify the gaps in terms of spatial coverage, remeasurement interval, and in attributes.
3. Set precision and cost requirements – Must assess the risk of making an incorrect decision while balancing monitoring costs. REDD+ payments will be linked to the precision of the estimates.
4. Identify the main monitoring components – for REDD+, these include remote sensing, forest inventory, models of tree carbon, and predictions for Reference Levels (RL).

The "Conservative Principle" for Accountable Carbon Credits



B. Remote Sensing

1. Availability of remote sensing – Analyze the availability of remote sensing sources, and their spatial resolution and frequency.
2. Remote sensing methodologies – determine the remote sensing methods:
   - To support forest classification and stratification.
   - To monitor forests using wall-to-wall imagery or sampling methods.
   - To evaluate historic rates of change.
   - To evaluate map uncertainty including a statistical accuracy assessment.

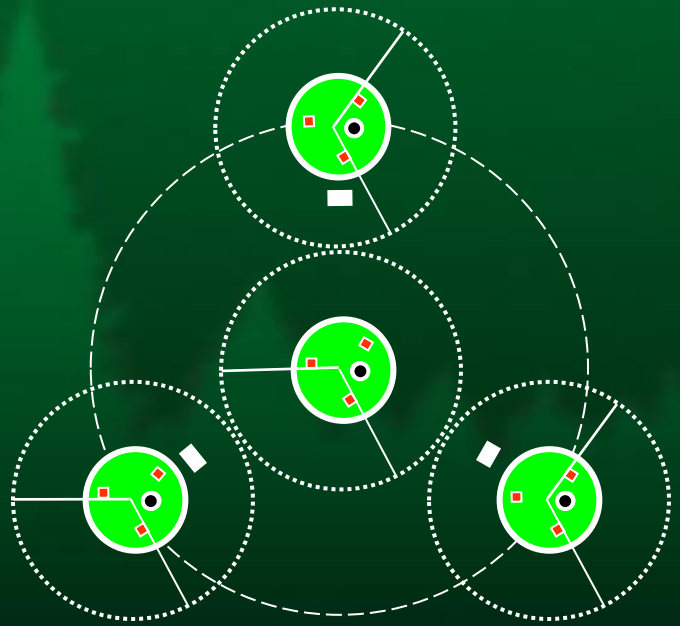
B. Remote Sensing (cont.)

3. Remote sensing implementation - obtain the staff, train them, pre-process imagery, perform the analysis, and perhaps the land use change analysis.
4. Ground data collection – plan for the data collection, develop the field guide, obtain the equipment and materials, train the crews, and perform the data collection, and process the data.
5. Uncertainty analysis and reporting – using the data collected, assess and report on the uncertainty of any maps produced.

C. Inventory Design & Data Collection

1. Identify sampling methodology – including plot configuration, sampling design, estimation methods, use of existing data or pilot survey data to determine sample size.

United States



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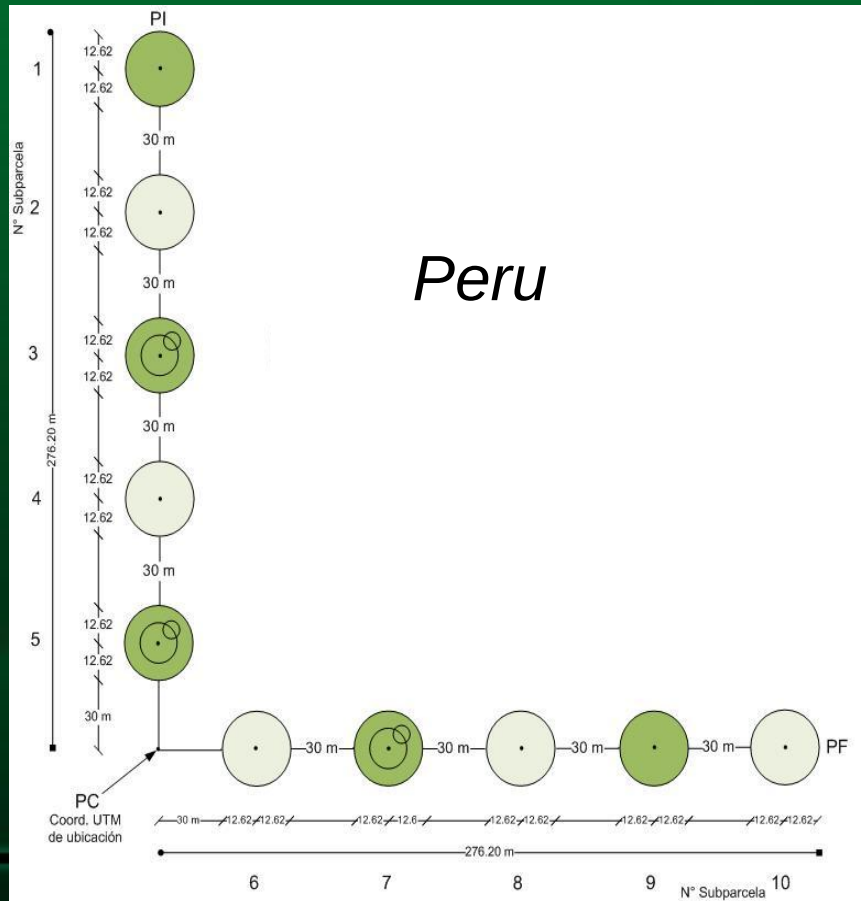
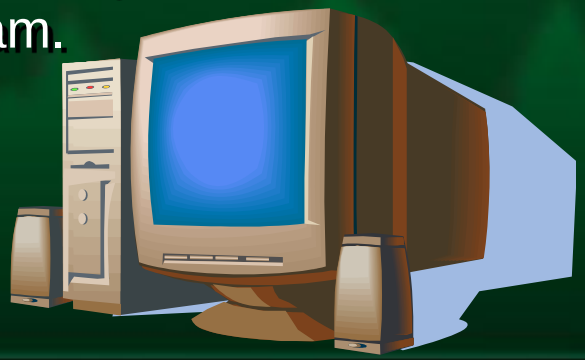


C. Inventory Design & Data Collection

2. Develop a Quality Assurance/Quality Control plan – methods for checking that accuracy of crew measurements. REDD quality criteria: transparency, comparability, consistency, completeness and accuracy.
3. Prepare for field data collection – including logistics, contracts, equipment, field guide, training materials, conducting training, and certifying data collectors.
4. Conduct pilot test of the field logistics, to evaluate costs and precision options, and/or to estimate variability.
5. Conduct data collection. Supervise and provide continued training and QC. The use of Portable Data Recorders is encouraged.

D. Processing, Reporting & Dissemination

1. Design information systems – including the data base, data entry system, data checking and editing, compilation system, and analysis system
2. Enter and store data – either upload data from the portable data recorders or enter from paper forms. Run edit checks on the data – data validation and crosschecks.
   - We have developed Systema Inventario Bosques Publico y Privado (SIBP^2) . Training has been done in Peru, Gabon, Honduras and Vietnam.



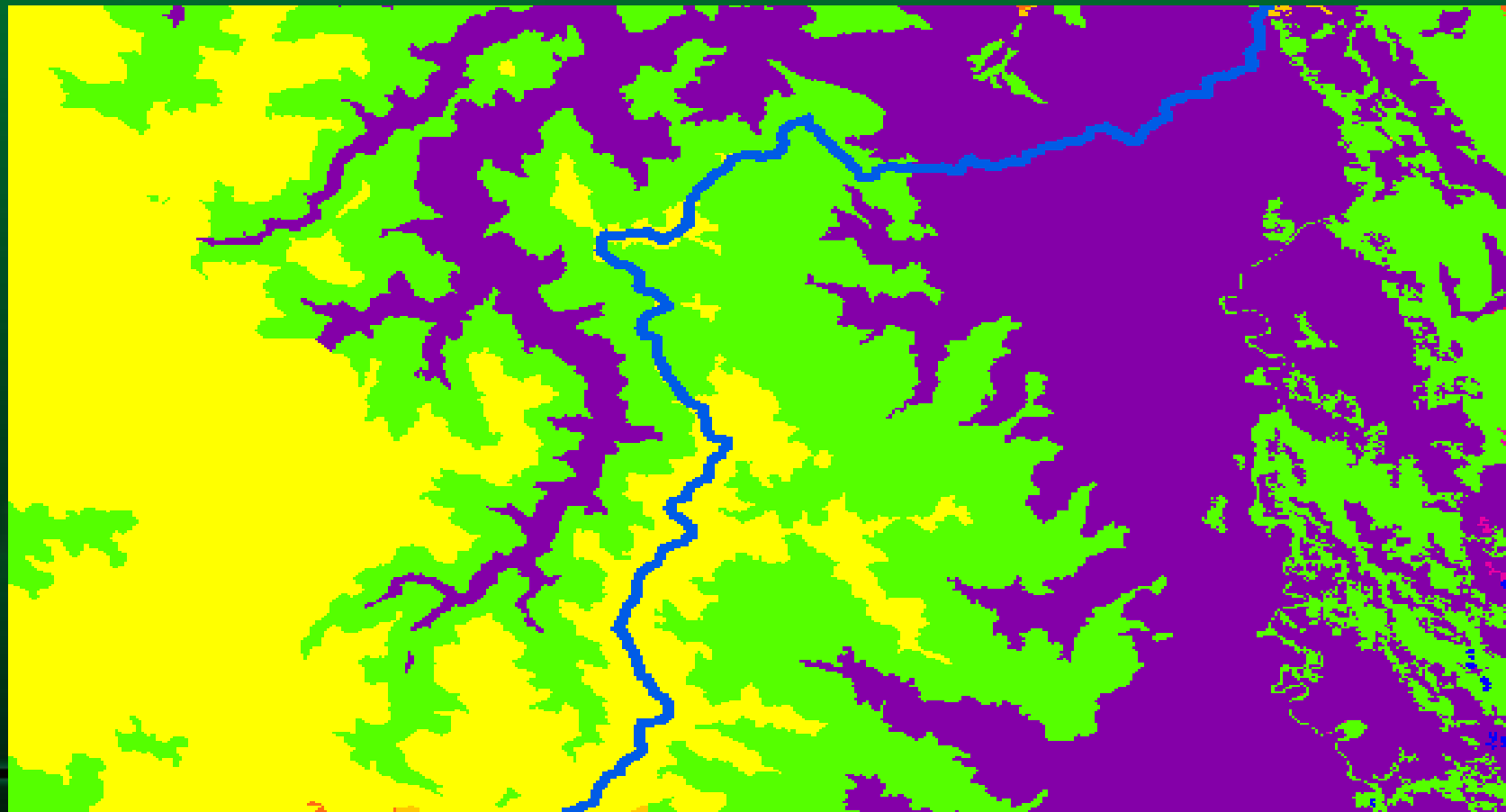
D. Processing, Reporting & Dissemination

3. Process (compile) the data – Once the data are clean, then computed variables are calculated (such as applying models for tree volume, biomass and carbon) and added to the database along with the field data.

4. Analyze the data – Produce tables (with associated sampling errors) to answer the questions from step A.1. Disseminate the *data* via the web. Create and disseminate *reports*.

D. Processing, Reporting & Dissemination

5. Map-based estimation – combine remote sensing data and field samples using modeling methods to make small-area estimates.



D. Processing, Reporting & Dissemination

5. Evaluate results for strategic planning. REDD+ results will be used to make decisions on payments to be made to the country, and as feedback on the efficacy of policies, regulations, and programs.

6. Re-evaluate information needs and monitoring methodologies – Check that monitoring system met the need.

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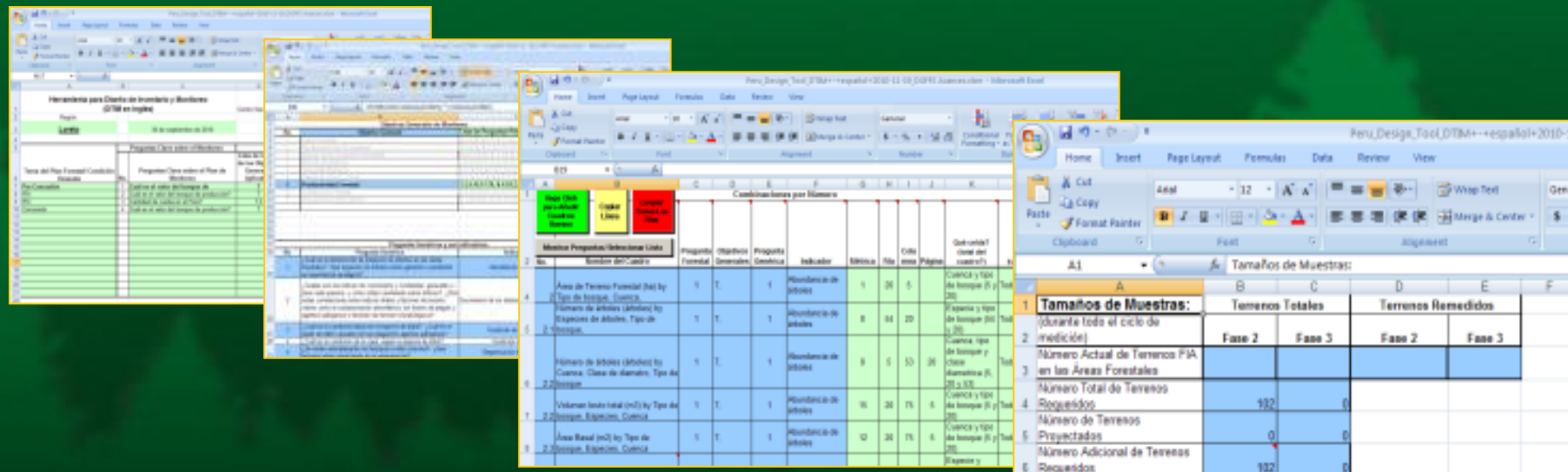
Common Objectives in Forest Inventory

- Forest Health
- Biodiversity
- Value of Forests
- Wildlife Habitat
- Forest Productivity
- Carbon Stock & Flows



DTIM – Design Tool for Inventory & Monitoring

Example Monitoring Questions

- What is the distribution of tree species across the landscape? What tree species are increasing or decreasing in importance?
- Are forests replacing themselves? What factors are impacting regeneration?
- What is the distribution of biomass across the forested landscape? Is total biomass increasing or decreasing? Does total net growth exceed removals?
- What is the current and net change in carbon by pool? How are the changes related to human activity?

Example Metrics (Indicators)

- Area of forest and other land cover (ha)
- Area by management actions (ha)
- Commercial volume of all live trees (m^3)
- Biomass of standing dead trees (oven-dry tons)
- Aboveground carbon of all live trees (tons)
- Belowground carbon of all live trees (tons)
- Soil organic carbon (tons)
- Net change in total forest carbon (tons)

Example:

- Objective: Carbon Stock & Flows
- Question: What is the current and net change in carbon by pool?
- Metrics:
  - Aboveground carbon of all live trees (tons)
  - Belowground carbon of all live trees (tons)
  - Carbon in down dead wood (tons)
  - Carbon in standing dead trees (tons)
  - Soil organic carbon (tons)
  - Carbon in litter (tons)

Estimates of Current Carbon Stocks by Pool

		District		
Carbon Pool	**Total**	District 1	District 2	District 3
Total	**1,736,734**	**1,270,646**	**103,185**	**280,082**
Aboveground	**391,643**	334,354	17,558	39,730
Belowground	**413,159**	353,944	6,008	53,207
Standing Dead	**74,742**	66,190	-	8,552
Down Dead	**10,248**	10,248	-	-
Litter	**122,192**	104,541	8,491	9,161
Soil	**204,486**	189,477	-	15,009

Summary

- Identifying the information needs is often overlooked as the important first step.
- National Forest Monitoring Systems (NFMS) are very expensive, so they must be optimally designed based on the objectives
- The monitoring should be questions-driven based on the reasons for monitoring (objectives).
- What to measure is based on the questions asked.
- Specify the estimates to be made now, so that all the variables needed are measured.
- Begin with the end in mind.

Questions / Comments

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