Data Development Approach for National Forest Inventory in Japan

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1. Japanese Definitions of Forests

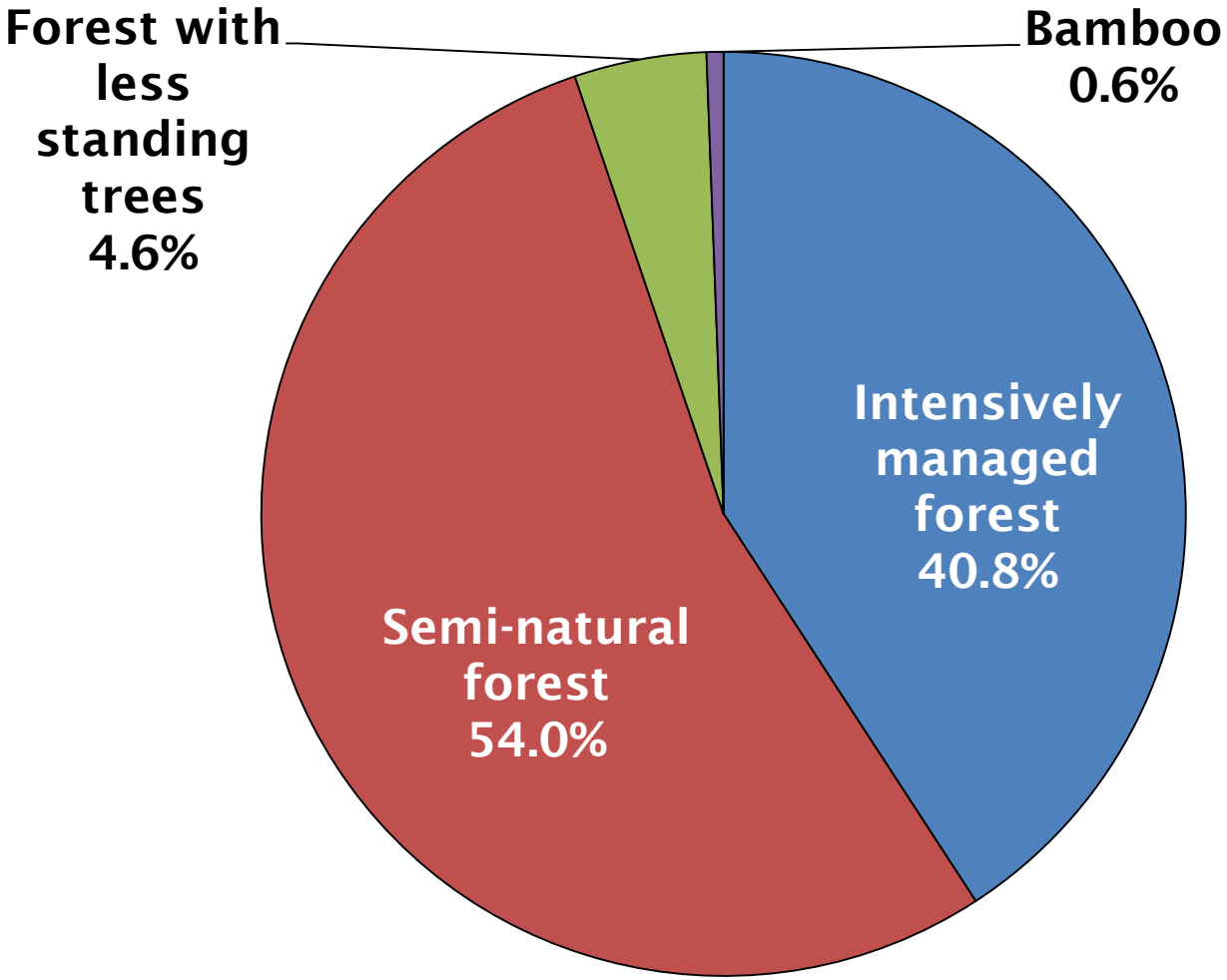
Japanese Definitions of Forests

- **Forests are classified in following subcategories by their definitions**
  1. **Forest with standing trees**
     - *Forest that does not fall under "forest with less standing trees" and has a tree crown cover of standing trees 30% or higher.*

     a. **Intensively managed forest**
        - *Forest land that is subject to artificial regeneration such as tree planting and seeding, and in which no less than 50% of the volume (or the number) of standing trees are of tree species subject to artificial regeneration.*

     b. **Semi-natural forest**
        - *Forest with standing trees which is not classified as intensively managed forests.*
  2. **Forest with less standing trees**
     - *Forest in which the sum of the tree crown covers of both standing trees and bamboo is less than 30%.*
  3. **Bamboo**
     - *Forest, other than "forest with standing trees", in which a tree crown cover of bamboo is 30% or higher.*

Area percentage of forest land in 2016



2. Development of National Forest Resource Database

National Program for measuring and estimating GHGs from Forests

Design Process:

- Collect and analyze country-specific scientific data;
  - BEF of various forest types, carbon stocks in soil organic matter, etc.
- Verify accuracy of existent data;
- Develop effective methods to detect and monitor land conversion;
- Establish emission/removal estimation methods; and
  - Consistency with GPG, formulate ground design for accounting
- Establish nationwide forest database and management system.
  - Data integration by GIS

Operation of National Program

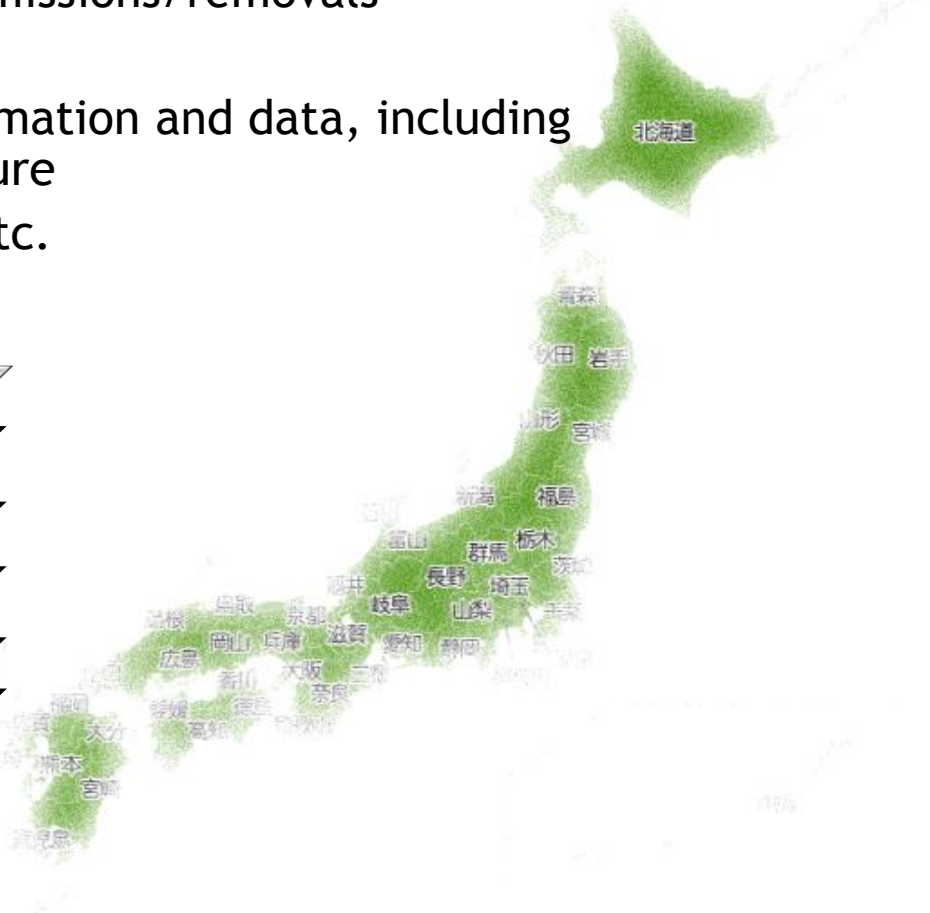
- Time frame:
  - 2003 – 2006 (FY)
- Administration/Coordination:
  - Forestry Agency (MAFF)
- In cooperation:
  - Forestry & Forest Prod. Research Institute;
  - 47 prefectural governments;
  - Ministry of the Environment (MOE);
  - National Institute for Environmental Studies, etc.
- Costs
  - ¥400 Million (2003-2006) incl. establishment of National Forest Resource Database (NFRDB)

National Forest Resources Database

Forestry Agency

Establishment of National Forest Resources Database

- For estimation of forest carbon emissions/removals
- Covering all forests in Japan
- Integration of various forest information and data, including ***Forest Registers*** in each prefecture
  - area, age, species, volume, etc.



FOREST CARBON SINK STRATEGY OFFICE, FORESTRY AGENCY

3. Parameters Development Approach

Data collection for estimating carbon stock changes in living biomass (above/below ground biomass)

Formula for estimating carbon stock from IPCC Good Practice Guidance (GPG)

Carbon Stock (C-t／year)	=	Trunk Volume (m3/yr)	×	BEF	×	1 + R/S ratio	×	Density (t/m3)	×	Carbon Fraction

Trunk volume

Data collection

- Forest registers
  - Attribute information
    - Area, Species, Age, DBH, Volume etc.
    - Volume: Estimation by empirical yield tables
  - Every sub-compartment of all private and national forests
    - Compartments: 370,000
    - Sub-compartments: 33 million
  - Updating every 5 years
  - Linkage with boundaries in forest planning maps

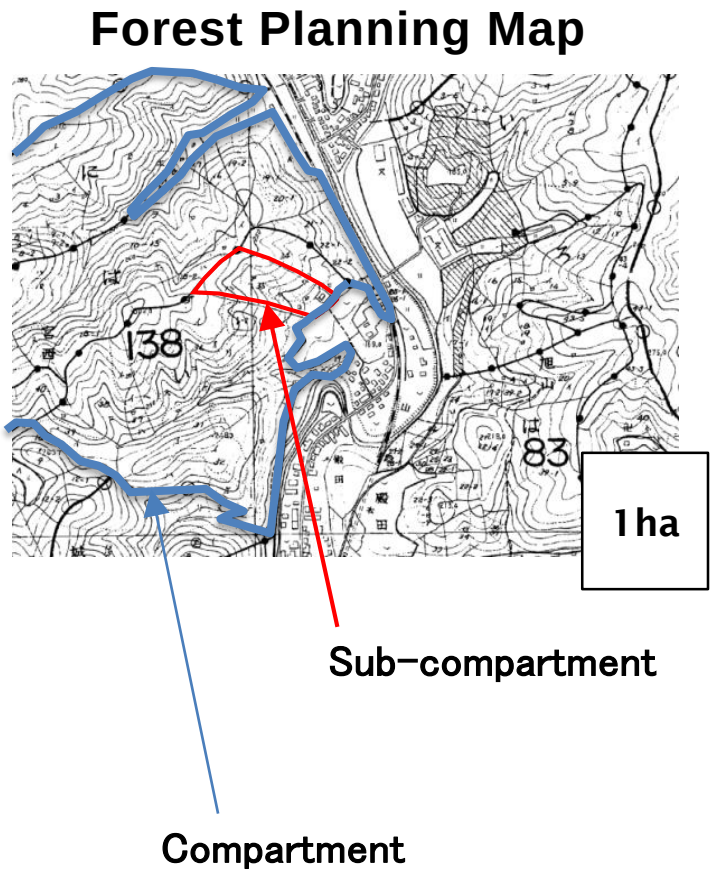
Example format of “Forest registers”

Basin	Planning Area	City/Town	Regional Forest Office	Compartment

Sub Compartment	Location			Forest owner		Type of forest function	Type of forest	Area (ha)	Management type	Tree species		Mixed status		Forest age	Age class	Tree crown density	Average tree height	Level of location	Level of soil-fertility	Harvesting-method	Regeneration-method	Volume				Growth		Management plan	Notes
	Village section	Location code	Location sub-code	Name	Absentee/Living-in-town					Present	Future	Volume Ratio	Area Ratio									per unit area (/ha)	Gross			per unit area (/ha)	Sum (m^3)		
																							N (m^3)	L (m^3)	Sum (m^3)				
										cedar	cypress	80	20	70	30	34	7	2											

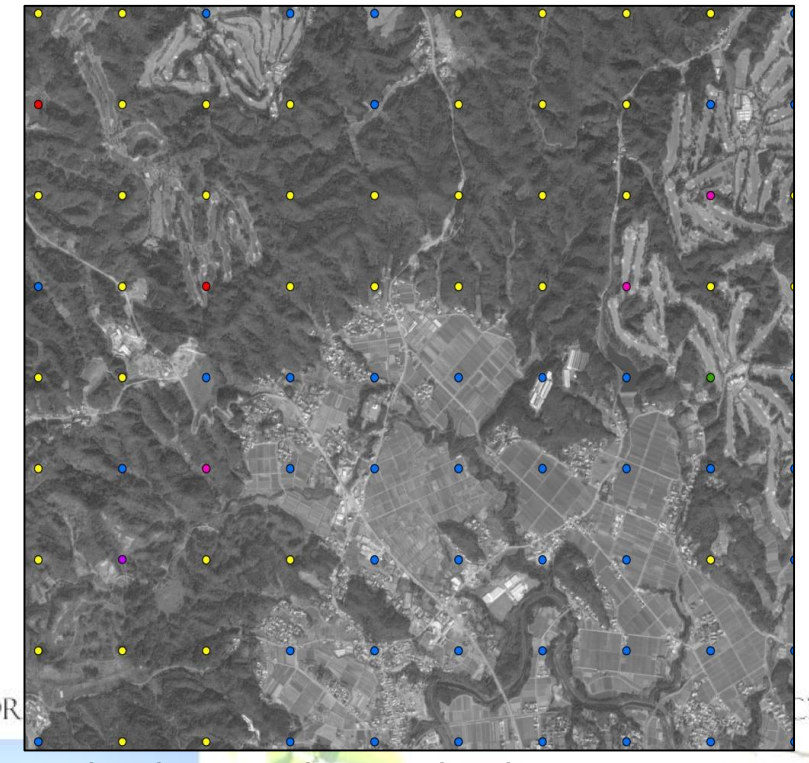
Forest planning map

- Forest planning maps
  - 1/5000 scale maps
  - Boundaries of forest compartments and sub-compartments
  - 100% of the boundaries of forest components have been digitized for GIS.
  - Around 80% of the boundaries of sub-compartments have been digitized for GIS

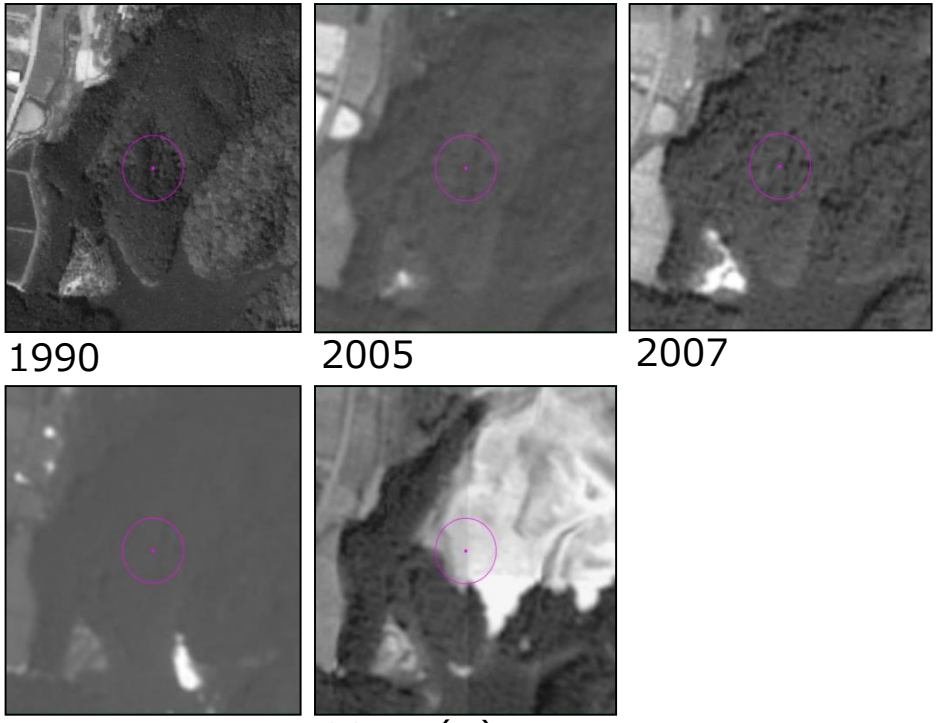


Detection method for land conversion ①

- Set the plot points on the whole country in a grid with an interval of 500m (approximately 1,500 thousands plots)
- Detect land conversion from forest to non-forest and vice versa at each plot point by comparison work using orthophotos
- Sample field surveys are conducted after interpretation



Orthophoto with sample plots (1990) ※Red point : D



An example of image interpretation

Parameters developing methods

- BEF and R/S ratio

  Set based on the results from a biomass survey on dominant tree species and existing research reports

- Wood density

  Set based on the results from a biomass survey on dominant tree species and existing research reports

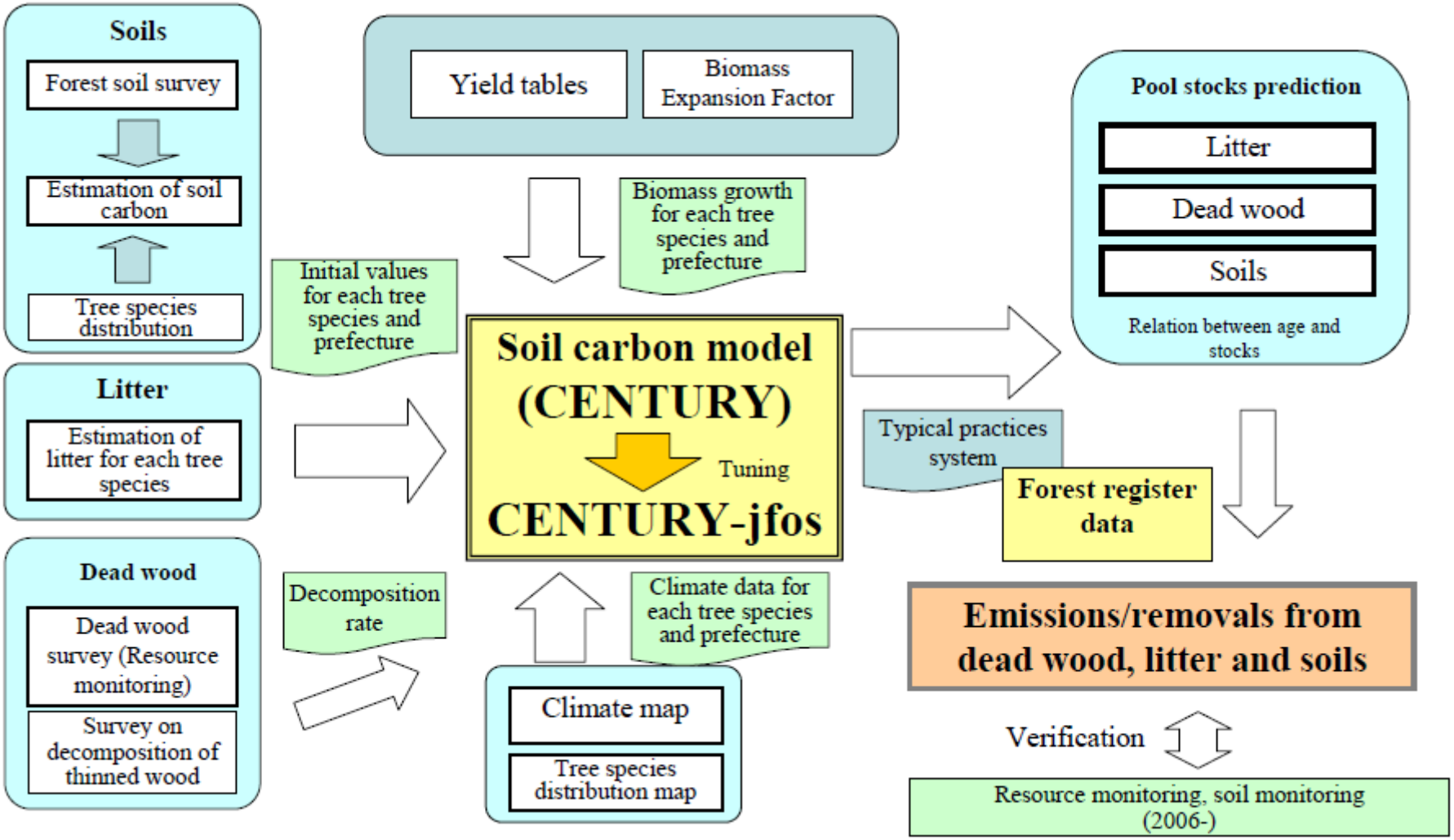
- Carbon fraction

  Japan's research result has been adopted as the carbon fraction

Survey to obtain BEF parameter

Survey to obtain R/S ratio

Estimation method for stock change in pools of dead wood, litter and mineral soils



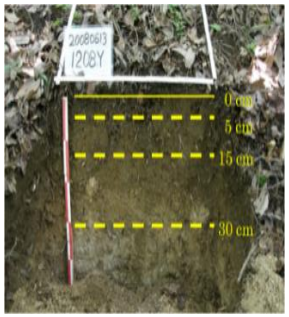
Verification of Emission/Removals from DOM and soils

- Soil survey
  - Making use of plots of 'Forest ecosystem diversity basic survey'※
  - Dead wood surveys are conducted along lines directed to east, west, north, and south from the plots. Additionally, at one of three plots, litter and soil surveys are also conducted at the points directed to east, west, north, and south from the plots

Systematic Sampling Survey plots (red and yellow)

Dead wood
Measure Diameter of dead wood on the ground

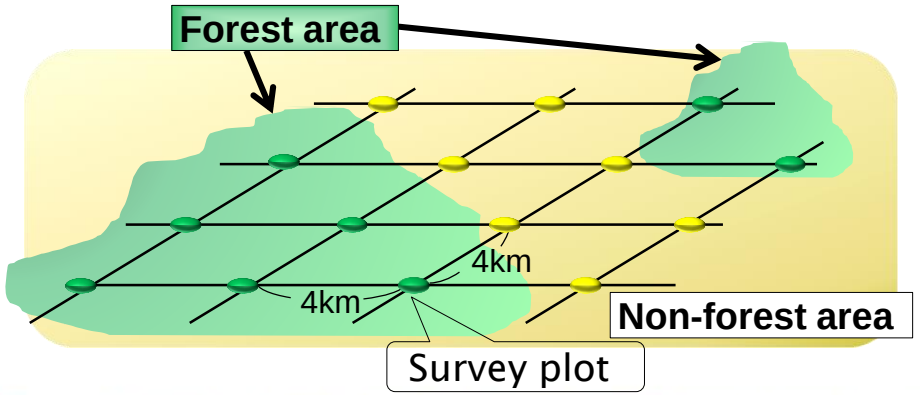
Litter
analyze sample litter in 50cm × 50cm frame



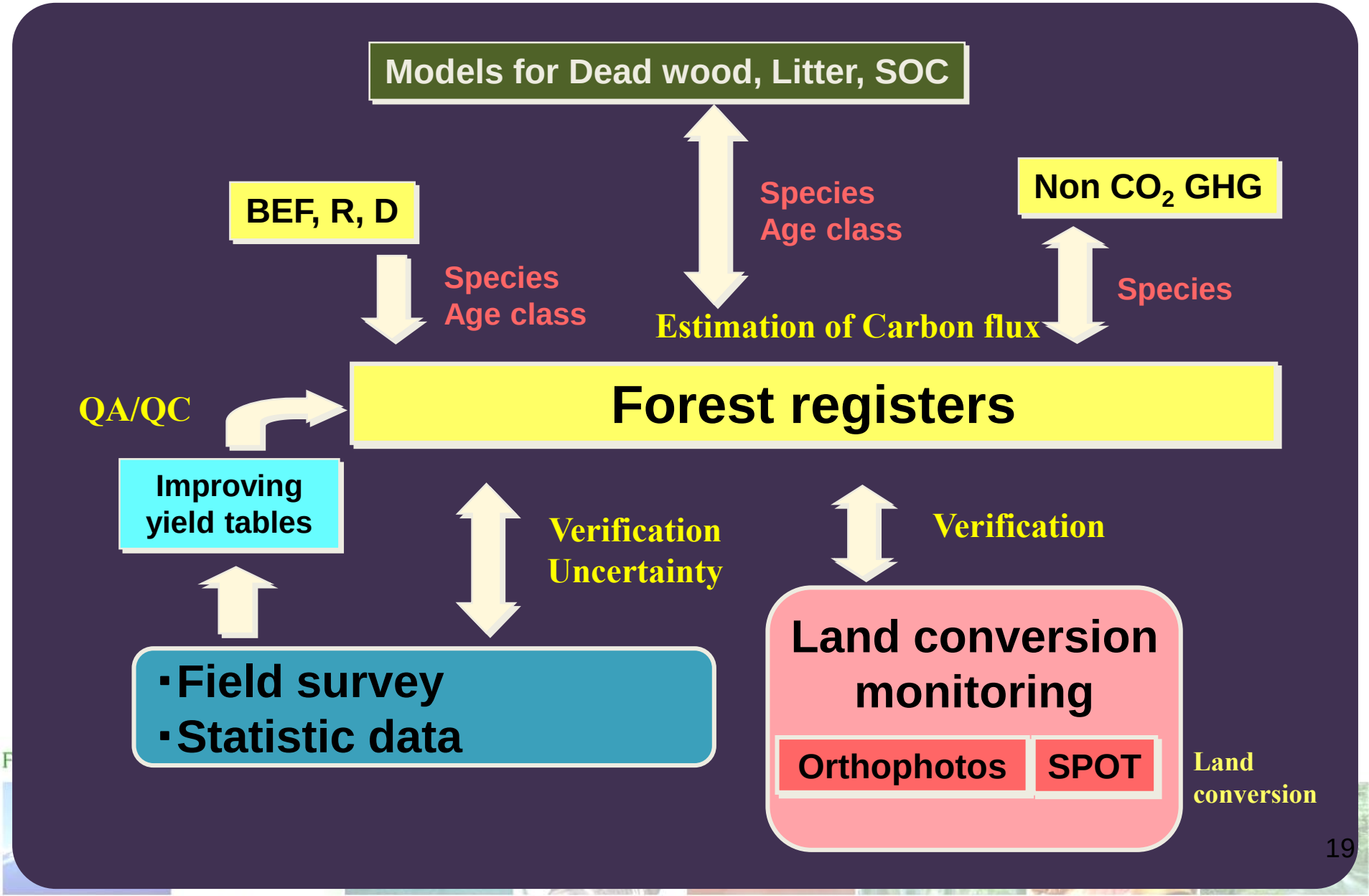
Soil
3 layers in depth of 30cm

※ Forest ecosystem diversity basic survey

- A sampling survey which is conducted at 4km interval grid sampling plots in all over the country
- Field survey is conducted in forest area only
- Dominant species, forest age, forest type, DBH and etc. are surveyed
- Number of plots: about 15,000
- The survey has been conducted since 1999



Total Design of Reporting System



Conclusion

- The approach should be determined depending on data availability and national circumstances in your countries, however development of the first statistics data is very important to improve accuracy of the national GHG inventory.

Thank you for your attention!