

## Estimating Tropical Forest Carbon Stocks for REDD

Forests sequester and store large amounts of carbon in their above-ground (trunks, branches, leaves) and below-ground (roots) biomass. When forests are cleared or degraded, the stored carbon is released into the atmosphere as carbon dioxide (CO<sub>2</sub>). To estimate reductions in emissions from deforestation (REDD), we need to know where and how forests are being cleared, the carbon stored in those forests, and thus how much carbon is emitted to the atmosphere as CO<sub>2</sub> after clearing.

### How can we measure forest carbon stocks?

- *On the ground* – using forest inventory measurements such as tree diameter and height, and then converting them to carbon stocks using available methods.
- *From space* – using remote sensors mounted on satellites or airplanes to measure tree height and size, and then convert to carbon stocks using statistical methods.

### Do we need to measure all forests in a country?

- *We need to measure carbon content in all categories of forests, but not every forest.*
- Forests can be grouped by type (e.g., evergreen, deciduous, swamp) and condition (pristine, logged, regrowing) to capture the major variation in carbon stocks.
- Satellite-based forest maps can help identify the location of different forest categories. Carbon values can then be applied to the map of forest categories.
- These carbon estimates could be applied to past or future forest maps.

### What is needed to improve estimates of forest carbon?

- *Additional ground-based measurements are critically needed* to refine existing methods or develop new ones and to validate results. In particular, we need:
  - Direct measurements of carbon stocks obtained by cutting down trees, drying them, and then weighing their biomass to estimate carbon storage.
  - Forest inventory information collected using sampling schemes.

### How can we estimate emissions from deforestation?

- Estimates of carbon stocks and deforestation can be combined to estimate emissions either across an entire country or region, or by forest category.

- The IPCC Good Practice Guidance (2003, 2006) provides detailed descriptions of methods to estimate forest carbon stocks.
- The most general IPCC method (Tier-1) was used to provide approximate estimates of forest carbon across major tropical regions in the figure to the right.

