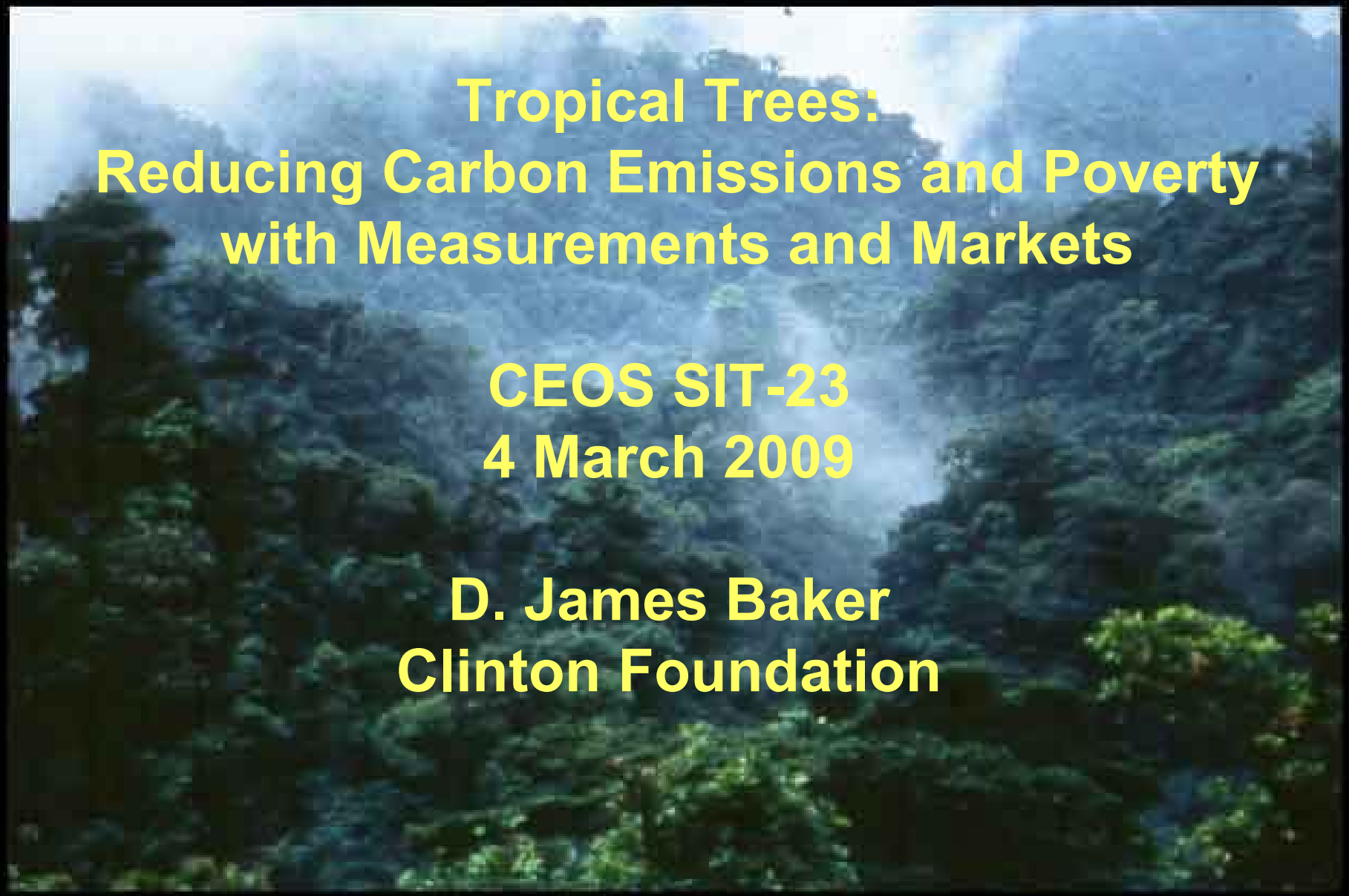
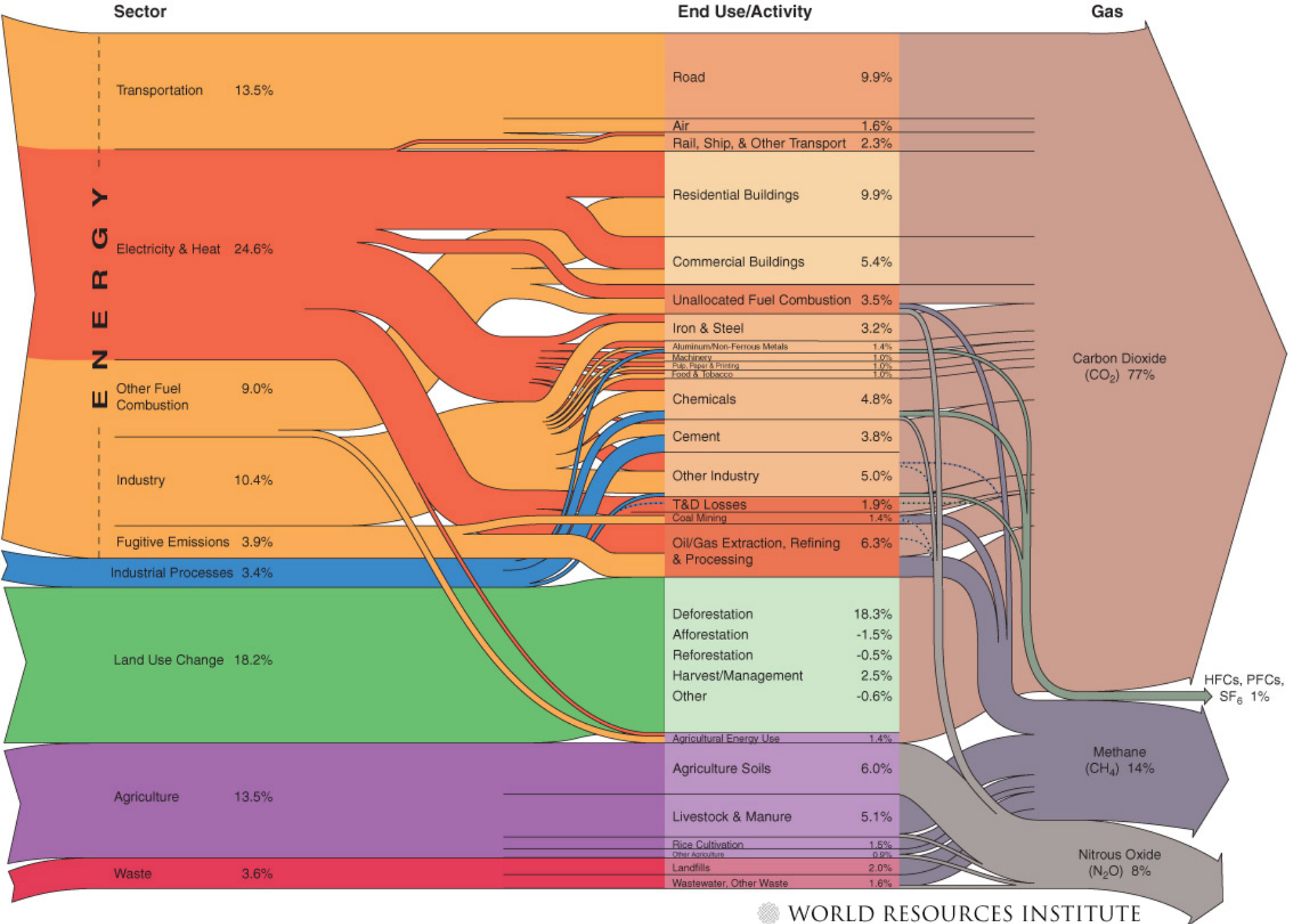


Tropical Trees: Reducing Carbon Emissions and Poverty with Measurements and Markets

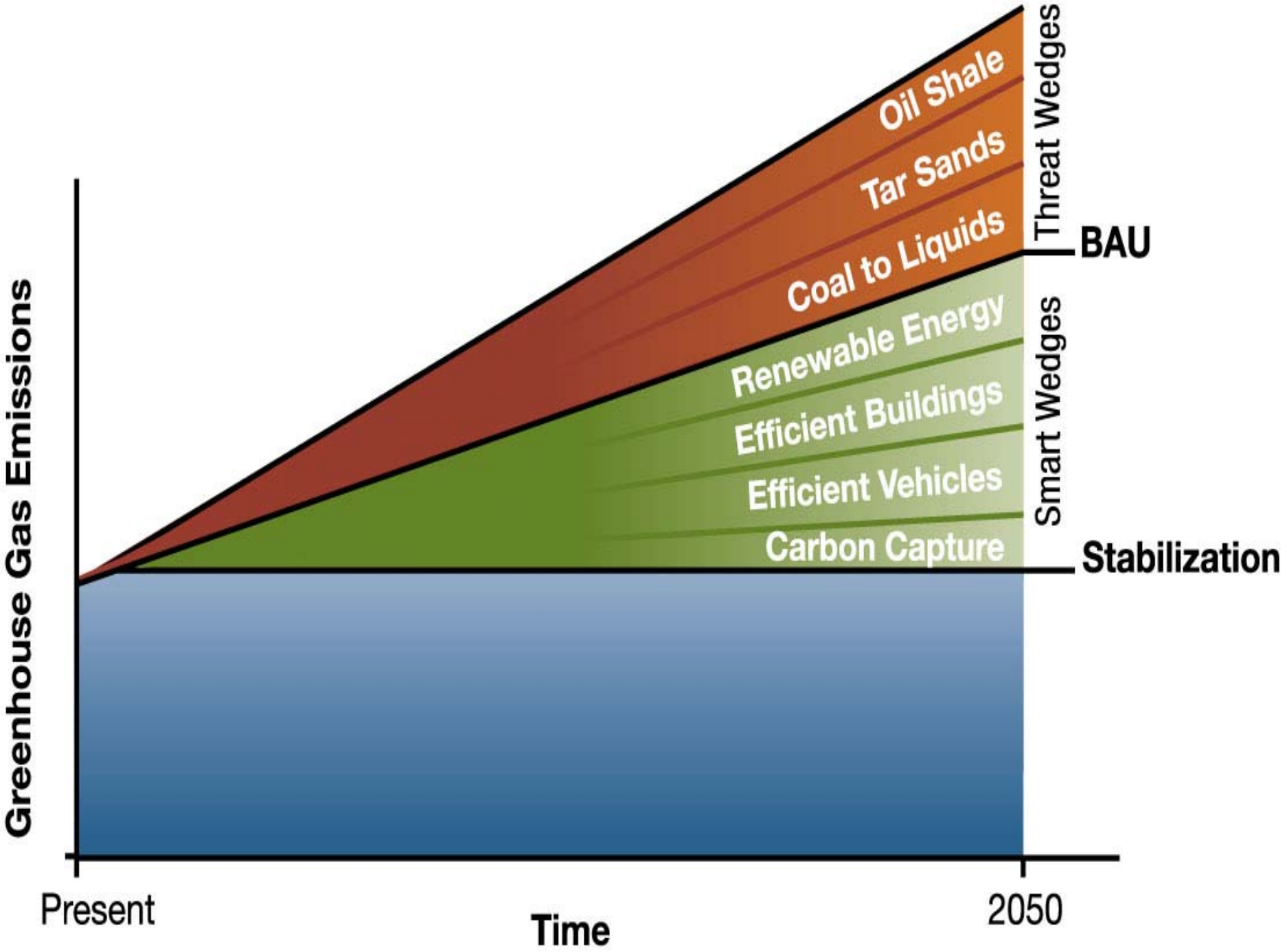
CEOS SIT-23
4 March 2009

D. James Baker
Clinton Foundation

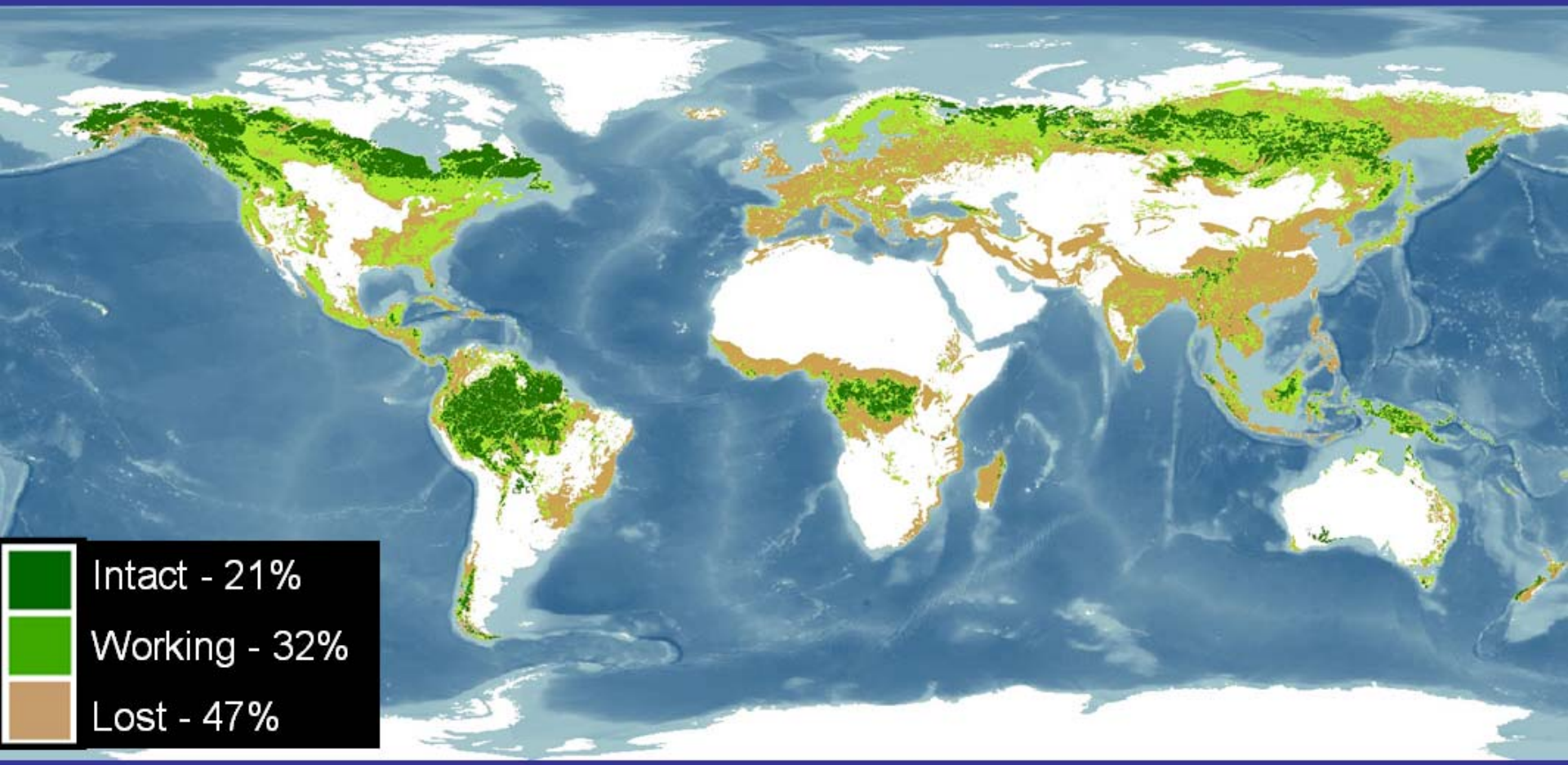
World GHG Emissions Flow Chart



WORLD RESOURCES INSTITUTE


Oil Shale
Tar Sands
Coal to Liquids
Renewable Energy
Efficient Buildings
Efficient Vehicles
Carbon Capture
Threat Wedges
Smart Wedges
BAU
Stabilization
Greenhouse Gas Emissions
Present
Time
2050

State of the World's Forests



Source: WRI

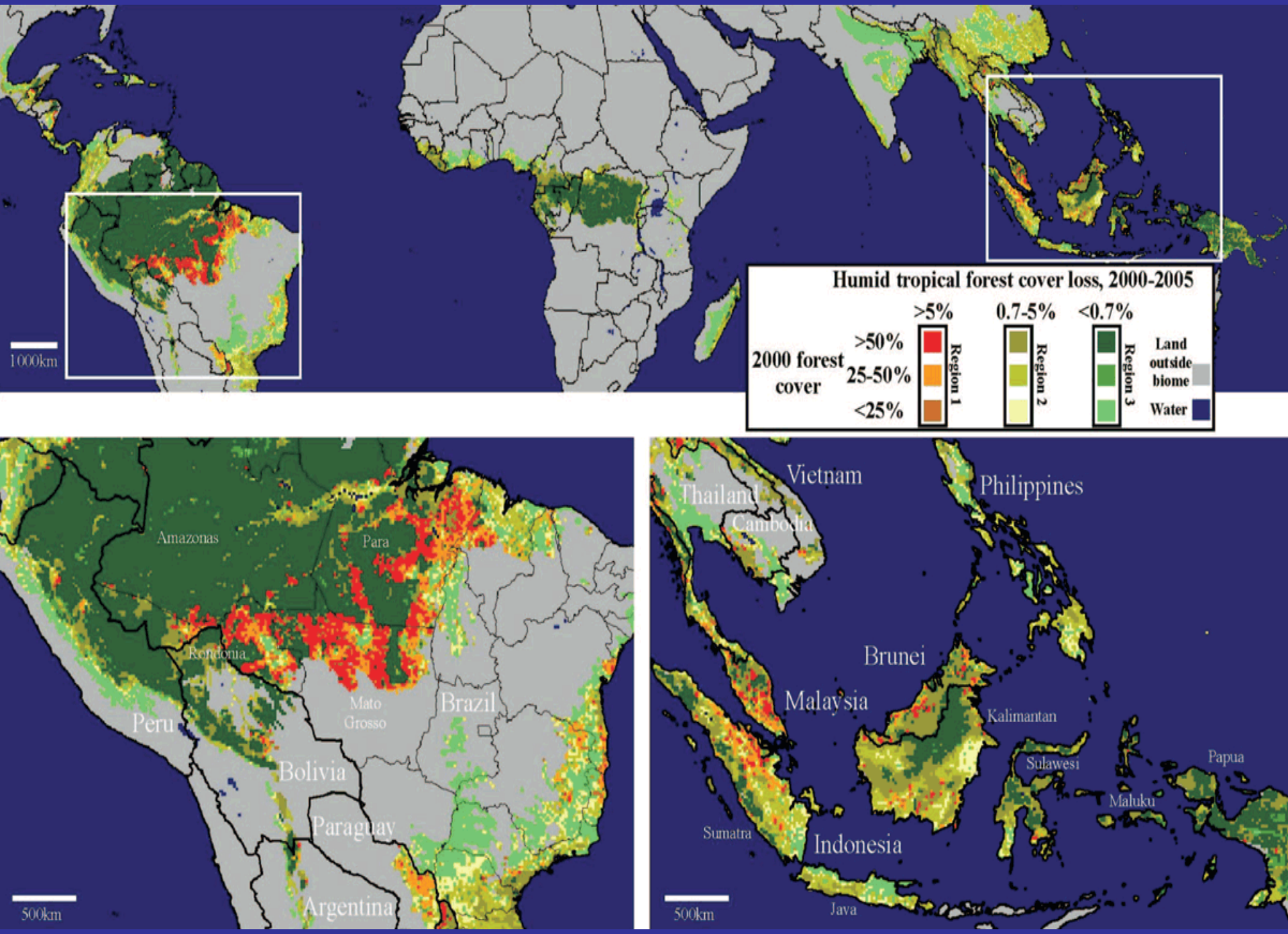
Tropical Forests

Productivity and Sequestration

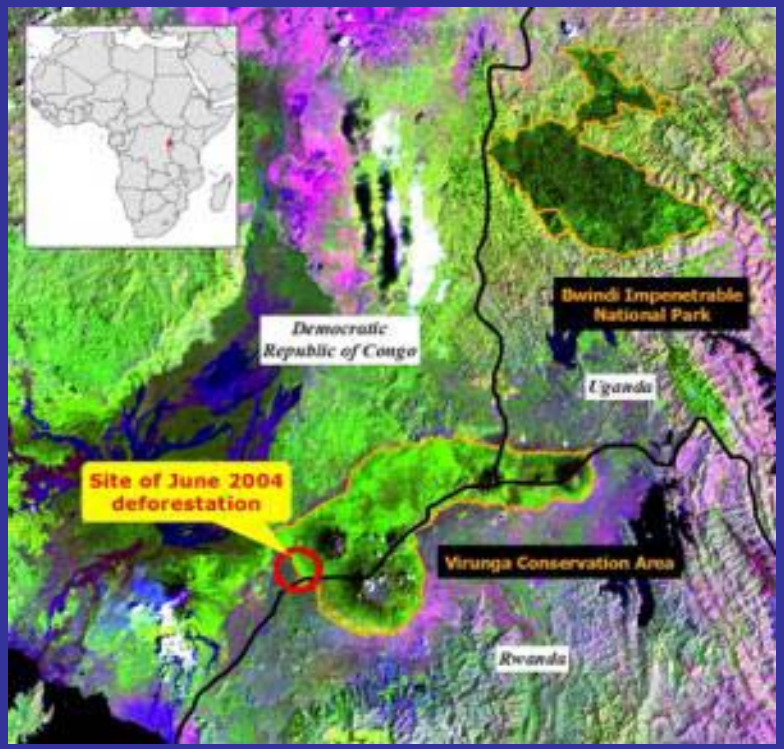
- Tropical forests ecosystems have highest net primary productivity, 2-3x greater than temperate forests
- Tropical trees sequester more carbon at higher rate than trees in temperate zones per forest hectare
- Thus they are the most effective plants to sequester CO_2

Agroforestry:
Planning tree-crop interaction for specific outputs

- Agroforestry systems benefit rural poor by providing biodiversity – wildlife habitat, indigenous species, non-timber forest products, and multi-purpose trees
- Enhanced soil fertility and land productivity
- Socioeconomic benefits for smallholders: employment, diversified incomes, greater gender equality


1000km
Humid tropical forest cover loss, 2000-2005
2000 forest cover
>50%
25-50%
<25%
>5%
0.7-5%
<0.7%
Region 1
Region 2
Region 3
Land outside biome
Water
Amazonas
Para
Rondonia
Mato Grosso
Brazil
Peru
Bolivia
Paraguay
Argentina
500km
Vietnam
Thailand
Cambodia
Philippines
Brunei
Malaysia
Kalimantan
Sulawesi
Papua
Maluku
Sumatra
Indonesia
Java
500km

Deforestation along National Boundaries

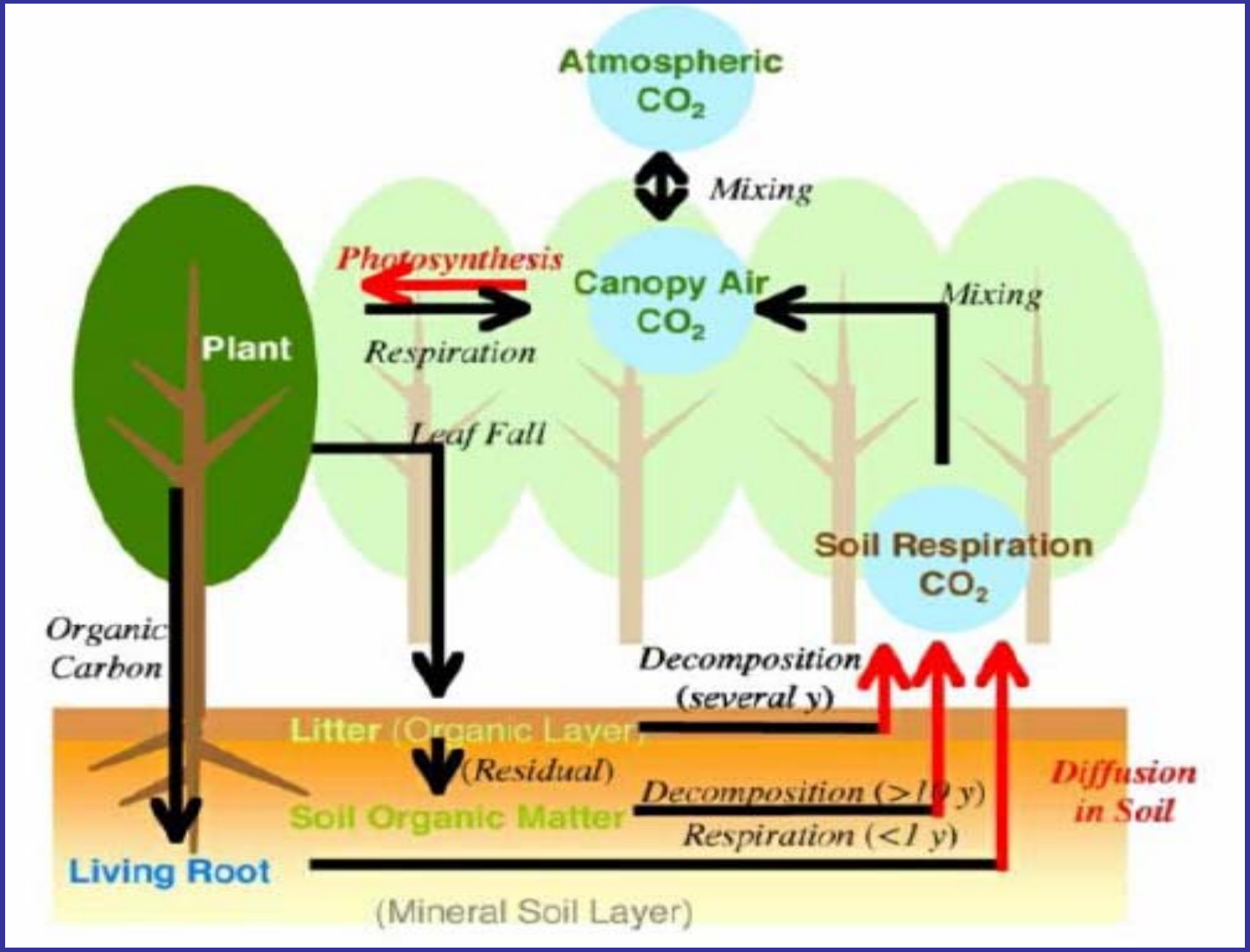


Congo, Rwanda, Uganda border

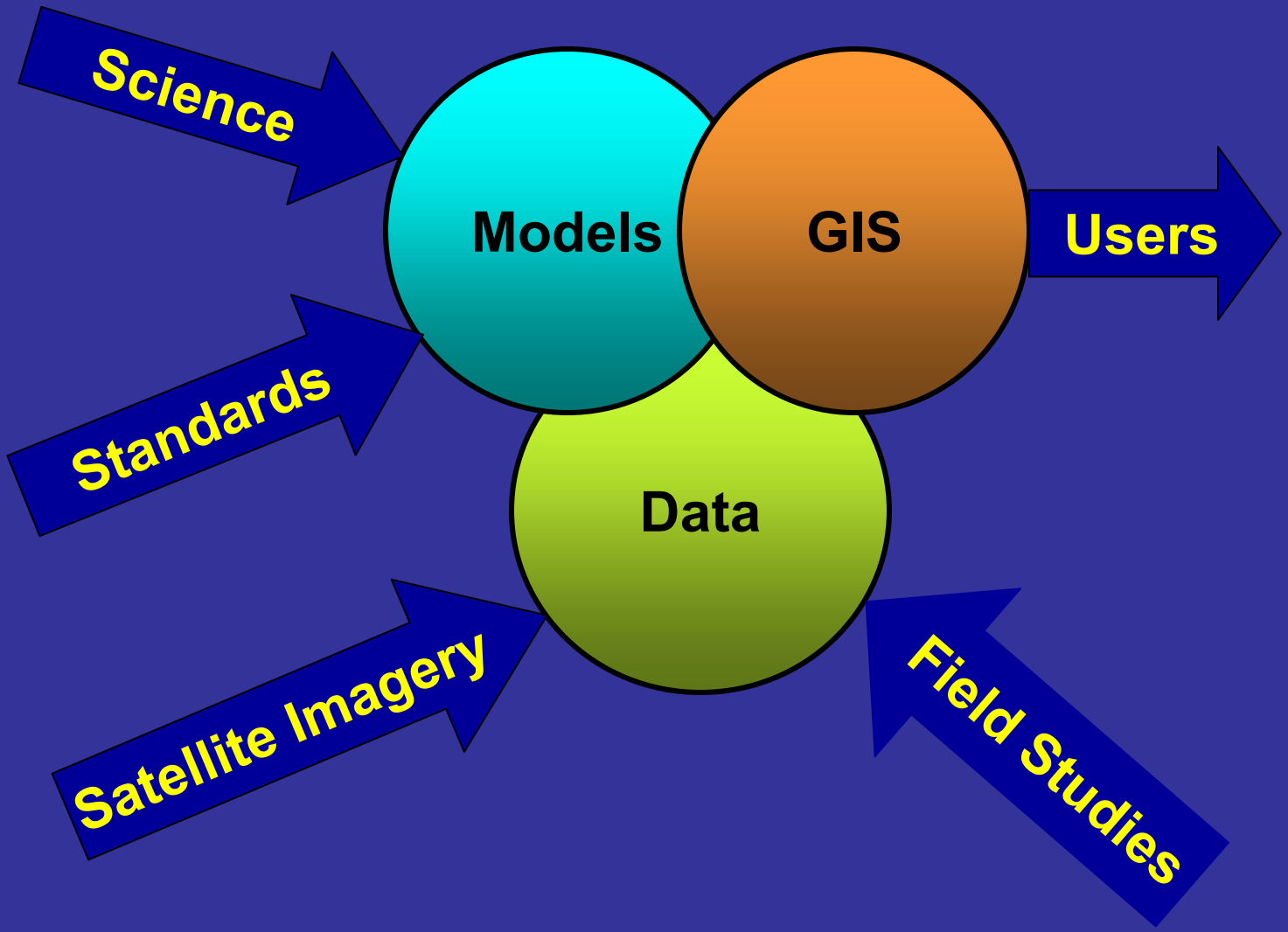
Border between Haiti and Dominican Republic

africascience.blogspot.com/ 2007/07/mapping-ca…,

Nasa/Goddard Space Flight Center


Atmospheric
CO_2
Mixing
Photosynthesis
Canopy Air
CO_2
Mixing
Plant
Respiration
Leaf Fall
Soil Respiration
CO_2
Organic
Carbon
Decomposition
(several y)
Litter (Organic Layer)
(Residual)
Diffusion
in Soil
Decomposition (>1 y)
Soil Organic Matter
Respiration (<1 y)
Living Root
(Mineral Soil Layer)

System Elements

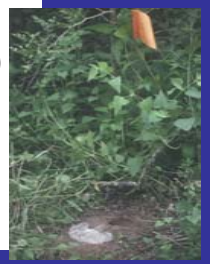


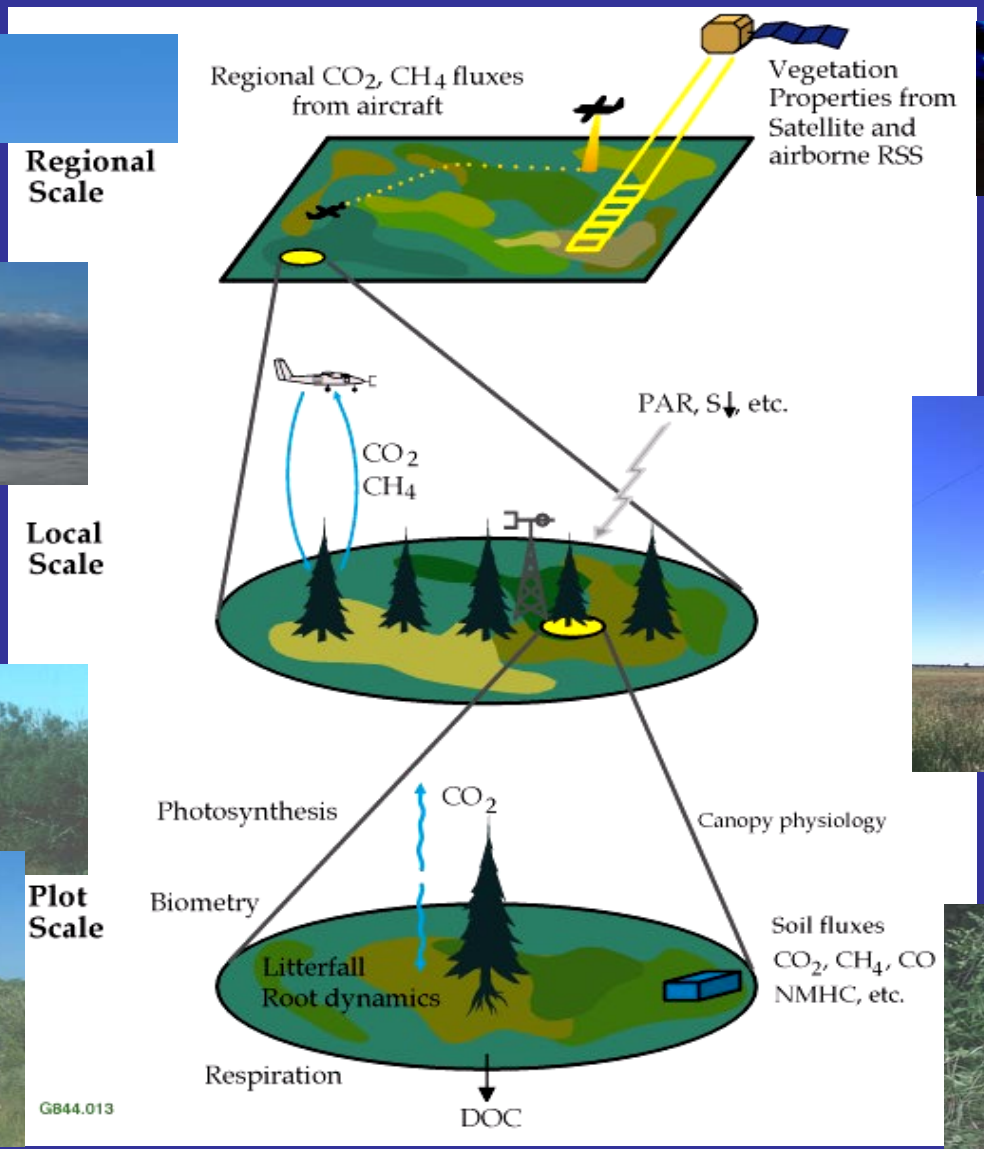
A Global Emissions Accounting System for Forestry and Agriculture

System Elements

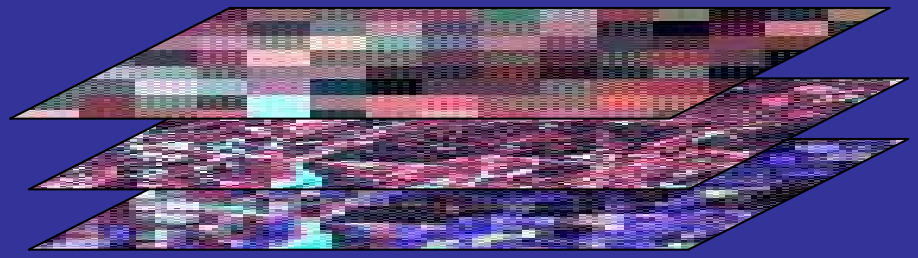
- *Estimation Models*
  - *Data fusion*
  - *Integrates observational data*
  - *Flexibility to meet national design*
- *Visual and Inventory data*
  - *Wall-to-wall mapping needed*
  - *Satellite coverage critical*
    - *Accessibility*
    - *Continuity*
  - *Inventory data for calibration, ground truth*
- *Geographic Information System*

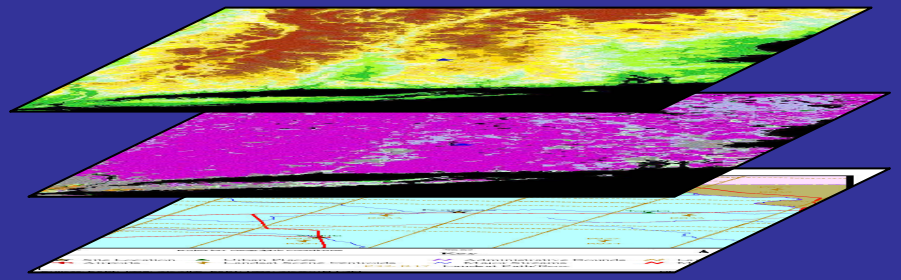
Multiscale observations for Carbon Accounting

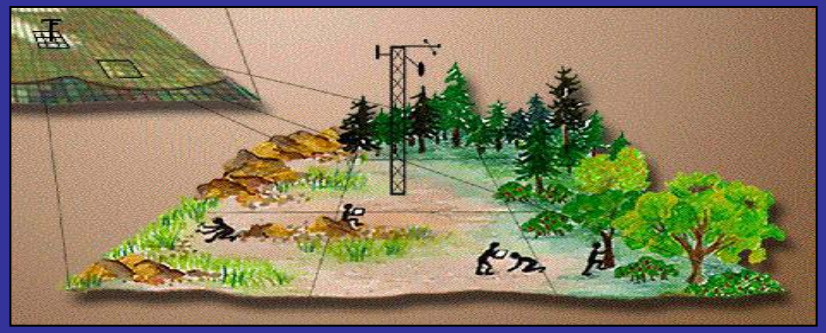




Data-Model Fusion through GIS







SATELLITE IMAGERY

- MODIS Subsets
- AVHRR
- ETM+
- Atmospherically Corrected ETM+
- ASTER data
- MISR Local Mode
- IKONOS (Scientific Data Purchase)
- "GeoCover '90s TM

Ancillary layers and background information

such as existing

- elevation
- land cover
- reference layer

Field data:

insitu land use information
collaboration information from field studies
site level field surveys

Integrated Modeling Framework:

Net C and GHG emission estimates
Incorporation of land use change
Projected net changes in storage and fluxes of C and other GHG

Carbon Measurement Collaborative Approach

- *Design and measurement support is scale independent*
- *Project measurements nest into national systems*
- *No “one-size fits all” technocratic solutions*
- *Diversity in approach depending on needs*
- *Consistent and robust framework*

Carbon Measurement Collaborative
Sequence of Outputs

- *Identify and develop necessary web-based services and delivery systems*
- *Demonstrate measurement potential for select projects*
- *Reduce cost of satellite data and improve access and continuity*
- *Continue to evolve a global framework of national systems*

Forest Carbon Tracking
GEO/CEOS

- Consolidation of observational requirements and establishment of several regional reference test-sites
- Wide range of spatial and spectral resolution required
- Coordination of observations, including securing their continuity
- Improvement of access to observations, datasets, tools and expertise and associated capacity building activities.

Forest Carbon Tracking
GEO/CEOS

- Supporting political requirements related to the UNFCCC negotiations
- Window of opportunity for political attention towards COP-15 in Copenhagen end 2009
- Unique opportunity for GEO, CEOS and the forest community to demonstrate their capability to develop a consistent, long-term forest carbon monitoring system


UN Agencies
FAO
UNDP
UNEP
UNFCCC/IPCC
Organizational Landscape for Forest Carbon Emissions Measuring and Monitoring
Markets
Carbon Exchanges, Voluntary Markets
GEO/CEOS
Satellite data
Carbon Tracking
and other tasks
International NGOs working globally and in specific countries
National Emissions Accounting Systems
Forest Carbon Models
Delivery of Carbon Emissions Information GIS
Data and Visualization
Communities, Other Users
Projects: NGOs National and Regional
Projects: Private Sector
Projects: Government National and Regional
Foundations Supporting:
Projects
National Systems
International Coordination
All of the above