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EUROPEAN FOREST INSTITUTE
MEDITERRANEAN REGIONAL OFFICE – EFIMED

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STRUCTURING FOREST ACCOUNTS OVERALL FRAMEWORK

Global Workshop on Forest Accounting

Washington, May 2014

www.efimed.efi.int

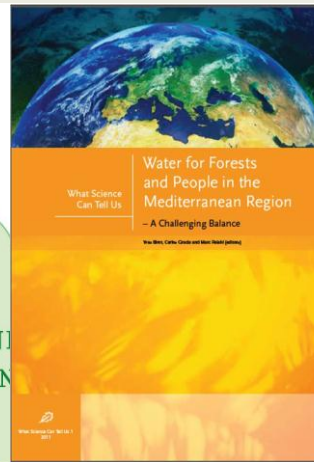




CREEA

Compiling and Refining

Environmental and Economic Accounts



EFI Discussion Paper 15, 2009
**Living with Wildfires:
What Science Can Tell Us**
A Contribution to the Science-Policy Dialogue

Yves Boer (ed.)



EUROPEAN FOREST INSTITUTE



(outside Mediterranean area)

● Finland





Outline

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1. Setting up the framework to compile forest accounts
2. General structure of forest accounts
3. What are the steps to follow to fill-in the accounting tables
4. Indicators to fill-in the asset and flow accounts
5. Where do we get the data from?
6. Questions, challenges....



How to do forest accounting - Setting up a framework for forest accounts

Forests are environmental assets:

“the naturally occurring living and non-living components of the Earth, together comprising the bio-physical environment, that may provide benefits to the humanity”.



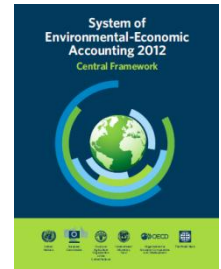
Traditionally accounted through their individual components (i.e. timber)

Overlooking other benefits forests provide to the society

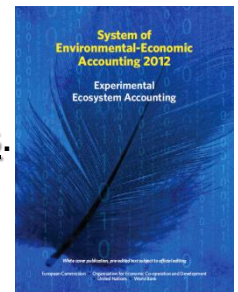


THE SEEA FRAMEWORK

A RESOURCE BASED PERSPECTIVE: Forests are measured through their individual components, i.e. traditionally, forest land and timber (including timber outside the forests) → SEEA CF



AN ECOSYSTEM BASED PERSPECTIVE: Acknowledges the role of forests as ecosystems providing a multiplicity of services that benefit the society: forest assets. In line with ongoing initiatives mapping ES and their flow → SEEA EEA

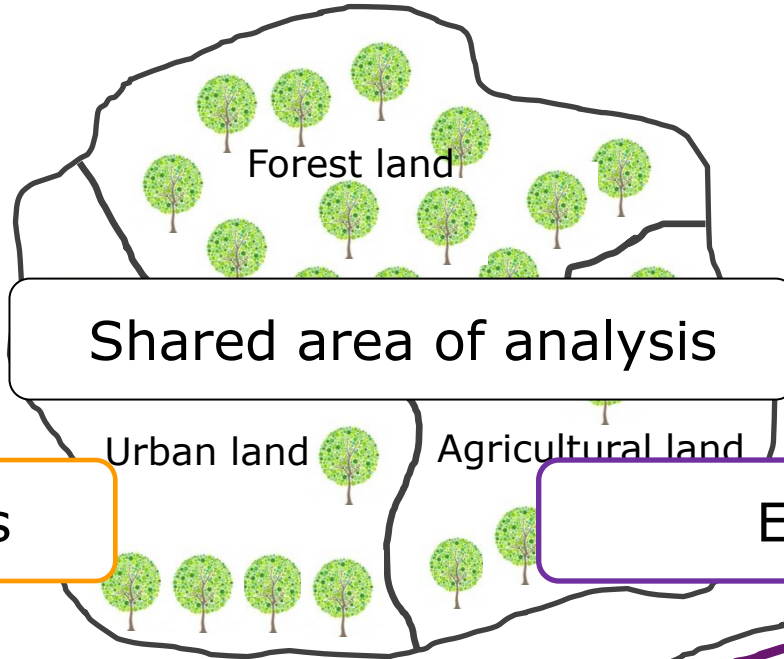


OUR OBJECTIVE: to integrate both perspectives (which are already complementary)



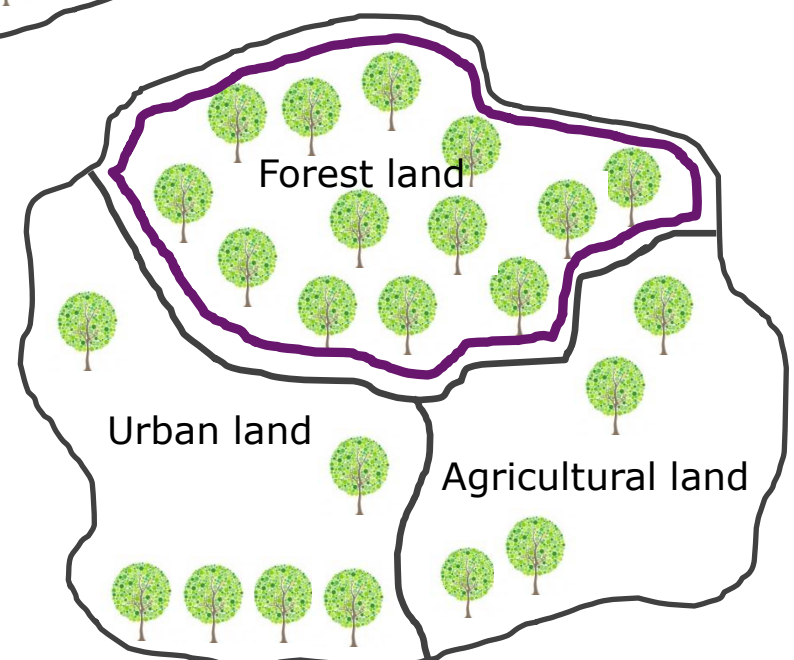
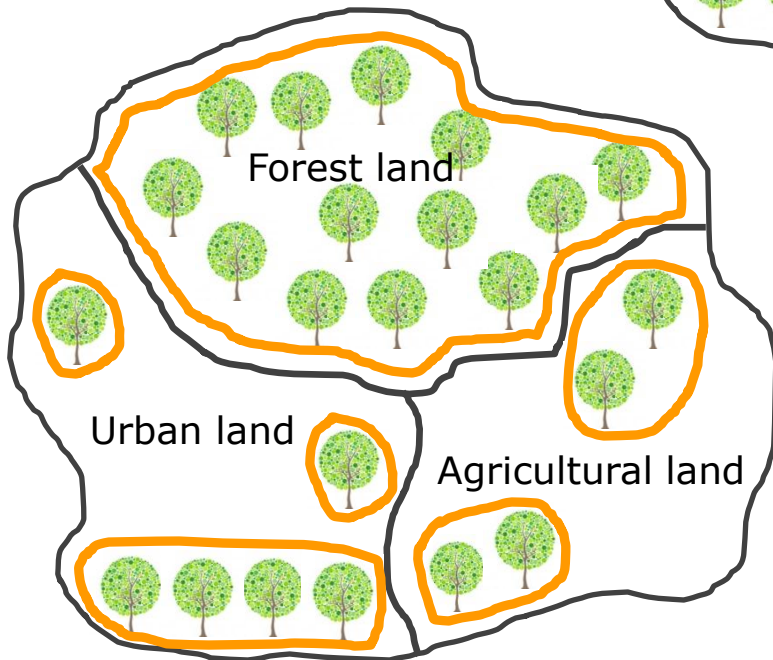
How to do forest accounting - Setting up a framework for forest accounts

- Land cover types
- Scope of the ecosystem based forest account
- Scope of the resource based forest account



Individual resources

Ecosystems





General structure of the forest accounts – ASSET ACCOUNTS

❖ resource by resource

Type of timber resource			Type of timber resources	
Cultivated timber resources	Natural timber resources		Cultivated timber resources	Natural timber resources Available for wood supply
	Available for wood supply	Not available for wood supply		

Monetary units

Opening stock of timber resources
Additions to stock

Natural growth
Reclassifications
Total additions to stock

Reductions in stock

Removals
Natural losses
Catastrophic losses
Reclassifications
Total reductions in stock

Closing stock of timber resources

❖ Cultivated: management practices constitute a process of economic production
❖ Natural: where the previous doesn't apply.

❖ Not AFWS: due to physical, economic or regulatory reasons

❖ forest asset (forest ecosystem unit)

Monetary units

	Changes of ecosystem condition				
	Vegetation	Biodiversity	Soil	Water	Carbon
Opening condition					
Improvements in conditions					
Reduction in condition					
Closing condition					

	EAU or LCEU
Opening stock	
Additions to stock	
Regeneration-natural	
Regeneration. human	
<i>Total additions to stock</i>	
Reductions in stock	
Extraction and harvest	
Catastrophic losses	
<i>Total reductions in stock</i>	
Revaluations	
Closing stock of ecosystem assets	



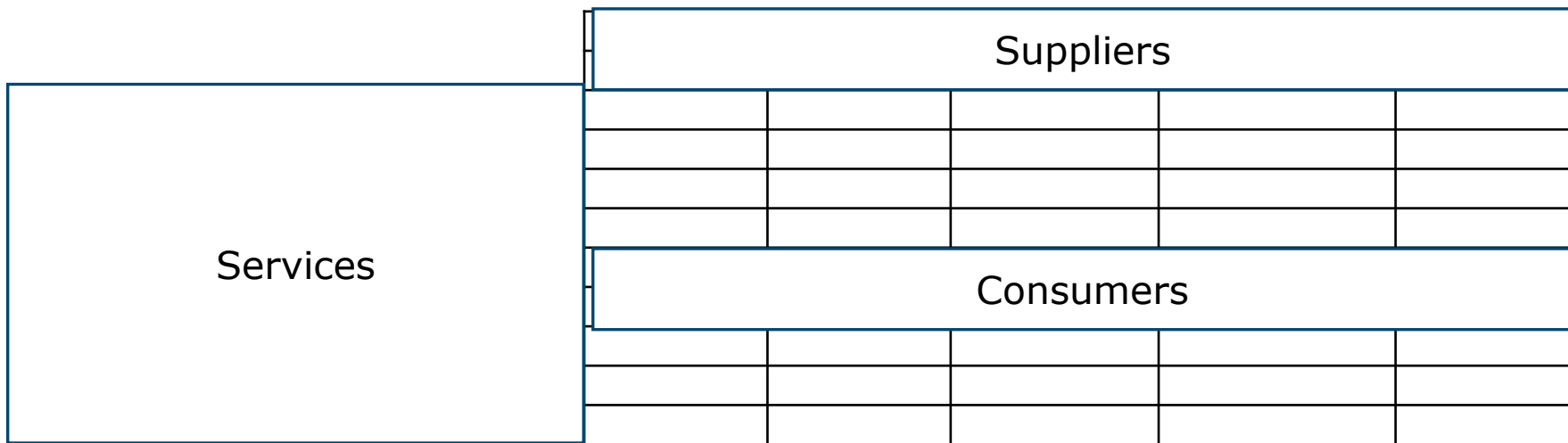
General structure of the forest accounts – FLOW ACCOUNTS

Table 6.9: Physical supply and use table for wood products, France, 1999
(timber, logs and wood in 1000 cubic metres; pulp, paper and waste in 1000 tons)

SUPPLY		Economic activities: suppliers											
Products	95920									95920			95920
	23162									23162	1451		24613
	31200												
	11869												
											x	x	x

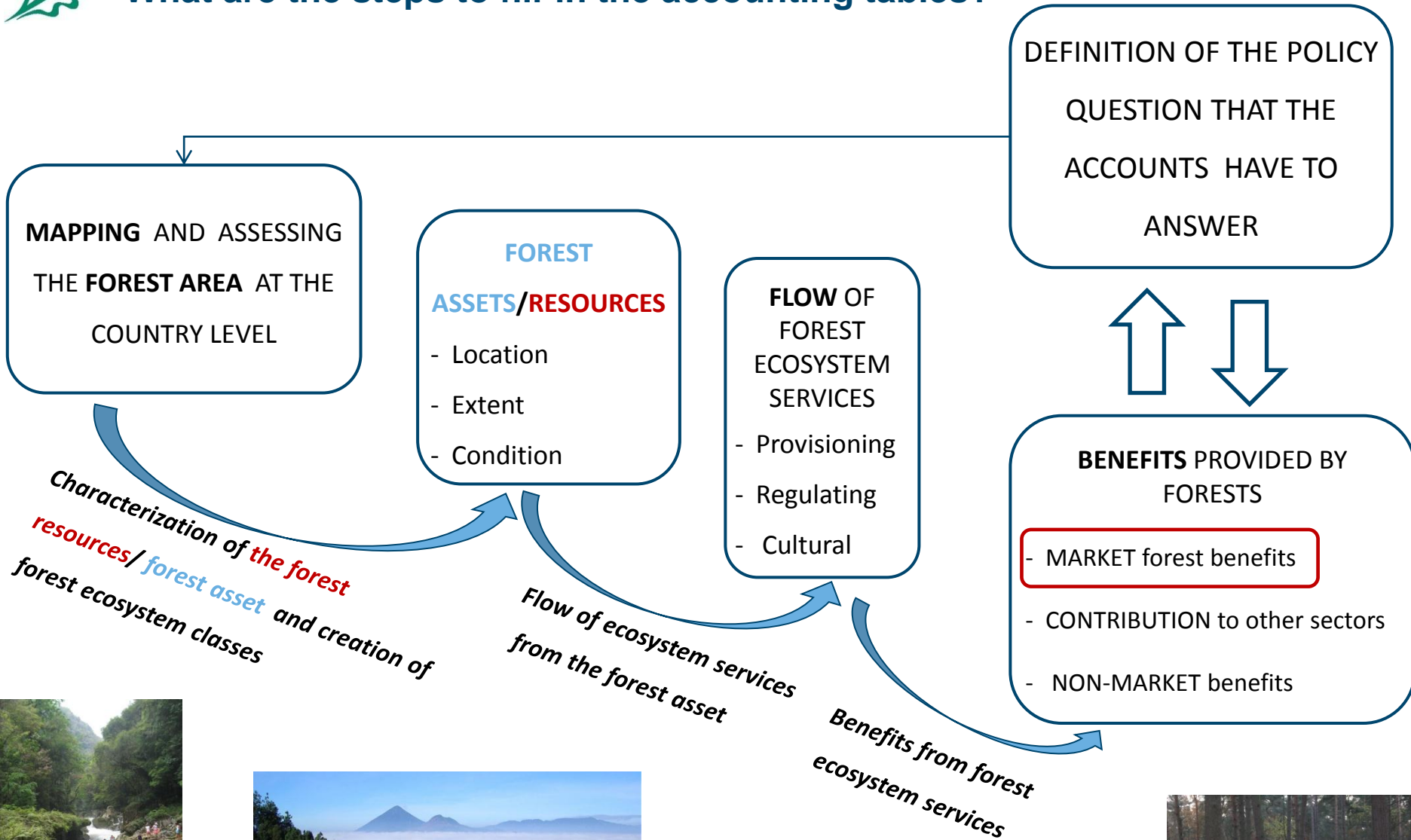
❖ PHYSICAL UNITS: flow of materials and products / flow of ES
❖ MONETARY UNITS: aggregated value .

USE		Economic activities: intermediate and final consumers													
Products		23337									23337			1276	24613
											2423	2423	28429	375	31227
			10944								10944			1624	12568
			7736								6076	13812		2695	16507
					4372						4372			431	4803
											4465	4465		4167	8632
			2265	2162							3431	7858		980	8838
					5276						5276			1028	6304





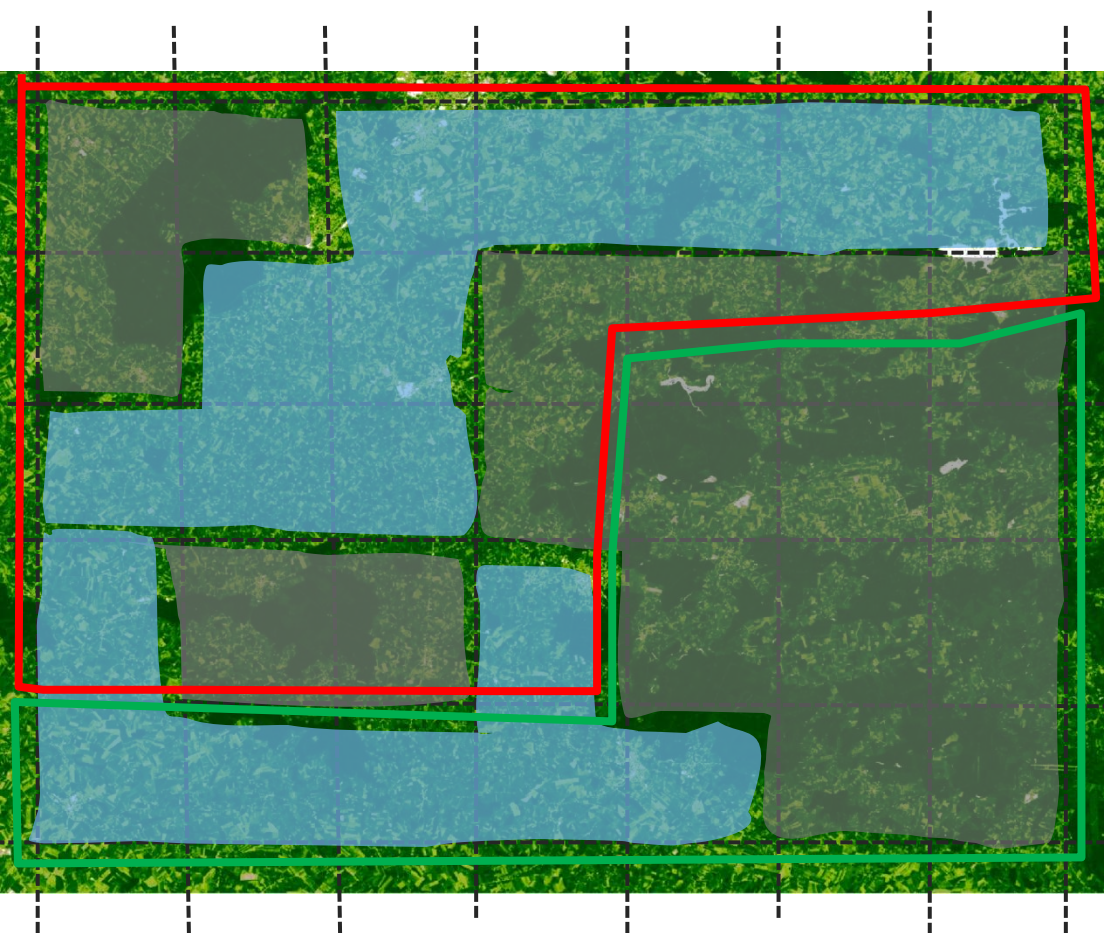
What are the steps to fill-in the accounting tables?





Steps to fill-in the accounting tables – Mapping of the forest area & ecosystems

Steps proposed by the EEA to define units to account for forest assets



BSUs Min grid resolution info



LCEUs Closest to ecosystems



Broadleaved primary forest



Broadleaved secondary forest

EAUs Long-term monitoring



Not protected forest



Natural park (protected forest)





Steps to fill-in the accounting tables- Indicators to characterize the forest ASSET

Forest land

Opening stock of forest and other wooded land	
Additions to stock	
<ul style="list-style-type: none"> Afforestation Natural expansion Reforestation 	<ul style="list-style-type: none"> Afforested area (m²) Density (trees/ha) Area (m²) Reforested area (m²) Density (trees/ha)
Reductions in stock	
<ul style="list-style-type: none"> Deforestation Natural regression 	<ul style="list-style-type: none"> Deforested area (m²) Area (m²)
Closing stock of forest and other wooded land	

Standing timber

Additions to stock	
<ul style="list-style-type: none"> Growth Timber in young trees (not considered in previous accounting period) 	<ul style="list-style-type: none"> Natural growth of timber volume (m³) Volume in trees recently classified as timber (m³)
Reductions to stock	
<ul style="list-style-type: none"> Tree harvest Tree losses 	<ul style="list-style-type: none"> Harvested timber during the period (m³) Losses in timber volume due to fires, disease, catastrophic events, etc (m³)
Closing stock of standing timber	

Condition of forest ecosystems

Defoliation	<ul style="list-style-type: none"> Litter fall measurements (kg) LAI-based indicator
Forest health	<ul style="list-style-type: none"> Presence of pathogens and plagues Status of bark Mortality rate
Forest fires	<ul style="list-style-type: none"> Burnt area
Fragmentation	<ul style="list-style-type: none"> % of forest area in categories (core, interior, connected, patchy) Effective mesh size Size of forest fragments Length of fragment edge
Aerosol pollutants	<ul style="list-style-type: none"> Ozone concentration Nitrogen deposition Sulfur deposition



Steps to fill-in the accounting tables Indicators to characterize the forest FLOWS

Provisioning services

- Timber
 - Harvested timber (m³; m³/ha)
- Firewood/charcoal
 - Volume (m³)
- NTFP
 - Volume (m³); Weight (kg; ton);
 - Number of units
- Genetic material
 - Composition
 - Diversity
- Grazing
 - Number of animals in silvo-pastoral system
 - Weight units of produced animal product
 - Energy uptake

Regulating services

- Atmospheric/climate regulation
 - Net carbon storage (gains-losses)
- Water flow regulation
 - Canopy cover fraction in recharge areas
 - Average daily and annual water flow in rivers
 - Cover in strategic locations (floodplains, steep slopes, wetlands, etc)
- Water cycle regulation
 - BOD
 - Turbidity in waterways
- Pollination
 - Abundance and variety of pollinator species
- Soil retention and formation
 - Erosion rates
 - Cover (or bare soil) fraction in vulnerable areas
 - Turbidity in waterways

Cultural services

Division	Group	Class	Indicators
Physical and intellectual interactions with biota, ecosystems, and land-/seascapes	Physical and experiential interactions	Experiential use of plants, animals and land-/seascapes in different environmental settings. And physical use of land-/seascapes in different environmental settings	<ul style="list-style-type: none"> • Distribution of wildlife/emblematic species associated with forest • Important bird areas associated with forest • Area of forest accessible for recreation • Number of visitors • Number of hunters • Ecotourism operators • Area of forests accessible for hunting
	Intellectual and representative interactions	Scientific, educational, heritage, cultural, entertainment and aesthetic	<ul style="list-style-type: none"> • Citations, distribution of research projects, educational projects, number of historic records • Number/value of publications sold
Spiritual, symbolic and other interactions with biota, ecosystems, and land-/seascapes	Spiritual and/or emblematic	Symbolic and sacred and/or religious	<ul style="list-style-type: none"> • Distribution of sites of emblematic plants/forest • Number of sites with recognised cultural & spiritual value • Number of visitors
	Other cultural outputs	Existence and bequest	<ul style="list-style-type: none"> • Distribution of important areas for forest biodiversity and their conservation status • Condition of forest-associated priority species on habitat and birds directives • Distribution of sites with forest designated as having cultural values • Number of visitors

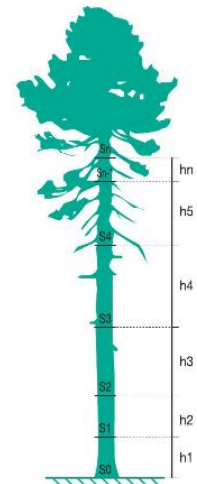
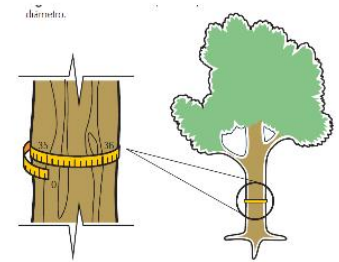
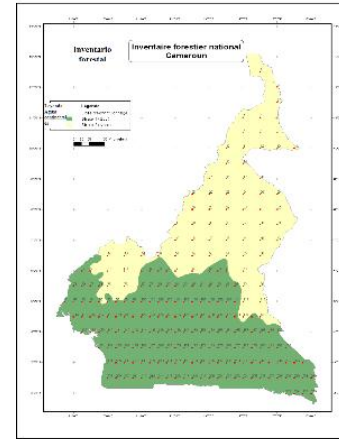


Where do we get the data from?

Forest inventories/forest statistics

Main features:

- ❖ The primary source of quantitative information on forest resources
- ❖ Based on statistical sampling
- ❖ Based on field surveying techniques
- ❖ Basis for planning and assessments at country, regional or global level (e.g. Forest Resources Assessment – FRA)



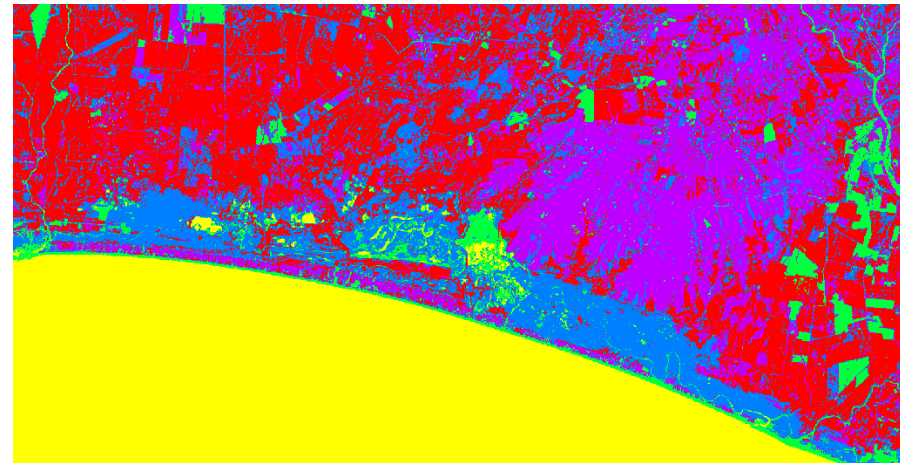


Where do we get the data from?

Spaceborne remote sensing

Why remote sensing?

- ❖ Dynamic data source of area covered by vegetation
- ❖ Identification of different vegetation types
- ❖ Upgrade forest inventories
- ❖ Information forest condition
- ❖ Geographical reference
- ❖ Constant technological development



Example: Land cover classification based on Landsat 8 imagery. Pacific coast; Guatemala



Where do we get the data from?

Forest Modeling

Why modeling ?

- ❖ Various indicators of forest assets and flows can not be measured directly.
- ❖ Particularly useful for deriving indicators of environmental services.
- ❖ Some examples are:
 - Wild fauna population
 - Erosion protection
 - Surface discharge
 - Carbon sequestration
 - Green area deficit in urban areas



ARIES

ARTificial Intelligence for Ecosystem Services

InVEST

Integrated Valuation of
Ecosystem Services and
Tradeoffs

natural
capita
PROJECT



science for a changing world

Social Values for Ecosystem Services (SoIVES)—Using GIS to Include Social Values Information in Ecosystem Services Assessments





Where do we get the data from?

Other sources

- ❖ Livelihood surveys
- ❖ Population census
- ❖ Other statistics, reports, spatial databases
- ❖ etc.
- ❖ SNA → validate
- ❖ Global forest watch programs (?)

Table 6. Number of households in survey consuming each type of renewable energy.

Village class	Sample size	Fire-wood	Char-coal	Plant residues	Animal dung	Biogas	Solar panel
LOA	406	395	35	250	40	0	0
LOF	276	275	29	192	10	0	1
RAF	29	29	5	25	1	0	0
UPA	37	37	7	22	0	0	0
LOG	162	147	83	115	5	1	0
UG	351	202	248	324	3	0	0
National total	1261	1085	407	928	59	1	1

Source: Mustonen, S.; Raiko, R.; Luukkanen, J. Bionergy consumption and biogas potential in Cambodian households. Sustainability. 2013 (5) 1875-1892 doi:10.3390/su5051875

Challenges, questions???



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