

# Developing Ecosystem Capital Accounts

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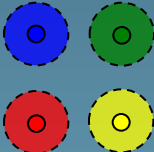
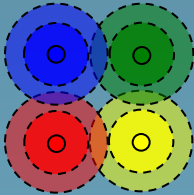
Integrated Environmental Assessments

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# Why develop ecosystem capital accounts (ECA)?

Characterisation of key challenges	Key features	In the spotlight in	Policy approach example
Specific 	linear cause-effect large(point) sources often local	1970s / 1980s (continuing today)	targeted policies and single-issue instruments
Diffuse 	cumulative causes multiple sources often regional	1980s / 1990s (continuing today)	policy integration and raising public awareness
Systemic 	systemic causes interlinked sources often global	1990s / 2000s (continuing today)	policy coherence and other systemic approaches

# Why develop ecosystem capital accounts (ECA)?

The development of ecosystem capital accounts aims to:

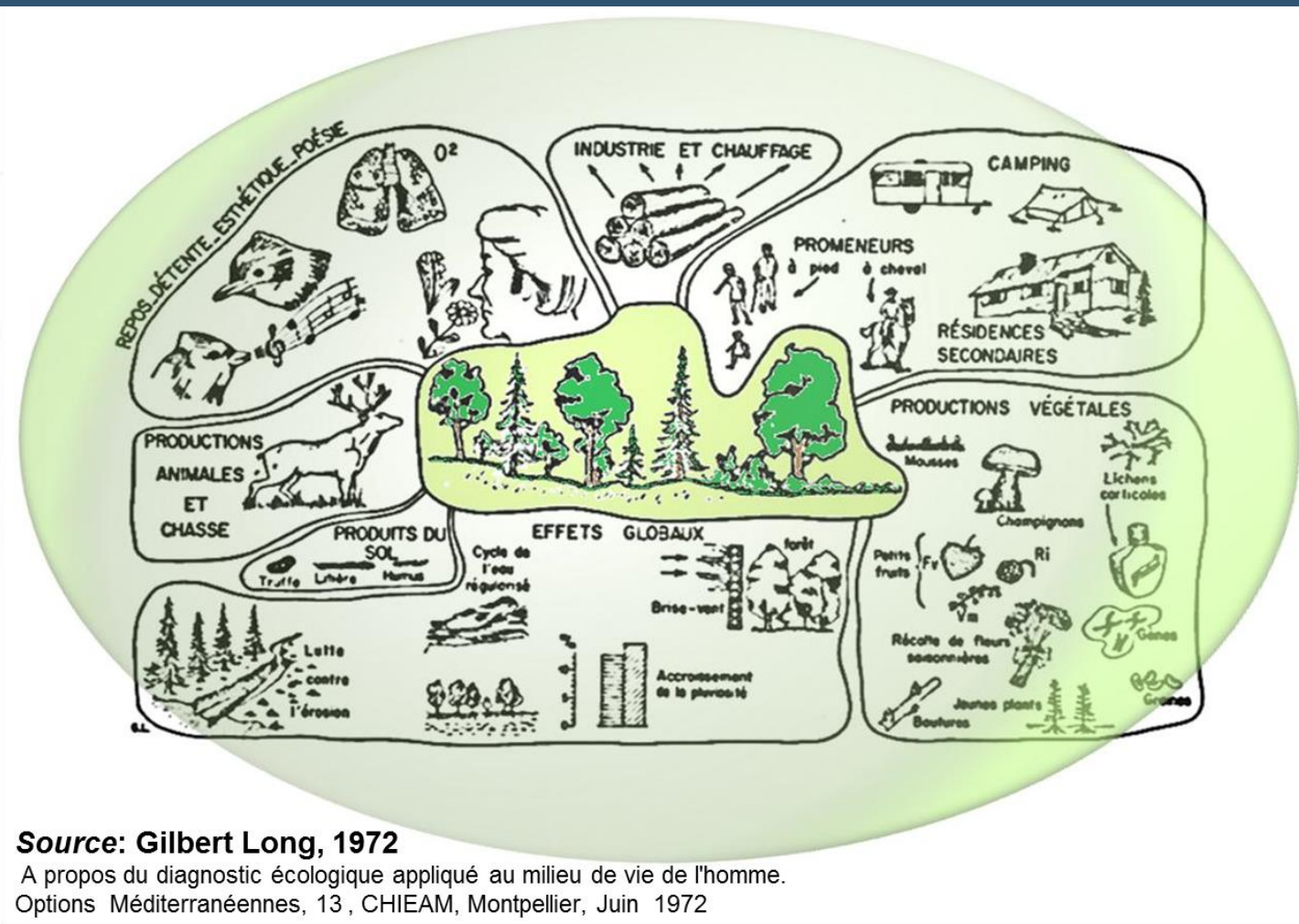
- Bring together essential information on land, water, carbon and biodiversity in an integrated framework
- Describe the European stock of ecosystem capital
- Track changes in the stocks and flows of ecosystem capital

If successful this leads to:

- An integrated accounting framework for ecosystem capital
- Measure of the *quantity* and *quality* of ecosystem capital stocks and flows
- Understanding of human impacts on the resilience of ecosystems and a measure of ecological debt
- Accounting derived indicators in physical (and eventually monetary) units



# Characteristics of ecosystem capital accounts - *ecosystems deliver multiple services*



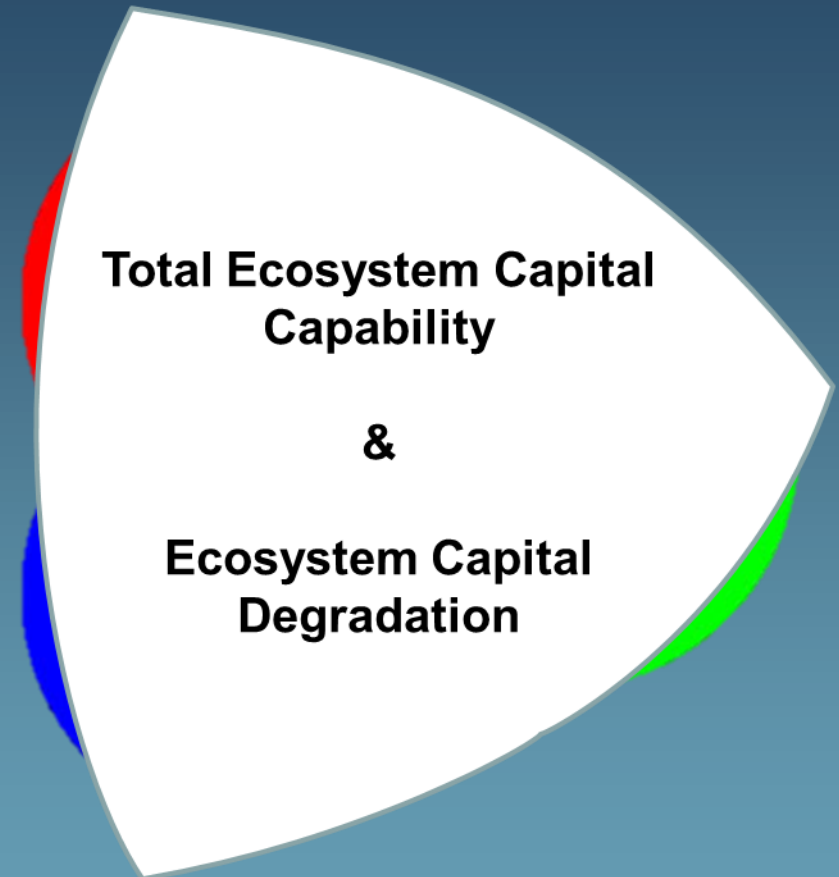
Source: Gilbert Long, 1972

A propos du diagnostic écologique appliqué au milieu de vie de l'homme.  
Options Méditerranéennes, 13, CHIEAM, Montpellier, Juin 1972

# Characteristics of ecosystem capital accounts - *3 broad types of services are accounted for*

Ecosystem capital produces 3 broad types of services, between which there is little compensation or trade-off: land/carbon AND freshwater AND functional services.

Ecosystem capital potential and degradation can be measured by combining measurements of these 3 broad services/accessible resources.



# Characteristics of ecosystem capital accounts - *only a surplus is available for human use*

**Available resource:** the total resource (actual stocks and flows) which can be used in principle.

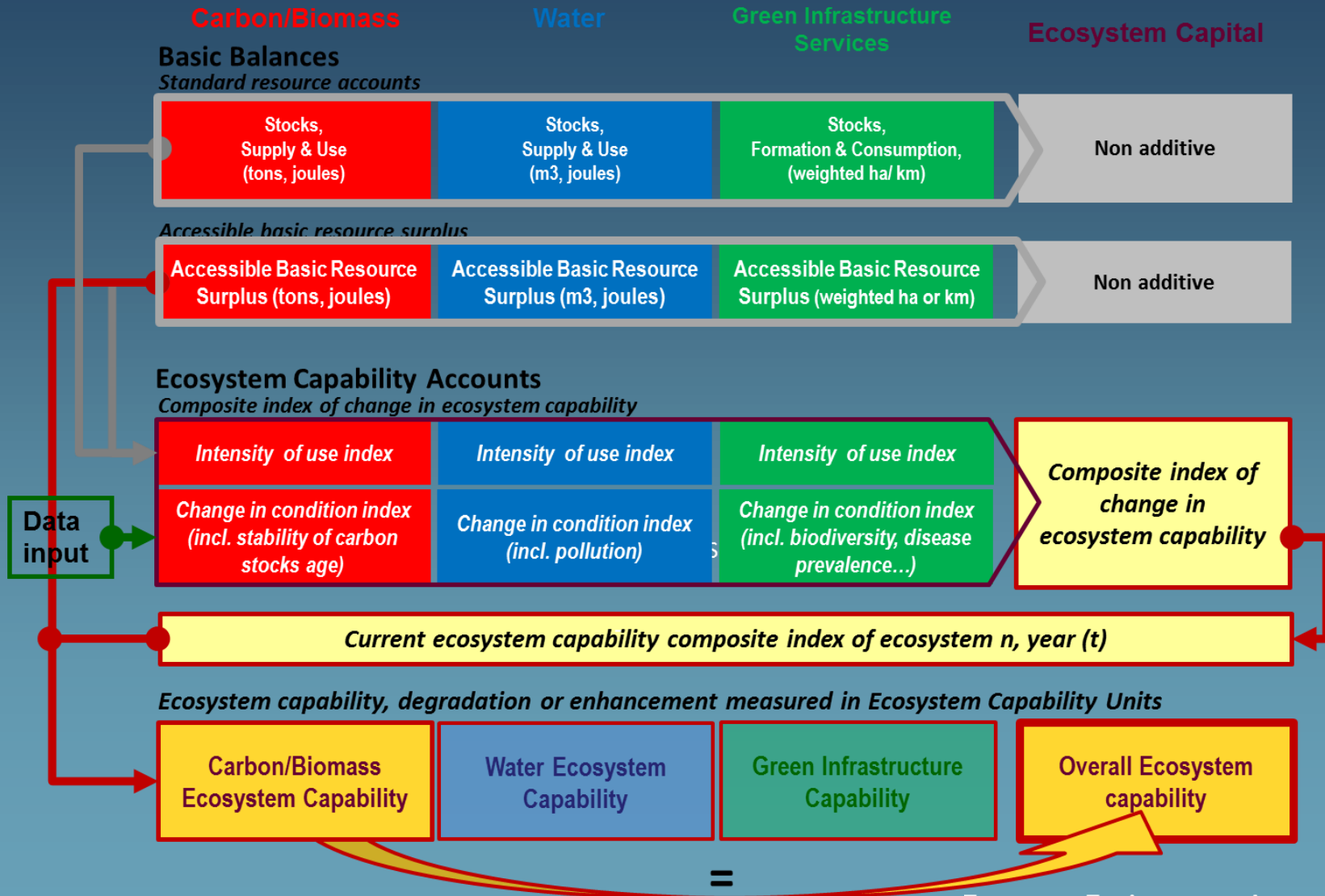
**Accessible resource:** the surplus (actual stocks and flows) which can be used considering

1. physical constraints (timeliness and location, cyclical risks, bio-chemical quality)
2. the amount to be left to nature for ecosystem reproduction, environmental constraints
3. side or indirect impacts on ecosystem health (biodiversity, resilience, dependency from artificial inputs...)
4. risks factors

**Ecosystem capital accounts refer to intensity of use of accessible resources (ecological sustainability)**



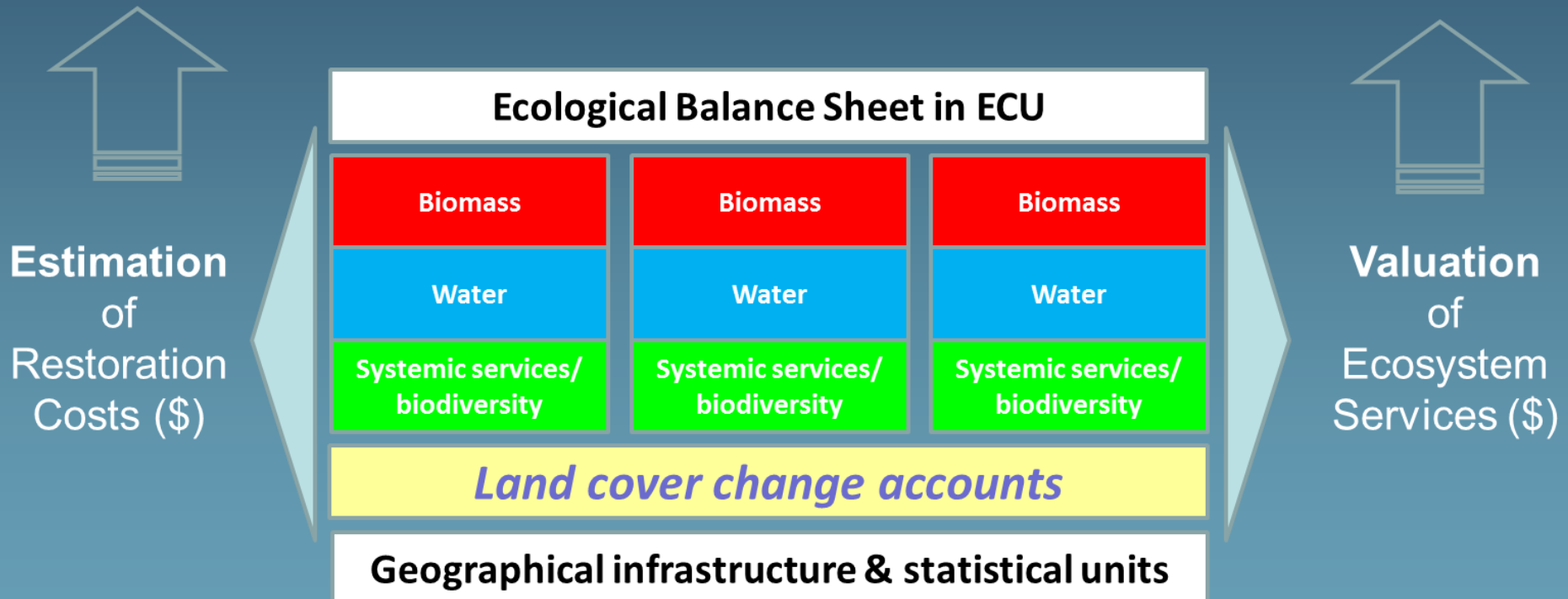
# Characteristics of ecosystem capital accounts - *Integration of quantities and qualities and measurement of Ecosystem Capital Capability*



# Characteristics of ecosystem capital accounts - *accounts in physical and monetary units*

Consumption of Ecosystem Capital,  
Adjustment of Final Demand (Full Cost)  
Ecological Balance Sheet in \$

Economic benefits of projects,  
policies and plans





# Characteristics of ecosystem capital accounts - *Statistical units used in ecosystem capital accounting*

## Statistical Units for Accounting

(approx. field covered by the SEEA Part1)

### National Accounts

#### Boundaries:

- Countries (**residence criteria**, incl. EEZ)
- Administrative regions (option)
- Rest of the World

#### Institutional Units :

- Enterprises
- Government bodies
- Households
- Non-profit organizations

#### Economic production units :

- Establishments

#### Commodities (CPC):

- Goods
- Services

#### Assets

(Owned and managed for profit – SNA 2008)

#### + Primary units for data collection & assimilation of statistics:

e.g. Primary Statistical Units, regular grids...

### Ecosystem Capital Accounts

#### Boundaries:

- Countries (**territory criteria**, incl. EEZ)
- Administrative regions (option)
- Rest of the World

#### Ecosystem Accounting Units :

- Global/ Regional Scale Units
- Catchment areas/ Drainage basins
- Socio-Ecological Landscape Units (SELU) for land, rivers, coastal zones, sea zones...
- Institutional Units (for use, degradation...)

#### Ecosystem production units :

- Land Cover Functional Units (incl. river reaches, coastal units...)

Ecosystem services (CICES): provisioning, regulating (incl. protection), socio-cultural

#### Assets

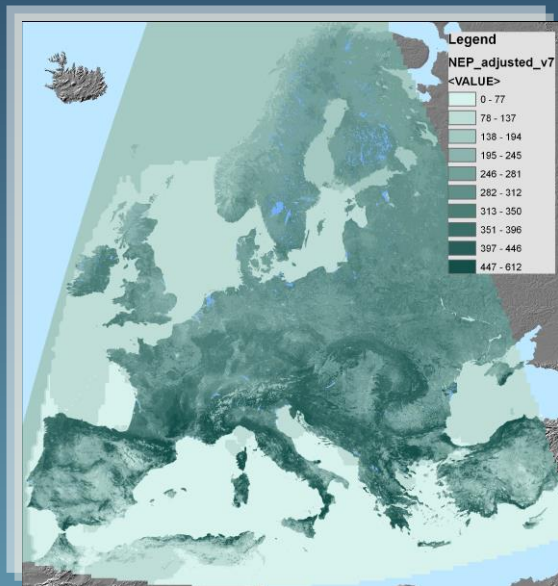
(Existing, part of the ecosystem capital, private as well as public goods...)

#### + Primary units for data collection & assimilation of data & statistics:

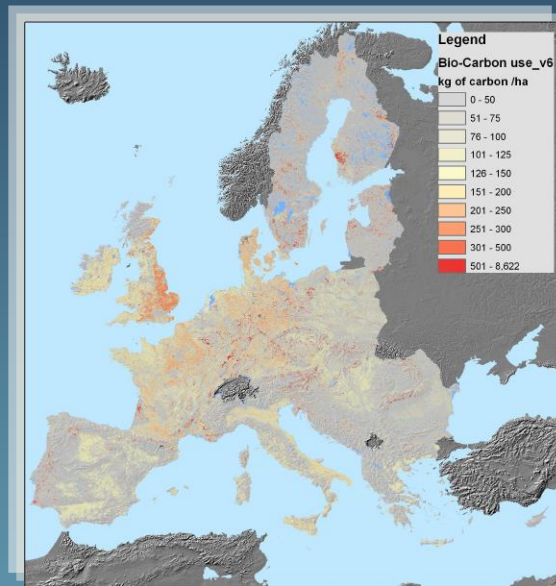
e.g. Primary Statistical Units, SELU, regular grids...



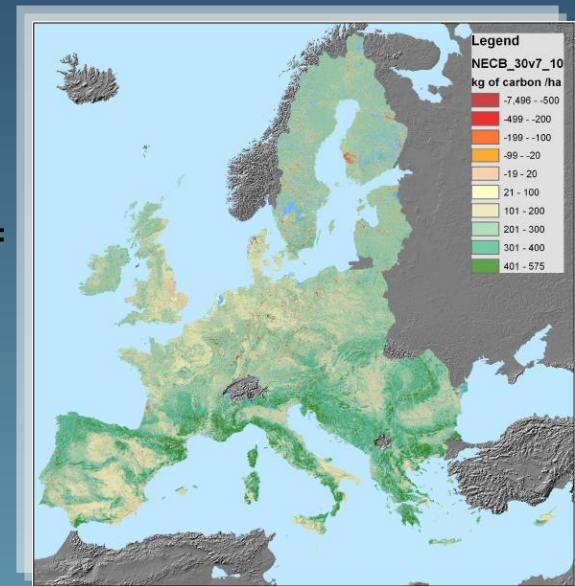
# Characteristics of ecosystem capital accounts - *the carbon/biomass account*



NPP/NEP:  
*satellite images  
(NDVI) and  
modeling,  
accessible bio-C  
surplus*



Uses:  
*agriculture and  
forestry statistics by  
regions/countries  
resampled to 1km2  
grid f(land cover,  
NDVI)*



Net Ecosystem  
Carbon Balance:  
*soil and vegetation  
(trees, shrubs,  
grass)*

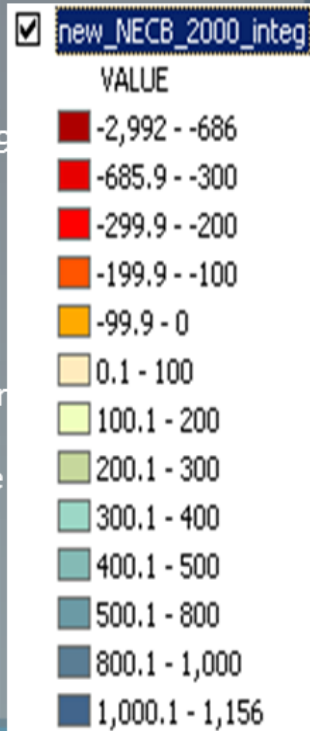


# Characteristics of ecosystem capital accounts - *the carbon/biomass account*

ECOSYSTEM CAPITAL ACCOUNTS: BIO-CARBON		Forest biomass	Crops biomass	Grassland / pastures biomass	Other natural vegetation biomass	Water bodies biomass	TOTAL
		s/total forest biomass	s/total agriculture / crops	s/total grassland / pastures	s/total other vegetation	s/total water bodies	
<b>1. BASIC BALANCE/ STANDARD RESOURCE ACCOUNT</b>							
COS1	Below ground stocks						
COS2	Above ground stocks						
COS3	Bio-carbon stocks in water bodies						
COS4	Other stocks of bio-carbon						
COSA	<b>Opening Stocks</b>						
<b>1.A INCREASE IN STOCKS (NATURAL AND SECONDARY BIO-CARBON RESOURCE FLOWS)</b>							
CRF1	Net primary production of bio-carbon (NPP)						
CRF2	Net internal transfers vegetation-soil (received minus provided)						
s/t (CRF1+CRF2)	Total primary renewable bio-carbon resources (TRCR <sub>natural</sub> )						
CRF3	Total secondary bio-carbon resources (TSCR <sub>secondary</sub> )						
CRFA	Total increase in stocks						
<b>1.B DECREASE IN STOCKS (BIO-CARBON EXTRACTION, CONSUMPTION AND OUTFLOWS)</b>							
CRFB = CRF4to6	Total removals of bio-carbon from internal assets						
CRFC = CRF7to11	Other decreases in bio-carbon stocks						
CRFD = CRFA-CRFB-CRFC	Net Ecosystem Carbon Balance (NECB) or Net Accumulation [1]						
CRF11	Other change in volume of stocks						
CRFEa	Total decrease in stocks before adjustment						
CCSB = COSA-CCSA	Net Accumulation [2] = Closing Stocks minus Opening Stocks						
ADJ = CRFD-CCSB	Adjustment of change in stocks						
CRFEb = CRFEa+ADJ	Total decrease in stocks after adjustment						
CCSA = COSA+CRFEb	Closing Stocks						
<b>2. BASIC BALANCE/ BIO-CARBON USES</b>							
CUSA	Total use of ecosystem bio-carbon						
CUSB	Total bio-carbon uses						
<b>3. BASIC BALANCE/ ACCESSIBLE BASIC RESOURCE SURPLUS</b>							
<b>3.1 TOTAL INCREASE OF BIO-CARBON RESOURCES STOCKS</b>							
CRFA	Total increase in stocks						
<b>3.2 ACCESSIBILITY ADJUSTMENTS OF RENEWABLE BIO-CARBON RESOURCES</b>							
CARA	Total accessibility adjustment of renewable bio-carbon resources						
s/t (CRF1+CRF2)+ CARA	Exploitable (or manageable) natural bio-carbon resources						
CARB	Total accessibility adjustment of secondary bio-carbon resources						
s/t = CRF3 + CARB	Exploitable (or manageable) secondary bio-carbon resources						
CARC = CRFA+CARA+CARB	Accessible basic bio-carbon resource surplus						
<b>4. TABLE OF INDEXES OF ECOSYSTEM HEALTH/DISTRESS</b>							
<b>4.1 INDEX OF INTENSITY OF USE IMPACT [IF&lt;1, = overuse, dilapidation; IF&gt;1, accumulation]</b>							
CEHA = CARC/CUSA	Bio-carbon intensity of use impact						
<b>4.2 COMPOSITE INDEX OF ECOSYSTEM HEALTH CHANGE</b>							
CEHB	Composite index of change of ecosystem health						
<b>4.3 ANNUAL CHANGE IN INTERNAL PRICE OF BIO-CARBON RESOURCE</b>							
CEHC = AVG(CEHA+CEHB)	Annual change in resources internal price						



# Characteristics of ecosystem capital accounts - *the carbon/biomass account - spatial dimension*



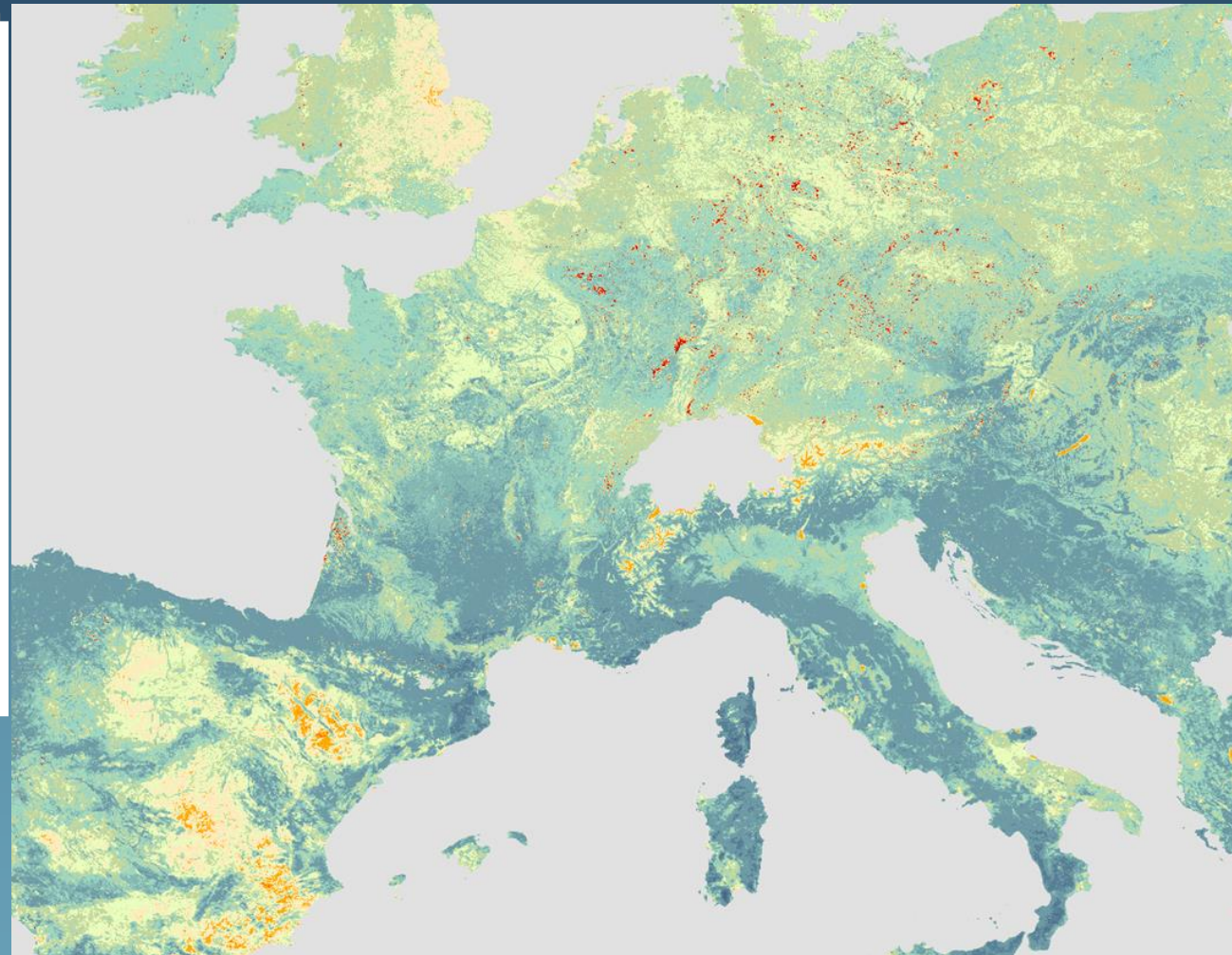
Tree felling, 1999  
Xmas storm

Greenhouses,  
plastic sheets

Intensive agriculture

Mixed agriculture

Forest



NB: over-  
estimation of  
NPP in the South



# Where are we now?

## Simplified Ecosystem Capital Accounts - Fast Track Implementation Plan

6 INDEXES		EEA		EEA & EUROSTAT		EUROSTAT	
Land accounts	Land cover accounts		Vegetation profiles	Resource use	Sectors use		
		Land cover accounts update	Landscape ecosystem potential (LEP) upgrade: mini-features & ecotones	External and internal LC change (from vegetation profiles)	Land use flows sealing/ transport / population (with JRC)	Supply & Use of land, ecosystem services (with JRC)	
Integrated carbon accounts (biological, fossil, emissions...)	Biomass/bio-C accounts		Vegetation dynamic profiles (vegetation index analysis)	Provisioning services: crops (DGAgri Land Parcel identification System), forestry, fisheries	Supply & Use Bio-Carbon, fossil C and GHGs emissions, NAMEA bio-C	Expenditure	
		Net Primary Production balances + anomalies				Soil balances (soil carbon - agriculture and forest / water / erosion)	C tradable Permits / Carbon Taxes
Water accounts (quantity, quality, use)	Water systems accounts			Water use and In situ use of water systems: fishing, damming, amenity	Water Supply & Use, NAMEA-Water	Protection/ management expenditures: water	
		Water balances + anomalies	Water systems quality / physico-chemistry / fragmentation			Water systems biological potential	
Biodiversity index and accounts	Biodiversity index	Biodiversity cross analysis				Protection/ management expenditures: land & biodiversity	
	From species status reporting to Art17 and Specialisation Index	Biodiversity # NPP/Biomass	Biodiversity # Landscape Ecosystem Potential	Biodiversity # Land use			
Interdependency index and accounts (artificial inputs, trade...)				Agriculture inputs: subsidies /chemicals / energy / water / genes	Virtual flows		
					Virtual flows embedded into internat'l trade Land/Carbon/Water		
Health indexes and accounts		Soil resilience		Urban health			
		Soil intoxication/ biodiversity		Life expectancy / socio-economy / metabolism			



# Lessons learnt so far

- **Accounts have got to be relevant and useful** - *should support and be directed by the development of policy relevant indicators*
- **Keep it simple** - *new areas require substantial investment in conceptual and methodological development and experimentation*
- **Value for money** - *can produce accounts on the basis of current data and investment in integrating data can deliver an information base for more than accounts*
- **Co-operation is vital for successful delivery** - *between research, NSI's, EEA, Eurostat, country and European level*



## Next steps

- **Consolidation and implementation** - *need to improve so accounts and indicators reach a standard that can be confidently used in policy and decision making*
- **Integration** - *ECA and other accounts, integration of trade to give a global perspective, sectoral perspectives*
- **Application** - *identification of key policy questions and how ECA can contribute, report in preparation*
- **Enabling further experimentation** - *publication of ECA and supporting information in a package that enables experimentation and use at national and global level*
- **Strengthening co-operation** - *revision of the European Strategy for Environmental Accounting*

