



INSTITUTE FOR THE
DEVELOPMENT OF
ENVIRONMENTAL-
ECONOMIC
ACCOUNTING

A transaction based approach to defining and measuring ecosystem services

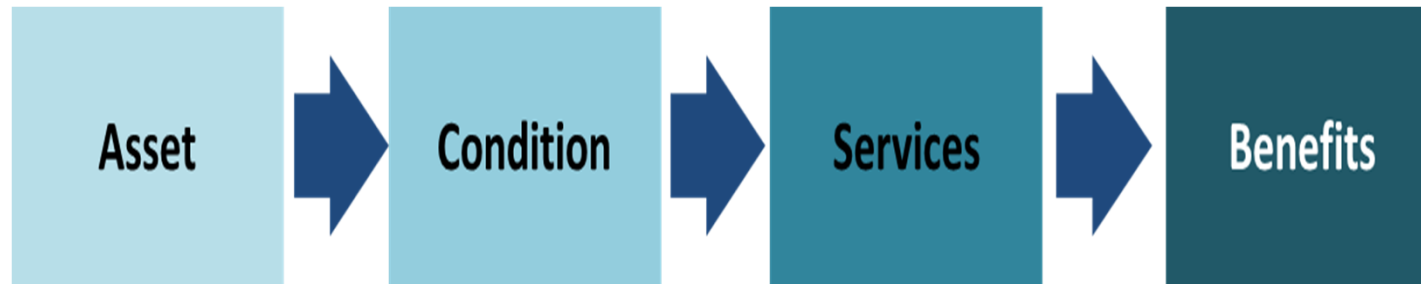
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Environmental-Economic Accounting

CORE MODEL



- Single **asset** framework applied to different landscapes and ecosystem types
- Assess impact of human activity on extent and **condition**
- Asset and condition combine to produce **ecosystem services**
- **Benefits** to economic and social-wellbeing
 - Evaluate **benefits** and tradeoffs among different ecosystem uses

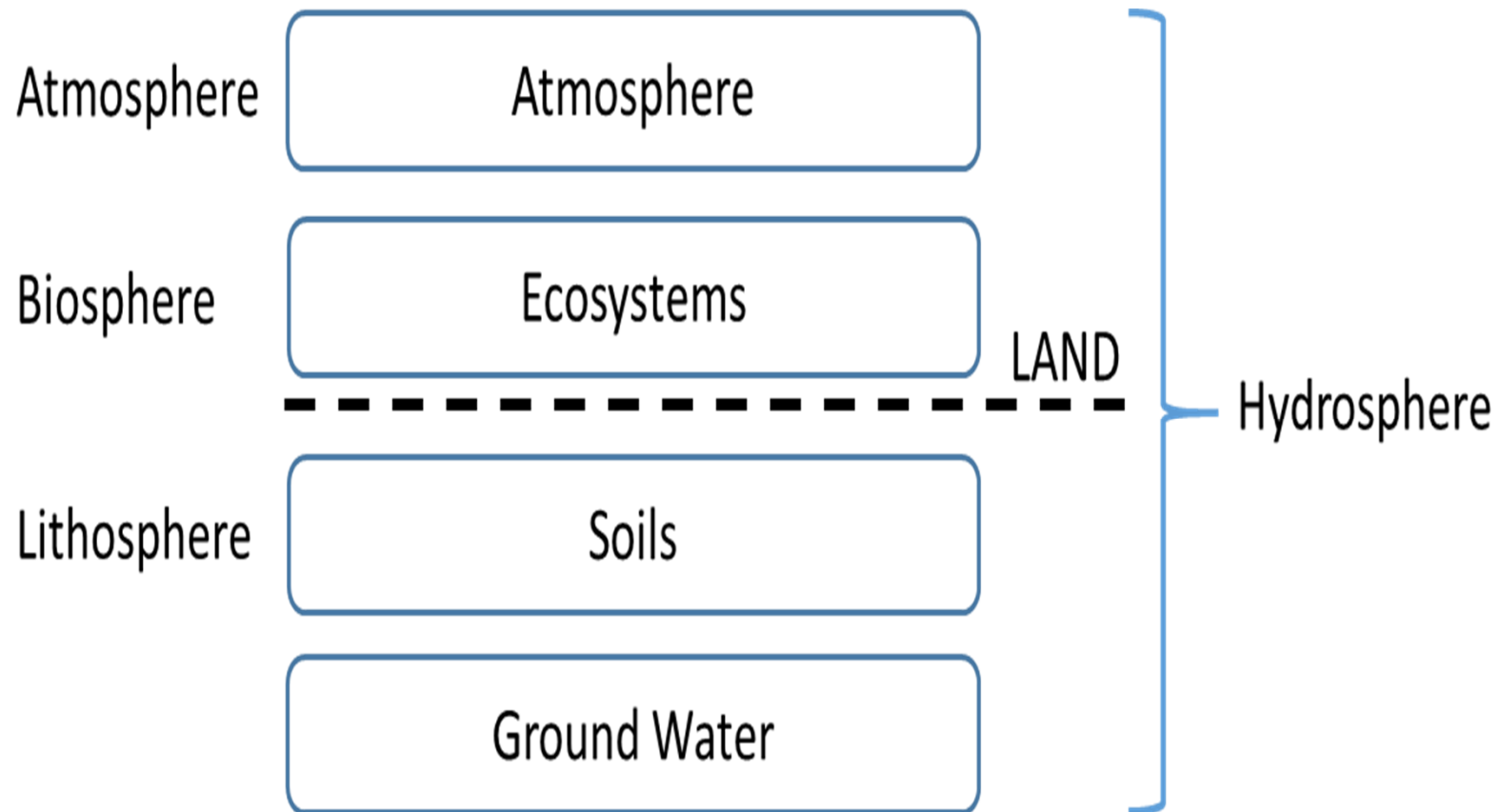
Contrasting approaches ecosystem services

- **MA 2005 – Benefits approach – RHS of the core model**
 - provisioning, supporting, regulating, cultural
- **CBD – Ecological approach – LHS of the core model**
 - ecosystem approach is one based on the application of appropriate scientific methodologies focused on levels of biological organization, encompassing the essential structure, processes, functions and interactions among organisms and their environment.
- **CICES – Extended benefits approach – RHS of the core model**
 - Extension of the MA 2005 to include the cascade model
 - Incorporating ecosystems and functions
 - provisioning, ~~supporting~~, regulating, cultural

Challenge

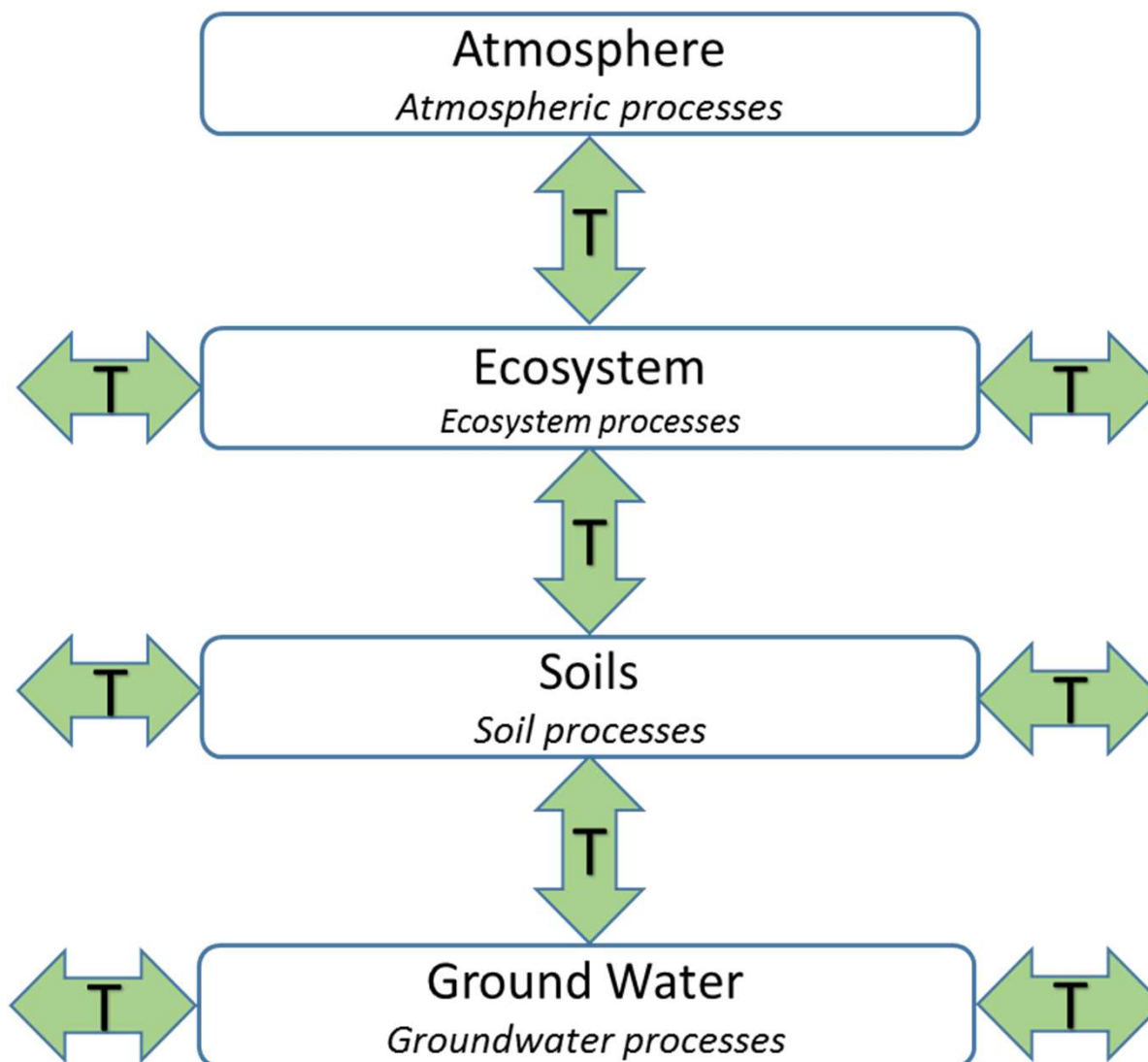
- Different starting points to define ecosystem services
 - Benefits versus ecological approach
 - Result in different descriptions and definitions of ecosystem services
- Further, the boundary between ecosystems and other elements of the environment make the challenge more complex
 - Soil and ecosystems
 - Economic unit (human activity) and ecosystems
- Both approaches leave a number of issues unresolved from an accounting perspective
 - Intermediate services?, Supporting services?, Links between units and boundaries between units?
- Accounting links between SNA, SEEA CF (AFF) and SEEA EEA?

Environmental units



Land – economic construct – not an environmental unit

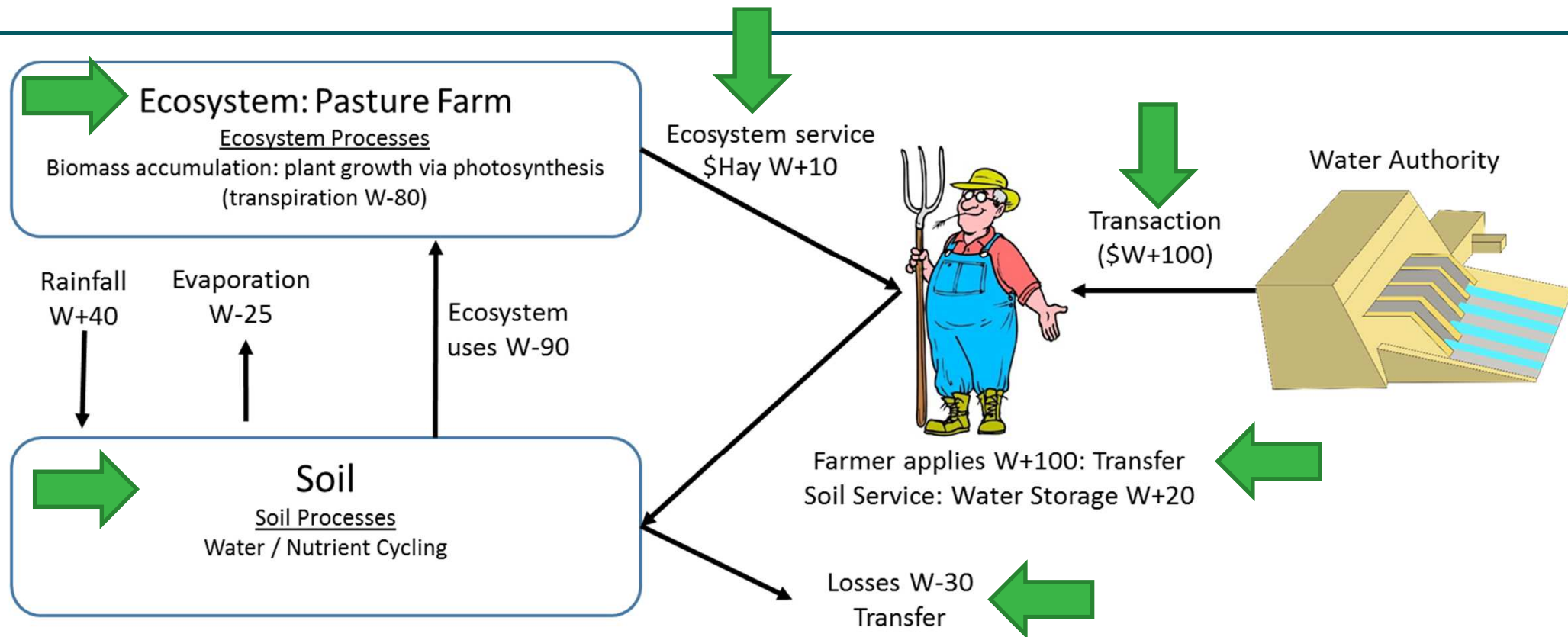
Environmental units – physical transfers (SEEA CF)



Building on SNA construct

- Economic flows
 - Creation, transformation,..... Changes in volume and composition
- Transaction
 - Economic flows..... between institutional units by mutual agreement
 - Or..... within an institutional unit that is analytically useful to treat like a transaction
- Production
 - production is for sale, for own use or is made available to others at little or no cost

Linking economic units (institutions) and environmental units



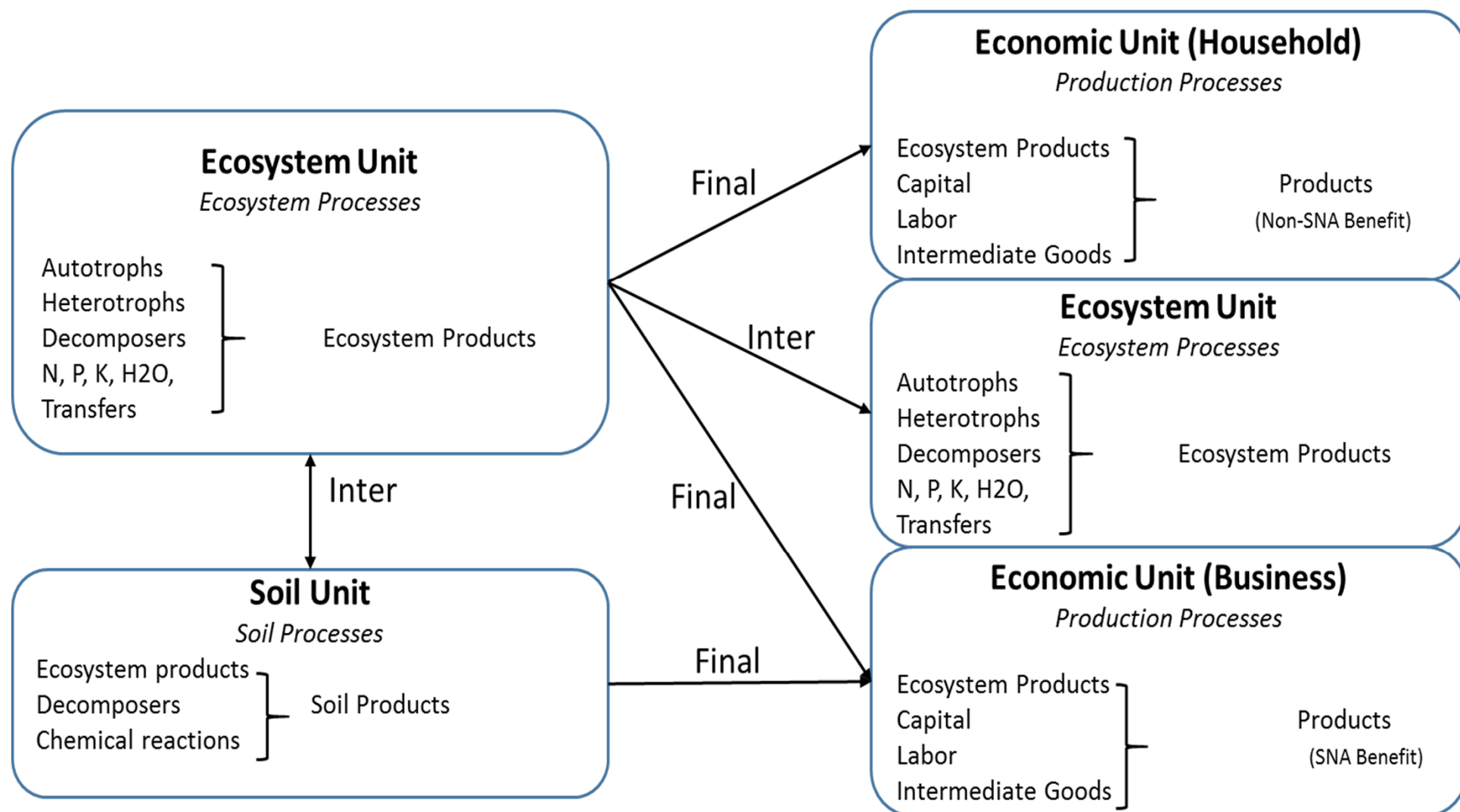
Soil Water Balance Account:

$$= +100 \text{ irrigation} +40 \text{ rainfall} -90 \text{ ecosystem} -30 \text{ losses} +20 \text{ storage (t-1)} -25 \text{ evaporation} = +15 \text{ storage (t+1)}$$

Environmental Units – processes (production)

- Each unit undertakes processes that have the potential to be services
 - Ecosystem processes
 - Soil processes
 - Atmospheric processes
 - Groundwater processes
- **Environmental unit processes**
 - Similar to production processes undertaken by institutional units
- **Transfers – physical movements between units (water, nitrogen, etc)**
- **Transaction – between units (including economic) where there has been a transformation – a process has been employed**

Ecosystem production (services) model



Transaction based ecosystem services

	<<<<<< Transaction >>>>>>						
Ecosystem Units	Ecosystem Process (Production)	Ecosystem services (Products)	Economic Units	Economic inputs	Economic process	Economic product (benefits)	Final or Intermediate
Pasture	Biomass accumulation	Grass	Farmer	Fertiliser, labour, machinery, etc.	Grazing	Cow	Final
Wheat	Biomass accumulation	Wheat plant	Farmer	Fertiliser, labour, machinery, etc.	Farming	Wheat	Final

Transaction based ecosystem services

	<<<<<< Transaction >>>>>>						
Ecosystem Units	Ecosystem Process (Production)	Ecosystem services (Products)	Economic Units	Economic inputs	Economic process	Economic product (benefits)	Final or Intermediate
Plantation forest	Biomass accumulation	Trees	Forester	Fertiliser, labour, machinery, etc.	Forestry	Logs	Final

Transaction based ecosystem services

	<<<<<< Transaction >>>>>>						
Ecosystem Units	Ecosystem Process (Production)	Ecosystem services (Products)	Economic Units	Economic inputs	Economic process	Economic product (benefits)	Final or Intermediate
Wetland	Biomass accumulation	Water regulation	Society	Weed and pest control	Government management of wetland	Flood protection	Final and Intermediate
	Water holding or capture	Water storage	Farmer	Machinery (pump)	Irrigation farmer	Water	Final
	Nutrient capture and processing	Water filtration	Society	Weed and pest control	Government management of wetland	Clean water	Final and Intermediate
	Biomass storage	Carbon storage	Society	Seedling trees	Government management of wetland	Carbon storage	Final and Intermediate

Accounting linkages

- SNA
 - Institutional units (economic units) – trade in land (SEEA CF)
 - Transactions and production – between economic and ecosystem units
- SEEA CF
 - Land (economic construct) – ecosystems, soils (Asset), water
- SEEA EEA
 - Ecosystems – soil, water
 - Economic units – ecosystems, soils, land, atmosphere, groundwater

*Clarifying accounting units that engage in transactions
provides an approach to identifying and measuring
ecosystem services*



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Thank You

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