

**Economic Valuation of Biodiversity Wealth and Debt in National Accounting**

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# **Ecosystem Accounting: Economic Value of Biodiversity vs. Economic Values *Connected to Biodiversity***

**On the correct use of the results of Ecosystem services' "valuation" methods**

**Aldo Femia**

Senior Researcher - Istat

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This presentation is based on the article *Femia AM, Capriolo A (2022) Beyond valuation. Monetary aggregates for the SEEA-EA. The Italian proposal. One Ecosystem.* <https://doi.org/10.3897/oneeco.7.e84689>, peer-reviewed by Carl Obst among others, which anticipated the views of the Italian NCC, included in its fifth Report on the State of Natural Capital in Italy.

1. Core: the estimation methods of the SEEA EA, one by one:
  - What do they tell?
    - On which logical-theoretical basis are they taken to be the value of ESs?
  - «Values of» vs. «Values connected to» ESs
  - How may multiple **values connected to** ESs help decision making, and for which purpose?
  - Hypothetical entities and heavy modelling: are the methods suitable for official statistics (OSs)?
2. A bit of theory here and there (and everywhere):
  - Which monetary value concept corresponds to the ecosystem services (ESs) concept?
  - ESs are appropriated, not transacted
  - ESs are non-produced
  - Economic property of ESs, rents, resource rents, (local) monopoly rents.
  - Supply and demand curves for ESs
  - "Necessary for" does not mean "contributing value". **Being** value does not mean **producing** value.
  - Capitalisation of Nature and valuation – and indissoluble bond

# The valuation concept pertinent to ecosystem services

- Ecosystem services are the **contributions of ecosystems to the benefits** that are used in economic and other human activity (2.14)
- Benefits are the goods and services that are ultimately used and enjoyed by people and society. (2.15)

**Contributions:** Whatever you thinking of, strip it of all human contribution. If the ES is not naked, you are thinking about a benefit. A *picked-up* mushroom is not an ES, nor is *walking* in a park. (A type of **natural inputs** in SEEA CF ch.3 terms).

Consequently:

“In the monetary valuation of ecosystem services, the relevant values should be calculated such that **the costs incurred by economic units of using or accessing the ecosystem services are deducted**, i.e. they are “net” of costs”. (2.81).

**After the strip, something remains. This is the ES's value.**

**What is it and where does it come from?**

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(answer in the next slide)

## *i. Methods where the price for the ecosystem service is directly observable*

**Directly observed prices.** Described in the SEEA EA by way of examples (9.28, 9.31-32):

**Charges** by the owners of a wetland, for its purification service, **stumpage values** charged to timber logging businesses, **land rental** prices in agriculture, prices from **emission trading systems** (ETS), **payments for ecosystem services** (PES) only if “there is clear evidence that the scheme does target a specific service”.

Must be used also if “low”, “provided the prices are from institutional arrangements that are sufficiently mature and large”(9.30), **but**: “where directly observed prices are considered not economically significant ([...] fees paid to enter a national park, for example), the observed price should not be used” (9.33). (CONTRADICTION)

**N.b.:** “natural resources that are extracted in open-access contexts will tend to zero” (9.29)

**Non-zero prices come from (local) monopoly power on (chunks of) ES.** In turn, the existence of such market power depends upon **institutional arrangements**. **No new real value** is generated, **exchange value stems for property rights** (exclusion of others from benefits).

- ⇒ Do we ever **observe** something that can be called **the ESs’ price or value**?
- ⇒ Do the prices somehow reflect their economic importance, or rather the influence of property rights on **income allocation**?
- ⇒ May any of the prices used as example be the expression of the (non-monetary) **costs borne** by the ecosystem?
- ⇒ The method gives monetary values **connected to** ess, not **of** ess. Useful for the analysis of actual income distribution and how property rights influence it.

**Prices from similar markets.** Foreseen, for things defined as products, in SNA (3.123).

- two different institutional contexts
- “prices from similar markets will reflect prices of the existing institutional context” (9.35), i.e. a context **where a market exists**. Society has chosen non-market regulation mechanism for access to the ES. Should the accountant prefer a **hypothetical institutional arrangement** to the **observation** of the implications of the one in place? **Or is this a different kind of analysis from accounting?**

[mushrooms example is misleading: **gathered** mushrooms are products, even if self-consumed. ES are not products].

[method reliable if “the flows of (non-marketed) ecosystem services [...] are **not significant enough** such that they would alter the observed price of, and demand for, the good or service”. However, the transfer of observed prices from ETS to carbon retention services not subject to ETS is common practice. The quantities are surely big enough to make the estimates unreliable]

=> the method tells **what the market value of an ES would be, if it could be sold**. It quantifies the **income shift that would be observed** in favour of the owners of the ES, should they be able to politically impose the same **institutional arrangements** (market conditions) as those existing for similar services elsewhere.

**A connected value, again. Useful for Nature-based income redistribution policy.**

**“residual value and resource rent”, “productivity change” and “hedonic pricing”**

- different ways to isolate the part of EVs of marketed goods or services embodying ESs that is specifically attributable to the **economic property** (appropriation for production purposes) of ESs  
[Quite general situation/concept: no marketed goods could ever be realised without some ES and, vice versa, all ESs are inputs in the production of some marketed product].

The **Resource Rent** (RR), in particular, is obtained by "deducting the cost of all other inputs, including labour, produced assets and intermediate inputs" (9.36).

[N.b.: RR ≠ Rental price, rent (which are observable values). See the next SNA at the item “split asset”]

⇒ **Income on top of costs borne**, that accrues to the produced goods and services. Same utility as the previous two methods.

In the **productivity change method** the production function is estimated and “the change in the value of production consequent upon a marginal change in the supply of the ecosystem service” (9.38) assessed.

⇒ Useful for policy knowing the **potential productivity loss or gain**, consequent to having less or more of a given ES.

In **Hedonic pricing** «*the differential premium on property values/rentals (or other composite goods) that arises from the effect of an ecosystem characteristic (e.g., clean air, local parks) on those values*». (§9.40)

⇒ Could be useful for **fiscal policy (taxation of some rents)**

But for Productivity change, they are **most appropriate in a National Accounting perspective**:

- Responding to the valuation concept
- Aimed at quantifying the shares of **actually existing exchange values** appropriated by owners ( $\cong$  users); *Productivity change*: modelling of production functions not suited for OS. **But** results interesting *per se*. However, estimates limited to marginal changes  $\Rightarrow$  marginal usefulness.

Interpreted as **values of** ESs, all provide **poor measures of what is at stake**, as they are:

- “**residuals**” or “marginal values” which tend to zero (unless the market power of the owners is high);
- related neither to the ecological value of ESs, nor to their social value;
- represent only the **income appropriated by ESs’** users that produce SNA G&Ss, not the income that depends on ESs’ availability.

Interpreted as monetary values **connected to** ESs, allow analysis of actual income distribution and how property rights influence it. Not very useful for ecosystem management purposes.

**Non-SNA benefits, including non-use**: the contribution of ecosystems to non-SNA benefits is 100%; no intermediary between the ecosystem and the user; ESs “naked” from the beginning; ESs not embodied in products’ values; nothing to disentangle their value from  $\Rightarrow$  none of the methods above can be used.

**Should ESs providing non-SNA benefits be valued on the basis of a different concept?**

**Averting behaviour:** «*individuals and communities spend money on preventing or mitigating negative effects and damages caused by adverse environmental impacts [...] for example, in relation to incurring costs associated with extra filtration for purifying polluted water, air conditioning for avoiding polluted air and so forth*» (§9.45)

- ❖ expenditure that “reveals” a **lower bound of the exchange value** of the **lacking** ecosystem services (unmet demand)
- ❖ to the extent expenses are aimed at preventing or mitigating negative effects **on the anthroposphere**: ≠EPE, which is about preventing/mitigating impacts **on ecosystems**.
- ❖ a whole functional satellite account, complementary to the EPEA, could be designed around this concept.
- ❖ such an account would describe **actual costs of ecosystems’ degradation to society**.
- ❖ To the extent that these costs can be avoided through certain ecosystem types’ extension and restoration (e.g. for air filtration urban parks), it is **useful for policy to have this estimate. Suitable for OSs**.
- ❖ applied to **existing** Ess:
  - ⇒ in the SEEA EA, expresses a **price** through which the **value** of the ES is calculated;
  - ⇒ In the Italian approach, expresses the **potential** economic **costs** of coping with their possible loss. In this sense:
    - ⇒ it can somehow be related to the French **ecological debt** approach;
    - ⇒ **useful for policy** but **not suitable for OS**.



**Travel cost:** «*expenditures incurred by households or individuals to reach and access a recreational area, entrance fees and may include the opportunity cost of time*» (§9.47)

- ❖ informs *per se* on **how much the economy depends on certain ES**.
  - ⇒ **useful for policy as such (no further interpretation needed)**
  - ⇒ connected to Tourism Satellite Accounts (OS).
- ❖ what is the ES contribution?
  - ⇒ The ecosystem provides the very **reason** for the consumption (and indirectly, production) activities involved
  - ⇒ not an input to production! Enjoyment is not production.
  - ⇒ if recreation was production:
    - travel costs were production costs (intermediate inputs). The value added of the activity valued at cost would be zero...
    - ...or the consumer's "net enjoyment" would still have to be quantified independently from the costs...
    - ...But how? personal experiences such as recreation lack the exchangeability prerequisite of EV (recreation stands naked within the consumer).
      - only way out: consider the time spent in nature as working time (opportunity cost), and confirm that human beings are not made for having fun, but for production.
      - Useful for policy? No more than knowing about actual working hours and average wages

## v. Methods where the prices are based on expected expenditures or markets

«*the expenditure that would be expected to be made if the ES were no longer provided or were, in fact, sold on a market* » (9.49).

**If:** the relation to our framing of monetary values connected to ESs is direct and explicit. Estimates of **hypothetical values** (hardly for OS) that should be used **as such** (no reason for “value of”).

**Replacement costs:** no more and no less than «*the **cost of replacing the ecosystem service by something that provides the same benefits***» (§9.50)

- ⇒ clear message: if a gift of nature is destroyed, and we want something similar, we'll have to pay for it
- ⇒ useful for policy, but only to the (limited) extent to which ESs can actually be replaced. Otherwise could be **mislead** decision makers into thinking that ecosystems can always be replaced.

## v. Methods where the prices are based on expected expenditures or markets

**Avoided damage costs** «*the costs of the damages that would occur due to the loss of these services*» (§9.38)

- ⇒ **Quite useful for policy**, as a **complement** of information such as: how many additional dead, wounded and homeless, lost structures...
- ⇒ No apparent reason to understand it as “value of” ESs
- ⇒ OS may calculate **expected values of existing risks**, based on spatial distribution of man-made capital and activities, and likelihood of events.
- ❖ Like *averting behaviour*, if applied to **existing** ESs:
  - ⇒ in the SEEA EA, expresses a **price** through which the **value of** the ES is calculated;
  - ⇒ In the Italian approach, expresses the **potential economic costs** of coping with their possible loss. In this sense:
    - ⇒ it can somehow be related to the French **ecological debt** approach;
    - ⇒ **useful for policy but not suitable for OS.**

**Simulated Exchange Value (SEV)** «*price and the quantity that would prevail if the ecosystem service were to be traded in a hypothetical market*»

- the clearest in the message: “deal with this as a private good, and somebody will make some money”
- arbitrary choice of the hypothetical institutional context
  - the very simulation of a market, a quite specific institutional context itself
  - assumptions on the market structure (how competitive, distribution of hypothetical ownership rights). Influence estimates in a crucial way:
    - perfect competition:  $EV(ES) = \text{costs} = \text{null}$ ;
    - $EV(ES)$  maximized under full monopoly
- Useful for understanding the effects of common goods’ privatisation policies.
- E.g fee for entry in a public park. Expected reduction in visitors’ number and income from new fee (extraction of consumer surplus).

**Shadow project cost** see below Restoration cost

**Opportunity costs of alternative uses.** «*the forgone benefits of not using the same ecosystem asset for alternative uses*», «*what has to be given up for the sake of securing the ecosystem services*».

⇒ This is **useful** (as such) **for establishing compensations** for those who would otherwise use up the ecosystem (if policy deems it worth paying to avoid destructive use)

**Stated preference methods (Contingent valuation, Choice experiments )**

«*willingness to pay for, or willingness to accept*» (9.63)

⇒ Also these are meanings of their own. Difficult to put them in relation with National Accounts, though. WTP no use if the ES cannot be produced. WTA does not serve conservation. Both assume everything has a price. Both crucially depend on income.

**Prices from economic modelling**

**Qualitative methods**

**Restoration costs** (SEEA section 12.3.2) are particularly interesting in a non-valuation, policy-oriented, perspective on economic values connected to ESs. They provide information about the economic resources necessary “to re-establish pre-existing structure and function, including biotic integrity” (10.18).

This surely is **important for policies** aimed at that.

Attempt to “measure the cost of degradation directly”, rather than the value of ESs, “since there is no particular reason that the estimated restoration costs will align with the estimated loss of future flows of ESs” (12.41).

(the only place where the reason why “value of” is dealt with in the SEEA EA!)

The cost of degradation approach is a particularly interesting one in a perspective of integration of environment-connected values in the SNA (Vanoli 2017).

# CONCLUSIONS

The Italian proposal, in a nutshell, is to:

- ✓ **Drop** the step of *imputation*, whereby:
  - the estimates of monetary aggregates are arbitrarily transformed into the *value of* ecosystem services
    - “methods that translate observable and revealed prices and costs (i.e., for related or similar goods and services) into the values required for accounting purposes”(SEEA EA§9.22)
  - their specific meanings are obliterated
  - their richness is reduced to a monodimensional value
  
- ✓ **Renounce to valuation and directly refer to a variety of *monetary aggregates connected to ES, adhering to their own specific definitions*, instead.**
  
- ✓ **Coordinate the accounting for the values connected to ESs with the rest of monetary national and satellite accounting (where are the values in the SNA? How do they relate to other accounts such as EPEA?)**

## Additional work and opportunities

While the estimation techniques are as good (or as bad) for *monetary aggregates* as for value, the conceptual aspects of the different *monetary aggregates* need to be further **worked out** :

- Develop the full potential of these estimates highlighting the specific connections to core National Accounts and other satellites, as a satellite should
- Consider additional ones,
- classify/characterize aggregates according to general properties (e.g. costs/benefits, potential/occurring, perspective/current, hypothetical/actual),
- Identify where their positions within core National Accounts, as a satellite should
- Elaborate on usefulness for decision-making based on characteristics and positions



Thank you for the attention

femia@istat.it