

System of Environmental-Economic Accounting— Ecosystem Accounting

Global Consultation on the complete document: Comments Form

Deadline for responses: 30 November 2020

Send responses to: seea@un.org

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The comments form has been designed to facilitate the analysis of comments. There are six guiding questions in the form, please respond to the questions in the indicated boxes below. To submit responses please save this document and send it as an attachment to: seea@un.org.

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General comments, inclusive of Chapters 1 and 2

The SEEA-EA is an ambitious and important project following a long arc of development. The importance of natural capital and environment has been well known for centuries. Fisher makes clear that nature is capital and can provide services in his seminal 1906 book. Kuznets was clearly aware of the importance

of natural capital and services from the environment, but felt that probably they were of second order importance during the depression and later for world war II planning. Failing to foresee climate change, Kuznets wrote in 1973 that GDP would not be appropriate for heavily resource dependent countries. More than half a dozen Nobel Laureates in economics have written about the importance environmental service and natural capital. Dale Jorgenson points to the importance of SEEA in his 2018 review of progress in economic measurement.

I make this point to emphasize the importance of a System of Environmental **Economic** Accounts and the importance of the SEEA undertaken in building a system that unifies physical measurement and monetary marginal valuation. How to manage ecosystems and the natural environment is a paramount question. Barack Obama, while speaking about something else summarized the importance of the integrated physical and monetary system of SEEA say, there is a need to “recognize a common set of facts before we start arguing about what we should do about those facts.” In economic theory, the theory that underpins the SNA to which SEEA is meant to articulate, there is a direct mapping between the quantity and price domains. There are two practical advantages of making sure a system of measurement has this tight mapping.

1. It is often the case that information and relationships are easier viewed in one domain or the other.
2. At the end of the day the SEEA-EA will be a starting point for discussions about what to do about the state of the world. In my experience some people view the world in physical quantities. These are often biophysical scientists and engineers. It is also true that this is how much of the public views the world. However, a substantial and important share of people, especially those allocating resources, view the world from the angle where they are looking at the system through the price domain. This group includes business leaders, bankers, and economists. The only way to get these groups on the same page (as opposed to a tribalism with each group intent on overpowering the other – we need both groups) is build accounts that help them see the mapping.

The discipline of accounting will upgrade many physical accounts. However, these natural features inventories already exist in many places. The strength of the SEEA-EA model is making information readily accessible to regular and sophisticated users of national accounts (e.g., makers of fiscal and monetary policy) and constructing an information system to support sustainable development metrics like change in inclusive or comprehensive wealth.

The real power of the SEEA-EA is not to cheer those concerned about ecosystems, but to make ecosystems visible in places they currently are not. The aspiration for the SEEA-EA should be to furnish a workable set of input-output tables so that ecosystems can easily “ride-along” in standard macro-economic analyses irrespective of whether the development of SEEA-EA changes GDP aggregates. Indeed, the aggregates from SEEA-EA are of second order importance to getting the information structure right. SEEA-EA should also be a window into macro-economic measurement for those who view the world in biophysical terms. SEEA-EA with physical and monetary accounts is the great translator needed to get to a commonly agreed set of facts about what has and is happening not what should happen.

The SEEA-EA project is only worthwhile because it unites the quantity and price dimensions and facilitates communication.

Fisher, I. 1906. The nature of capital and income. Norwood Press, Norwood, MA.
Kuznets, S. 1973. Modern economic growth: Findings and reflections. The American Economic Review **63**:247-258.
Jorgenson, D. W. 2018. Production and welfare: Progress in economic measurement. Journal of Economic Literature **56**:867-919.

An overarching issue:

To much effort is put on how measurements should be aggregated rather than building the quantity-price information system.

Point 1.31 highlights a longstanding misunderstanding of environmental accounting – the goal of adjusting GDP. There are few core issues with GDP being used an index of social progress and the SNA is pretty clear on this. At the core of the problem for ecosystem services is that many, probably most, ecosystem services are probably best characterized as or similar too household produced services. These are excluded from the SNA because “The inclusion of large non-monetary flows of this kind in the accounts together with monetary flows can obscure what is happening on markets and reduce the analytic usefulness of the data” (SNA 1.42). A translation of this is that household produced services are so vast (even more so with ecosystem services) that it could swamp the market signal central banks need to manage monetary policy and perhaps governments need to set fiscal policy. The problem is the world wants an index or at least dashboard of social progress. Steve Landefeld has been outspoken on the need for good measures of household produced services and worked with Bill Nordhaus and Dale Jorgenson in the 90s and early 2000s to extend this thinking to the environment and beyond.

At this stage, the SEEA should work to provide the information system that allows the boundary to be moved rather than establishing a specific boundary. To do that effectively means making sure that the information system supports prices and quantities.

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My view of the SEEA process is that it has been too inclusive of individuals unwilling to learn what the SNA is. Section 2.4 should be amended to focus on valuation and not even open the can of worms of morals. Section 2.4.2 should be dropped. It is unfortunate that the English language is so imprecise. This is fundamentally about marginal tradeoffs with other uses of resources. A recurring problem with the SEEA -EA process has been an aggressive environmentalist push to ensure that the environment is valued above and beyond all else. I am a strong supporter of conservation activities, but I don't think my personal opinions or ethics should guide measurement. I always felt I was in the minority of people at SEEA-EA meetings, and the majority felt that SEEA-EA was a way to advance a certain type of conservation agenda. I do believe accurate measurement will lead to more conservation overall, but only if prices and quantities are reported accurately. For the most part the leadership team has done a good job containing the view that SEEA-EA must advance conservation. However, it has crept in in a few places. However, the best way to undermine the promise of SEEA-EA for advancing sustainable development is to drop the monetary valuation all together. Doing so would have the effect of SEEA being just another natural features inventory.

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We need to move beyond the exchange value = price \neq consumer surplus red herring. I feel have lost a year of my life or more to this discussion which stems from fundamental misunderstanding of basic economic concepts. We need to say clearer and definitively, following the SNA, (see SNA section 15.11, 3.121, 3.131, 3.139). Once we understand that the exchange value concept is a price, which means that it measures the value of the last unit exchanged, then it becomes clear that this cannot be consumer surplus. It is clear this is not consumer surplus because exchange value = price is a point on the curve the maps quantities into prices (e.g., a demand curve). Consumer surplus is the area between two points on the demand curve. This means measure of consumer surplus can be used to find exchange values = prices for non-market goods under some conditions. It also means that measuring all units at the exchange value imposes a strong assumption of perfectly elastic demand. This is not so bad if it is substituted with the idea that only marginal units are being valued (see Muller, Mendelsohn and Nordhaus 2011). Unfortunately, there seems to be an unhealthy goal of measuring the total value of ecosystem service and natural capital. That is not really what the SNA does. In the SNA all exchanges are assumed to be marginal and “immobile” capital is unvalued. This is because presumably for immobile (capital not exchanged in a period) capital the owner of the capital places a greater marginal value (via expected NPV) than any prospective seller.

Muller, N. Z., R. O. Mendelsohn, and W. D. Nordhaus. 2011. Environmental Accounting: Methods with an Application to the United States Economy. *American Economic Review* **101**:1-30.

There are number of other details in the weeds of the valuation, but these are resolvable.

It would be useful at some point to see an account that uses SEEA-EA and other SNA or satellite accounts to emphasize SEEA-EA as an information system and part of a modular SNA family.

Comments on Chapters 8 -10

8.1 should emphasize the information system component. It is almost there.

8.2 is the real value of SEEA relative to a natural features inventory system.

Around 8.5 it should be clearly noted that the SNA suggests valuing many of these assets, though in practice these natural assets don't make it onto national balance sheets (under the head of non-produced capital). Therefore, the SEEA system CF & EA are necessary to complete core ambitions of the SNA. This is another reason why monetary valuation is an important component of the SEEA-EA.

8.7 is a throw away statement. It is ok to clarify once that valuation refers to monetary valuation and marginal valuation and end it. The point is understanding ecosystems in the context of the macro economy not to advance a belief set.

Please edit to **directly observing** market transactions. Market transactions are still used in the measurement process.

The discussion of welfare is slightly amiss. The SNA's reason for avoiding welfare measure is to help meet monetary, labor, and fiscal policy targets that are somewhat arbitrarily set. It is not clear there are equivalent targets when using national accounts information that includes the environment. So, it is important to be able to get to measures of welfare or at least changes in welfare.

8.14 is the definition of a price and SNA3.118 says that if you keep reading. In the market context this is the marginal transaction unit. Please be clear about this.

8.15 seems to be describing Riemann integration? This means that there are issues elsewhere in this document. Some of those issues are highlighted below.

8.17 there is an assumption of marginal exchange in the SNA.

8.19 Please add and there is little evidence that people would replace lost ecosystem components, which is the critical assumption in the SNA for replacement cost. Also, the key word here is *world* and not *should*. Advocates of replacement cost for ecosystems must use the word should.

8.25 should this say the marginal contribution of the ecosystem.

8.34 I think this needs some slight adjustment. We can value the change in NPV from a change in an ecosystem asset. The change may be the totality of an ecosystem in a small area. However, these cannot really be aggregated up. For example, if we did the thought experiment of liquidating all forest, then there would be huge general equilibrium effects in the economy (not to mention other ecosystems), so the price changes would be massive (going to infinity). This is a reason to be clear about what is being measured (not a reason to skip monetary valuation).

8.40 seems inconsistent with the importance of institutional arrangements being important.

Chapter 9

I would recommend elevating 9.9. The supply use table structure leads to IO Tables, which is where I think the SEEA-EA could really shine and have a great impact on how macro-economic analysis is done. Indeed, Nordhaus's DICE model would have been a lot less innovative if there were ready to go IO tables that connected industries to climate. SEEA-EA can make that the case for ecosystems.

9.10 it might be worth noting that the supply & use table to IO table structure is at the heart of modern ecosystem modeling as well (e.g., ecopath-ecosim, Atlantis).

9.X somewhere – in an information system it might be important to develop code so that prices adjust to the chosen boundaries, because prices should capture interactions with other goods and services within the boundary.

9.37 where you say the properties must be completely described, I think all you really mean is that care must be taken to identify the price from the ecosystem services. Early hedonics did not always pay attention to identification concerns.

Kuminoff, N.V., Parmeter, C.F. and Pope, J.C., 2010. Which hedonic models can we trust to recover the marginal willingness to pay for environmental amenities?. *Journal of environmental economics and management*, 60(3), pp.145-160.

9.42 on travel cost it is important to separate the price of the trip from the exchange value associated with the increment of ecosystem service.

10.38 There should be pains taken to point out that this is not the exchange value of the asset. As it is this implies V is exchange value, which would be WRONG and is certainly confusing. It is also worth point out that ES_t can be time varying along with EA_t . Actually ES should be thought of as a function of EA rather than a product, which means notational ES should not be subscripted.

It could also be written

$$V(EA) \approx \frac{1}{r} \left(F(EA_t) + \frac{\partial V}{\partial EA} \frac{dEA_t}{d\tau} \right)$$

Where the exchange value of the EA is $\frac{\partial V(EA)}{\partial EA}$. The approximation comes from discrete v continuous time. F is simply the function that maps EA to ES time. The first term in the parenthesis is ecosystem service dividends the second term is capital gains.

This clearly laid out in

Fenichel, E. P., J. K. Abbott, and S. D. Yun. 2018. The nature of natural capital and ecosystem income. Pages 85-142 in V. K. Smith, P. Dasgupta, and S. Pattanayak, editors. *Handbook of Environmental Economics North Holland*. And summarized in

Karp, L. 2017. *Natural Resources as Capital*. MIT Press, Cambridge, MA.

And pulling from

Arrow, K. J., P. Dasgupta, and K.-G. Maler. 2003. Evaluating projects and assessing sustainable development in imperfect economies. *Environmental and Resource Economics* **26**:647-685.

Jorgenson, D. W. 1963. Capital theory and investment behavior. *American Economic Review* **53**:247-259.

Fenichel et al. 2018 also explain how to deal with interacting assets in this framework. (10.41)

It is also worth noting that when prices and quantities change over time. The change in wealth is not $p_1q_1 - p_0q_0$. That is simply wrong. Because it violates the exchange value concept of the exchange value being the value that each unit is transacted at. This is because if q is approximately continuous (by which I mean measured on the real number line), then p must be approximately continuous, then by the intermediate value theorem, the units exchange that move the system between q_1 and q_0 must be exchanged at prices between p_0 and p_1 (assuming weak monotonicity). I have tried to explain this a dozen or more times. One should be able to use $V(1) - V(0)$ but that is unlikely to be $p_1q_1 - p_0q_0$ (very unusual conditions would have to apply for $V(1) - V(0) = p_1q_1 - p_0q_0$).

Alternatively, the exchange value could be approximated as $\frac{(V(1)-V(0))}{q1-q0}$. This provides the average exchange value over the interval of the change from q1 to q0 (or vice versa with the sign change).

A10.7 it is worth writing this is a summation over assets not time.

A10.13 IS STILL WRONG because the prices used are not the correct exchange value. I think this extends to A10.27

A10.32 I think this is mathematically correct, but it does not align with the exchange value concept as the marginal value of exchange.

Chapter 11 seems really important, but I'm out of time.