DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS
STATISTICS DIVISION
UNITED NATIONS

System of Environmental Economic Accounting

System of Environmental-Economic Accounting— Ecosystem Accounting

Global Consultation on the complete document: Comments Form

Deadline for responses: 30 November 2020
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General comments

Question 1: Do you have comments on the overall draft of the SEEA Ecosystem Accounting?

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Comments by sets of chapters

Question 2. Do you have comments on Chapters 1-2 of the draft SEEA Ecosystem Accounting?

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Question 3. Do you have comments on Chapters 3-5 of the draft SEEA Ecosystem Accounting?

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Question 4. Do you have comments on Chapters 6-7 of the draft SEEA Ecosystem Accounting?

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Question 5. Do you have comments on Chapters 8-11 of the draft SEEA Ecosystem Accounting?

We agree that the current version, dated October 2020, of the SEEA EA has advantages to the previous one dated May 2020, but we would like some additional clarification on the precise features of the ecosystem trustee, as both versions share the same concept of "ecosystem trustee" as a sort of new institutional sector (essentially as proposed in Edens and Hein 2013).

The key issue is whether or not, and how, manufactured intermediate consumption, capital user costs and paid labor involved in the provision of the ecosystem service attributed to the ecosystem trustee will be considered as production factors in this new institutional sector. Using the example in Table 11.4., let us complete the example by assuming that to provide the free access recreational services the government needs to pay 10 currency units as compensation to employees (e.g. for cleaning services).

We understand that the 30 units of recreational service under the column of ecosystem trustee would be net of this 10 units, i.e. that the total output of the recreational service would be 40 units, as 30 is the "contribution of nature" in this case. This would imply that, to describe the whole system, one should incorporate the 10 units paid for labor (cleaning services) that are already recorded in the SNA in the general government institutional sector. This could be done in an additional column devoted to the "government", where the compensation to labor of 10 would be recorded, together with an output of 10 (equal to the cost). This does not imply to record the compensation to labor in the government twice, as this would be double counting, it would just imply to show spatially the information in the general government sector that is relevant for ecosystem accounting.

Alternatively, one could record the manufactured costs also in the column devoted to the "ecosystem trustee". In this case, the 30 units under the column of ecosystem trustee could be an ecosystem fixed asset service and the 10 units of the employee compensation, i.e. the total output (the final product recreational service consumed) of the ecosystem trustee institutional sector would be 40 units, and the net value added would yield the same amount.

We would also like to note that, in the first interpretation adding up the columns of government and "ecosystem trustee" would basically yield the "government" in our Agroforestry Accounting System (AAS) (Campos et al., 2019), and what we called "society" in Caparrós et al. (2003). The second interpretation is closer to the system

detailed in these publications, as adding up the manufactured cost to the column of "ecosystem trustee" would basically yield the "government" in the AAS (see Annex I for a more detailed comparison of the AAS with the SEEA EA).

In fact, even if neither of these interpretations is correct, we would suggest to expand the example behind Table 11.4 by considering manufactured costs, to better understand the proposed treatment of manufactured costs involved in the provision of ecosystem services attributed to the "ecosystem trustee". This is not a minor issue, as we have shown in our application to Andalusia that there are significant manufactured costs associated to the provision of ecosystem services (Campos et al., 2019).

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Annex I: Comparison of economic ecosystem accounting frameworks

1. Introduction

This Annex presents a conceptual critical revision of the production (including generation of income) account structure and the concepts of ordinary operating surplus, ecosystem service and ordinary value added in the draft SEEA EA guidelines subject to open critical review (UNSD, 2020: chapter 11). We also compare the production account structure of the SEEA EA (henceforth Economic Ecosystem Accounting-EEA) with our refined EEA (henceforth rEEA) and the Agroforestry Accounting System (AAS).

The inclusion of the rEEA in this accounting frameworks comparison can be justified bearing in mind "that the precise description of the relationships between ecosystem assets, ecosystem services and the associated production, consumption and balance sheet information in the standard national accounts is subject to ongoing discussion" (Atkinson and Obst, 2017: p. 11). The production and generation of income account of the EEA in its current stage of development and application continues to be an accounting structure under ongoing development from the perspective of integration of ecosystem services in the products consumed and the degradation in environmental assets of the ecosystem services valued in the ecosystem accounting area.

What is of interest here is to critically review the EEA methodology through stylized examples of selected cropland products (wheat and recreation) and forest

products (timber and atmospheric air filtration). The aim of these comparisons is to highlight the fact that the same results are obtained for the ecosystem services of private and public products when applying the EEA, rEEA and AAS methodologies to products without government manufactured cost incurred. Thus, it is evidenced that the visibility of the ecosystem services can be achieved without having to resort to the institutional government sub-sector of the ecosystem trustee.

In the stylized production account records for the products of wheat, timber, public recreation and air filtration under the EEA methodology presented in the UNSD (2020: Tables 11.4-11.5) the production functions coincide with the rEEA and AAS methodologies. The comparison of the results under the EEA, rEEA and AAS in these stylized examples reveals the logic of these records and due to their simplified production function the reader may have doubts with regard to the differences between the EEA and rEEA and the novelties of the AAS methodology. However, as verified in Campos et al. (2019, 2020a, 2020b), the reality with regard to the valuations of ecosystem services under the rEEA and AAS, carried out completely for holm and cork oak forest case studies in Andalusia-Spain under real management conditions of multiple landscape uses, is that when their production functions incorporate the government manufactured costs of public activities, the AAS methodology provides results which are quite different from those of the EEA and rEEA methodologies.

In the review of the updated publication of the production account structure of the Tables 11.4 and 11.5 in the EEA there is little margin for more in-depth debate on the concept of ecosystem service. The fact that the EEA in UNSD (2020) illustrates the estimation of the ecosystem service of the government institutional sub-sector termed ecosystem trustee with reference to two public products consumed (recreation and air filtration) without manufactured costs, means that it coincides with the estimates under the EEA, rEEA and AAS methodologies. In contrast, the discussion on the concept of ordinary values added in the EEA is of instrumental interest given the difficulty involved in estimating them in practice and their inclusion of environmental intermediate consumption cost. The simplicity and the coincidence in the measurements of ecosystem services (through the concept of resource rent) in the examples in Tables 11.4 and 11.5 of the EEA (UNSD, 2020), which are presented in revised form in Tables 1and 22, highlight the problem reflected in the concepts and measurements of final products consumed and values added.

2 Ecosystem services and ordinary net values added in the draft SEEA-EA

The SNA and EEA methodologies ignore the records of intermediate product (IP) in the production account and maintain the shortcoming associated with the environmental work in progress used (WPeu) embedded in the operating surplus. The EEA adjustment of the SNA operating surplus is done by subtracting from it the ordinary consumption of environmental fixed asset (CFCeo), termed degradation in the EEA. Similarly, the EEA proposes the estimation of the adjusted ordinary values added at basic price as the production factor services of the ordinary labour compensations and the adjusted ordinary surplus at basic price. The AAS methodology registers the intermediate products, incorporates the WPeu in the ordinary intermediate consumption at social price, replaces the ordinary surplus at basic price with the ordinary operating margin at social price and estimates the total product consumed. The AAS ordinary value added at social price is estimated as the sum of the ordinary labour compensation and the operating margin. In short, the EEA surplus and the AAS margin differ in that the former is not a pure operating profit since it includes the cost of WPeu whereas the

latter does not. This difference is equally present in the ordinary values added of each methodology.

The simulated schematic applications of the EEA, rEEA and AAS methodologies shown in Tables 1 and 2 below apply the concept of ecosystem service as the resource rent of the final products consumed in the ecosystem accounting area taking into account single activities at social prices. The resource rent coincides in the EEA, rEEA and the AAS because the ecosystem trustee products of recreation and air filtration services in the EEA do not incur government manufactured costs. The estimates of the ordinary net values added in the rEEA and AAS methodologies are consistent with the concept of ordinary operating income. This is not the case in the EEA as it incorporates the cost of the WPeu in the ordinary net value added.

3. Is it time to leave behind the government institutional sub-sector of ecosystem trustee?

In the debate on the role of the government institutional sector in the EEA, the EEA currently under discussion proposes the inclusion of the ecosystem trustee as "additional types of institutional units" under the control of the government general institutional sector in order to estimate the simulated exchange value of the resource rent of the products[1] consumed without observed market prices (UNSD, 2020: para. 11.58, p. 211). However, in this update of the EEA the production functions of the farmer and the ecosystem trustee are maintained as different, therefore there is no conceptual change derived from the new definition with respect to the previous definition which considered the ecosystems as "additional types of institutional units" without manufactured costs (Edens and Hein, 2013: eq. (2), p. 45). However, in accordance with this new classification in the EEA it could be interpreted that there is a single production function of the ecosystem economic activities, regardless of whether it is derived solely from the economic activities not recognized by the System of National Accounts (SNA) and/or from other manufactured production factors. Thus, the condition of consistency of a single production function as proposed in Campos et al. (2019) relegates the ecosystem trustee to specific product function cases where no manufactured production factors are incorporated. In other words, the function of a product for which the value coincides with that of the ecosystem service "$s \equiv F(E)$"[2] is a special case which is included in the general extended production function "$x \equiv F(i, K, L, E)$"[3], both proposed by Edens and Hein (2013: p. 45). The consequence of discarding the ecosystem trustee condition of institutional sector in the AAS, is that both the farmer and the government are owners of the products which we classify as either private or public according to the respective legal and/or economic owners. Thus, if the backbone of ecosystem accounting is based on a single general production function, we avoid the possible overvaluation of the ecosystem services by equating their products in the presence of government manufactured costs for the products consumed of government activities which take place in the ecosystem accounting area valued.

The concept of the government institutional sub-sector of ecosystem trustee in the EEA is confusing and leads to problems of inconsistencies in the definitions of the ordinary extended values added of the ecosystem accounting area which produce them

[1] According to the criteria of the System of National Accounts (European Commission et al., 2009), it is arbitrarily assumed that the public economic activities provided by the government do not generate profits, their net value added being limited to paid labour compensations.

[2] Where s is ecosystem services, F is function; E is ecosystem capital [environmental asset].

[3] Where x is outputs [products] (SNA and non SNA), i is inputs [intermediate consumption], K is produced [manufactured fixed] capital, L is labour cost.

or appropriate them[4]. In order to value them it is necessary to estimate the final products consumed through current observed/simulated transactions.

In the rEEA and AAS approaches, it is not necessary to incorporate the household institutional sector to the aim of estimating the ecosystem service, since the government can be considered as owner of the overall public environmental assets, representing consumer collective ownership. Nevertheless, it is still necessary to estimate the existence of the simulated transaction value though revealed or stated preferences of the consumers (collective owners of the environmental assets). Furthermore, there is no transfer of final product consumption from other institutional sectors to the household sector, but rather, free consumption of final products without observed market prices by the beneficiaries.

4. Is it time to leave behind the SEEA-EA structure and adjusted net value added?

We assume the EEA and rEEA attribute the ownership of the products consumed to the farmer and ecosystem trustee institutional sectors. It is assumed in the AAS that the property rights of the products consumed are ascribed exclusively to the farmer or to the government. As there are no other owners of the ecosystem products, the condition for making visible the resource rent of the nature-based private and public products is that the final products consumed be valued according to their exchange values derived from observed and/or simulated transactions by individuals and institutions.

The updated draft of the EEA, which includes the ecosystem services as a final product in the "ecosystem trustee" sub-sector (UNSD, 2020), may not be consistent with the AAS concept of government ordinary values added. This will be the case when government ecosystem trustee (including household) product consumption incur manufactured costs. However, if the value of the consumption of the ecosystem trustee final product coincide with that of their ecosystem services, the only production factors that may be involved in the generation of the product consumed are the environmental work in progress used (WPeu), the ordinary consumption of environmental fixed asset (CFCeo) and the ordinary environmental net operating margin (NOMeo), coinciding in value but not in concept the product and its ecosystem service. In other words, by definition, we can consume the products of the ecosystem trustee but not the ecosystem services that contribute to part, if not all, of the value of the product. With this in mind, our rEEA and AAS approaches establish a clear conceptual distinction between the ecosystem services and the total product consumption (Campos et al., 2019; 2020a, 2000b).

An unnecessary double register of an ecosystem service arises in the structure of the EEA production account when this service is already included in the final product consumption (UNSD, 2020: Tables 11.4-11.5). In addition, we consider it inconsistent to include an ecosystem service as intermediate consumption when it is in the production function as a service of the environmental fixed asset termed ordinary environmental net operating margin (NOMeo).

The updated supply of the production account in the official draft of the EEA also includes the provisioning service of timber work in progress used termed natural growth (NG). The wording here could be confusing, since the true meaning of this NG included in the supply side of the production account is environmental work in progress

[4] The confusion associated with the use of the concept of ecosystem is not exclusive to the ongoing environmental economic accounts coordinated by the United Nations Statistic Division, but also arises in the field of ecology due to the use of the concept of ecosystem as an entity without human's intervention (O´Neill, 2001).

used (WPeu) in the period (Table 2), whereas in fact, NG in supply side is a concept that refers to gross environmental asset formation in the period, hence, it would not be an ecosystem service of the period as it does not form part of the consumption of the product in the period, but rather, in future periods.

In the development of economic ecosystem accounting (EEA), it is necessary to explicitly register the work in progress used inventoried at the opening of the period as production factors of the ecosystem accounting area as well as the ordinary consumption of environmental fixed asset (environmental degradation) and the ordinary environmental operating margin, the latter as the ordinary operating return of the environmental assets embedded in the total product consumed of the individual activity in the period. If the timing biases have been overcome, it is not necessary to adjust the values added of a total product in which the value added is embedded; consequently, it is misleading with respect to the ordinary operating income theory that the ordinary value added needs to be adjusted. In other words, the adjustment of the ordinary value added in the EEA is due to the shortcomings associated with the absence of a total income estimate for the individual economic activity in the ecosystem accounting area.

It should be understood that the EEA adjustment of the value added is due to the implicit recognition that this system measures an incomplete concept of total income of the individual product, although in this case, the adjustment of the ordinary value added does not estimate the ordinary inanimate fixed capital gain of the activity which originates the true total income.

5. Concluding remark

The comparison of the results for the selected products of wheat, timber, recreation and air filtration under the SNA, EEA and rEEA methodologies in Tables 1 and 2 reveals that they differ in terms of the overvaluation of the total products and ordinay values added in the EEA, while the results of the rEEA and AAS for ordinary values added and ecosystem services do not differ. The values added in the SNA and EEA differ from those of the rEEA and AAS when environmental work in progress used (WPeu) is incorporated, since the former two methodologies include them in the ordinary operating surpluses while the ordinary operating margins in the rEEA and AAS exclude WPeu (Tables 1-2). However, in the absence of WPeu, the values added and ordinary environmental operating surplus/margins in the EEA, rEEA and AAS coincide.

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Table 1. Stylized example of comparison of ordinary values added and ecosystem services in cropland under the ecosystem accounting frameworks (monetary units).

Class	SNA	EA			rEEA			AAS			EEA	rEEA	AAS	AAS_G
Sector	Farmer	Farmer	Ecosystem trustee	Total	Farmer	Ecosystem trustee	Total	Farmer	Government	Total	/SNA	/EEA	/EEA	$/EEA_{ET}$
Product	Wheat	Wheat	recreation		Wheat	recreation		Wheat	recreation					
1.1 Final product consumption	200	200		200	200	30	230	200	30	230				
1.2 Ecosystem service		80	30	110										
1. Total product consumption	200	280	30	310	200	30	230	200	30	230	1.55	0.74	0.74	1.00
2. Environmental intermediate consumption		80	0	80	0	0	0	0	0	0				
3. Ordinary gross value added	200	200	30	230	200	30	230	200	30	230	1.15	1.00	1.00	1.00
4.1 Ordinary manufactured consumption of fixed capital	10	10	0	10	10	0	10	10	0	10	1.00	1.00	1.00	1.00
4.2 Ordinary environmental consumption of fixed asset		10	5	15	10	5	15	10	5	15		1.00	1.00	1.00
4. Ordinary consumption of fixed capital	10	20	5	25	20	5	25	20	5	25	2.50	1.00	1.00	1.00
5. Ordinary net value added	190	180	25	205	180	25	205	180	25	205	1.08	1.00	1.00	1.00
5.1 Ordinary labour compensation of employees	50	50	0	50	50	0	50	50	0	50	1.00	1.00	1.00	1.00
5.2 Ordinary net operating margin	140	130	25	155	130	25	155	130	25	155	1.11	1.00	1.00	1.00
5.2.1 Ordinary manufactured net operating margin		60	0	60	60	0	60	60	0	60		1.00	1.00	1.00
5.2.2 Ordinary environmental net operating margin		70	25	95	70	25	95	80	25	95		1.00	1.00	1.00
6. Ecosystem services		80	30	110	80	30	110	80	30	110		1.00	1.00	1.00

Source: Own elaboration after UNSD (2020: Table 11.4).
Abbreviations: SNA is standard System of National Accounts, EEA is economic ecosystem accounting, rEEA is refined economic ecosystem accounting, AAS is Agroforestry Accounting System and ET is ecosystem trustee.

Table 2. Stylized example of comparison of ordinary values added and ecosystem services in forest under the ecosystem accounting frameworks (monetary units).

Class	SNA	EEA			rEEA			AAS			EEA	rEEA	AAS	AAS_G
Sector	Farmer	Farmer	Ecosystem trustee	Total	Farmer	Ecosystem trustee	Total	Farmer	Government	Total	/SNA	/EEA	/rEEA	$/EEA_{ET}$
Product	Timber	Timber	Air filtration		Timber	Air filtration		Timber	Air filtration					
1.1 Final product consumption	50	50		50	50	15	65	50	15	65	1.00	1.30	1.00	1.00
1.2 Ecosystem service		30	15	45										
1. Total product consumption	50	80	15	95	50	15	65	50	15	65	1.90	0.68	1.00	1.00
2. Environmental intermediate consumption		30		30	30		30	30		30		1.00	1.00	1.00
3. Ordinary gross value added	50	50	15	65	20	15	35	20	15	35	1.30	0.54	1.00	1.00
4. Ordinary net value added	50	50	15	65	20	15	35	20	15	35	1.30	0.54	1.00	1.00
4.1 Ordinary manufactured net value added		50		50	20	15	35	20	15	35		0.70	1.00	1,00
4.2 Ordinary Environmental net operating margin			15	15		15	15		15	15		1.00	1.00	1.00
5. Ecosystem services		30	15	45	30	15	45	30	15	45		1.00	1.00	1.00

Source: Own elaboration after UNSD (2020: Table 11.5).
Abbreviations: SNA is standard System of National Accounts, EEA is economic ecosystem accounting, rEEA is refined economic ecosystem accounting, AAS is Agroforestry Accounting System and ET is ecosystem trustee.

Question 6. Do you have comments on Chapters 12-14 of the draft SEEA Ecosystem Accounting?

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