DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS
STATISTICS DIVISION
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System of Environmental Economic Accounting

System of Environmental-Economic Accounting 2012 – Experimental Ecosystem Accounting Revision

First Global Consultation on:

Chapter 8: Principles of valuation for Ecosystem Accounting

Chapter 9: Accounting for ecosystem services in monetary terms

Chapter 10: Accounting for ecosystem assets in monetary terms

Chapter 11: Integrated and extended accounting for ecosystem services and assets

Comments Form

Deadline for responses: 6 July 2020
Send responses to: seea@un.org

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The comment form has been designed to facilitate the analysis of comments. There are twelve 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 the following e-mail address: seea@un.org.

All documents can be also found on the SEEA EEA Revision website at:
https://seea.un.org/content/seea-experimental-ecosystem-accounting-revision

In case you have any questions or have issues with accessing the documents, please contact us at seea@un.org

Questions related to Chapter 8

Question 1: Do you have comments on the principles proposed to underpin monetary valuation for the revised SEEA EEA, including the use of exchange values and net present value approaches?

8.8 It is stated that approaches to monetary valuation of ecosystem services – as advanced over decades by environmental economists -- "most commonly" include consumer or producer surplus. The latter is hold to be incompatible with the exchange value concept. We believe that this is an incomplete review of the valuation literature in environmental economics. A widely used measure for economic value is the WTP for a marginal change in an ecosystem service at a certain level of endowment with ecosystems and income. This is equal to the price a household would have been willing to pay if the ecosystem service level consumed would have been bought at a hypothetical market – often termed "virtual", "hypothetical" or "Lindahl" price. This mirrors exactly the SNA definition of point estimates for hypothetical exchange values.

If this marginal WTP is multiplied with the whole stock of ecosystem services one directly obtains a value as volume, i.e. a price times quantity (8.10). The whole stock is then valued at the current hypothetical market price (or in the SNA language "hypothetical exchange value"). Marginal WTP does not include consumer surplus.

Seminal papers on the virtual or Lindahl price for environmental goods are e.g.

- Ebert U (2003) Environmental goods and the distribution of income Environmental and Resource Economics 25(4):435–459
- Flores NE, Carson RT (1997) The relationship between the income elasticities of demand and willingness to pay. Journal of Environmental Economics and Management 33(3):287–295

For recent applications see e.g.

- Meya, J.N. (2020): Environmental inequality and economic valuation. Environmental and Resource Economics, 76(2), 235-270, https://doi.org/10.1007/s10640-020-00423-2
- Baumgärtner et al. (2017): Income inequality and willingness to pay for public environmental goods. Journal of Environmental Economics and Management, 85: 35–61, http://dx.doi.org/10.1016/j.jeem.2017.04.005

Question 2. Do you have any suggestions for topics to include in Annex 8.1?

Annex 8.1 2.a.vi should also refer to the literature on shadow pricing of natural capital, as many will wonder how the SEEA EEA concept relates to this older literature (e.g. Hartwick 1990; Dasgupta 2009; Arrow et al. 2012). To avoid confusions, the SEEA EEA approach should be carefully delineated from the welfare economic literature on natural capital accounting.

- Arrow, K.J., Dasgupta, P., Goulder, L.H., Mumford, K.J. and Oleson, K. (2012), Sustainability and the measurement of wealth, Environment and Development Economics. 17(3): 317-353.

- Dasgupta, P. (2009), The welfare economic theory of green national accounts, Environmental and Resource Economics 42(1): 3.
- Hartwick, J.M. (1990), Natural resources, national accounting and economic depreciation, Journal of Public Economics 43(3): 291--304.

Question 3. Do you have any other comments on Chapter 8?

Click here and start typing (The length of your response is not limited by this text box.)

Questions related to Chapter 9

Question 4. Do you have comments on the range of valuation methods proposed for use in estimating exchange values of ecosystem services?

9.44, 9.45 and Fig. 9.1: The "Simulated Exchange Value method" is a stated preferences method and should be treated like this, i.e. be grouped under "9.3.7 Stated Preference Methods". As we read it the "simulated exchange value" just means multiplying the marginal WTP at the current level of endowment with ecosystem services with this level of ecosystem services. This is exactly the idea of the "Lindahl price" or "virtual price" (see e.g. Flores and Carson 1997), which guides several stated preference studies. It only means taking the marginal WTP elicited for a current stock and multiplying it with the stock size (see e.g. Baumgärtner et al 2017 or Meya et al. 2018 for applications to biodiversity). By the way the references on the "simulated exchange value" (Caparrós et al. 2003, 2017) seem over represented, since hardly any other journal articles are cited in Chapter 8 to Chapter 11.

- Baumgärtner et al. (2017): Income inequality and willingness to pay for public environmental goods. Journal of Environmental Economics and Management, 85: 35–61, http://dx.doi.org/10.1016/j.jeem.2017.04.005
- Flores NE, Carson RT (1997) The relationship between the income elasticities of demand and willingness to pay. Journal of Environmental Economics and Management 33(3):287–295
- Meya, J.N., Drupp, M.A., Baumgärtner, S., Quaas, M.F. (2018): Inter- and intragenerational distribution and the valuation of natural capital. Presented at

SURED 2018, WCERE 2018, BIOECON 2019. http://fleximeets.com/wcere2018/getpaper.php?fid=3377

9.51: The statement that "typical applications" of stated preference methods "include consumer surplus" is to bold. This is correct to say for Hicksian measures of utility (or welfare) changes like compensating variation or equivalent variation. However, many empirical stated preference studies elicit marginal WTP instead of such a Hicksian welfare measure. Marginal WTP gives a point value for a marginal change at a certain level of ecosystem services. It does not include consumer surplus and *prima facie* seems to be very well in line with the SNA concept of a unit price for ecosystem services (e.g. 9.3).

Question 5. Do you have any other comments on Chapter 9?

9.66 Regarding the use of meta-analysis for benefit transfer, it is important to note that benefit transfer based purely on statistical fit might lead to predictions that violate basic economic principles, such as adding-up (e.g. Moeltner 2019; Newbold et al. 2018). Some convergent validity analyses have even found that simple adjusted unit transfers outperform functional transfer that is based on statistical fit (Czajkowski et al. 2016). Indeed, several scholars have highlighted before that benefit transfers need to be based more firmly in micro-economic theory (Bateman et al. 2011; Smith et al. 2002). Recently, there have been new approaches to account for spatial heterogeneity in benefit transfer in a theoretical consistent manner (Kuminoff 2018; Meya 2020). We recommend to briefly discuss such structural benefit transfer approaches, since they can increase the validity of benefit transfer in particular when information is limited.

References:

- Bateman IJ, Brouwer R, Ferrini S, Schaafsma M, Barton DN, Dubgaard A, Hasler B, Hime S, Liekens I, Navrud S, De Nocker L, Ščeponaviciute R, Semeniene D (2011) Making benefit transfers work: deriving and testing principles for value transfers for similar and dissimilar sites using a case study of the non-market benefits of water quality improvements across Europe. Environmental and Resource Economics 50(3):365–387
- Czajkowski, M., H. Ahtiainen, J. Artell and J. Meyerhoff (2016), Choosing a functional form for an international benet transfer: Evidence from a nine-country valuation experiment. Ecological Economics 134: 104{113.
- Kuminoff NV (2018): Can understanding spatial equilibria enhance benefit transfers for environmental policy evaluation? Environmental and Resource Economics 69:591–608
- Meya, J.N. (2020): Environmental inequality and economic valuation. Environmental and Resource Economics, 76(2), 235-270.
- Moeltner K (2019): Bayesian nonlinear meta regression for benefit transfer. J Environ Econ Manag, 93:44–62
- Newbold SC, Walsh PJ, Massey DM, Hewitt J (2018): Using structural restrictions to achieve theoretical consistency in benefit transfers. Environmental and Resource Economics, 69(3):529–553

- Smith VK, Van Houtven G, Pattanayak SK (2002): Benefit transfer via preference calibration: "Prudential algebra" for policy. Land Econ 78(1):132–152

Questions related to Chapter 10

Question 6. Do you have comments on the definitions of entries for the ecosystem monetary asset account including ecosystem enhancement, ecosystem degradation and ecosystem conversions?

Click here and start typing (The length of your response is not limited by this text box.)

Question 7. Do you have comments on the recommendations concerning the selection of discount rates for use in NPV calculations in ecosystem accounting?

10.67 Discounting consistent with economic theory requires to discount ecosystem services (or "environmental goods") at a different rate than human-made market goods if their growth rates differ and market goods are not a perfect substitute for environmental goods. This result is referred to as "dual discounting" (e.g. Weikard and Zhu 2005, Baumgärtner et al 2015, Zhu et al. 2019). Dual discounting is a pragmatic way to account for the increasing (or decreasing) relative importance (or scarcity) of ecosystem services over time as future relative prices are usually not well known (Weikard and Zhu 2005). Since most environmental goods continue to decline over time (IPBES 2019, MEA 2015) this requires to discount human-made consumption goods at a higher discount rate than environmental goods.

Baumgärtner et al (2015) estimate that environmental goods are decreasing globally by 0.5% per year and consumption goods are growing by 1.88%. Due to the limited substitutability of environmental goods, it follows that the relative price of environmental goods increases over time. Both Baumgärtner et al (2015) and Drupp (2018) suggest that the relative price of environmental goods increases by about 1% per year meaning that environmental goods should be discounted by 1 percentage point less. Based on these arguments, the Ministry of Finance in the Netherlands (MFN 2015) recommends discounting environmental goods by a rate one percentage point lower than consumption goods (Koetse et al. 2018).

For applications where the net present value (formula in 10.35) is estimated using constant unit prices for ecosystem services in future time periods – which might be very likely in many pragmatic applications – then specific discount rates for ecosystem service should be recommended.

References:

- Baumgärtner, S., Klein, A.-M., Thiel, D., and K. Winkler (2015). Ramsey Discounting of Ecosystem Services. Environmental and Resource Economics 61(2): 273-296.
- Drupp, M.A. (2018). Limits to Substitution between Ecosystem Services and Manufactured Goods and Implications for Social Discounting. Environmental and Resource Economics 69(1): 135–158.
- Koetse M.J., Renes G., Ruijs A. and De Zeeuw A.J.. (2018). Relative price increase for nature and ecosystem services in cost-benefit analysis. PBL Netherlands Environmental Assessment Agency, The Hague. http://www.pbl.nl/en/publications/relative-price-increase-for-nature-and-ecosystem-services.
- [MFN 2015] Ministry of Finance of the Netherlands (2015). Rapport werkgroep discontovoet 2015. Available at: https://www.rijksoverheid.nl/documenten/rapporten/2015/11/13/rapportwerkgroep-discontovoet-2015-bijlage
- Weikard, H.-P., and X. Zhu (2005). Discounting and environmental quality: when should dual rates be used? Economic Modelling 22: 868-878.
- Zhu, X., S. Smulders, and A. de Zeeuw (2019), Discounting in the presence of scarce ecosystem services, Journal of Environmental Economics and Management 98: 102272.

Question 8. Do you have comments on Annex 10.1 describing the derivation and decomposition of NPV?

10.36 It is not a priori clear, why a fixed time horizon should be applied. Most ecosystems and natural capital stocks offer a flow of ecosystem services until the infinite future. In this case and for a constant flow of ecosystem services the geometric series presented in the net present value formula converge and can be simplified (sometimes referred to as "present value of an annuity".

I would suggest to write the formula for an infinite time horizon, i.e. infinity instead of S. If ecosystems are completely depleted, this is a special case to this more general formula, where the ecosystem flow is zero from a certain point in time T on. By the way, it would be more convenient to denote periods by t instead of j, and the time horizon by T instead of N.

For one of the many applications on natural capital valuation where the value of a stock is the net-present value of the flow of ecosystem services into the infinite future see e.g. Meya et al. 2018.

By the way, there seems to be a mistake on page 14 when it says "and j the assest life (number of years)". According to the notation in formula 10.36. The asset life time is S instead of t. What is meant here is the "and j the time period"

References:

- Meya, J.N., Drupp, M.A., Baumgärtner, S., Quaas, M.F. (2018): Inter- and intragenerational distribution and the valuation of natural capital. Presented at SURED 2018, WCERE 2018, BIOECON 2019. http://fleximeets.com/wcere2018/getpaper.php?fid=3377

Question 9. Do you have any other comments on Chapter 10?

Click here and start typing (The length of your response is not limited by this text box.)

Questions related to Chapter 11

Question 10. Do you have comments on the proposed structure of the extended balance sheet that integrates the monetary values of ecosystem and economic assets?

Click here and start typing (The length of your response is not limited by this text box.)

Question 11. Do you have comments on the approaches to assigning the ownership of ecosystem assets that underpins the structure of the extended sequence of institutional sector accounts?

Click here and start typing (The length of your response is not limited by this text box.)

Question 12. Do you have any other comments on Chapter 11?

11.31 Biodiversity can make ecosystems more stable and has therefore an insurance value for the returns from natural capital for humans (HM Treasury 2020; Quaas et al. 2019). Biodiversity provides this insurance value for all flows of ecosystem services that depend on ecosystem function and hence the stock of natural capital. It would be inappropriate to value biodiversity only be by its direct inputs to agriculture, forestry or fishery and not to e.g. nutrient retention, diseases control, flood management, climate regulation, recreation and so on.

References:

- HM Treasury (Mai 2020): The Dasgupta Review –Independent Review on the Economics of Biodiversity. Interim Report. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/882222/The_Economics_of_Biodiversity_The_Dasgupta_Review_Interim_Report.pdf
- Quaas, M., Baumgärtner, S., & De Lara, M. (2019). Insurance value of natural capital. Ecological Economics, 165, 106388.