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Issue #20: Recording of soil and its valuation¹

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A. Introduction

1. The inclusion of this issue “Recording of soil and its valuation” as an issue for the revised System of Environmental and Economic Accounts (SEEA) reflects the recognition that soil is a key natural resource underpinning both economic production and environmental cycles such as water and carbon. However, our understanding of soil, in particular its quality, is not as strong as its importance suggests.
2. One barrier to work in this area from an environmental and economic accounts perspective is the interdependent relationship between soil and land. In many cases, either explicitly or implicitly, the value of land that is often observable, is dependent on the characteristics of the soil – for example, farming in fertile soil. However, land has other qualities particularly in terms of its ability to delineate space and define location that imply that the value of an area of land is not purely based on the soil quality.
3. This interdependence has meant that in accounting terms it has never been quite clear as to whether soil should itself be considered a separate asset. In some cases treating the land and soil together makes most sense, in other situations a separation of the two is better. This lack of clarity has meant that flows relating to soil have usually not been clearly identified. For example, even though the depletion and degradation of soil are long recognised phenomena, a common accounting assumption is that land cannot deplete as its area stays the same from year to year. Better conceptualising and reflecting the asset and the associated flows is an important part of the revision of SEEA.
4. This outcome paper presents recommendations of the London Group on how stocks and flows related to land and soil should be recorded in the SEEA asset accounts and balance sheets. The paper does not deal with specific issues related to land use and land cover classifications that are discussed under a separate SEEA revision issue (Issue #19: Land).
5. The paper is structured to cover (i) the distinction between land and soil; (ii) issues in the valuation of land in the revised SEEA; (iii) the definition of soil depletion and degradation; and (iv) the recording of payments for land use and soil depletion.
6. Overall, the London Group considered that accounting for soil depletion and degradation is highly policy relevant. However, it is recognised that, to date, the practical experience in this area by the environmental accountants community is rather limited. Despite this lack of practical experience the recommendations in the paper are applications of accounting concepts that have been developed and applied for other natural resources and hence are relevant for explanation in relation to soil in Volume 1 of the revised SEEA.

B. The distinction between land and soil

7. A starting point in discussing land and soil is the recognition that land is an element in the description of all territory in a country. Thus land is an integral part of many assets including the land under houses and buildings, the land under forests and agricultural land. At times it is reasonably straightforward to separate the land from the other assets but in other cases this is not easy.
8. The market value of assets will incorporate implicit values for each component. For example, the market value of a house will be a combination of the value of the house itself and the value of the land. Similarly, the situation for assets such as forests and vineyards which grow in soil is slightly more complex but follows the same logic. For these assets the overall value will be a combination of the value of the timber or vineyard itself, the soil in which the trees or vines grow and the land.
9. The key characteristic of land in all of these cases is that it defines the location of the assets and it is quite often the location of assets that provides a significant element of the overall value. This is most clearly seen in the rising prices for houses where, even if the house itself might be depreciating in value, the overall value of the asset rises as land values rise.
10. Because the physical characteristics within an area of land can be completely described by other asset types (i.e. houses, forests, soil, etc.) it follows that land itself cannot be depleted. Its value may rise or fall but the actual quantity of land will remain the same over time. The same is not true of the other asset types. These all have physical characteristics that will change over time.

11. In relation to the combination of land and soil, the distinction is therefore that the soil resource provides the physical base for the growing of plants while the land defines the area of interest. The same soil in different locations will have different values reflecting the value of the combination of land and soil.

12. While this partitioning of land and soil allows the depletion and degradation of soil to be placed in a clear construct distinct from land, the general discussion of the valuation of land and soil tends to be described almost solely in terms of the value of land. This also applies to payments made for the use of land, even though in practice these payments will cover both the use of the land for its location and the use of the soil for its productive capacity.

13. Soil will, in general, be in the same places as land. However, it is not the case that soil will always be used in such a way that it contributes to the generation of income. This is only likely to be the case in agriculture and forestry. Thus the attribution of value to soil and associated measures of depletion and degradation will not occur in as many situations as compared to the attribution of value to land.

C. The valuation of land in the revised SEEA

14. In the SEEA-2003 and the 2008 System of National Accounts (SNA) all land subject to ownership should be valued at its market price and in the SNA this provides a limit to the asset boundary. However, not all land within a country is necessarily subject to direct ownership. Further, in the SEEA-2003 the asset boundary is defined more broadly than in the SNA and, as a consequence, land should also be included on the basis of its non-marketed services, for example, ecosystem services provided by land. (The measurement of these non-marketed services will be the subject of discussion of SEEA Volume 2 and is not discussed further in this paper.)

15. In order to account for the broader asset boundary of SEEA compared to SNA, it is proposed that where explicit or direct ownership cannot be identified, the government could be considered the land owner by default. This means that all land within the borders of the national territory could, in principle, be represented on a nation's balance sheet. However, it is recognised that market values of some land, such as for remote and inaccessible deserts or tundra, may be close or equal to zero. One may expect all privately owned land to have a positive market value.

Recommendation 20.1: That the market value of all land within a territory should be included in the balance sheets of the revised SEEA whether explicitly owned or owned by the government by default.

16. Discussion within the London Group considered whether the value of certain types of government owned land may already be reflected in the value of adjacent land. For example, this may be the case for the area of land associated with roads and public parks. The value of most privately owned land depends, among other things, on its accessibility that relies on public infrastructure. An accessible house (including the land) usually has a higher value than a remote house along a dirt road. This additional value may be considered as being created by the roads or public means of transport that provide access to the houses.

17. In this case, including in the balance sheet a value for government owned land associated with roads or city parks may lead to double counting. One may argue that this additional value of the adjacent land is a spill over effect. However, this would only be the case when the government owned land has a demonstrated value on its own. This self-standing asset value does not seem to exist for roads that have no other function than supporting access to residential areas.

18. This characterisation of the integrated value of different assets (in the example roads and houses) is, however, dependent upon the private land owner's assumption that the government will neither sell the land associated with these roads nor will use it for other purposes. As soon as the government reallocates the land, the value of adjacent privately owned land would quite likely change substantially. Consequently, accounting for changes in the value of the two assets is made quite complex since, following this approach, the land associated with the road itself would not have a value on the government's balance sheet. In general terms this approach would be inconsistent with the

recommendations of the 2008 SNA which are based on the separability of assets and a clear connection between the value of each asset and its economic owner.

19. It is also noted that the roads and public parks that have been the focus of consideration are limited to those in residential areas. Main roads, highways, freeways, large public sporting areas, etc; the services of which are consumed by the public at large rather than only by adjacent residents, were not within scope of the discussion.

Recommendation 20.2: That, in certain cases such as the area of land associated with roads in residential areas, it may be appropriate for the value of government owned land to be accounted for in the value of adjacent private land.

D. Soil depletion and degradation

20. Section B introduced the idea that land and soil are separable assets each having distinct characteristics. This section considers further the accounting treatment for soil which, as noted in section B, has physical characteristics that can be depleted and degraded over time.

21. A SEEA asset account explains systematically all changes between the opening and closing balance sheet over an accounting period. Looking at the entries in asset accounts, one can make a basic distinction between those changes that are directly related to production (e.g. capital formation, depreciation and depletion) and those that are not (e.g. catastrophic losses, revaluations).

22. SEEA-2003 (paragraph 8.373) recognises that the quantitative dimension of soil is subject to depletion, being the loss of soil and the nutrients it contains as a result of agricultural and forestry production. However, agricultural and forestry production in particular, can have a much wider direct impact on the quality of the soil, for example:

- Intensive irrigation may lead to salination of soil;
- Uncontrolled removal of virgin vegetation and unsustainable agricultural practices may lead to soil structure decline and water and wind erosion;
- Uncontrolled use of (the wrong sorts of) pesticides may lead to soil contamination.

23. All of these production related impacts may lead to a loss in the productive capacity of the soil. This is recognised in SEEA-2003 in paragraphs 7.291 – 7.299. In particular, paragraph 7.292 notes that

“Where land is used sustainably, the soil has an infinite life and therefore no adjustment for depletion is required; ... However, where land is being degraded due to economic activity, a depletion adjustment to income is applicable.” (SEEA-2003 paragraph 7.292)

24. Unfortunately the use of terms in this sentence seems confusing with a lack of clarity between land and soil and between depletion and degradation. However, if we apply the logic presented in section B, the SEEA-2003 is quite clear about the driver for and nature of accounting adjustments in this area

“In the context of economic assets ... [soil] degradation represents the decline in the capital value of land over time caused by economic activity. ... This decline in value represents the fall in the future productive capacity of the land.” (SEEA-2003 paragraph 7.295)

“The impact of degradation, the decline in the value of the [soil], should be shown as depletion of natural resources even though it is due to qualitative changes in the soil and not quantitative changes in the [soil] itself.” (SEEA-2003, paragraph 7.296)

25. Thus SEEA-2003 is clear that the generation of income account should be adjusted to account for the use of soil resources in the same way as the generation of income account should be adjusted for the use of mineral and energy resources. From this starting point the objective is to measure the change in the productive capacity of the soil due to the direct impact of economic activity. The decline in productive capacity resulting from externalities, or the indirect consequence of production and consumption activities elsewhere (such as acid rain or desertification of land due to global warming), should not be included in a depletion estimate. It is relevant to mention in this context that losses in the

productive capacity of land may be offset by land improvements that are regarded as capital formation in the SNA and the SEEA.

26. The decline in the productive capacity of soil due to soil depletion or degradation is embedded in an assessment of the quality and value of agricultural and forestry land. Therefore, one may argue that the revised SEEA should classify soil in combination with land. This would also bring the SEEA in line with the SNA. However, discussion within the London Group concluded that from an ecosystems perspective there are stronger arguments in favour of maintaining the SEEA-2003 distinction between land and soil in the asset classification.

Recommendation 20.3: That in the revised SEEA the depletion and degradation of soil should be clearly defined where, in general terms, depletion relates to changes in the quantity of soil and degradation relates to changes in the quality of soil.

Recommendation 20.4: That, since both soil depletion and soil degradation causing a loss in productive capacity of the soil can occur as a direct result of economic production, the revised SEEA should deduct the value of this loss in productive capacity in the generation of income account similar to the recording of depletion for non-renewable resources.

Recommendation 20.5: That, due to their specific ecological characteristics, land and soil should be classified as separate assets in the revised SEEA.

E. Recording of payments for land use and soil depletion

27. Like any other asset type, the value of land should be recorded in the balance sheet of its economic owner. However, the owner is not necessarily the user of the land. At least two situations can be distinguished. First, the land owner (usually the government) may provide free access to the land as a public service. This is for example the case for land associated with roads or public parks. The general treatment in this situation is for the government to be considered the collective user of the land on behalf of all users. As there are no actual payments involved this situation is not considered further in this paper.

28. A second possibility is that the land owner charges for the use of the land. Examples are payments for use of agricultural land or land underlying buildings. The building itself may, or may not be subject to the rental agreement. Payments in respect of land use agreements, or in the terms of the 2008 SNA, resource leases, are treated as flows of property income, known as rent, in the 2008 SNA.

29. In theory, payments of rent, often referred to as resource rent, have two components (i) an income component which represents a return to the owner of the resource and (ii) a depletion component which represents the cost of using of the resource (the decline in the potential to earn income in the future). Where there is no depletion all of the resource rent must be considered to be income. The current SNA treatment assumes no depletion for natural resources and hence all of the rent is considered to be income.

30. In situations in which land use agreements involve the use of land for agricultural or forestry purposes, i.e. in those situations in which soil depletion and degradation impacts on productive capacity, then it is possible to see that the payments of rent can, in theory, be separated into an income component and a depletion component. The proposed treatment for the revised SEEA is that

(a) The part of the rent which relates to soil depletion is deducted from the operating surplus of the land user in the generation of income account;

(b) The total rent is shown as being paid from the land user to the land owner in the allocation of primary income account (as in the 2008 SNA); and

(c) In order to balance the flows from the perspective of the land user a capital transfer from land owner to land user is recorded in the capital account reflecting the value of the depletion.

31. This capital transfer is also required to ensure that the deduction for depletion also affects the accounts of the land owner. Since the value of the asset – the land and soil – is recorded in the accounts of the land owner the depletion of this asset must also be recorded there.

32. It is noted that in cases where the land user and the land owner are the same economic unit only the entry reflecting the soil depletion is required – consistent with the recommendation made in the previous section.

Recommendation 20.6: That where land use agreements are in place and soil depletion and degradation is recorded, then the accounting treatment in the revised SEEA should show the deduction of soil depletion in the generation of income account, the payment of rent from the land user in the allocation of primary income account and a capital transfer from the land owner equal to the value of soil depletion in the capital account.

33. The discussion above implicitly assumes that the amount of rent payable is at least as large as the amount of depletion. Put differently, the land owner should charge an amount of rent which at least covers the decline in the value of the land due to soil depletion and degradation. In practice, there are likely to be cases where the rent charged does not cover the cost of soil depletion. The proposed treatment does not require special adjustment for this. All of the three recorded entries remain as they are. What will occur is that the balancing items, such as net saving and net worth will reflect the using up of the asset over the period in the accounts of the land owner but also the lack of sufficient receipt of rent to cover this cost. For the land user, their overall position will be relatively better since the actual cash payment of rent is lower than the actual cost of soil depletion.

34. Finally, it is noted that the general situation assumed here is that the land use agreements are for relatively short periods and in these cases the assets are considered to remain in the economic ownership of the legal owner. However, in cases where the land use agreement is for long periods of time then there may be cause to consider whether the economic ownership of the assets has shifted to the land user. This being the case then the full value of the assets and the associated depletion would be recorded against the land user.

35. A complicating factor in this situation is the treatment of the payment of rent. This issue is discussed at some length in the SEEA Revision issue #15b: Recording the ownership of mineral related assets. As it does not generally apply in the case of land use agreements it is not discussed further in this paper.