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# **SEEA Central Framework 2028 update**

## **Draft Guidance Note**

### **Issue A9.1: Consistency with the 2025 SNA update issues – Natural resources**

**Version for discussion at the SEEA CF Technical Committee meeting on 17-21 November 2025.**

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## GUIDANCE NOTE Issue A9.1: Consistency with the 2025 SNA update issues – Natural resources

### 1 Introduction

#### 1.1 Purpose of the Guidance note

1. The purpose of this Guidance Note is to provide guidance on the treatment of issue A9 “Consistency with the 2025 SNA update issues” in the update of the SEEA 2012 Central Framework (SEEA CF) with a focus on issues concerning natural resources.
2. The short description of issue A9 from October 2024 recognises a range of issues that concern the accounting treatment of natural resources. That description notes:

“In the 2025 SNA revision, several issues have been addressed in the area of natural capital and the environment, and the updated SEEA CF must consider the implications. The issues include a) Biological resources, b) Economic ownership / depletion natural resources, c) Treatment of emission trading schemes, d) Treatment of renewable energy resources as assets, e) Valuation of natural resources, and f) Distinction between taxes and services. In addition, there is a need to understand the implications of changes to the asset classification of the 2025 SNA, as there is a need for a harmonized asset classification for the SNA/SEEA from a SEEA perspective, i.e. the inclusion of natural resources / ecosystems / renewable energy resources etc. In addition, there may be overlaps in terminology between the SEEA CF and 2025 SNA which need to be clarified.”
3. There is a range of other issues concerning the consistency of the updated SEEA CF with the 2025 SNA that will be discussed in separate Guidance Notes. GN A9.2 will focus on accounting for environmental transactions and cover topics concerning emission trading and emission permits, sustainable finance, and climate offsets. GN A9.3 will focus on consistency in classifications, terminology and definitions. GN A9.4 will focus on all other issues and will include discussion of the recording of catastrophes, leasing of land, stranded assets, accounting for land, the treatment of the atmosphere as an asset, SUT/IOT globalisation, household electricity and sustainability data.
4. The updated 2025 SNA was adopted by the UN Statistical Commission in March 2025 and there is now a baseline version of the SNA that can be used for consideration of the issues raised above and any other issues of consistency that might be identified.
5. In determining the appropriate scope of this Guidance Note, it was identified that the 2025 SNA provides a complete list of changes from the 2008 SNA and also describes a research agenda from which some of the topics listed are relevant for consideration in the update of the SEEA CF. Further, as part of the SNA update process, the OECD led the drafting of a Compilation Guide concerning Measuring natural resources in the national accounts. A draft guide was released for global consultation and subsequently updated and published in late 2025. The content of the Compilation Guide contains useful information to support the update of the SEEA CF.

6. In the development of the SEEA over the past 30 years there has been a consistent intent to apply the underlying accounting principles and rules of the SNA noting the potential for some differences in specific treatments such as concerning the recording of depletion. The general consistency in accounting across the SEEA and SNA allows data from both systems to be more readily combined and hence support more comprehensive and integrated analysis of the links between the environment and the economy.
  7. The SEEA CF was drafted using as its basis the treatments described in the 2008 SNA. As part of the update of the SEEA CF, the changes in the 2025 SNA must be considered to ensure ongoing alignment. This is particularly relevant at this time given the range of changes to the accounting for natural resources that were included in the 2025 SNA (noting that a number of these SNA changes were motivated by developments in the SEEA over the past 15 years).
  8. The broad proposal for consideration under issue A9 is determining which changes reflected in the 2025 SNA should be incorporated into the updated SEEA CF. Whether all of the relevant changes in the 2025 SNA should be incorporated is to be determined but there is a strong expectation that the implications of changes to the SNA should be examined closely through the SEEA CF update process. With this objective in mind, this Guidance Note discusses:
    - a. whether the changes to the SNA concerning natural resources are of relevance to the SEEA CF update; and if so,
    - b. what changes to the SEEA CF might be needed.
  9. The Guidance Note does not intend to open up for discussion the changes that have been adopted in the 2025 SNA. Thus, it is taken as given that the 2025 SNA is the definitive SNA treatment. The focus is therefore on the extent to which the treatment in the 2025 SNA should also be included in the SEEA CF update. To the extent that a different treatment may be applied in the updated SEEA CF the rationale for this difference is discussed.
  10. In parallel to the update of the SEEA CF, the Government Finance Statistics Manual (GFSM) is also being updated. There are a number of topics under discussion in the GFSM that are similar to those being considered in the SEEA CF update process, including the accounting treatments for natural resources. For both manuals, the treatments in the 2025 SNA are the underlying starting point. Since these update processes are occurring in parallel, the Guidance Note aims to also incorporate GFSM relevant aspects and hence support discussion of the issues across both processes. Ultimately, treatments in both manuals will be determined through related but separate decision-making processes and differences in treatment are possible. More generally, in light of the connections between the SEEA CF and the GFSM, including on issues other than natural resources, consideration will also be given to explicitly describing the connections (and any differences in treatment) in the introduction to the SEEA CF.
  11. With a focus on natural resources, the Guidance Note considers the following issues and topics.
    - a. Economic ownership and the depletion of natural resources
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- b. Treatment of biological resources
- c. Treatment of renewable energy resources as assets
- d. Valuation of natural resources
- e. Other issues concerning natural resources including specific issues in accounting for timber resources and aquatic/fish resources and the treatment of radio spectra.

## 1.2 Process for developing the Guidance Note

12. The following process was used to prepare and finalise the GN. (This will be drafted by UNSD for inclusion ahead of Global Consultation).

## 1.3 Structure

13. The remainder of this Guidance Note is structured as follows:

- a. Sections 2- 6 discuss each of the five topics listed above with each section providing a description of the relevant issues and proposals for discussion.
- b. Subject to further discussion of the issues and proposals, Sections 7 and 8 will be drafted providing recommendations for updates to the SEEA CF and a description of other considerations in advancing the issue.

## Questions for discussion

### 14. Concerning the accounting for environmental assets:

- a. Do you agree that the SEEA CF should continue to endorse the split asset approach and refine its description to incorporate the developments in the 2025 SNA?
- b. Do you agree that the SEEA CF should include a discussion on the accounting entries associated with applying the split asset approach, noting the intention to discuss the accounting entries and treatments in 2025 SNA Table 27.1 with national accounts and GFS experts?
- c. What content should be included in the SEEA CF concerning market and non-market activity associated with natural resources, in particular concerning government activity in managing natural resources?

### 15. Concerning depletion:

- a. Should the definition of depletion in the SEEA CF be aligned with the 2025 SNA?
- b. Do you support describing a wider range of methods for the measurement of depletion?
- c. Should the depletion of water resources be further investigated?
- d. How should the depletion of land be considered in the context of the SEEA CF treatment of land as space?
- e. Do you support further investigation of the entries required to account fully for changes in land use?
- f. How should the distinction between depletion and degradation be described?
- g. Do you support further investigation of the derivation of depletion in Annex 5.1 on the decomposition of NPV changes?

### 16. Concerning biological resources

- a. Is it agreed that the conceptual boundary for the measurement of biological resources in monetary terms is unchanged following the adoption of the 2025 SNA?
- b. Should the distinction between cultivated and non-cultivated biological resources be changed, primarily for timber resources, to align with the 2025 SNA?
- c. Do you support the inclusion of supply and use tables related to the harvest of biological resources to clarify connections to asset accounts?
- d. Should consideration be given to using different words to refer to cultivated and non-cultivated/natural/non-produced resources? If so, do you have suggestions?

### 17. Concerning timber resources:

- a. Does the Guidance Note appropriate present the different options for describing the accounting for timber resources and forest land and associated measurement of depletion?

- b. What accounting option should be applied in accounting for timber resources and forest land?

18. Concerning the scope of environmental assets:

- a. Should renewable energy resources be treated as a separate class of environmental assets? To what extent is the decision dependent on the presence of a physical stock?
- b. Should the radio spectra be included as a new type of environmental asset?

19. Concerning other issues

- a. Do you support further work to investigate the implications of the updated description of valuation and associated issues in the 2025 SNA?
- b. Do you support engagement with the national accounts community to determine an appropriate approach for recording cases where non-residents catch fish in a target country's EEZ?

## 2 Recording economic ownership and the depletion of natural resources

### 2.1 General context

20. In considering the consistency between the SEEA CF and the SNA in accounting for natural resources<sup>1</sup> a key distinction lies in the difference between environmental assets and economic assets. In the SEEA CF, natural resources are a sub-set of environmental assets and have a measurement scope that is determined by the physical presence of the natural resource. The entry point for accounting in the SEEA CF is thus the existence of a physical stock<sup>2</sup> and the accounts relate to the size and value of a natural resource for a country (or other region) as a whole.
21. In the SNA, in line with the general definition of economic assets (2025 SNA, 4.98), natural resources must have both an economic owner and a flow of economic benefits to which the economic owner is entitled. As for all economic assets, the entry point for accounting for natural resources is thus an economic owner (an institutional unit) and their balance sheet.
22. This different entry point to accounting for natural resources allows the SEEA CF to apply a broader measurement boundary in physical terms than in monetary terms since there is no requirement to allocate all physical stocks to an economic owner.
23. However, in monetary terms the SEEA CF has applied the same conceptual measurement scope as the SNA – i.e. natural resources in the SEEA CF are economic assets following the SNA. Thus, if a natural resource has a value that is recorded in the SNA as an economic asset, then that same value should be recorded in the monetary accounts for that natural resource in the SEEA CF.
24. Generally speaking, the SEEA CF doesn't describe accounting for the attribution of this value to individual units – either to establishments (or industries as sum of them), or to institutional units (or institutional sectors as sum of them). The consequence is that the descriptions in the SEEA CF can be used to underpin an economy wide (S1)<sup>3</sup> value for a national balance sheet in the SNA, i.e. for the total value of a natural resource for a country, but they cannot be used to provide values for specific types of economic owners – by industry or institutional sector.<sup>4</sup>

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<sup>1</sup> Note that the SEEA CF and the SNA use the term “natural resources” to refer to a different but overlapping set of assets. In the SNA it covers all types of environmental assets in scope of the integrated accounts, in the current SEEA CF it refers to individual environmental assets but excludes land and all cultivated biological resources. The current SEEA CF also does not treat renewable energy resources as a separate asset and excludes radio spectra which are both natural resources in the 2025 SNA. In this paper the term natural resources is used in line with its “umbrella” use in the SNA unless otherwise explained. Issues of classification and terminology will be considered in a separate Guidance Note: A9.3.

<sup>2</sup> The term physical is used in a generic sense to cover measures in non-monetary terms. In some instances, particularly concerning renewable energy, the physical substance of the stock will be less evident.

<sup>3</sup> S1 is the SNA code used to describe the total economy.

<sup>4</sup> While a disaggregation by economic unit is not described, there is increasing interest in spatial disaggregation of data, i.e., at sub-national level. Such disaggregations are not currently described in the SEEA CF but further discussion of this potential building on the spatial approach to accounting described in the SEEA Ecosystem Accounting is being examined as part of the SEEA CF update under issue A4.

From this perspective the accounts of the SEEA CF and SNA for single type of natural resource can be directly aligned at the aggregate (S1) level.

## 2.2 Changes in the 2025 SNA

25. The 2025 SNA includes two major changes with respect to accounting for natural resources compared to the 2008 SNA. First, the 2025 SNA now applies the “split asset” approach for recording the value of natural resources (para 4.92-95). In effect, this treatment extends the approach to the valuation of natural resources described in the SEEA CF. That is, the SNA now measures the total value of a natural resource for a country (in a manner aligned with the SEEA CF) and then allocates – “splits” - that value to multiple economic units in cases where there is more than one economic unit entitled to a share of the benefits from the use of the resource. Commonly, this split in asset value will be between the legal owner of the resource (often government) and the extractor of the resource.
26. Second, the 2025 SNA recognises depletion as a cost of production for the extractor of non-produced natural resources and places more prominence on presenting net measures of economic activity and wealth which adjust for both depreciation (formerly known as consumption of fixed capital) and depletion.
27. The 2025 SNA has also updated its definition of depletion. 2025 SNA paragraph 7.286 states  
*Depletion (P8), in physical terms, represents the decrease in the quantity of the stock of a non-produced natural resource over an accounting period that is due to the extraction of the natural resource by economic units occurring at a level greater than that of its growth. In monetary terms, it corresponds with the decline in future economic benefits, due to extraction in excess of its growth, that can be earned from a resource, the value of which is based on the physical flows of depletion using the price of the natural resource in situ.*
28. This definition is a direct adaptation, with minimal change, of the definition of depletion in physical terms in the SEEA CF 2012 para 5.76 combined with the description of the measurement of depletion in monetary terms in SEEA CF 2012 paragraph 5.80.  
*5.76 Depletion, in physical terms, is the decrease in the quantity of the stock of a natural resource over an accounting period that is due to the extraction of the natural resource by economic units occurring at a level greater than that of regeneration.*  
*5.80 Depletion can also be measured in monetary terms by valuing the physical flows of depletion using the price of the natural resource in situ. This step is explained in detail in Annex A5.1. It is noted that the monetary value of depletion is equal to the change in the value of the natural resource that is due to physical depletion.*
29. Conceptually, the 2025 SNA has thus fully endorsed the approach to accounting for the depletion of natural resources presented in the SEEA CF 2012. The changes in the 2025 SNA reflect only (i) the merging of the definitions in physical and monetary terms; and (ii) a small change to specify at the opening of the definition that depletion refers only to non-produced natural resources. This change in wording reflects a separate change in the 2025 SNA wherein

the term natural resources covers both produced (cultivated) biological resources and non-produced (non-cultivated) biological resources.

30. These two changes concerning split assets and depletion are connected. Since the total asset value is split between two economic units, the change in the balance sheet of each unit as a result of extraction or harvest of the resource will also be split. Consequently, depletion will be recorded against both economic units. However, since the depletion is recorded as a cost of production, the full value of the depletion is initially recorded in the production accounts of the extractor.
31. Next, a series of entries in the allocation of earned income accounts, the capital accounts and the other changes in assets and liabilities account is recorded to ensure that the change in the balance sheet position reflects the appropriate allocation of the depletion charge to each unit's share of the future benefits. The set of accounting entries is shown in 2025 SNA Table 27.1.

### 2.3 Implications for the SEEA CF and GFSM

32. As noted above, in describing accounting for natural resources in monetary terms, Chapter 5 of the SEEA CF focuses on the total value of the resources for a country and does not generally discuss issues of allocation of value to institutional units. The exception to this concerns accounting for mineral and energy resources where section 5.5.5 (para 5.216-5.224) discusses the allocation of income from the extraction of mineral and energy resources. This discussion includes Table 5.10 which shows a series of entries for recording depletion adjusted measures of income and saving in a case involving a government unit and an extractor.
33. In the GFS accounts, a specific implication of the SNA recording approach is that a new accounting entry "Depletion borne by the legal owner" is introduced, in effect reflecting the cost of capital to the legal owner associated with their receipt of rent as an economic benefit.
34. Separate from the conceptual aspects, the SEEA CF provides a short description of the considerations in the measurement of depletion of natural biological resources (para 5.81-5.87). This section of text should be reviewed to consider any advances in the discussion and measurement of depletion for these resources, including in the 2025 SNA (paragraphs 7.286-294, 11.236-238) and as a result of the drafting of the OECD Compilation Guide on Natural Resources (OECD Guide).
35. Of specific note, the drafting of the OECD Guide by the Expert Group on Natural Capital (EGNC) identified the following points that should be taken into consideration in applying the conceptual framing of the 2025 SNA and these points are proposed to be incorporated into the updated SEEA CF.
36. First, while in principle the SEEA CF and now SNA definitions of depletion appear straightforward, their application in the context of biological resources can be challenging since many biological resources are cultivated and hence not subject to depletion. This is

particularly challenging where there is also a non-cultivated asset (e.g. forest land) that underpins the growth of the biological resource (e.g. timber). Consequently, it may be relevant to either amend the definition of depletion or explicitly extend the discussion of the definition in relation to biological resources.

37. Second, the SEEA CF implicitly assumes that in case of measuring depletion for biological resources, such as fish resources, some form of biophysical modelling would be undertaken. However, discussion in the EGNC showed that this is too difficult for most statistical offices. In fact, compiling physical asset accounts for individual fish resources is likely not possible. The OECD Guide therefore considers biophysical modelling a Tier 3 (= advanced) method and recommends more basic methods such as assessing (or using information about) the status of individual fish stocks to estimate asset life and use that information to derive estimates of depletion directly (section 5.3.2) Similarly, the SEEA CF may acknowledge more basic methods for measuring depletion for non-cultivated biological resources.
38. Third, water is a highly challenging natural resource to value. Moreover, there are both renewable and non-renewable resources (e.g. closed aquifers) that may require a different measurement approach. The OECD Guide proposes to exclude the depletion of water resources from the scope of measurement by convention as the 2025 SNA does not explicitly discuss the valuation of these resources. In a SEEA CF context, a conclusion about the discussion of the depletion of water resources should consider the findings from the Guidance Notes on issue D4 on the treatment of water resources as produced assets/inventories and issue D7 on the valuation of water resources.
39. Fourth, the 2025 SNA does not discuss depletion of agricultural land explicitly (although its measurement is implied) although it does raise the possibility of the depletion of forest land. The SEEA CF update could discuss the issue of the depletion of land more explicitly (e.g. also linkage with soil resources and erosion) noting that there may be some challenges in doing so given the SEEA CF framing of land as space which is non-depletable.
40. In a similar vein, further work is needed to determine the appropriate accounting entries for depletion in the context of land use and land cover change (e.g. depletion associated with deforestation)
41. Fifth, and relevant to determining treatments for recording the depletion of land, is clarifying the distinction between depletion and degradation (which is also to be considered in paper A1 on the link between SEEA CF and SEEA EA). SEEA CF (5.90) defines as follows: "Degradation considers changes in the capacity of environmental assets to deliver a broad range of contributions known as ecosystem services (e.g., air filtration services from forests) and the extent to which this capacity may be reduced through the action of economic units, including households. In this sense, since depletion relates to one type of ecosystem service, it can be considered a specific form of degradation."
42. However, the SEEA EA (UN et al. 2024 10.29) explains that the definition of depletion "can be seen as sitting within the definition of ecosystem degradation to the extent that the quantity of a stock of a natural resource is considered part of the structure and composition of an ecosystem asset. The term depletion is retained to refer solely to the cost of using up natural

resources. This measure will be narrower in scope than ecosystem degradation since it will only relate to the loss of future provisioning services. However, an economy-wide measure of depletion will be broader in scope to the extent that it includes declines in the net present value of the stock of non-renewable resources due to extraction, in particular mineral and energy resources, since these fall outside of the scope of ecosystem assets. In the framing of the SEEA EA, depletion therefore relates to provisioning services, that are the contributions ecosystems provide to benefits that are extracted or harvested from ecosystems.”

43. Most recently, the 2025 SNA notes (13.32) that “All degradation of land, water resources and other natural assets due to less predictable erosion and other damage to land from deforestation or improper agricultural practices should also be considered as a quality change, and thus recorded in the other changes in the volume of assets and liabilities account”.
44. Relatedly, SDG indicator 15.3.1 on land degradation includes as one of its (sub)indicators land cover change (e.g. from forest into urban areas).
45. To reconcile these slightly different definitions and approaches, the OECD Guide emphasizes (203) that “depletion should be understood in quantitative terms - the using of assets in production - while degradation captures the qualitative dimension.” It then explains “For example, improper agricultural practices may consist in use of fertilizers or other chemicals to boost agricultural yield which may lead to (predictable) erosion and hence depletion. At the same time, fertilizers may also cause a reduction in quality of surrounding natural resources such as water (e.g. eutrophication) or land (e.g. chemical pollution), which may be picked up in associated market prices. This reduction in value would not be considered as a cost of depletion but as a change in quality and hence as degradation to be recorded as other changes in volume. Deforestation in many instances is a result of overharvesting of timber resources which would be recorded as depletion off forest land, but overharvesting may also result in other damages such as flooding or mud flows which would be treated as degradation”.
46. It is proposed for SEEA CF review its current text to clarify the relationships among these different descriptions of depletion and degradation. The clarification should support providing a treatment for the recording for the depletion of agricultural and forest land and the treatment of land use change.
47. Sixth, the 2025 SNA (4A.6) includes depletion in the sum-of-cost method now that depletion is recognized as a cost of production. This has raised the question whether the revised treatment of depletion would (theoretically) raise GDP. In most circumstances, the asset would be split between legal owner (e.g. government) and extractor, and all costs of depletion would be allocated to the production account of the extractor. The situation may arise in exceptional circumstances (e.g. government own account production of oil or timber). Note that in cases where the government is the owner and manager of resources and sells the resources to other units prior to harvest, it is likely that a separate economic unit should be established as a market producer. It is proposed that the SEEA CF includes some sentences explaining these treatments and referring to the SNA for the definitive treatment, noting that

the SEEA CF accounts do not typically extend to recording the output of non-market producers.

48. The GFSM consequences for the sectorisation (market producer versus non-market producers) using the quantitative test (i.e. the percentage of production costs that is covered by sales) will be tackled by the GFSM Task Team 1 that deals with this subject.
49. Finally, further review of the decomposition of the change in net present value presented in Annex A5.1 suggests a distinction between *ex-ante* and *ex-post* depletion needs to be recognized. In general, measuring the asset value of natural resources by applying the net present value (NPV) method requires estimating the stream of economic benefits expected to be earned in the future. Therefore, the stream of future extraction (depletion) should be used in expected or *ex-ante* terms. However, within a consistent and integrated measurement framework, when moving one accounting period forward, decomposing the change of natural resources stock between the opening and closing period into various flow components requires that depletion should be used in realized or *ex-post* terms, because at the end of the accounting period, all flows occurred during the period, such as discoveries, losses, and extraction (depletion), are already known. The SEEA CF should be updated as necessary following further technical discussion.

## 2.4 Proposals

50. It is proposed that the updated SEEA CF incorporate the split asset approach for the allocation of benefits to multiple economic owners of all natural resources. In principle, this approach has already been embodied in the SEEA CF although it is only described in the context of accounting for mineral and energy resources in the current version. The wider application of the principle of the split asset approach would complement the general SEEA CF focus on the measurement of the total physical stock and economy-wide value of individual natural resources.
51. However, subject to further discussion on the accounting entries associated with the split asset approach (2025 SNA Table 27.1) and their rationale, there may be benefit in providing additional descriptions to clarify the current 2025 SNA description. To the extent that material enhancements can be made to the discussion in the 2025 SNA, these should be presented in a new Annex to Chapter 5 of the SEEA CF.
52. In the context of updating the content of SEEA CF Chapter 5, it is proposed that the content of section 5.5.5 should be updated to align with the discussion of depletion related entries in the 2025 SNA, including updating Table 5.10. At the same time, extended discussion is not required and compilers can be referred to the advice in the 2025 SNA and the OECD Guide.
53. More broadly, it is proposed that the discussion of the sequence of economic accounts in SEEA CF Chapter 6 (Table 6.3) be significantly reduced given the change in the 2025 SNA wherein the sequence of economic accounts now adjusts for the depletion of natural resources. Rather, the SEEA CF should introduce the topic of the sequence of accounts and the associated net measures of income and net worth in line with the related discussion in

the 2025 SNA and, for details, refer compilers to the accounting approach described in the 2025 SNA.

54. To support consistency and connection across statistical standards, it is proposed that the SEEA CF update its definition of depletion in physical and monetary terms to align with the definition in the 2025 SNA. However, recognising the challenges in application of the definition, it is proposed that the SEEA CF review its text on approach to the measurement of depletion such that it:
- a) Allows for the measurement of depletion of non-cultivated biological resources to use a range of methods and not assume the application of biophysical modelling.
  - b) Clarifies whether depletion should be measured for water resources.
  - c) Incorporates a discussion on the depletion of agricultural and forest land.
  - d) Incorporates a discussion on recording depletion associated with land use change (e.g. deforestation).
  - e) Clarifies and reconciles the definitions of depletion and degradation.
  - f) Notes the link between recording depletion and the application of the sum-of-costs approach to the measurement of non-market output.
  - g) Reviews Annex 5.1 on the decomposition of changes in net present value with respect to depletion.
55. In further investigating these issues it is noted that many of them revolve around reaching a common understanding of the concept of an “underlying asset” and how that concept should be applied in the context of different resources. In the case of some resources, such as mineral and energy resources and fish resources, the underlying asset that is subject to depletion might be considered to be the resource itself. In the context of timber resources, the underlying asset seems to be generally considered to be the land (generically referred to as forest land) on which the timber resources grow.
56. From this starting point the discussion of depletion would consider questions such as whether it is only the underlying asset that can be subject to depletion; whether underlying assets are de facto non-cultivated; and how to record situations where the expected use of the underlying asset changes – e.g. changes in land use and stranded mineral resources.
57. To the extent that a central focus of the discussion on depletion will concern land, it will be necessary to recognise the alternative treatment of land in the SEEA CF, i.e. as space, which is distinct from any associated soil resources which are likely to be the resources that underpin future growth of resources. As well, part of the further work should incorporate presentation of appropriate accounting entries showing the changes in stock and associated entries in different contexts.
58. On the distinction between depletion and degradation, a key issue will also concern the underlying asset and the link to the effects of changes in its “productive” capacity. If the concept of productive is defined narrowly (e.g. with respect to the SNA production boundary)

then the effects of the changes in capacity will be different compared to defining productive in a broader sense (e.g. including all ecosystem services). Thus a clear distinction is needed between the reason for changes in the capacity of the underlying asset and the range of effects considered.

### 3 Treatment of biological resources

#### 3.1 General context

59. Biological resources encompass both cultivated and non-cultivated (natural) resources including crops, livestock, orchards and other plantations, timber and fish resources. For these resources, the asset boundary in monetary terms in the SEEA CF 2012 is the same as the boundary described in conceptual terms in the 2008 SNA but the SEEA CF provides far greater detail on the approach to clarifying and applying the conceptual boundary for selected key biological resources in practical terms, namely timber resources and aquatic (fish) resources.

#### 3.2 Changes in the 2025 SNA

60. In the process of drafting the 2025 SNA, the additional detail in the SEEA CF was considered. Two key points emerged. First, there was no change conceptually to the scope of the asset boundary in monetary terms for biological resources, i.e. all biological resources in scope of the SNA balance sheet must have an economic owner who receives economic benefits from the harvest of the resources consistent with the definition of economic assets in the SNA. On this issue therefore the 2025 SNA and the SEEA CF remain aligned.

61. Second, the distinction between cultivated and non-cultivated resources has been changed in certain contexts. This change has no effect on the accounting entries required for recording cultivated biological resources, noting in particular that the recording of work-in-progress and gross fixed capital formation (and associated depreciation<sup>5</sup>) remains unchanged.

62. However, for certain non-cultivated biological resources, in particular timber resources, where there is a clear “*continuum from intensive to extensive forms of control, responsibility and management*” (para 11.208), the 2025 SNA now recommends that the output of these biological resources is recorded progressively (i.e., on an accrual basis) as the resource grows (i.e. as for cultivated biological resources) rather than being recorded at the time of harvest. This change can therefore be considered to reflect a change in the time of recording rather than a change in the scope of economic benefits to be recorded.

63. From a balance sheet perspective, the change encourages the more consistent recognition of the asset value (and associated changes in value) of the stock of biological resources even in

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<sup>5</sup> Formerly referred to as consumption of fixed capital

cases where direct and active management of the resource is less evident – see 2025 SNA para 11.208.

### 3.3 Implications for the SEEA CF

64. Undoubtedly, the changed advice concerning the location of the boundary between cultivated and non-cultivated biological resources has considerable implications for measurement in practice in some contexts, especially if the monetary value of the stock of non-cultivated biological resources has not previously been recognised. The measurement challenges are considered at length in the OECD Guide. However, these challenges are not discussed here and the focus is placed on discussing the appropriate accounting treatment.
65. From the perspective of the SEEA CF, the change in the 2025 SNA relates primarily to the description of accounting for timber resources. Indeed, it is highlighted that the accounting for aquatic (fish) resources is unchanged under this new SNA treatment, i.e. fish raised in aquaculture facilities remain treated as cultivated and wild fish are treated as non-cultivated. With regard to timber resources, the overall scope of measurement in physical terms is unchanged with the SEEA CF recommending the recording of both timber resources available for wood supply and not available for wood supply.
66. As well, the scope of measurement in monetary terms is unchanged, i.e. the valuation scope remains those timber resources for which there is an expected future flow of benefits from the harvest of timber. In the SEEA CF, the European Forest Accounts and the OECD Guide, the expectation is applied in practice by limiting valuation to those areas where the timber resources are available for wood supply. The wood harvested from areas that are not available for wood supply is included in measures of production but stocks of these timber resources are not valued on the assumption that there is no expectation of future economic benefit.
67. While the overall scope is unchanged, the effect of changing the boundary between cultivated and non-cultivated timber resources has a number of significant implications for recording. The fundamental change is that it implies that all timber resources in areas available for wood supply and that are expected to be harvested are treated as cultivated biological resources. This means that:
  - The value of all stocks of timber resources are recorded on the balance sheet as work in progress rather than as non-cultivated (natural) resources.
  - The change in value of the stock due to the balance of harvest and net increment is recorded in the production account as a change in inventory rather than as (net) depletion.
  - There is a change in the time of recording of output such that rather than recording output when wood is harvested as would be the case for non-cultivated timber resources, the output is recorded as the trees grow. In practice this may be very challenging to implement since many trees have very long time period to maturity (>80 years).

68. The table below describes three possible accounting treatments that can be envisaged for timber resources that are not subject to intensive management and the relevant entries associated with changes in stock and depletion. It is relevant to highlight that the SEEA CF does not describe in any detail how depletion of timber resources should be measured or recorded. The monetary asset account for timber resources (SEEA CF Table 5.20) shows additions in the form of natural growth (net increment) and reductions in the form of removals but has no explicit entry for depletion. The implicit assumption in the section on timber resources and in the definition of depletion (para 5.76) is that ongoing year-on-year negative differences between net increment and removals would lead to depletion of a non-cultivated (natural) resource. What is not considered is the link to forest land that emerges in the discussion in the 2025 SNA.
69. Further, what is not considered or differentiated in the SEEA CF, is the difference in value between the current stock of standing timber and the value of all future harvests from a plot of forest land<sup>6</sup>. Further consideration of the literature on forest accounting and forest valuation practices in the development of the European Forest Accounts Handbook, reveals that the methods that are generally described for valuing timber resources (whether cultivated or non-cultivated) relate to valuing the current stock of standing timber. This includes methods that use estimates of resource rent and net present values. This general practice is often referred to as valuing the current rotation.
70. Returning to the table below, following the 2025 SNA, the current stock of standing timber is treated as an inventory and valuation in terms of the current rotation is appropriate. Changes in the stock of standing timber from year to year are then recorded as changes in inventory. As inventories they are not subject to depletion as noted above. However, to complete the balance sheet value the value of the underlying forest land also needs to be incorporated. This value must relate to all future rotations. Put differently, the total value of the composite asset (timber resources plus forest land – aka forest estate) will equal (conceptually at least) the net present value of all future resource rents from harvesting timber including the harvest of the current rotation. Thus to obtain the value of the forest land component, it is necessary to exclude from this total value the value of the current rotation.

Table : Options for recording values relating to timber resources assuming timber growth with little management

Treatment option	Asset component			Forest estate (composite asset)
	Timber resources		Forest land	
	Cultivated (inventory)	Non-cultivated		

<sup>6</sup> The term forest land is used here to refer to all areas that may have timber resources that are “available for wood supply”. This includes forests, other wooded land, and some areas of agricultural land (e.g. agro-forestry).

2025 SNA	X		X	X
SEEA CF		X		X
Alternative option		X	X	X

73. In the context of the 2025 SNA treatment the distinction between the two components is clear, as is the allocation of depletion to only the forest land component. However, if the 2025 SNA treatment of all timber resources being cultivated is not applied – i.e. the current distinction in the SEEA CF is maintained – then two options need to be considered.
74. The first option involves ignoring the distinction between standing timber and forest land and considering the whole forest estate as a single non-cultivated resource. In this treatment, which is effectively the treatment described in the SEEA CF for non-cultivated timber resources, the whole resource is valued in terms of the NPV of future resource rents and depletion is applied to the whole value of the forest estate. There is a nuance in the SEEA CF which recognises that the resource rent of the non-cultivated timber resources should be reduced to the extent that there is any inherent rent attributable to land but the suggestion in the SEEA CF (para 5.379) is that this is likely to be very low or zero. As a consequence, after comparing these two options, a possible interpretation is that in the SEEA CF what is called the depletion of timber resources is, effectively, the depletion forest land in the 2025 SNA.
75. The second option involves maintaining the distinction between the stock of standing timber and forest land as per the new SNA treatment but instead treat the standing timber as a non-cultivated resource. If the value of the standing timber is estimated in the same way as if it was an inventory (which appears common practice) and hence is focused on the value of the current rotation, then the open question under this option is whether the current rotation can be subject to depletion, in addition to any depletion of forest land.
76. Critical to determining the appropriate pathway forward is therefore determining whether, under all of the possible approaches, the total value of the forest estate (i.e. the composite asset), is the same. Assuming this is the case, then the choice of treatment concerns (a) the way in which the balance sheet value is decomposed into timber resources (either cultivated or non-cultivated) and forest land and (b) which components are subject to depletion.
77. A final consideration regarding asset accounts is that if standing timber is treated as non-cultivated timber resources, there should be a value on the balance sheet at least equal to the value of the current stock, i.e. the value of the stock is not dependent on the time at which the output is recorded. Put differently, even if the output is recorded at the time of harvest, this does not imply that the value of the associated timber resources suddenly appeared at that time. Thus, if there is an expectation that timber resources are to be harvested at some point in the future, this is sufficient to rationalise the estimation of an economic value of the resource.

78. Separate from the appropriate recording for asset accounts, it is noted that the SEEA CF does not discuss the connection between asset accounts for timber resources and associated entries for production accounts. It is proposed that the incorporation of a supply and use table for timber resources to complement the asset account would be a useful addition in the SEEA CF and can build on content developed for the European Forest Accounts Handbook.
79. The proposed change in the time of recording of output in the 2025 SNA also has connections to the proposals for a more complete description of Economy-Wide Material Flow Accounts and PSUT. The time of recording of output and the associated flows of natural inputs (primarily for timber resources) will be affected by the SNA change and will need to be considered in those descriptions. This topic should be considered further in Guidance Note B1.
80. While the overall measurement boundaries are unchanged, there is currently considerable text in the SEEA CF devoted to describing the boundary between cultivated and non-cultivated timber resources (para 5.353-357) as well as some text describing the recording of output following the SNA (para 5.376-377). Further, Table 5.19 and 5.20 distinguish between cultivated and natural timber resources. The relevance of maintaining these distinctions in light of the changes in the 2025 SNA should be revisited. A longer discussion on specific issues associated with accounting for timber resources is presented below in section 6.
81. More generally, relevant sections of the SEEA CF, particularly Chapters 2 and 5, will need to be reviewed to consider the way in which the terms cultivated and non-cultivated/natural are applied.
82. The SEEA CF currently describes in detail accounting for only two biological resources – timber resources and aquatic (fish) resources. A short one-page section (5.10 Accounting for other biological resources) introduces a number of points that should be considered in accounting for non-cultivated biological resources but does not expand the discussion to considering any measurement issues in detail. Building on the discussion above, the interpretation of the changes in the SNA for non-timber, non-aquatic biological resources is that they would be largely treated as non-cultivated unless there was a clear continuum of management. Whether they might be reflected on balance sheets in monetary terms would depend on an assessment of the extent of future benefits to be harvested which may largely revolve around the level of commercialisation of the resource.
83. A topic that the SEEA CF does not describe is accounting for cultivated biological resources such as livestock, crops, orchards, vineyards, plantations (e.g. rubber). The accounting for these resources is a focus of the SNA given the direct links to the measurement of agricultural output and GDP and from a SEEA perspective the relevant aspects of physical and monetary measurement are described in the SEEA Agriculture, Forestry and Fisheries. Note that there are no changes in the 2025 SNA related to the treatment of cultivated biological resources.
84. Aside from accounting treatments, there is an important consideration of the way in which users of SEEA CF accounts may interpret data relating to biological resources, in particular relating to the loss of those resources. Specifically for timber resources, it may not be apparent to users why there is no depletion recorded since any depletion is recorded as

declines in the value of forest land. For the purposes of communication and explanation, it may thus be necessary to explicitly present accounts for forest land and timber resources in a combined way.

85. More generally on the issue of interpretation of accounting entries, the terms cultivated and non-cultivated (or natural) may be more commonly associated with different land and ecosystem types – e.g. cultivated agricultural land and natural wetlands. Indeed, conversion of natural or semi-natural (N/SN) ecosystems to anthropogenic ecosystems is the biggest driver of biodiversity loss in the terrestrial realm. From this perspective, it may be expected that – in short hand – cultivated biological resources are found in cultivated landscapes and natural biological resources are found in natural landscapes. While this is not the correct interpretation of the use of the terms in the SNA context, it is a reasonable starting assumption. Examples where this simple connection does not apply can be reasonably readily identified. Aquaculture facilities in bays and the open ocean, livestock on rangelands, beehives in national parks, etc although most would be cases of cultivated (i.e. managed) production in natural/semi-natural contexts rather than non-cultivated/unmanaged production in cultivated landscapes.
86. The question is whether mis-interpretation of the terms cultivated and natural as applied in the SNA and SEEA context, is a sufficient reason to apply an alternative approach in the SEEA CF. The challenge is that in an SNA context (but less so for SEEA) the accounting treatment is different depending on whether the biological resources are considered cultivated/managed or not. Since the primary focus of the SNA is on the appropriate recording of production by economic units, it would not seem appropriate to apply a different treatment for the same production activity undertaken in different landscape contexts.
87. One option for advancing on this issue would be to both explain the distinction in interpretation and to also encourage the compilation of accounts such that the underlying ecosystem type is presented in conjunction with the type of biological resources. For example, a distinction could be made between aquaculture facilities in stand-alone ponds/tanks and those in lakes, bays and oceans.
88. It is noted that this information is implicitly present in the accounting described in the SEEA Ecosystem Accounting where flows of, for example, wood provisioning services, should be assigned to the ecosystem type where the harvest occurred. In that sense the SEEA EA framing does not distinguish between those ecosystem services that are inputs to cultivated production or non-cultivated production.
89. Another alternative would be to use different terms for cultivated / non-cultivated in the SEEA CF – such as managed and unmanaged as introduced above. This would be a relatively simple, albeit significant, change that may support better and more consistent interpretation of the issues across the SEEA framework.

### 3.4 Proposals

90. Since there is no change in the conceptual boundary for the measurement of biological resources in monetary terms in the 2025 SNA, it is proposed that the SEEA CF retain its current treatment concerning the scope of measurement of biological resources.
91. At the same time, the text concerning accounting for timber resources should be reviewed to consider the distinction between cultivated and non-cultivated biological resources in the physical and monetary accounts and associated text. In terms of the treatment that should be applied in the SEEA CF, it would be possible to either adopt the treatment in the 2025 SNA or to retain the current treatment showing a distinction between cultivated and non-cultivated timber resources on the basis of the level of management (a treatment that reflects also the 1993 and 2008 SNA).
92. As described above, the main difference from the 2025 SNA in retaining the current treatment relates to the measurement of output. At present the SEEA CF does not provide supply and use tables for timber resources to complement the asset accounts but if these tables were introduced different entries would be required if the current SEEA CF treatment or the 2025 SNA treatment were adopted. Under both treatments, the total value of timber resources is the same. However, under the 2025 SNA treatment, the current structure of the asset accounts in the SEEA CF would need to change to remove the distinction between cultivated and natural but otherwise no changes are needed.
93. Pending a decision on the treatment to be applied, other sections of the SEEA CF will also need to be reviewed to ensure that a consistent description of the distinction between cultivated and non-cultivated biological resources is presented.
94. A separate issue that will be discussed in Guidance Note A9.3 on Alignment with SNA terminology, concerns the changed use of the term natural resources in the 2025 SNA to refer to both cultivated and non-cultivated resources, noting also that the term natural resources in the SNA includes land and other assets such as radio spectra. Adopting this change would have a range of effects on descriptions of accounting treatments across the SEEA CF.

## 4 Treatment of renewable energy resources as assets

### 4.1 General context

95. The SEEA CF 2012 recognises the potential to record information about energy from renewable sources in Chapter 5, Section 5.5.5 – paragraphs 5.225-234 (and also in the context of accounting for land in para 5.310). Further, a listing of renewable sources of energy is provided in Chapter 3, Table 3.2 in the context of accounting for physical flows of energy. The treatment in the SEEA CF involves the expectation that the value of any resource rent to be earned from sources such as wind, solar and geothermal sources will be embodied in the price of the associated land (or water body in the case of hydropower). The inherent logic is that the value attributable to energy from renewable sources arises due to the scarcity of the sites used for energy generation.

### 4.2 Changes in the 2025 SNA

96. The asset boundary of the SNA has been extended to include the value of renewable energy resources as part of natural resources in the balance sheet of the integrated sequence of economic accounts. The definition of renewable energy resources is described in 2025 SNA paragraph 11.200 as follows:

“The second group of mineral and energy resources relates to **renewable energy resources (AN322) consisting of energy resources which comprise the cumulative quantities of kinetic, radiative and thermal energy recoverable from moving water (hydro and ocean energy), moving air (wind energy), hot underground and surface rock and water (geothermal resources) and incident solar radiation (solar resources)**. Although these resources as such are generally not scarce, the exploitation of these resources may be restricted to certain economic agents, for example by needing permissions to put wind turbines on land, or having ownership of particular pieces of land which are highly favourable for exploiting renewable resources.”

97. The inclusion of renewable energy resources as a class of natural resources in the SNA was subject to extensive research and discussion<sup>7</sup>. While the approach in the SNA reflects a similar framing to that described in the 2012 SEEA CF, a much clearer delineation and distinction is described between the value of renewable energy resources and associated assets such as land and produced assets (for the capture of energy).

### 4.3 Implications for the SEEA CF

98. The primary implication for the SEEA CF of adopting the treatment outlined in the 2025 SNA is that the monetary value of renewable energy resources would need to be explicitly partitioned from the value of the associated land following the treatment described in the

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<sup>7</sup> SNA Update (2023e). WS.11 Guidance note on the treatment of renewable energy resources as assets. Available at: <https://unstats.un.org/unsd/nationalaccount/SNAUpdate/GuidanceNotes.asp>

SEEA CF. The creation of a new class of environmental asset would also require amendments to the classification of environmental assets and involve making an explicit distinction between renewable and non-renewable energy resources.

99. While the changed treatment may be readily applied in monetary terms, the lack of a tangible stock of renewable energy resources, may raise concerns about whether these resources satisfy the definition of environmental assets which requires that relevant assets comprise the biophysical environment. Discussion on the issue of “tangibility” indicates that there is a potential to quantify the stock of renewable energy resources in terms of the cumulative quantity of energy harvestable by viable renewable energy projects. This may be sufficient to satisfy the current definition of environmental assets but requires further consideration. It is also noted that the SEEA CF conception of land as space does not definitively satisfy a tangibility criteria but quantification of space is straightforward.

#### 4.4 Proposals

100. Given that the value of renewable energy resources is already recognised in the SEEA CF 2012, it is proposed that the current content in the SEEA Central Framework (primarily in section 5.5.5) is reviewed and updated to align with the discussion in the 2025 SNA. As appropriate, content from the 2025 SNA research papers and the OECD Guide should be incorporated.
101. As part of this alignment, it is also proposed that renewable energy resources be treated as a distinct class of environmental assets, in particular one that is separate from land or other underlying assets where the capture of energy from renewable sources occurs, such as water bodies or oceans. This topic is discussed in GN A9.3 on Alignment of terminology and classifications with the 2025 SNA.
102. To complement the content describing the SNA treatment, it is also proposed to introduce discussion on accounting for the stock of renewable energy resources in physical terms using as appropriate content from the OECD Guide.

## 5 Valuation of natural resources

### 5.1 General context

103. The valuation of natural resources and environmental assets has been a long-standing area of discussion in the SEEA community. The SEEA CF provides a statement on the agreed understanding of the appropriate valuation approaches for natural resources and land, in particular aiming to add detail to the discussion of the topic as presented in the 2008 SNA. In this regard, SEEA CF Chapter 5, Section 5.4 provides an extensive discussion of the principles and approaches to the valuation of natural resources in the context of the SEEA CF.
104. Since the finalisation of the SEEA CF, there has been a rich ongoing discussion on the valuation of environmental assets particularly as it concerns the valuation of ecosystem assets and the recognition of monetary values for ecosystem services for which there are no markets or for which there are no direct links to marketed goods and services. This discussion has involved many experts from national accounting and environmental economics and many aspects of valuation have been discussed. From a conceptual perspective, a particular area of discussion has been clarifying the relationship between exchange and welfare values.

### 5.2 Changes in the 2025 SNA

105. The ongoing discussion of monetary valuation in the context of ecosystem accounting revealed that the expression of national accounts valuation principles in the SNA could be improved to resonate with a wider audience than national accountants. Thus, for this reason and with other revision issues in mind, the 2025 SNA clarifies a range of valuation aspects related to natural resources including the definition of exchange values, the inclusion of an estimate for the return to capital for non-market producers in applying the sum-of-costs approach and the measurement of depreciation and capital services on produced assets. Also, the OECD Guide contains more detailed guidance on the use of the net present value (NPV) of future resource rents for valuing natural resources including the choice of discount rate and the rate of return to produced assets to be applied in deriving estimates of resource rent.
106. Notwithstanding the rich discussions on the valuation of ecosystems, and the more extensive discussion and application of valuation based on the use of the net present value approach, there have in fact been no changes in concept to the valuation approach to be applied in an SNA context for natural resources. As well, the SNA still favours the use of observed market values in the estimation of exchange values for inclusion in the accounts.

### 5.3 Implications for the SEEA CF and GFSM

107. Since monetary valuation of individual environmental assets in the context of the SEEA CF is intended to align fully with the SNA, then it is not expected that there should be any revision to the SEEA CF valuation principles or concepts.

108. At the same time, the nature of the clarifications in the 2025 SNA on the description of valuation of natural resources in the SEEA CF need to be considered. Some specific issues are:

- The definition of resource rent in relation to the inclusion/exclusion of specific taxes and subsidies. As context, the SEEA CF 2012 (Table 5.5) recommends that, in the derivation of resource rent, specific subsidies on extraction should be deducted from gross operating surplus (GOS) and specific taxes on extraction should be added to GOS before the user costs of produced assets used in extraction are deducted. This approach was also included in the 2025 SNA, Chapter 4, paragraph A32 which repeats the content of SEEA CF Table 5.5. However, during the drafting of the OECD Guide it became clear that there was a lack of clarity about the definition of specific taxes and subsidies in the context of resource extraction. This included the need to consider the implications of a separate change in the 2025 SNA wherein certain taxes are to be treated as payments of rent<sup>8</sup>. The treatment of concessional loans and tax abatements also needs to be clarified in this context. (NB: There are likely links to Issues C6 and C7 on Potentially environmentally damaging subsidies (PEDS). and tax abatements to be considered in elaborating appropriate treatments.)
- In cases where there are multiple extractors or the legal owner of a natural resource is not the government, clarity is needed on the appropriate treatment of taxes in deriving resource rent and resource rent shares in order to implement the split asset approach. The 2025 SNA does not explicitly discuss the situation when government is not the legal owner (it is possible for other sectors S11, S12, S14, S15) to be the legal owner). This raises the issue (discussed in OECD Guide (section 3.6) of what to do in cases where there would be what the SEEA CF calls specific taxes paid to government which would be recorded under D21 or D29 in the national accounts. In the resource rent calculation, following the SEEA CF such specific taxes would be added back in and therefore lead to a higher asset value. However this additional value would not properly capture the asset value to the legal (and economic) owners of the resource as these benefits would not flow to them (but only to the government). The OECD Guide therefore recommends that when government is not the legal owner, it is not appropriate to correct for specific taxes less subsidies when deriving the resource rent. Moreover, for the GFSM it may be relevant to consider introducing specific codes to separately identify specific taxes and/or specific subsidies.
- There have been advances in discussion on the application of the net present value method, including concerning discount rates and rates of return to produced and non-produced assets used as inputs to extraction of natural resources, that should be considered in updating the SEEA CF. The main recommendations from the OECD Guide are:

*When rights to exploit a natural resource have been allocated by an open competition process or when rights are transferable, the value paid by the extractor may provide a proper valuation of the resource (i.e. of the part covered by the right). It is however recommended to calculate and compare the resource rent with rent payments (when the contract is annual) and apply a*

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<sup>8</sup> See <https://s-circabc.europa.eu/ui/group/ca7c9cc4-b473-4abc-8e95-263dcd57d79d/library/64dc8502-f8ee-433f-bd4e-27bdffcd914/details>

*threshold: if rent payments are on average more than 90% of the resource rent, it may be assumed that economic ownership remains with the legal owner and there is no need to split the asset between legal owner and extractor.*

*User costs of capital consist of two elements: depreciation and a net return to capital used in production. Capital used in production may include both produced capital and non-produced capital such as purchased goodwill and marketing assets, although the latter are often immaterial and/or difficult to measure. The scope of produced assets is restricted to fixed assets on practical grounds, unless the use of non-produced assets is expected to be material. NB: the SEEA CF Table 5.5 needs to be slightly amended to align with the SNAs broader focus on user costs of capital, not just produced assets.*

*For estimating the rate of return to capital, it is recommended to apply the “Everything but” approach, When applying the “Everything but” approach, the rate of return is obtained by dividing the net operating surplus of all economic activities minus the activities of the natural resources industry and minus the net operating surplus of non-market production, by the net fixed assets of the same set of activities and sectors.*

*Discounting: Market-related risk is assumed to be captured by the rate of return to fixed capital, rather than by the discount rate used for valuing natural resource assets. For the common stable real discount rate for calculating natural resource assets and depletion, it is proposed to use 2%. In case countries prefer to choose their own rates, the following applies: If a government-prescribed discount rate for valuing natural resources exists, apply this rate. Otherwise, the rate used should be a stable rate. The preferred option is an average yield of government debt securities (real), representing a risk-free rate; in light of the long asset lives of natural resources, the securities should have a maturity of at least 10 years; the average should be taken over the last 10 years (minimum). Another alternative would be to apply a social rate of time preference; here it is recommended to apply the so-called Ramsey formula as expressed in OECD (2009).*

109. Alternatives to the use of the net present value approach to value natural resources have been further investigated. The 2025 SNA describes a hierarchy of valuation methods ranging from observed market prices, market-equivalent prices, valuation based on past expenses (such as the written down replacement costs), nominal value, indirect valuation and finally the present value of future economic benefits . The SEEA CF describes alternative approaches to measuring resource rent for the purposes of applying the net present value approach but does not focus more widely on describing other methods which could be used to measure the value of natural resources without using resource rent and NPV methods. A separate valuation issue concerns the potential effects in the SEEA CF of applying the new sum-of-costs approach for non-market producers from the 2025 SNA. It is expected that this would have an impact on the measurement of environmental expenditures including environmental protection and resources management expenditure, given that many of these expenditures will be undertaken by non-market producers including general government and NPISH. This will need to be investigated further in particular in the COFOG review Task Team.

## 5.4 Proposals

110. For the valuation of individual environmental assets, since in principle there have been no changes to the recommendations in the 2025 SNA then no changes to the principles of valuation in the SEEA CF for the valuation of these assets is proposed.
111. At the same time, it is clear that the discussion of implementing these valuation principles in an SNA context has raised issues that are not discussed in the SEEA CF. Consequently, it is proposed that a more detailed review is undertaken of the associated descriptions and explanation of valuation of natural resources comparing the SEEA CF text and the content developed in the preparation of the 2025 SNA and the OECD Guide.

## 6 Other issues related to natural resources

### 6.1 Accounting for timber resources

112. As discussed above, the 2025 SNA introduces some changes to accounting for timber resources. While the conceptual scope of measurement remains unchanged and is aligned with the scope of the current SEEA CF, there are a number of aspects of the accounting that have been refined, in particular the removal of the distinction between cultivated and non-cultivated timber resources as introduced above.
113. The following points are noted:
- a. The 2025 SNA explicitly distinguishes the timber resource asset from the underlying forest land asset. This distinction is also present in the framing of the SEEA CF and hence as a general point no change is needed in the SEEA CF.
  - b. However, making this distinction in combination with the removal of the distinction between cultivated and non-cultivated timber resources, implies that there is no longer the need to record depletion of non-cultivated timber resources (SEEA CF 5.368-370) since “normal” changes in the stock of timber resources are included as changes in inventories and hence directly affect measures of output (via changes in work in progress) rather than net operating surplus or net value added.
  - c. Instead, focus in the 2025 SNA is on the measurement of depletion of forest land – i.e. the loss in the potential future harvest of timber from a given area of forest land due to declines in its productive capacity to provide timber. It is proposed to update the content of the SEEA CF to explain the approach to recording the depletion of forest land in relation to the value of timber resources and clarifying the way in which the two asset values (together comprising the value of the forest estate) should be distinguished.
  - d. In adopting this proposal it will, however, be necessary to recognise that land in the SEEA CF is conceptualised as space and is distinct from soil resources, which in the case of forest land will be the key driver of productive capacity and the source of depletion. To this end, the SEEA CF approach will need to be explained in more detail building on the current discussion about composite assets (SEEA CF Section 5.6.5).

- e. Also, in considering the links to forest land it will be necessary to clarify the relationships between alternative possible interpretations of the concept of forest land as applied in the SNA, in the SEEA CF concerning land use and land cover; and in the SEEA Ecosystem Accounting concerning ecosystem types. Issues to be considered include the links to economic ownership, the links to the production of timber (e.g. being available for wood supply), the coverage with respect to other areas, especially other wooded land and agricultural land.
- f. Building on work undertaken to develop the European Forest Accounts (EFA) Handbook, it is also proposed to describe the series of entries required in a supply and use table presentation such that the entries for the changes in stock in the timber resources asset account can be fully reconciled with the entries for output, changes in inventories and intermediate consumption that are required for the measurement of value added. This reconciliation should be presented in both physical and monetary terms.
- g. Work on the EFA Handbook and on the OECD Guide on methods for measuring the value of timber resources has revealed that the discussion of prices for valuing the stock (SEEA CF 5.378-385) needs to be updated. In short, the description in the SEEA CF of the relationship between resource rent and stumpage prices is incomplete and a better explanation is needed of the connections between output prices, production costs, and rents associated with valuing timber resources. Content from both of the documents noted above can be used to provide revised text. The EFA Handbook and OECD work has also provided a more comprehensive description of different methods and hence it is proposed that the description of methods for valuation of timber resources is also revisited noting that it is appropriate that a longer description of methods is retained in these other documents rather than being fully incorporated into the updated SEEA CF.
- h. In the final stages of updating the 2025 SNA, a tricky national accounting issue arose concerning the appropriate recording in cases where the extractor/harvester of resource is not the legal owner of the resource. In the context of timber resources, if a specific area of forest land is already on the balance sheet (i.e. there is an economic owner), then additional value (recorded as an economic appearance) may be assigned to the resource to reflect the additional economic benefits being captured by other economic units – for example in cases of illegal logging or subsistence harvesting. However, such additional value should only be recorded when the activity is considered of sufficient scale (see 2025 SNA 27.36).
- i. Separately, if such activity occurs in relation to timber resources not available for wood supply (e.g. in a national park) and there is no existing economic owner, then any additional value will need to be incorporated in the accounts by recording the economic appearance of “new” timber resources and associated forest land (see 2025 SNA 27.36). The full accounting implications of these entries (e.g. wrt depletion) were not articulated in the 2025 SNA and hence the issue was placed on the research agenda. For the SEEA CF update, it is proposed that, subject to closer review, the limited text in the

2025 SNA may be incorporated. However, the full accounting implications of the treatment has a low priority from a SEEA CF update perspective.

## 6.2 Accounting for aquatic (fish) resources

114. As noted above, the changes to the 2025 SNA in respect of cultivated and non-cultivated biological resources do not affect the general approach to accounting for fish resources. That is, wild fish resources continue to be treated as non-cultivated biological resources that are subject to depletion and aquaculture resources are treated as cultivated biological resources.
115. At the same time, building on the 2025 SNA's delineation of the boundary between economic and legal ownership, the 2025 SNA Chapter 27 (27.37-47) outlines in considerable detail the recommended treatment of various ownership and fishing rights situations including the treatment under different types of quota arrangements. The SEEA CF also describes the valuation of fish resources using licence and quota information (SEEA CF 5.444-452). It is recommended that this text is reviewed to align with the discussion in the 2025 SNA. Of specific note are the following points:
- a. Licence payments for commercial fishing should be recorded as rent rather than as taxes. Payments for licences for recreational fishing should continue to be recorded as a payment of a tax.
  - b. The value of a quota should not be recorded as a separate asset (in 2008 SNA it was treated as a permit to use a natural resource) but rather it should be embodied in the value of the fish stock with appropriate application of the split asset approach to reflect the different share of benefits from the harvest of the fish stock accruing to different economic owners. Where quotas are traded or transferrable, the associated information may support measurement of the value of the fish stock and will also support appropriate attribution of the value of the fish stock to economic units including institutional sectors.
116. An outstanding accounting issue from the 2025 SNA update process concerned the appropriate measurement boundary and allocation of economic ownership for fish stocks located within a country's exclusive economic zone (EEZ). As noted in the 2025 SNA (para 27.46) and the SEEA CF, by convention the output (and hence economic benefits) from harvesting of fish in an EEZ is allocated to the country of residence of the operator of the vessel undertaking the fishing. In an extreme case, if all of Country A's EEZ fish stock was harvested by Country B, then economic ownership of the fish stock should be attributed to Country B. By construction this should mean that any depletion of the fish stock due to the activity of Country B should also be attributed to it.
117. While it will be common for country A's fish stocks to be the subject of some management or quota arrangement and hence it is likely that some of the asset value will be attributable to country A (i.e. based on their share of the resource rent), there will usually remain some share of the total value that should, in principle, be allocated to the balance sheet of Country B. However, as recognised in the 2025 SNA, there is currently no agreed

treatment for the recording of the relevant stocks and flows, including of depletion, between residents and non-residents in the SNA or Balance of Payments and hence no depletion is recorded in the accounts of the non-resident extractor. Further, there is no standard practice in which country B would include on its balance sheet the value of its share of the fish stock located in country A. This issue was put on the research agenda for the 2025 SNA.

118. In the context of the SEEA CF, since the entry point to measurement is the fish stock itself rather than the associated economic units of country A or B, an initial step that can be taken is to record the value of all fish stocks within a country's EEZ as being on the balance sheet of that country, irrespective of who harvests the fish. The current structure of the monetary asset account for aquatic resources (Table 5.23) shows only the total stock and changes in the total stock, i.e. it does not allocate the total value to economic units. Consequently, this attribution of fish stocks to their "reference" country would be possible without a change in the account itself. The treatment would also align with the general recommendation in the SEEA CF that the geographic boundary for the asset accounts includes resources within a country's EEZ. Additionally, for the monetary asset account, it would also be possible to incorporate additional rows to record separately the flows of gross catch (i.e. total live weight of fish caught), depletion and other changes that are attributable to residents and non-residents as part of recording the total changes in stocks.
119. This approach to recording would not resolve the challenge facing the integrated accounts of the SNA and the balance of payments, and it would also generate a different balance sheet value for fish resources in the SEEA CF compared to the SNA. However, it would provide relevant information for decision makers.
120. In addition to this step, it is proposed to undertake further investigation of this issue in collaboration with SNA and BPM experts with a particular focus on a possible solution introduced in the 2025 SNA Chapter 5 involving the establishment of a notional unit to record the activity of non-resident fishing vessels operating in a country's EEZ. A challenging aspect of this solution is that it would imply clear changes to the country attribution of output, exports and imports and raises a wide range of measurement challenges, particularly in cases where one fishing vessel operated in multiple countries' EEZs, where fish are landed in other countries and where fish are caught on the high seas – beyond EEZ.

### 6.3 Treatment of radio spectra

121. In the 2025 SNA, the treatment of the radio spectra was unchanged from the 2008 SNA and the value of the radio spectra continues to be classified as a natural resource. In the 2008 SNA, the treatment was to separate the value of the radio spectra itself from the rights to use the spectrum (e.g. in the form of a mobile phone licence). Thus, it was possible for two assets to be recorded with the rights/licence itself also being treated as a natural resource.
122. Changes to the treatments of leases and licences related to natural resources in the 2025 SNA should have meant that the rights to use the spectrum were no longer treated as a separate asset and the value of a licence would be embodied in the value of the radio spectra

itself (i.e. as applied in the context of fishing quotas described above). However, the need to make this change to the treatment of radio spectra for consistency purposes was only identified by the editors and advised to the AEG at the end of the update process. Subsequently, it was determined to leave the 2008 SNA treatment of radio spectra unchanged and to place the potential to change the treatment on the SNA research agenda.

123. The radio spectra has not been included as an environmental asset in the SEEA CF. Although the treatment of radio spectra was a large issue for discussion during the 2008 SNA update process, there was no consideration given to including radio spectra as an environmental asset in the SEEA CF. This may have been because of the agreed treatment at the time wherein most, if not all, of the value of the radio spectra was treated as a licence (and hence not an environmental asset) and perhaps also considering that there is no depletion of the radio spectra in physical terms to be recorded.
124. Two issues arise in the context of the SEEA CF update. First, should the radio spectra be included in the SEEA CF as a type of individual environmental asset? On this issue, the radio spectra might be considered to represent a component or characteristic of the biophysical environment, consistent with the definition of environmental assets. Alternatively, the value associated with radio spectra might be considered to reflect solely a licence/permit and hence not an environmental asset. In either case, it is noted that there is no overlap in value with any other environmental assets, i.e. the value does not need to be partitioned from an existing asset. The choice in treatment then depends on a decision on the preferred scope of the definition of environmental assets. Treating the radio spectra as a type of environmental asset would mean that the scope of individual environmental assets in the SEEA CF aligns with the scope of natural resources in the SNA.
125. Second, what accounting treatment should be applied to record the value of the radio spectra? There is a choice of treatments described in the 2025 SNA that, following the 2008 SNA, involve making a distinction between the radio spectra itself and the licence, often established via auction, to use the radio spectra. Subject to further discussions in the national accounts community, more direct valuation options might be applied for example the auction values.
126. A further challenge for the SEEA CF is that the SNA does not provide a discussion on the conceptualisation or measurement of the radio spectra in physical terms. These measurement issues will be examined further pending a conclusion on whether the radio spectra should be included as an environmental asset in the SEEA CF.

## 7 Recommendations on conceptual treatments

<<NB: This section has not yet been drafted pending discussion of the issues described in the preceding sections. It is intended that draft recommendations are developed at the November meeting of the SEEA CF Technical Committee and further refined ahead of Global Consultation.>>

## 8 Other considerations in advancing the issue

<<NB: This section has not yet been drafted. It is not expected that many additional considerations, for example in terms of indicators and compilation guidance, will be identified. However, connections to the GFS revision process items and the development of the SEEA CF research agenda will be incorporated. >>

## 9 References

SEEA CF

2025 SNA