



System of
Environmental
Economic
Accounting

Update of the SEEA Central Framework

Draft Guidance Note

Issue A.8

“Explicitly linking/integrating environmental activity accounts (ch4), asset accounts (ch5) and flow accounts (ch3)”

Version for discussion at the SEEA Central Framework Technical Committee meeting on 9 – 11 September 2026 in Guatemala.

August 2026

GUIDANCE NOTE Issue A.8 “Explicitly linking/integrating environmental activity accounts (ch4), asset accounts (ch5) and flow accounts (ch3)”

Table of contents

Contents

Executive summary3

Description of issue3

Summary of proposals3

Questions for Global consultation5

1 Introduction6

 1.1 *Purpose of the Guidance note*6

 1.2 *Motivation for the issue:*6

 1.3 *Structure of the GN*7

2 Summary of existing measurement and research7

3 Options and possible treatments14

4 Proposals and recommendations16

5 Other considerations in advancing the issue19

References19

Annexes19

EXECUTIVE SUMMARY

Description of issue

1. The issue is described as: “Asset, flow and environmental activity accounts are now all described separately in the SEEA, where the links and integration of the different accounts is one of our key selling points. While this is currently mentioned in Chapters 2 and 6, the linkages could be described and highlighted more regularly through the chapters”. This could roughly translate to either stronger wording to link flow, asset and functional (environmental activity) accounts together, or a discussion of an integrated framework for flow, assets and expenditures based on improving the overall quality of these stocks and flows. This guidance note will look at the connection between the accounts and propose what changes will be needed for the SEEA CF update.

Summary of proposals

2. Why do we need a series of linked environmental economic accounts? In its existing format the SEEA is a grouping of largely self-contained accounts dealing with environmental assets, environmental flows and measures to protect the environment through the economy. The defining concept was the sequence of accounts, this linked depletion of resources, as measured by changes in asset values, to the sequence of national accounts. SNA 2025 changed, introducing depletion as a direct element of ‘net’ economic measures such as value added and national income. Thus, the inclusion of the sequence of accounts in the SEEA CF has lost meaning since this change. However, there are particular policy interests in understanding casual links between consumers and the environment.
3. This means that there is a need for SEEA CF to innovate and further link the means of production to the environment. From the outset in SEEA 1993, there was always an underpinning desire to have a full schedule of monetary and physical environmental-economic accounts.
4. This guidance note recommends the adoption of a standard environmental economic accounting model to replace the original sequence of accounts from SEEA CF 2014. This constitutes a further adoption of the accounting principles from the SNA, in particular the adoption of mapping transactions between the assets (the natural capital balance sheet) and the production accounts and a return to the original focus of the environmental economic accounts.
5. A Standard Accounting Model for the environment has physical and monetary views. The physical model generally follows these steps:
 - a. Creation of an individual environmental asset (Issue A1), this reflects the creation of ownership of an asset from its ecosystem host. For example, coal resources being identified as demonstratable and have production activities.

- b. Creation of a capital and other changes in volume account entry for the individual environmental asset (economic appearance of assets) and allocation to consistent sectors of the economy.
 - c. Aggregation in a Natural Capital Balance sheet, with entries for discoveries, harvest and losses.
 - d. Capital and other changes in volume account entries for losses as economic disappearances, creation of finished products from Natural Inputs as inventories, ideally produced Natural Resources would also be registered here. Depletion is also recorded.
 - e. Inventories of natural inputs are consumed in the flow accounts for environmental goods, with losses due to production activities recorded in the capital account as well as the flow account.
6. The monetary standard account is still intended as an elaboration of SNA. The entries needed are reflected in the physical account with one useful addition for analytical purposes. The standard monetary model has the following features:
- a. Elaboration of natural resource assets in the capital and other volume changes accounts for economic appearance of assets, economic disappearance of assets, depletion and terminal costs.
 - b. Elaboration in the Natural Capital Balance sheet to identify individual environmental assets
 - c. Elaboration in the change in inventories accounts for natural resources.
 - d. Elaboration of supply use tables for production activities based on natural resources.
 - e. Elaboration of generation of income accounts for sector activities regarding natural resources.
 - f. Accounting for environmental activities accounts, in particular restoration and minimisation activities.
7. Accrual accounting should be the gold standard for applying transactions. However advice will need to be included in the accounts for the situations where the physical and the monetary don't line up in an accruals sense. For most cases, cultivate biological resources, this will not be too much of an issue due to exclusions from the standard. In other cases where materials harvested from the environment are stored prior to delivery can be managed through the adoption of elements from the proposed standard model. For example, is coal resources are warehoused at ports prior to delivery, the transactions are accrued in inventories as they are stockpiled and transactions appear on the physical flow accounts as these stockpiles are withdrawn for sales (natural inputs in the energy account). Land is also a special case, as it is the space in which individual environmental assets reside then accrual accounting often doesn't make sense, for example, Ogiliv 2018 points out that accrual accounting for land is only relevant when there is some obligation to restore the landscape after economic activity, especially for agricultural operations.

8. Calculation of Resource Rent for some individual environmental assets are problematic. Biological resources, water and some sub-economic minerals will generate negative resource rent. Chapter 2 should discuss this issue prior to presenting a practical method of determining exchange values. The SEEA CF should discuss:
 - a. Approaches to dealing with negative resource rents and individual environmental assets which are likely to generate them
 - b. Propose alternative methods such as baseline return on the environment or optimising return on capital within the Net Present Value framework
 - c. Proposed alternative methods for developing exchange values and asset values in those cases where NPV and residual value are nonsensical derivations of resource rent.
9. Chapter 5 (or equivalent) has to opportunity to adjust the appendix on NPV estimation to include and expand on this guidance with examples and formulae.

Questions for Global consultation

10. Question 1: Do you agree that a standard accounting model for physical environmental economic accounts be included in the SEEA CF?
11. Question 2: Do you agree that a standard accounting model for the elaboration of monetary environmental economic accounts be included in the SEEA CF?
12. Question 3: Do you agree that a environmental income needs to be derived to add context to the environmental economic activity accounts?
13. Question 4: Do you agree that more research is needed to examine the interaction between restoration and mitigation expenditures and impacts on the environment?
14. Question 6: Do you agree that NPV estimates need to be considered in relationship to the type of asset (biological vs abiotic), if extraction without profit needs to be considered with a different method?

1 INTRODUCTION

1.1 Purpose of the Guidance note

15. The purpose of this guidance note is to provide guidance on the treatment of issue A8 in the update of the SEEA Central Framework (CF).
16. The concept of assets, flows and monetary accounts were introduced in the initial draft version of SEEA in 1993 in parallel with the development of SNA 1993. In this initial version there was a keen interest in developing a broad schedule of accounts with a focus on:
 - a. An elaboration of the environmental and natural resource related transactions in the SNA, and
 - b. The development of counterpart entries for physical accounts that were logical and adhered to the principles of SNA.
17. Over the next two iterations of the SEEA more focus was placed on the development of the physical asset and flow accounts; introduction of depletion as a cost of production; and the development of environmental activity accounts.
18. After a global consultation process there was a key issue raised as means of improving the accounts. This was described as: *“Asset, flow and environmental activity accounts are now all described separately in the SEEA, where the links and integration of the different accounts is one of our key selling points. While this is currently mentioned in Chapters 2 and 6, the linkages could be described and highlighted more regularly through the chapters”*.
19. In the process of consulting on this issue a number of sub issues were identified for discussion in a broader guidance note. These were:
 - a. Consider an account design model.
 - b. Consider the linkages within the account design model and if there needs to be supplementary information to fill the model.
 - c. Consider the implications of the depletion discussion in Issue A9 as well as implication for degradation (which is also discussed in Issue A1).
 - d. Consider the different units reported in physical accounts, their alignment in a broader account model and highlight where there are existing linkages such as industry.
 - e. Consider the accrual reporting of output and implications for linking accounts
 - f. Consider issues associated with the generation of negative resource rent.
 - g. Examine how extended environmental activity accounts link to assets and flows.

1.2 Motivation for the issue:

20. One of the key strength of the family of national accounting is the ability for each of the statistical measures to be coherent with each other. Following on from the aspirations of the

original SEEA process, there is now a desire for a comprehensive set of accounts, where transactions can be tracked and other analytical opportunities are unlocked. Clarifying the asset and production boundaries are needed for understanding how accounts deal with the formation of assets, their depletion through harvesting, treatment of losses and residuals and having a traceable transaction through the accounts to final consumption. This guidance note is also an opportunity to clarify some compilation issues dealing with the transition from physical to monetary accounts.

1.3 Structure of the GN

21. This guidance note has five sections:

- a. An introduction
- b. A summary of existing measurement and research
- c. Options and possible treatments
- d. Proposals and recommendations
- e. Other considerations in progressing this issue.

2 SUMMARY OF EXISTING MEASUREMENT AND RESEARCH

22. An account design model

23. SNA 2025 is the key example of a standard accounting model for the economy. In SEEA 1993, it was first discussed that the Standard SEEA framework should be both an elaboration of the SNA and should attach physical accounts in a similar fashion to represent the sustainability of economic use of the environment. In subsequent issues of the SEEA, this was narrowed down to a focus on the development of independent asset and flow tables for physical accounts, with a smaller discussion on the monetary accounts, recognising that monetary accounts were based on the System of National Accounts and only elaborated on supply use tables for SEEA.
24. It is worth noting that the methods for developing balance sheet estimates and monetary asset accounts in SEEA were considered to be the same for mineral assets. Biological resources and water were seen as necessary for inclusion in the SNA but had underlying issues in the calculation of resource rents and thus any Net Present Value (NPV).
25. SEEA 2014 focused its attention on the development of the Sequence of Accounts for the purposes of developing environmental adjusted net measures of the economy. These became a focus on the where depletion would occur in the economy and enabled tracking of where excessive harvesting of individual environmental assets would impact on the Net economy. However, one distinct problem was the derivation of depletion, in most cases net depletion was available from national balance sheets, which distorted true depletion based on the inclusion of discoveries.

26. SNA 2025 has changed the economic perspective. It now enables the calculation of Net Measures of the economy through the deduction of depletion which aligns with the conceptual framework proposes in SEEA 2014. Thus, it could be concluded that the sequence of accounts has been superseded by standard national accounting.
27. There is still a need to have some economic framing of how the economy relies or uses the environment in an aggregate sense for the purposes of SEEA. One of the frustrating outcomes of SEEA 2014 is the lack of an aggregate for the environment or at least a coordinated output that reflects the entirety of the environment within the SEEA/SNA asset and production boundaries. It should be noted that ecosystems in relation to the asset boundary are discussed in Issue A1.
28. One of the interesting components of SEEA 1993 was the proposal for a standard set of accounts modules that were mainly an elaboration of the SNA for natural resources, but also attributed physical accounts to the same model. In this way a standard accounting model for the environment could be conceptualised (figure 1) if we borrow from the standard model for SNA (Appendix 1).
29. To make sense of this this guidance note will step through how the standard model emerges from basic principles of how the economy interacts with the environment. This guidance note will consider the monetary set of accounts for the environment followed by physical accounts.
- 30. Standard monetary accounts for the environment.**
31. One of the more useful features from SNA is the introduction of assets onto the balance sheet. Discoveries and subsequent allocation of non-produced assets appear through the other change in volume account as an 'economic appearance of an asset'. This method works well for describing the allocation of an owner (or multiple owners when considering split assets) in the creation of an individual environmental asset.
32. Step 1 in understanding how a standard model for environment accounts would work is the creation of an individual environmental asset from an ecosystem, entering a value for an 'economic appearance of an environmental asset' in a capital and other volume change account and then the entry of the lifetime value of the asset in a natural capital balance sheet. The benefits of this approach apart from consistency with SNA is that the monetary data should already exist. Worst case scenario is that if this process is adopted in SEEA compilation then it could be used in national accounting.
33. {step 1 picture}
34. The second step relies on the fact that the SNA 2025 has adopted Natural Capital Balance Sheets as a sustainability option. In contrast the current SEEA CF currently recommends individual asset accounts (Chapter 5). While these are coherent with the SNA, they don't reflect the need for a defined Natural Capital measure in the SEEA. The definition of Natural Capital is largely determined by the SNA 2025 definition. However is worth noting that individual environmental assets are slightly different to those prescribed in SNA (Issue A9).

35. In the determination for SNA 2025, Natural Capital is more broadly defined as: *“Natural capital refers to the combination of natural resources and ecosystem assets, of which the latter are not explicitly recognized as economic assets in the integrated framework of national accounts”*.

36. {Step 2 picture}

37. From a monetary perspective, a Natural Capital Balance sheet should be an elaboration of the SNA based estimate, where this is not available, it should be a consolidated output of the individual asset accounts where available. Considering the means for calculating depletion for the purposes of NVA and NNI, these balance sheet entries could be made available for national accounting.

38. The following diagram is the basic form of a monetary balance sheet:

Assets	Opening and closing balance sheets with changes in assets									
Code	Stocks and changes in assets	Non-financial corporations	Financial corporations	General Government	Households	NPISHs	Total economy	Rest of the world	Goods and services	Total
AN12	Inventories (excluding produced natural resources)									
AN3	Natural resources									
AN31	Land									
AN32	Mineral and energy reserves									
AN33	Biological resources									
AN34	Water resources									
AN39	Other natural resources									

39. A new component for SEEA monetary accounts could be a Generation of Environmental Income Account (Step 3). This would be an elaboration of the Generation of Income Account from SNA, with a focus on the returns from economic activities through Natural Resources. One useful indicator (for the purposes of Issue A2) from this would be the proportion of expenditure on restoration compared to income generated, reflecting the effort to maintain environmental integrity after economic activities have taken place.

40. {Step 3 picture}

41. Finally, the adoption of the National Expenditure on Environmental Activities account table in the standard model.

42. Monetary supply use tables (Step 4) are an elaboration of standard supply use tables. These link relatively well to physical supply use tables inasmuch as the transactions that take place are linked to the value add of materials flowing through the economy. There are a number of areas where this falls short:

- Links between changes in environmental assets and supply are often measured independently. On the monetary side, this makes sense as the value of losses from the physical transference of assets are not often considered as a part of the SNA.
- Changes in inventories are a net measure, where in environment accounting, the inflows and outflows are more important. Monetisation of inflows, the losses as a part of the transfer between the environment and the economy, and losses due to consumption need to be factored in to make sense of the volume of materials.

- c. Stranded assets and natural resources assets that are no longer viable need to be taken off the balance sheet

43. {Step 4 picture}

44. **Physical accounts**

- 45. These accounts can follow a similar pathway to the development of standard monetary accounts. If we take a stepwise approach from above and using the same figures.
- 46. The first step in a physical account would be the recognition of a physical individual environmental asset. As discussed in Issue A1, individual environmental assets are contained within ecosystems, if the rights or ownership of an environmental asset are created, then these cross the asset boundary and are calved from ecosystem. The act of creating ownership is synonymous with the creation of the value of the asset. In the current SEEA these are entered onto the asset tables as “additions to stocks”. In SNA 2025 we note that assets appear on the other change in volume account in parallel with entering on the Natural Capital Balance Sheet.
- 47. In a standard accounting model for the environment, there are some benefits to adopting a similar path to the SNA for onboarding assets into the economy:
 - a. Creation of individual environmental assets are easier to trace and maintain coherence with National Accounting;
 - b. Discoveries can be recognised and taken into account for the calculation of depletion.
 - c. It establishes a capital and other volume change account for later use in the standard model.
- 48. The second step is to build physical Natural Capital Balance sheets, these handle the physical transactions between the economy and the environmental asset as well as establishes core data for deriving asset value, depletion and resource life for use in later monetary estimation. A combined Natural Capital Balance Sheet is also advantageous for examining sustainability and understanding national wealth.
- 49. It is worth considering the units that apply to physical assets and their treatment in linking within the accounting structure. Different individual environmental assets have different units of measure, for example water is typically in Litres, energy is measured in joules and minerals are typically Tonnes and so on. Mixing these in an aggregate sense is problematic. Material Flow Accounting deals with this by excluding water and reconciling to a common unit as Tonnes. This has the risk of losing meaning as Tonnes of energy products doesn't necessarily mean consistent release of energy and can be entirely dependent on the process. In some cases there are no matter to energy transference, for example energy from solar collectors, which confuse a common physical measure.
- 50. So where national accounting works with the physical environment is the use of common statistical units that determine ownership and use. Materials that have the same units measure can be aggregated under common sectors (typical non-financial corporations and general government) or be described in an industry classification. Industry classifications are advantageous due to their homogenous nature, that is common businesses or economic

entities are gathered under common production functions. Focusing on the environment, this means mining industries are often combined together, water supply and energy supply can have their environmental accounting information aggregated in a sensible fashion. This is important for solving the problem of different units of measure for physical assets mentioned above. As the concept is measure all individual environmental assets and to have them co-located on output tables. Applying an industry or sectoral link to the measurement of physical assets and products allows coincidental linkage to monetary accounts. For example, Looking at Table 1 above, in the balance sheet there is already some use of homogenous units for environmental assets, and there is sectoral classification which can be applied.

51. The third step is to think through how materials are extracted from the environment for further use in the economy. SEEA EA focuses its attention on the final consumption of ecosystem services, which is jumping over what SEEA CF was intended to do from its inception. Thus SEEA CF should track the throughput of raw materials (Natural Inputs + losses from extraction) as inventories. This aligns with the SNA where environmental goods are considered to be finished products and can be included in change in inventories. However, a net change in inventories loses vital information about resource extraction. There are benefits to measuring the amount stored prior to final or intermediate consumption (inflows to inventories), accounting for the losses in storage and in transmission to final or intermediate consumption. These inventories would be considered as produced assets (aligning with the sentiments of Issue D4, water as a produced asset).
52. The fourth step is to consider the treatment of losses from economic activity. Losses can be as a part of the supply chain (losses due to extraction, losses in storage, losses due to transmission/transport) or as a part of final consumption (heat lost in final use of energy, waste materials). At the moment these have no pathway to be removed from the economy or have some form of treatment in the accounts. SNA has a pathway for dealing with losses to the economy. Losses can be both recorded in an other change in volume account as an economic disappearance. Similarly, monetary value can be attributed to these losses based on their market value, at least for comparison.
53. One of the missing elements is how ecosystems deal with losses and other externalities. There is a gap about understanding the capacity of ecosystems to handle and assimilate externalities and how these pressures (Issue B5) impact on condition. From a SEEA CF perspective, the fifth step is to measure where externalities are stored in ecosystems where that material will assimilated (eg Carbon) or will accumulate (eg PFAS) in the environment. This paper supports the modular approach suggested in Issue B5 as an interim solution.
54. Finally, linking functional (environmental activity) accounts to asset and supply use accounts is an interesting challenge and opportunity. If we ask the question, how do we pay for restoration of the environment in a national accounting sense, the answer isn't really in the current SEEA CF. Granted the current financing table (Table C1) explains the source of funds for environmental activity, it does not address the fundamental question if extractive activities have spare capacity to restore or minimise impact on the environment. One of the benefits of producing environmental activity accounts however is the adherence to economic

classifications. Implementing an industry classification (eg ISIC) enables gross linkages between use of the environment by industry and any restoration activities. Hence while generation of income is usually done by sectors, there is some merit to having splits by industry for further analysis.

55. Linking restoration and mitigation expenditure to physical accounts continues to be a challenge. Mitigation expenditure could be viewed in parallel with resource efficiency or resource productivity estimates as a determinate factor.

56. Impact of accrual accounting on SEEA CF

57. SEEA CF already attempts to adhere to accrual accounting (for example, para 2.139). So the question is if any changes in approach will impact on the use of accrual accounting in physical terms. Para 2.139 already notes that while accrual accounting is the preferred method, the natural environment may not necessarily follow the monetary transactions. So if we do apply a Standard Accounting Model for the environment, then accrual transactions in a physical context might be more conceptually relevant.

58. SNA states in particular that: “Transactions internal to one institutional unit are equivalently recorded when economic value is created, transformed or extinguished. Generally speaking, all transactions, however they are described, can always be viewed as dealing with economic value.” (SNA2025, 3.56). If we refer to the first step of the Standard Model above, then the creation of the individual environmental asset through an other change in volume entry could better align with the timing of the event. If harvested products and losses are accounted for in the capital and other change in volume accounts, then this could mitigate where there are lengthy delays between harvesting and being sold to consumers. Externalities also could be referred as stored in ecosystems outside the asset boundary, prior to assimilation or accumulation, taking care of the transaction process (deposit of the residual) and eventual intermediate consumption in ecosystems via SEEA EA regulation services.

59. Also note that: “Time of recording of output and intermediate consumption 4.211 The principle of recording on an accrual basis implies that output is recorded over the period in which the process of production takes place. Thus, additions to work-in-progress are recorded continuously as work proceeds. When the production process is terminated, the whole of the work-in-progress accumulated up to that point is effectively transformed into a stock of finished product ready for delivery or sale. 4.212 Similarly, the intermediate consumption of a good or service is recorded at the time when the good or service enters the process of production, as distinct from the time it was acquired by the producer.” There is a special case which has been discussed as a part of Issue A9 on the inclusion of cultivated biological resources in the Natural Capital definition for SEEA CF.

60. There are positive benefits to rejecting these assets from the suite of individual environmental assets. For example, if there are no natural cultivated biological resources, then there are no produced natural resources and no special cases where work in progress for managed biological products need to be accounted for. Each harvested product crosses the asset boundary when harvested, forming finished products for future production and thus accumulate in Inventories.

Noted that these are typically drawn down in the same financial period so there is minimal

asset accumulation in practice, but mapping the process and using it in output can support accrual accounting.

61. An extreme example is the identification of a water asset on the balance sheet. These should be related to the creation of the economic asset, independent of the ecosystem asset changes over the hydrological year. And if standard accounts of the environment are adopted, then water as a produced asset (Issue D2?) makes more sense as water in storage are finished products prior to distribution by water supply.
62. Thinking through an example of this: if 100 units of water are available in natural aquifers each year, then this capacity should be recorded for the purposes of ecosystems. Some of this will be stored (say 20 units) and held in inventories (behind dams), leaving the remaining 80 units as capacity in the ecosystem for the production of water. If 5 units are withdrawn for consumption over the year, this is seen as withdrawals from inventories. The model can account, however, for the next set of inflows of 20 units even if they are haphazard (due to rainfall) or averaged over the financial year. This also allows for dealing with losses. If an additional 3 units evaporate from the storage, then these are economic disappearances given that they were stored (economic process) and lost in storage (still under an economic process).
63. One consideration is the treatment of depreciation of natural resource based inventories. Depreciation applies when an asset is used in the production process. Water is not used in the production process, but relies on infrastructure to shift the product between locations. Hence, one could argue that there is no depreciation in regards to inventories of finished products from natural resources, but there are losses. These losses can be attributed to the entry for economic disappearance of assets and a counterpart stored in ecosystems.
64. **Impacts of negative resource rent.**
65. The problem of negative resource rent and alternative solutions need an entry in the SEEA CF. The OECD's measuring Natural Resources in the National Accounts (2025) provides some guidance to resolving this issue:
 - a. High capital costs
 - b. Overstatement of depreciation costs from PIM or from business accounts
 - c. Impact of stranded assets
 - d. Enthusiastic rates of return on capital
 - e. Impact of subsidisation from the government sector distorting Gross Operating Surplus.
 - f. Or simply an error in the calculation process, typically identified as negative resource rents over an extended time.
66. One element not covered in this analysis was the ABS' discovery that some capital are included when taking an industry approach that are not part of the initial or harvesting production process, which distorts the value of capital prior to calculating depreciation. For instance, valuation of fish stocks from a resource rent perspective could be underestimated if there is vertical integration in the industry. In the ABS case this was the inclusion of manufacturing

facilities for processing fish, over and above the trawlers needed for fishing. This distortion was estimated at slightly over 50% increase in the amount of capital reported for fish harvesting.

67. Pascoe et al (2026) note that there are some discrepancies in the valuation of resource rent for ecosystem services. They note that residual resource rent calculations fail on two levels:
- a. Residual values are not representative of the ecosystem service value (resource rents).
 - b. They are an unstable and somewhat subjectively biased means of calculation.
68. Unfortunately the paper stopped short of recommending a way forward beyond examining other means of calculating the exchange values.
69. Concluding this issue, it would seem that there should be a process to recalibrate the calculation of resource rents for the purposes of Net Present Valuation and depletion in the broader SEEA and SNA. In the interim, this guidance note proposes to introduce a section on the problems with residual resource rent values, recommend approaches from the Manual of Natural Resources (OECD, 2025) for the purposes of mineral and energy resources, and propose that other means would be more suitable for biological resources and water resources that can be highlighted from the SEEA Ecosystem Accounting guidance.

3 OPTIONS AND POSSIBLE TREATMENTS

70. A standard model of the environmental economic accounts – replacing the environmental adjusted sequence of accounts – should look like this:
71. {pictures of the standard model for monetary and physical accounts}
72. The following steps are suggested for inclusion in chapter 2 as a replacement to the narrative on the sequence of accounts and reflected through other chapters on flows and assets.
- 73. Standard Monetary Accounts for the Environment**
74. Step 1. Recognise Natural Capital Balance Sheets in the SEEA CF.
75. Step 2. Adopt a capital and other volume changes account for SEEA CF. Include natural resource finished products as inventories prior to inclusion in production accounts. Following on from this treatment, losses of environmental goods should therefore be treated as disappearance of economic assets, as they are a nominally a loss to inventories. Depletion in monetary terms are consistent with SNA 2025 (Issue 9.1).
76. Step 3. Link to production accounts (Supply Use Tables). The physical accounts demonstrate that there is a flow of resources from assets to production units. This creates the accounting identity:
- a. $\text{Total Supply} = \text{Natural Inputs} + \text{imports} + \text{draw down from inventories} - \text{losses} = \text{Total Use}.$

77. Step 4. Introduce a Generation of Environmental Income Account. This would be on the one side a concise form of a standard Generation of Income Account (SNA 2025) and on the other hand an elaboration of the income generated from economic activities based on the environment.
78. Step 5. Integrate the Environmental Activity expenditure tables into the standard model as nominally a return to the environment. This could also be used in conjunction with a generation of environmental income account as an indicator.
- 79. Standard accounting model for physical environmental accounts**
80. Following a similar stepwise approach from the standard monetary accounts for the environment.
81. Step 1 establish a natural capital balance sheet for individual environmental assets and land. Recognise ecosystem asset as extensions to the balance sheets.
82. Step 2 establish concise versions of physical capital accounts and physical other volume change accounts with the primary purpose of entries for:
- a. Economic appearance of environmental assets and regrowth
 - b. Economic disappearance of environmental assets and losses
 - c. Recognition of split ownership between sectors?
 - d. Attribution of harvested natural resources as finished products in inventories
 - e. Deduction of inventories for flows to physical accounts
 - f. Measurement of depletion of natural resources
83. Step 3 Link to production (physical flow) accounts through the identities of Natural Inputs + losses = outflows of inventories. This should mean that the change in volume of individual environmental assets should be equal to additions to inventories + losses due to extraction.
84. Step 4 Establish pressure accounts as accumulation in ecosystems, could attribute some economic disappearance of assets as a part of this process pending discussions in Issue B6 pressure accounts.
85. Step 5 Align, for example by industry classifications, expenditure on environmental activities with related physical flows and assets. For example, aligning resource management expenditure on minerals with mineral assets and mineral flow accounts.
86. For both monetary and physical accounts there is an issue of how to treat sustainable finance (pending discussion in issue C8).
- 87. Depletion and degradation.**
88. Treatment of depletion in the accounts will be discussed in issue 9 on the alignment with SNA. Treatment of degradation in the accounts can be handled in two ways:
- a. Degradation should be attributed to ecosystem accounts where there is leakage from the economy back to ecosystems or excessive extraction. This could be traced through

step 4 where there is some establishment of a storage facility within ecosystems for losses. This is similar to the modular approach for issue B6.

- b. Valuation of degradation is problematic. Valuation of ecosystems is not a standard set of accounts and is being actively discussed. For central framework assets these are generally out of scope of measurement. There is no degradation of abiotic resources, since cultivated biological resources are excluded and uncultivated biological resources appear when they are extracted, water quality accounts were discarded in the revision process, then degradation isn't recorded in the SEEA CF. The only point where this logic may fail could be soil resources, though it is debatable if this is a depletion event or degradation event.

89. Negative resource rents

90. Some discussion should be included in chapter 2 and chapter 5 on assets for the case of negative resource rent values. While there is discussion about the relevance and usefulness of residual values for resource rent, discarding them is problematic given the emphasis in SNA 2025. The discussion should focus on:

- a. Common issues and solutions for negative resource rent based on the Measuring Natural Resources in the National Accounts: a compilation guide.
- b. Alternative methods as discussed in SEEA EA for the determination of exchange value should be introduced as part of the narrative.

91. Accrual accounting and SEEA CF

92. The existing text in the SEEA CF and SNA deal with most of the challenges of accrual accounting. One means of alleviating this may be to adopt a standard accounts model which can potentially deal with transactions that happen substantially after the production activity. For example, if minerals are stockpiled waiting for sales to the Rest of the world and cross accounting periods, then tracing the transactions through inventories can minimise some of the inconsistency.

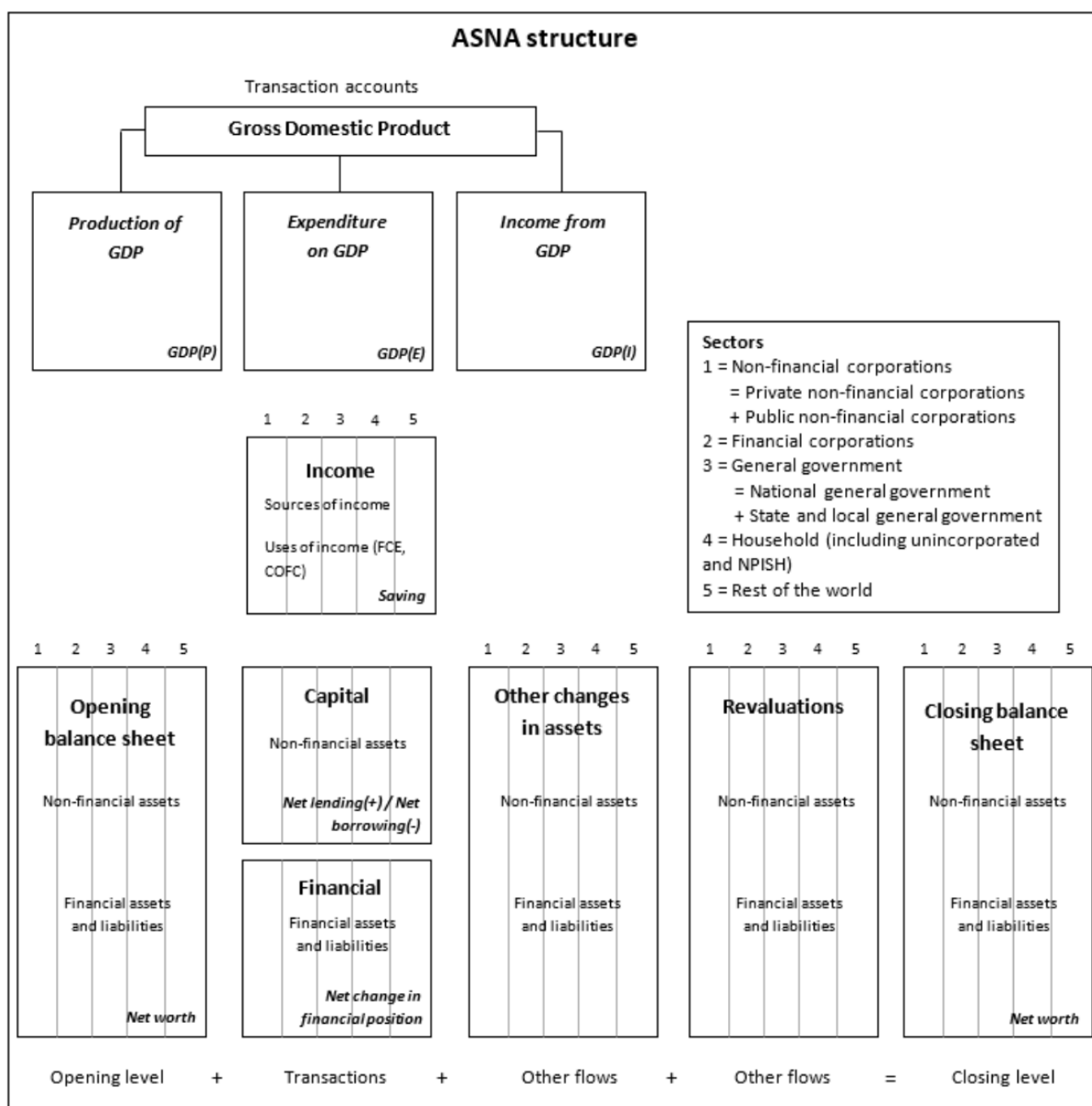
4 PROPOSALS AND RECOMMENDATIONS

93. This guidance note proposes to introduce one change to the SEEA CF. The concept of a standard account model for the environment could be introduced into chapter 2 as a replacement for the sequence of accounts.

94. The standard account model for the environment could include the following accounts to the current set of accounts. This includes use of standard economic classifications for determine how to allocate monetary information. For monetary accounts these should be an elaboration of the SNA2025:

- a. A Natural Capital Balance sheet
- b. A concise version of a capital and other changes in volume account including inventories
- c. A generation of environmental income account

- d. Inclusion of the environmental activity expenditure accounts
 - e. An environmental financial account (pending discussion on sustainable finance)
 - f. Environmental supply use tables
95. The physical accounts should follow a similar set of standard accounts but without the need a generation of income and environmental activity expenditure accounts. This includes use of standard economic classifications for determine how to allocate physical information. The standard physical account model could include:
- a. Natural Capital Balance Sheet
 - b. A modified Capital and Other Changes in Volume Account including inventories of natural resources and creation of environmental assets.
 - c. Existing Asset accounts as source information
 - d. Standard physical flow accounts
 - e. A residual or pressure account dealing with accumulation of residuals in ecosystems.
96. The issues of valuation and dealing with depletion and degradation should update existing information in chapters 2 and 5 to reflect the contemporary views such as the Manual of Measuring Natural Resources in the National Accounts (OECD, 2025).
97. Finally the introduction of a standard accounting model should alleviate challenges with adopting accrual accounting practices. This should include text if these changes are adopted.



98. Question 6: Do you agree that looking at the interaction of environmental activity accounts and how

Notes to authors

- Describe proposals and recommendations to address the issue.
- Where relevant and possible list the sections/paragraphs of the SEEA CF that need to change or where additional content is required

5 OTHER CONSIDERATIONS IN ADVANCING THE ISSUE

Notes to authors

- If relevant, propose **indicators** (and their derivation methods) that could be derived for this issue to support reporting and analysis
- Document **key terms and definitions** for inclusion in the SEEA CF Glossary
- Describe the existing **compilation guidance** and document what additional compilation guidance might need to be updated or developed (do **not** provide the guidance itself, that is not for inclusion in the SEEA CF)
- Document any issues that remain unresolved as a result of the investigation or issues that have emerged as a result of the work that should be placed on the **research agenda** of the SEEA and potentially in relation to other statistical standards (e.g. SNA, BPM, etc.)
- For issues that are also being considered in the **GFS and COFOG revision processes**, describe the connections and potential differences in proposed treatments

REFERENCES

ANNEXES

Some random excerpts from SNA 2025:

The Asset Boundary

1.68 Balance sheets are compiled for institutional units, or sectors, and record the values of the assets they own or the liabilities they have incurred. Assets as defined in the integrated framework of the SNA are items that must be owned by some unit, or units, and from which economic benefits are derived by their owner(s) by holding or using them over a period of time. Financial assets and fixed assets, such as machinery, equipment and structures which have themselves been produced as outputs in the past, are clearly covered by this definition. However, the ownership criterion is important for determining which natural resources are treated as assets in the integrated framework of the SNA. Natural resources such as land, mineral deposits, fuel reserves, renewable energy resources, forests or other vegetation and wild animals are included in the balance sheets provided that institutional units are exercising effective ownership rights over them, that is, are actually in a position to be able to benefit from them. Assets need not be privately owned and could be owned by government units exercising ownership rights on behalf of entire communities. Thus, many environmental assets are included within the integrated framework of the SNA. Resources such as the atmosphere or high seas, over which no ownership rights can be exercised, or mineral and energy resources that have not been discovered or that are technically or economically unworkable, as demonstrated by the absence of production or the expectation of production via the granting of a lease to exploit the resources, are not included as they are not capable of bringing any economic benefits to their owners, given the

technology and relative prices existing at the time. Ecosystem assets are also excluded from the asset boundary applied in the integrated framework of the SNA.

1.69 Changes in the values of natural resources owned by institutional units between one balance sheet and the next are recorded in the accumulation of assets accounts of the sequence of economic accounts. For example, the depletion of a natural resource as a result of its use in production is recorded in the capital account, together with the depreciation of fixed assets. On the other hand unpredictable losses of non-financial assets due to their destruction by natural disasters (floods, forest fires, hurricanes, earthquakes, etc.) are recorded in the other changes in the volume of assets and liabilities account. Also, the appearance of workable deposits or reserves of minerals or fuels as demonstrated by their use in production or their expected use via the granting of a lease for production are recorded in this account and they enter the balance sheets in this way.

Downwards reappraisals of mineral and energy resources

13.27 The changes recorded here are the negative analogues of gross additions to the level of exploitable mineral and energy resources that result from reassessments of exploitability because of changes in technology or relative prices. In practice, only net additions may be available, and these will be recorded under discoveries and upwards reappraisals of mineral and energy resources.

13.28 Mitigation objectives related to climate change may lead to worldwide reductions in fossil fuel consumption, which may cause losses in the values of corresponding energy resources due to falls in commodity prices. In addition, downwardly bended extraction path projections may give rise to declining energy resource asset values. This phenomenon is also known as stranded assets. Such downward appraisals of the value of energy resources should also be recorded as other changes in the volume of assets, similar to the treatment of reappraisals more generally. Other declines in the value of mineral and energy resources due to changes in commodity prices, which are not related to reappraisals, should be recorded as revaluations.

3.32 As the previous example shows, the integrated framework of the SNA also often uses categories which are compacted, that is, are the result of combining a number of elementary transactions. The term *changes in inventories, for example, refers to the difference between entries into and withdrawals from inventories and recurrent losses.*

3.34 The coverage of assets is limited to those assets which are subject to ownership rights and from which economic benefits may be derived by their owners by holding them or using them in an economic activity as defined in the integrated framework of the SNA. Consumer durables, human capital, and also those natural resources that are not capable of bringing economic benefits to their owners, are outside the scope of assets in the integrated framework of national accounts.