

14th Meeting of the Advisory Expert Group on National Accounts, 5-9 October 2020, Virtual Meeting

Agenda item: 6.3

Accounting for Biological Resources

Introduction

For biological resources, the 2008 System of National Accounts (2008 SNA), and also the System of Environmental-Economic Accounting 2012 Central Framework (SEEA CF), make a distinction between *cultivated* and *non-cultivated* resources. If the growth and regeneration process of the biological resource is *controlled by, managed by and under the responsibility of* an economic agent, the growth is considered production, and the relevant resource is considered as a produced asset, i.e. a cultivated resource. If this criterion does not apply, and the growth relates to a purely natural process without any human involvement, in line with the definition of the SNA production boundary in paragraph 6.24, the growth of the biological resource is not production in an economic sense, and the asset is considered a non-produced asset, i.e. a non-cultivated resource. Examples relate to the unmanaged growth of fish stocks in international waters, the growth of trees in ‘uncultivated’ forests. In these latter cases, only goods produced by catching the fish, felling the trees, or picking berries, etc. enter into the production boundary.

The draft guidance note attached to this cover note addresses a number of interrelated questions concerning the accounting for biological resources, and puts forward the following recommendations:

- 1) First of all, it is proposed to extend the asset boundary for biological resources, in line with SEEA CF. This comes down to an extension of the asset boundary in physical terms. It would not affect the boundary in monetary terms. All known biological resources which are ‘owned’ in one way or another, both individually and collectively, would be treated as an asset. It would thus also include resources with zero, or very marginal, monetary benefits in the foreseeable future, albeit that these resources would be recorded with a value of zero.
- 2) In relation to the distinction between cultivated and non-cultivated resources, it is proposed to take the continuum from intensely managed to totally undisturbed as a starting point for the recording of biological resources. The distinction would thus cease to exist, as ecologically speaking all biological resources are impacted by human activity (directly or indirectly) and become ‘produced’. Output would then be measured as the percentage of natural growth that is expected to be exploited in the foreseeable future. This comes down to an accrual accounting of production, which in the case of non-cultivated assets currently is recorded at the time of removing the biological resources from nature.

If the above is not considered feasible, the only viable alternative for distinguishing cultivated from non-cultivated resources would be a very strict application of the significance of management practices, in which case the biological resources are only considered as cultivated if they are more or less fully managed. Very intensive human intervention would then only qualify assets as being produced, e.g. for timber resources only plantations would be considered as produced assets, while for aquatic resources only fish farming would qualify as such. All other biological resources, for which management levels are not that intensive, would be recorded as non-produced assets.

- 3) Regarding the recording of biological resources and the treatment of permits to use them, the question arises whether the interpretation of the 2008 SNA, as explained in paragraph 43 – 47 of the attached draft guidance note, is correct.

In addition, it is recommended to clarify the recording of the (partial) handing over of access rights for free. Here, it is proposed to treat such a handing over as a transfer of non-financial assets with a concomitant capital transfer. Whatever the case, it is argued that the current text of the SNA needs to be updated by providing much more explicit guidance.

- 4) The attached guidance note also contains a proposal to reconsider the difference in treatment between leasing of produced assets (output) versus the leasing of non-produced natural resources (rent). It is recognised that this would constitute a major departure from the 2008 SNA. However, for the arguments mentioned in the relevant section of the attached guidance note, it is considered important to investigate this potential change in more detail.
- 5) Although not having been discussed in this guidance note, it is also proposed to reconsider the current classification of non-financial assets in the SNA balance sheets. Currently, prominence is given to the way in which the assets come into existence, i.e. whether they are produced or not produced. Produced assets are subsequently broken down into fixed assets, inventories, and valuables. The consequence of this hierarchy is a completely dispersed allocation of natural resources. Some will be part of fixed assets (cultivated biological resources which yield repeat products), some will be recorded as inventories (cultivated biological resources which yield one-off products), while the remainder will be classified as non-produced assets. Amongst others for reasons of a growing user interest into natural capital estimates, one may want to re-think the current hierarchy. This issue is however first and foremost part of guidance note EA.06.

Documentation

- Draft guidance note “Accounting for Biological Resources”, as attached to this cover note.

Main issues to be discussed

The AEG is requested:

- to offer its opinion on the first three proposals for changing and/or clarifying the 2008 SNA;
- to provide its first views on the fourth and fifth proposal;
- to provide feedback on the need for further testing the feasibility of the recommendations, for the two areas listed in Section 5 of the attached guidance note; and
- to provide feedback on ways to further improve the guidance note.

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Accounting for biological resources (Guidance note EA.02)

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Recent accounting practice has shown that the distinction between cultivated and non-cultivated assets can be quite thin. This distinction is important as it has a direct impact on how output and assets are being defined. There is quite a lot to unpack in this area, which may, or may not, require any (substantial) changes to the 2008 System of National Accounts (2008 SNA) and/or the System of Environmental-Economic Accounting 2012 Central Framework (SEEA CF). Whatever the case, as argued in the guidance note, more clarification and common understanding is needed, especially in the SNA. Further alignment between the updated SNA and SEEA CF would also be welcome.

1. Introduction

1. For biological resources, the 2008 System of National Accounts (2008 SNA), and also the System of Environmental-Economic Accounting 2012 Central Framework (SEEA CF), make a distinction between *cultivated* and *non-cultivated* resources. If the growth and regeneration process of the biological resource is *controlled by, managed by and under the responsibility of* an economic agent, the growth is considered production, and the relevant resource is considered as a produced asset, i.e. a cultivated resource. If this criterion does not apply, and the growth relates to a purely natural process without any human involvement, in line with the definition of the SNA production boundary in paragraph 6.24, the growth of the biological resource is not production in an economic sense, and the asset is considered a non-produced asset, i.e. a non-cultivated resource. Examples relate to the unmanaged growth of fish stocks in international waters, the growth of trees in ‘uncultivated’ forests. In these latter cases, only goods produced by catching the fish, felling the trees, or picking berries, etc. enter into the production boundary.

2. There are a number of interrelated questions when it comes to the accounting of biological resources:

- Firstly, issues related to the application of the general asset boundary, i.e. when do biological resources qualify as being considered (economic) assets?
- Secondly, issues related to the distinction between cultivated and non-cultivated biological resources. Here, one can question the actual need for such a distinction. If the answer to this question is affirmative, then the question arises how to make a distinction between the two asset categories. What are the defining characteristics for considering a biological resource as being cultivated (produced) or non-cultivated (non-produced)?
- Thirdly, issues related to the recording of biological resources and the treatment of permits to use them.

¹ The author would like to thank Bram Edens (UNSD), Anton Steurer (Eurostat), Joe St Lawrence (Statistics Canada), and Jim Tebrake (IMF) for their very useful comments and suggestions on a previous version of this guidance note.

- Finally, a more general question is raised about a possible alignment of the accounting for leasing produced and non-produced assets.

3. In Section 2 below, the current treatment according to the 2008 SNA and SEEA CF is discussed. Section 3 will then discuss the various options to account for biological resources, including the most pros and cons of each alternative. This is followed, in Section 4, by a proposal for the preferred treatment from a conceptual point of view, while Section 5 takes a closer look at the practical implications and the feasibility of the proposed recording.

2. Existing material

Accounting for biological resources: guidance from the 2008 SNA

4. When it comes to naturally occurring assets in the form of biota (trees, vegetation, animals, birds, fish, etc.), a distinction can be made into three categories:

- resources which are controlled by, managed by and under the responsibility of an economic agent, to be treated as produced assets, i.e. cultivated biological resources (or inventories; see later);
- resources which are not controlled by, managed by and under the responsibility of an economic agent, but which are “owned” by an economic agent who can derive economic benefits from them, to be treated as non-produced assets, i.e. non-cultivated biological resources;
- other resources, not meeting the criteria for being considered an asset.

5. When it comes to whether or not biota are considered an asset, the criteria for the general asset boundary of the 2008 SNA needs to apply. As stated in paragraph 3.30 of the 2008 SNA: *“An asset is a store of value representing a benefit or series of benefits accruing to the economic owner by holding or using the entity over a period of time. It is a means of carrying forward value from one accounting period to another”*. So, the biota must be owned by an economic agent, and benefits need to be derived from them.

6. Paragraph 10.167 of the 2008 SNA further clarifies economic ownership in the case of natural resources: *“Only those naturally occurring resources over which ownership rights have been established and are effectively enforced can therefore qualify as economic assets and be recorded in balance sheets. They do not necessarily have to be owned by individual units, and may be owned collectively by groups of units or by governments on behalf of entire communities. Certain naturally occurring resources, however, may be such that it is not feasible to establish ownership over them: for example, air, or the oceans. In addition, there may be others that cannot be treated as economic assets because they do not actually belong to any particular units. These include not only those whose existence is unknown but also those, including uncultivated forests, that may be known to exist but remain so remote or inaccessible that, in practice, they are not under the effective control of any units”*. Furthermore, paragraph 10.182 of the 2008 SNA makes clear that, for example, virgin forests and fisheries within the territory of the country are to be considered as assets. Only if those resources are not exploitable for economic purposes, currently or in the foreseeable future, they should be excluded.

7. When it comes to economic benefits derived from biota, one should be aware of the fact that this only relates to monetary benefits, including the production of goods for own final use (e.g., picking berries or felling trees, for own use). In respect of these benefits from biological resources, the 2008 SNA first and foremost speaks about the benefits from the natural growth of goods, which in the context of accounting for ecosystem services and assets are referred to as *provisioning services*. However, although this is not mentioned explicitly, benefits from e.g. payments of entrance fees to natural parks would also qualify as such. Having said that, biological resources, e.g. forests, also

provide, to individuals and/or the community at large, regulating services (e.g., carbon sequestration, avoidance of soil erosion, flood control, etc.) and (unpaid) cultural services (e.g., recreation). These latter services, which are accounted for in the SEEA Experimental Ecosystem Accounting (SEEA EEA), do not qualify as benefits within the production boundary, as defined in the 2008 SNA. These benefits therefore also do not add to the value of assets, unless implicitly, for example as a consequence of higher values of land close to parks.

8. For biota which are considered to be part of the asset boundary, both the 2008 SNA and SEEA CF make a distinction between *cultivated biological resources* and *non-cultivated biological resources*, depending on whether the growth and regeneration process of the biological resources is *controlled by, managed by and under the responsibility of* an economic agent. If the latter is the case, the natural growth is considered as value of output. If this is not the case, only the goods produced by catching the fish, felling the trees, or picking berries, etc. are recorded as output.

9. More specifically, when defining the general production boundary, paragraph 6.24 of the 2008 SNA states the following: *“Economic production may be defined as an activity carried out under the control and responsibility of an institutional unit that uses inputs of labour, capital, and goods and services to produce outputs of goods or services. ... A purely natural process without any human involvement or direction is not production in an economic sense. For example, the unmanaged growth of fish stocks in international waters is not production, whereas the activity of fish farming is production”*. In further specifying the production boundary for agriculture, forestry and fishing, paragraph 6.136 of the 2008 SNA states that *“... the growth and regeneration of crops, trees, livestock or fish which are controlled by, managed by and under the responsibility of institutional units constitute a process of production in an economic sense”*.

10. When one looks for further precisions of the above control and management, paragraph 1.43 is quite informative, in stating that *“... the natural growth of stocks of fish in the high seas **not subject to international quotas** (bold inserted by the author) is not counted as production: the process is not managed by any institutional unit and the fish do not belong to any institutional unit”*. This can be interpreted as if the presence of international quotas is to be regarded as a sufficient condition for the natural growth to be considered as part of the production boundary, while in the case of truly open access to fish in international waters only the catching of fish enters the production boundary. The latter interpretation considering the presence, or not, of international quota, also makes one wonder about the recording of uncultivated forests, which are often under some form of control by the national government and cannot be used for e.g. wood production without an explicit permission provided by government.

11. Paragraph 10.182 of the 2008 SNA states the following in the context of non-cultivated resources: *“Examples are virgin forests and fisheries within the territory of the country. Only those resources that are currently, or are likely soon to be, exploitable for economic purposes should be included”*. Combining this with paragraph 1.43, one could argue that, in the case of fisheries, this only relates to those fisheries for which there is no quota regime, otherwise they would qualify as cultivated resources. Applying a similar line of reasoning for forests, the following definition of a virgin forest may be relevant: *“an old-growth forest — also termed primary forest, virgin forest, primeval forest, late seral forest, or forest primeval — is a forest that has attained great age without significant disturbance and thereby exhibits unique ecological features and might be classified as a climax community”*. The Amazon rainforest qualifies as such. On the other hand, in Europe, less than 3% would qualify as such. The question then arises whether the other forests should be categorised as cultivated biological resources.

12. Biota which qualify as produced assets are further distinguished into fixed assets and inventories. In this respect, paragraph 6.138 of the 2008 SNA states that “... *some plants and many animals take some years to reach maturity. In this case, the increase in their value is shown as output and treated as increases in fixed capital or inventories, depending on whether it concerns plant or animals that yield repeat products or not*”.² A good example regarding this latter distinction between fixed capital and inventories concerns fruit trees versus trees grown for one-off wood production. The growth of fruit trees is to be considered as gross fixed capital formation, and the use of these trees in the production of fruits is to be recorded as depreciation, while the growth of trees for wood production is to be recorded as positive changes in inventories, the felling of which is to be accounted for as negative changes in inventories.

13. Another consideration in the context of the SNA concerns the time of recording of output. In the case the growth and harvesting of e.g. crops take place in the same year, the output value can be put on a par with the value of the harvested products, resulting in a similar treatment of cultivated and non-cultivated biological resources. If however the resources take several years to reach maturity, the allocation of output over time may differ. In the case of cultivated assets, the natural growth will be recorded, while in the case of non-cultivated assets, output will only be recorded at the time of actual use, i.e. when felling the trees, catching the fish, etc. One could thus argue that the difference in recording output for cultivated and non-cultivated biological resources is a matter of timing. However, one also has to take into account that for some non-cultivated resources the whole idea may be to only use part of the natural growth in production, as a consequence of which there may be a significant difference between the growth of the resources and the actual use of these resources in production, also over longer periods of time.

14. Finally, it should be noted that the recording and valuation of permits for the use of natural resources, e.g. fishing quota, may have a direct impact on the recording and valuation of natural resources. Paragraph 10.191 of the 2008 SNA states the following: “*Permits to use natural resources are third-party property rights relating to natural resources. An example is where a person holds a fishing quota and he is able, again both legally and practically, to sell this to another person*”. More details are provided in chapter 17 of the 2008 SNA; see paragraph 17.313 – 17.343. It goes too far to spell out all the details in this guidance note, but paragraph 17.334 further exemplifies the case of fishing quotas: “*Fishing quotas may be allocated in perpetuity or for extended periods to particular institutional units, for example, where fishing is an established way of life and there may be little alternative economic employment. In such circumstances the quotas may be transferable and if so, there may be a well developed market in them. Fishing quotas may therefore be considered as permits to use a natural resource that are transferable. They are thus assets in the SNA*”. However, it should be noted that recording a positive value for these permits should have a direct and equivalent impact on the value of the underlying natural resources, otherwise a double counting of the value of the relevant resource would result. Paragraph 17.315 states in relation to these permits, somewhat cryptic, that it “... *leads to the creation of an asset for the user, distinct from the resource itself but where the value of the resource and the asset allowing use of it are linked*”.

Accounting for biological resources: guidance from SEEA CF

15. As expected, SEEA CF provides much more detailed guidance on the accounting for biological resources. Here, it should be noted upfront that the asset boundary in physical terms according to SEEA is different from the 2008 SNA. However, in monetary terms the asset boundaries, including the

² Note that this distinction implicitly leads to a difference between the 2008 SNA and SEEA CF in the classification of cultivated biological resources. Whereas both international standards make a distinction between cultivated and non-cultivated resources, the 2008 SNA only considers those biota that yield repeat products as cultivated resources, while the other biota are recorded under inventories.

delineation between cultivated versus non-cultivated resources (and therefore also the production boundaries), are supposed to be fully aligned. Here, the term “supposed” is used, because the wording is quite different, which may lead to differences in interpretation, and arguably to real differences beyond interpretation.

16. First of all, concerning the asset boundary, SEEA CF also refers to economic ownership and economic benefits. More precisely, paragraph 5.39 of SEEA CF states the following:

In physical terms, the scope of environmental assets measured in the Central Framework may be greater than the scope of environmental assets measured in monetary terms following the SNA definition of economic assets. This is because there is no requirement in physical terms that environmental assets must deliver economic benefits to an economic owner. For example, remote land and timber resources should be included within the scope of the environmental assets of a country even if they do not currently or are not expected to deliver benefits to an economic owner.

17. In paragraphs 5.346 – 5.347, paragraph 5.395, and paragraphs 5.398 – 5.400, this is further specified for timber resources and aquatic resources, as follows:

5.346 Timber resources may be found in a wide variety of places and may or may not be available to be felled and used as wood supply, i.e., to produce timber products or as fuelwood. Timber resources may not be available for wood supply due to the fact that the trees (i) are in areas in which logging operations are restricted or prohibited; (ii) are in areas that are inaccessible or remote and hence where logging is not economically viable; or (iii) do not, from a biological perspective, belong to a commercially useful species.

5.347 While the timber resources that are not available for wood supply do not have an economic value, these timber resources remain in scope of timber resources in the SEEA in physical terms, as they fulfil the definition of environmental assets and may provide benefits. However, since these timber resources do not have an economic value, they are not recorded in the asset accounts for timber resources in monetary terms. Consequently, the volume of these timber resources in physical terms should be clearly identified so that appropriate alignment can occur between asset accounts in physical and monetary terms.

5.395 Asset accounts for aquatic resources organize information on the stocks and changes in stocks of the quantity and value of aquatic resources within a country’s economic territory, including stocks within a country’s EEZ or on the high seas over which the country holds ownership rights. In principle, all aquatic resources are in scope of the asset accounts in the Central Framework; but in practice, the scope is limited to those aquatic resources that are subject to commercial activity. Asset accounts cover both cultivated aquatic resources and natural aquatic resources, thus enabling a comparison of trends in both resources.

5.398 The aquatic resources for a given country comprise those resources that are considered to live within the exclusive economic zone (EEZ) of a country throughout their life cycles, in both coastal and inland fisheries. Migrating and straddling fish stocks are considered to belong to a country during the period when those stocks inhabit its EEZ.

5.399 When exploitation control over migrating and straddling fish stocks, and fish stocks that complete their life cycle in international waters (high seas), has been established and the access rights of a country to them are defined in international agreements, that portion of agreed access rights to those aquatic resources can be considered to belong to the country.

5.400 In some cases, international agreements specify explicitly the share of total catches that should be allocated to each country. When this is the case, each country's share of the stock of the common aquatic resource can be determined on the same basis. In the absence of specific information about the share of the common aquatic resource, the catch realized by a given country can be used as an indicator of the country's share.

18. All of this is very much in line with the 2008 SNA, especially when it concerns the references to economic ownership and economic benefits. However, SEEA CF is much more precise and prescriptive in clarifying the interpretation of these general notions. For example, in the case of timber resources, the exclusions from the monetary asset boundary are very clearly outlined in paragraph 5.346. Also in the case of aquatic resources, SEEA CF provides very useful guidance on how to deal with fish in the exclusive economic zone and fish in international waters.

19. Also when it comes to the delineation between cultivated and non-cultivated biological resources, SEEA CF provides substantial guidance, as follows:

5.26 The cultivation of biological resources can take a wide range of forms. In some cases, the management activity is highly involved, which is the case for battery farming of chickens and the use of greenhouses for horticultural production. In these situations, the unit undertaking the production creates a controlled environment, distinct from the broader biological and physical environment.

5.27 In other cases, there may be relatively little active management as is the case, for example, with broad-acre cattle farming and the growing of plantation timber. In these cases, the biological resource is exposed constantly to, and interacts as a part of, the broader biological and physical environment. There are also situations in which the cultivation of various areas over hundreds of years has transformed the natural environment.

5.28 In practice, it may be difficult to distinguish between cultivated and natural biological resources. Relevant considerations in relation to timber resources and aquatic resources are presented in sections 5.8 and 5.9.

5.349 Timber resources are also found in other areas such as in orchards, rubber plantations, along roadsides and train tracks, and in city parks. Conceptually, the timber resources in all of these areas are also within the measurement scope of the SEEA. In practice, countries should determine the scope of their timber resource accounts based on the relative importance of the types of areas that provide timber resources. Timber resources from different types of areas should be clearly differentiated.

5.354 The treatment of timber resources as either cultivated or natural depends on the management practices applied to the areas in which timber resources are found. For timber resources to be classed as cultivated, the management practices must constitute a process of economic production. This is likely to include activities such as (a) control of regeneration, for example, seeding, planting of saplings, thinning of young stands; and (b) regular and frequent supervision of trees to remove weeds or parasites, or to attend to disease. The level of these types of activity should be significant relative to the value of the timber resources and should be directly connected with the growth of the timber resources in question.

5.355 In practice, a common initial basis for the determination of whether timber resources are cultivated or natural is the type of land on which the timber resources are found. For

example, for forest land, those timber resources within primary forests would generally be considered natural timber resources, whereas those timber resources in plantations would be generally considered cultivated timber resources.

5.356 However, the rules by which different areas of forest land are differentiated may not align neatly to the production boundary of the SEEA. For example, pursuant to applying the definitions of different forest land as presented in section 5.6.4: as soon as primary forest is logged for the first time, it becomes other naturally regenerated forest and hence falls into a category of forest land that is likely to be a mixture of land under active management and control, and land in which human intervention is relatively infrequent. Also, in some countries, there are large areas of planted forests that are not managed directly or frequently where the trees are left to grow until ready to harvest. These trees would be considered natural timber resources following the SEEA production boundary, even though the term “planted forests” may immediately suggest a high level of economic activity.

5.357 Given the potential for forestry management practices to vary considerably across and within countries, it is recommended that countries determine the status of their timber resources as either natural or cultivated based on application of the production boundary considerations listed above. This process is likely to require assessment by type of area in which timber resources are found, including forest land, other wooded land and other land with wood supply.

5.393 Aquatic resources are an important biological resource. They include fish, crustaceans, molluscs, shellfish and other aquatic organisms such as sponges and seaweed, as well as aquatic mammals such as whales. Aquatic resources are subject to harvest for commercial reasons as well as in the context of subsistence and recreational fishing activities.

5.394 In most parts of the world, fishing capacity has reached a level where unrestricted fishing will result in over-exploitation and lead to smaller catches and economic benefits than would be possible if the catch was managed in such a way as to prevent over-exploitation. In extreme cases, there is the risk of commercial extinction of some aquatic resources with attendant impacts on the aquatic ecosystem.

5.408 The production boundary includes all activities carried out under the responsibility, control and management of a resident institutional unit in which labour and assets are used to transform inputs of goods and services into outputs of other goods and services. In the case of aquatic resources, the growth of fish in fish farms and other aquaculture facilities is treated as a process of production.

5.409 Aquaculture is defined by FAO as follows: Aquaculture is the farming of aquatic organisms, including fish, molluscs, crustaceans and aquatic plants. Farming implies some form of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc. Farming also implies individual or corporate ownership of the stock being cultivated. For statistical purposes, aquatic organisms that are harvested by an individual or corporate body that has owned them throughout their rearing period contribute to aquaculture, while aquatic organisms that are exploitable by the public as a common property resource, with or without appropriate licences, are the harvest of the fisheries.

5.410 Following the FAO definition of aquaculture, all aquatic resources produced within aquaculture facilities are considered cultivated biological resources. All other aquatic resources

harvested as part of capture production processes are considered natural biological resources. In some cases, the life cycle of aquatic resources may start in an aquaculture establishment before transfer to the wild. In other cases, fish are captured in the wild for further growth in aquaculture facilities. Following standard methods, the proportion of growth in the wild and the proportion of growth in aquaculture facilities should be separated and classified appropriately.

20. Again, like in the case of the asset boundary, the general notions regarding the distinction between cultivated and non-cultivated resources seem to align very well, both referring to the level of management practices and active human involvement in the growth of the biological resources. There is one notable exception though. The 2008 SNA seems to suggest that the establishment of fishing quota is sufficient to classify the relevant aquatic resources as cultivated. One wonders whether this is simply a mistake in the 2008 SNA, or possibly an over-interpretation by the author of this note. Whatever the case, more clarity is needed here.

21. Furthermore, and once again, SEEA CF is much more precise and prescriptive in providing guidance for the distinction between cultivated and non-cultivated resources. Although it states, in paragraph 5.28, that “*in practice, it may be difficult to distinguish between cultivated and natural biological resources*”, in what follows for timber resources, in paragraph 5.349 and paragraphs 5.354 – 5.357, and for aquatic resources, in paragraphs 5.393 – 5.394 and paragraphs 5.408 – 5.410, one can derive a rather clear picture of what is targeted at when defining management practices. One may only wonder about the qualification, in paragraph 5.354, of the management activities being *significant* relative to the value of the timber resources. Whatever the case, a quite distant and relatively inactive type of management will not qualify the relevant resources as being managed. One could also make the point that, according to SEEA CF, the establishment of quota regimes for say fish in open seas does not constitute significant management activities.

22. Finally, SEEA CF also provides some guidance on the recording of quotas, especially in paragraphs 4.178 – 4.180, paragraphs 5.128 – 5.130, and paragraph 5.450, as follows:

4.178 Fishing quotas established by national and international agreement may be allocated in perpetuity or for extended periods to particular institutional units. In such circumstances, the quotas may be transferable and, if so, there may be a well-developed market for them. Fishing quotas may therefore be considered permits to use a natural resource that are transferable and in these situations, the quotas are considered assets in their own right.

4.179 Under an alternative regime, a permit is issued for a strictly limited period of time, less than a year, to a nominated institutional unit, often a non-resident. This is a common practice in some islands in the South Pacific, for example. In these cases, the revenue from the licences should be recorded as rent in the allocation of primary income account.

4.180 A licence granted to a household for recreational fishing is considered, by convention, as payment of a tax.

5.128 The access price method is based on the fact that access to resources may be controlled through the purchase of licences and quotas, as is commonly observed in the forestry and fishing industries. When these resource access rights are freely traded, it is possible to estimate the value of the relevant environmental asset from the market prices of the rights. The economic logic parallels the residual value method, since it is expected that, in a free market, the value of the rights should be equivalent to the future returns from the environmental asset (after deducting all costs, including user costs of produced assets).

5.129 *Where the resource access rights that are purchased provide a very long term or indefinite access to the assets, the market value of the rights should provide a direct estimate of the total value of the asset rather than simply an estimate of the resource rent. In this case, no discounting of future flows of resource rent is needed. If the rights are for a more limited period (e.g., for one year in the case of entitlements), this can provide a direct estimate of the resource rent for that period.*

5.130 *In practice, in many cases governments may give the access rights direct to extractors for free or do so at a price that is less than the true market value. Further, trading of the rights may be restricted or prohibited. In these cases, there is no directly observable market valuation.*

5.450 *In theory, the value of the quota represents the NPV of the owner's expected income using the quota over its period of validity. If the aquatic resource is managed with such quotas and the quotas are valid in perpetuity, then the value of all quotas, at the market price, should be equal to the value of the aquatic resource.*

23. This guidance is very much in line with the 2008 SNA. As in the latter standards, the asset boundary for quota permits are restricted to tradable ones. However, paragraph 5.130 of the SEEA CF is slightly cryptic, in the sense that it seems to suggest that non-tradable access rights, or rights whose trading is restricted, may have a non-zero value as well, the only problem being that there is no directly observable market price. Whatever the case, it is clear that limitations in the provision of access rights will lead to a positive asset value, as one may expect that the restricted access will result in a positive resource rent. In this case, however, one could argue, that similar to the case of mineral and energy resources, (the resource rent from) the underlying biological resource may be split between the legal owner and the extractor. Or, if the access rights are provided for free by government, that the biological resources are fully transferred to the extractor.

Accounting for biological resources: other guidance

24. When it comes to the distinction between cultivated and non-cultivated resources, Eurostat (2002a) on accounting for forests further clarifies “direct control, responsibility and management” as seeding and planting, thinning and other kinds of forest management. However, it goes on with stating that “... forest management in Europe represents a continuum from intensely managed to totally undisturbed, and a clear-cut division into a cultivated and a non-cultivated category will always be difficult. Often, the data that would be needed to separate the stocks and related flows are not available. It was therefore decided not to distinguish between cultivated and non-cultivated timber”. Furthermore, “... inaccessible or low-productivity forests will usually not be managed intensively, and should be classified as not available for wood supply and thus non-cultivated”.

25. Eurostat and OECD (2017), with reference to Eurostat (2002b), suggests the following breakdown of forests:

- forests available for wood supply, cultivated;
- forests available for wood supply, not cultivated;
- forests not available for wood supply, related to legal restrictions;
- forests not available for wood supply, not related to legal restrictions.

26. The first category would qualify as “... cultivated for economic exploitation; they are managed and controlled by an institutional unit. Regular human intervention takes place”, to be recorded as a produced asset, under inventories. The second category concerns “... forests that are in principle

available for wood supply, but that are not harvested in practice. It concerns natural forests in which for many years no human intervention has taken place". The third category "... concern forests areas where forestry for wood production is forbidden by legislation or other official measures. This can be the case for strict nature reserves, national parks or wilderness areas". Finally, the fourth category "... contains non-protected forests that are, however, not suited for wood supply for economic reasons. Reasons might be that the physical productivity is too low or harvesting and transportations costs are too high to warrant regular wood harvesting. Examples could be mountain forests and swamps".

27. It is then noted that all forests from the second, third and fourth category are to be recorded as non-cultivated biological resources³, because "... the natural growth of the trees is not managed and controlled by an institutional unit and therefore does not generate output". Natural growth and harvesting should be recorded as economic (dis)appearance of non-produced assets.

28. More generally, it is (again) noted that "in most European countries almost all the forests are considered as cultivated as they are managed by public or private institutional units. Only the protected areas and the forests not exploitable from a technical or an economic-convenience point of view are excluded from cultivated forests".

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³ One could argue that the third and fourth category do not qualify as an (economic) asset according to the 2008 SNA.

3. Options considered

29. As noted at the start of the previous section, naturally occurring assets in the form of biota (trees, vegetation, animals, birds, fish, etc.) can be distinguished into three categories:

- resources which are controlled by, managed by and under the responsibility of an economic agent, to be treated as produced assets, i.e. cultivated biological resources (or inventories);
- resources which are ‘owned’ by an economic agent who can derive economic benefits from them, but which controlled and managed at hardly any, or very low levels of, engagement, to be treated as non-produced assets, i.e. non-cultivated biological resources;
- other resources, not meeting the criteria for being considered an asset, at least in monetary terms, in the 2008 SNA and the SEEA CF respectively.

30. There are a couple of issues to be considered. The first one concerns the delineation of biological resources as an asset or not. The second one relates to the delineation between cultivated and non-cultivated biological resources. Thirdly, attention needs to be paid to the actual recording of biological resources, including the treatment of permits to use these resources. Finally, a more generic issue is put on the table, i.e. whether the difference in recording of income from produced assets (output) versus income from non-produced assets (rent) is still justified.

Issues related to the general asset boundary for biological resources

31. In the context of the SNA, an asset is only recognised if it concerns “*a store of value representing a benefit or series of benefits accruing to the economic owner by holding or using the entity over a period of time*”. As noted in the above, ownership may also include, for example, collective ownership by groups of units or by governments on behalf of entire communities. However, if for some reason no economic benefits can be derived from them, they do not qualify as an asset in the SNA. The SEEA CF applies the same valuation principles, but in physical terms natural resources from which no economic benefits can be derived in the foreseeable future, would still qualify as part of the (physical) asset boundary.

32. One could thus distinguish two basic options in defining the asset boundary of biological resources in the context of the SNA:

- Record known biological resources which are ‘owned’ in one way or another, both individually and collectively, always as an asset. This would also include resources with zero monetary benefits in the foreseeable future, but these resources would then be recorded with a value of zero.
- Make a distinction between biological resources that qualify versus those that do not qualify as an asset, but apply more strict criteria for the delineation of the latter category, such as the criteria applied in Eurostat and OECD (2017)⁴. Alternatively, one could simply disqualify all resources as being part of the asset boundary, if they have a value of zero, which is in line with the 2008 SNA⁵.

33. The first option has the advantage of a full alignment of the asset boundary in the SNA and the SEEA CF, also in physical terms. It would also provide a neater alignment with the accounting for ecosystems, by including those resources which may provide all kinds of ecosystem services without a monetary payment being involved. A possible extension, in extended accounts, of a full accounting for ecosystems would thus require less adaptation. Natural parks, for example, may not have a monetary value derived from potential provisioning services, simply because of legal restrictions to

⁴ I.e. biological resources do not qualify as assets, if they are not able to provide monetary benefits because of legal restrictions and/or very strictly applied economic reasons (impossibility in the foreseeable future to derive a positive economic return from the resources).

⁵ This alternative is more restrictive, because in the definition of Eurostat and OECD (2017) one could still imagine including resources which currently have a value of zero, but which may potentially provide economic benefits in the future.

use trees for wood production, but from an ecosystem services' perspective, they may provide substantial benefits in the form of e.g. recreational services or carbon sequestration services. Another advantage of the first option is that it allows for a more appropriate recording of resources switching from having a zero value to becoming a monetary asset. In physical terms, it can be recorded as a reclassification, instead an *economic appearance* of an asset.

34. On the other hand, it is also clear that the first option would go against the general definition of an asset in the SNA, which in addition to ownership also requires the existence of a store of value representing a benefit or series of benefits by holding or using the entity over a period of time. One could argue though that the current value of the asset being zero does not preclude the value from becoming non-zero in the future. Furthermore, in practice, a broader definition of physical assets would not matter that much, as it actually would not make any difference for compiling monetary stocks of biological resources. In addition, it can be argued that almost all biological resources do have some monetary value, albeit at very marginal levels, because people can derive minor economic benefits, in line with the production boundary of the SNA, from them. This could relate to, for example, picking berries and recreational fishing.

Distinction between cultivated and non-cultivated biological resources

35. The distinction between cultivated and non-cultivated biological resources matters a lot when it comes to the recording of (the use of) these assets in the system of national accounts. Whereas in the case of cultivated assets, output is equivalent to the natural growth of the resources, in the case of non-cultivated assets, output is only recorded when, for example, the trees are felled for wood production or the fish is being caught. Furthermore, cultivated assets are considered as inventories (resources yielding one-off products) or fixed assets (resources yielding repeat products), while non-cultivated assets are recorded as non-produced non-financial assets. The capital use of cultivated resources yielding repeat products thus gives rise to depreciation or consumption of fixed capital, while the degradation of non-produced assets is accounted for as an other change in the volume of assets. Yet another difference concerns the leasing of the relevant assets: provision of services in the case of cultivated assets versus rent on natural resources in the case of non-cultivated assets.

36. When taking the current SNA as a starting point, there basically are two options for the delineation between cultivated and non-cultivated biological resources, depending on how to interpret the significance of management practices, i.e. when to consider the level of these types of activity as being significant relative to the value of the resources:

- A strict application of the significance of management practices, in which case the biological resources are only considered as cultivated if they are more or less fully managed. In this case, very intensive human intervention would qualify the relevant resources as produced assets. In the case of timber resources, only plantations would then be considered as produced assets, while in the case of aquatic resources only fish farming would qualify as such. All other biological resources, for which management levels are relatively minor, would be recorded as non-produced assets.
- The alternative is to record all biological resources as produced assets. Here it is assumed that the relevant resources do provide some benefits and that they are, implicitly or explicitly, under some form of control by economic agents, either individually or collectively, i.e. that they qualify as produced assets.

37. Both options have their advantages and disadvantages. One important point concerns the clarity of the guidance. Using the first option, one definitely needs adequate phrasing which avoids issues of delineation where one can observe a continuum from intensely managed to totally

undisturbed, such as the example of European forests. This clarity can only be achieved in the case of a very strict interpretation, such as the one explained in the above.

38. An advantage of the second option is that it aligns much better to the notion of ecosystem services, for which natural growth is the logical starting point. On the other hand, it is quite problematic to look upon growth of fish in open waters, even if controlled by quota regimes, or the growth of timber in natural forests, as a human-induced activity. It is first and foremost nature that provides the “input” into the process of growth.

39. In respect of the second option, one could also take the continuum from intensely managed to totally undisturbed as a starting point for the recording of biological resources. From this perspective, the most straightforward interpretation would be that the distinction between cultivated and non-cultivated ceases to exist, as ecologically speaking all biological resources are impacted by human activity (directly or indirectly) and have become ‘produced’. Within this produced class it is however meaningful to distinguish the degree of human input versus natural inputs.⁶ The latter could be materialised by measuring output, and – in the case of resources yielding one-off products which is most relevant in this discussion – the growth in inventories, as the percentage of natural growth that is expected to be exploited in the foreseeable. This would come down to an accrual accounting of production which currently is recorded at the time of removing the biological resources from nature.

40. Yet another option would be to use ownership as the distinguishing feature, rather than fully managed versus marginally managed. If a corporation owns land and essentially just lets the trees grow over time without any intervention, the fact remains that the company is still managing the resource. This could be considered as cultivated. Biological resources which are collectively owned would then qualify as non-cultivated assets.⁷

41. From a conceptual point of view, the option presented in paragraph 39 in the above looks most appropriate. It reflects economic reality, and leads to an accrual accounting of all natural growth that at some stage will result in output of products derived from biological resources. It also acknowledges the fact that these products are the results of a combination of human activity and natural inputs. Finally, as noted before, it better aligns to the accounting for ecosystem services and assets.

42. From a measurement perspective, the first option seems to be the most straightforward one. This may not be true for very cultivated regions like Europe, but measurement of natural growth in other regions of the world will be much more problematic. In a certain way, the conceptually preferable option holds the middle ground. It however requires an estimate of the expected future exploitation, which then needs to be allocated to the years in which the natural growth has contributed to this exploitation.

The recording of biological resources and the treatment of permits to use them

43. The third point of reflection concerns the recording of (quota) permits to exploit biological resources. This mainly relates to non-cultivated resources, as (negatively) defined under the first option. The guidance in both the 2008 SNA and the SEEA CF is not always that clear and transparent.

⁶ With thanks to Bram Edens for his valuable comments in this regard.

⁷ With thanks to Jim Tebrake for his valuable comments in this regard.

More clarification is therefore warranted. As spelled out in SEEA CF, the following main modalities can be distinguished⁸:

- licenses and permits for a limited period of time, generally less than one year;
- licenses and permits for a very long term or indefinite access to the resources:
 - provided against a monetary payment; or
 - provided for free.

44. The first case is relatively simple and straightforward. The payment for such a time limited license or permit is considered as a form of primary income, more precisely as rent on natural resources, at least according to the current international standards⁹. As noted by the SEEA CF, when these licenses and permits are freely traded, the payments could be used as a proxy for the resource rent of the relevant biological resources, assuming that in a free and competitive market these payments will approximate the resource rent that can be captured from having access. The resource rent could subsequently be used as a starting point for valuing the underlying asset, when applying the net present value of the future stream of benefits as approximation of the market value of the asset.

45. In other cases, governments may give the resource access rights direct to the exploiters for a very long term or indefinite access to the assets¹⁰. This may be done at market prices¹¹, although in many cases governments give the rights for free, or do so at a price that is less than the true market value. In the latter cases, trading of the rights may be restricted or prohibited, as a consequence of which there is no directly observable market valuation.

46. As noted before, the actual recording of the related transactions and positions is not entirely clear. Take the example of government selling the permits at market prices. The 2008 SNA notes that the permits constitute assets in their own right. However, simply recording (the purchase of) the permits in the accounts of the exploiter would lead to a double counting of the resources involved, one time as biological resources in the accounts of government, and one time as permits in the accounts of the exploiter. However, implicitly it seems to be suggested that the total value of the permits and the underlying biological resources should not exceed the original value of the asset in question. If this is indeed the correct interpretation, then the value of the biological resources in the accounts of the government should be lowered with the value of the permits, which makes sense because (the future income from) the resources have been sold. However, this treatment is not considered as a preferable option, as the natural resources would (partly) disappear from the accounts. A more logical alternative is to consider the sale of permits as a sale of (part of) the biological resources from the government to the one who has received the permission to exploit the natural resource.

47. In addition, the 2008 SNA and SEEA CF could be further clarified when it comes to the recording and valuation of access rights provided for free or at prices which are below the market prices. Here it is proposed that the handing over of these access rights for free, or the part that is provided for free, is to be treated as a hand-over of the biological resources with a concomitant capital transfer to the exploiter. In the Annex, such a recording is presented in the form of T-accounts; see

⁸ Here, licence granted to households for recreational fishing are ignored for the time being. SEEA CF notes that these should be recorded, by convention, as payments taxes. However, this can only be true when they are granted by government. However, such licenses may also be granted by an individual economic agent, in which case they would qualify as either rent on natural resources or the provision of services.

⁹ One could also argue in favour of a treatment as a payment for the provision of services; see the discussion further below.

¹⁰ In some cases, there may be an outright sale of the asset in question. Such cases, including the criteria for treating it as a sale, are considered of less relevance for the discussion in this note.

¹¹ As noted in paragraph 5.129, this market value of the rights may provide a direct estimate of the total value of the asset.

example A. In the example, the natural resource asset represents a value of 750, with an annual resource rent of 45. Furthermore, it is assumed that government transfers the asset and the related resource rent to the exploiter for an annual payment of 30 (to be recorded as rent on natural resources). This basically means that the government is given up part of the future resource rents ($45 - 30 = 15$), which comes down to a free transfer of one third of the asset (i.e., $(15/45 * 750 = 250)$) to the exploiter. The latter is recorded in the capital account and the balance sheets as a disposal of assets by government with a concomitant capital transfer from government.¹²

48. The above recording is different from the guidance regarding the recording of mineral and energy resources, in which case the 2008 SNA clearly states that the resources should remain in the balance sheets of the legal owner, i.e. the government in most countries. However, it should be acknowledged here that, in the combined guidance note for issues EA.01 and EA.09, which deals with the recording of mineral and energy resources, it is proposed to apply a split-asset approach, which would nicely align to how the SNA is interpreted here when it comes to the treatment of biological resources. Although admittedly it is not fully clear how the transfer of part of the resource rent and the related value of the asset from the legal owner to the exploiter is to be recorded according to the 2008 SNA. Would the recording of a concomitant capital transfer be the most appropriate solution, or would one suffice with a recording of a “reclassification” in the other changes in the volume of assets account.

49. In assessing the pros and cons of the above recording biological resources, one also has to take into account how this approach work out in the case of recording depletion/degradation of the relevant assets, as proposed in the combined guidance note for issues EA.01 and EA.09. In the Annex, this has been elaborated in example B, which starts from the recording, as presented in example A. For more details, reference is made to the combined guidance note mentioned before.

50. All in all, it is proposed here to apply the split-asset approach, which is not only considered as the correct interpretation of the current standards, but which is also consistent with what has been proposed for mineral and energy resources.

Aligning the accounting for leasing produced and non-produced natural resources

51. Finally, it is questioned here whether the difference in accounting for leasing produced assets versus the accounting for leasing non-produced assets is a valid one. As noted before, the income generated through the use of produced natural resources, including the income derived from leasing the natural resources, is recorded as output, whereas the leasing of non-produced natural resources is accounted for as a form of primary income, i.e. rent on natural resources. This does not only relate to biological resources, but to all natural resources, thus including land and mineral and energy resources. Could one argue that also in the case of non-produced assets, the leasing is to be accounted for as a form of production of services, instead of a recording as primary income?

52. Paragraph 17.310 of the 2008 SNA states the following: “A resource lease is an agreement whereby the legal owner of a natural resource that the SNA treats as having an infinite life makes it available to a lessee in return for a regular payment recorded as property income and described as rent. The resource continues to be recorded on the balance sheet of the lessor even though it is used by the lessee. By convention, no decline in value of a natural resource is recorded in the SNA as a transaction similar to consumption of fixed capital”. The reason for treating the leasing of these assets as rent, instead of the provision of services seems to mainly relate to the point of these assets having

¹² Alternatively, one could have assumed a sale of the whole asset for the value of 500, with no future annual payments of rents. In this case, the whole asset value (750) would have been transferred against cash of 500 and a capital transfer of 250.

an infinite life, thus not contributing to a process of production in the form of depreciation or consumption of fixed capital.

53. An argument in favour of also recording the leasing of natural resources as a form of production is the rather technical argumentation, in the current SNA, of an 'infinite life' for recording this income as a rent. However, having a closer look at it, this actually only holds for land. It is unequivocally not true for mineral and energy reserves, while it may only hold for biological resources in the case of sustainable exploitation. The reasoning for mineral and energy resources seems to be a purely technical one, in the sense that depletion of resources is not considered as an input into the exploitation of the relevant resources, but is instead recorded as an *other change in the volume of assets*.

54. In the case of land, one can also make the point that the main part of land leasing, i.e. the leasing of land underlying dwellings and non-residential buildings, is implicitly recorded as part of output of housing services or rentals of offices. So, why not consider the remainder, mainly relating to rents on agricultural land, as output as well?

55. Furthermore, also in the case of other intellectual property products, such as licensing of e.g. software or the receipts of royalties for music originals, the process of generating income is not that different from leasing natural resources. The process of producing the original leads to the creation of a produced asset different the appearance of natural resources, but the subsequent process of generating income in the form of license fees and royalties is not that different from generating income from natural resources. Both require little labour input, in the form of checking the credentials of the client and administering the lease, in addition to the use of the underlying asset. Similarly, financial leasing generating output in the form of FISIM is not that different from leasing of natural resources.

56. Another argument is the growing role of data in the production of goods and services. Data, or more precisely observations, can hardly be seen as produced assets. Yet they may be exchanged on the market, and as such they may need to be recorded as sales and purchases of assets, without wanting them to be labelled as being produced assets. They are however being used in the production of goods and services. All of this is to say that the whole distinction between produced and non-produced assets becomes more and more blurred.

57. On the other hand, it should be noted that the alternative recording of natural resource leases as output will change the recording of transactions in relation to these resources quite dramatically. Governments renting out natural resources will become market producers. One also has to figure out how to account for leasing of e.g. mineral and energy resources, the income of which may be (partly) appropriated through joint ventures (equity income) and/or special tax arrangements. On the other hand, various changes in the recording of natural resources are already being proposed, e.g. the split-asset approach, including the accounting for depletion, as proposed in the combined guidance note for issues EA.01 and EA.09.

58. In the Annex, the treatment of leasing, as output/intermediate consumption, instead of receipts/payments of rent, is presented in example C. The example is using example B as a starting point. As becomes clear from example C, it leads to a much more logical way of recording, certainly when also accounting for the costs of depletion/degradation. Obviously, when this treatment would become the preferred option, it would equally apply for land and mineral and energy resources.

4. Recommended approach – conceptual aspects

59. First of all, this guidance note proposes to extend the asset boundary for biological resources, in line with SEEA CF. This comes down to an extension of the asset boundary in physical terms. It would not affect the boundary in monetary terms. All known biological resources which are ‘owned’ in one way or another, both individually and collectively, would be treated as an asset. It would thus also include resources with zero, or very marginal, monetary benefits in the foreseeable future, albeit that these resources would be recorded with a value of zero.

60. In relation to the issue of the distinction between cultivated and non-cultivated, it is proposed to take the continuum from intensely managed to totally undisturbed as a starting point for the recording of biological resources. The distinction would cease to exist, as ecologically speaking all biological resources are impacted by human activity (directly or indirectly) and become ‘produced’. Output would then be measured as the percentage of natural growth that is expected to be exploited in the foreseeable future. This comes down to an accrual accounting of production, which in the case of non-cultivated assets currently is recorded at the time of removing the biological resources from nature.

61. The only viable alternative for distinguishing cultivated from non-cultivated resources would be a very strict application of the significance of management practices, in which case the biological resources are only considered as cultivated if they are more or less fully managed. Very intensive human intervention would then only qualify assets as being produced, e.g. for timber resources only plantations would be considered as produced assets, while for aquatic resources only fish farming would qualify as such. All other biological resources, for which management levels are not that intensive, would be recorded as non-produced assets.

62. Regarding the recording of biological resources and the treatment of permits to use them, the question arises whether the interpretation of the 2008 SNA, as explained in paragraph 43 – 47, is correct. In addition, the above guidance also proposes to clarify the recording of the (partial) handing over of access rights for free. Here, it is proposed to treat such a handing over as a transfer of non-financial assets with a concomitant capital transfer. Whatever the case, it is argued that the current text of the SNA needs to be updated by providing much more explicit guidance.

63. In addition, it is proposed to reconsider the difference in treatment between leasing of produced assets (output) versus the leasing of non-produced natural resources (rent). It is recognised that this would constitute a major departure from the 2008 SNA. However, for the arguments mentioned in the relevant section of this guidance note, it is considered important to investigate this potential change in more detail.

64. Although not having been discussed in this guidance note, it is also proposed to reconsider the current classification of non-financial assets in the SNA balance sheets. Currently, prominence is given to the way in which the assets come into existence, i.e. whether they are produced or not produced. Produced assets are subsequently broken down into fixed assets, inventories, and valuables. The consequence of this hierarchy is a completely dispersed allocation of natural resources. Some will be part of fixed assets (cultivated biological resources which yield repeat products), some will be recorded as inventories (cultivated biological resources which yield one-off products), while the remainder will be classified as non-produced assets. Amongst others for reasons of a growing user interest into natural capital estimates, one may want to re-think the current hierarchy. This issue is however first and foremost part of guidance note EA.06.

5. Recommended approach – practical aspects

64. From a compilation point of view, the proposed changes to the 2008 SNA and SEEA CF do not give rise to major additional challenges, as compared to the current international standards, with the (possible) exception of two issues.

65. The first one concerns the proposal to treat all biological resources as being ‘produced’, as a consequence of which one would need to make, for assets which are currently considered as non-cultivated biological resources, an estimate of the part of annual growth that will lead to actual production in the foreseeable future. On the other hand, one should also acknowledge that the current treatment of some biological resources as cultivated may lead to an overestimation of production, at least from a purely economic perspective, in cases that one knows that some of the natural growth will never lead to future production of provisioning services.

66. Finally, although the proposals for recording the leasing of biological resources are considered to be further clarifications of the 2008 SNA and SEEA CF, some will look upon this differently. The main challenges from a compilation perspective may concern the estimation of the handing over of (part of) the biological resources for free as a capital transfer. The shares of future resource rents that are being appropriated by the legal owner and the exploiter may not always be that easy to establish. For further discussion of this problem, reference is made to paragraphs 50 and 51 in the combined guidance note for issues EA.01 and EA.09.

Annex: Recording of biological resources in the system of national accounts

This annex presents two examples for the recording of biological resources. In doing so, a simplified set of assumptions is made, as follows.

General information on the biological resources

1. Stock of natural resources (at T = 0)	750
2. Stock of natural resources (at T = 1)	705
3. Resource rent	45
4. Rents paid by the exploiter to government (= appropriation by government)	30
5. Appropriation of resource rent by the exploiter (= 3 – 4)	15
6. Depletion/degradation	45

Accounts of the exploiter:

1. Output	100
2. Compensation of employees	35
3. Consumption of fixed capital	20
4. Resource rent (= 1 – 2 – 3)	45
5. Rents paid to government	30
6. Stock of fixed assets (at T = 0)	200
7. Stock of fixed assets (at T = 1)	180
8. Cash flow (= 1 – 2 – 5)	35

Accounts of the legal owner (i.e., government):

1. Rents received from the exploiter	30
2. Cash flow (= 1)	30

As can be derived from the numbers in the above, for reasons of keeping the example simple, the return on capital, including natural resources, is set equal to zero. Furthermore, it shows that the legal owner appropriates 2/3 of the resource rent derived from exploiting the resources, while the exploiter appropriates 1/3 of the related resource rent.

In the elaboration of the recordings below, both the accounts of the extractor and those of the legal owner (i.e., government) are shown.

Example A

Allocation of biological resources to legal owner and exploiter, based on the share of returns (split-asset approach), recording depletion/degradation as an other change in the volume of assets

Accounts for the exploiter of natural resources

Production and generation of income account			
Compensation of employees	35	Output	100
Consumption of fixed capital	20		
Net operating surplus	45		

Distribution of income account			
Rent on natural resources	30	Net operating surplus	45
Net saving	15		

Capital account			
Acquisition of assets	250	Net saving	15
Consumption of fixed capital	-20	Net capital transfers received	250
Net lending/borrowing	35	Changes in NW due to saving and CT	265

Financial account			
Cash	35	Net lending/net borrowing	35

Other changes in the volume of assets account			
Depletion/Degradation of natural resources	-15	Changes in NW due to other changes in assets	-15

Balance sheet					
Cash	0	35	Net worth	200	450
Fixed assets	200	180			
Natural resources (or permits)	0	235			
Total	200	450	Total	200	450

Example A (continued)

Allocation of biological resources to legal owner and exploiter, based on the share of returns (split-asset approach), recording depletion/degradation as an other change in the volume of assets

Accounts for the government

Production and generation of income account			
Compensation of employees	0	Output	0
Consumption of fixed capital	0		
Net operating surplus	0		

Distribution of income account			
		Net operating surplus	0
		Rent on natural resources	30
Net saving	30		

Capital account			
Acquisition of assets	-250	Net saving	30
Consumption of fixed capital	0	Net capital transfers received	-250
Net lending/borrowing	30	Changes in NW due to saving and CT	-220

Financial account			
Cash	30	Net lending/net borrowing	30

Other changes in the volume of assets account			
Depletion/Degradation of natural resources	-30	Changes in NW due to other changes in assets	-30

Balance sheet					
Cash	0	30	Net worth	750	500
Fixed assets	0	0			
Natural resources	750	470			
Total	750	500	Total	750	500

Example B

Allocation of biological resources to legal owner and exploiter, based on the share of returns (split-asset approach), including accounting for depletion/degradation as a cost of production

Accounts for the exploiter of natural resources

Production and generation of income account			
Compensation of employees	35	Output	100
Consumption of fixed capital	20		
Depletion/degradation of natural resources	45		
Net operating surplus	0		

Distribution of income account			
Rent on natural resources	30	Net operating surplus	0
Depletion/degradation borne by government	-30		
Net saving	0		

Capital account			
Acquisition of assets	250	Net saving	0
Consumption of fixed capital	-20	Net capital transfers received	250
Depletion/degradation of natural resources	-15		
Net lending/borrowing	35	Changes in NW due to saving and CT	250

Financial account			
Cash	35	Net lending/net borrowing	35

Other changes in the volume of assets account			
Depletion/Degradation of natural resources	0	Changes in NW due to other changes in assets	0

Balance sheet					
Cash	0	35	Net worth	200	450
Fixed assets	200	180			
Natural resources (or permits)	0	235			
Total	200	450	Total	200	450

Example B (continued)

Allocation of biological resources to legal owner and exploiter, based on the share of returns (split-asset approach), including accounting for depletion/degradation as a cost of production

Accounts for the government

Production and generation of income account			
Compensation of employees	0	Output	0
Consumption of fixed capital	0		
Net operating surplus	0		

Distribution of income account			
		Net operating surplus	0
		Rent on natural resources	30
		Depletion/degradation borne by government	-30
Net saving	0		

Capital account			
Acquisition of assets	-250	Net saving	0
Consumption of fixed capital	0	Net capital transfers received	-250
Depletion/degradation of natural resources	-30		
Net lending/borrowing	30	Changes in NW due to saving and CT	-250

Financial account			
Cash	30	Net lending/net borrowing	30

Other changes in the volume of assets account			
Depletion/Degradation of natural resources	0	Changes in NW due to other changes in assets	0

Balance sheet					
Cash	0	30	Net worth	750	500
Fixed assets	0	0			
Natural resources	750	470			
Total	750	500	Total	750	500

Example C

Allocation of biological resources to legal owner and exploiter, based on the share of returns (split-asset approach), including accounting for depletion/degradation as a cost of production, and recording rent as output

Accounts for the exploiter of natural resources

Production and generation of income account		
Intermediate consumption	30	100
Compensation of employees	35	
Consumption of fixed capital	20	
Depletion/degradation of natural resources	15	
Net operating surplus	0	

Distribution of income account			
Rent on natural resources	0	Net operating surplus	0
Depletion/degradation borne by government	0		
Net saving	0		

Capital account			
Acquisition of assets	250	Net saving	0
Consumption of fixed capital	-20	Net capital transfers received	250
Depletion/degradation of natural resources	-15		
Net lending/borrowing	35	Changes in NW due to saving and CT	250

Financial account			
Cash	35	Net lending/net borrowing	35

Other changes in the volume of assets account			
Depletion/Degradation of natural resources	0	Changes in NW due to other changes in assets	0

Balance sheet					
Cash	0	35	Net worth	200	450
Fixed assets	200	180			
Natural resources (or permits)	0	235			
Total	200	450	Total	200	450

Example C (continued)

Allocation of biological resources to legal owner and exploiter, based on the share of returns (split-asset approach), including accounting for depletion/degradation as a cost of production, and recording rent as output

Accounts for the government

Production and generation of income account			
Compensation of employees	0	Output	30
Consumption of fixed capital	0		
Depletion/degradation of natural resources	30		
Net operating surplus	0		

Distribution of income account			
		Net operating surplus	0
Net saving	0		

Capital account			
Acquisition of assets	-250	Net saving	0
Consumption of fixed capital	0	Net capital transfers received	-250
Depletion/degradation of natural resources	-30		
Net lending/borrowing	30	Changes in NW due to saving and CT	-250

Financial account			
Cash	30	Net lending/net borrowing	30

Other changes in the volume of assets account			
Depletion/Degradation of natural resources	0	Changes in NW due to other changes in assets	0

Balance sheet					
Cash	0	30	Net worth	750	500
Fixed assets	0	0			
Natural resources	750	470			
Total	750	500	Total	750	500