LG/14/11

14th Meeting of the London Group on Environmental Accounting
Canberra, 27 – 30 April 2009

Classification of forests

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1. Introduction

For the SEEA physical forest asset accounts forest statistics compiled at national level for the FAO Global Forests Resources Assessment are the most important data source. These statistics are also used as a basis for national greenhouse gas inventories for land use, land use change and forestry according to the UN climate convention and the Kyoto protocol. Specification of national reporting tables for FRA 2010 including definitions and classifications has been published by the FAO in November 2007.

The purpose of this issue paper is to show, how current definitions, classifications and categories used in the FAO Global Forests Resources Assessment (FRA) fit with SEEA asset classification related to forests. The paper also briefly describes, how the FRA definitions and categories could be linked to SEEA standard for asset accounts on forests.

2. Classifications in the FAO Global Forest Resource Assessment 2010

The FAO requests countries to submit their country report for FRA 2010 according to a format of 17 reporting tables. Definitions of categories used in reporting are given, as well as specifications for units of reporting and reporting years and periods. For most of the tables reporting years are 1990, 2000, 2005 and 2010. The reporting tables are:

- T 1 Extent of forest and other wooded land
- T 2 Forest ownership and management rights
- T 3 Forest designation and management
- T 4 Forest characteristics
- T 5 Forest establishment and reforestation
- T 6 Growing stock
- T 7 Biomass stock
- T 8 Carbon stock
- T 9 Forest fires
- T 10 Other disturbances affecting forest health and vitality
- T 11 Wood removals and value of removals
- T 12 Non-wood forest products removals and value of removals
- T 13 Employment
- T 14 Policy and legal framework
- T 15 Institutional framework
- T 16 Education and research
- T 17 Public revenue collection and expenditure

In this paper, only Extent of forest and other wooded land, Forest designation and management, Forest characteristics, Forest establishment and reforestation, Growing stock, Biomass stock, Wood removals and Non-wood forest products removals are described. However, also information on Forest fires and Other disturbances affecting forest health and vitality are important for the SEEA asset accounts. Carbon stock is described in Issue paper 21.b. Carbon sequestration.

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Extent of forest and other wooded land

Information on the extent of Forest and Other wooded land is central for assessing the current state and monitoring trends of forest resources at national, regional and global scale. It is a key indicator in various international reporting processes, conventions and other instruments. Unit of reporting is 1000 hectares.

T1 Extent of forest and other wooded land

Forest	Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use.
Other wooded land	Land not classified as “Forest”, spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of 5-10 percent, or trees able to reach these thresholds in situ; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use.
Other land - Other land with tree cover (sub-category)	All land that is not classified as “Forest” or “Other wooded land”. Land classified as “Other land”, spanning more than 0.5 hectares with a canopy cover of more than 10 percent of trees able to reach a height of 5 meters at maturity.
Inland water bodies	Inland water bodies generally include major rivers, lakes and water reservoirs.

Forest designation and management

Designation and management describes how the forest is intended to be managed and used and relates to the common thematic areas of sustainable forest management. Several of the categories are directly related to information requirements of other international organisations and arrangements. Unit of reporting is 1000 hectares.

Primary designated function is defined as the primary function or management objective assigned to a management unit either by legal prescription, documented decision of the landowner/manager, or evidence provided by documented studies of forest management practices and customary use. In order to be considered primary, the designated function should be significantly more important than other functions. Protected areas are those especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means.

T3 Primary designated functions

Production	Forest area designated primarily for production of wood, fibre, bio-energy and/or non-wood forest products.
Protection of soil and water	Forest area designated primarily for protection of soil and water.
Conservation of biodiversity	Forest area designated primarily for conservation of biological diversity. Includes but is not limited to areas designated for biodiversity conservation within the protected areas.
Social services	Forest area designated primarily for social services.
Multiple use	Forest area designated primarily for more than one purpose and where none of these alone is considered as the predominant designated function.
Other	Forest areas designated primarily for a function other than production, protection, conservation, social services or multiple use.
No / unknown	No or unknown designation.

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Forest characteristics

Information on forest characteristics describe the extent and degree of human impact on the forest ecosystems. The categories represent a continuum from undisturbed primary forests to planted forests with introduced species. The categories are important for consolidating land use assessments and to monitor particular forest ecosystems. Unit of reporting is 1000 hectares.

T 4 Forest characteristics

Primary forest	Naturally regenerated forest of native species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed.
Other naturally regenerated forest	Naturally regenerated forest where there are clearly visible indications of human activities.
- of introduced species (sub-category)	Other naturally regenerated forest where the trees are predominantly of introduces species.
Planted forest	Forest predominantly composed of trees established through planting and/or deliberate seeding.
- of introduced species	Planted/seeded trees are predominantly of introduced species.

Naturally regenerated forest are predominantly composed of trees established through natural regeneration. Introduced species are those occurring outside their natural range and dispersal potential.

Growing stock

Information on growing stock is essential to understand the dynamics and productive capacity of Forest and Other wooded land in order to develop national policies and strategies for a sustainable use of the forest resources. Reported figures on growing stock refer to area classified as Forest and as Other wooded land. Total growing stock is divided into stocks of coniferous species and broadleaved species. Unit of reporting is million cubic meters over bark.

T 6 Growing stock

Growing stock	Volume over bark of all living trees more than X cm in diameter at breast height (or above buttress if these are higher). Includes the stem from ground level or stump height up to a top diameter of Y cm, and may also include branches to a minimum diameter of W cm.
Growing stock of commercial species	Growing stock (see def. above) of commercial species.

Biomass stock

Information on biomass stock is used to assess the amount of carbon that exists in the woody vegetation on Forest and Other wooded land. This information is directly linked to the international processes reporting on greenhouse gases and climate change. The information on biomass stock is also of interest from a wood energy point of view. Reported figures refer to area classified as Forest and as Other wooded land. Unit of reporting is Million metric tonnes (oven dry weight).

Categories and definitions used in FRA 2010 correspond to those established by the Intergovernmental Panel on Climate Change (IPCC). The biomass figures are generally derived from the growing stock figures reported in table T6 through biomass conversion and expansion factors, which expand growing stock to different biomass components such as branches, foliage and roots.

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T7 Biomass stock

Above-ground biomass	All living biomass above the soil including stem, stump, branches, bark, seeds, and foliage.
Below-ground biomass	All biomass of live roots. Fine roots of less than 2mm diameter are excluded because these often cannot be distinguished empirically from soil organic matter or litter.
Dead wood	All non-living woody biomass not contained in the litter, either standing, lying on the ground, or in the soil. Dead wood includes wood lying on the surface, dead roots, and stumps larger than or equal to 10 cm in diameter or any other diameter used by the country.

Wood removals and value of removals

Information on actual removal of wood from forest, other wooded land and other land, and the value of the removal indicate the economic and social utility of forest resources for national economy and dependent local communities. Units of reporting are 1000 m3 of roundwood (measured over bark) and Unit value (average value in local currency per m3 o.b. of roundwood). Reported figures refer to All land area.

T11 Wood removals and value of removals

Category	Definition
Industrial roundwood removals	The wood removed (volume of roundwood over bark) for production of goods and services other than energy production (woodfuel).
Woodfuel removals	The wood removed for energy production purposes, regardless whether for industrial, commercial or domestic use.

Non-wood forest products removals and value of removals

Information on removals and value of non-wood forest products (NWFP) demonstrates the potential of forests to provide NWFP, both as important commodities for national and international markets, and for the livelihood of local and indigenous people dependent on them. This information is important to show that NWFP will often deserve a higher priority in the development of national policies and forest management strategies.

Reporting table is focused on listing the ten most important non-wood forest products in order of importance (based on value) of the removals. If data are missing, countries are requested to provide expert estimates. For quantity of removals the unit must be number, weight or volume. Value of removals is 1000 local currency. Reported figures refer to Area classified as Forest in table T1.

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T 12 Non-wood forest products removals and value of removals

Non-wood forest product (NWFP)	Goods derived from forests that are tangible and physical objects of biological origin other than wood.
Value of NWFP removals	For the purpose of this table, value is defined as the market value at the site of collection or forest border.
NWFP categories	Plant products / raw material 1. Food 2. Fodder 3. Raw material for medicine and aromatic products 4. Raw material for colorants and dyes 5. Raw material for utensils, handicrafts & construction 6. Ornamental plants 7. Exudates 8. Other plant products
	Animal products / raw material 9. Living animals 10. Hides, skins and trophies 11. Wild honey and bee-wax 12. Wild meat 13. Raw material for medicine 14. Raw material for colorants 15. Other edible animal products 16. Other non-edible animal products

Forest establishment and reforestation

Information on forest establishment and reforestation is essential to monitor the progress towards sustainable forest management and the global objectives on forests of the United Nations Forum on Forests. Unit of reporting is hectares per year

T 5 Forest establishment and reforestation

Afforestation	Establishment of forest through planting and/or deliberate seeding on land that, until then, was not classified as forest.
Reforestation	Re-establishment of forest through planting and/or deliberate seeding on land classified as forest.
Natural expansion of forests	Expansion of forests through natural succession on land that, until then, was under another land use (e.g. forest succession on land previously used for agriculture).

3. FAO forest categories in the SEEA asset classification and asset accounts

For the SEEA asset accounts for forested land, timber and forest ecosystems the primary classifications of the FRA are Extent of forest and other wooded land, Forest designation and management, and Forest characteristics (Picture 3.1). The FRA Growing stock, Biomass stock, Wood removals, Non-wood products removals and Forest ownership can further be dissaggregated for the SEEA forest land-, timber- and ecosystems categories and for the FRA extent-, designation- and characteristics- categories.

Picture 3.1. FRA classifications primary to the SEEA asset accounts

FAO Global Forest Resources Assessment		
T1 'extent'	**T4 'characteristics'**	**T3 'designation'**
- Forest	- Primary Forest	- Production
- Other wooded land	- Other naturally regenerated forests	- Protection of soil and water
- Other land with tree cover	- Planted forest	- Conservation of biodiversity
		- Social services
		- Multiple use
		- Other or Unknown

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Forest according to the FRA classification equals to the category Forested land of the SEEA classification. Other wooded land of the FRA equals to the SEEA category Other wooded land. The FRA categories Other land and it's sub-category Other land with tree cover are outside the SEEA categories Forested land and Other wooded land.

Growing stock by the FRA means almost the same than Timber resources (Cultivated and Non-cultivated) of the SEEA. The total tree biomass can be derived from the growing stock figures through conversion factors, that expand growing stock of timber to other biomass components of wood.

In the current SEEA asset classification both Forest designation and management and Forest characteristics of the FRA have connections to the SEEA categories Timber resources, Forested land and Forest ecosystems. This is presented in the list below, where categories numbered (and bold) are SEEA asset categories, and the others are FRA categories.

EA.141 Timber resources
EA.1411 Cultivated
Timber in Other naturally regenerated forest
Timber in Planted forest
Timber in forest designated for Production
Timber in forest designated for Multiple use
EA.1422 Non-Cultivated
Timber in Primary forests
Timber in forest designated for Protection…
Timber in forest designated for Conservation…
Timber in forest designated for Social services…
EA.23 Wooded land and associated surface water
EA.231 Forested land (FRA category Forest)
EA.2311 Available for wood supply
Forest designated for Production
Forest designated for Multiple use
Primary forest
Other naturally regenerated forest
Planted forest
EA.2312 Not Available for wood supply
Forest designated for Protection…
Forest designated for Conservation…
Forest designated for Social services…
Primary forest
Other naturally regenerated forest
Planted forest (for Prot., Cons., Social categories.)
EA.232 Other wooded land (FRA category Other wooded land)
EA.313 Forest ecosystems
Forest
Other wooded land
Forest designated for Production
Forest designated for Multiple use
Forest designated for Protection
Forest designated for Conservation…
Forest designated for Social services…
Primary forest
Other naturally regenerated forest
Planted forest

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Most of the FRA categories have connections to several SEEA asset categories. The FRA categories are not directly useful as 'sub-categories' for the SEEA asset classification. However, it seems that it might be useful to replace the SEEA division between Available / Non-available for wood supply with division based on the FRA Forest designation and management categories, as presented below:

EA.231 Forested land

EA.2311 Primarily for production of forest products or multiple use
Other naturally regenerated forest
Planted forest
(Primary forest only exceptionally)

EA.2312 Primarily for protection, conservation and social services
Primary forest
Other naturally regenerated forest
Planted forest (for Prot., Cons., Social categories.)

For the SEEA physical asset accounts on forested land and timber most of the basic data needed is available from the FRA data or can be derived from that data. The main data sources of the FRA to the SEEA asset accounts are presented in picture 3.2. For example, Wood removals by the FRA fall into Decrease in timber stocks due to economic activity. Changes in forest area and timber stock between reporting years in the FRA can be used in estimating average annual increase or decrease of the stocks.

Picture 3.2. FRA as a data source for the SEEA forest asset account

SEEA asset account for forested land	**FRA as a data source**
Opening stock levels	T1 Forest area
Increases in stock	
Due to economic activity	T5 Forest establishment and reforestation; Afforestation
Due to regular natural process	T5 Forest establishment…;Natural expansion of forests
Decrease in stock	
Due to economic activity	T1 Forest area
Due to regular natural process	(T9 Forest fires, T10 Other disturbances)
Due to natural disaster (net decrease)	(T9 Forest fires, T10 Other disturbances)
Changes due to economic classifications	T1 Forest area, T3 F. designation and management
Closing stock levels	T1 Forest area
Changes in environmental quality	
Due to natural processes	
Due to economic activity	

SEEA asset account for timber	**FRA as a data source**
Opening stock levels	T6 Growing stock
Increases in stock	
Due to economic activity	T6 Growing stock, T4 F.characteristic (derived)
Due to regular natural process	T6 Growing stock, T4 F.characteristic (derived)
Decrease in stock	
Due to economic activity	T11 Removals of industrial roundwood and fuel wood
Due to regular natural process	
Due to natural disaster (net decrease)	T9 Forest fires, T10 Other disturbances
Changes due to economic classifications	T1 Forest area, T3 F. designation and management
Closing stock levels	T6 Growing stock
Changes in environmental quality	T9 Forest fires, T10 Other disturbances
Due to natural processes	
Due to economic activity	

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4. Some conclusions to be considered by the London Group

In the SEEA standard on physical asset accounts for forested land and timber, the total stocks and changes in stocks should, as far as possible, be dissaggregated at adaptable level by the FRA categories Forest designation and management and Forest characteristics (Production, Multiple use, Protection, Conservation, Social services, and Primary, Other naturally regenerated, Planted forests).

Physical timber asset accounts should be presented in cubic meters of roundwood (as in the FRA). If needed, this can be expanded to total tree biomass stock or carbon stock. In standard monetary timber asset accounts, value of timber refers to timber as raw material for industrial and other use and as fuel wood, and not to it's value in producing ecosystem services such as e.g. carbon binding.

The SEEA asset category **EA.231 Forested land** should be divided into:

EA.2311 Primarily for production of forest products or multiple use, and
EA.2312 Primarily for protection, conservation and social services.

This would be in line with the FRA, where division according to availability for wood supply is not used anymore.

The FRA framework and national statistics on forests and their use contain very remarkable amount of both economic and environmental information on forest assets. SEEA asset classification and accounts provide a framework, in which links between economic and environmental information can be made stronger than in the FRA or other forest statistics. For practical data availability reasons, the SEEA standard for forest asset accounts should use classifications, definitions and categories of the FRA always when it is possible with respect to general structure the SEEA asset classification and accounts.

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