

Biological diversity

Background paper to the Kotka V Expert Consultation

1 Introduction

‘Biological diversity’ encompasses the variety of existing life forms, the ecological roles they perform and the genetic diversity they contain. In forests, biological diversity allows species to adapt continuously to dynamically evolving environmental conditions, to maintain the potential for tree breeding and improvement (to meet human needs for goods and services and changing end-use requirements), and to support their ecosystem functions.

While timber production often dominated the way in which forests were managed in the twentieth century, new pressures in the twenty-first century drive a more balanced approach, calling for delivery of multiple goods and services. The process towards sustainable forest management is now considered consistent with the conservation of biological diversity.

Assessing, monitoring and reporting on biological diversity are important activities aimed at guiding sustainable forest management. Monitoring of biological diversity and of the changes caused by forestry practices is important in assessing the effectiveness of management and the cumulative changes brought about by forest use. However, there are conceptual and practical difficulties in doing so. These are not unique to biological diversity *per se*, but are general inventory problems related to target parameters that are complex and highly variable.

The values derived from biological diversity are associated with different scales that require different assessment methodologies. These include ecosystems, landscapes, species, populations, individuals and genes. Varying and complex interactions exist among all these levels.

Because biological diversity encompasses the complexity of all life forms, assessment and monitoring are only possible for specific aspects or particular, defined goals. There is no single, objective measure of biological diversity, only proxy measures appropriate for specified and, by necessity, restricted purposes. Species richness, for example, has a very wide natural variation from boreal to tropical forests. For policy and monitoring purposes, it is the change in biodiversity that is important, which implies identifying a few relevant indicators and then monitoring them over time. So far this has not been achieved for forest ecosystems on a wide scale (i.e. national or continental), but FRA 2005 attempted to establish a baseline for forest ecosystems worldwide, and to provide input into wider biodiversity monitoring work. Most local forest inventories are conducted to estimate harvestable volumes of wood and sometimes non-wood forest products, rather than to monitor biological diversity. An immediate need exists to categorize and substantially improve the understanding of biological diversity with a view to measuring trends, particularly on regional scales. In this respect, the work carried out in the framework of criteria and indicators processes, which all address biological diversity, is an important contribution.

This background paper contains an analysis of the variables used in FRA 2005 related to this theme, and some specific issues and proposed changes for FRA 2010 to be discussed by the Kotka V expert consultation.

The proposals presented in this document are based on the responses to the FRA 2005 evaluation questionnaire sent to all national correspondents, FAO staff, the FRA Advisory Group and representatives of forest related organisations and reporting processes (members of the Collaborative Partnership on Forests, criteria and indicator processes and environmental NGOs). Feedback received on the release of the Key Findings of FRA 2005 and the Main Report has also been included where relevant. The proposals have not been prioritised and are presented for discussion by working group participants.

2 FRA 2005 Variables

The variables measured in FRA 2005 with relevance to forest biological diversity include:

- area of primary forests;
- forest area designated for conservation of biodiversity;
- tree species composition of growing stock;
- number of native tree species;
- threatened forest tree species.

These variables include measures both of policy response (e.g. areas designated for conservation of biodiversity) and of outcome (e.g. number of threatened species). Both are needed, but the fundamental difference between these two concepts should be borne in mind.

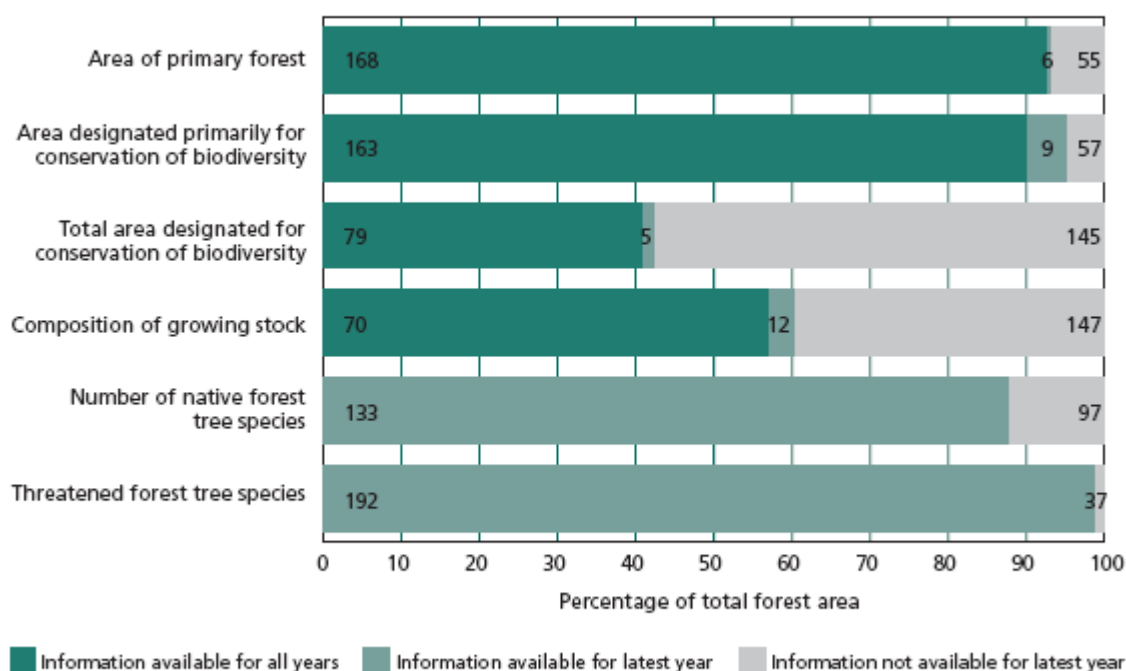
In recent years, the Global Forest Resources Assessments have increased their focus on forest biodiversity. FRA 2005 gathered and compiled relevant information at landscape and species levels, while addressing some structural and compositional aspects. At the ecosystem level, FRA 2005 provides information on the area of forests and – more specifically – on the area of primary forest and on forests designated for the conservation of biological diversity, thus complementing FRA 2000 data on the proportion of forests in protected areas. At the species level, FRA 2000 highlighted the global lack of estimates of the number of tree species by country, with the exception of endangered tree species. FRA 2005 thus focused on assessment of the number of both native and threatened forest tree species at the country level. In addition, country reports included lists of the ten most common tree species (measured by their share of total growing stock), thus providing important information on the tree species composition of forests.

2.1 Data Availability

Many countries lack the capacity to report on biological diversity. In particular, there is generally less knowledge with respect to biological diversity in tropical forests compared with the other biomes. In FRA 2005, countries were better able to report on the area of primary forest, on forest area designated for the conservation of biodiversity and on threatened tree species than on the other variables reported in this background document (Figure 1). However, these data alone are insufficient to provide a reliable picture of broader trends in forest biological diversity.

Figure 1

Information availability – biological diversity



Note: Figures present number of countries in each category.

2.2 Area of primary forest

This variable form part of the table on forest characteristics, and is therefore also dealt with in the background paper on forest characteristics.

Definition

Forest/other wooded land of native species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed.

Explanatory note: Includes areas where collection of NWFP occurs, provided the human impact is small. Some trees may have been removed.

Data availability

Of 229 countries and areas reporting, 174 reported on the characteristics of their forests. Their combined forest area is equivalent to 93 percent of the total forest area of the world. However, information on all five classes was not always readily available, because countries either did not collect information or used a different national classification system. Proxy values were often used, which made a detailed analysis of status and trends difficult. Information was unavailable for many of the countries in the Congo Basin, the second largest expanse of tropical forest.

Of the 180 countries providing information on the area of other wooded land, 114 provided information on the characteristics.

Data quality

Few countries have direct information on the area of primary forests. Most countries used the current area of forests in national parks and other protected areas as a proxy value or provided an expert estimate of the percentage of natural forests that could be considered primary according to the definition used for FRA 2005. The data on other wooded land and the change estimates for primary forest are weak.

Methodologies for data collection

Information on primary forest is rarely directly available and most countries used proxy values such as area of forest in protected area or area of forest over a certain age where no intervention had been made for a certain number of years.

Issues and suggestions for FRA 2010

- Delete category of other wooded land.
- Proposal for a thematic study for large countries with limited information to combine with proposed remote sensing component for FRA 2010, to address issues related to:
 - a) Assessment of area of primary forest
 - b) When area of primary forest is lost is it being converted to: modified natural or semi-natural forest, plantations, other land use (agriculture)?
 - c) Possible linkage with ecological domain and absence of transportation infrastructure such as: roads, railways and rivers.
 - d) Other linkages such as remoteness, altitude and protected status.

2.2 Area primarily designated for conservation of biodiversity and Total area designated for conservation of biodiversity

This variable form part of the reporting table on forest designation, and is therefore also dealt with in the background document on forest designation, management and use.

Link between variable used and the theme

This table is a complement to Extent of forests, as it further breaks down the areas according to their designated function. It relates to the common thematic areas of the Criteria and Indicator processes that was adopted as a reporting framework for FRA. The setting aside and management of land as protected areas is a key part of ongoing global efforts to conserve biological diversity. The amount of land set aside for conservation is an important indicator of progress, and the monitoring of this variable provides valuable information to conservation practitioners.

The primary global source of data is the World Database on Protected Areas (WDPA), which is managed by the World Conservation Monitoring Centre (WCMC) of the United Nations Environment Programme (UNEP) and funded by the WDPA Consortium. The WDPA and the analysis of the data it contains are useful in understanding global trends in protected areas.

FRA 1990 (FAO, 1993) presented data in a table entitled Distribution of protected areas. It documented the number of protected areas and the total area under protection in developing countries in Africa, Asia and Latin America and in developed countries in Asia, Europe, the former Union of Soviet Socialist Republics (USSR), North America and Oceania.

FRA 2000 presented regional and global data on forests in protected areas and on the proportion of forest in protected areas in tropical, subtropical, temperate and boreal zones. The estimate in FRA 2000 that 12.4 percent of total forest area was in protected areas was of obvious interest. The relatively low proportion of boreal forest in protected areas was also significant. These findings should be compared with the contemporary World Wide Fund for Nature (WWF)/IUCN goal of establishing an ecologically representative network of protected areas covering at least 10 percent of the world's forest area by the year 2000. For FRA 2005, information was requested from countries and areas on two measures of the area designated for conservation of biodiversity:

- forest area designated primarily for conservation of biodiversity;
- total forest area designated for conservation of biodiversity.

Areas designated for conservation of biodiversity, whether as the primary or a subsidiary function, include areas outside protected areas. At the same time, some forests in protected areas may be designated for the conservation of soil and water resources or a cultural heritage. So the estimated area of forest designated for conservation of biodiversity is not necessarily equivalent to the area of forest in protected areas.

Definitions used

Designated function: The function or purpose assigned to a piece of land either by legal prescriptions or by decision of the land owner/manager. It applies to land classified as forest or other wooded land.

Primary function: A designated function is considered to be primary when it is significantly more important than other functions. This includes areas that are legally or voluntarily set aside for specific purposes. The designation categories for total area with function are not exclusive. Hence, areas can be counted more than once, for example: areas with multiple purposes as primary function should be counted once for each specific function included in the multiple purposes; areas with a specific designated primary function should be counted more than once if other, less significant, functions have also been designated.

Total area with function: Total area where a specific function has been designated, regardless whether it is primary or not.

Conservation of biodiversity: Forest/Other wooded land designated for conservation of biological diversity.

Data availability

Primary function: Of 229 countries and areas reporting, 172 reported on the designation of their forests. Their combined forest area is equivalent to 95 percent of the total forest area of the world. However, information on all six classes was not always readily available, because countries either did not collect information or used a different national classification system. Proxy values were often used, which made a detailed analysis of status and trends difficult.

Issues and suggestions for FRA 2010

- Delete other wooded land (information availability/reliability a problem)
- Delete or modify reporting on total area designated for conservation of biodiversity. Many countries reported difficulties in extracting this information and even understanding the concept of total area with function...

2.3 Composition of growing stock

Link between variable used and the theme

The information of growing stock composition is important for understanding the dynamics of forests composition and addresses some critical issues relating to conservation of biodiversity.

Definition

List of ten most common tree species in terms of total growing stock (volume).

Data availability

Information on composition of growing stock was provided by 82 countries representing roughly 60 percent of the forest area. Out of the 82 countries 70 reported figures for both reporting years (1990 and 2000).

Data quality

The quality of the information is variable. A few countries with repeated national forest assessments have reliable information, but many countries do not have good inventory data to support growing stock composition estimates and changes over time.

Issues and suggestions for FRA 2010

- Few countries have comparable information over time for reporting on this variable, is it reasonable to collect information for more than one point in time? The variable has potential to tell us something about population dynamics, changes in abundance of most common species, but only if we have good inventories at regular intervals. Can indicate if introduced species are in top 10 and provides information about the composition of forests (many verses few species).
- Comparison or up scaling reported information to regional level not possible for individual species.
- Reporting by species groups? If so, which ones?
- It has been suggested to use area instead of volume as the unit of reporting for composition of growing stock.

2.4 Number of native forest tree species

Link between variable used and the theme

This variable aims at giving an indicator of the biodiversity of the country.

Definition

The total number of native tree species that have been identified with in the country.

Data availability

Information on number of native forest tree species was provided by 133 countries representing almost 90 percent of the forest area.

Issues and suggestions for FRA 2010

- Should naturalized introduced species be included? If so, what should the criteria be for inclusion?
- In terms of an indicator of biological diversity is this variable meaningful?

2.5 Threatened forest tree species

Definition

Number of native tree species that are classified by IUCN as threatened in the IUCN red list.

Data availability

Information was provided by 192 countries covering more than 98 percent of the forest area.

Issues and suggestions for FRA 2010

- Differences with national lists of threatened species and IUCN recorded in the reporting of 49 countries. Should reporting be based on national lists and requested from countries or should we (FAO) simply extract the information from the official IUCN list (in which case should IUCN be asked to divide the plant lists into trees/other plants?)
- Currently the reporting is focusing on ecosystem & species level. Nothing on genetic level.

3 Summary of proposals for FRA 2010

3.1 Deletions

- Delete category “Other wooded land” for the reporting on area of primary forest?
- Delete category “Other wooded land” for the reporting on area designated for conservation of biodiversity?

3.2 Additions

- Area of forest in protected area systems?
- Fragmentation of forests and intact forest landscapes?
- Forest genetic resources/diversity?

3.3 Changes

- Delete or modify reporting on total area designated for conservation of biodiversity. Many countries reported difficulties in extracting this information and even understanding the concept of total area with function...
- It has been suggested to use area instead of volume as the unit of reporting for composition of growing stock.
- Suggestion to report by species groups for composition of growing stock? If so, which ones?
- Should naturalized introduced species be included in number of native forest tree species? If so, what should the criteria be for inclusion?
- Differences with national lists of threatened species and IUCN recorded in the reporting of 49 countries. Should reporting be based on national lists and requested from countries or should we (FAO) simply extract the information from the official IUCN list (in which case should IUCN be asked to divide the plant lists into trees/other plants?)

3.4 Other considerations

Area of primary forest

- Proposal for a thematic study for large countries with limited information to combine with proposed remote sensing component for FRA 2010, to address issues related to:
 - a) Assessment of area of primary forest
 - b) When area of primary forest is lost is it being converted to: modified natural or semi-natural forest, plantations, other land use (agriculture)?
 - c) Possible linkage with ecological domain and absence of transportation infrastructure such as: roads, railways and rivers.
 - d) Other linkages such as remoteness, altitude and protected status.

Composition of growing stock

- Few countries have comparable information over time for reporting on this variable, is it reasonable to collect information for more than one point in time? The variable has potential to tell us something about population dynamics, changes in abundance of most common species, but only if we have good inventories at regular intervals. Can indicate if introduced species are in top 10 and provides information about the composition of forests (many verses few species).
- Comparison or up scaling reported information to regional level not possible for individual species.

Native forest tree species

- In terms of an indicator of biological diversity is this variable meaningful?

Threatened forest tree species

- Currently the reporting is focusing on ecosystem & species level. Nothing on genetic level

Linkages to other processes

- How can FRA best support the information requirements from CBD?
- Could information from other sources be used for getting the number of threatened TREE species (e.g. the WCMC tree database)