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HCV RESOURCE
NETWORK

Practical assessment and monitoring of forest biodiversity

Based on a manual produced by HCVRN and Proforest, with support from WWF

Responsible land managers want a clear understanding of the forest biodiversity on their lands for many reasons. Many sustainability standards require assessments of forest biodiversity, for example to identify High Conservation Values (HCVs) and set aside areas for conservation or special management. An assessment of forest biodiversity values, may be useful to:

- inform management operations and identify areas to protect, or manage differently
- provide a baseline from which changes in forest biodiversity can be monitored over time
- help prioritise set aside areas
- inform outreach and communication, providing a basis for discussion about which habitats are important for biodiversity
- measure improvements in biodiversity resulting from management and restoration.

Yet comprehensive forest biodiversity assessments are challenging, even for large, well-resourced organisations. Ideally, such inventories address not only the large, visible animal and plant species, but also invertebrates, fungi, mosses and lichens. Assessing and monitoring forest biodiversity is an even bigger challenge for smallholders, communities and medium-sized land holdings.



Key points

- Forest Integrity Assessment is a simple, accessible way to evaluate forests' naturalness and, by proxy, their level of biodiversity.
- Non-specialists, such as communities, smallholders and company staff, can do the assessments, following basic training.
- The mean integrity scores from different years can be compared to monitor change in forest integrity and, by proxy, their biodiversity over time.
- It is accurate (and fun!) and has good alignment with more scientific assessment parameters.

What are forest integrity assessments?

The Forest Integrity Assessment (FIA) tool is a simple and user-friendly checklist approach designed to allow land managers and other non-biologists to carry out quick and effective estimates of forest biodiversity levels. Forest integrity refers to the 'level of naturalness of a forest'. The Forest Integrity Assessment therefore compares an actual site with an 'undisturbed' natural reference forest.

Rather than carrying out species surveys as a measure of biodiversity, forest integrity assessment focuses on habitats as indirect proxies for biodiversity. Natural forest types that have not been substantially affected by human activities provide a reference point for 'integrity'. Using a simple checklist, companies, smallholders and community members can assess larger forest areas or remnant forest patches interspersed in an agricultural landscape.

The assessment evaluates the extent to which these forest areas have the characteristics of the natural forest types, and from that can infer the level of biodiversity they are likely to support.

Forest integrity assessments can thus be used for:

- self or participatory assessment and monitoring over time of forest conditions for biodiversity in managed forests, HCV areas or set-aside reserves
- guiding responsible forest management and forest restoration, by identifying forest elements that are missing, and which managers could help to recreate
- raising awareness and educating non-biologists about forest conditions that are important for biodiversity.

How is forest integrity assessed?

FIA uses a checklist to guide people through the process. The checklist needs to be adapted for the forest type where it will be used, so that the indicators are appropriate and relevant. Checklists have been developed and adapted for a number of forest types (see Table 1).

Adapting the checklist is most effectively done by a team including a forester or forest ecologist, a botanist and a zoologist. It takes 3–4 days, including field visits.

The checklist fits on a single sheet of paper and has four sections covering: (i) structure and composition; (ii) impacts and threats; (iii) focal habitats; and (iv) focal species.

For (i) and (ii), questions are formulated to require yes/no answers. The number of 'yes' answers is tallied at the end to provide the plot score.

1. Structure and composition

This section compares the structural characteristics of the forest with a reference 'natural forest'.

It looks at characteristics such as the:

- number of large trees and trees known to be important for biodiversity
- presence of regeneration
- presence of coarse woody debris or 'deadwood'
- other elements specific to that forest type, such as the presence of lichen or anthills.

Table 1: Forest types for which checklists have been developed

	Date developed
Scandinavian boreal and temperate forests	1990s
Southeast African dry Miombo forests	2005
US (Northwest and Southeast) FSC temperate moist and dry forests	2012
Malaysian moist tropical forests	2013
Panamanian FSC moist tropical forests	2014
Chilean temperate forests	2014
Cambodian and Lao FSC moist and dry tropical forests	2015

2. Impacts and threats

This section looks at human pressures on the forest, on the assumption that human impacts generally, but not always, reduce naturalness and diversity. Adaptation to the local context is very important here.

This section assesses issues such as the:

- presence of trees of high commercial or local value
- visibility below the canopy, and lack of undergrowth (which is favoured by disturbance)
- presence of invasive species
- evidence of fires, illegal hunting, poisoning, capturing or collecting
- logging and forest clearance for permanent agriculture
- accessibility by vehicles, motorbikes and boats.

3. Focal habitats

Some sites in forests are especially important for biodiversity – for shelter, feeding or reproduction. These habitats should be managed and protected

to maintain their character. The checklist helps to identify them and provides the basis for developing management plans and standard operating procedures to protect them.

They include areas such as:

- wetlands, springs, lakes, streams and rivers
- bogs, peatlands, marshes and fens
- steep slopes, cliff and ravines
- open heath and meadows mixed with forest.

4. Focal species

For each local checklist, the regional adaptation team selects a shortlist of species of regional conservation concern. This is usually a subset of national protected or IUCN-classified Rare, Threatened or Endangered species. These species are mainly included to support outreach and awareness-raising about biodiversity conservation in the area. It also provides a basis for land managers to record observations of these species during other activities, to build up a picture of them over time.

How are the checklists used?

Working in pairs or small teams, the checklists are used to evaluate one or more sample plots. Assessors generally need 1–2 days of training to generate consistent results. Assessors may be members of the local community or smallholders or company staff. Using the same team of people year after year makes the results more consistent and reduces the need to train new assessors.

In small forest patches and woodlots, a single plot may be sufficient. The upper size limit for the single field form approach varies with the character of the forest, from about 0.5 ha of very heterogeneous forest up to perhaps 5 ha of homogeneous forest with good visibility. In larger forests, several sampling plots are needed. Randomly selecting their location is ideal statistically, but difficult and slow in practice. Line transects are more commonly used. The assessors walk in a straight line, and stop every 300–1000m to survey a 100m long stretch of the line. Each plot is scored on a separate checklist.

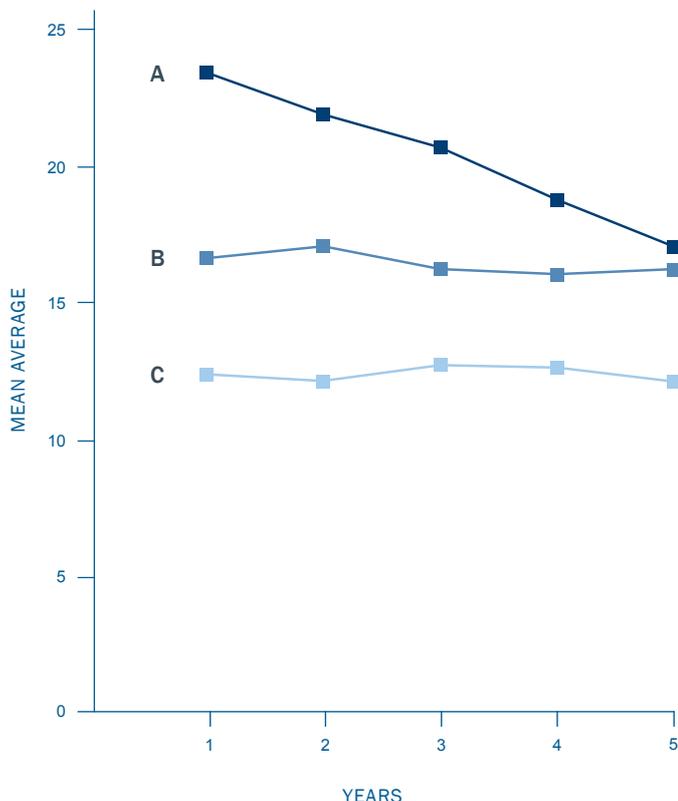
Assessments need to be regularly repeated, as it is the change over time in FIA scores that is important, rather than the absolute scores themselves. In general, assessments are repeated annually.

What does it mean?

The scores from all the sub-plots are collated into a table (Table 2). The ‘integrity’ of the forest is calculated as the mean (average) score of that unit (ie. the sum of all the plot scores divided by the number of plots).

	Forest 1	Forest 2	Forest 3
	25	12	
	24	10	
	19	11	
	23	15	
	23	9	
	21	8	11
	24	12	25
	25	13	9
	25	10	23
	21	11	10
Mean	23.0	11.1	15.5

Table 2: sample scores from three different forest units



The mean integrity scores from different years can be compared to monitor change over time (Figure 1), enabling the land manager to see where there is a negative trend. If the mean integrity score suddenly decreases sharply, this suggests something has changed and individual plot scores will need to be checked to identify where.

Over time, the FIA calculations allow land managers to detect significant losses of forest integrity and, by looking more closely at each plot and specific questions, to identify what is going on and where. It enables them to decide what action is needed to reverse, or halt, that decline.

Positive change may be seen too, of course, as a result of good forest management and protection. Changes in FIA scores to reflect these improvements, however, are likely to be slower.



Figure 1: monitoring change over time

Mean scores from five consecutive years of sampling of subunits A, B and C. While B and C seem to reflect random variation around a more or less stable mean, the slope of A is likely to reflect real forest degradation. Managers need to identify the cause and take remedial action.

Box 1: FIA in practice

The Phnom Toap Community Forest is located in the coastal area of Cambodia in Koh Kong Province. The community forest is part of a rattan-harvesting project that has achieved Forest Stewardship Council (FSC) certification. Under this certification, the community needed a system to monitor High Conservation Values in the forest.

Members of the community and the Forest Authority therefore carried out a Forest Integrity Assessment to gain an understanding of the level of intactness of the forest, as well as impacts and threats, and any focal species present in the area.

Before the assessment, team members participated in a short training session, which also served to adapt the checklist locally. Three locations were selected for assessment; approximately 17 samples were assessed in each location. The average scores from the three locations were relatively consistent, at 23.0, 25.4 and 21.9 of a total possible of 39, suggesting the forest is relatively uniform. Most of the variation was due to different interpretations by the data collection teams, highlighting the importance of keeping the same teams where possible from year to year. The team identified traces of five focal animal species, most commonly gibbons and hornbills. The initial assessment provided a basis for community members and the Forest Authority to continue monitoring and identify changes that occur over time.

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