

Forest Integrity Assessment Tool

A participatory tool to assess and monitor
biodiversity and carbon stock in natural forests



Why assess biodiversity in forest management

Assessing and monitoring forest biodiversity is integral to good forest management. An assessment of forest biodiversity values, may be useful to:

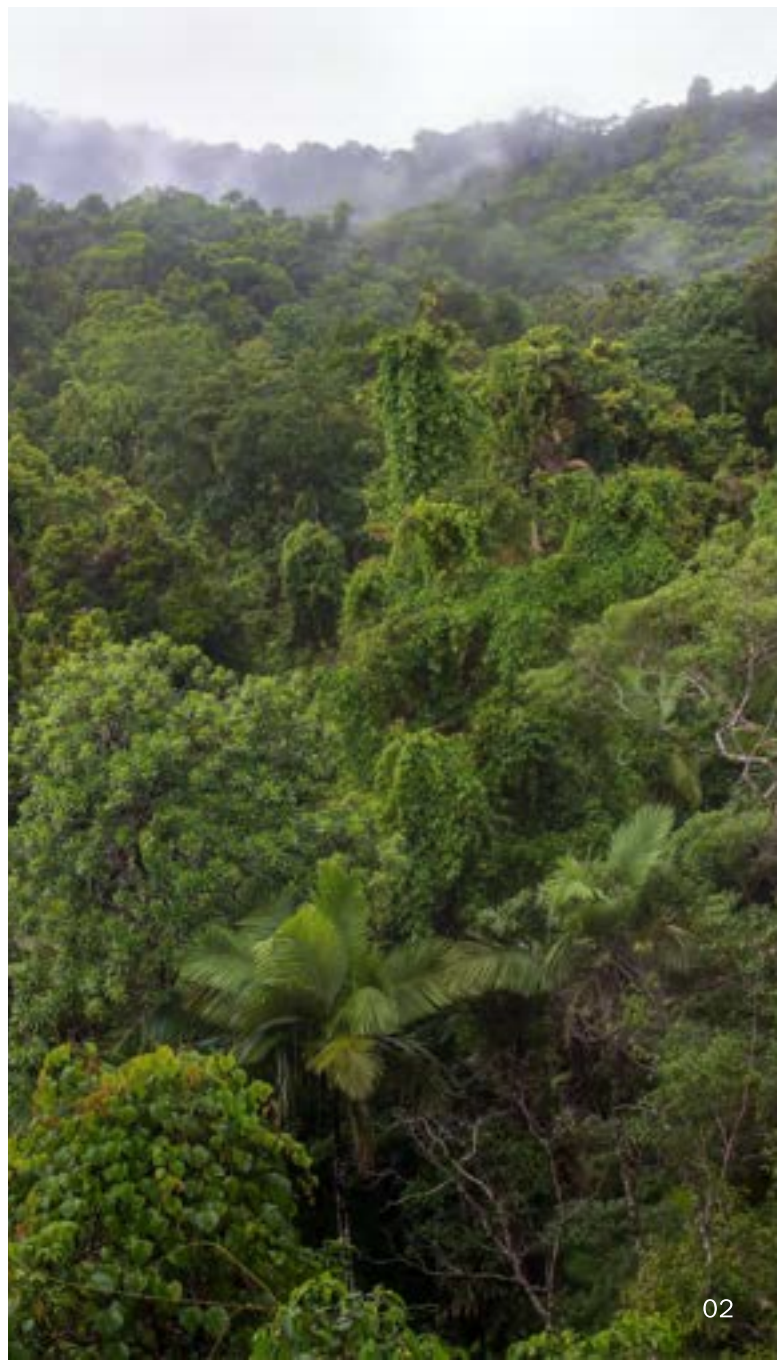
- Inform management operations and identify areas to protect or manage differently.
- Identify natural ecosystems areas that cannot be cleared or prepared for new activities such as agriculture or forestry.
- Provide a baseline from which changes in forest biodiversity can be monitored over time.
- Help prioritize set-aside areas or areas for restoration.
- Measure improvements in biodiversity resulting from management and restoration.
- Inform outreach and communication, providing a basis for discussion about which habitats are important for biodiversity.

Biodiversity assessments are also often required to meet sustainability standards and legislation, and - as emphasis is shifting to protect and restore nature such as through Nature-Based Solutions - to report on nature-positive impacts of a project, and to make claims.

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.
- FIA can also be used to provide a measure of forest carbon stock.





The Forest Integrity Assessment Tool

The Forest Integrity Assessment (FIA) tool is a simple and user-friendly approach that allows non-biologists to quickly and effectively measure the biodiversity condition of their forests. By making forest monitoring accessible, land managers are better equipped to make forest-management decisions using the data they collect and interpret, and to communicate results with their stakeholders.

Forest integrity refers to the 'level of naturalness of a forest'. The Forest Integrity Assessment tool works by comparing the forest being assessed against an 'undisturbed' natural reference forest. Rather than carrying out species surveys as a measure of biodiversity, the assessment focuses on habitat condition as an indirect proxy for biodiversity ¹. The assessment uses a checklist of simple indicator questions to evaluate the extent to which the forest has the characteristics of undisturbed reference forest types, which infers the level of biodiversity they are likely to support.

The assessment can be used across larger forest areas, as well as remnant forest patches interspersed in an agricultural landscape. Its simplicity makes it accessible for use by companies, smallholders and community members.

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 forest managers/owners about forest conditions that are important for biodiversity.
- providing a measure of above-ground forest carbon stock (see Case Study 2).

¹ The FIA score has been shown to closely correspond with several independent biodiversity metrics.

<https://besjournals.onlinelibrary.wiley.com/doi/10.1002/2688-8319.12067>

<https://www.sciencedirect.com/science/article/pii/S1470160X2300211X>



How is forest integrity assessed?

FIA uses a checklist of indicator questions straightforward for people to respond following minimal training. While FIA can be used in any natural forest globally, the checklist must first be adapted to a forest type in a given region, to ensure the indicator checklist is relevant and appropriate. Numerous checklists are already available for several regions (See map on last page).

A FIA adaptation involves an in-the-field workshop, and is most effective when the team includes a forester, forest ecologist, botanist and zoologist. In addition to the FIA checklist, the workshop may also develop a sampling procedure tailored to the specific context of its intended use.

FIA has four components: (i) structure and composition; (ii) impacts and threats; (iii) focal habitats; and (iv) focal species.

(i) Structure and Composition and (ii) Impacts and Threats, are formulated as questions that require yes/no answers. The questionnaires are completed at survey plots, with the yes/no responses tallied as the FIA score for the plot; 'Structure and Function' questions generate positive scores, while the 'Impact and Threat' questions generate negative scores. The FIA score will be highest in plots located in forests that are intact and where there is negligible human activity. Conversely highly degraded forest impacted by human activity will have a low FIA score.

1. Structure and composition

This section compares the structural characteristics of the forest with a reference 'natural forest'. Each question is an indicator of habitat heterogeneity or other features that promote biodiversity and ecological functioning.

FIA score Biodiversity	=	Forest structure & composition	-	Impacts & Threats
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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. The adaptation must take care that all questions finally included are meaningful and relevant, as in some cases human activity can actually promote biodiversity.

(iii) Focal habitats and (iv) focal species, are optional additions to FIA, which may be included if they add-value to a given management and monitoring programme. Unlike the FIA score, they are not recorded at defined plots, but rather more widely in the management area or forest concession.

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. Examples include salt licks, wetlands, cliffs, natural clearings and open heath.

4. Focal species

Focal species are mainly included in FIA to support outreach and awareness-raising about biodiversity conservation in the area. It also provides a basis for forest managers to record observations of these species during other activities, to build up a picture of them over time, but it cannot provide information on the species' population trends or dynamics. A local checklist provides a shortlist of species of regional conservation concern (e.g. nationally protected or classified on the IUCN Red List of threatened species) which are easy to identify.

How is FIA data recorded?

Observers generally need 1–2 days of training to generate consistent results, and can be members of the local community, 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 observers. The FIA score is calculated for each plot, using either a paper version or FIA Smartphone App ² to record the answers and generate the score. In small forest patches and woodlots, a single plot may be sufficient. In larger forests, several sampling plots are needed. Line transects are commonly used, where observers walk in a straight line, and stop every 300–1000m to survey a 100m long stretch of the line. Small circular plots are also being used for their ease, however due to the small size needs to be offset by a large sample size to ensure the results are representative. As choosing the right sample design and questionnaire is critical to collecting credible data, any adaptations and deviations from an existing procedure should draw on the expertise of a forest ecologist. 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.

² A technical platform for FIA is in development and testing phase





How is the FIA data used?

The scores from all the sub-plots are collated into a table. The 'integrity' of the forest is calculated as the mean (average) score for a sampling unit, such as a sampling strata or forest patch.

Managers will use the FIA scores to guide management responses at a project onset, and to monitor change over time. For example, by comparing the FIA score between sites, managers can prioritise conservation areas where the FIA score is particularly high, but also identify where restoration efforts would be valuable to improve forest condition. Through repeated monitoring over years, and looking at the trends, allows the manager to determine if management objectives are on track. Where there are significant downward changes, the manager can look more closely at each plot and specific questions, and then decide what course of action is needed.

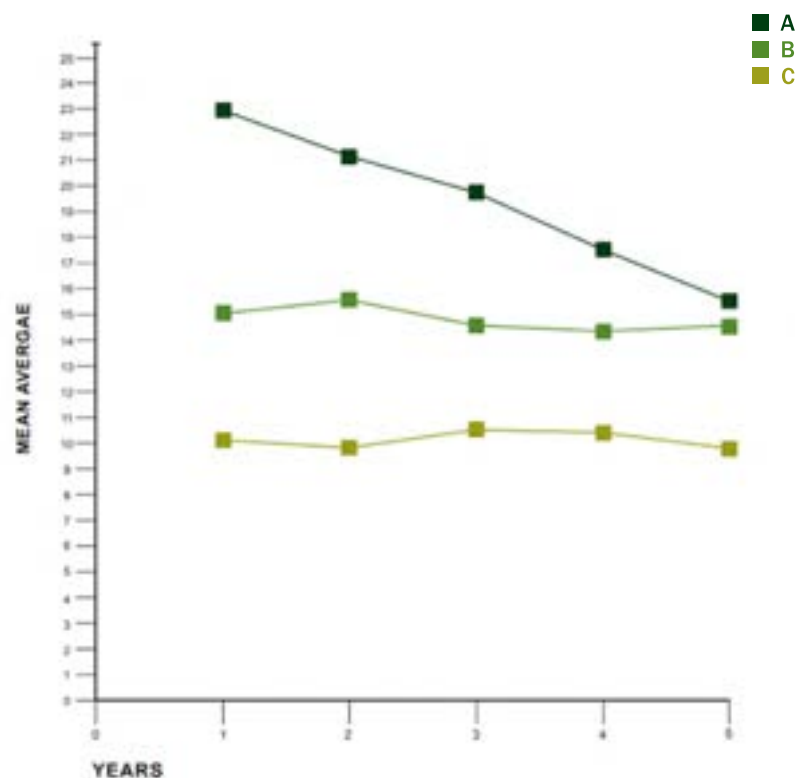


Figure 1. Monitoring change over time Mean scores from five consecutive years of sampling of subunits A, B and C. While B and C seem to reflect random variation around a more or less stable mean, the slope of A is likely to reflect real forest degradation. Managers need to identify the cause and take remedial action.



Case Study 1: FIA to support the protection and monitoring of the Central Forest Spine in Malaysia

The [Central Forest Spine](#) initiative aims to reconnect major forest complexes in Peninsular Malaysia that have become fragmented due to competing land-use interests. To support this initiative, [SEARRP](#) collaborated with local institutions and forestry departments to implement a capacity building project. They utilised the Toolkit for Ecosystem Services Site-based Assessment (TESSA) to evaluate the ecosystem services and conservation values of the Central Forest Spine areas. Additionally, they piloted the Forest Integrity Assessment (FIA) tool in the Royal Belum State Park to monitor habitat health and assess the effectiveness of habitat in supporting critical ecosystem services. The FIA, facilitated by a smartphone app, proved to be user-friendly and accessible, even for non-forestry practitioners. Project partners suggested that the FIA could also serve as an educational tool for citizen science projects, engaging youths and local communities in forest quality assessment and encouraging community forest stewardship.



Photo credit: SEARRP

Case Study 2: FIA to monitor biodiversity and forest carbon stock – Cameroon pilot

Recent studies have shown that the FIA methodology can also be used to generate a reliable measure of above-ground forest carbon stock. This unlocks the potential of FIA being a valuable participatory tool in community-based sustainable forest management projects seeking to access carbon-linked financial support and incentives. This was tested out in the southern Cameroon area of the Tridom conservation landscape, as a collaborative effort between Rainforest Alliance, WWF, local organisation SAPED and the HCV Network. Following an adaptation and calibration study, FIA was introduced by the Rainforest Alliance with three Community Forests who were updating their 5-year forest management plans. Community members received training and participated in collecting FIA data with SAPED's field staff. As a simple and accessible monitoring methodology, participants also felt more capable to meet the regulatory requirement that Community Forests monitor their forests. The FIA results allowed the community to make informed decisions on which sectors to harvest for timber, as well as the need to more actively control illegal timber harvesting in their forests.



Photo credit: SAPED

According to Gervais Nsibeuweula, from SAPED: ‘The communities appreciated the participatory aspect of the tool and specifically the fact that they were involved in the data collection.’



How can I start using FIA?

The FIA tool has been used in a wide range of contexts and regions (Click on Map icons for some examples of regional adaptations). To find out if there is a checklist already available for your region, contact the [HCVN Secretariat](#). They can point you in the direction of existing checklists, procedures or local capacity to support you.

For more information on how to adapt the FIA checklist, download the manual, available in English, Spanish, French, Portuguese and Bahasa from the [website](#).

