

FOREST4EU

Connecting forestry and agroforestry partnerships across Europe



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Funded by the European Union (Grant n. 101086216). Views and opinions expressed are however those of the authors only and do not necessarily reflect those of the European Union or REA. Neither the European Union nor the granting authority can be held responsible for them.

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The Index of Biodiversity Potential tool: How to implement it in forest management?

1. What is the Index of Biodiversity Potential Index (IBP)?

The Index of Biodiversity Potential is a scoring tool to assess the biodiversity potential of forest stands according to 10 factors related to animal, plant and fungal species. Biodiversity refers to the diversity of living organisms in a broad sense and includes the diversity of habitats at landscape level, the diversity of species within an environment, and the genetic diversity and variability of individuals within a species. The IBP tool focuses only on species diversity.

The IBP helps forest managers to identify the elements favourable to biodiversity to be preserved, in particular the trees of biodiversity interest. A radar diagram makes the biodiversity potential visible. With this, it highlights the factors that could be improved. The IBP documentation also proposes how each of the highlighted factors can be improved.

2. Why care about forest biodiversity?

Forests are full of life. Often hidden under the cover of trees, tens of thousands of species of plants, animals, fungi and microscopic organisms interact. Species diversity affects plant regeneration, tree growth, protection against insect pests, and is important for forest resilience. Forest ecosystems, however, are not necessarily pristine habitats but exposed to different pressures incl. demand for forest products and climate change. Assessing the perhaps unimagined and fragile biodiversity of forest ecosystems recognizes the intrinsic value in all living things. Species diversity is an essential condition for forests to function properly and has economic benefits, incl. soil fertility and wood volume, reduction of costs for seedlings

and planting, stand resistance and resilience, and protection against natural hazards.

Europe is committed to conserving biodiversity through international agreements. This led to adoption of the Nature Directive, the EU Biodiversity Strategy, the Nature Restoration Law, as well as the funding of numerous LIFE and other projects to protect nature and halt biodiversity loss.

The IBP tool makes forest biodiversity visible and provides reliable data for monitoring. It is useful for educational purposes and communication with the public, for road building in forests and landscape planning.



Figure 1. Old beech trees in nature reserve in Northern Bavaria (Franconia) (Source: Klaus-Peter Janitz)

3. Where does the IBP tool come from?

The methodology for the IBP was designed at the National Forest Ownership Centre – Institute for Forest Development (CNPf-IDF) by Laurent Larrieu and Pierre Gonin in 2008. They started from the idea that no simple indicator allows for a quick assessment or routine monitoring of forest stand or plot biodiversity, and have therefore proposed a tool of indirect evaluation of biodiversity to forest managers that can be likened to a composite index. Since 2008, a Research & Development programme to improve IBP, integrate new knowledge and meet the needs of users is conducted at the CNPF and the French Research Unit “Dynamics and Ecology of Paysage Agriforestiers” (INRAE UMR Dynafor). This programme brings researchers, owners, professionals, teachers together. It received support from the French Ministry of the Environment and other entities. The IBP was included in the French Strategy for Biodiversity in 2011. In later years, it was translated and adopted in Italy and Spain (Catalonia). A programme to extend and test the IBP is currently being led in 17 countries across Europe and the Mediterranean Basin. In the frame of the FOREST4EU project, the IBP was met with interest from forestry stakeholders in other countries incl. Finland, Germany, Latvia, and Slovenia.

3.1. How to use the IBP tool?

The Index of Biodiversity Potential identifies ten factors to assess the carrying species diversity of forests. Factors A-G are directly dependent on the evaluated forest stand and its management, while factors H-J are context-dependent:

- A. *Diversified native tree species*: Animals, plants and fungi in the forest depend on the characteristics of the tree. The more different species there are in a forest, the more likely it is to support the diversity of species specific to each, in addition to more generalist species
- B. *Vertical structure of the vegetation*: There are different layers (herbaceous, shrub, tree). Each provides specific habitats (food, shelter etc.), which supports species with different requirements

- C. (D) *Abundant and diversified large deadwood*: More than 25% of forest species depend on deadwood or on tree-related microhabitats incl. decaying wood. A wide variety of deadwood (species, size, decay stage, position) supports a diversity of associated species
- E. *Presence of very large living trees*: Large-diameter trees, tall and old, provide varied tree-related microhabitats, large branches form platforms for fauna
- F. *Numerous and diverse tree-related microhabitats*: Refers to morphological features of trees (cracks, cavities), which are essential places for shelter, reproduction, hibernation and nutrition for many species.
- G. *Flowers-rich open areas in appropriate amount*: In permanent or temporary open areas, conditions differ from those inside the stand. There are more numerous flowers, greater variations in temperature and light, etc., which increases forest biodiversity.
- H. *Forest continuity over time*: The history of a forest influences its biodiversity. Recently established forest on former agricultural land does not support the same species as land that has been wooded for many centuries.
- I. (J) *Aquatic and rocky habitats*: Rivers, ponds, peat bogs, boulders, crags and escarpments are habitats for various species.

Tool users are equipped with a survey to score the biodiversity of forest stands. This is done by walking through a given stand and counting the items related to each of the ten factors (e.g., number of large dead trees or forest layers). Based on these observations, a score between 0 and 5 is given to each factor. Adding together these scores gives the IBP and characterises the stand on a gradient of low to high carrying capacity. It also makes it possible to identify features within a stand that are favourable to species diversity or, conversely, those that are insufficiently represented and which should be favoured during management activities.

The IBP survey provides a systematic approach to assess the species hosting capacity of a forest stand without making prior judgements of the biodiversity actually present in a given stand. The survey identifies the

factors already favourable to biodiversity and those that can be improved through management.

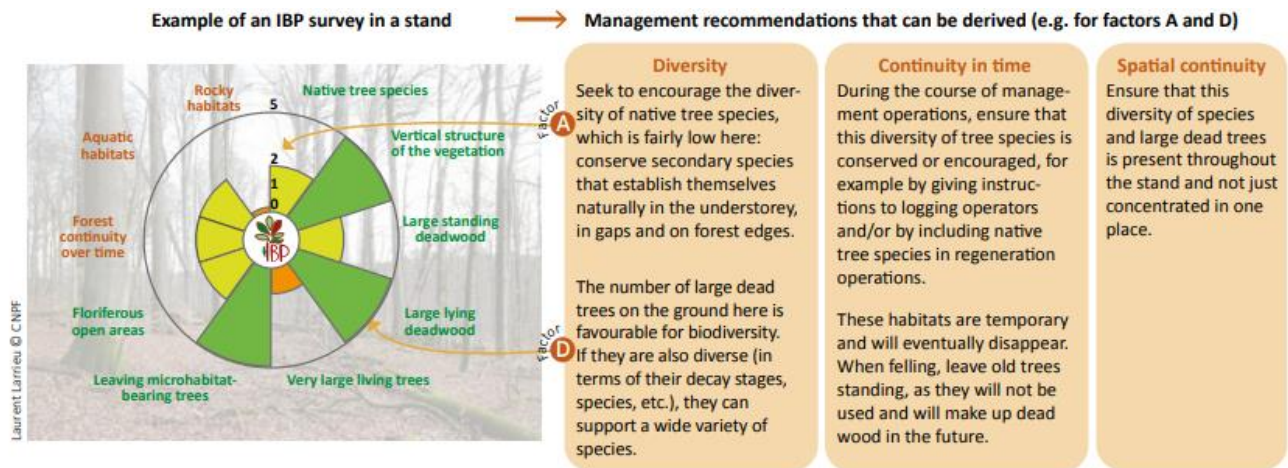


Figure 2. From the IBP practical recommendations (Source: Emberger et al. 2023, p. 4)

There are four survey methods: site coverage (complete, partial), typological sampling, and systematic survey. The choice of the appropriate survey method depends on, among other, the planned diagnoses, area and characteristics of stand, purpose and required level of precision, and available resources. The Appendix provides a table that compares the four survey methods. As a rule of thumb, a complete site coverage should be conducted in small stands (≤ 1 ha) whereas the partial and typological coverage methods should be applied in larger stands ($\geq 10-20$ ha). Typological sampling is a quick and non-exhaustive survey method.

Some prior familiarity basic vocabulary and its application is needed to apply the IBP survey. The index inventors of the index have issued the 2nd edition of the guideline "The key factors for species diversity in forests. Understanding the Index of Biodiversity Potential" in 2023. It explains important terms and how to arrive at management recommendations from scoring the biodiversity potential with the IBP factors.

4. References

Emberger C., Larrieu L., Rotiel S., Gonin P.(2023) Our forests are full of life! Discovering the Index of Biodiversity Potential (IBP). CNPF, INRAE Dynafor, 4 p.

Emberger C., Larrieu L., Rotiel S., Gonin P. (2023) Ten key factors for species diversity in forests. Understanding the Index of Biodiversity Potential (IBP). 2nd edition. Paris: CNPF-IDF, 2023, 62 p.

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Gonin P., Larrieu L., Baiges T., Corezzola S., Marty P., Miozzo M., Palero N. (2025) - Index of Biodiversity Potential for forests in temperate Europe and the Mediterranean Basin (IBP EUR.MED v3.1): definition and survey sheets. CNPF, INRAE Dynafor, CPF, DREAM Italia, 24 p.

Larrieu L. & Gonin P. (2008) - L'indice de Biodiversité Potentielle (IBP) : une méthode simple et rapide pour évaluer la biodiversité potentielle des peuplements forestiers. Rev. For. Française, LX 6-2008, p. 727-748


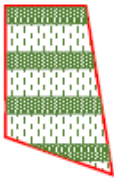
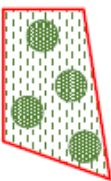
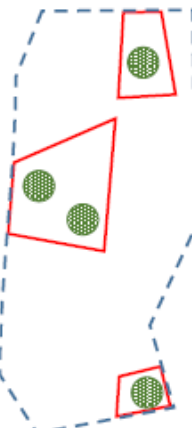
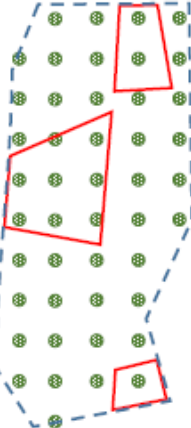
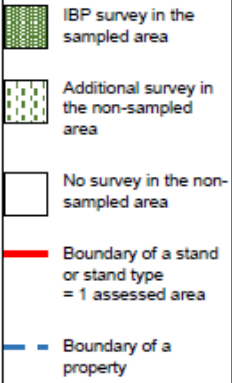
More information

More information about the IBP in practice, how to document forest species diversity, R&D to improve the tool, bibliographic resources, and contacts can be retrieved via: <https://www.cnpf.fr/ibp> (last accessed 04.04.2025).

The referenced brochure, guideline, survey method explanations and sheets can be downloaded via:

<https://cloud.cnpf.fr/index.php/s/DP9qB8wg9sqq7qH> (last accessed 04.04.2025). The documents are available in English, French, Italian and Spanish. The survey sheets are also available in Catalan.

Appendix

	Complete coverage	Partial coverage	Typological sampling	Systematic sampling
Context of use				
Assessed area ¹ and its area	Stand Small: < 10 ha	Stand Average: tens of ha	Stand or stand type Medium to large: tens to hundreds of ha	Stand type Medium to large: tens to hundreds of ha
Type of survey	Exhaustive (including forest edges...)	Exhaustive (including forest edges...)	Not exhaustive (not including forest edges...)	Not exhaustive (not including forest edges...)
Main types of use ²	Survey before a forestry operation or for the development of a management plan Educational or study plots	Survey before a forestry operation or for the development of a management plan	Survey for the development of a management plan	Survey for the development of a management plan
and scale of use ²	Plot, land parcel and property	Land parcel and property	Study plots Land parcel, property and forest massif / area	Property
Survey characteristics				
Sampling method	No sampling	Judgment sampling (thus non-probabilistic)	Judgment sampling (thus non-probabilistic)	Systematic
Area sampled	The entire area	At least 1 ha and > 10 to 20% of area assessed according to stand heterogeneity	2 cases depending on the area assessed: - > 40 ha: at least 5-8 survey plots of 1 ha / area assessed - < 40 ha: at least 1 ha and > 10 to 20% of area assessed according to stand heterogeneity	10 to 30% of the area of the property (= total assessed area)
Number of surveys per assessed area IBP calculation method if several surveys in an assessed area	1 survey	1 survey or several surveys (with 1 survey sheet per plot) Grouping plot data and determining the IBP	Several surveys (with 1 survey sheet per plot) Determination of the IBP in each plot; calculation of the mean and spread of IBP scores in the assessed area	Several surveys (with 1 survey sheet per plot) Grouping data from plots in each assessed area, then determining the IBP
Shape and dimensions of the sampled area	Stand shape	Linear strips of 20-50 m wide or circular, square or rectangular plots of 1 ha or 0.5 ha (or even 0.33 ha)	Circular plots (even square / rectangular) of 1 ha (or even 0.5 ha)	Circular plots from 0.20 to 0.33 ha
Additional survey in the non-sampled area	No	Yes for factors A, G, I and J	No	No
Capping of counts (except in special cases, see Chapters 5 and 8)	Capped counts	- 1 continuous survey: capped counts - several surveys: uncapped counts	Capped counts	Uncapped counts
Examples	e.g. complete coverage in a stand 	e.g. strip partial coverage in a stand  Example of plot partial coverage in a stand 	e.g. typological sampling in a stand type < 40 ha 	e.g. systematic sampling in a stand type on a property 
				

- 1: The IBP should be surveyed separately for each stand or homogeneous stand type
2: Different survey methods can be combined on the same land plot or property

Figure 3. Comparison of IBP survey methods (Source: Gonin & Larrieu 2025, p. 4)



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