



Italian Forest Service – CONECOFOR Board

Corpo Forestale dello Stato



Accademia Italiana di Scienze Forestali



COST E 43 WG 3 Biodiversity



**ICP Forests Expert Panel
Biodiversity and Ground Vegetation**

Joint workshop
Assessment of Biodiversity in Forests in Europe

22-24 March 2007, Firenze, Italy

MINUTES

*Edited by: Bruno Petriccione ICP Forests EP Biodiversity and Ground Vegetation
Gherardo Chirici COST E 43 WG 3 Biodiversity*

**THESE MINUTES AND ALL PRESENTATIONS ARE AVAILABLE AT THE
DEDICATED WEB SITE http://www.aisf.it/biodv/joint_meeting.htm**

Figures

- 54 participants
- 22 represented Countries
- Representatives from EC/JRC, EEA and ICP Forests PCC
- 20 scientific presentations
- 2 days work, in plenary and in eight working groups

Main goals

- Further development of the indicators;
- Discussion and scientific review of each indicator;
- Evaluate usefulness of each proposed indicator according to SEBI2010 criteria and other systems (e.g., Hagan & Whitman, 2006);

- Selection of the **most reliable methods** and the most suitable **assessment frequency** at each different level (**NFIs, Lev. I, Lev. II, landscape**);
- Contribute to re-drafting a project proposal for future biodiversity monitoring in Europe.

Main messages

- Promoting **integration** of biodiversity assessment at Lev. II, Lev. I, NFIs and landscape level
- **Merging** extensive networks (Lev. I and NFIs) at European level
- Adding **landscape scale** to biodiversity survey, on the basis of core “expanded” Lev. II plots (biodiversity cannot be assessed only at plot level: an integrated approach is required for a proper understanding).

Main results

All proposed indicators have been discussed on the basis of:

- Scientific presentation at the workshop from experts both of ICP Forests and COST E 43, in plenary;
- Detailed discussion and presentation of results of work done in group session;
- The system of nomenclature of the European Forest Type (EEA, 2006 - http://reports.eea.europa.eu/technical_report_2006_9/en) as valuable tool for stratifying forest biodiversity assessment;
- Draft table arranged in the previous meeting of the EP Biodiversity and Ground Vegetation (Cyprus, Nov. 2006).

Working groups (chairs / speakers):

- Stand structure (E. Hauk)
- Vegetation (R. Canullo)
- Deadwood (J. Rondeux)
- Lichens (S. Stofer)
- Naturalness (B. Petriccione / C. Cluzeau)
- Invertebrates (S. Hardersen)
- Birds (A. Bobiec / C. Cocciufa)
- Inventory approach at Level II/Level I/NFIs/landscape (G. Chirici / R. Fischer)

Stand structure

At Level II, it is recommended tree coordinate assessment on larger number on core plots, according to ForestBIOTA Manual.

At Level I, assessments will be completed by 2007, under BioSoil project, according to BioSoil Manual.

NFIs: indices based on dbh and height, partly tree coordinates.

At landscape level, it is recommended to explore new possibilities according to a habitat approach, through pilot projects.

Vegetation

The working group discussed mainly quality issues, to provide an update of the ICP Forests Manual by the 15th of April.

Upscaling of Level II data has to be explored. Further definition of rapid and feasible indicator groups of herb species for NFIs plant diversity assessments is required.

Deadwood

At Level II, it is recommended the assessment on larger number of core plots, according to ForestBIOTA Manual, stratified by forest types.

At Level I, assessments will be completed by 2007, under BioSoil project, according to BioSoil Manual.

It is recommended to develop bridging functions to the (BioSoil) reference method, to be tested with real NFI data.

Lichens

Lichen assessment is relevant (1) to describe and monitor part of forest biodiversity development over time in space, (2) to evaluate effects of changing air quality over time in space and (3) to acquire a consistent basis allowing to evaluate and recommend indicator species for specific questions and for different scales in future (e.g. suggestion of indicator species sets for NFIs).

At Level II, it is recommended the assessment on larger number of core plots, according to ForestBIOTA Manual (plus "intelligent random walk"), stratified by forest types.

Further discussion is needed on details of lichen assessment on Lev. I (e.g., sample unit size): only macrolichens can be assessed on a representative sample of plots for Europe.

Lichen assessment in NFIs based on indicator species per biogeographic region/forest types is recommended in the final phase of the project.

The effects of the surrounding landscape on species richness on the plot (e.g. area of forests / fragmentation) can be assessed, at landscape level.

Naturalness / Environmental quality

Considering the proposed forest naturalness assessment at all levels is rather a quality parameter/concept, it has been proposed replacing the expression "Naturalness" with the new one "Environmental quality".

Naturalness assessment is important to add a quality dimension to quantitative biodiversity indicators (e.g., species number), to be evaluated in a proper way. An urgent need is to provide a broad definition of "environmental quality" through a quick literature review.

At Level II, it is crucial taking into account the surroundings of the plots. The Level II plots have to be extended to landscape units. The assessment method will be based (1) at community level (current Lev. II 2.500 sqm large) on a reference plot (according to the method proposed and tested in Italy by Petriccione, 2006 - http://www2.corpoforestale.it/web/guest/serviziattivita/controlloecosistemiforestali/reti_dicontrollo/annali) and (2) at landscape level on a functional approach (e.g.: Ingegnoli, 2002, Springer-Verlag book). It could be done on a subset of Level II expanded plots. Both approaches have been successfully tested on a selection of Lev. II plots in Italy, under ForestBIOTA project. The assessment could be potentially suitable, at community level, in ca. 700 Lev. II plots through ground vegetation data, without any additional field survey (reference: Bohn map of potential vegetation of Europe).

At Lev. I and NFI level, it is recommended to apply the method based on five naturalness classes, as proposed by COST E43 WG 3 (sub-group Naturalness): 1. no visible human influence; 2. slight human influence; 3. strong human influence; 4.v

ery strong human influence; 5. artificial forest. These five classes have to be precisely defined (reference: Bohn map of potential vegetation of Europe). The proportion of native tree species per sampling plot is one of the most important parameters to assess the environmental quality of the forest plot. The group agreed on choosing the definition of *nativeness* given by the EEA Report "European Forest Types" (http://reports.eea.europa.eu/technical_report_2006_9/en). The local site conditions have to be taken into account in assessing the nativeness of tree species. Whenever a tree species has been introduced, it is supposed to keep its "introduced" status for ever. The assessment could be potentially suitable in all Lev. I plots through BioSoil data on vegetation, without any additional field survey.

Invertebrates

To address the main priorities at European level (climate change, loss of biodiversity/SEBI2010, synergies with the Nature2000 network, ecosystem functioning) it is recommended to apply the method "window traps", with a harmonised, streamlined and validated design, focused on the monitoring of the following beetles (*Coleoptera*) families, identified at species level: *Scolytidae*, *Cerambycidae*, *Elaterridae*, *Buprestidae*, *Lucanidae*, *Cetoniidae*, *Eucnemidae*. The assessment can be done on extended core Lev. II plots, stratified by biogeographical Region and forest type.

At Lev. I, the same approach could be applied after a successful testing on Level II, with a simplified sampling design.

Birds

In co-operation with Birdlife International and the EEA European Topic Centre for biodiversity a proposal will be made to introduce a standardised monitoring of forest birds on extended core Lev. II plots. This would allow information on bird species densities and frequency of occurrence to be evaluated against already existing data on forest structure and ground vegetation communities for the first time.

This approach could be tested by a number of volunteer countries and the major biogeographical Regions of Europe including the major European Forest Types should be included. The approach would also build on existing expertise and already agreed bird species indicators in the EU approved list ready for 2008.

Inventory approach at Level II / Level I / NFI / landscape

NFIs are based on a rigorous sampling design, they have a large number of sampling units (around 500.000 in EU) but definitions and methods adopted at Country level make statistics non comparable. Several projects deal on the harmonisation of NFIs in EU (COST action E43, "harmonisation" JRC tender).

UN-ECE ICP Forests network is not based on a rigorous sampling design with around 6.000 plots in Level I and 800 plots in Level II. Methods and definitions adopted are standardised and the results are comparable.

A future European Forest Monitoring Systems should be based on the integration of these networks in order to benefit of the best characteristics of both systems.

Possible operative methods are available for:

- (i) reshaping the ICP Forests networks (both Level I and Level II) on the basis of a consistent sampling design;
- (ii) integrating the ICP Forests and NFIs networks in order to be able to describe and model the relationships between information acquired in both networks (using both ICP Forests and NFIs protocols in the same plots);

- (iii) using remotely sensed data as a possible tool for enabling the integration of the networks.

Some of the indicators have been self-evaluated according to two evaluation systems (EEA SEBI2010 criteria and Hagan & Whitman, 2006). Two tables (Tab. 1, 2) are enclosed, as examples.

After the workshop, a new synthesis table (enclosed, Tab. 3) including the proposed assessment methods for each indicator at each level has been redrafted. It will be the basis for contributing to the European Forest Monitoring Project, in preparation under the upcoming EU Regulation LIFE+.

ANNEX 1: agenda

ANNEX 2: participant list

ANNEX 3: EEA SEBI2010 evaluation system

Tab. 1 - Evaluation of some biodiversity indicators (EQ-Environmental quality, LC-lichens; IN-Invertebrates) at three levels, according to the EEA SEBI2010 evaluation system, from low (1) to high (3), with a maximum score of 30 (http://reports.eea.europa.eu/technical_report_2006_9/en).

	1	2	3	4	5	6	7	8	9	10	TOTAL
EQ -NFIs and Level I	3	2	1	2	2	1	2	1	1	3	18
EQ - Level II landscape units	3	2	1	2	2	1	2	1	1	3	18
EQ - Level II current size plots	3	2	1	2	2	1	2	1	1	3	18
LC- Lev. II	3	3	3	3	2	2	2	2	2	3	25
LC – Lev. I	3	3	3	3	2	2	3	2	1	3	25
LC - NFIs	3	3	3	3	2	1	1	3	3	3	25
IN – Lev. II	1	1	1	1	1	3	2	1	2	1	14

Tab. 2 – Evaluation of some biodiversity indicators (a - EQ-Environmental quality, b - Invertebrates) at three levels, according to the method proposed by Hagan & Whitman (2006), from low (1) to high (3), with a maximum score of 15.

	NFIs & Level I	Level II landscape unit	Level II current size plots
EQ - Scientific merit	3	3	3
EQ - Ecological breadth	3	3	2
EQ - Practicality	3	1	2
EQ - Utility	3	3	3
EQ - Relevance	2	2	2
TOTAL	14	12	12

Hagan & Whitman (2006)						
Indicators	Scientific merit	Ecol. Breadth	Practicality	Utility	Relevance	Sum
Scolytidae						
Cerambycidae						
Buprestidae						
Lucanidae	3	2	3	2	2	12
Cetoniidae						
Elateridae						
Eucnemidae						
Earthworms	3	2	1	2	1	9
Carabidae	3	2	3	2	2	12

Tab. 3 – Proposed biodiversity assessment methods at all investigation levels

LEVEL	FOREST TYPES	STRUCTURE	TREE SPECIES	GROUND VEGETATION	DEADWOOD	LICHENS	NATURALNESS ENVIRONMENTAL QUALITY	INVERTEBRATES	BIRDS
Level II	MCPFE/EEA Forest types	Tree coordinates (core plots)	All trees on plot	ICP Forests Manual (core plots)	ForestBIOTA methods plus random walk (core plots, stratified by forest types)		Method based on the reference plot (Petriccione, 2006) (core plots)	Window traps for key Coleoptera families (core plots, stratified by biogeographical Region / forest type)	Bird species density and frequency with Birdlife method (extended core plots, stratified by biogeographical Region / forest type)
Level I	BioSoil (biodiversity module)					ForestBIOTA & BioAssess methods, but macro-lichens only	Method of five classes, to be precisely defined (ref.: Bohn map; tree species nativeness as defined by EEA Report on Forest types)	Simplified methodology, after testing on Lev. II	biogeographical Region / forest type)
NFIs	Proposal for adoption of MCPFE/EEA forest types as reference	Indices based on dbh and height, partly tree coordinates	All trees in sampling units	All shrub species; only indicator groups of herb species	Develop bridging functions to the BioSoil method	Indicator species per biogeographical Region / forest type		NO	NO
Landscape & remote sensing	Forest maps	Pilot projects (habitats)	Conifers / broadleaves. Possible tests for forest types (EEA, 2006) mapping	NO	indirect	Effects of surrounding landscape on species richness on the plot	Functional approach (extended core Lev. II plots)	NO	Same approach as Lev. II (extended core plots, stratified by biogeographical Region / forest type)