

CONVERGENCES AND COMPLEMENTARITIES OF FOREST INFORMATION SYSTEMS

ICP-Forests Level I grid net and its
harmonization with the National Forest
Inventory in Europe and in Spain

European scope

Study of scenarios for integration and / or harmonization between Level I gridnet and NFI at European level

Level I gridnet

National Forest Inventories

A common harmonized european forest information gridnet?

Different strategies proposed at international level

- a) **Harmonization of ICP Forests and NFI attributes and relevant assessment/measurement methods.** Networks may stay separated, plots may keep own characteristics, but the adoption of consistent methods will led to harmonized datasets in terms of attributes. This is the slightest possible “harmonization” action to be undertaken;
- b) **Functional integration of ICP Forest and NFI networks.** Networks remain separated, but they will use not only the same attributes and methods, but also the same plot design, which implies consistency in tree selection criteria. ICP Forest plots may adopt the design used in the NFIs, while keeping the assessment also on trees that were previously considered. This implies some work to be done to adapt the plots, but – under the assumption of a common target population - results can be used jointly to derive more precise and robust estimates;
- c) **Full integration of ICP Forests and NFI networks (all-in-one).** Original ICP Forest plots will be ceased and FCM attributes will be measured only on NFI plots. A single, fully integrated and harmonized set of data will be obtained. However, the ICP Forests data series will be lost, at country level, and – as a consequence - at European level.

WAY OF WORKING IN DIFERENT EUROPEAN COUNTRIES

THREE DIFFERENT LEVELS:

- ❖ No integration foreseen
- ❖ Integration in study / process
- ❖ Integration done

➤ No experience in integration yet

❖ Belgium



❖ Slovakia



❖ Spain



➤ Integratrion in process

❖ Denmark



❖ Estonia



❖ Italy



❖ Letonia



❖ Rumania



➤ Integration completed

❖ Germany (Baviera)



❖ Finland



❖ Hungary



❖ Poland



❖ Slovenia



❖ Suewden



❖ Switzerland



❖ Austria



❖ Lituania



□ Belgium



- 1997 – 1998 → “1st.” Belgium Forest Inventory



“Younger” than Nivel I network in Belgium

Possible future integration scenario:

Level I remains active, in the future NFI design
will be applied to those plots

□ Denmark, Estonia and Letonia



Level I plots be considered as subsample of the NFI, been adapted to this system gradually.

☐ Italy



Integration proposal:

- Creation of a new Level I grid as subsample of NFI.
- Old and new Level I grids remain active several years in order to compare results .
- Analysis of harmonization in order to “move” from the old system to the new one without loss of historical data.

□ Germany (Baviera)



Integration proporsal

- Set up of new Level I plots as subsample of NFI

Advantages

Repesentative sample as combination of both grids

Avoiding redundant data

Cost reduction on assesment

Increment of the Level I plots number

Disadvantages

Loss of historial serie of data (former Level I plots)

Additional costs (set up of new Level I plots)

□ Austria



- Level I and NFI plots are part of a unique and common grid from the beginning
- Level I plots are a subsample of NFI (5%), where in a year basis Level I parameters, biodiversity and soils are assessed; inventory parameters are measured every certain number of years

□ Spain



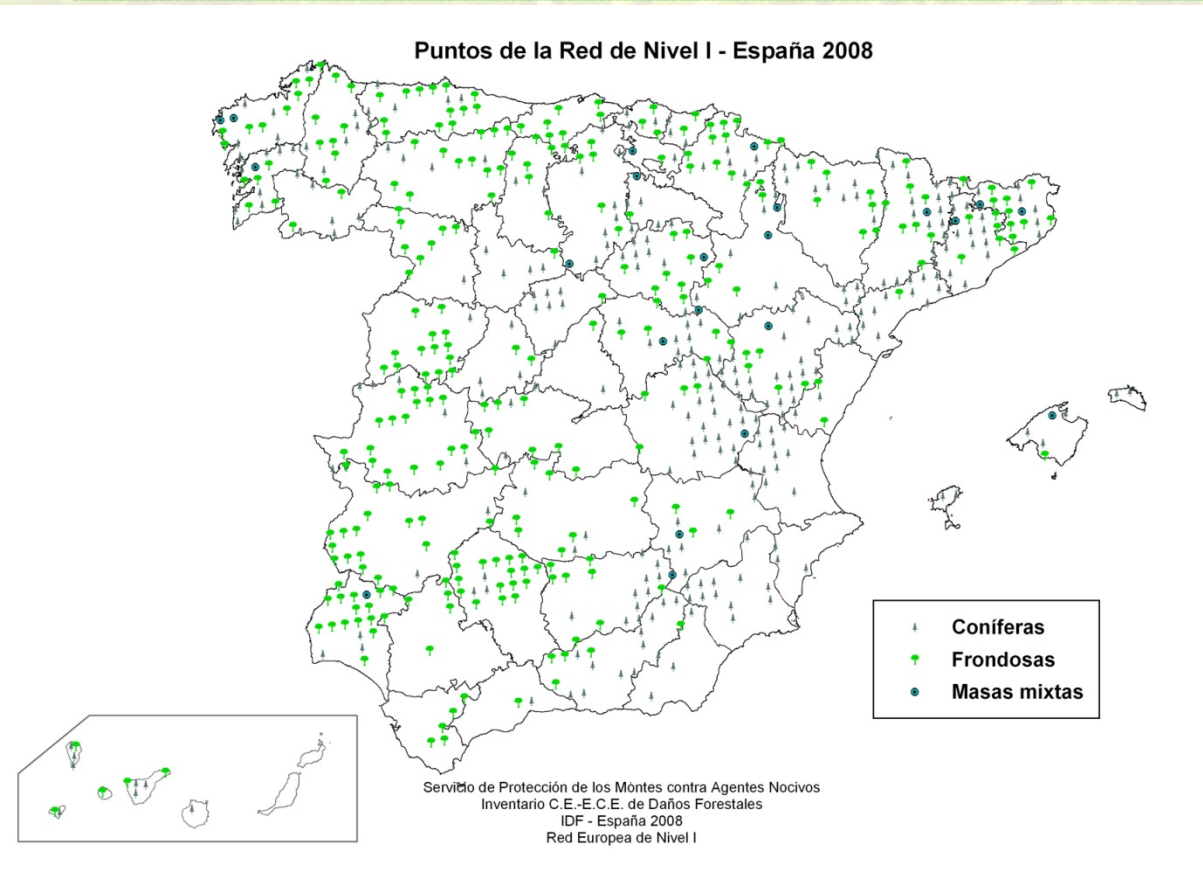
Integration problems

- Different goals, different department and staff
- Work structure and goals of NFI \neq Level I grid
- No spatial relationship between both systems

Level I systematic grid net in Spain

- The Level I systematic gridnet was installed in 1987 in Spain. Currently there are 620 sample plots.
- There is a total number of **14.880** trees sampled, distributed throughout all Autonomous Regions.

Servicio de Protección Contra Agentes Nocivos en los Montes (SPCAN)



306 conifers
289 broadleaves
25 mixed stands

Parameters in Level I

- **Dasometric data** : dbh of all 24 trees,
- **Annual forest condition and health data**: Defoliation, discolouration, damaging agents (causal agent, extension of damage), percentage of dead crown, fructification
- **Additional data**: GPS coordinates, altitude, exposure, mean age of the stand, slope, CORINNE code...
- **Not annual**:
 - Soil**: 1994 – 96 and 2006-2008 (BIOSOIL)
 - Forest Biodiversity**: Forest type classification, structural forest diversity (diameters, canopy closure, coarse woody debris), composition (vascular plant species), deadwood (BIOSOIL)

MAIN RESULTS OF THE LEVEL I

Annual Forest Damages Inventory (IDF)

Annual data and results about defoliation and discolouration levels, forest damaging agents occurrence and their distribution (national, regional and province levels).

- Time comparing data (1987-2009) at national level
- European "trends" of forest condition year by year

Dissemination and use of the IDF (Level I) data in Spain

The results are open to public in the Ministry web page, submitted to regional governments, to local forest managers, Universities, private companies working in forest health issues, Research Centers...

Data are used mainly as harmonized reference levels thorough the time, and as stable criteria and indicators of forest condition

Integration between NFI and Level I

MAIN PROBLEMS AND LIMITATIONS FOR THE HARMONIZATION PROCESS IN SPAIN

NFI and Level I managed by two separated Services. with different staff. Different and complementary goals

NFI and Level I have different structure: no coincidence among the plots (Level – I is not a sub-sample of NFI)

Coordination between both systems would be very useful, but is not easy due to the different goals and structures

Comparing NFI / Level I – Spain: design - structure

	ICP – Forest Level I (SERVICE: FOREST HEALTH)	National Forest Inventory (SERVICE: NATIONAL FOREST INVENTORY)
Cycles	1987 - 2009 Until now 23 annual assessments	IFN1: 1966 – 1975 IFN2: 1986 – 1996 IFN3: 1997 – 2008 IFN4: 2008 - 2018
Grid	16 x 16 km	1 x 1 km
Number of plots	620	> 90,000
Assessment unit	National	Provinces - National
Forest definition	At least 24 trees in a maximum radius of 50 m from the plot centre	Cover ≥ 5 %
Core variables	<p><u>Annual:</u> Defoliation & Discolouration Forest damages assessment Height & dbh (24 trees)</p> <p><u>Not annual:</u> -Soil: 1994 – 96 and 2006 – 2008- Forest Biodiversity (Species, structure, dead wood, etc)</p>	<p>Every 10 years: Dasometric parameters Selvicultural Forest biodiversity (Species, structure, dead wood, etc.)</p>

Comparing NFI/Level I: parameters - variables

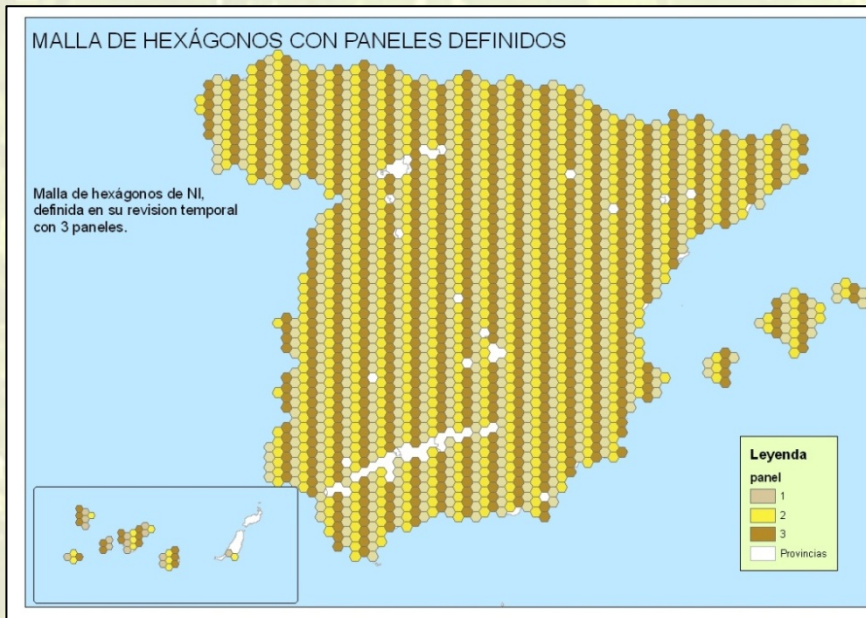
	ICP – Forest Level I	National Forest Inventory
Plot description	Permanent Not fixed size but fixed number of trees: 24 in a maximum radius of 50 m from the plot centre	Permanent Four concentric circles with radius respectively of 5, 10, 15 and 25 m
Human resources	13 field teams (x2 : 1 engineer and 1 assistant)	25 field teams (X3); 7 engineers
Dasometric data	D.b.h.; distances and azimuths of all 24 trees are measured	D.b.h. and height; distances and azimuths of all the selected trees are measured
Forest health data	Defoliation, discolouration, damaging agents (agent and extension of damage), percentage of dead crown	Basic data on forest damages
Biodiversity	Forest type classification, compositional forest diversity (vascular plant species), structural forest diversity, –BIOSOIL	Forest type classification, compositional forest diversity: species (trees and shrubs), structural forest diversity, Landscape scale: fragmentation, human influence
Soil	In – depth analysis (every ten years)	pH, basic soil description, erosion
Additional data	Altitude, coordinates, exposure, mean age of the stand, slope, brief description of the stand, CORINNE code	Altitude, coordinates, exposure, , land use, geomorphology, slope, soil protection and selvicultural description of the forest stands

Analysis of a harmonization process between both national forest information systems

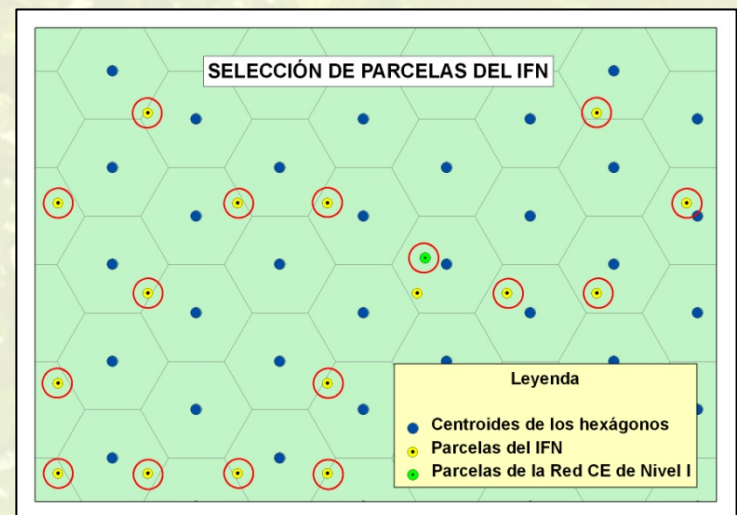
1. To study the European Forest Damage Monitoring Networks: Systematic grid net (Level I) and Intensive Monitoring of Forest Ecosystems (Level II) within the framework of **Pan – European Criteria and Indicators for Sustainable Forests Management (criteria 1 to 6)**
2. To study the **representativeness of the Systematic grid net (Level I) in Spain** with respect to the Spanish forest ecosystems. Degree of representativeness and adequacy of the Level I grid opposite to the National Forest Inventory and the Spanish forest map
3. To study and plan (with the information obtained previously) **possible future scenarios of integration and/or harmonization between the Systematic grid net (Level I) and the National Forest Inventory (NFI).**

Model in study for achieving the integration in Spain: the "hexagone" US model.

Developed by the Forest Service of USDA (Department of Agriculture of the United States of America).



The system is based in hexagons of equal area in order to establish sampling plots in a systematic way throughout the Spanish territory and regularly distributed in time.



Final goal

To create a integrated grid with:

- Annual assessment (in a representative grid subsample):
 - Forest condition
 - Basic inventory parameters suitable of upscaling at national level
 - Basic data for punctual needs (to demand, i.e. PWN)
 - Info needed for
 - Data comparable at international scale
 - Yearly time series harmonized at national level
- Periodic data (total sample)
 - In depth inventory parameters
 - Soil and biodiversity parameters
 - Database of reference for yearly results (see above)

Ok at national level. Up scaling al European one?