



Slovenian Presidency of the EU 2008

Forest biodiversity: a challenge and a possible opportunity for an adaptation strategy to climate change

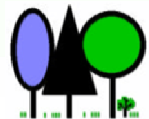
Bruno Petriccione, Ph.D.

ITALIAN FOREST SERVICE - CONECOFOR



PRESENTATION OUTLINE

1. *The biodiversity concept: sense or nonsense?*
2. *Current status of forest biodiversity in the EU*
3. *Climate change and forests: short background*
4. *Evidence of climate change impact on forests*
5. *Scenarios of climate change impact on forest*
6. *Towards an EU monitoring system for an early warning detection*
7. *Development and implementation of adaptation strategies*



Biodiversity: a wide quality concept, an operational tool or a nonsense?

six possible and very different concepts ...



1. Biodiversity as “primitive concept”

The instinctive inclination to give high consideration to “variety” (*Wilson, 1984 – Biophilia*)





2. Biodiversity as scientific concept

The variety of species and ecosystems

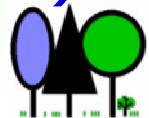
(Wilson, 1992 – The Diversity of Life)



3. Biodiversity as formal concept

The variability among living organisms and the ecological complexes of which they are part; this includes diversity within species, between species and ecosystems

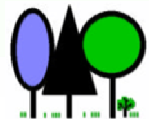
(Convention on Biological Diversity, art. 2, 1992)



4a. Biodiversity as information content



**A high content of information does not correspond necessarily to high quality:
the organizational level is the key factor!**



4b. Biodiversity as information contents ?

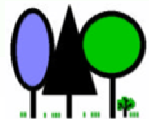
Biodiversity as the simple amount of species ?

NONSENSE

*“Biodiversity: wrong species, wrong scale,
wrong conclusions”
(Crow, 1990)*




**FRAGMENTATION increase species richness only locally
and at short-term,
but leads to a clear decrease in global biodiversity !**



5. Biodiversity as "naturalness" or "environmental quality"

The degree of self-functioning of the natural processes and the intensity of human interventions on the function and structure of ecosystems
(Petriccione, 2006)

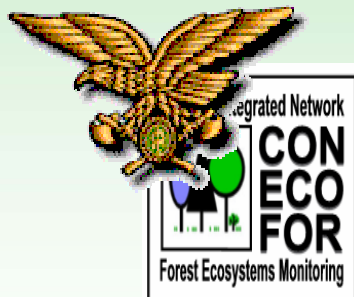
A photograph of a forest with tall, thin trees and a dense canopy, showing a natural ecosystem.

6. Biodiversity as pure operational definition

Indicators / sub-indicators / surrogate measures / parameters / attributes / traits

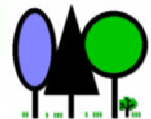


EU/EEA SEBI2010 approach



European Forest Status Indicator
approach

(vegetation, deadwood, structure, tree condition, naturalness)



Halting the loss of biodiversity by 2010:
proposal for a first set of indicators to monitor progress in Europe

ISSN 1725-2237

SEBI2010 Technical Report 2007

26 operative indicators



European Environment Agency



http://reports.eea.europa.eu/technical_report_2007_11

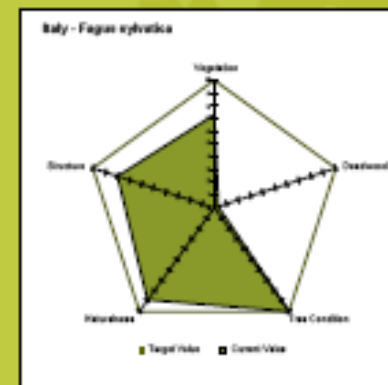
Towards a European Forest Status Indicator

The proposed European 'Forest Status Indicator (FSI)' can provide information to decision makers on forest condition (changes in quality, functionality and integrity of forest ecosystems) including progress towards halting the loss of forest biodiversity.

FSI comprise a number of indicator elements: forest structure, deadwood, crown condition, vegetation and naturalness. The indicator is proposed to be presented as a 'spider diagrams' showing the values at different times of the different elements put in relation to target values.

The data for the indicator can be provided by forest monitoring networks in Europe:

National Forest Inventories, ICP Forests and ICP Integrated Monitoring plot networks, European Long Term Ecological Research plots etc. A planned project 'Future forest biodiversity monitoring in Europe (FuDiv)' will ensure a coordinated European dataflow for the Forest Status Indicator.



Rete Nazionale Integrata
**CON.
ECO.
FOR.**
Controllo Ecosistemi Forestali

European Forest
and EC Cleaving
cooperation

Forest Policy Unit,
National Forest Service, Italy
forestpolicy@nfs.it

TorJorn Larsen
European Forest
TorJorn.Larsen@eea.europa.eu



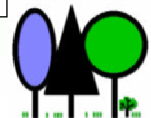
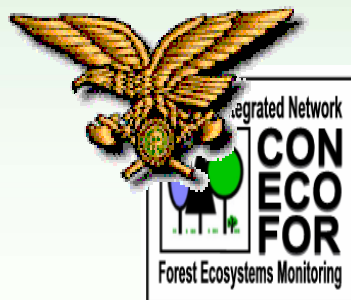
<http://biodiversity-chm.eea.europa.eu>



Development of a Forest Status Indicator

(status and trend of forest ecosystem)

A pilot project under the responsibility of the
Italian Forest Service,
in collaboration with PCC of ICP Forests,
funded by EEA, in the SEBI2010 framework





**CORPO FORESTALE DELLO STATO
ITALIAN NATIONAL FOREST SERVICE**

ISPETTORATO GENERALE

Servizio II - Divisione VI - Ufficio CONECOFOR

SEBI2010 special ad hoc project

**Development and harmonization of a
*Forest Status Indicator (FSI)***

EEA Contract no. 3603/B2006/EEA.52678 (06/10/2006)

Technical report

prepared by:

Bruno Petriccione, Claudia Cindolo, Cristiana Cocciufa, Silvia Ferlazzo, Giuseppe Parisi
Italian Forest Service, CONECOFOR Board

Via G. Carducci 5, Roma (Italy)
[*conecofor@corpoforestale.it*](mailto:conecofor@corpoforestale.it)

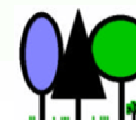
Final version – Roma, 04/06/2007

Final Technical Report

**just published on
EC web site
Clearing House
Mechanism**

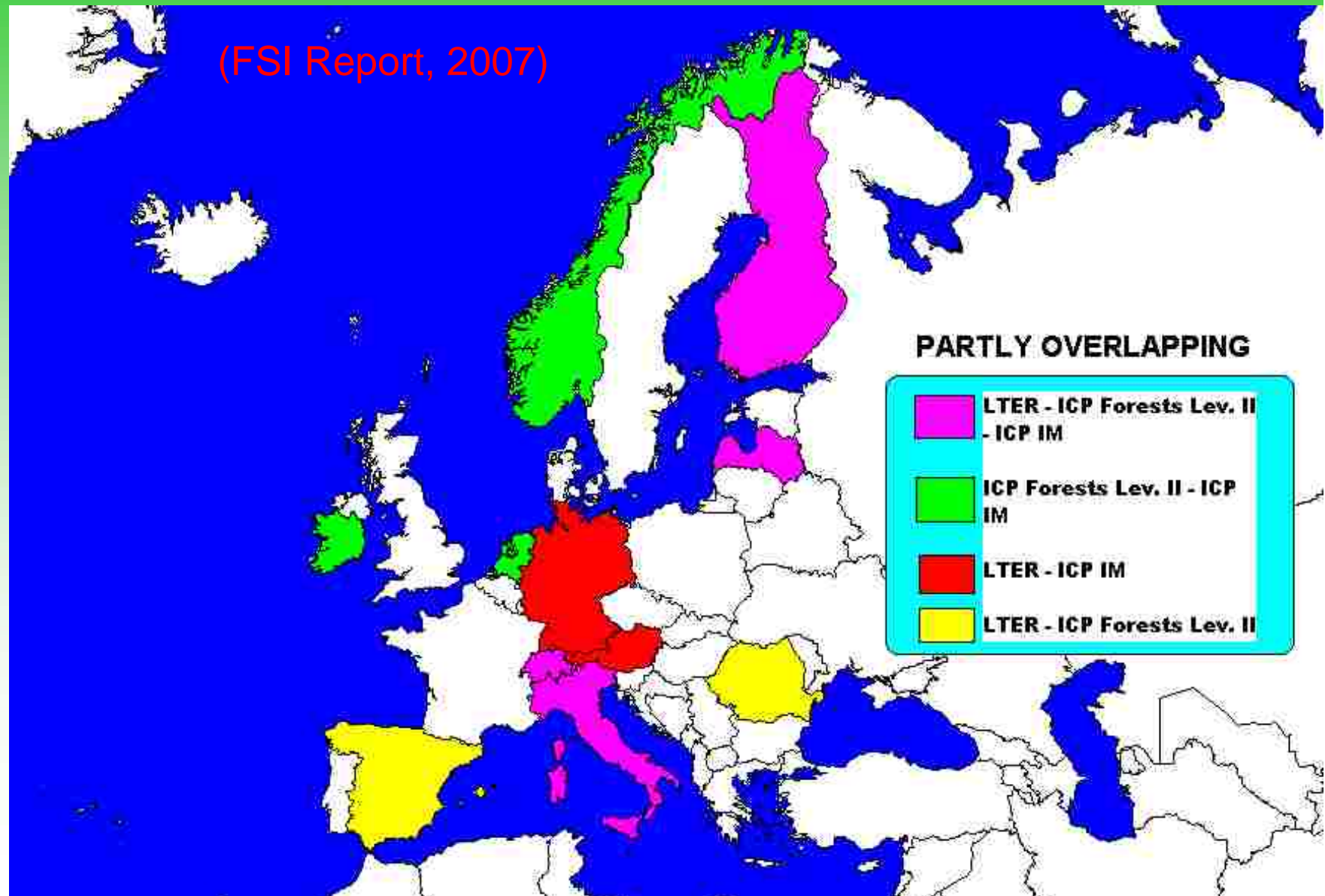
**[http://biodiversity-
chm.eea.europa.eu](http://biodiversity-chm.eea.europa.eu)**

**Petriccione B., Cindolo C.,
Cocciufa C., Ferlazzo S.,
Parisi G., 2007**



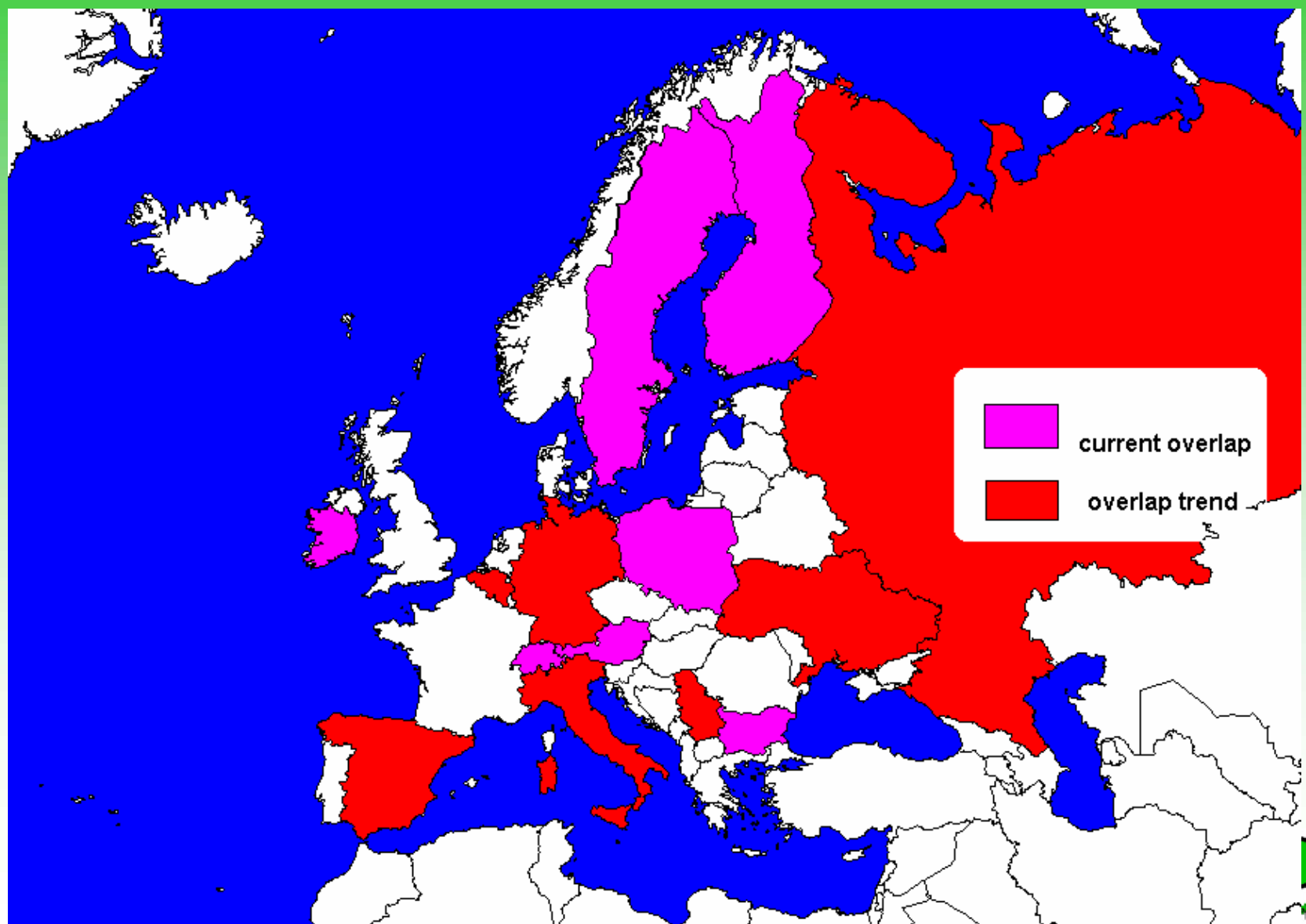
European intensive monitoring & research networks: Countries with overlaps

(FSI Report, 2007)



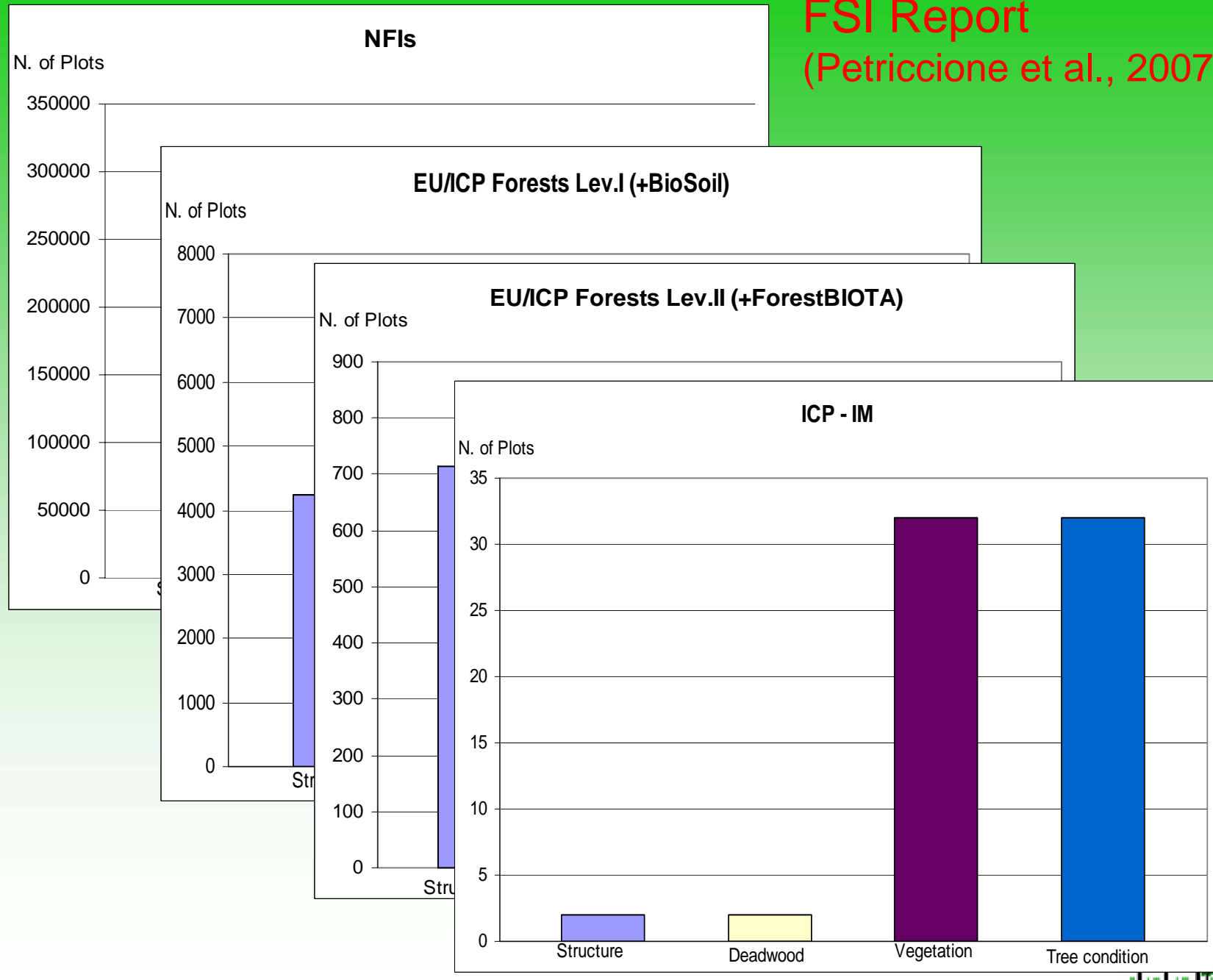
European extensive networks at Country level:

current situation and expected scenario for 2008-2010, as concerns Lev. I and NFI (FSI Report, 2007)



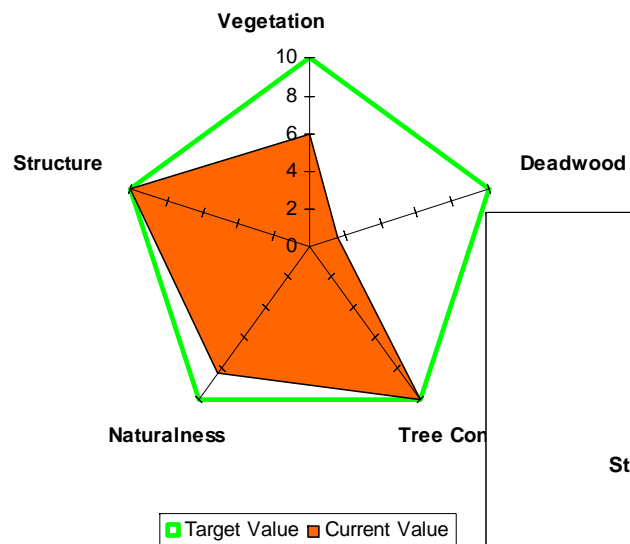
FSI Report

(Petriccione et al., 2007)

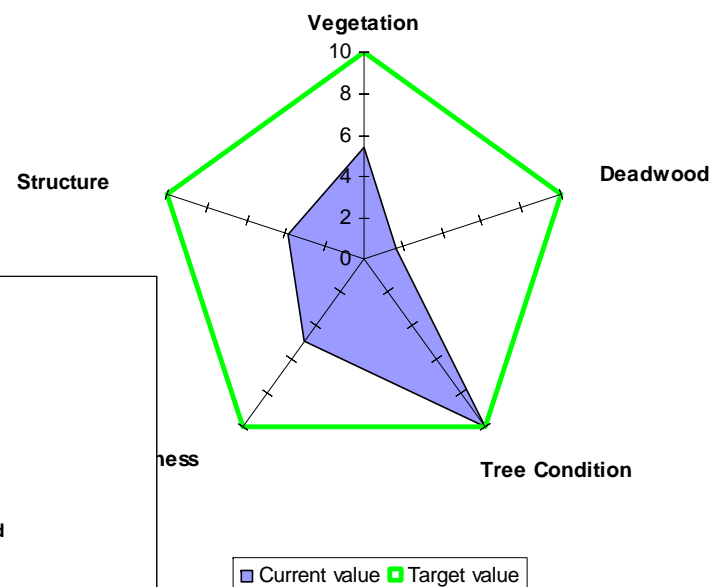


Forest Status Indicator: an example of the output

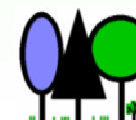
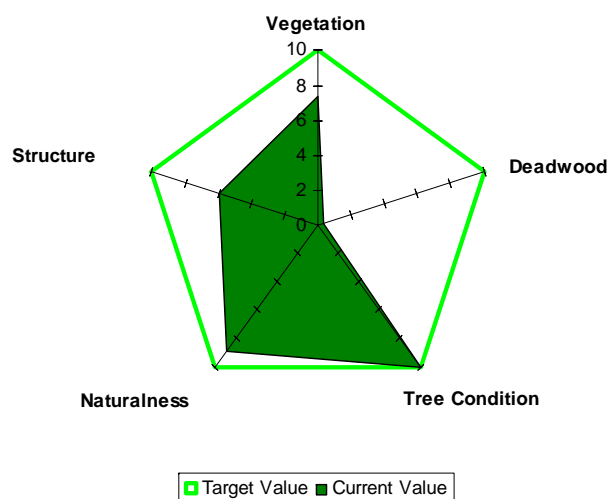
Italy - *Quercus ilex*



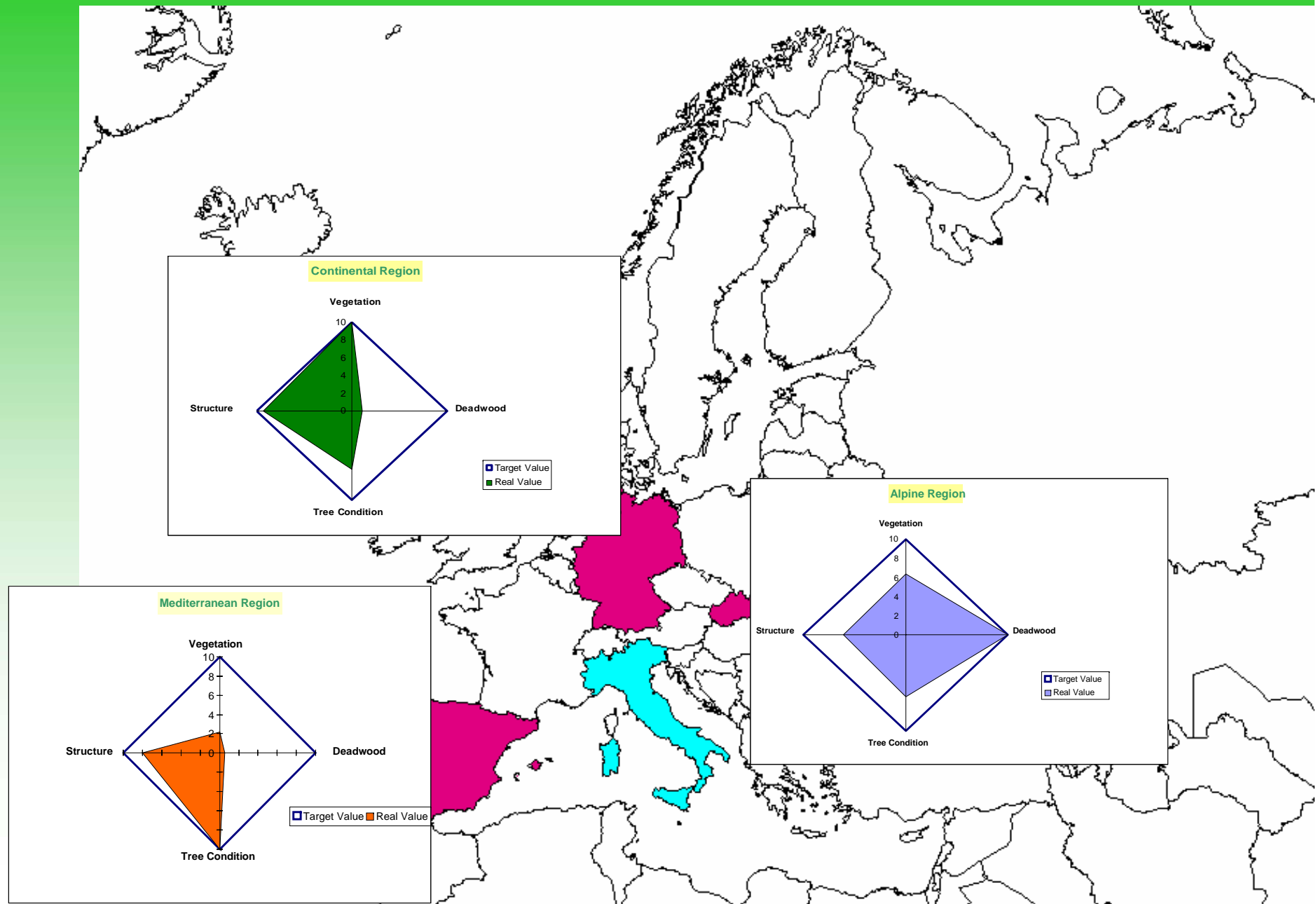
Italy - *Picea abies*



Italy - *Fagus sylvatica*

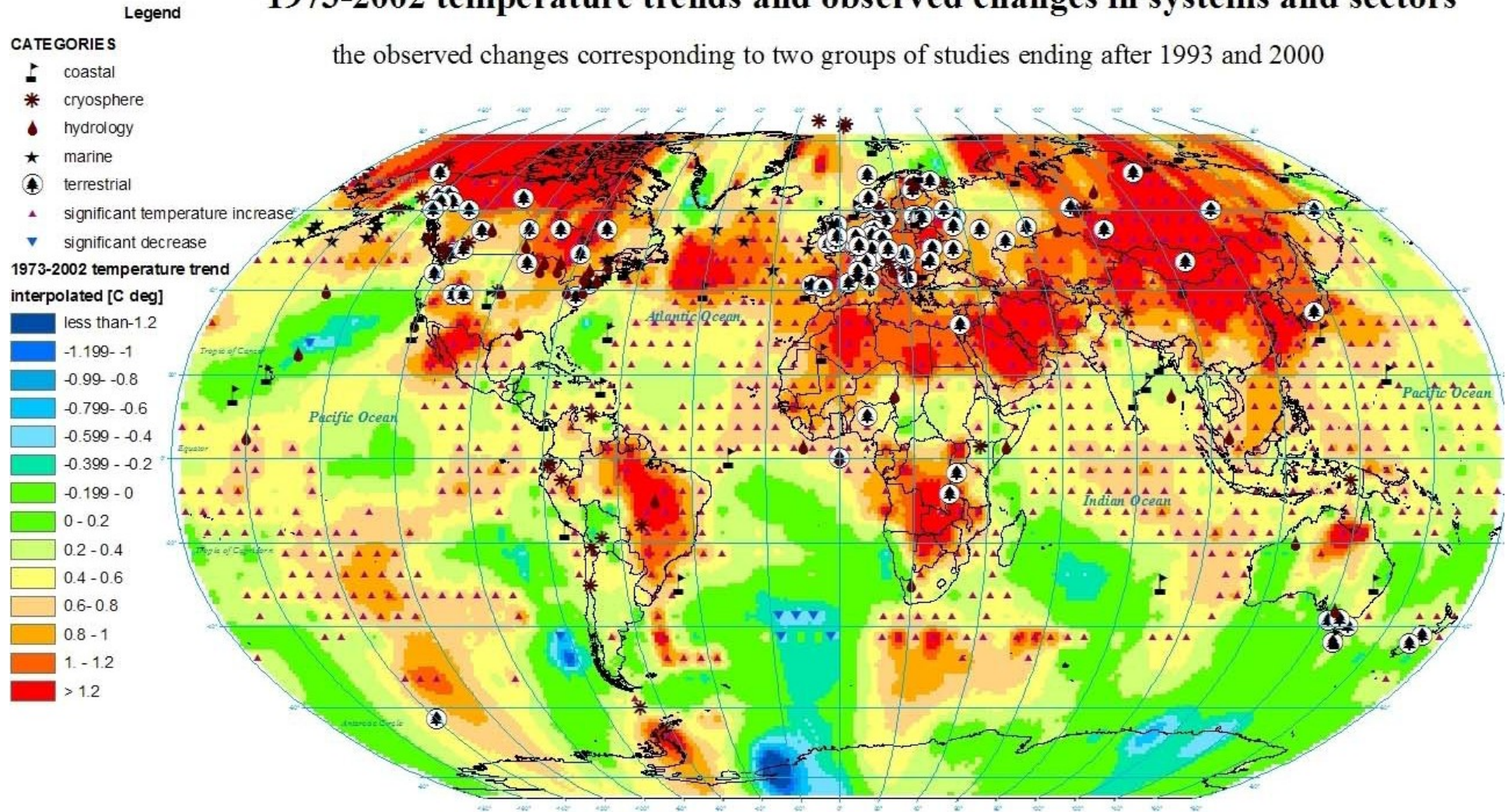


An other example of the output...

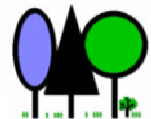


LONG-TERM RESEARCH (min. 20 years) AS CONCERNS IMPACTS OF CLIMATE CHANGES ON THE BIOSPHERE

1973-2002 temperature trends and observed changes in systems and sectors



Source: IPCC, 4th Assessment Report 2007



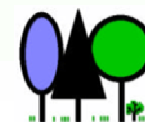
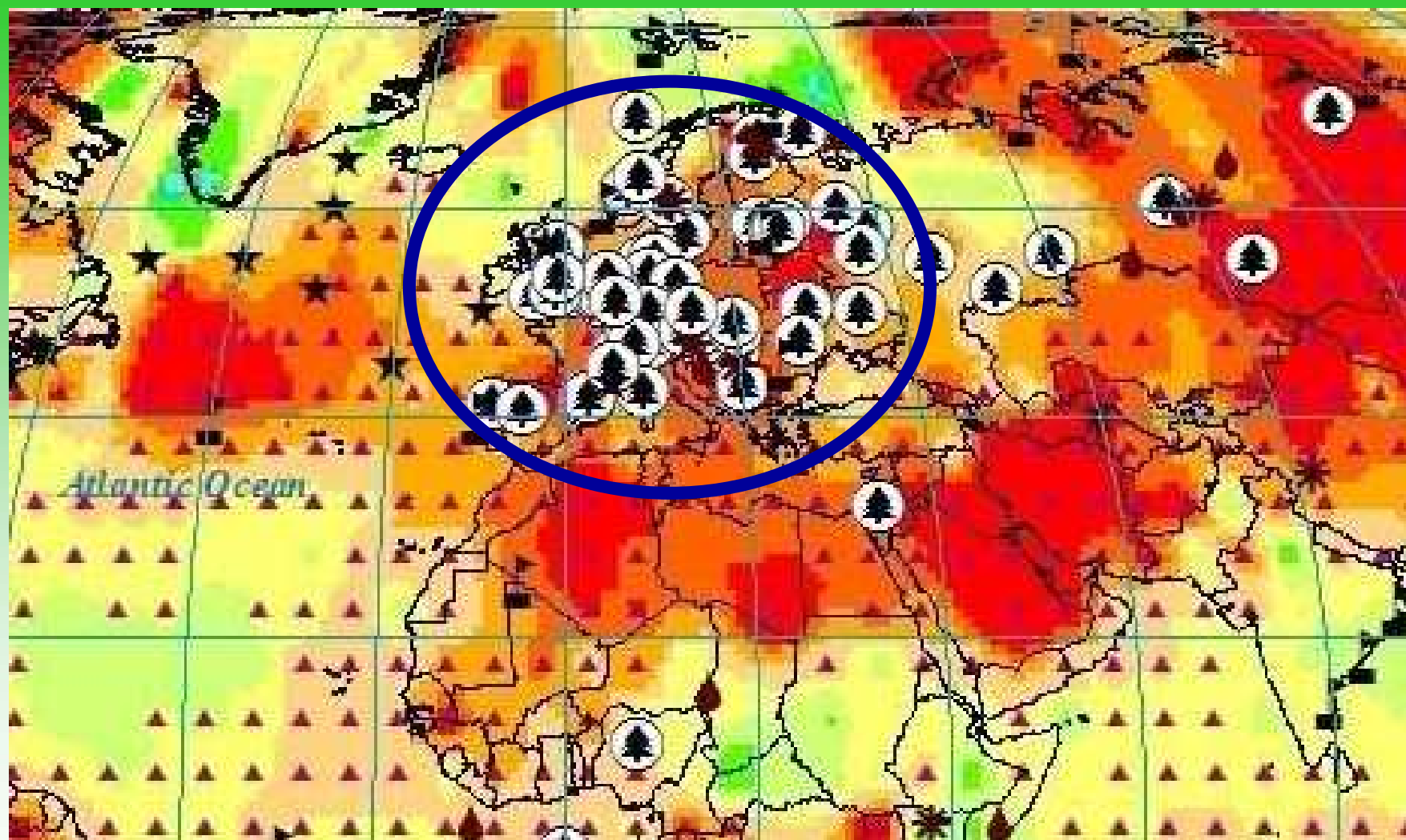


Figure 1: Change in mean annual temperature by the end of this century

Temperature: change in mean annual temperature [C°]

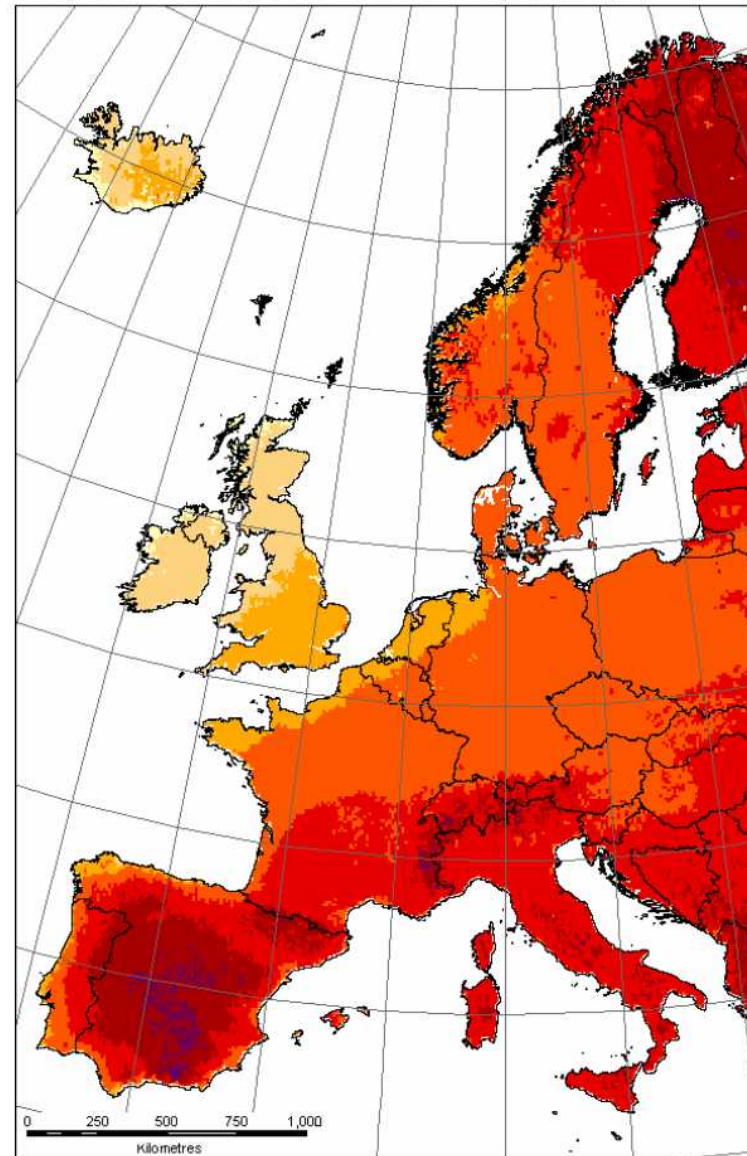
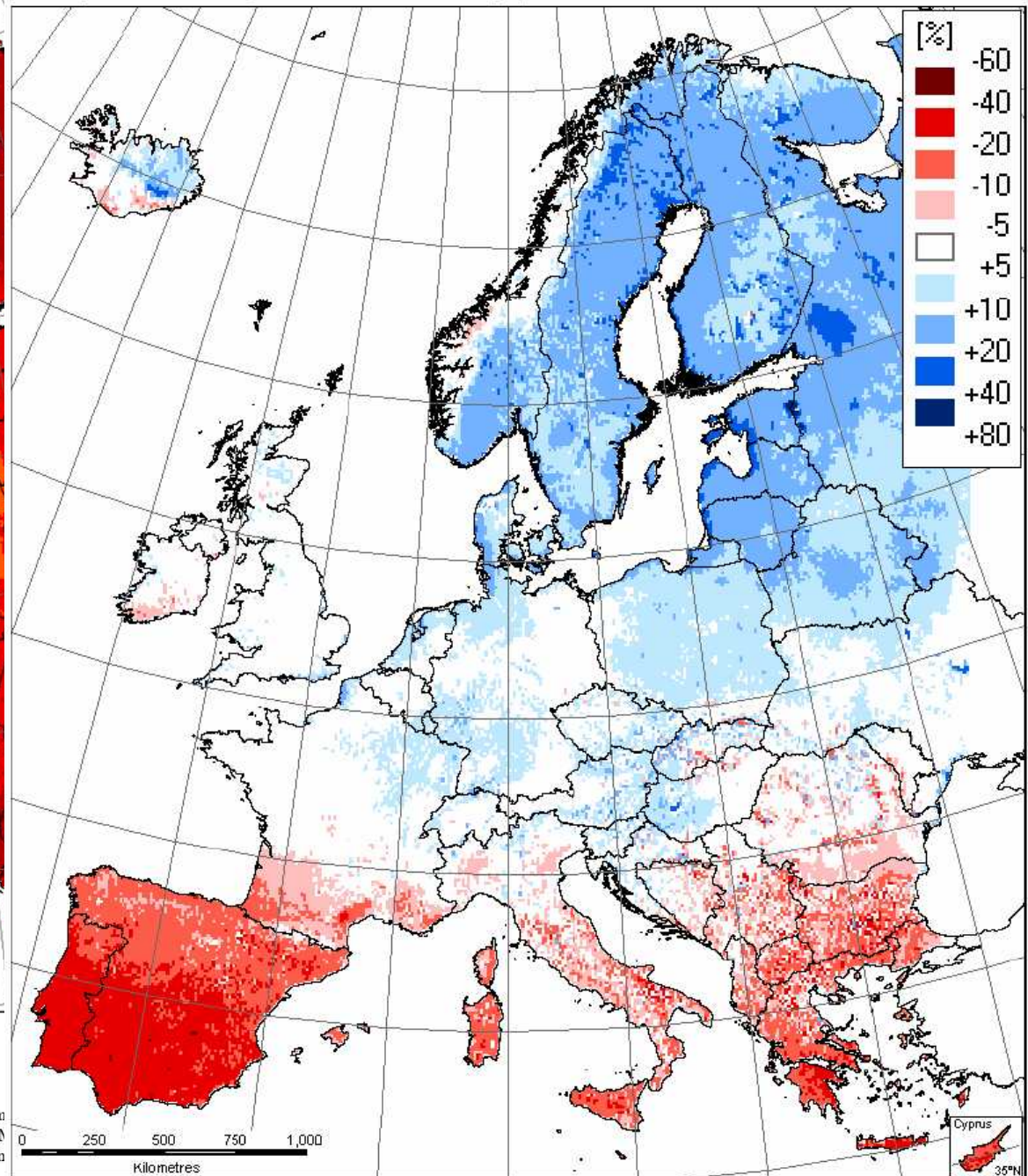


Figure 2: Change in mean annual precipitation by the end of this century

Precipitation: change in annual amount [%]



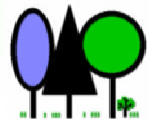
EC Green Paper, 2007

¹ Figures 1 and 2 are based on IPCC SRES scenario A2. The projected climate in 2071-2100 relative to 1961-1990. The maps are based on DN (<http://prudence.dmi.dk>), and processed by JRC within the JRC fun (<http://peseta.jrc.es>)

31/08/2006

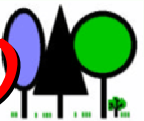


***“Forest” of Acacia in Africa effected by
30 years of dryness ...***



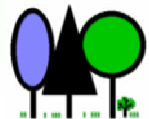


Newsweek, cover page (August 2005)



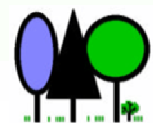
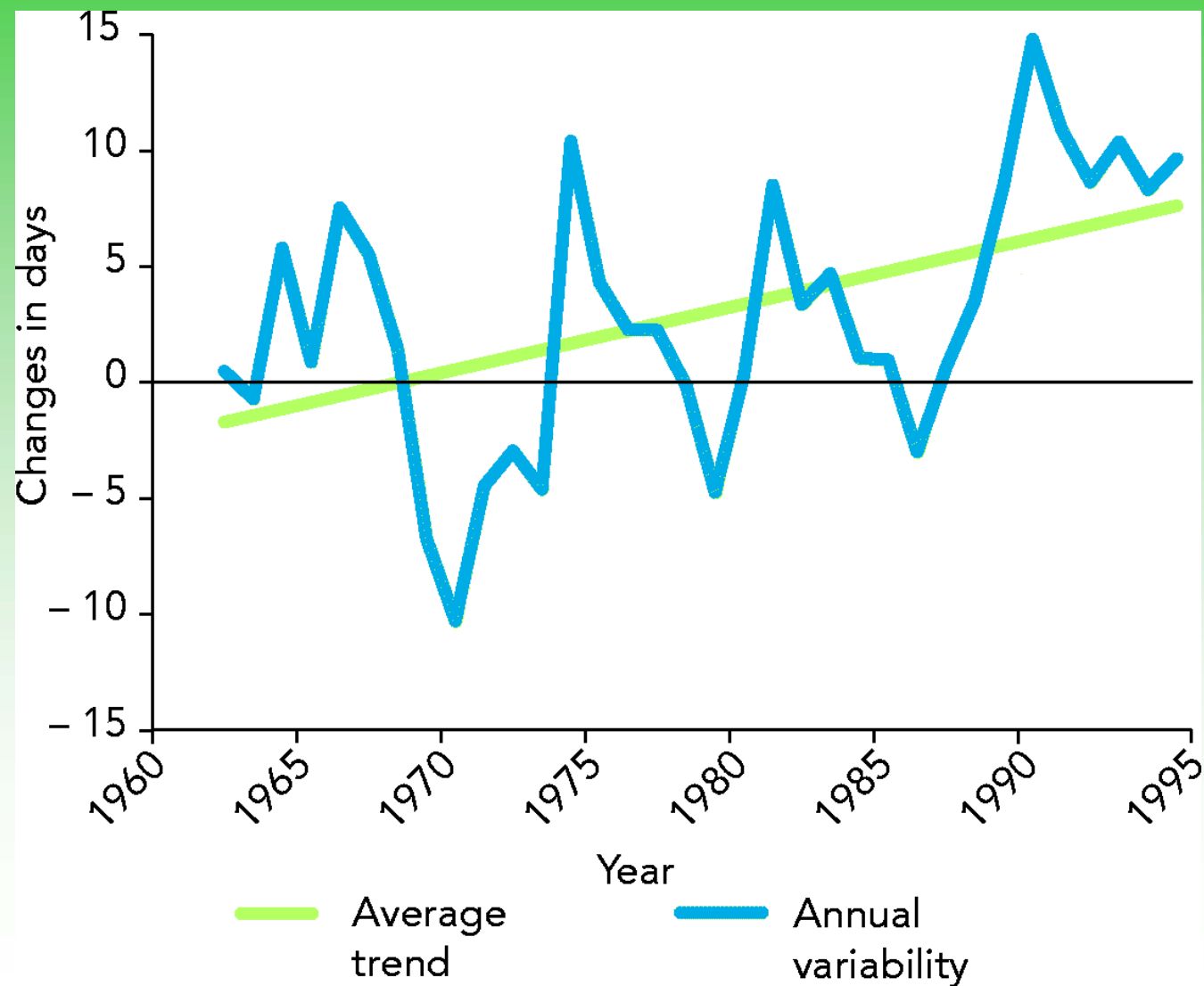
RECORDED EFFECTS OF CLIMATE CHANGES ON FOREST ECOSYSTEM (1)

- Early phenology (3 days every 10 years) in all main tree species (leaves unfolding flowers, fruits).
- ALL NATURAL CYCLES ARE 15 DAYS EARLY THAN 50 YEARS AGO



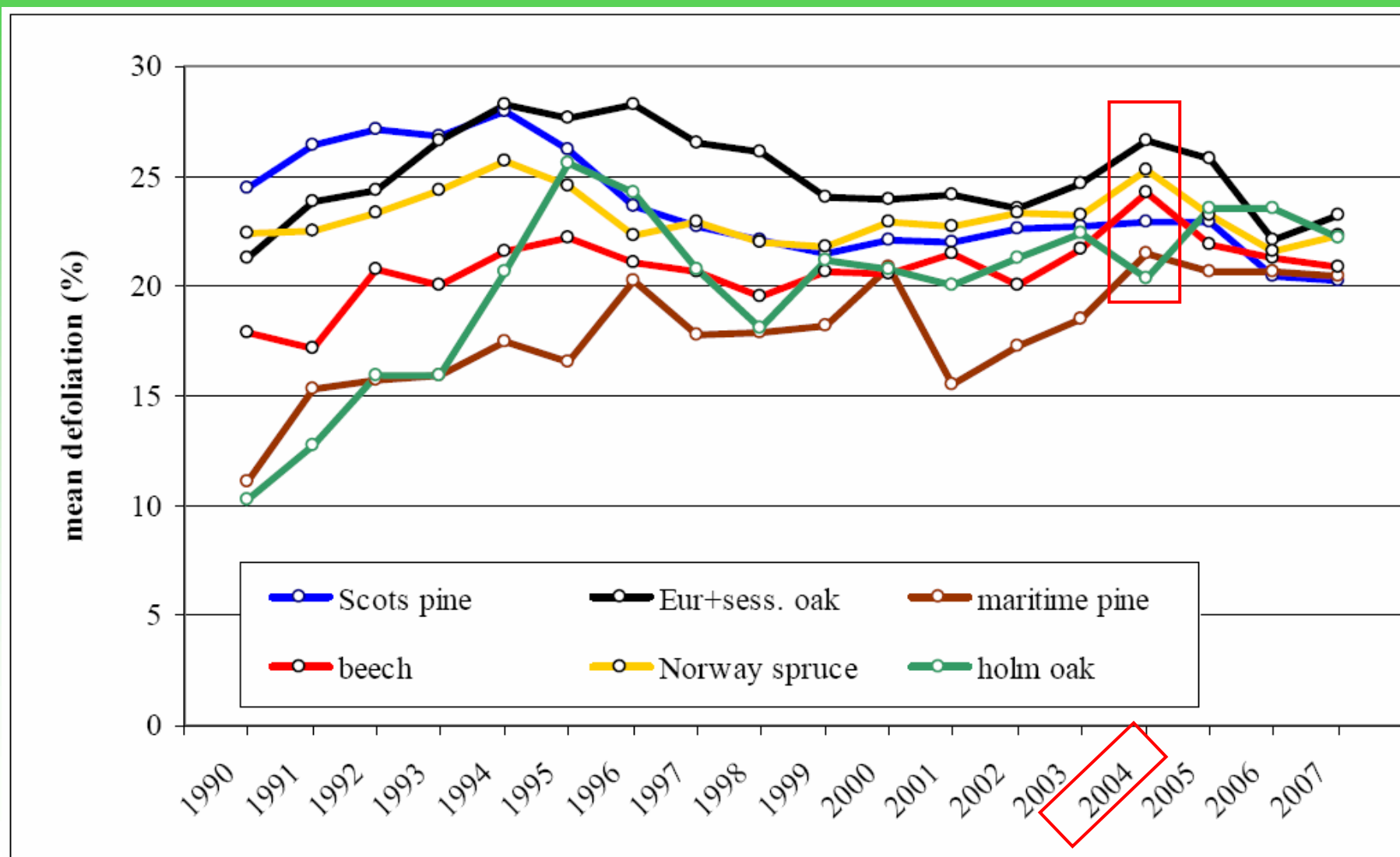
EARLY PHENOLOGY

in Europe in the period 1960-1995

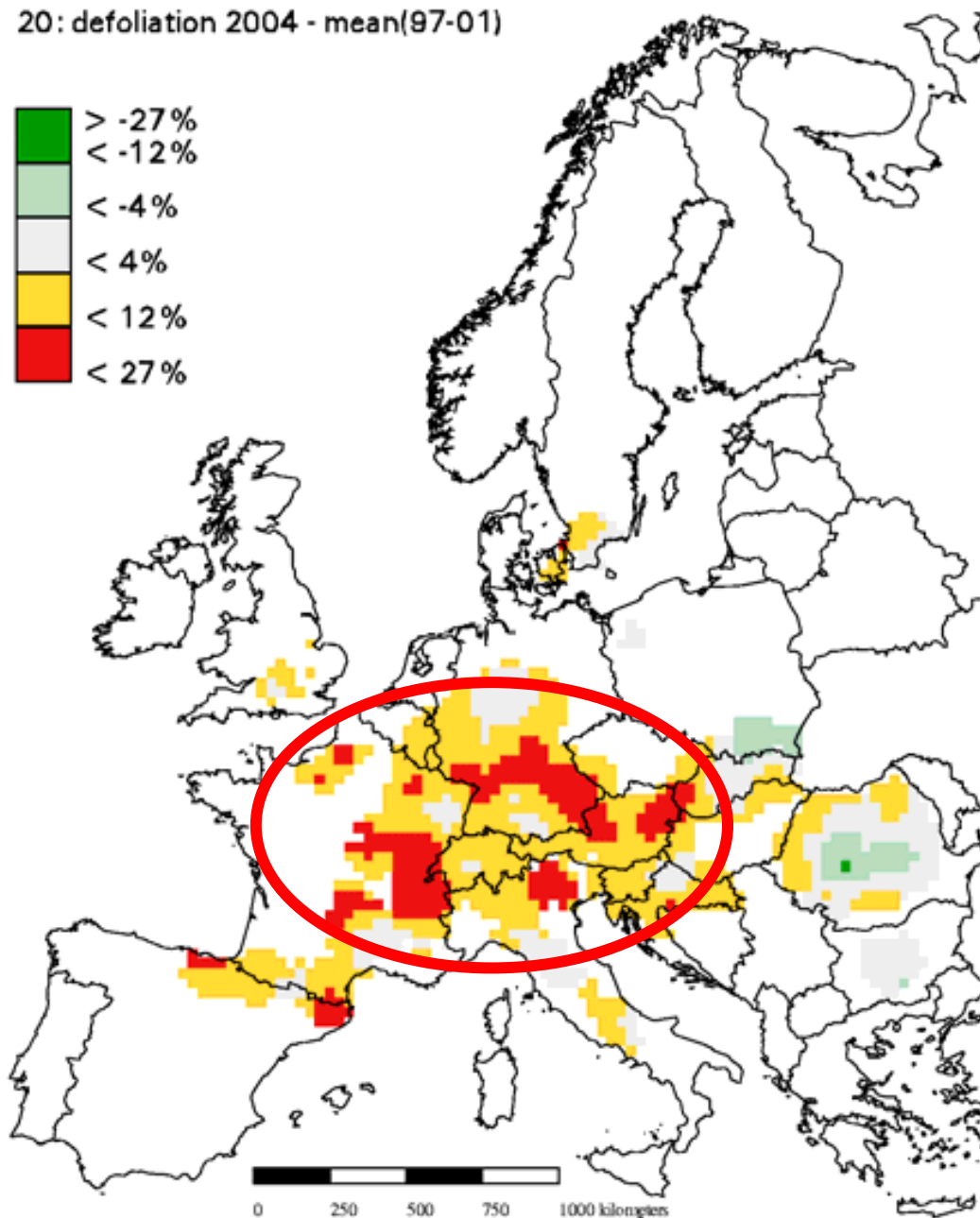
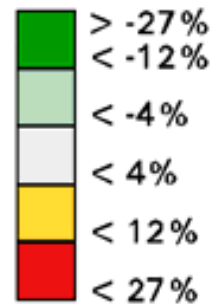


UE/UN-ECE ICP Forests Lev. I network (6000 plots)

Defoliation data 1990-2007



20: defoliation 2004 - mean(97-01)

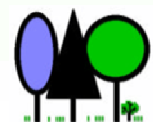


Results of 2003 summer heat and drought peak:

**deviation of mean plot
defoliation of common beech
in 2004 from the average
defoliation 1997-2003**

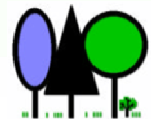
(Kriging interpolation based on 564
plots continuously assessed from
1997 to 2004)

*Source: UN-ECE ICP Forests
Technical Report 2005*



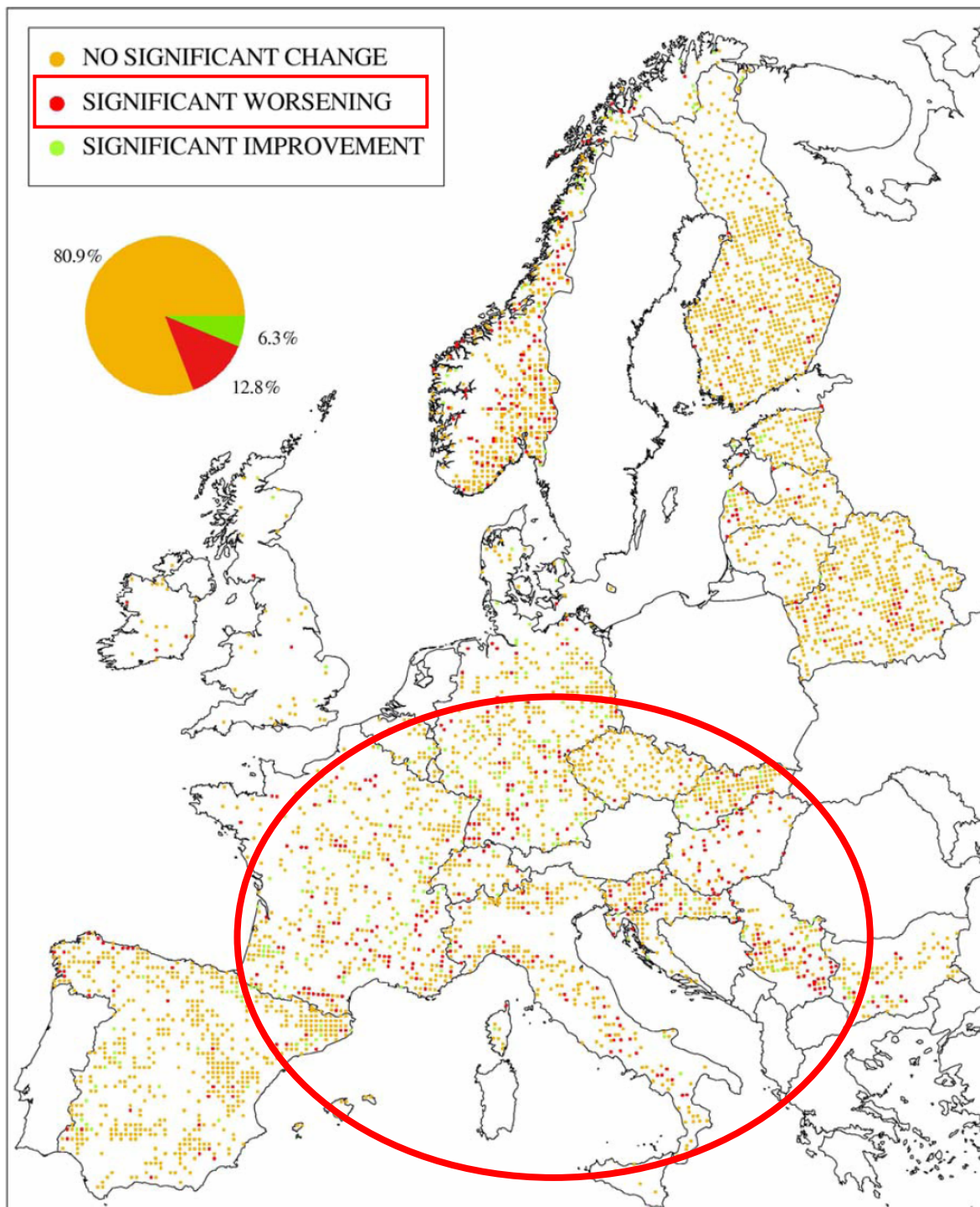
RECORDED EFFECTS OF CLIMATE CHANGE ON FOREST ECOSYSTEM (2)

- The damage threshold has been reached and passed for the first time in the Summer 2007 in Southern Europe Lev. I plots
- Oaks and beech have lost, in average, 25-35% of leaves (first event in 20 years of monitoring activities)
- First clear evidence of *desegregation* symptoms of forest ecosystem



Summer 2007
in Central Italy ...

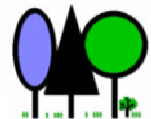




Results of 2007 summer heat and drought peak:

defoliation trend 2006-2007

Source: UN-ECE ICP Forests
Technical Report 2008 (in prep.)



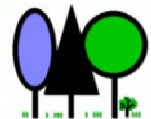
ITALY

Lev. I – Data 2007

DEFOLIATION



**DAMAGE THRESHOLD
(25%) PASSED**





EU Reg. n. 2152/2003 Forest Focus



Climate change effects on forest biodiversity: results of *BioRefugia*, a pilot project based on main tree species in Central Italy

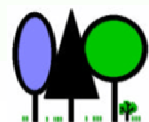


ITALIAN FOREST SERVICE - CONECOFOR BOARD

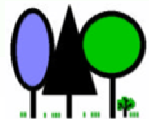


SAPIENZA
Università di Roma

University of Roma – Dpt. Plant Biology



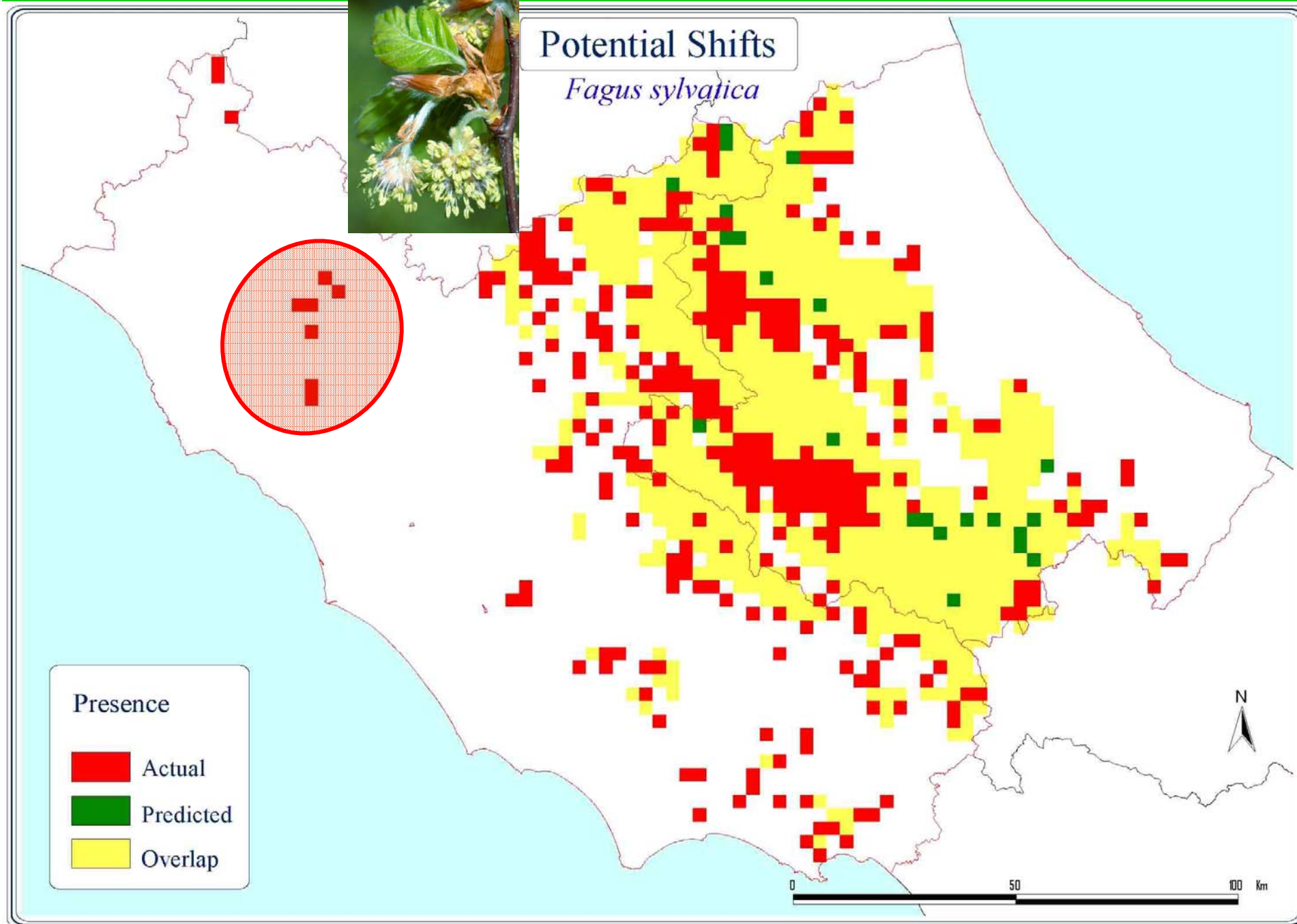
- Comparison of current and expected distribution of 16 tree species of Central Italy
- Ecological scenarios expected for 2080, on the basis of to IPCC 2001 climate worst scenarios (B1 & A1F1)
- Identify shelter areas (*biorefugia*) for main tree species in Central Italy

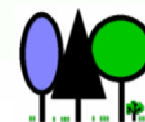
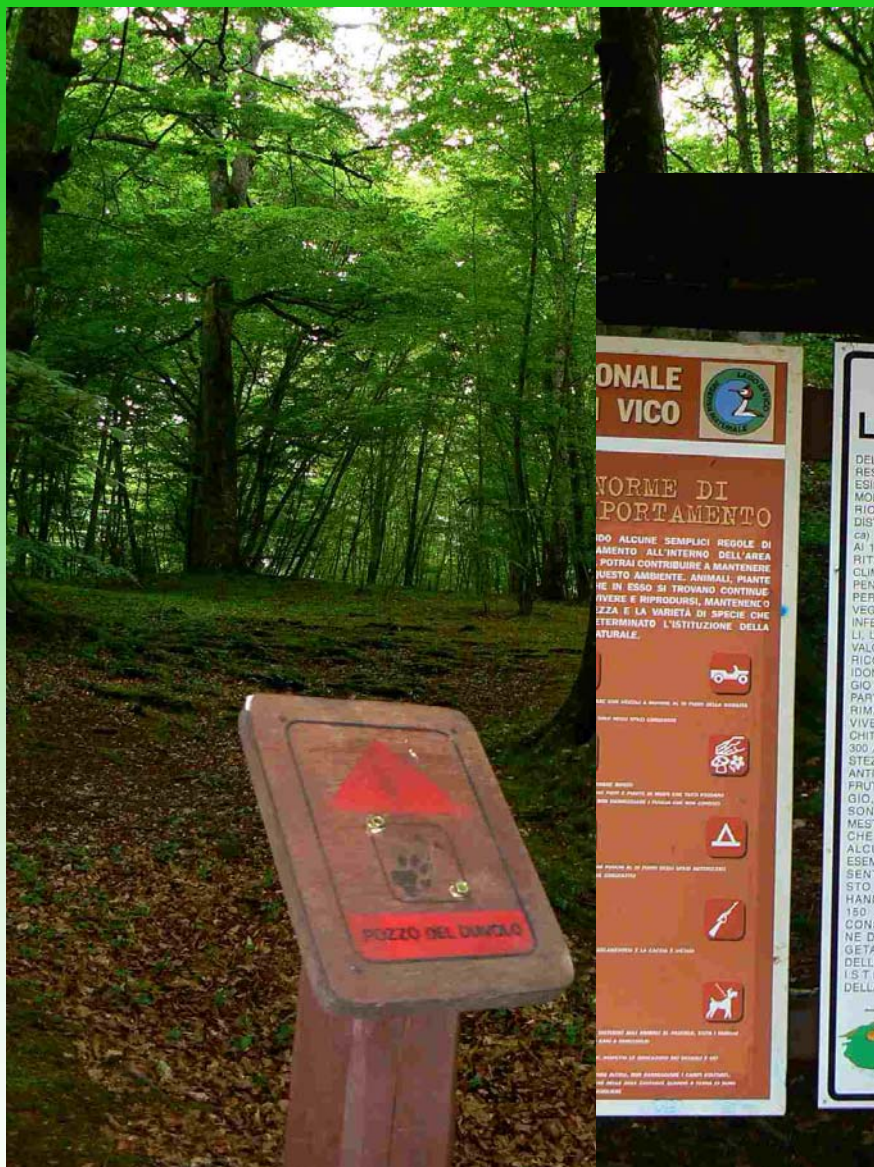




Potential Shifts

Fagus sylvatica

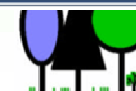
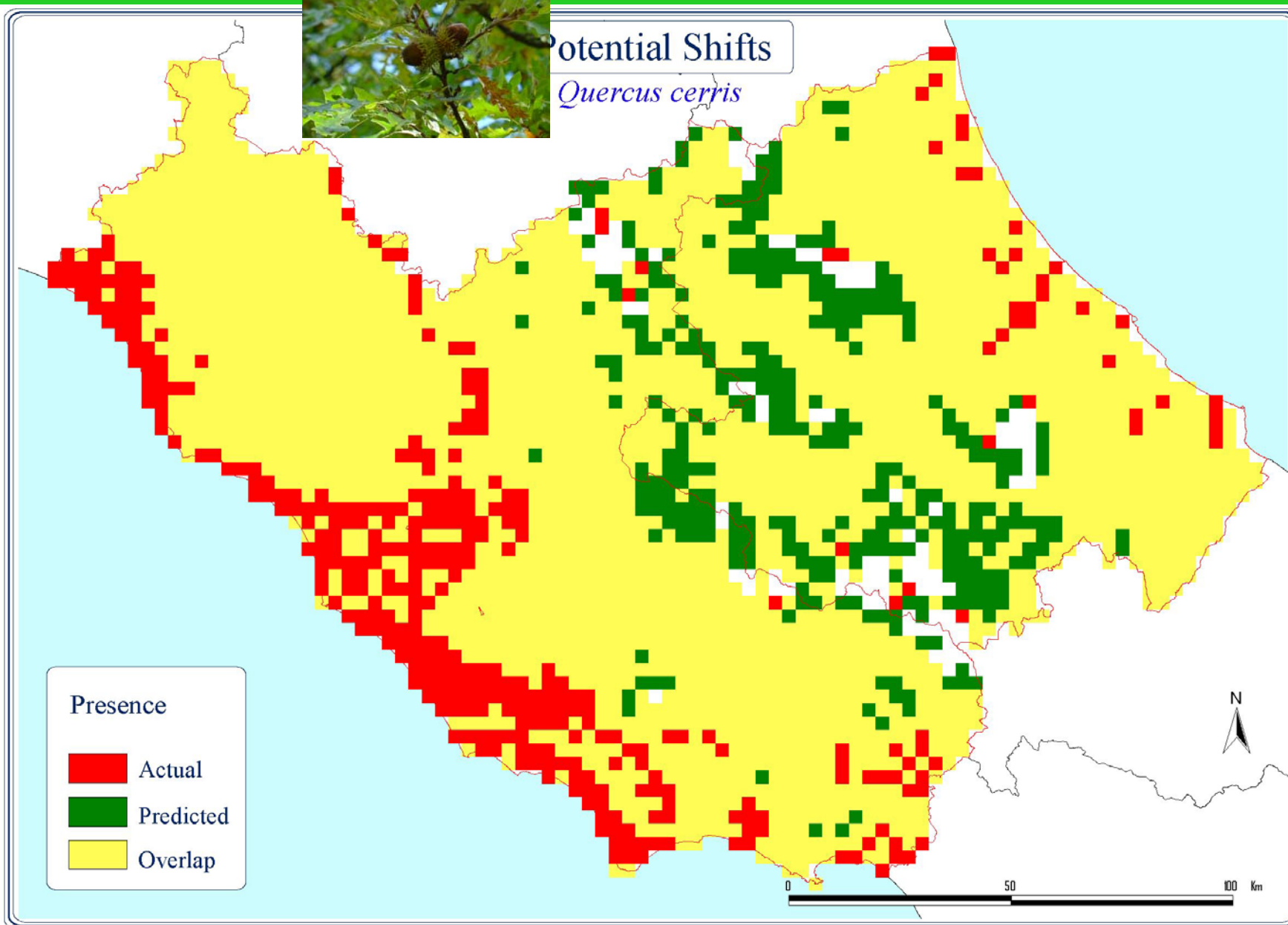






Potential Shifts

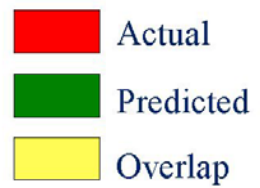
Quercus cerris





Potential Shifts *Quercus ilex*

Presence

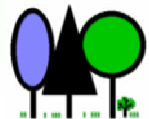


0 50 100 Km



SHIFTING OF SPECIES AREAS IS ONLY POTENTIAL

- Migration ability of species is very low: ***species are slower than climate change speed!***
- Soil suitability is not continuous in the space.
- Land fragmentation is a serious obstacle to species migration.
- Different species have different speed of potential migration → **desegregation process** in the forest ecosystems.



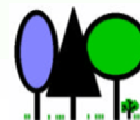
Climate warming will lead the forest environment to a phase of deep instability, with a worsening in comparison to the undisturbed and old-growth biocenosis, because of a wide-spread break of ecosystem interactions ...

(Pignatti, 2007)



EXPECTED EFFECTS OF CLIMATE CHANGES ON FOREST ECOSYSTEM

- Progressive **desegregation** of forest ecosystem: **only a few components will be able to migrate in more suitable areas**, whereas most of them will going to be extinct, at least at local level.
- A **desegregation** process is just in the course in the most sensitive forests to climate change (e.g., floodplain forests, strictly linked to regular availability of water in the upper part of soil)





URGENT ACTIONS

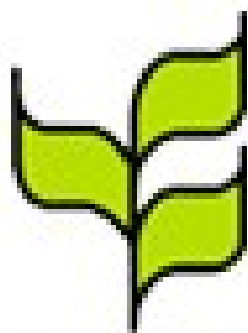
**IMPROVING MONITORING SYSTEMS FOR
AN EARLY WARNING DETECTION**

**IMPROVING PROTECTION OF
THREATEANED FORESTS AND SHELTER
AREAS**

**IMPROVING NETWORKS OF PROTECTED
AREAS**



CBD



Convention on Biological Diversity

Distr.
GENERAL

UNEP/CBD/SBSTTA/13/3
13 November 2007

ORIGINAL: ENGLISH

SUBSIDIARY BODY ON SCIENTIFIC, TECHNICAL
AND TECHNOLOGICAL ADVICE

Thirteenth meeting

FAO, Rome, 18–22 February 2008

Bonn, 19-30 May 2008

*The Conference of the Parties
invites/urges Parties to*

- ✓ improve forest biodiversity monitoring, inventorying and reporting
- ✓ harmonize temporal and spatial scales in data collection and analysis considering climate change and biodiversity status and trends

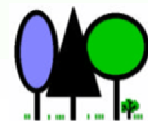


EU/ICP-Forests networks



- 800
Lev. II plots
- 6000
Lev. I plots

1990-2007

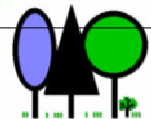
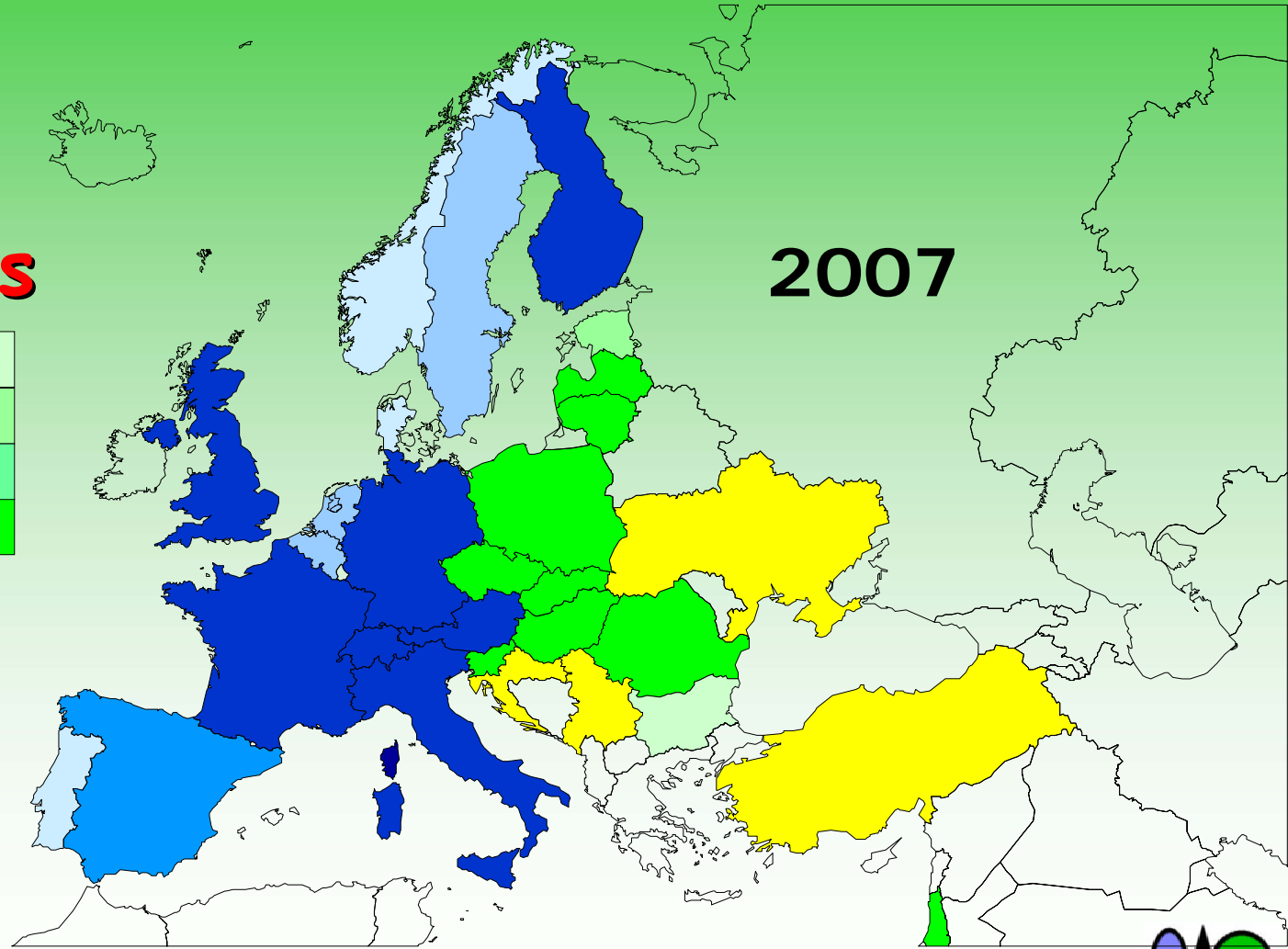


LTER Europe

16 members

2007

discussion started	W	E
first concepts		
network implementation		
formal ILTER member		





Regulation (EC) no. 614/2007 LIFE+



A project proposal for *Future* bio*Diversity* monitoring in Europe: *FutDiv*

Three years (2009-2011)

Total budget: 10 million €

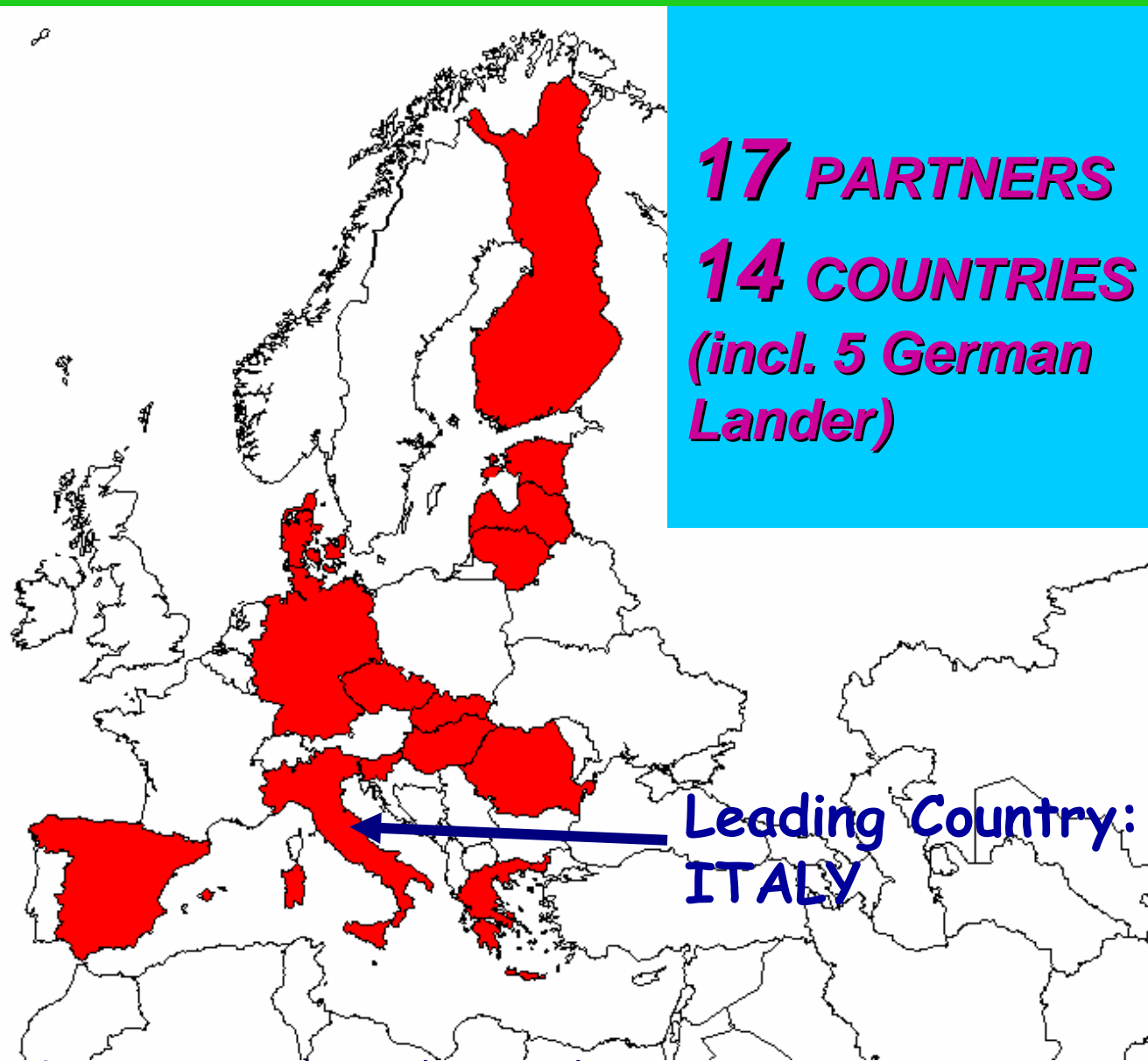




FutDiv



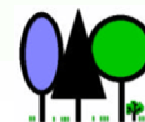
CRA
AGRICULTURAL RESEARCH
COUNCIL



17 PARTNERS
14 COUNTRIES
(incl. 5 German
Lander)

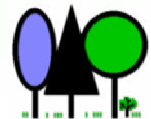
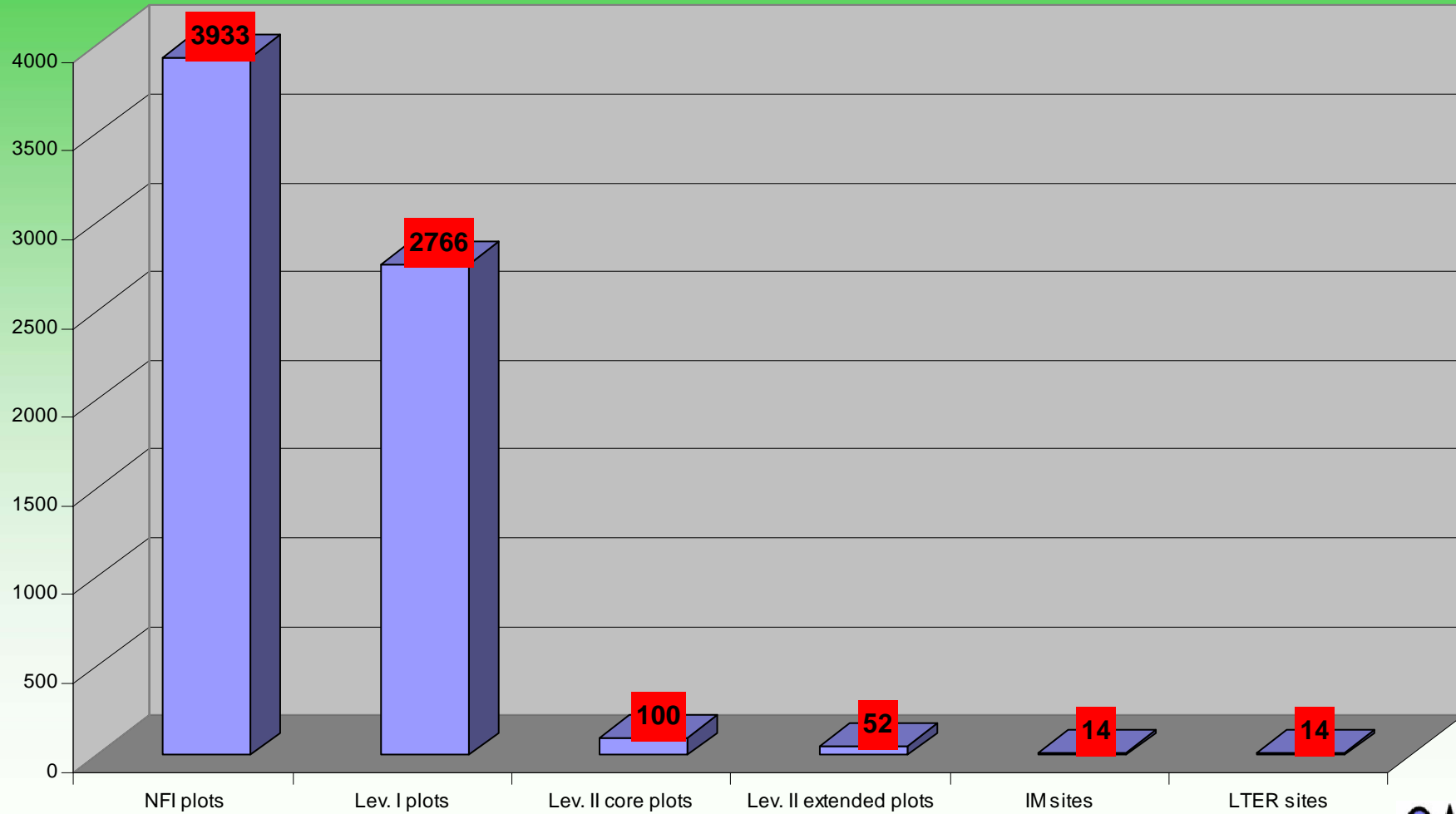
**Leading Country:
ITALY**

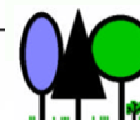
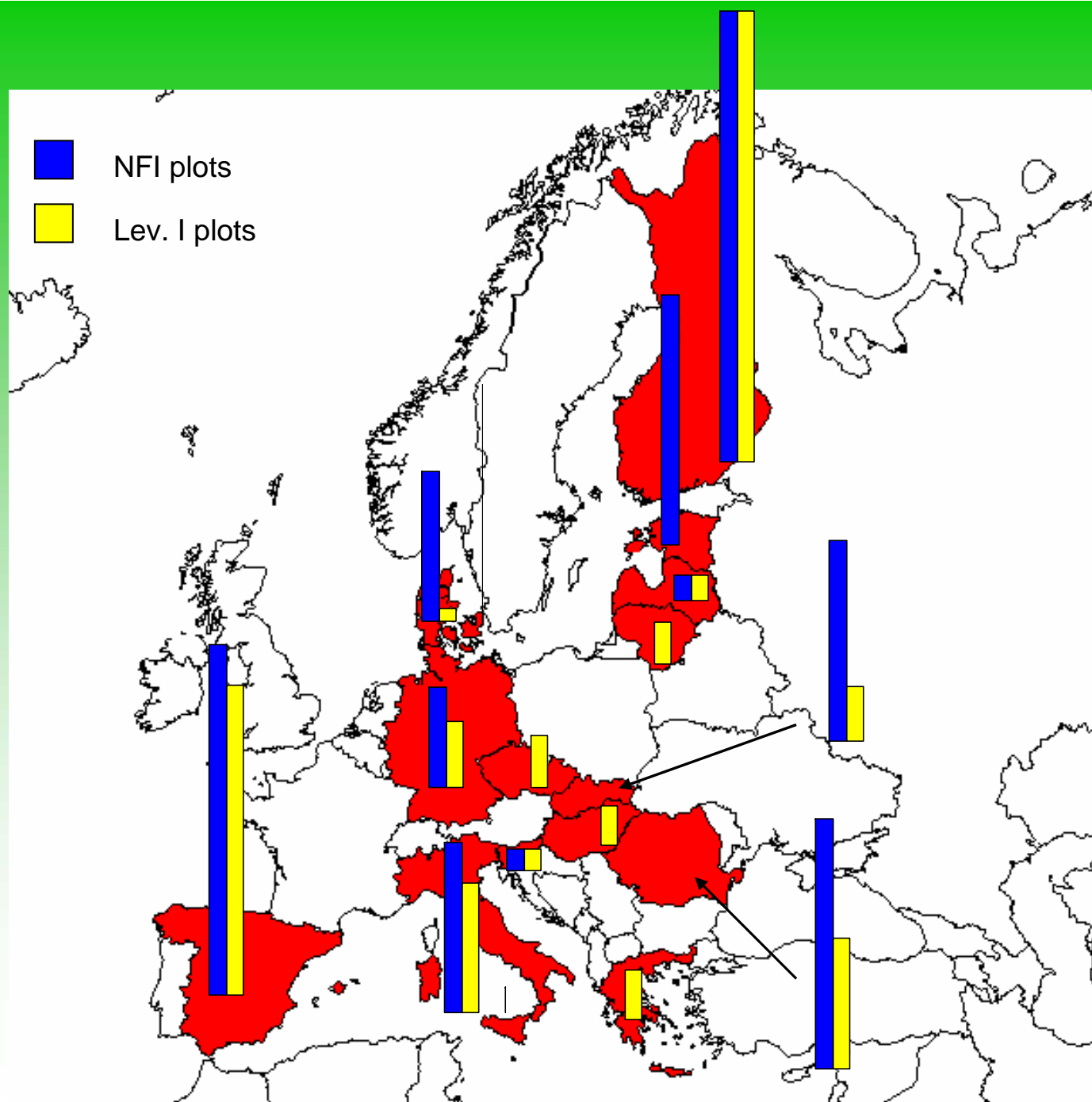
<http://www2.corpoforestale.it/web/guest/serviziattivita/controlloecosistemiforestali/iniziativeinternazionali/fut>

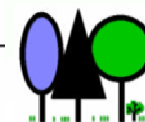
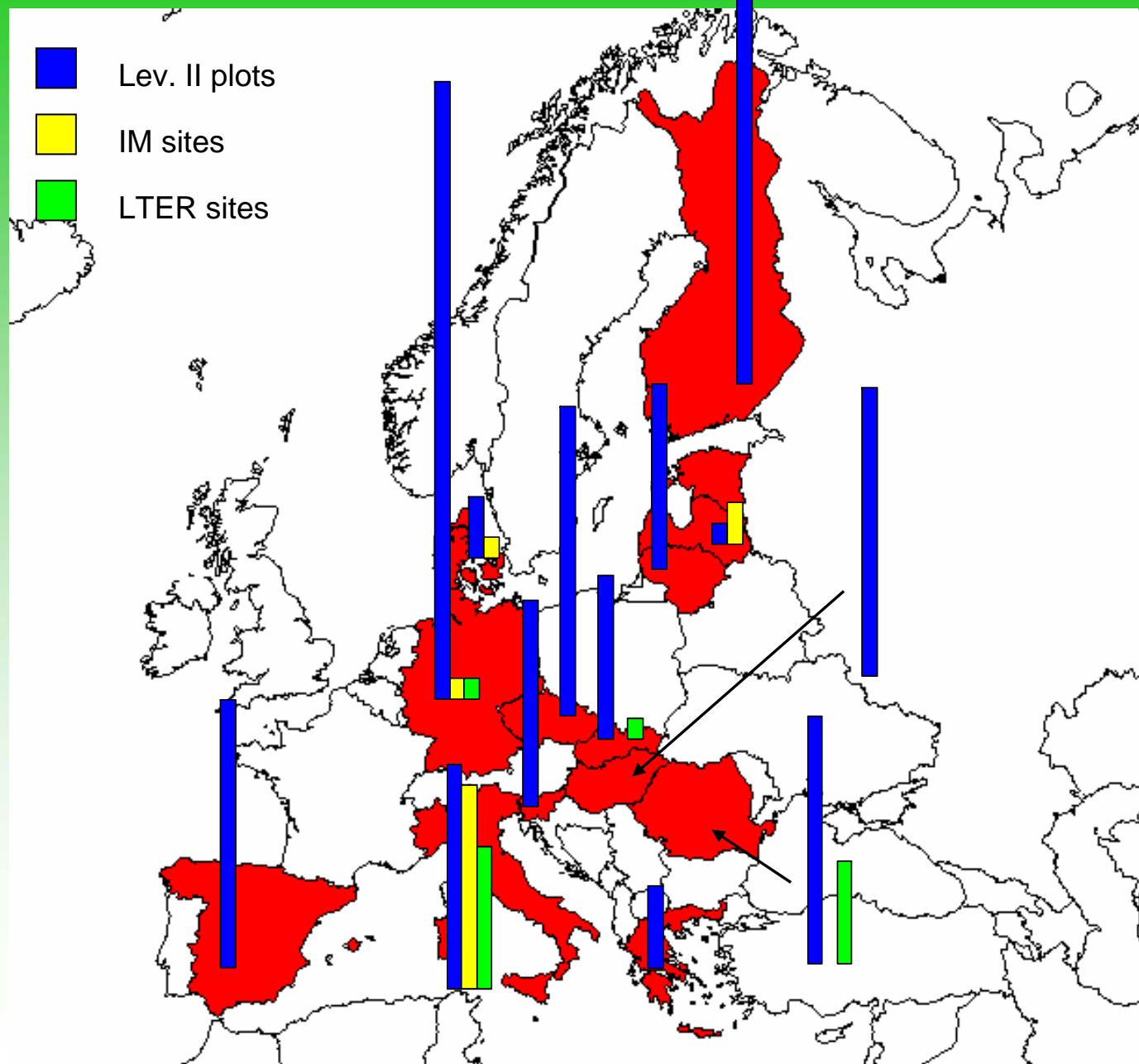




FutDiv networks







FutDiv expected results

- **Show feasibility** of “harmonised” methods at all levels on EU scale
- **Provide data** on status and trends of forest biodiversity on EU scale
- **Clarify cause-effect relationship** between pressure factors and biodiversity parameters (in connection with other SEBI2010 indicators)
- **Test phase 2009-2011** (implementation phase 2012-2014 in a 2nd project)

