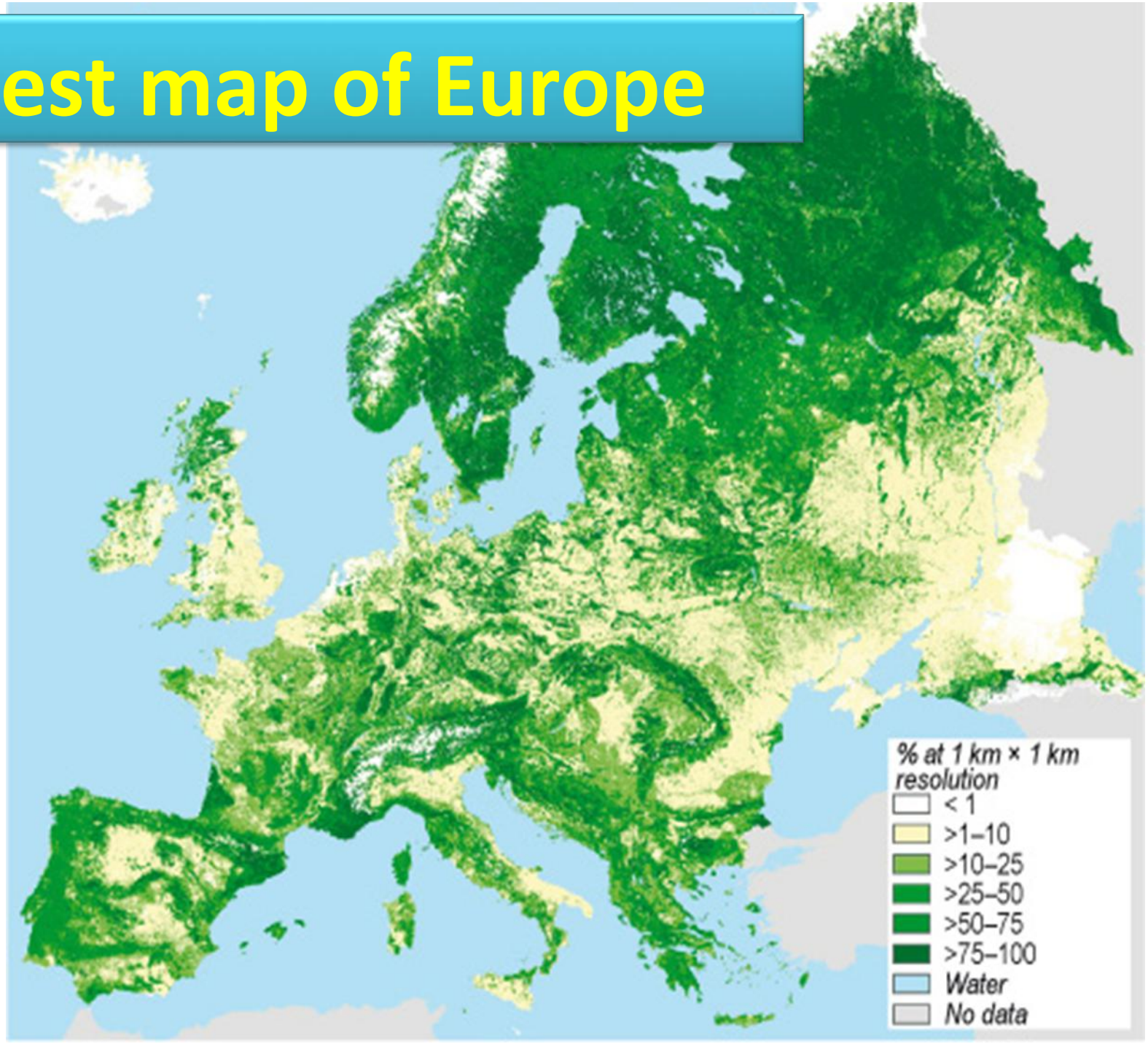
Promoting integrated management of mountain protected areas – new approaches to sustainable conservation and growth

Giuseppe Scarascia-Mugnozza -
University of Tuscia, Viterbo (Italy)

IPROMO -Summer School on Mountain environments and Protected areas
Ormea (CN), *11 july 2016*

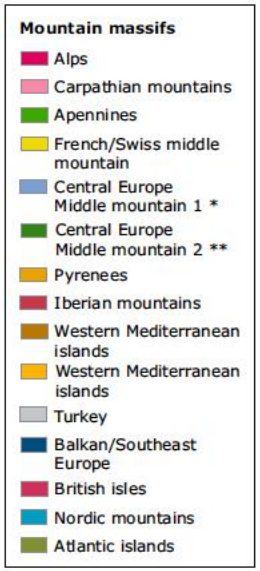
Forest map of Europe



Forest surface consistently overlaps with mountain areas in Italy (and in South Europe)

Forest surface consistently overlaps with mountain areas in Italy (and in South Europe)

Why scientific research on mountain forests?



Note: * = Belgium and Germany; ** = the Czech Republic, Austria and Germany.

- *Climate change adapt/ mitigation*
- *Treeline dynamics*
- *Tree productivity*
- *Wood mobilization*
- *Forest biodiversity*
- *Insect outbreaks*
- *Fire frequencies*
- *Melting glaciers*
- *Flushing nitrogen*

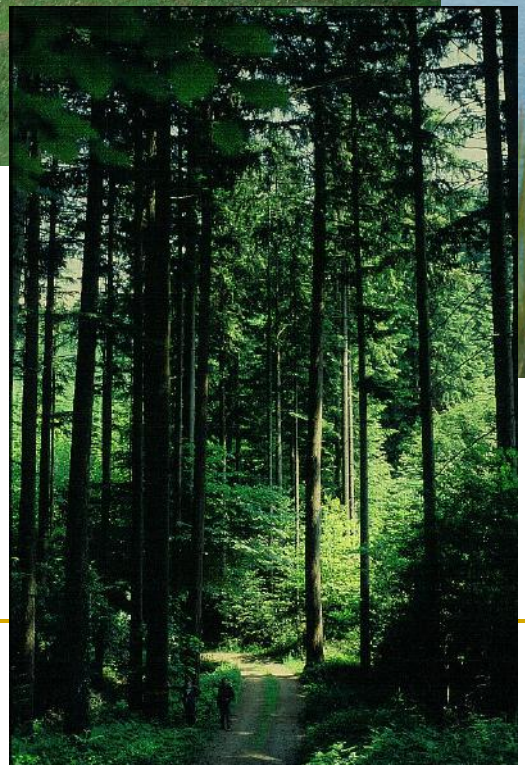
EU-27: 29% mountains, 41% forests, 43% Natura 2000, 88% habitats

Mountain ecosystems of Europe are ideally suited to address <u>ecological and social questions</u> associated with global change

Some facts about Italian forestry

- Italian forests are rich of biodiversity
  - large latitudinal and environmental gradient (from 35°N, in Sicily, to 47°N, in SudTyrol)
  - more than 25,000 plant species in the Mediterranean (6,000 species in NC Europe)
  - 100 forest tree species in the Mediterranean (30 tree species in NC Europe)
  - Italy has represented a glacial refugium for many important European species (*Fagus, Quercus, Picea, Abies*)
  - coevolution of plant and animal species with human activities

Some facts about Italian forestry



Italian forestry rich of history/1

- Landscape modification with the introduction/ diffusion of new species since Roman time (*Pinus pinea, Cupressus sempervirens, Castanea sativa*)
- In Siena (Montagnola senese) there are oak coppice forests that are still managed since XIII century (sustainable management!), as reconstructed from middle-age management plans

Italian forestry rich of history/1

Italian forestry rich of history/1

Italian forestry rich of history/1

Italian forestry rich of history/2

- The expansion of the Republic of Venice was based on alpine forests, for houses construction, war ships and soil conservation
- Venice had already in 1450 a detailed forest inventory of its State forests
- The Arsenal of Venice needed 60,000 m^3 of wood per year (oaks for ships, spruce as masts and beech as rows)

Italian forestry rich of history/2

Italian forestry rich of history/2

Italian forestry rich of history/2

Italian forestry rich of history/2

- Forest conservation through natural assisted regeneration was crucial for soil and water regulation and the protection of the Venetian Lagoon

Italian forestry rich of history/2

ADDI 22. SETTEMBRE 1770.

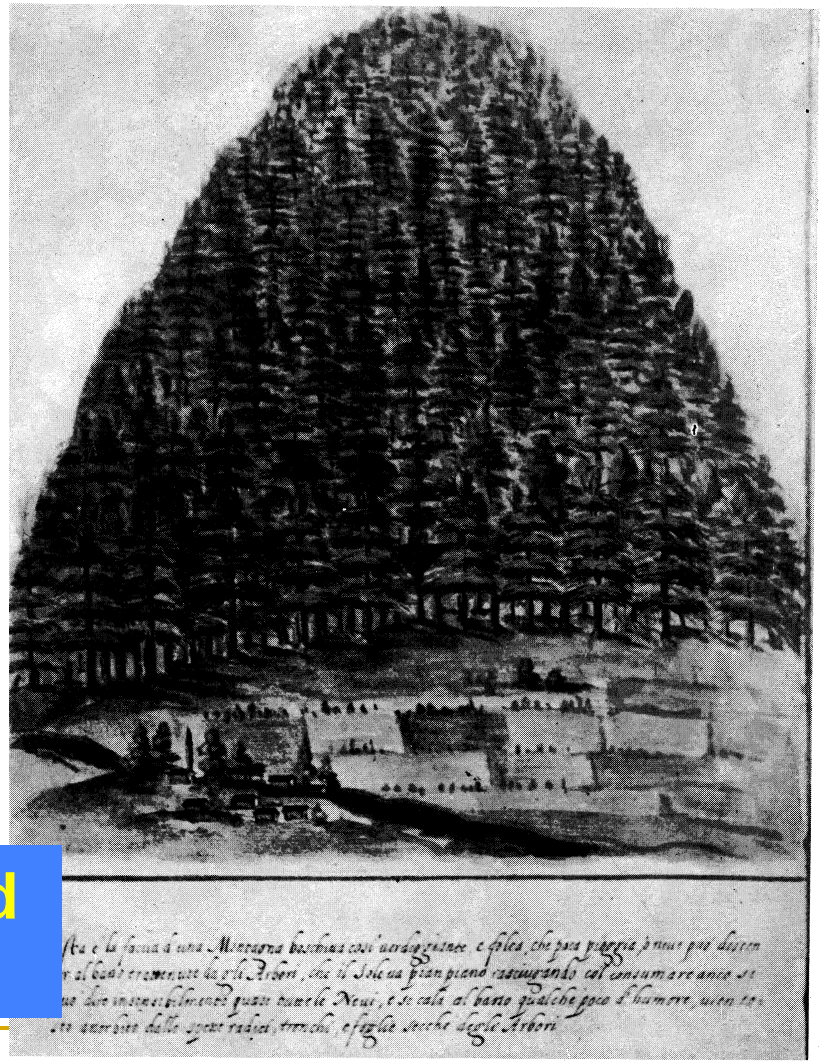
GL' ILLUSTRISSIMI, ED ECCELLENTISSIMI SIGNORI

PROVEDITORI AL BOSCO DEL MONTELLO

INFRASCRITTI.

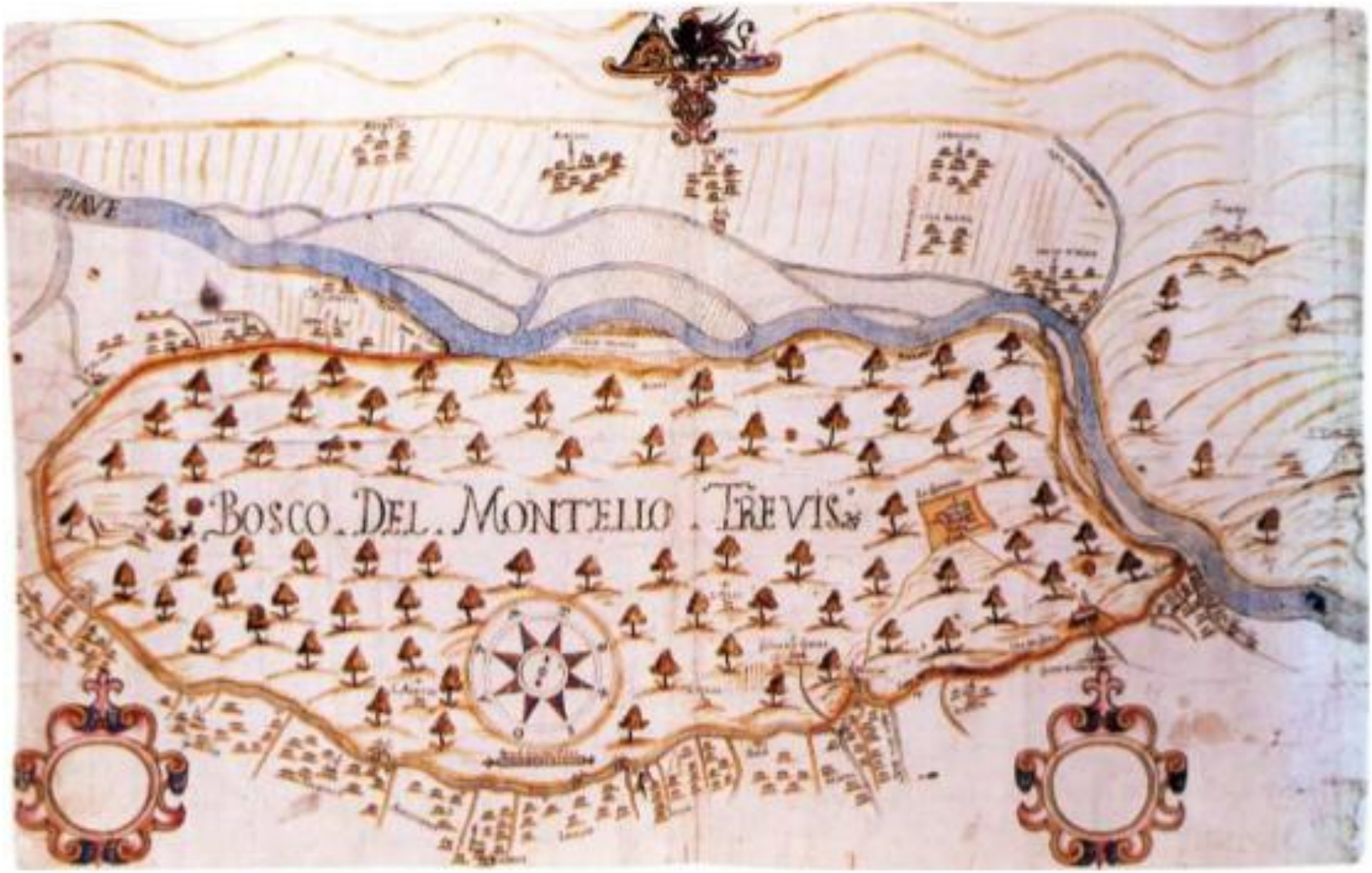
Avendo, che a cognizione di cadaun Conduttore di Roveri tanto Pezzoni derivanti dalli Curamenti, e Spianti che succedono nel Bosco, quanto delli Roveri da Fillo che a misura delle Pubbliche occorrenze vengono tagliati stabilire il prezzo delle Condotte di Terra, ed Acqua, onde non solo li Conduttori, ma il Capitanio, ed il Fed. Ragionato del loro Magistrato abbiano sotto gl' occhi li prezzi stabiliti, fuori delli quali non debba aver luogo l'arbitrio di accrescere, o diminuire: quindi è che loro Eccellenze dopo li più maturi esami avuto in riflesso l'equità, la carità, ed il praticato, sono venuti in deliberazione nello stato presente di stabilire la stampa dell' infrascritta Tarissa, la quale doverà immancabilmente esser osservata, ordinando che nelle Chiese delli Comuni sia letta, e pubblicata ad intelligenza di tutti quelli che dovranno aver parte nelle Condotte medesime, e così ordinarono notarsi, ed eseguirsi.

Forestry book printed in Venice in 1620



- « Questa è la faccia d'una Montagna boschiva così verdeggiante e folta, che poca pioggia e può discendere al basso trattenute da gli Arbori, che il sole va pian piano rasciugando col

Italian forestry rich of history/2

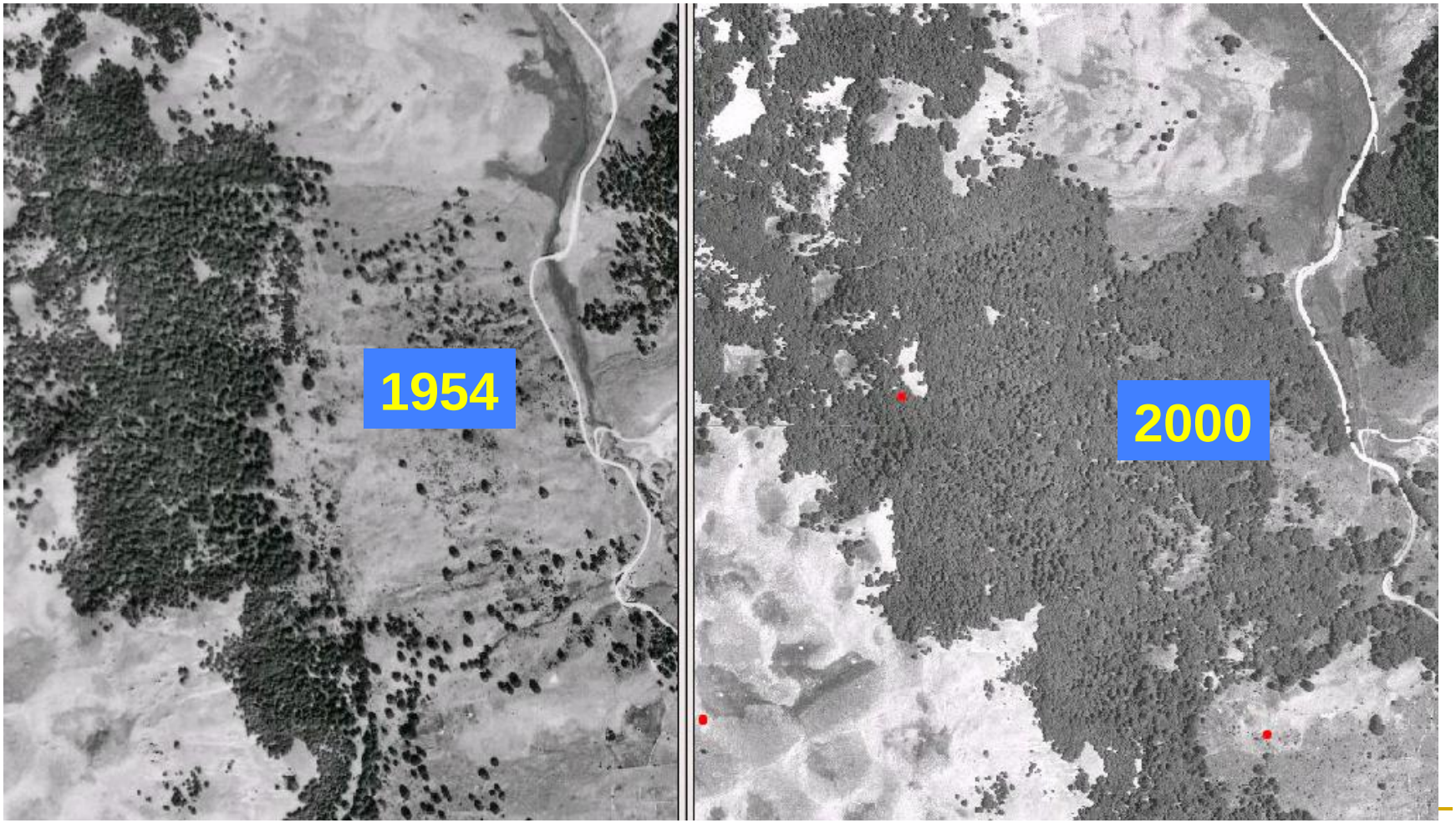


Italian forestry rich of history/2

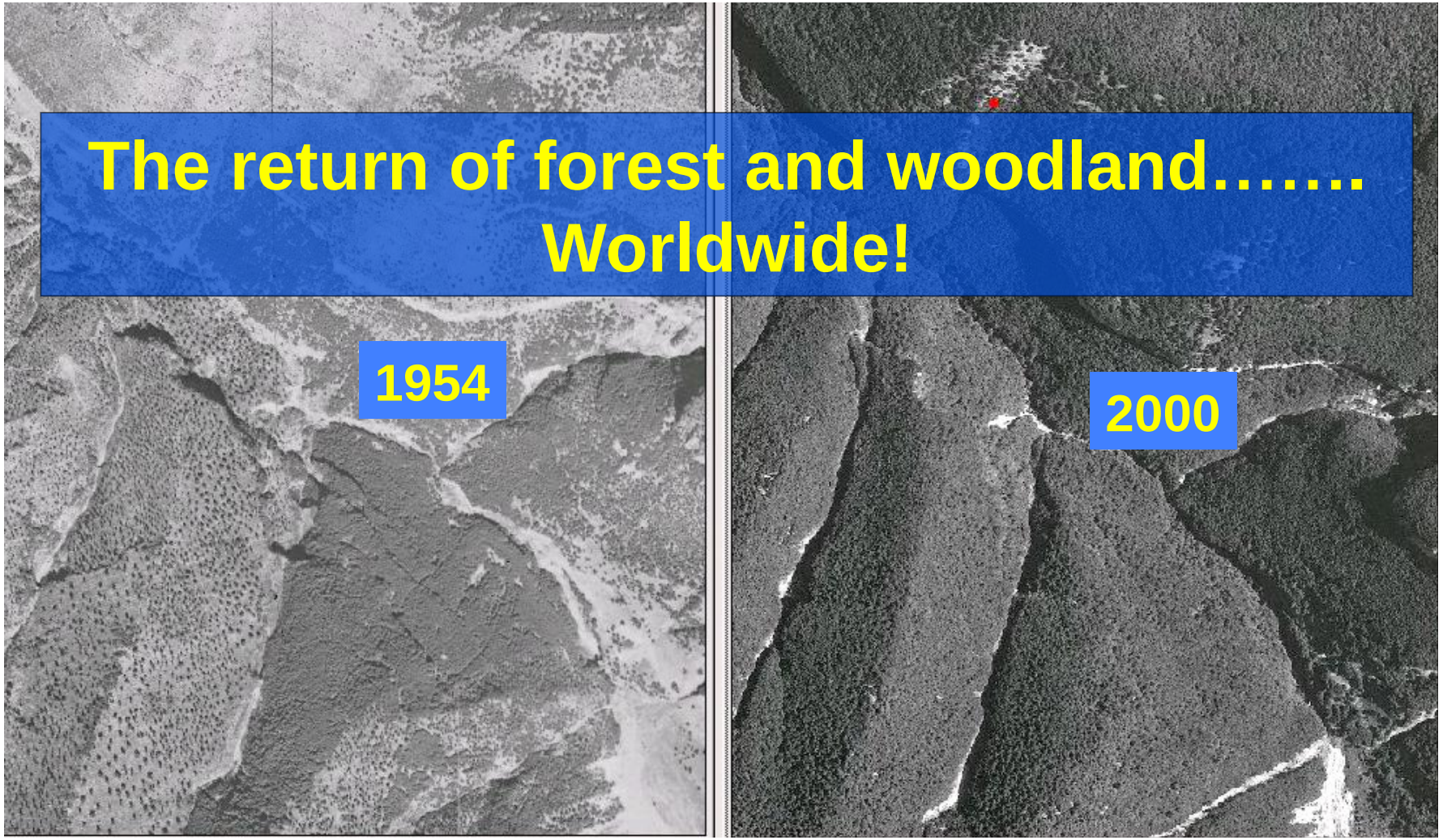
Forests in Italy (and EU): a dynamic situation

- 12 Mha of forests (100% expansion from 1950's)
- Forests are expanding in Italy because of abandoned farmland (+0.6% annually)
- Volume stock has increased by 50% in the last 50 years
- Conservative forestry (only 25% of forest annual increment is being harvested) and close-to-nature silviculture

Forests in Italy (and EU): a dynamic situation

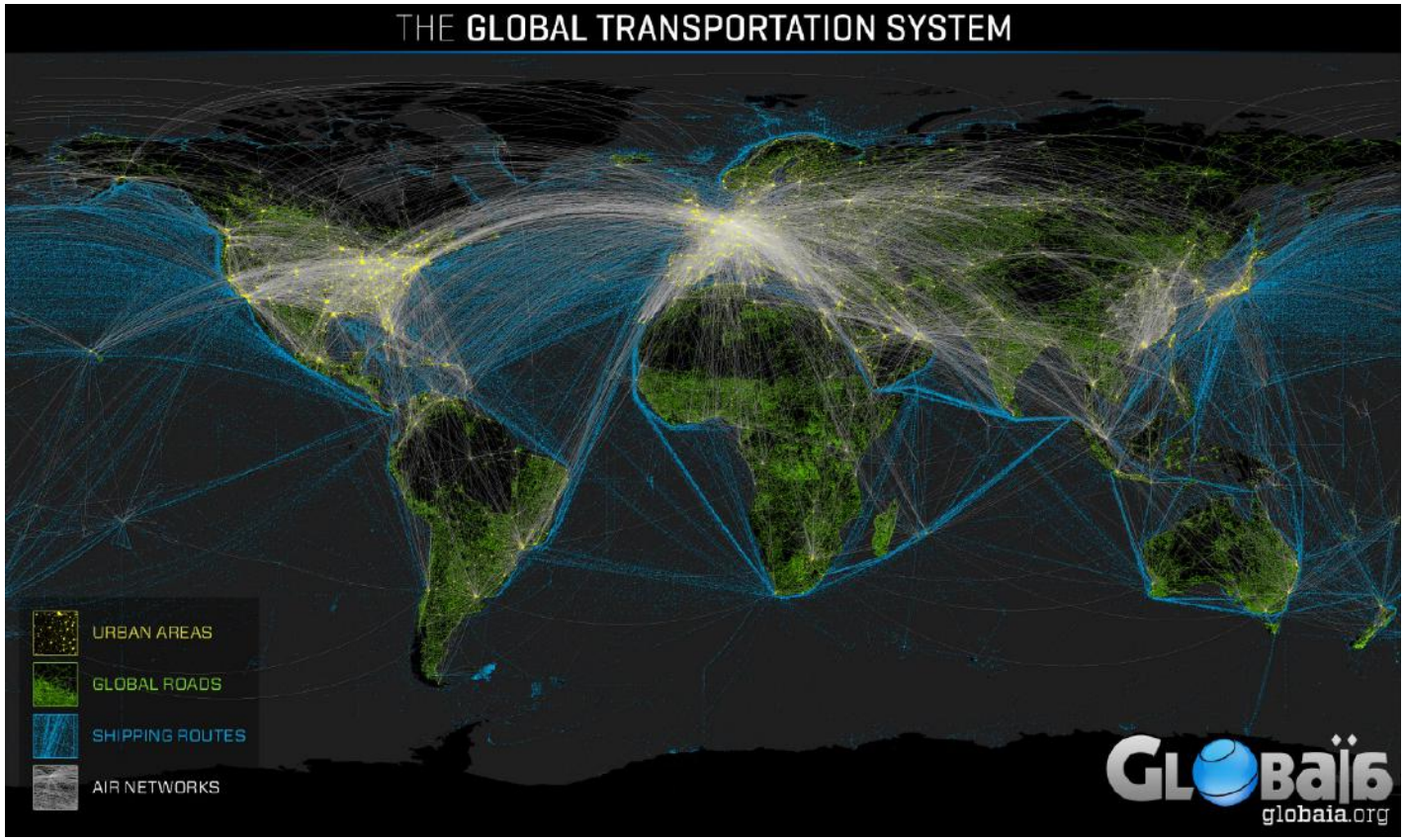


Forests in Italy (and EU): a dynamic situation



The forest issue has never been so central in the media and in the International debate as today

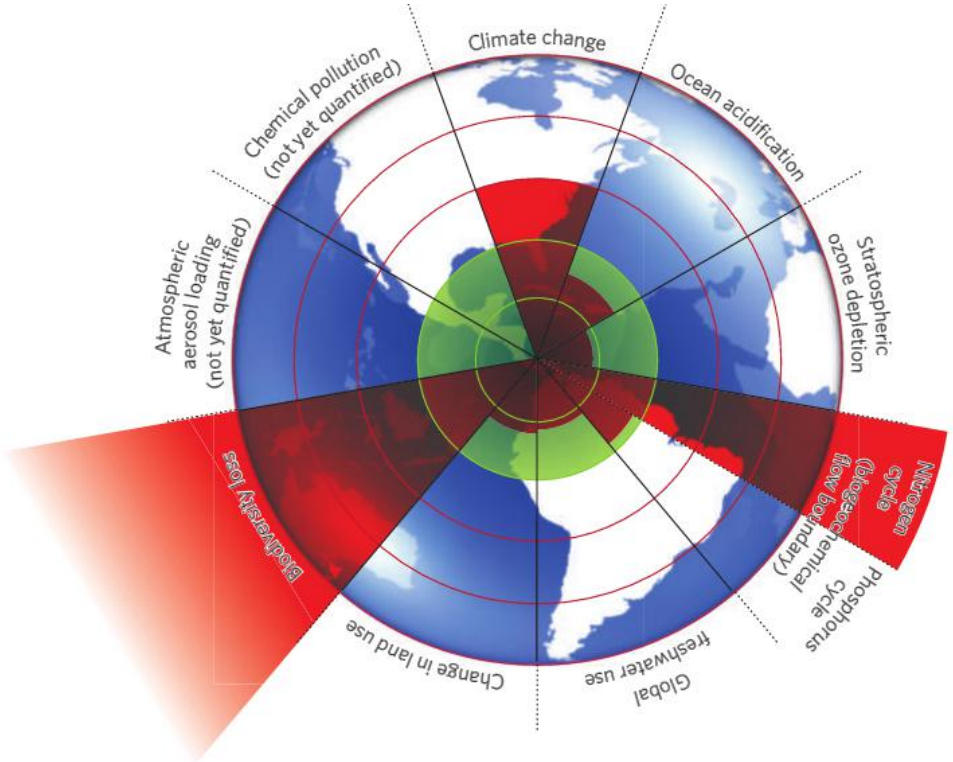
Since 1950 the Earth entered a new geologic Era, the Antropocene



"Strong acceleration" of human activity with consequential rapid and widespread impacts on the whole planet (Steffen et al, 2015)

New name needed for unwise *Homo*?

Homo sapiens was the name Carl Linnaeus assigned to our species in 1758, when humanity may indeed have seemed 'wise' relative to others. Today, this



PLANETARY BOUNDARIES

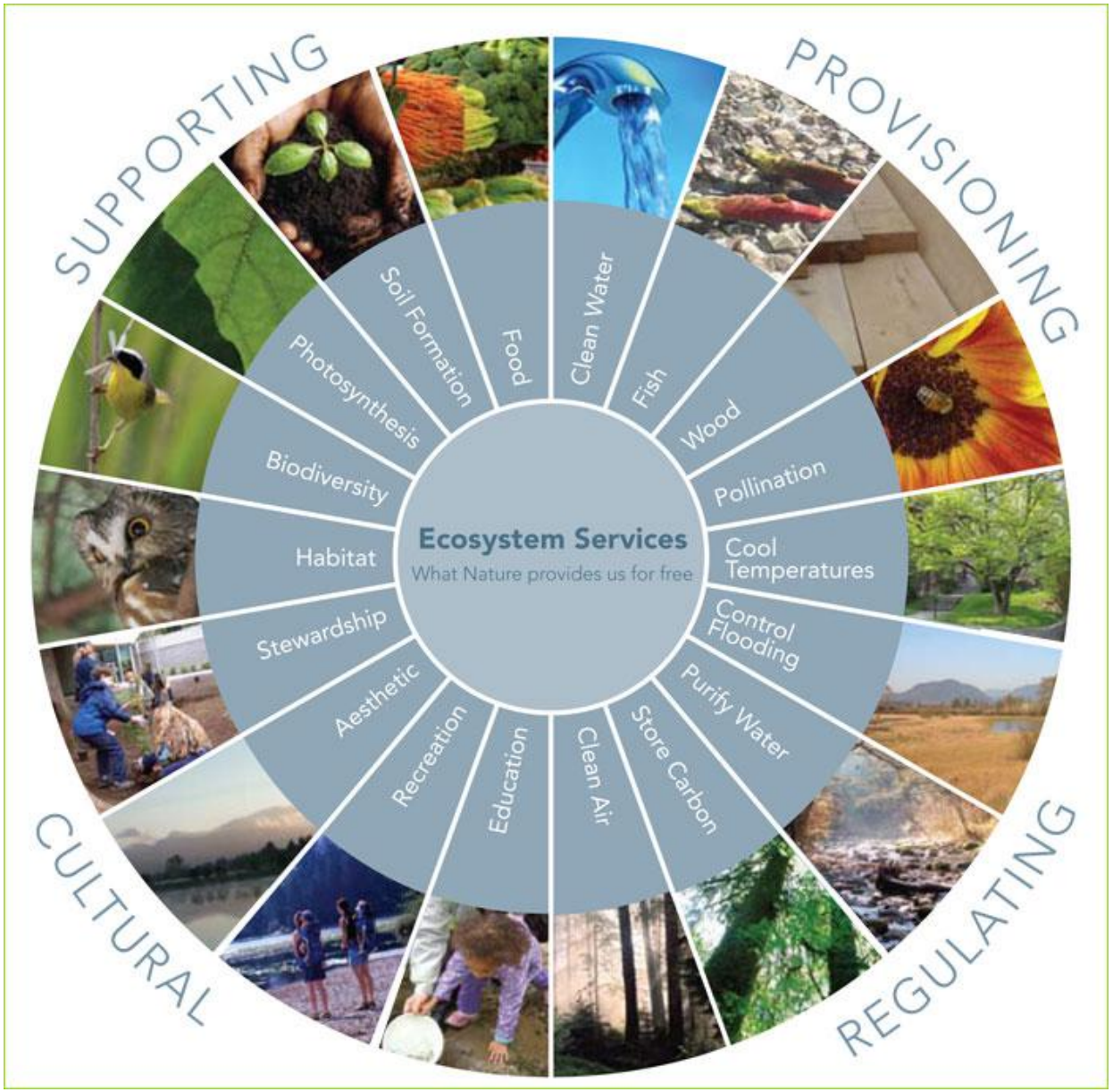
Earth-system process	Parameters	Proposed boundary	Current status	Pre-industrial value
Climate change	(i) Atmospheric carbon dioxide concentration (parts per million by volume)	350	387	280
	(ii) Change in radiative forcing (watts per metre squared)	1	1.5	0
Rate of biodiversity loss	Extinction rate (number of species per million species per year)	10	>100	0.1–1
Nitrogen cycle (part of a boundary with the phosphorus cycle)	Amount of N_2 removed from the atmosphere for human use (millions of tonnes per year)	35	121	0
Phosphorus cycle (part of a boundary with the nitrogen cycle)	Quantity of P flowing into the oceans (millions of tonnes per year)	11	8.5–9.5	~1
Stratospheric ozone depletion	Concentration of ozone (Dobson unit)	276	283	290
Ocean acidification	Global mean saturation state of aragonite in surface sea water	2.75	2.90	3.44
Global freshwater use	Consumption of freshwater by humans (km^3 per year)	4,000	2,600	415
Change in land use	Percentage of global land cover converted to cropland	15	11.7	Low
Atmospheric aerosol loading	Overall particulate concentration in the atmosphere, on a regional basis		To be determined	
Chemical pollution	For example, amount emitted to, or concentration of persistent organic pollutants, plastics, endocrine disrupters, heavy metals and nuclear waste in, the global environment, or the effects on ecosystem and functioning of Earth system thereof		To be determined	

Human ignorance and the exceeding of planetary boundaries

Mountain forests, as ecosystem services providers

Ecosystem services:

The hidden economy by 50,000 bln € a^{-1}



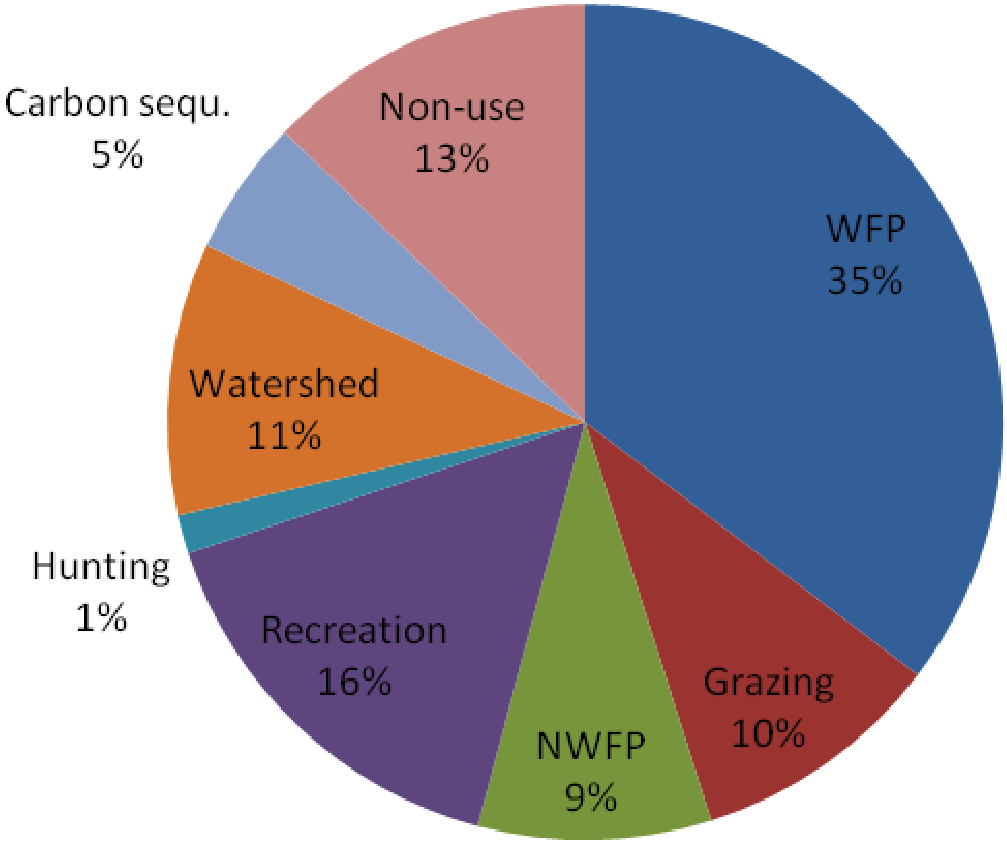
(from Millennium Ecosystems Assessment 2005 & FAO 2010)

Mediterranean forests: products and services

Total Economic Value of Mediterranean Forests

NWP: Non Woody Products; WFP Woody Forest Products; esternalità: Value of existence and demand

(from: Merlo & Croitoru 2005)

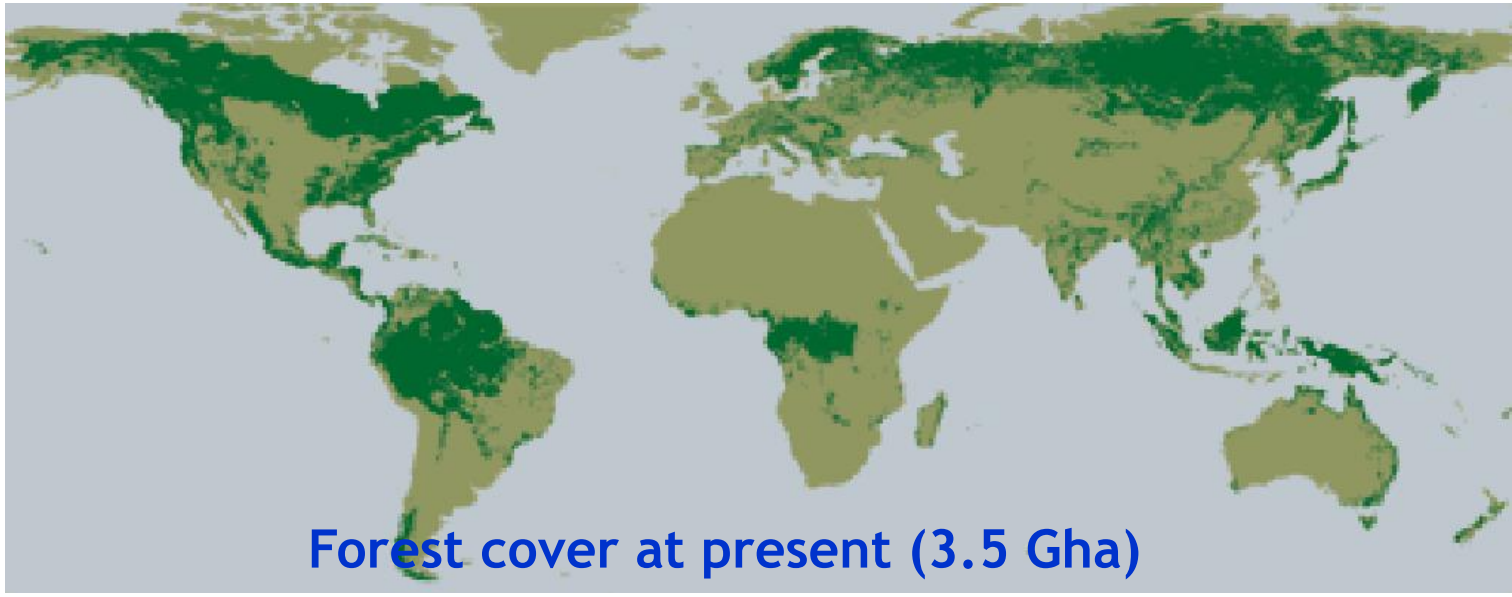


Value of environmental services:
4000-10000 € ha^{-1} a^{-1}
(FAO, 2010)

Forests in the world

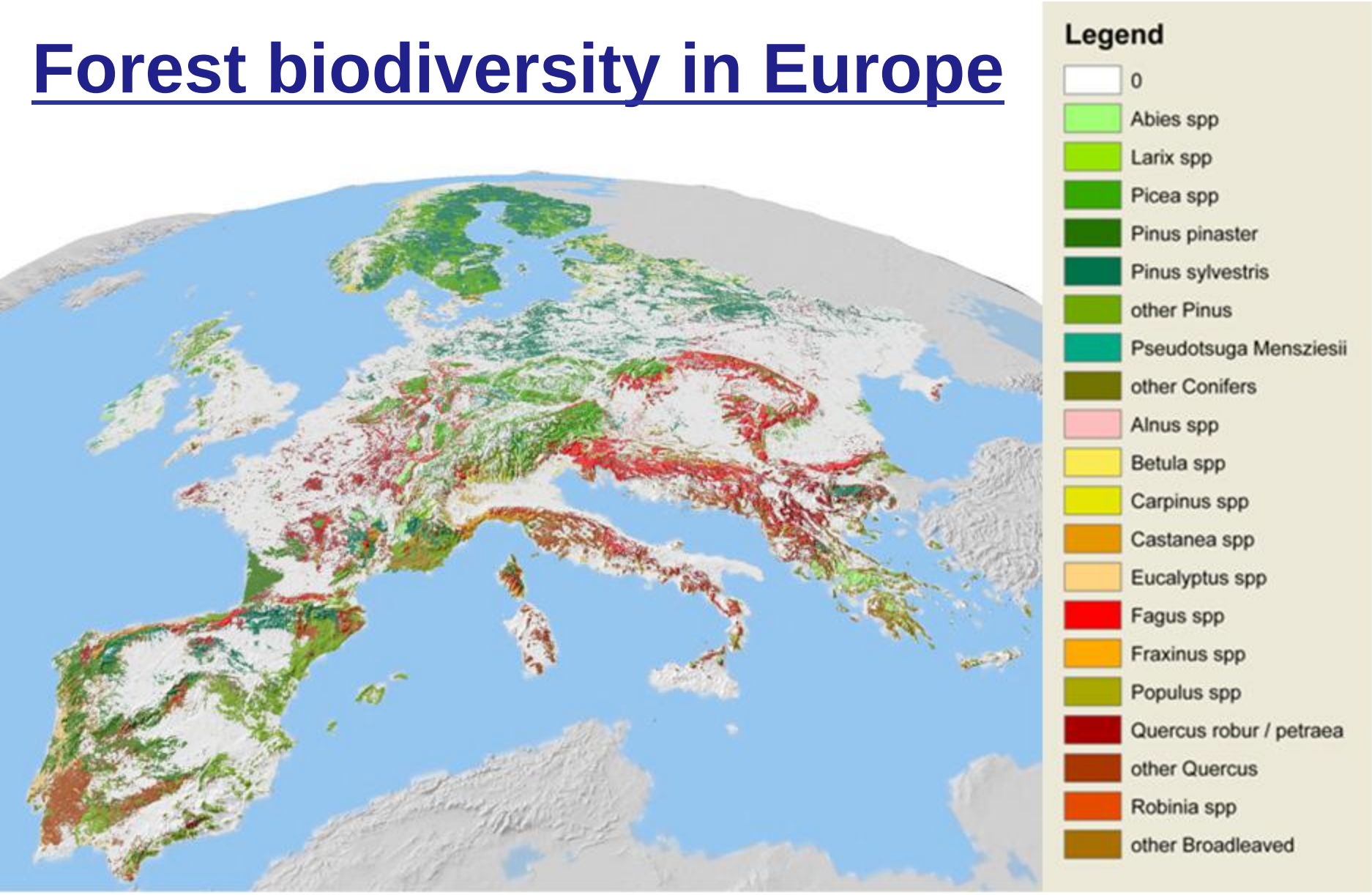
Le foreste, pur ridotte negli ultimi 10,000 anni a causa dell'azione umana, conservano tuttavia dal 60 al 90% di tutta la diversità di specie del pianeta

Forest cover 10,000 yrs ago (6 Gha)



Forest cover at present (3.5 Gha)

Forest biodiversity in Europe



EU27 Forest surface: 160 million ha
Biomass: 24 Bln m^3, still growing

European tree species map (Hengeveld et al, 2011)

World forest surface expansion is actually concentrated in the Northern hemisphered

FIGURE 4 **Annual net forest gain/loss (ha) by country (1990–2015)**

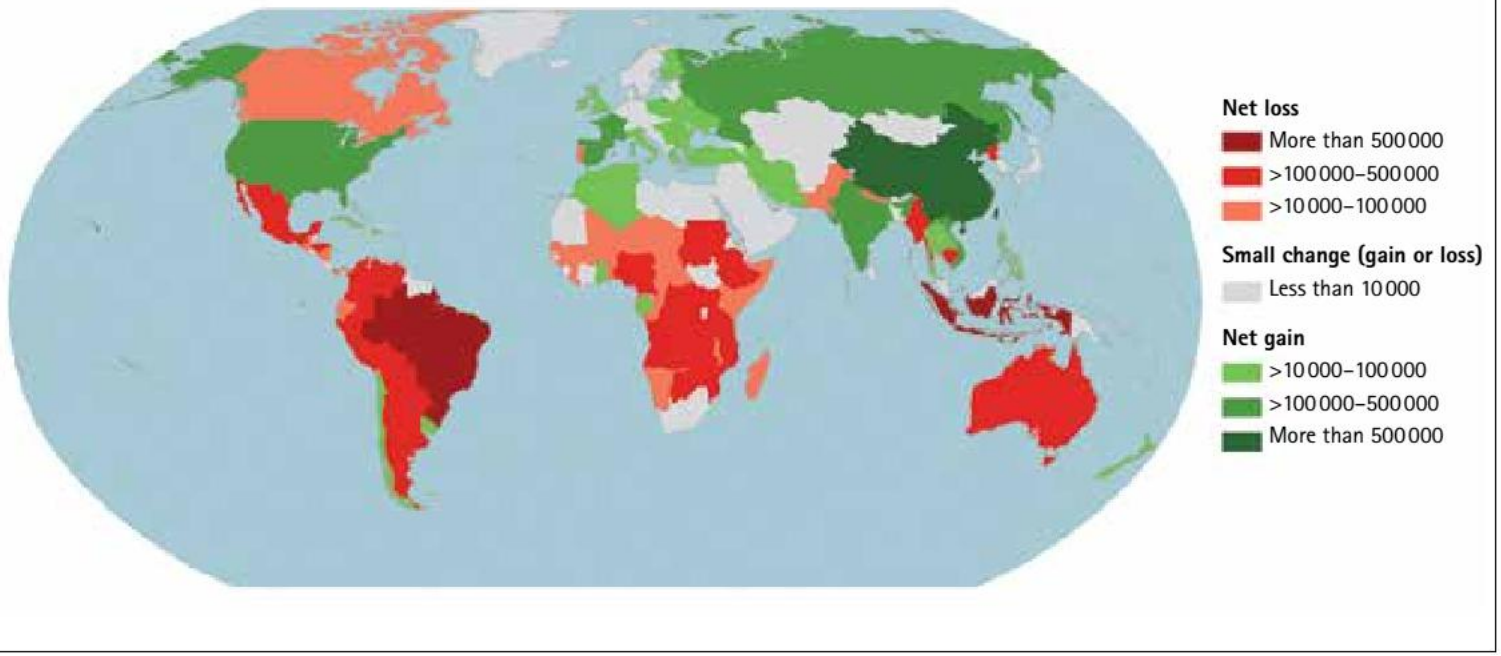
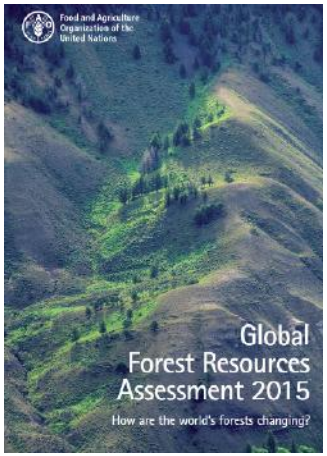


TABLE 3 **Countries reporting the greatest annual forest area reduction (2010–2015)**

	Country	Annual forest loss	
		Area (000 ha)	% of 2010 forest area
1	Brazil	984	0.2
2	Indonesia	684	0.7
3	Myanmar	546	1.7
4	Nigeria	410	4.5
5	United Republic of Tanzania	372	0.8
6	Paraguay	325	1.9
7	Zimbabwe	312	2.0
8	Democratic Republic of the Congo	311	0.2
9	Argentina	297	1.0
10	Venezuela (Bolivarian Republic of)	289	0.5

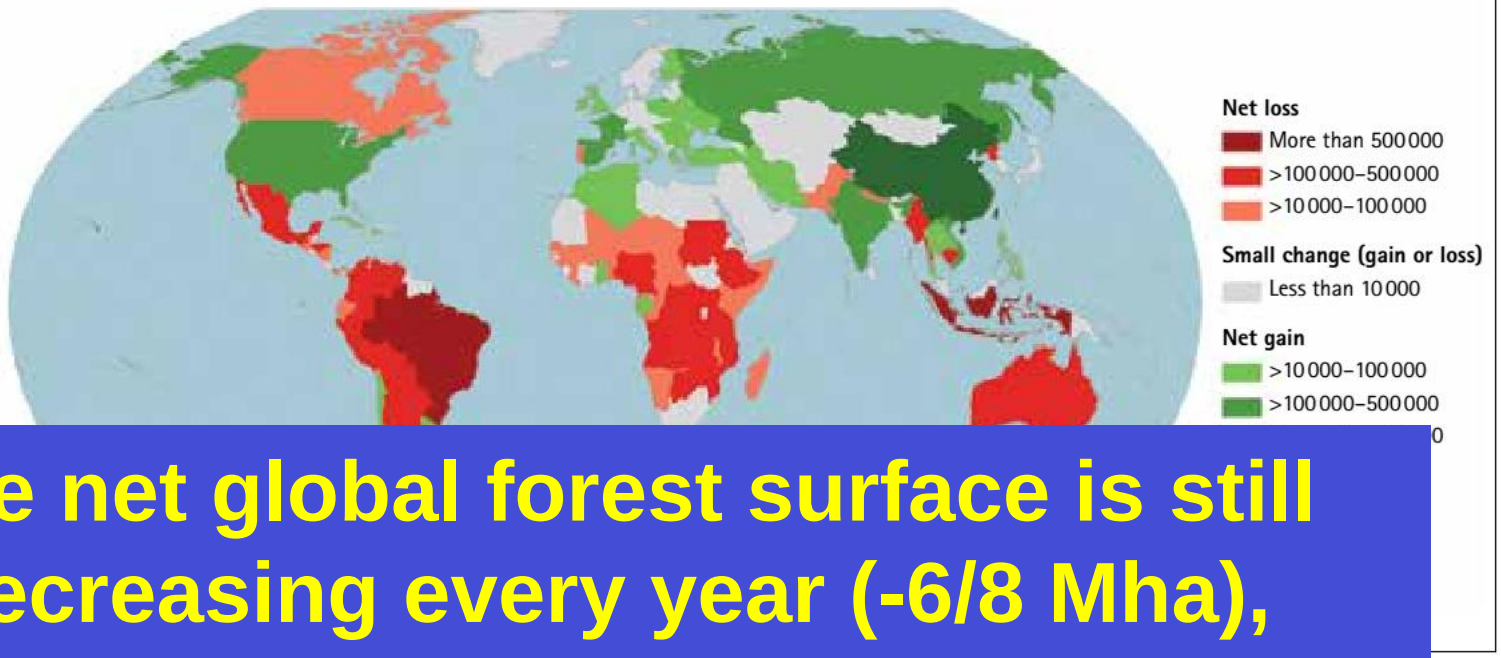
TABLE 4 **Countries reporting the greatest annual forest area gain (2010–2015)**

	Country	Annual forest area gain	
		Area (000 ha)	% of 2010 forest area
1	China	1542	0.8
2	Australia	308	0.2
3	Chile	301	1.9
4	United States of America	275	0.1
5	Philippines	240	3.5
6	Gabon	200	0.9
7	Lao People's Democratic Republic	189	1.1
8	India	178	0.3
9	Viet Nam	129	0.9
10	France	113	0.7



World forest surface expansion is actually concentrated in the Northern hemis

FIGURE 4 **Annual net forest gain/loss (ha) by country (1990–2015)**



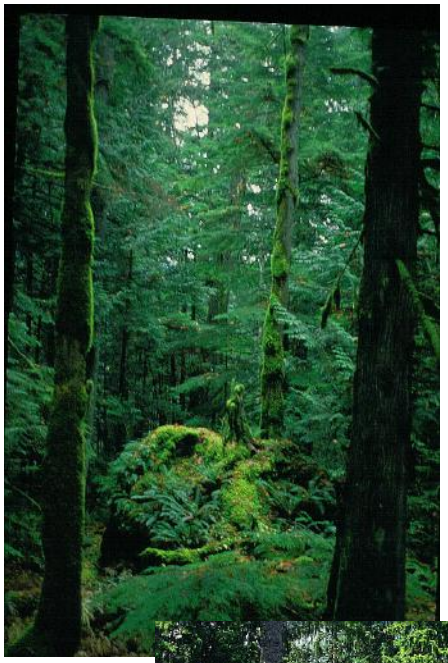
The net global forest surface is still decreasing every year (-6/8 Mha), however with significant trend changes. China and India have become countries with expanding forest surface.

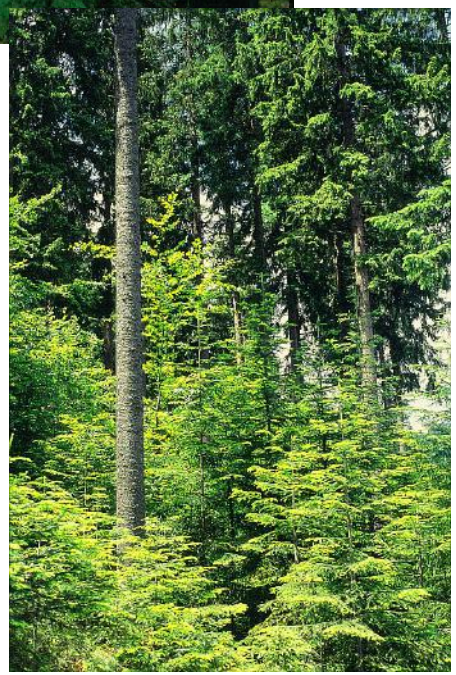
TABLE 3
area redu

	Cou		
1	Braz		
2	Indo		
3	Mya		
4	Nigeria	410	4.5
5	United Republic of Tanzania	372	0.8
6	Paraguay	325	1.9
7	Zimbabwe	312	2.0
8	Democratic Republic of the Congo	311	0.2
9	Argentina	297	1.0
10	Venezuela (Bolivarian Republic of)	289	0.5

4	United States of America	275	0.1
5	Philippines	240	3.5
6	Gabon	200	0.9
7	Lao People's Democratic Republic	189	1.1
8	India	178	0.3
9	Viet Nam	129	0.9
10	France	113	0.7

Forest definitions

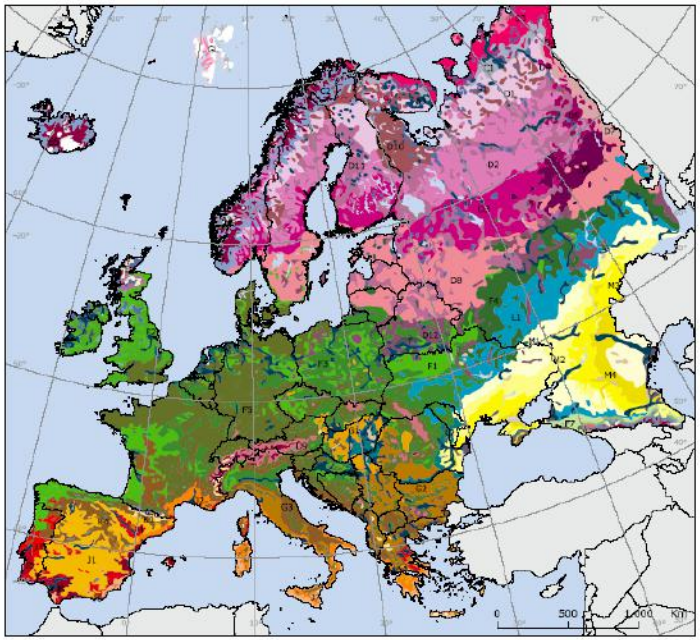




- Important to clearly define a forest to conduct forest inventories, and for international environmental conventions
- FAO definition: at least 10% of forest cover on more than 0.5 ha of land
- large variability of forest systems: natural forests, old-growth, reforestations, planted forests, agro-forest systems

Biodiversity of European forests

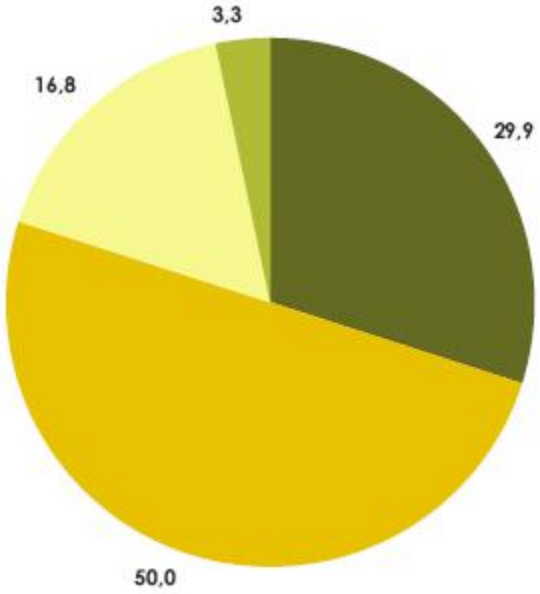
Potential distribution of forest vegetation (Bohn, 2000)

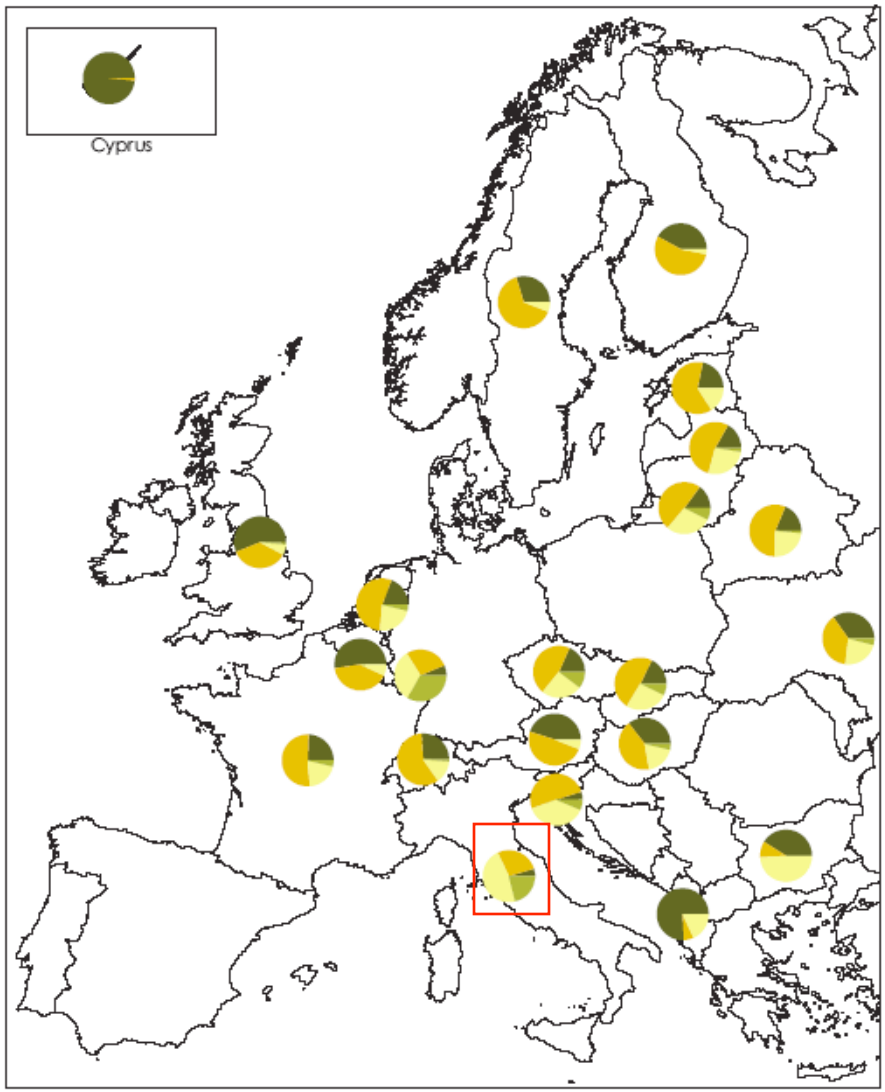


9 main forest types

- Subarctic boreal and nemoral-montane woodlands and subalpine vegetation
- Mesophytic and hygromesophytic coniferous and broad-leaved-coniferous forests
- Mesophytic deciduous broad-.leaved and coniferous-broad-leaved forests
- Thermophilous mixed deciduous broad-leaved forest
- Mediterranean sclerophyllous forests and scrub
- Xerophytic coniferous forests and scrub
- Forests steppes
- Swamp and fen forests
- Vegetation of flood-plains

Tree species composition
(MCPFE indicator 4.1)



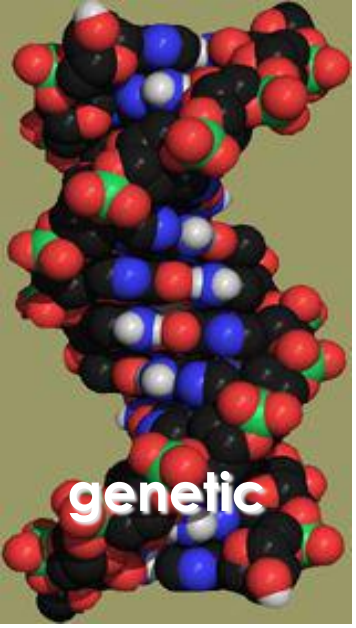


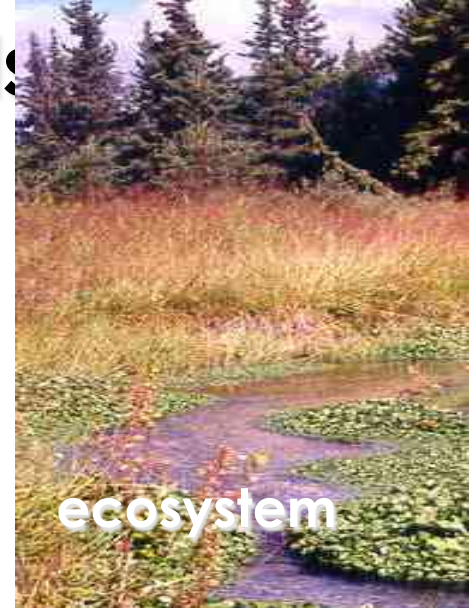
Overall results for Europe:
50% of the European forest cover is made of forests with 2-3 tree species

Italy *vs* Europe:
richer in mixed forests (4-6 tree spp.) compared to the European forests

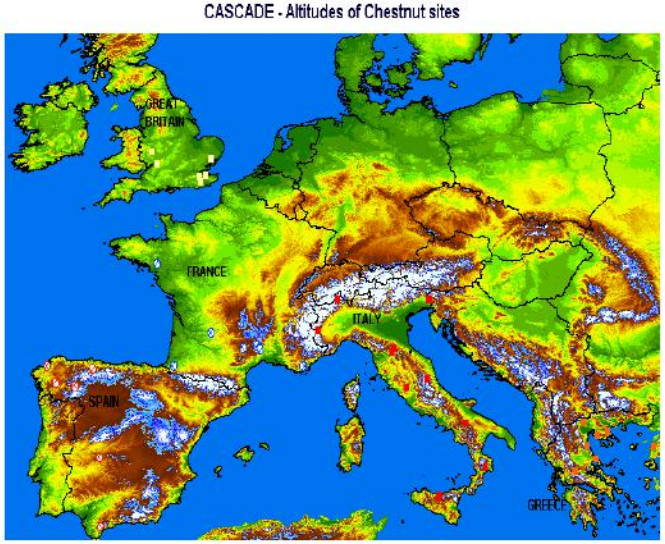
Figure 31. The share (%) of the forest area by number of tree species for MCPFE countries, 2005 (based on available data)

Different hierarchical levels of biological structure



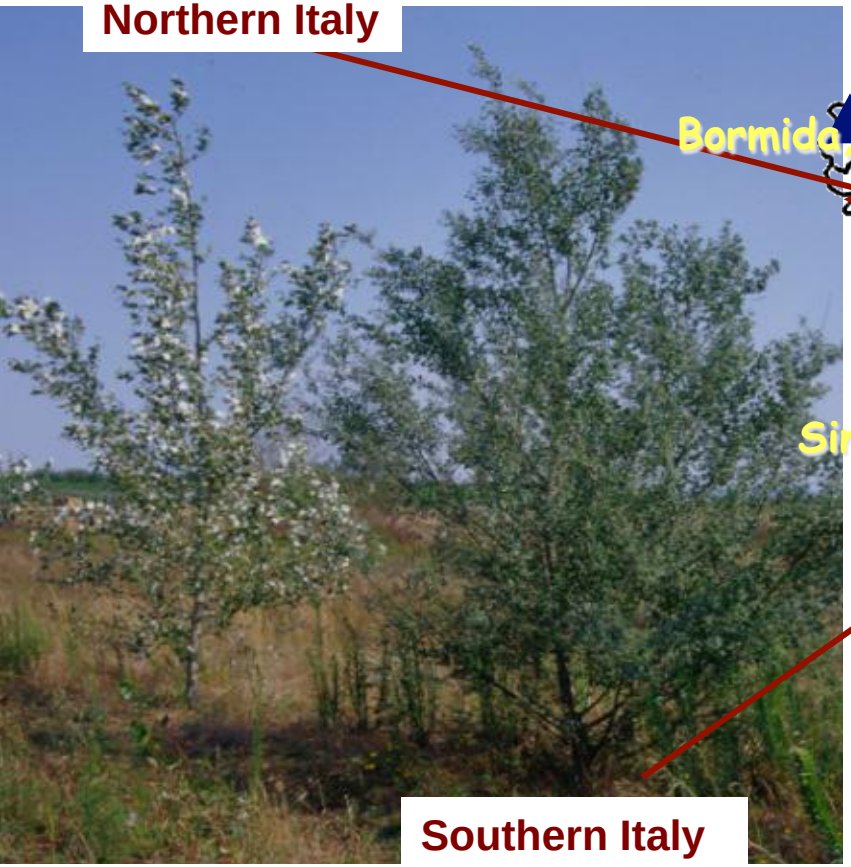


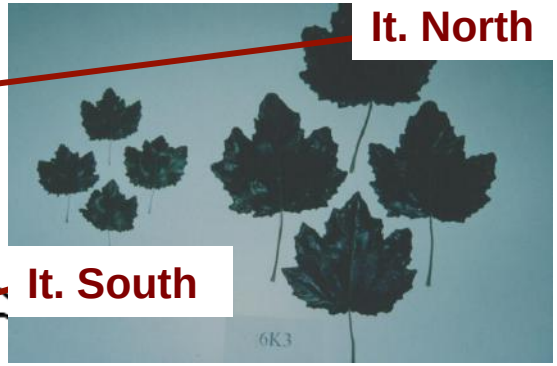
Diverse spatial and temporal scales



Genetic diversity (intraspecific)

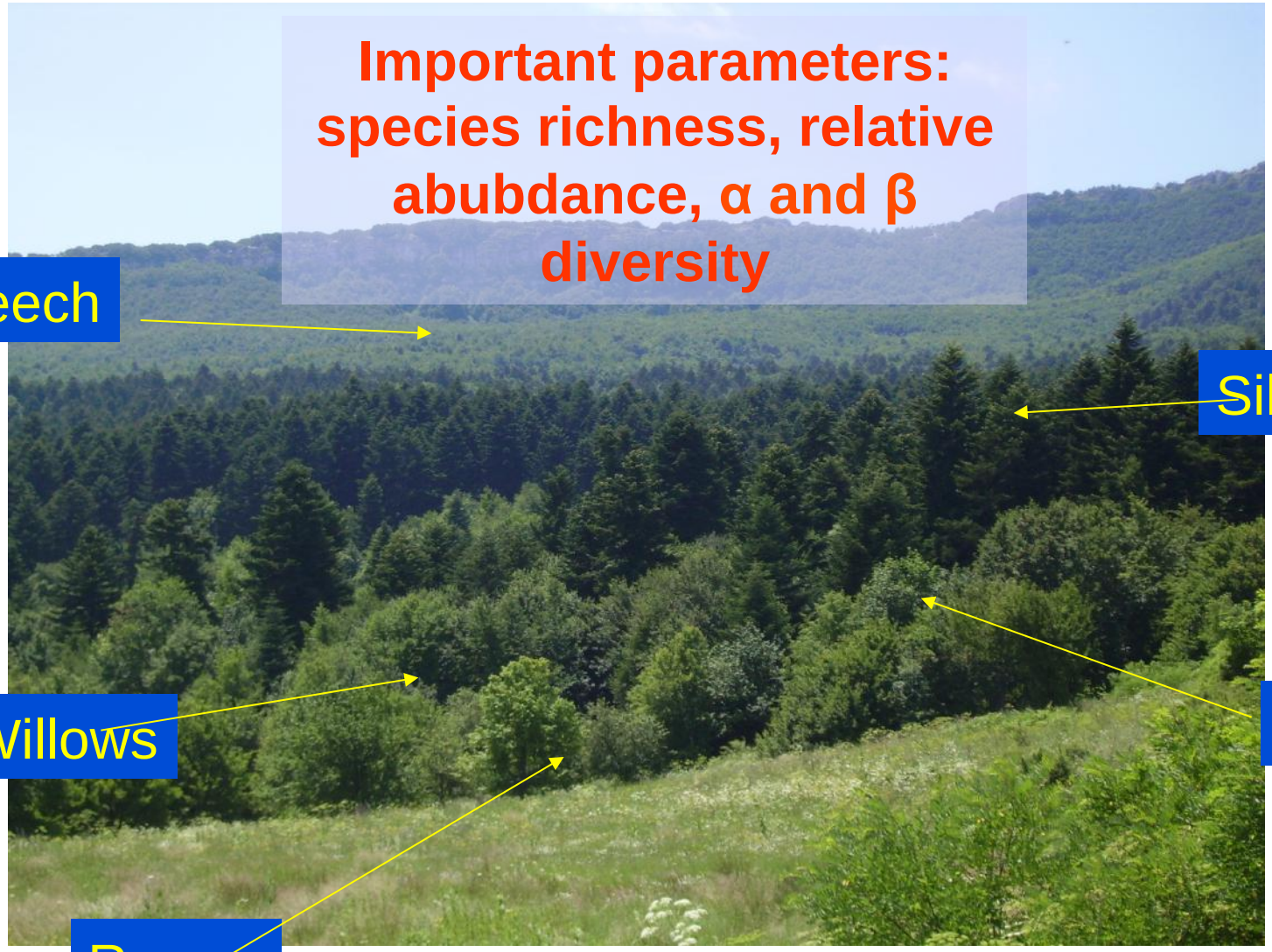
Populus alba





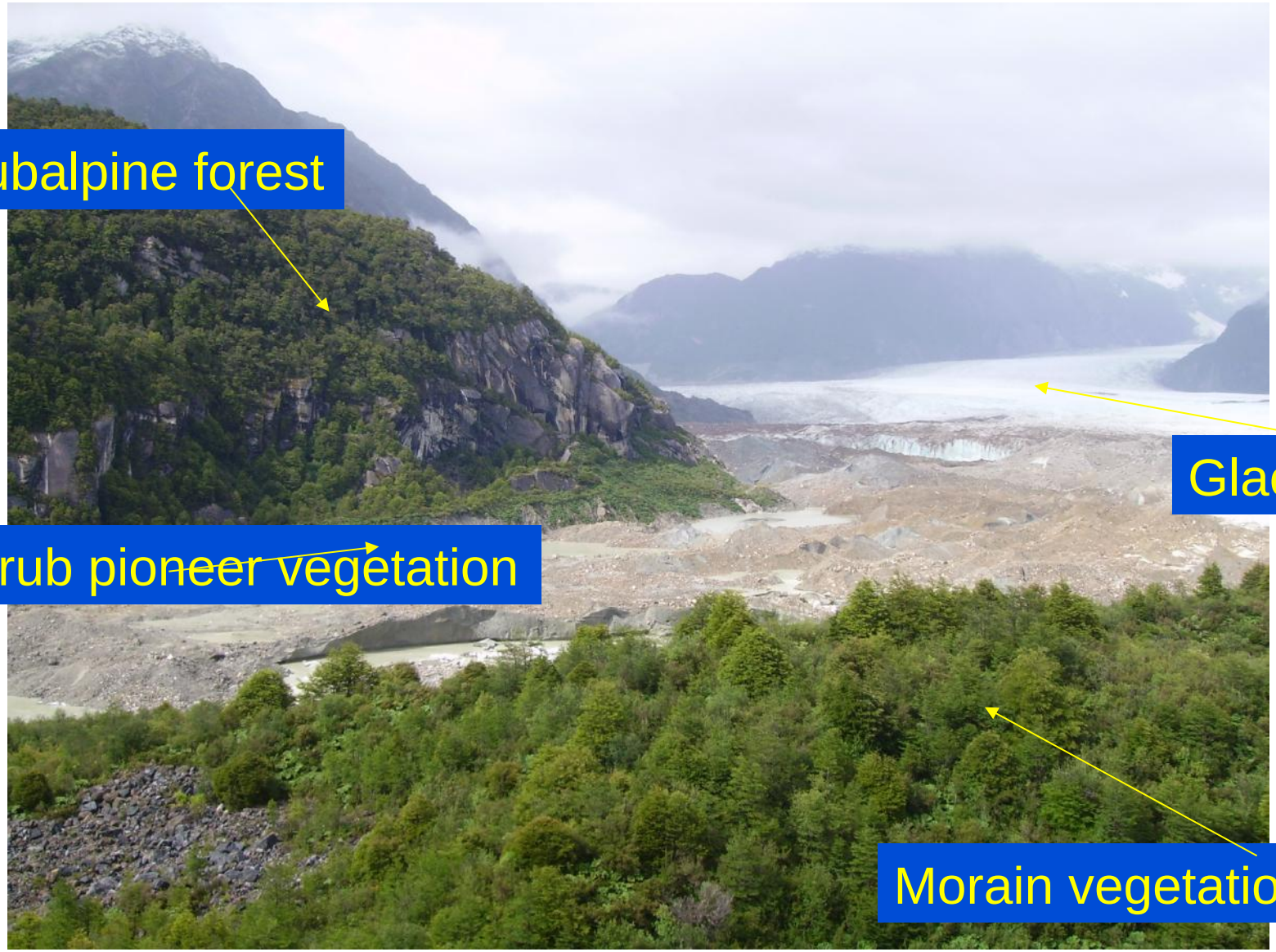
- Measure of gene variation in animal and plant species in the biosphere
- Resulting from past evolutionary processes
- “reservoir” of genes useful for future adaptation and evolution

Species Diversity



Mixed Forest in the Appennines

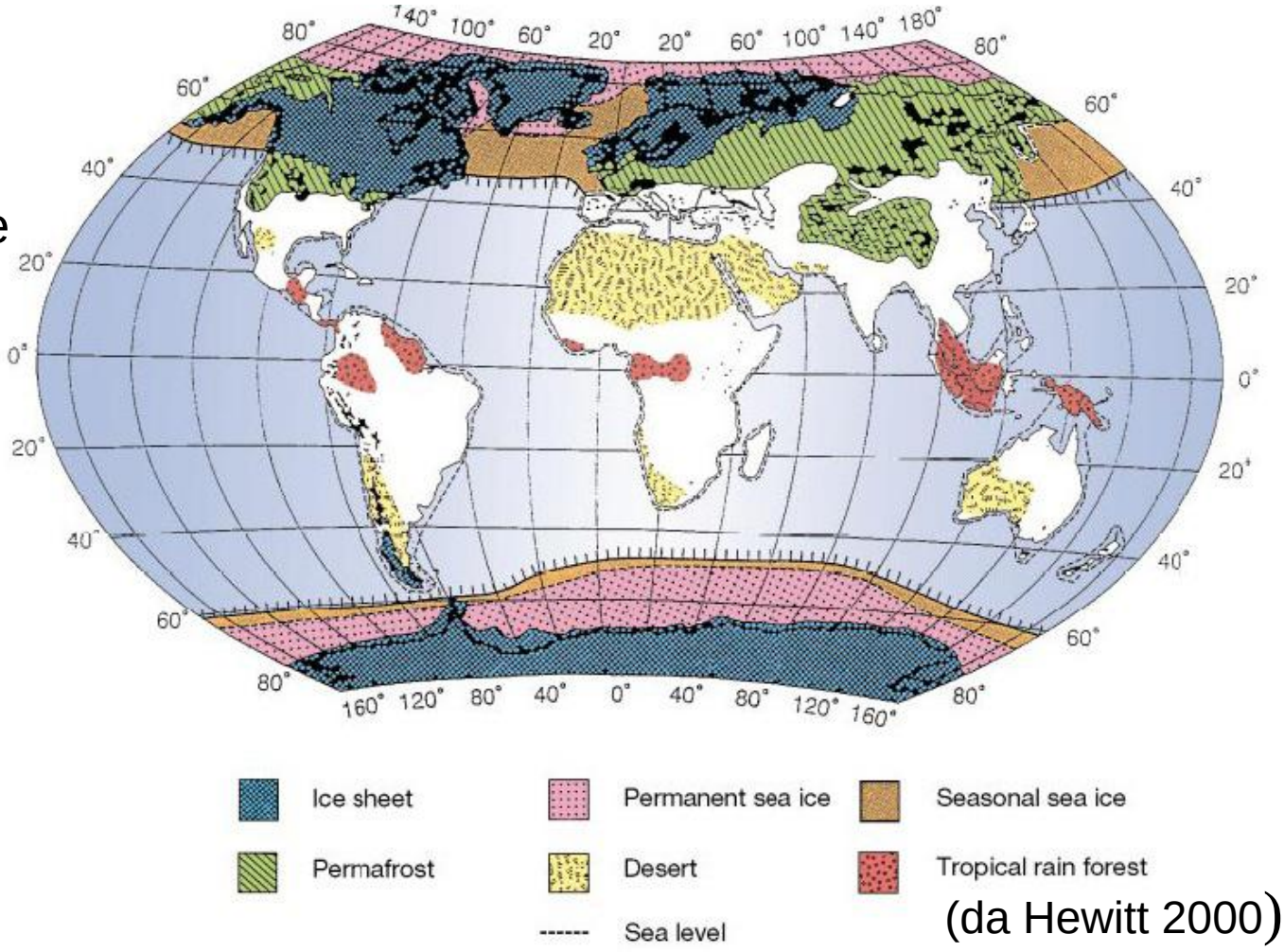
Structural and ecosystem diversity



Campo de Hielo, Cile

Natural history, glaciations and post-glacial recolonization

Forest species distribution and genetic variability are highly dependent on the succession of glacial and inter-glacial periods every 100,000 years, approximately

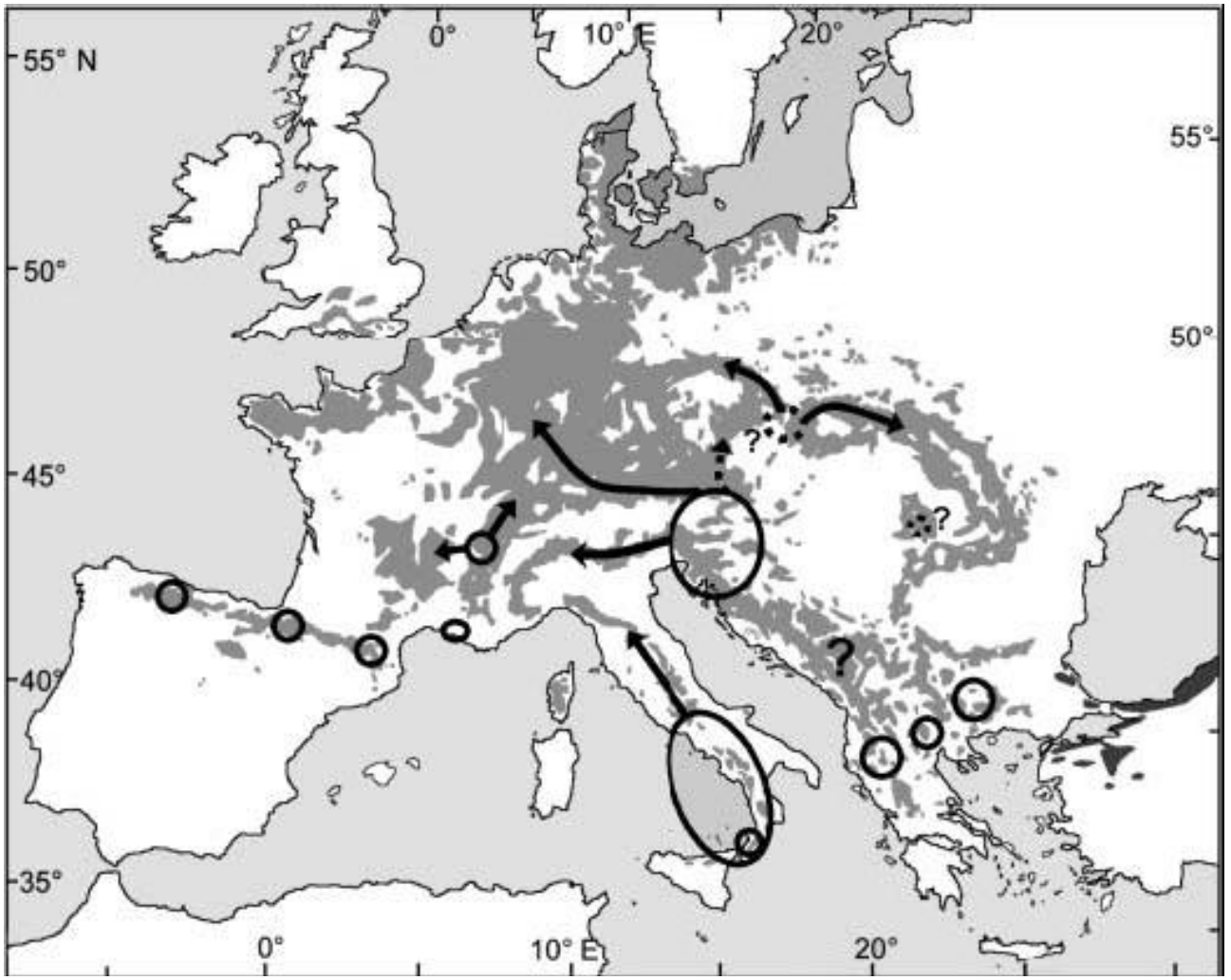


(da Hewitt 2000)

Last glaciation circa 20,000 years ago

Glacial refugia of *Fagus sylvatica* and recolonization routes in the post-glaciation

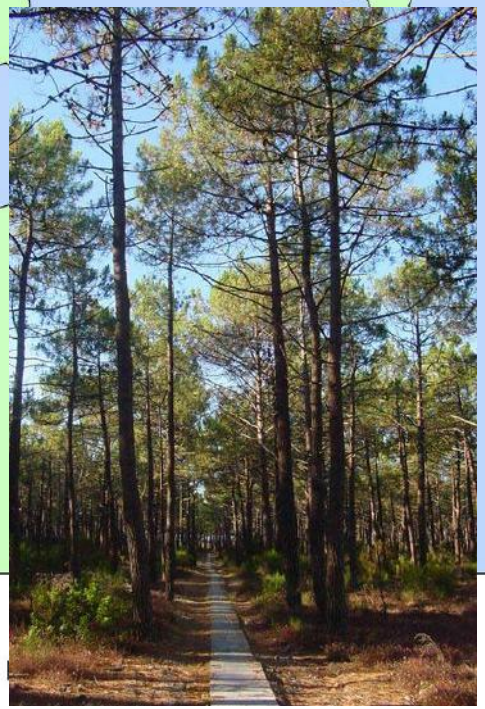
Relevant cosequences on the present-day distribution of tree species and communities and on their genetic variation (*bottle-neck* effect)



(da Magri et al. 2006)

Pinus pinaster

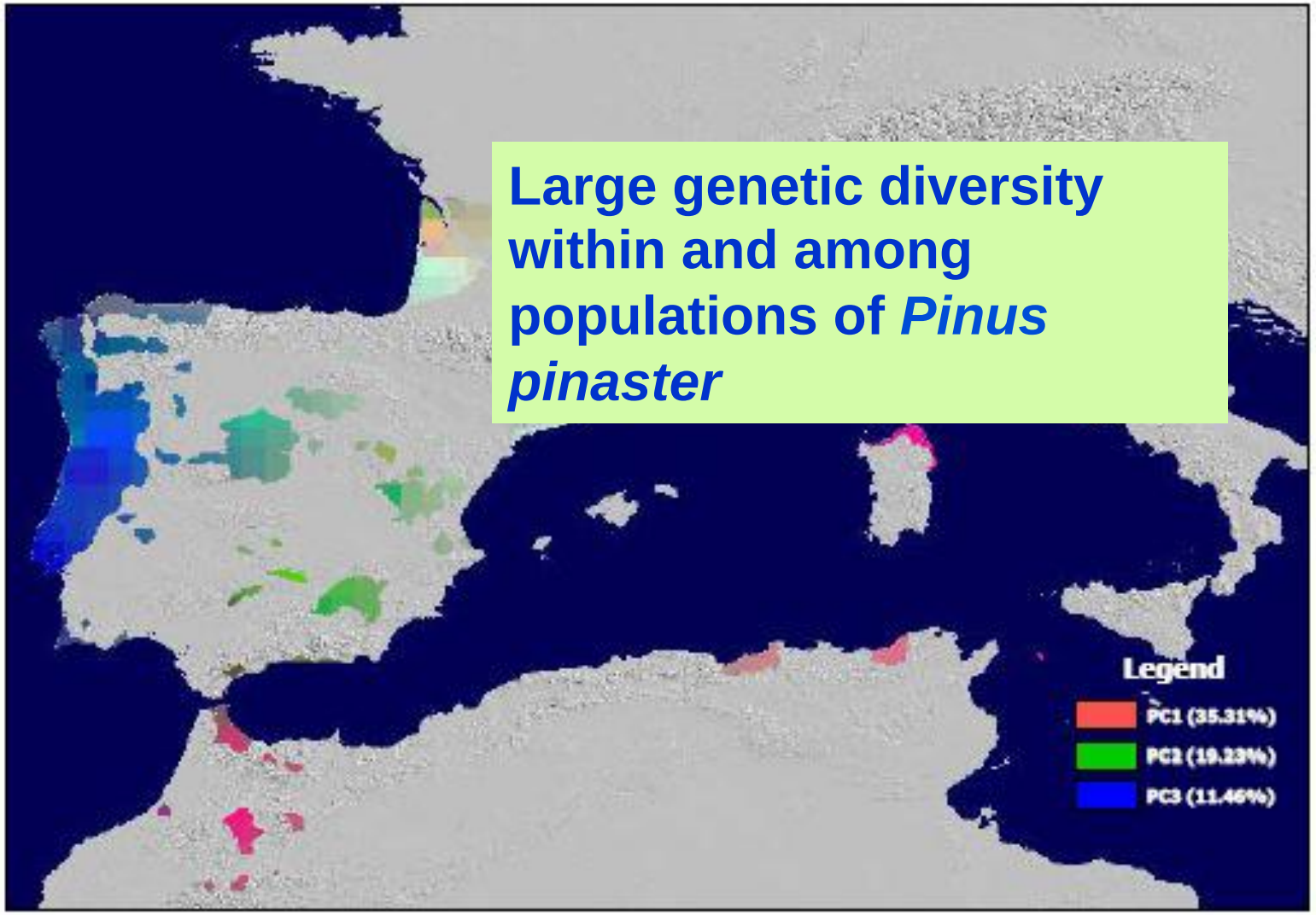
Another driver of genetic diversity is given by the extension and fragmentation of tree species distributions



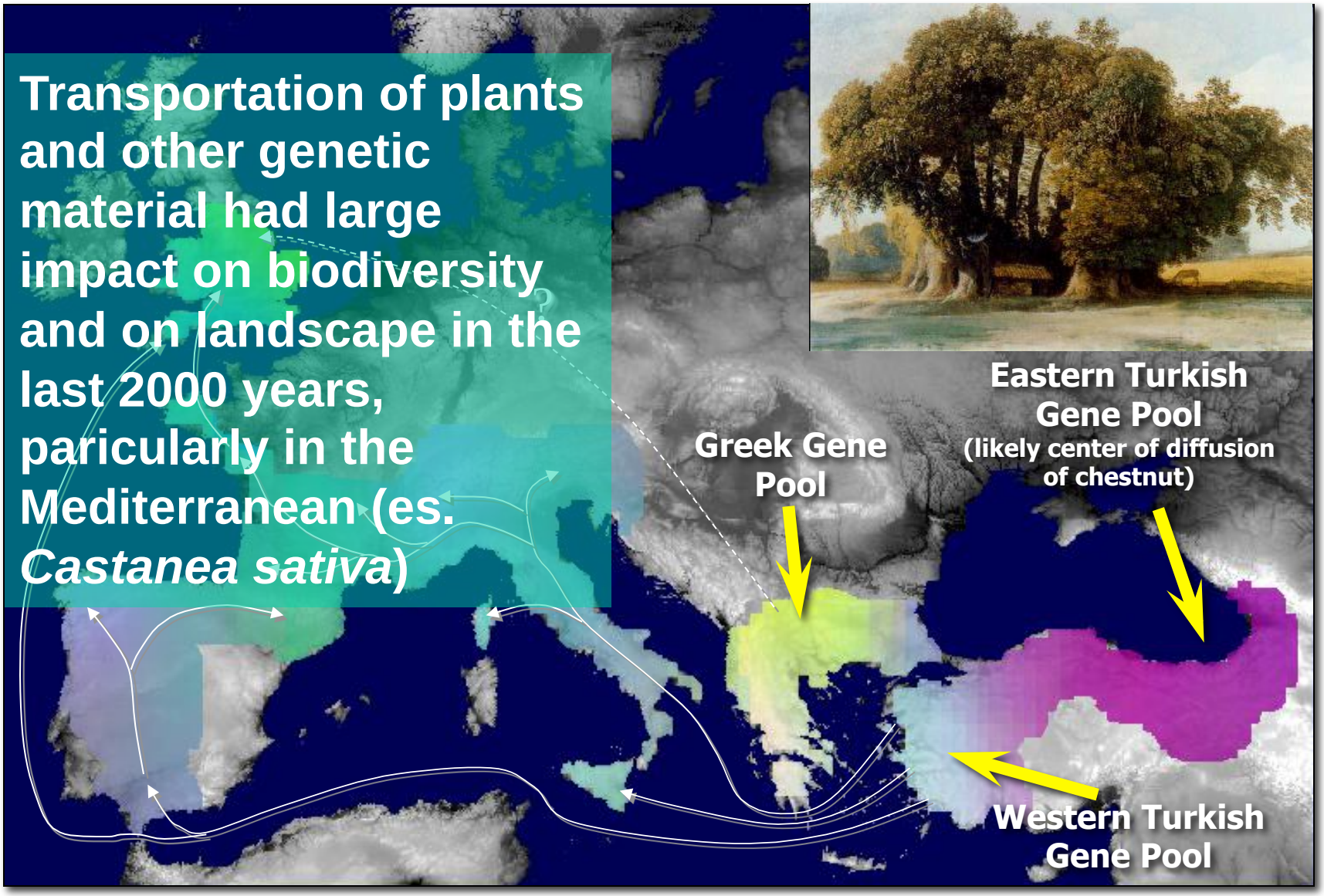
This distribution map was compiled by members of the EUFORGEN Conifers Network and was published in:

Alía, R. and S. Martín. 2003. EUFORGEN Technical Guidelines for genetic conservation and use for Maritime p
International Plant Genetic Resources Institute, Rome, Italy 6 pages.

Pinus pinaster Ait. - Principal Component Analysis (Bucci et al., 2006)



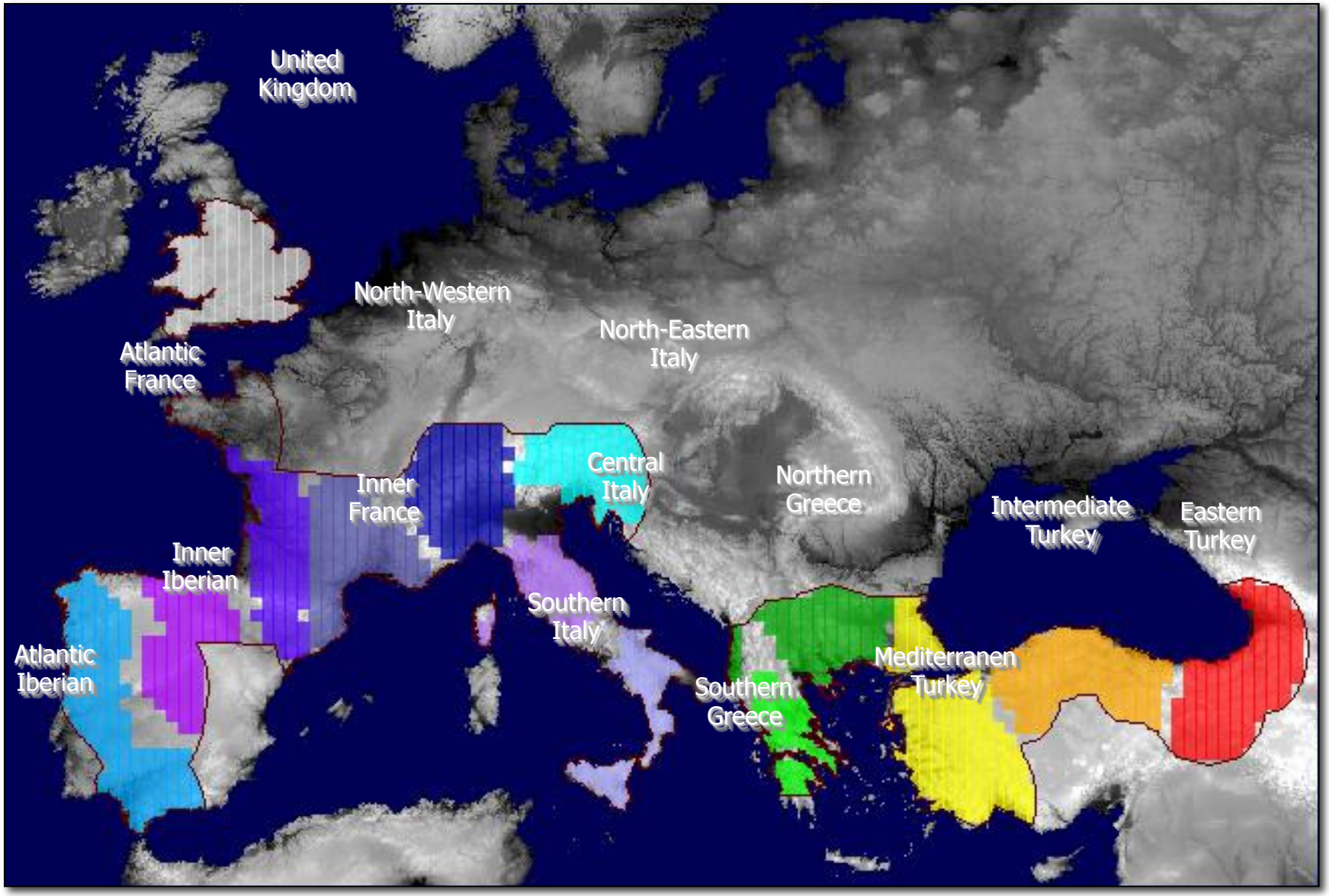
Man: another significant driver of diversity



Umbrella species

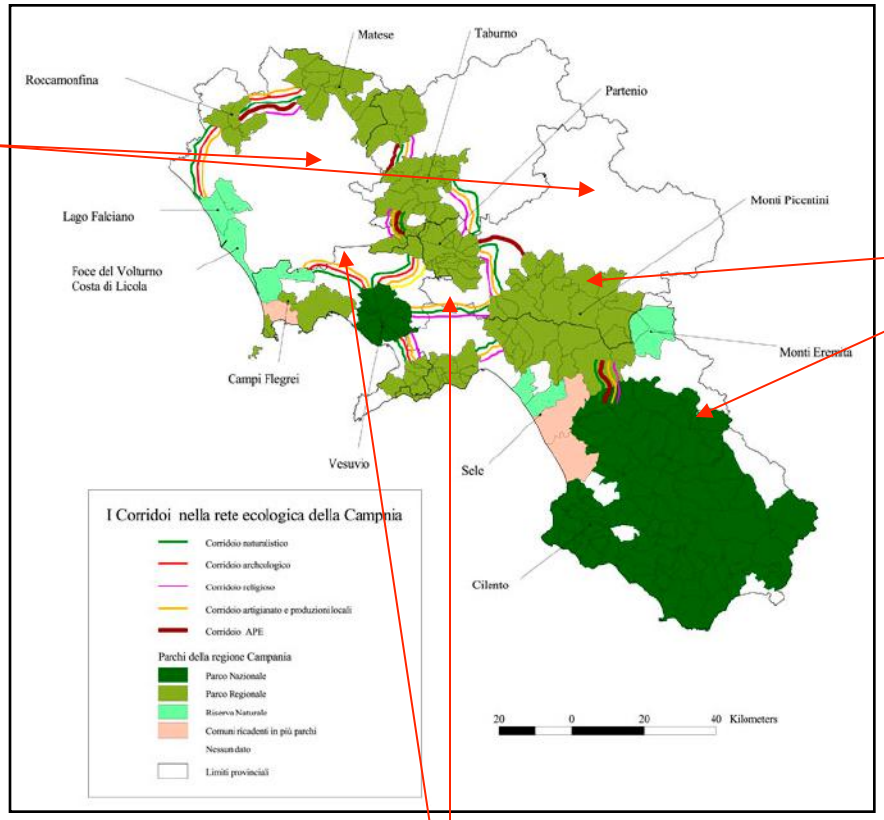
with large surface area requirements (> 1,000 ha); their preservation implies the conservation of vast ecosystems

Hot-spots of biodiversity and gene zones for conservation



At landscape level forest trees may (and should) be employed to recover, restore and ameliorate ecological connectivity

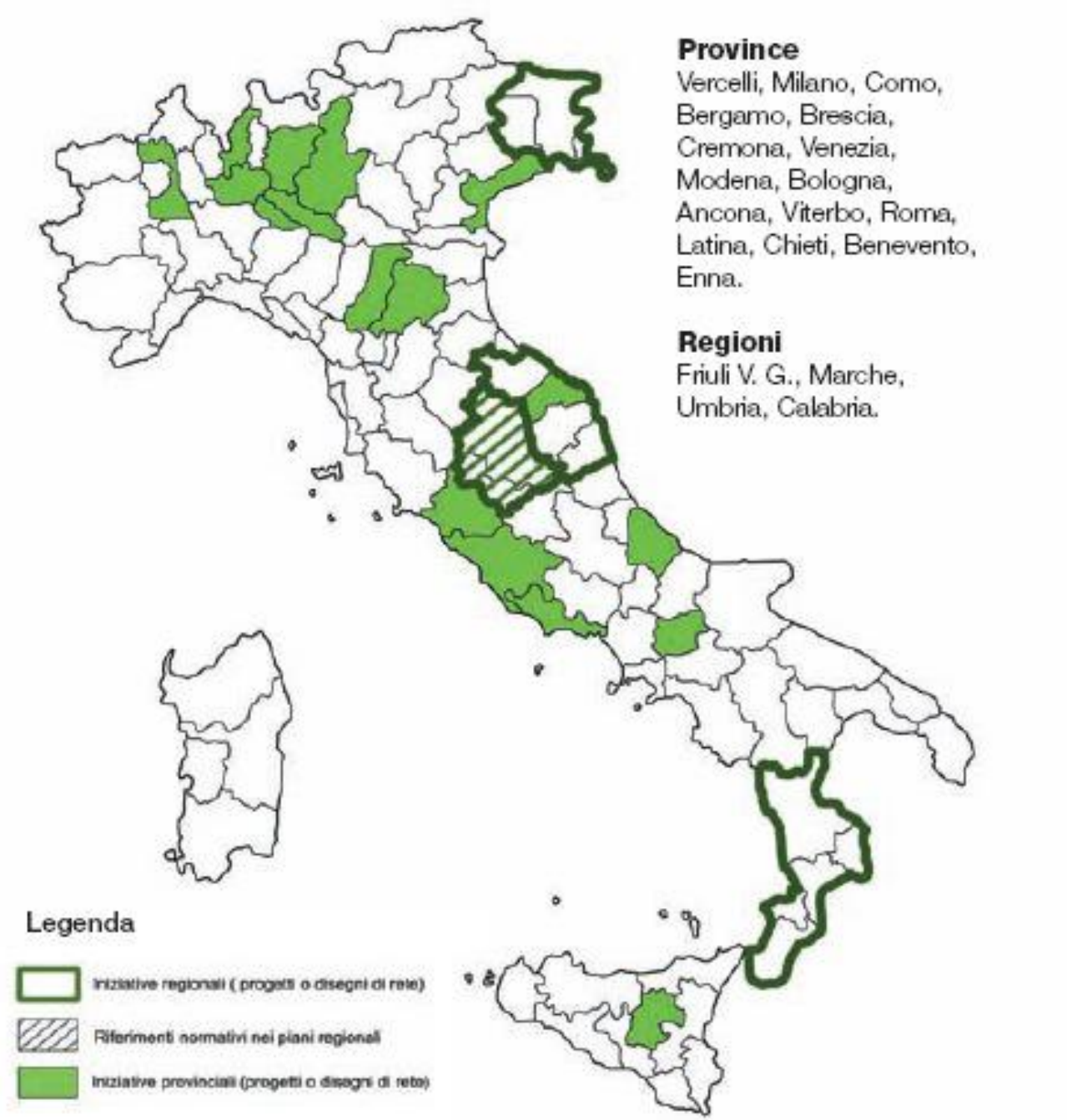
Buffer Zones to protect central areas (managed ecosystems)



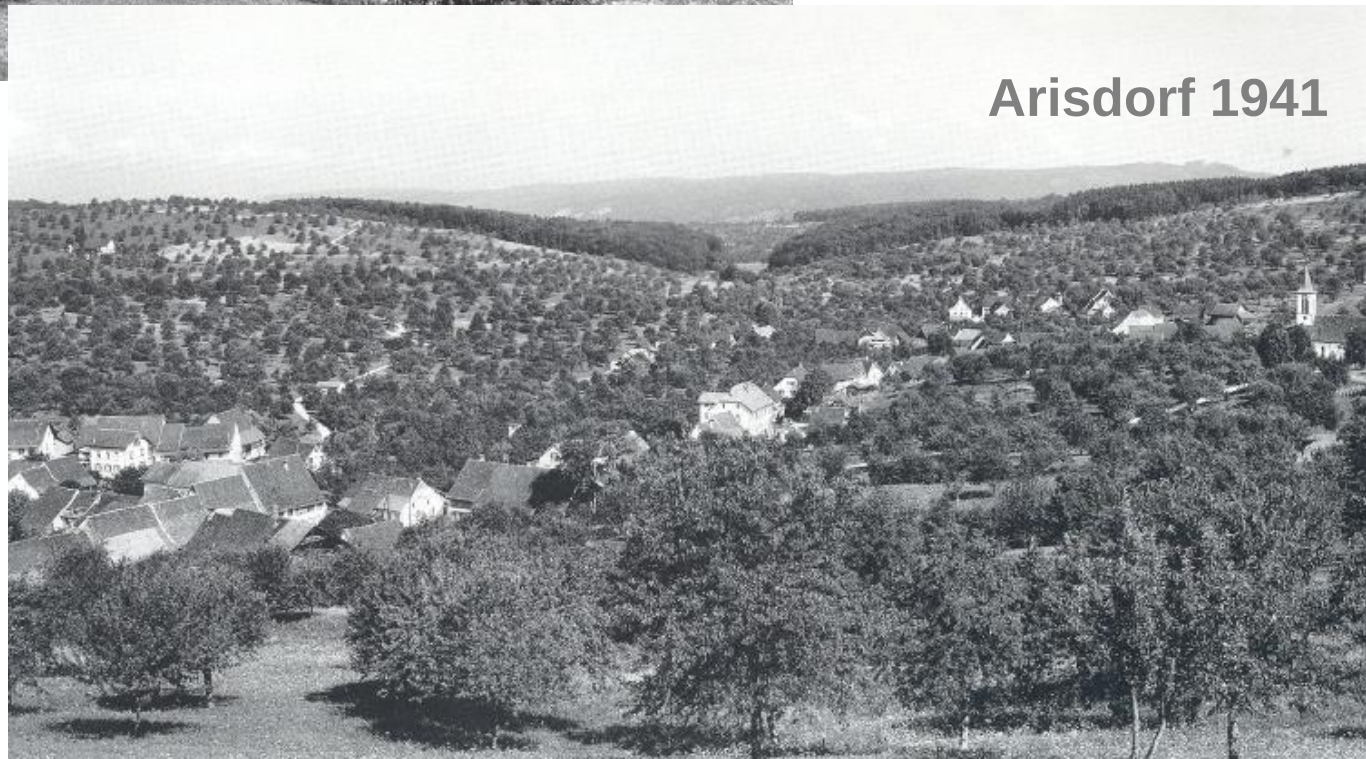
Central Zones characterized by high levels of ecological integrity and biodiversity (protected areas)

Stepping zones and corridors among central zones

Fig. 8.3 - Attività degli enti locali per le Reti Ecologiche



Tree distribution effects on landscape

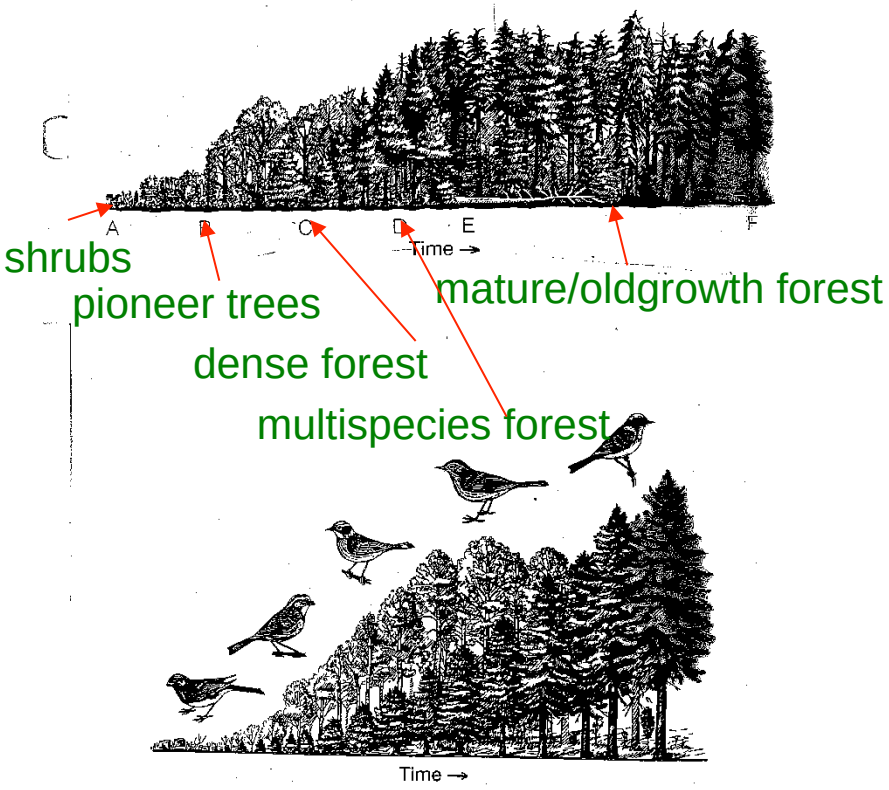


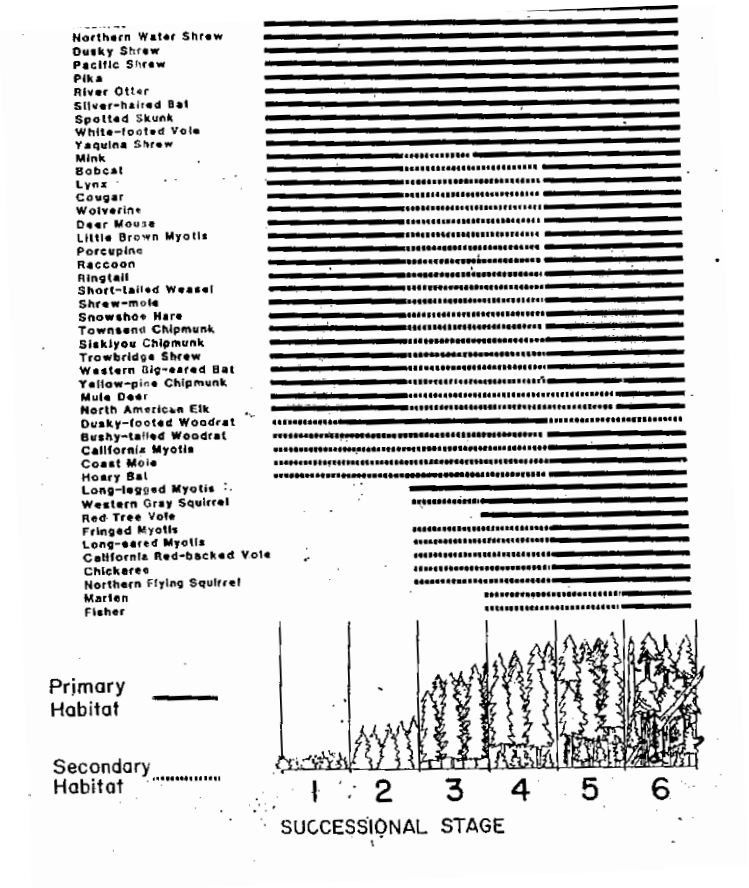
(Tanner, 1993)

Linear tree systems for micro-climate, phytodepuration and biomass

Forest management vs. biodiversity (species and ecosystem diversity)

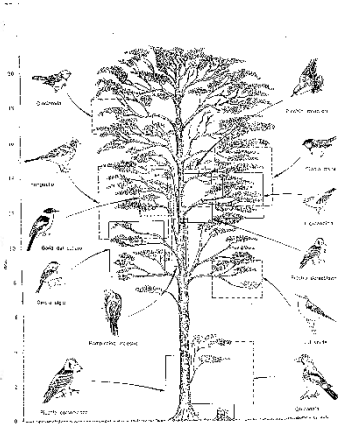
Relationships among forest structure and animal species diversity provide useful insights for forest management

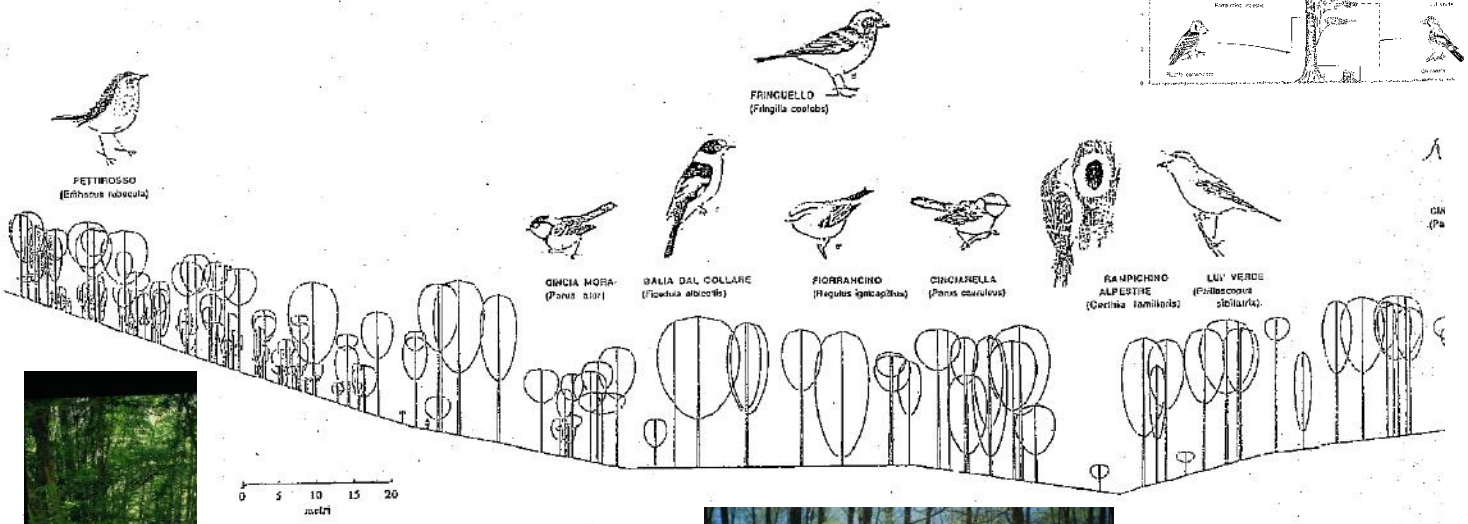




The combination of different forest structures at landscape scale increases overall biodiversity

Beech forest in Parco d'Abruzzo





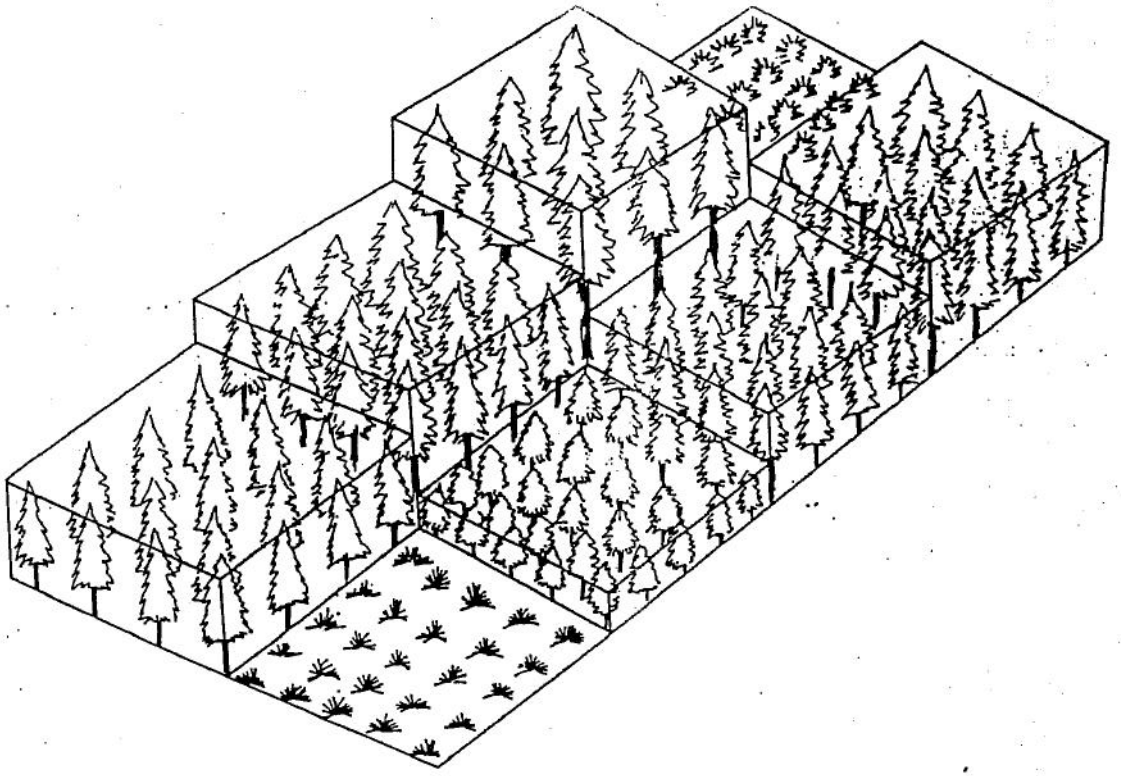
Dense/coppice forest

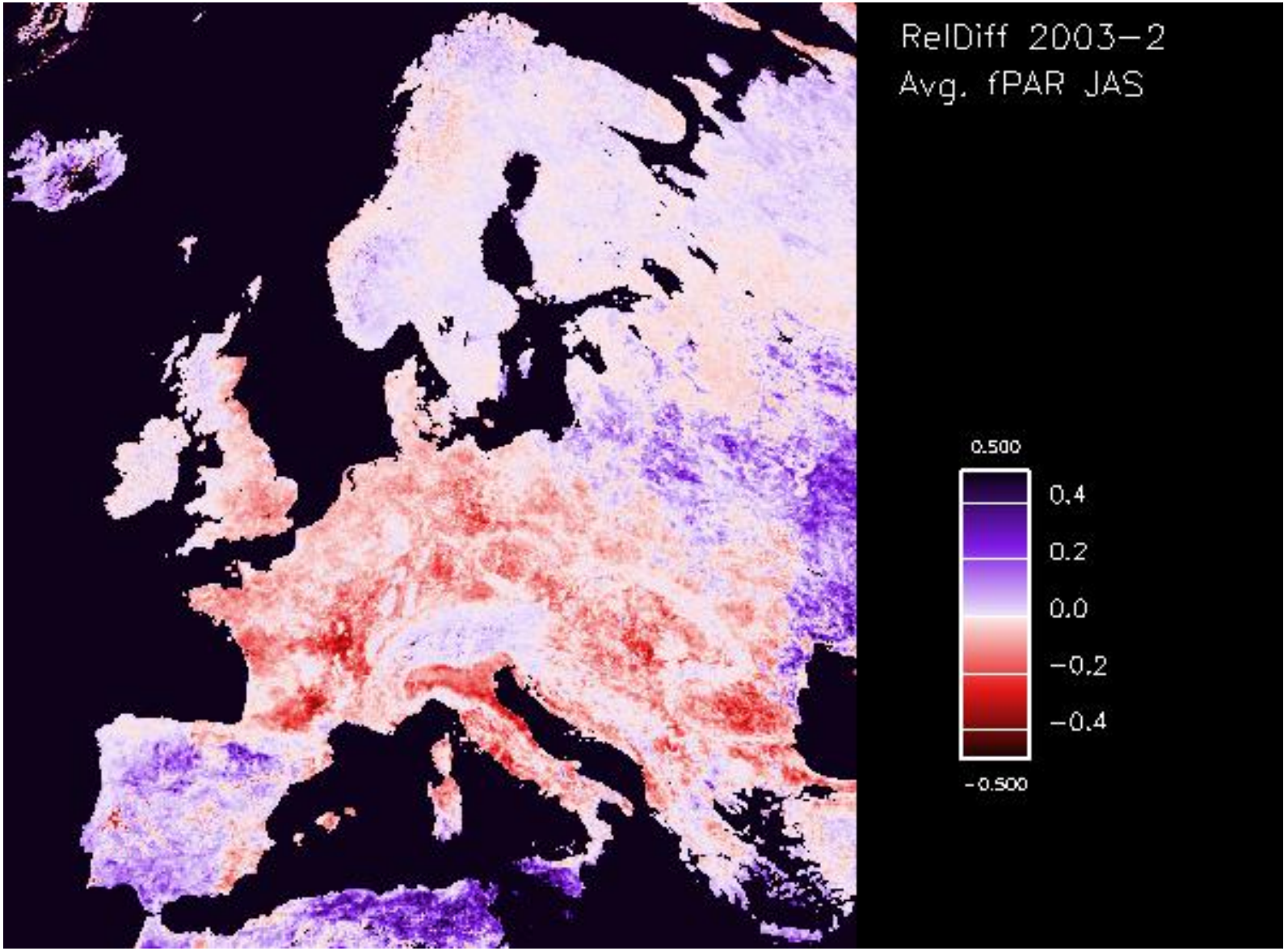
High stand

(Papi e Scarascia 1998)

Forest management with rotation in time and space of different forest stands may represent an interesting management option for biodiversity conservation, but:

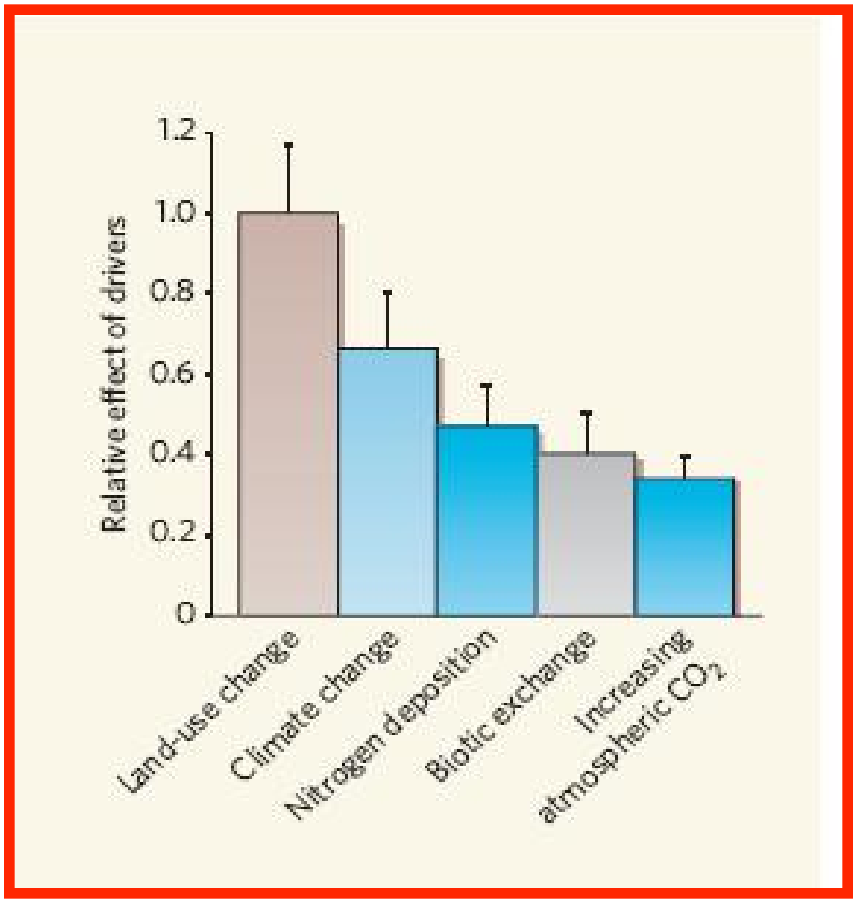
- increase rotation length
- not for all forest types
- natural reserve areas should be included
- umbrella species must be taken into account





Impact of climate change: heat waves of 2003 and reduction of forest NPP

Impact on biodiversity



Actually, the greatest impact on biodiversity in the mediterranean region is expected to be caused by land-use change (rather than climate change).

(Sala et al, Science, 2000)

HUMAN IMPACT ON DIVERSITY (genetic and species)

- **habitat fragmentation** :

  size reduction of forest cover

  continuity disruption

  creation of vulnerable “islands”

  genetic erosion

- **unsustainable use of biodiversity**

  Es. deforestation- monospecific forests – low genetic variation and low adaptive potential

- **alien species**

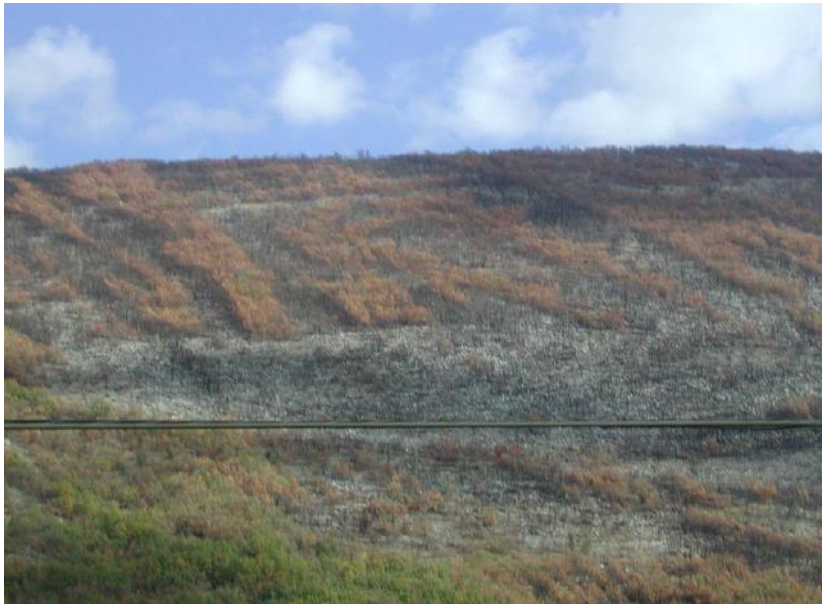
- **pollution**

Figura 2 – La polverizzazione dell'insediamento nelle aree pianeggianti

(da: Il progetto “RERU”, Bernardino Romano)

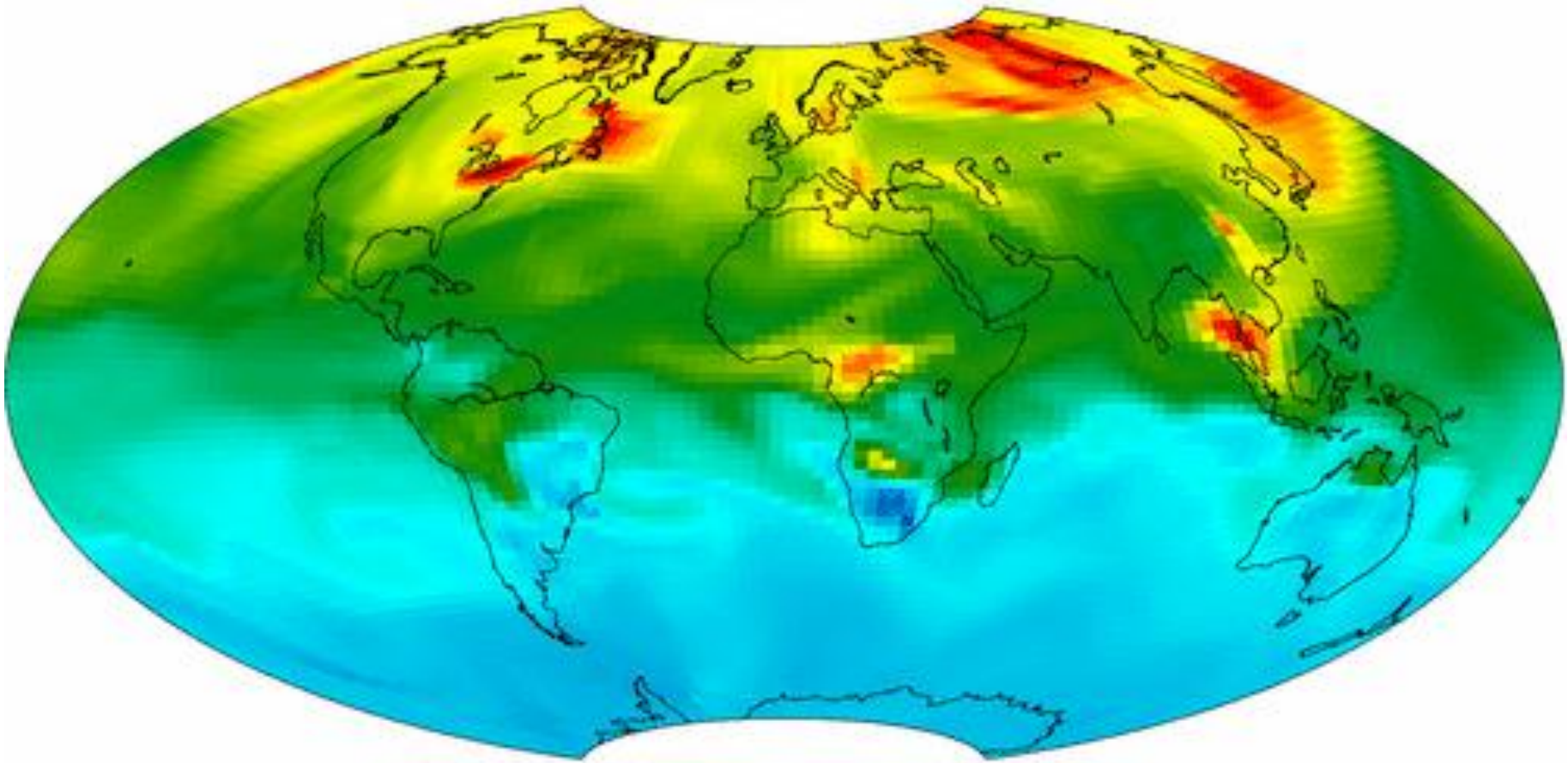
The fire factor

With climate change the risk of forest fires and the vulnerability of forests are dramatically increasing.
Fire prevention and forest protection will be more and more important



CarbonTracker free troposphere CO_2

2008-Jan-01



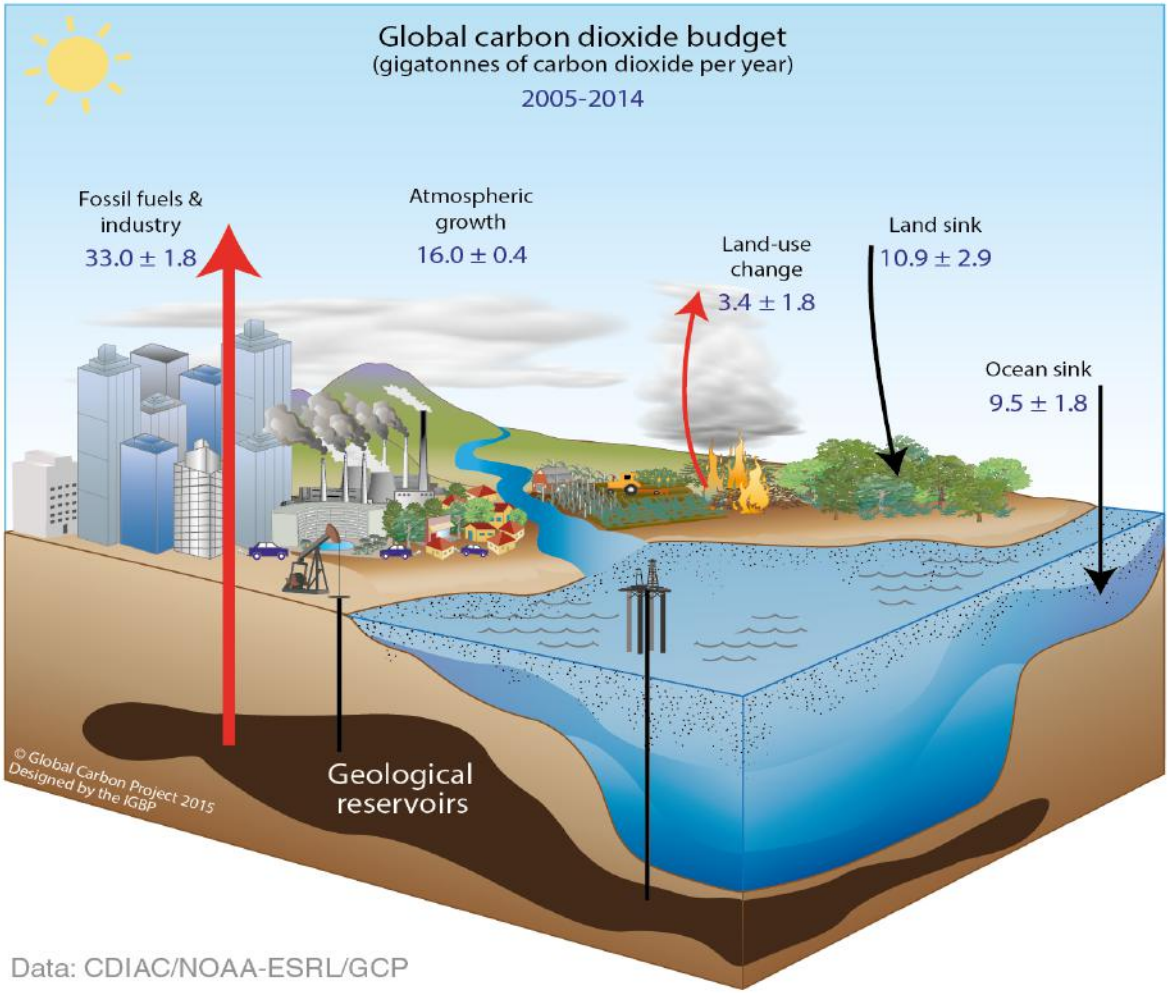
$[CO_2]$ µmol mol^{-1}

375 380 385 390

NOAA Earth System Research Laboratory

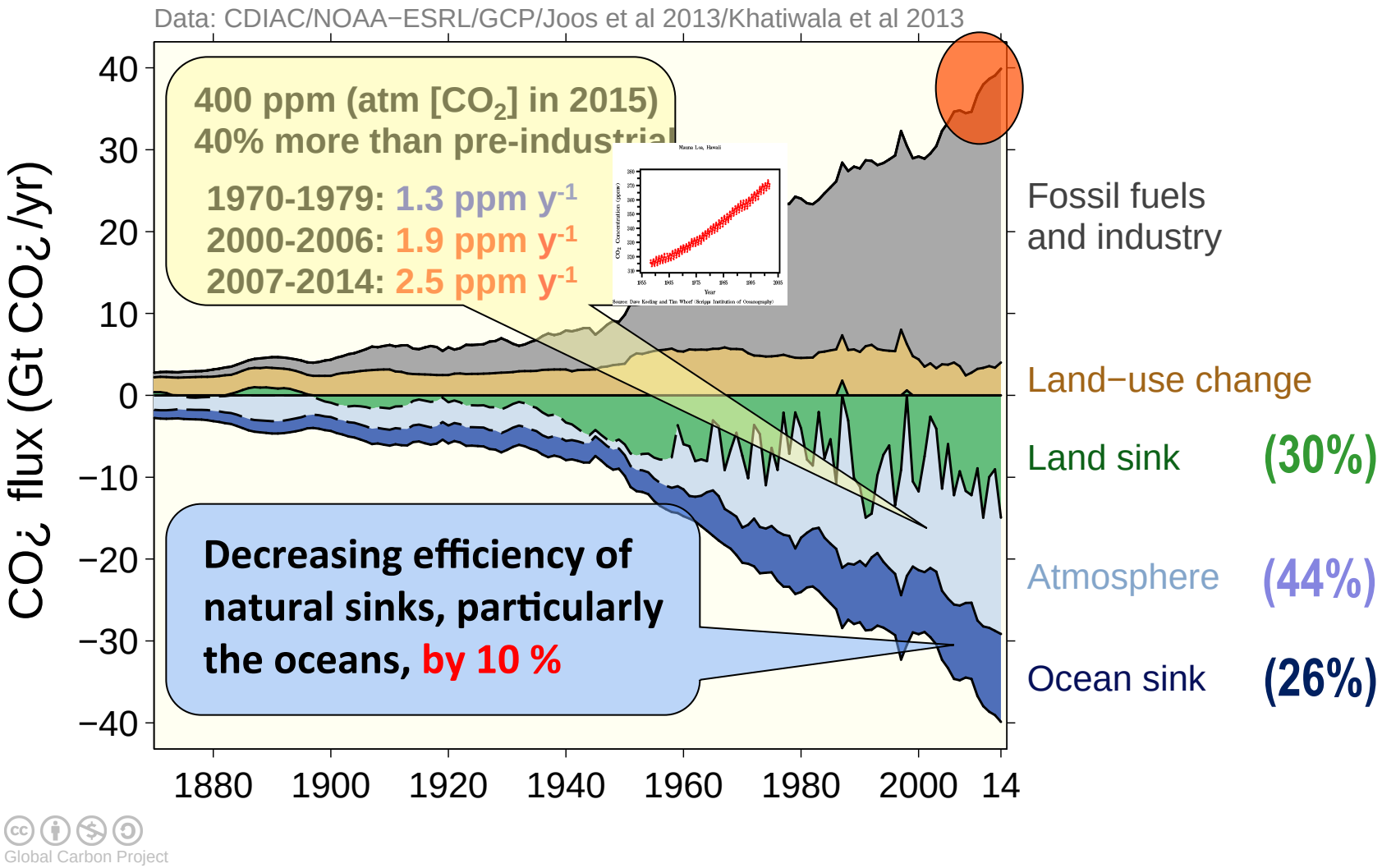
CarbonTracker CT2009 release

Global Carbon Cycle (2005-2014)



(da CDIAC; NOAA-ESRL; Le Quéré et al 2015; Global Carbon Budget 2015)

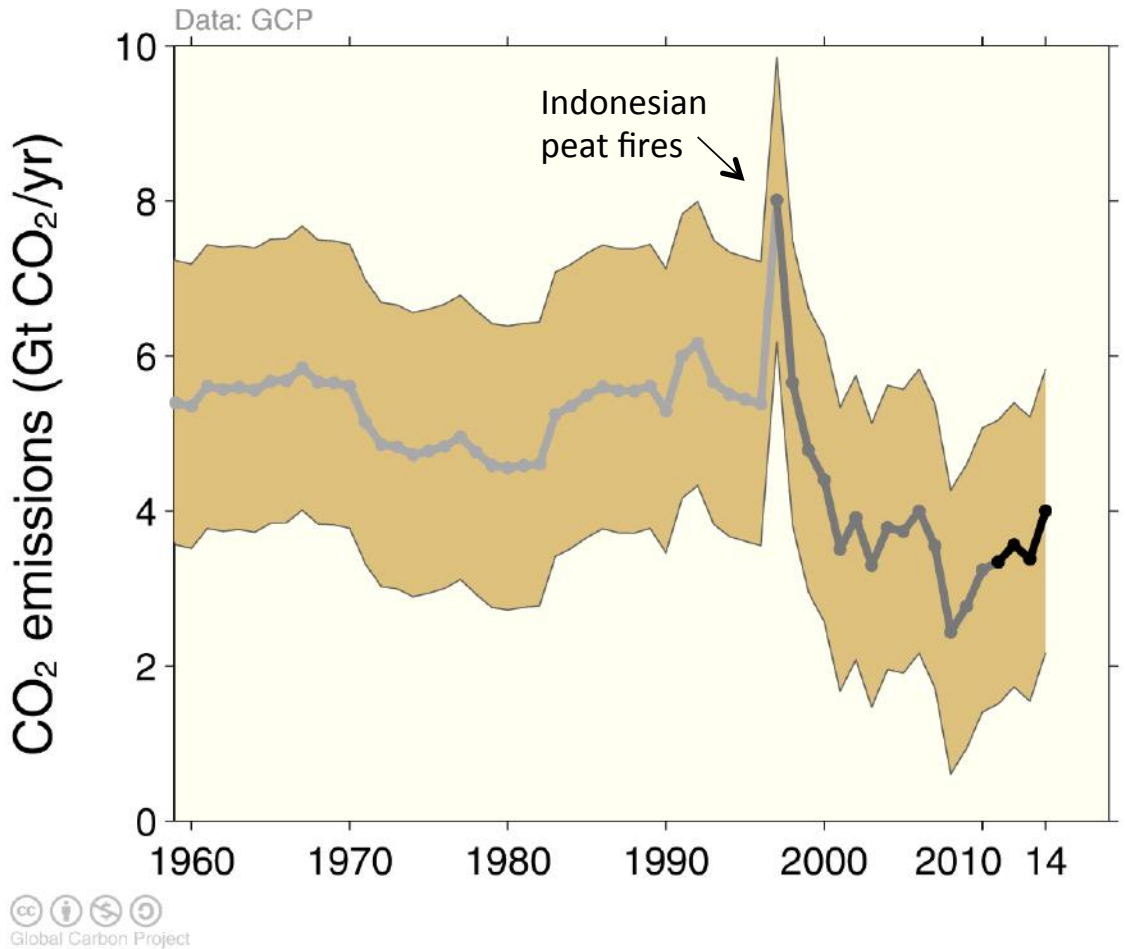
Human perturbations of global C-budget (1850-2014)



Growing contribution of forests as C-sink; but is increasing the uncertainty for the future

CO_2 Emissions from global deforestation

Generalized decrease of emissions from deforestation from 1990 onwards, though with large fluctuations and uncertainties



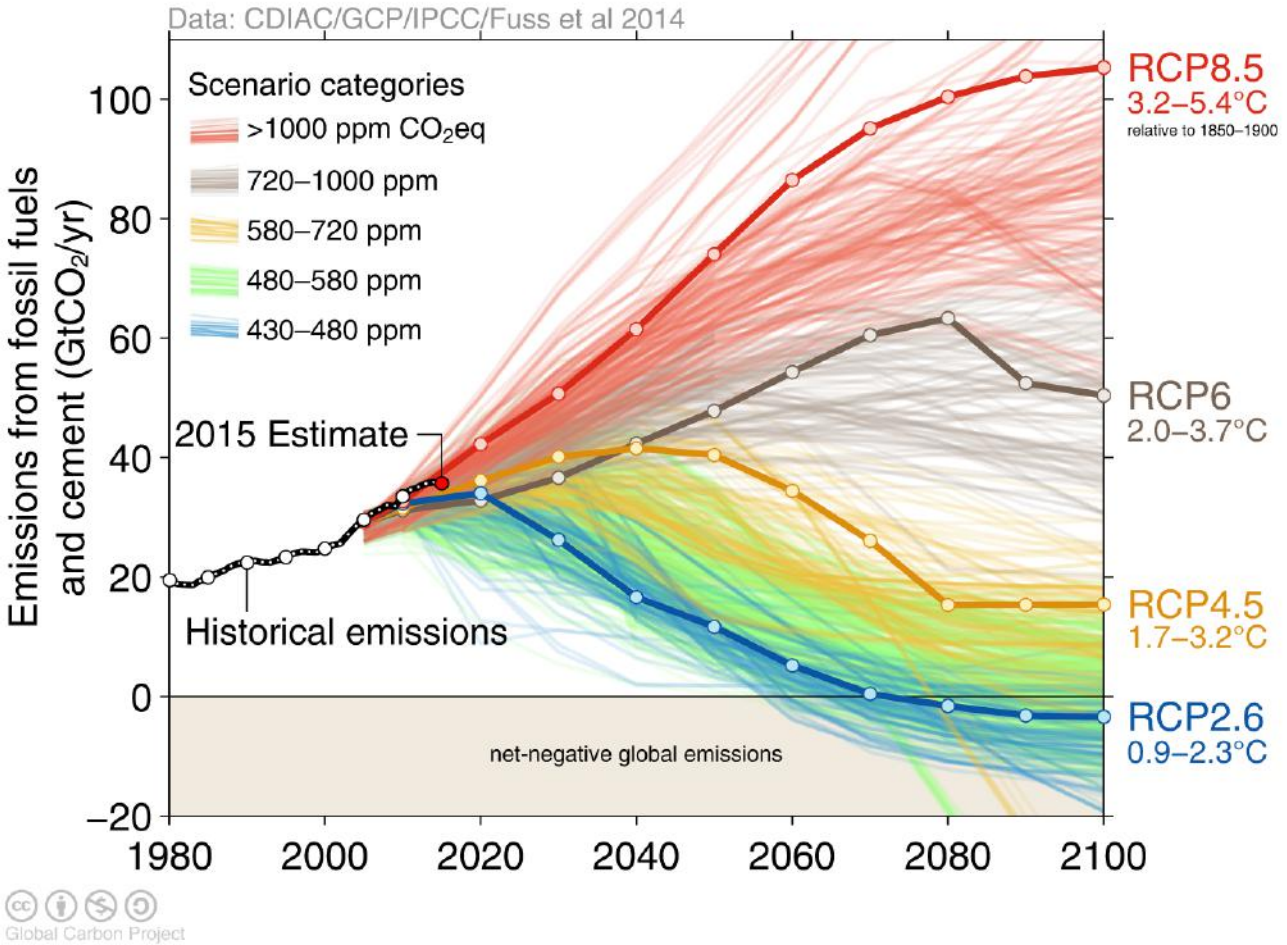
Three different estimation methods have been used, indicated here by different shades of grey

Land-use change also emits CH_4 and N_2O which are not shown here

Source: Houghton et al 2012; Giglio et al 2013; Le Quéré et al 2015; Global Carbon Budget 2014

What is expecting us in the future?
Observed data and emission scenarios for global Carbon

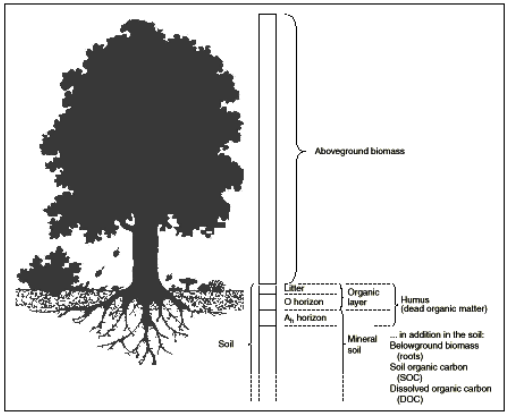
Volountary emission reductions commitments declared in Paris, to avoid the worst climate change scenario (**red**); the most probable scenario will entail an increase of temperature by 3°C (brown)



Over 1000 scenarios from the IPCC Fifth Assessment Report are shown
Source: Fuss et al 2014; CDIAC; Global Carbon Budget 2015

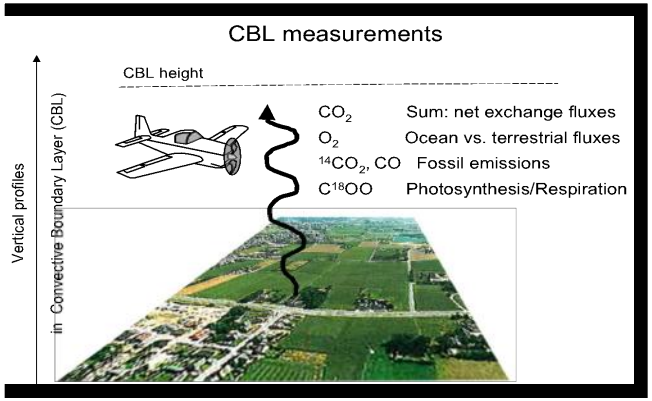
How do we measure C-absorption in the terrestrial ecosystems?

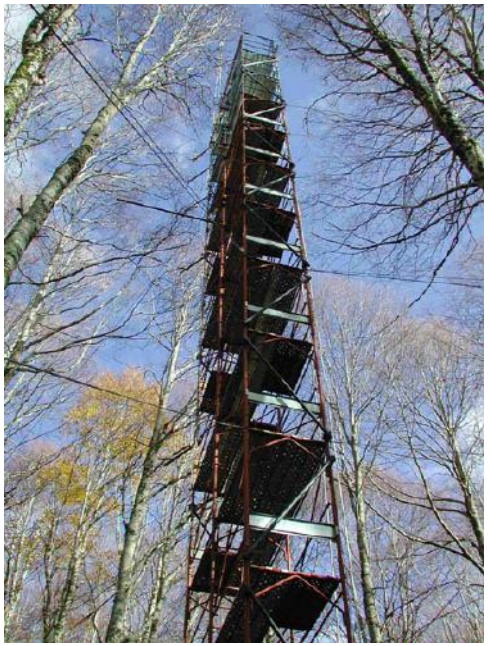
- Successive inventories of C- stocks in the biomass and in the soil



NEP=ΔB+ΔSOM

- Measure of (daily and annual) net C-fluxes at ecosystem/atmosphere





NEP=Fotos-$Resp_{aut,het}$

The ICOS ecosystem network

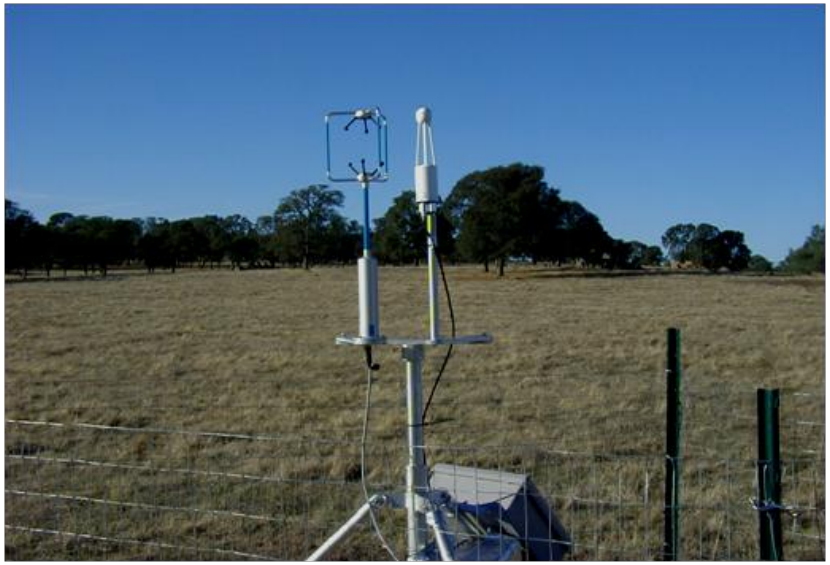
Currently 39 Class 1 and Class 2 candidate sites in the countries participating to the ERIC, covering all the PFTs.

Candidate sites will go through a labelling process where they are evaluated before their official approval as ICOS sites.

Additional 26 sites have been proposed as Associated ICOS sites.

Main features of ICOS Ecosystem stations

1. Measurement of GHGs fluxes (CO_2, H_2O, CH_4 and N_2O) between ecosystems and atmosphere using eddy covariance and chambers
2. Two levels of sites (Class 1- full suite of parameters and Class 2 – subset of variables but same quality) plus the possibility to have Associated sites
3. Standardization of methods and equipment following community defined protocols
4. Centralized data processing, storage and distribution
5. Completely open data access and data use policies



Forest management, age and carbon sink capacity: oak coppice in central Italy

Roccarespampani 1
(42.4082 N ; 11.9303 E)

Roccarespampani

Coppice forest
~1250ha

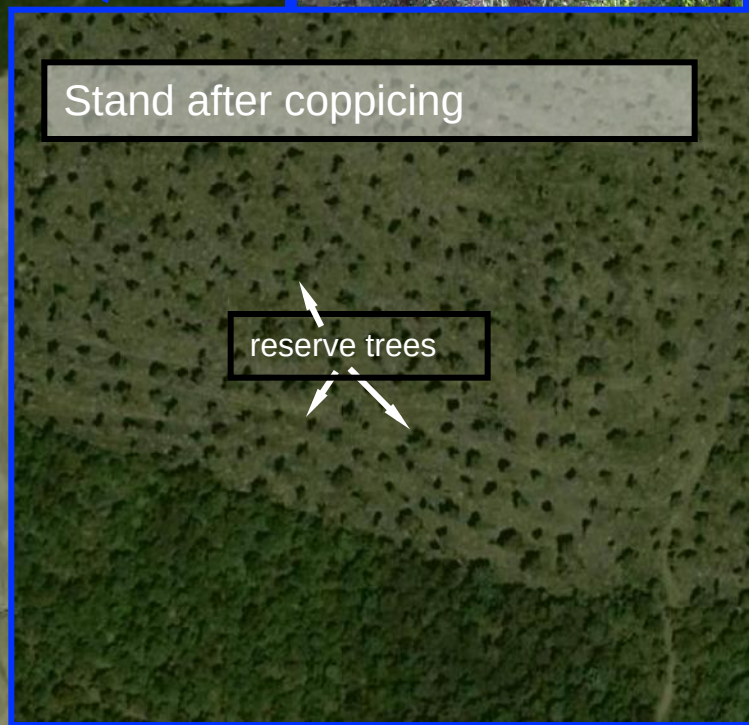
Two eddy covariance sites

Roccarespampani 2
(42.3903 N; 11.9209 E)

Image © 2009 European Space Imaging
© 2009 Tele Atlas

Image © 2009 DigitalGlobe

Stand after coppicing

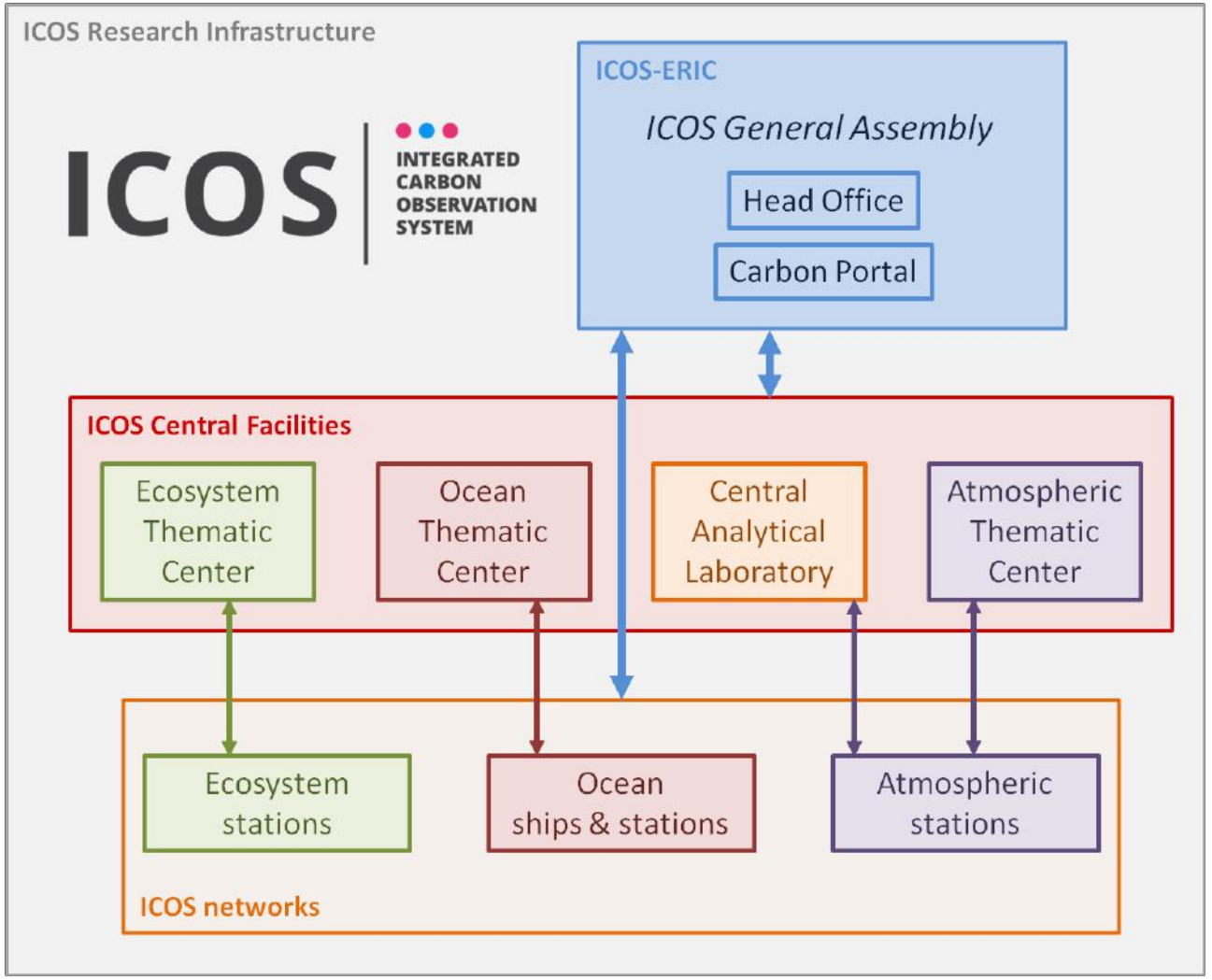


What is ICOS

www.icos-ri.eu

ICOS is:

1. A networks of sites measuring GHGs in the ecosystem, atmosphere and ocean compartments
2. Four thematic centres that coordinate the activity of the sites
3. One EU level head-office and web portal



The ICOS **Ecosystem network:** 40 to 60 ecosystem sites measuring fluxes of CO_2, CH_4 and N_2O

The ICOS **Ecosystem Thematic Center**: coordinates the ecosystem network, does the processing, test and development of new methods and sensors.

Coordination of ETC is in Italy (Viterbo).

The Ecosystem Thematic Centre structure and services

ETC Coordination-University of Tuscia

- Communication & interactions with ICOS ecosystem stations and other Central Facilities
- Organization of the annual assessment of ETC operations and reporting to the ERIC

Data Unit

- Near real time data/ metadata collection
- Automatic data QAQC and processing
- Data sharing, distribution and archiving
- Development of tools for data exploration and validation
- Alert service in case of data problems or inconsistencies

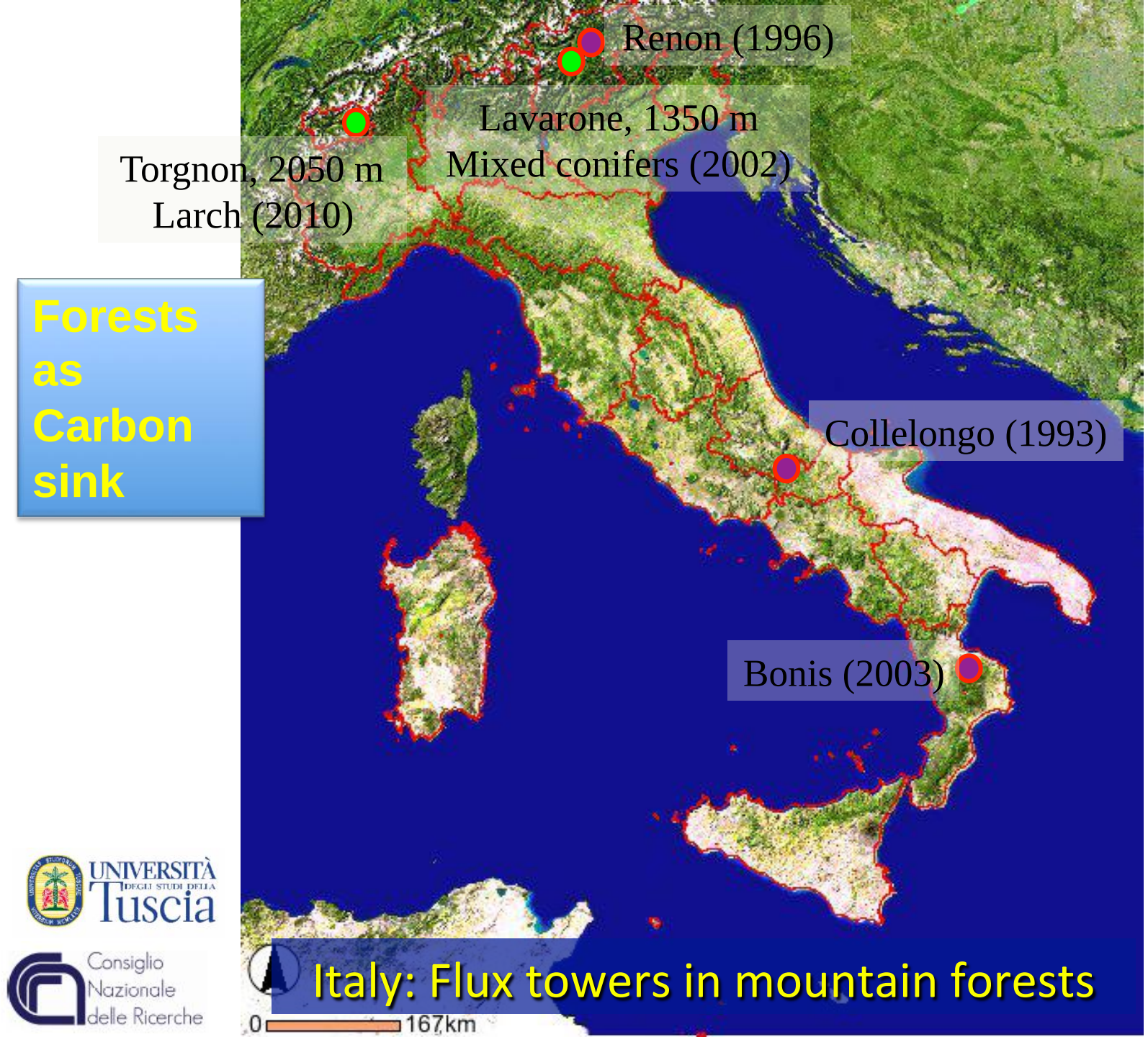
Test Unit

- Evaluation of new sensors and prototypes
- New methods development
- Interactions with instrument manufacturers and research centers
- Roving system management for sites validation and parallel measurements

Network Unit

- Assistance to the ICOS ecosystem stations
- Evaluation of the ICOS stations performances
- Training sessions for sites managers and technicians
- Soil and vegetation samples analysis and long term storage

http://www.icos-etc.eu



UNIVERSITÀ DEGLI STUDI DELLA Tuscia

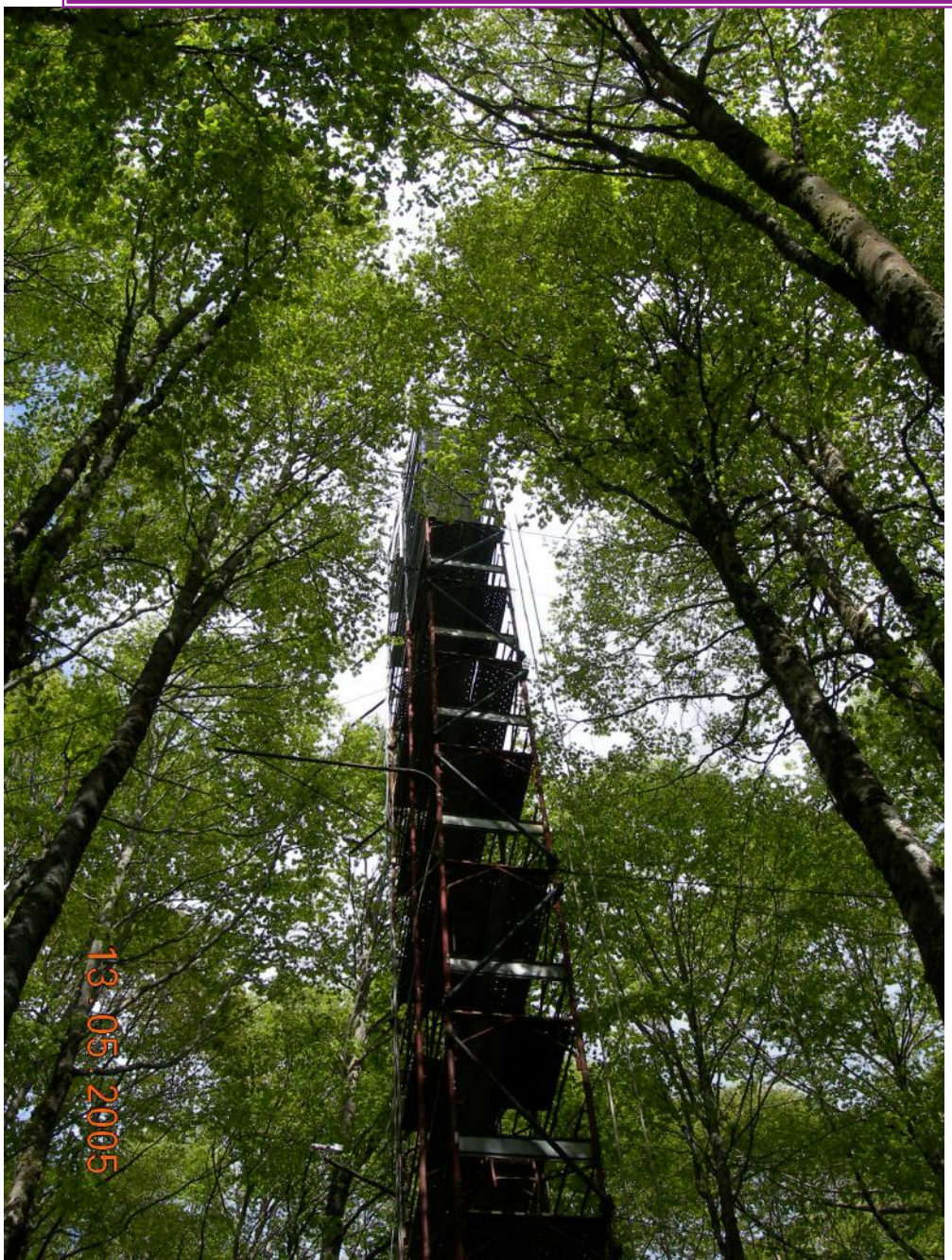
Consiglio Nazionale delle Ricerche

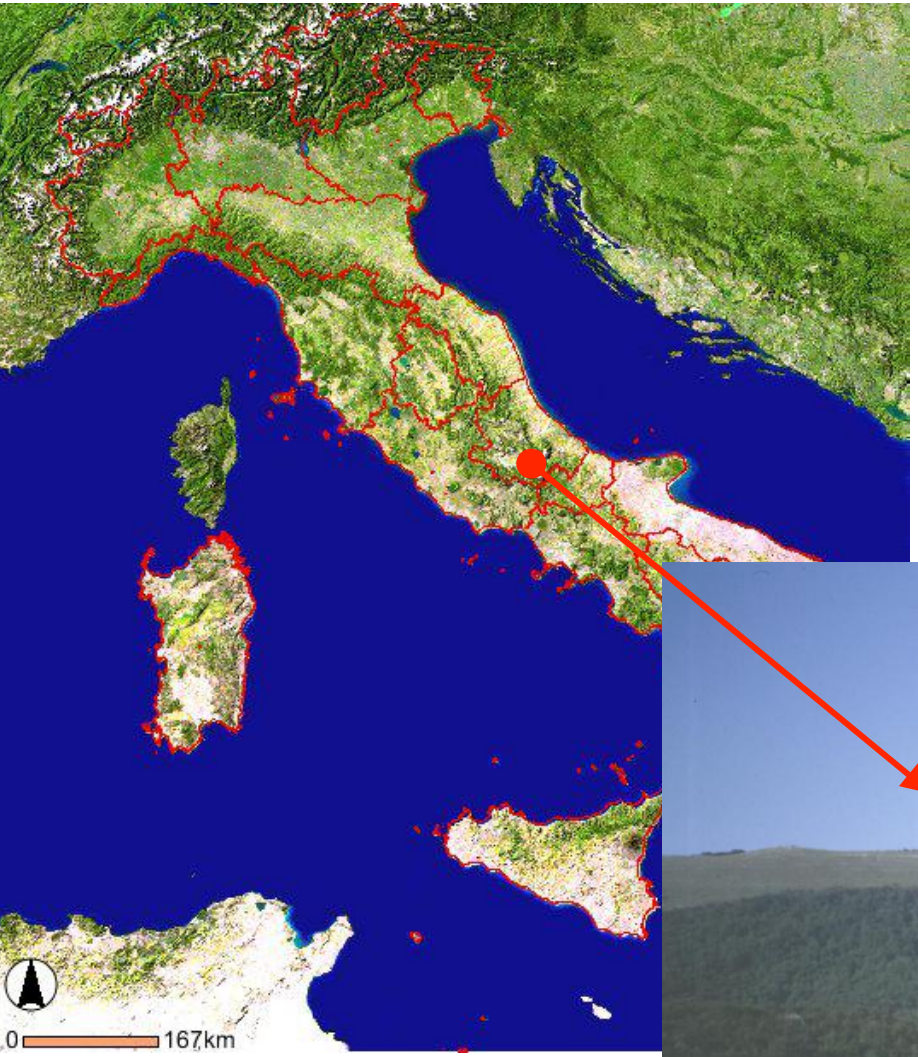
AUTONOME PROVINZ BOZEN SÜDTIROL

PROVINCIA AUTONOMA DI BOLZANO ALTO ADIGE

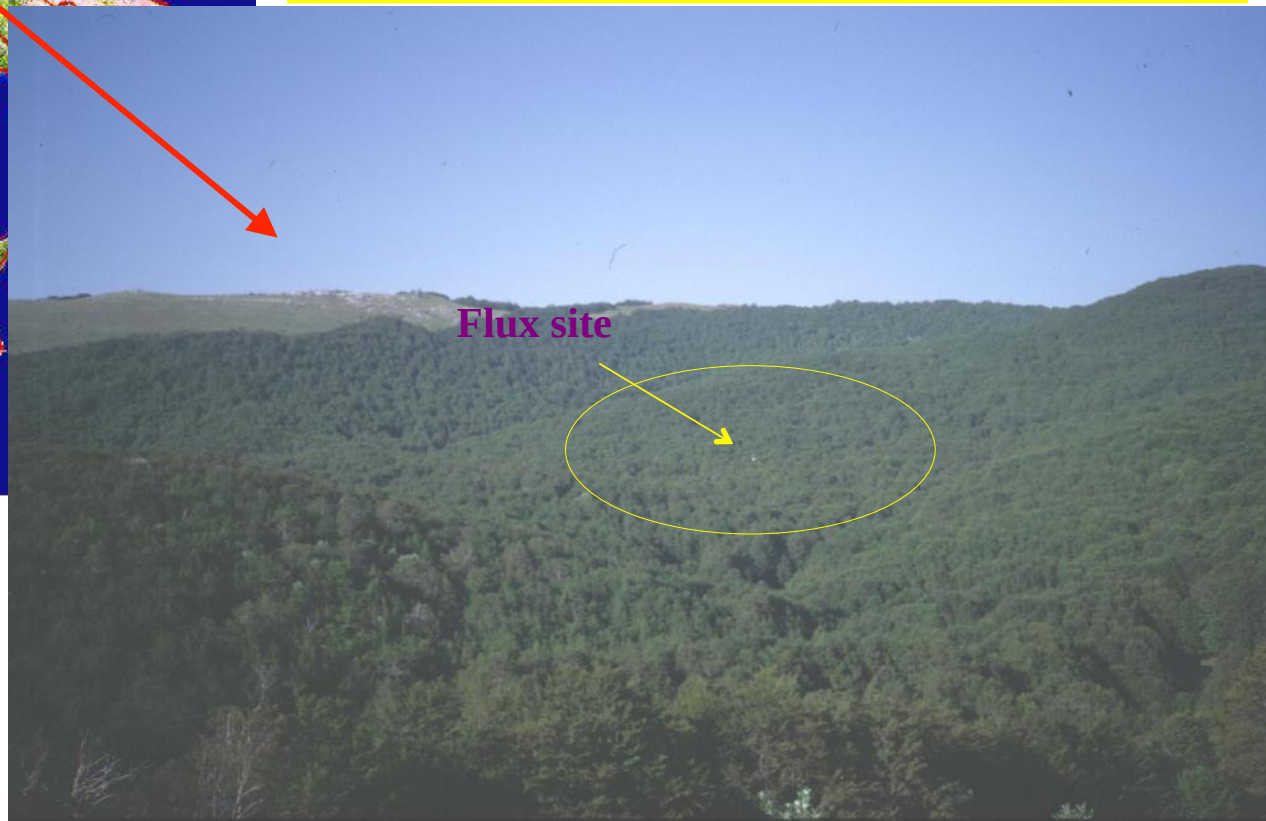
Corpo Forestale dello Stato

Set-up: tower, sonic anemometer, gas analyser



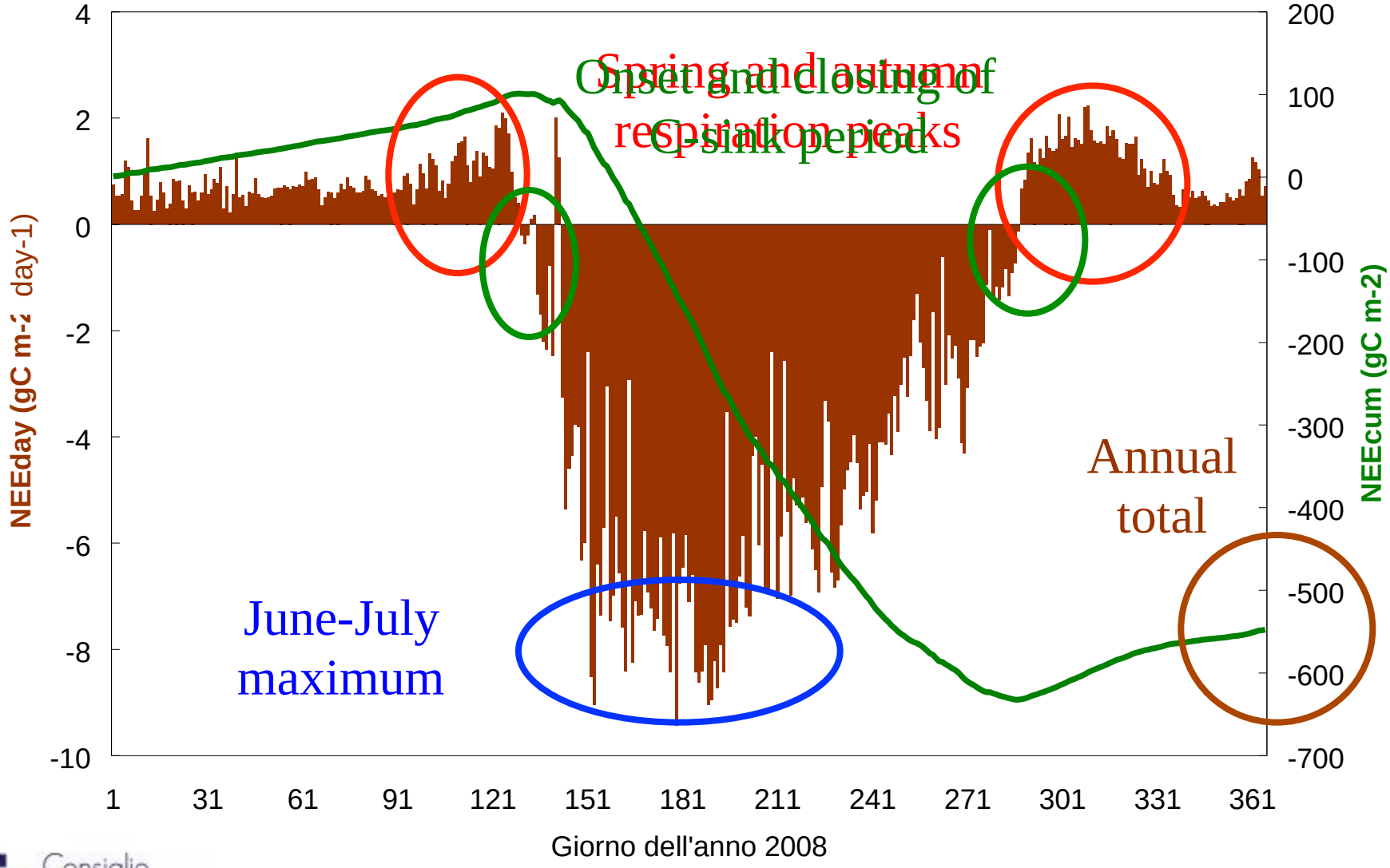


Collelongo (1600 m a.s.l.)
Beech forest
100 ➔ 110 years old
T = 7.1 °C, Prec. 1088 mm
3.5-4 months snow cover
LTER site



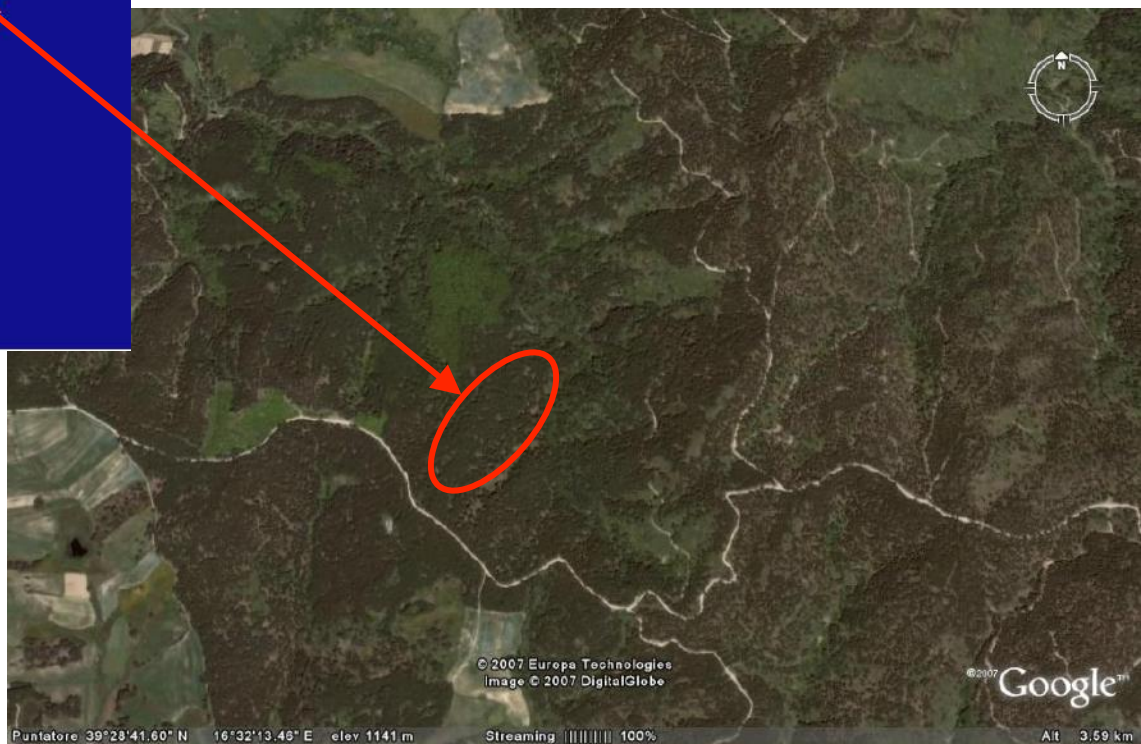
Consiglio Nazionale delle Ricerche

Annual trend of Net Ecosystem Exchange 2008



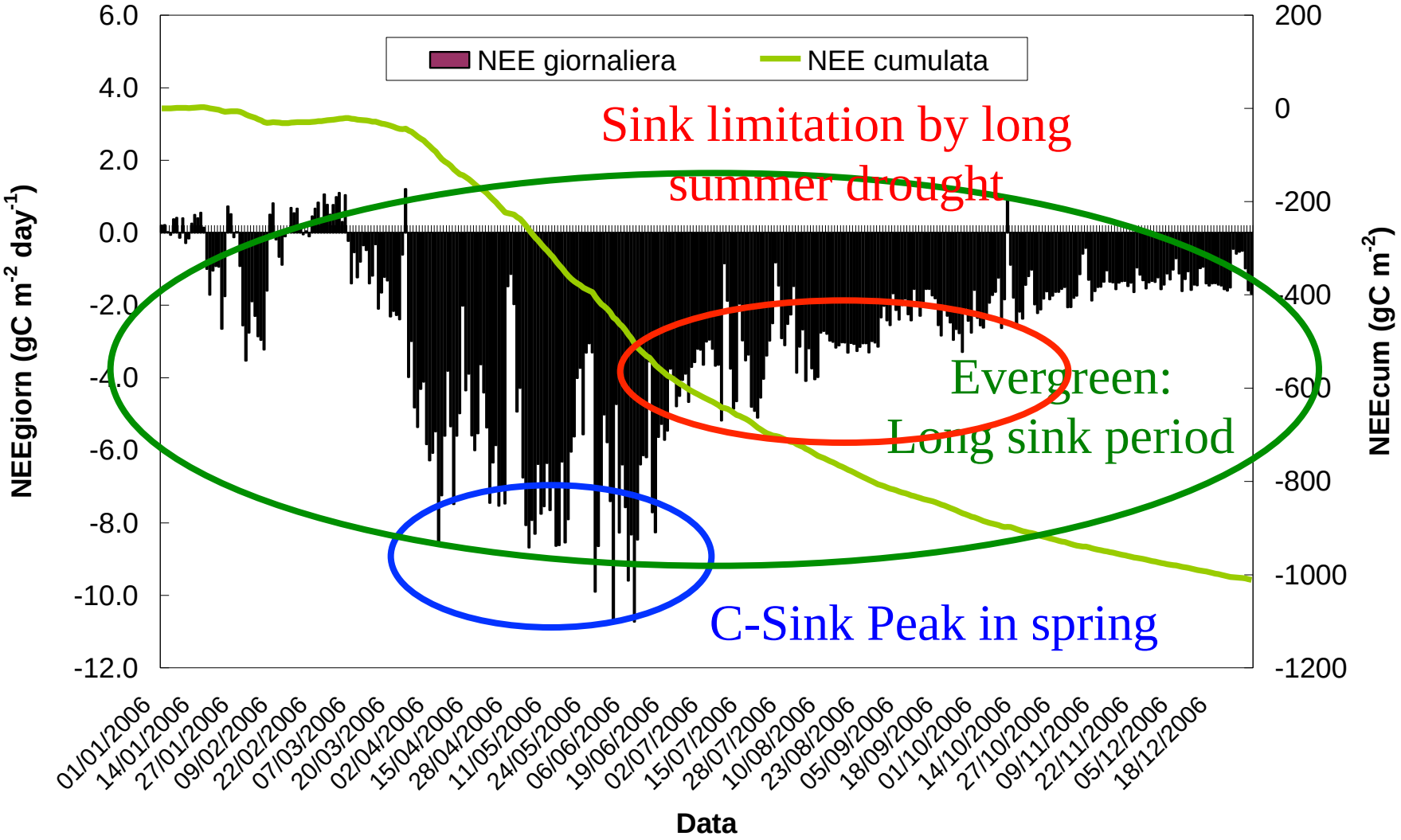
Consiglio Nazionale delle Ricerche

Bonis (1100 m a.s.l.)
Pine forest
40 ➔ 50 years old
T = 8.9 °C, Prec = 1179 mm
2-2.5 months snow cover
(on/off)



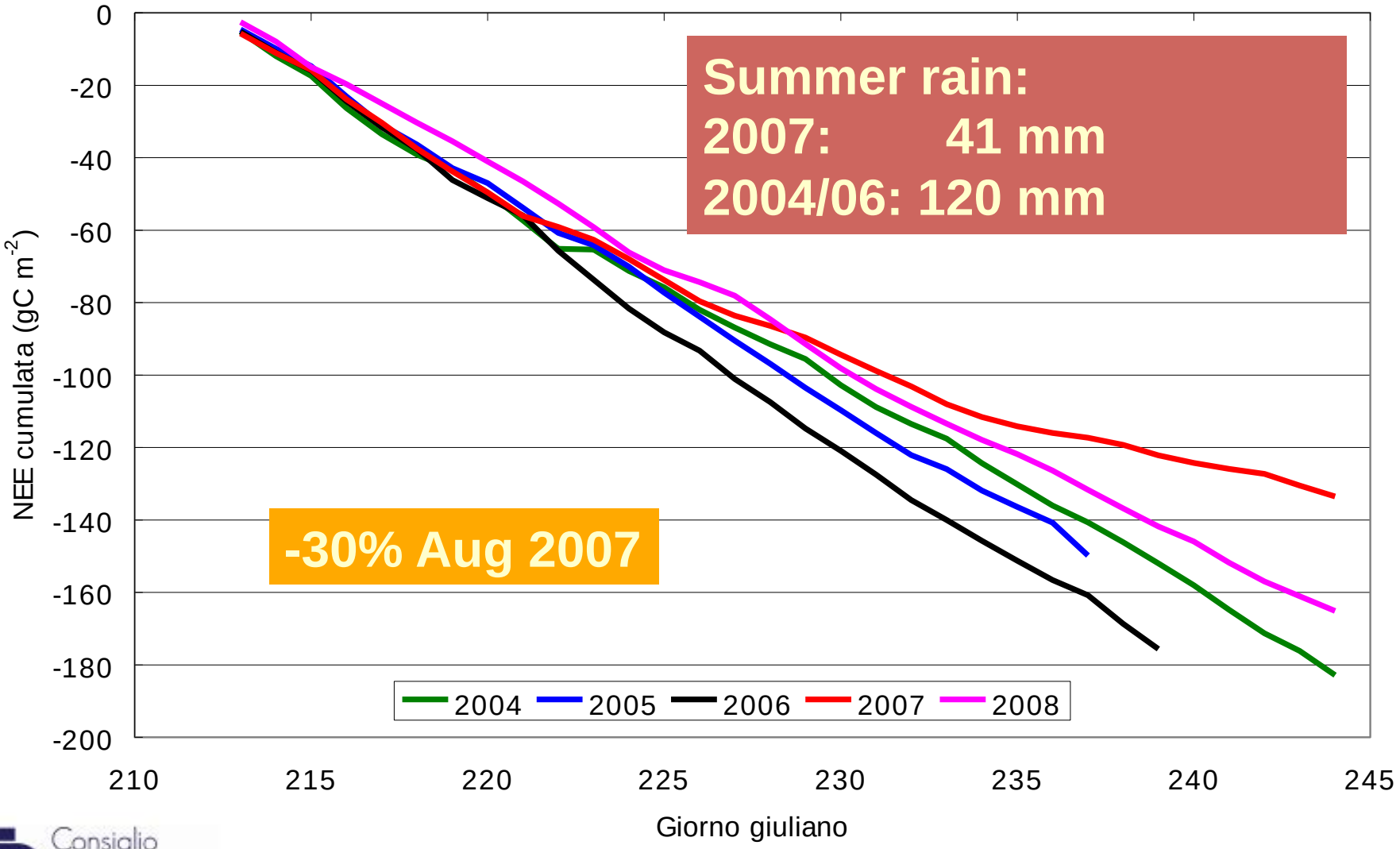
Consiglio Nazionale delle Ricerche

Annual trend of Net Ecosystem Exchange 2006



Consiglio Nazionale delle Ricerche

Beeche forest: heat wave and C-budget



Consiglio Nazionale delle Ricerche

In Europe forest C-absorption offsets C-emissions from agricolture

Forest C-sequestration accounts for 10-20% of European C-emissions

Table 1. Net biome productivity in forest, agricultural, and peat sectors. Positive fluxes mean net uptake; negative is net loss of C. Numbers within parentheses represent one standard deviation. For each ecosystem, the total area is also given.

	Area (Mha)	NBP (Tg C a^{-1})	Ref. nos.
	Forest sector		
Forests	339 (7)	363 (159)	(*10*, *15–19*)
Other wooded land	50 (17)	14 (7)	(*10*)
Subtotal		377 (159)	
	Agricultural sector		
Croplands	326 (32)	−300 (186)	(*15*, *24*)
Grasslands	151 (36)	101 (133)	(*15*, *24*)
Subtotal		−199 (229)	
	Peat sector		
Undisturbed peat lands	39 (6)	13 (7)	(*28–30*)
Drained peat lands	16 (4)	−30 (15)	(*29–31*)
Peat extraction		−50 (10)	(*29*, *30*)
Subtotal		-67 (19)	
Total		111 (279)	

But: large uncertainties!

Emissions from fossils = -1850 Tg

geographic Europe (up to Urals)

Janssens et al. (2003)

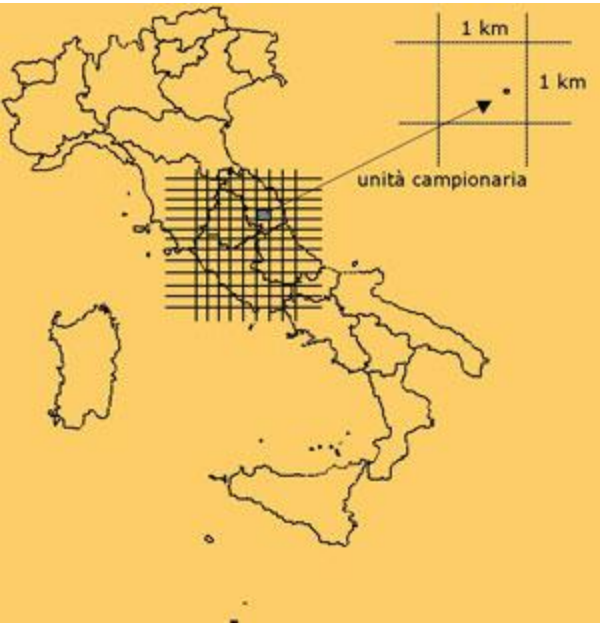
Corpo Forestale dello Stato

Role of mountain forests in Italy

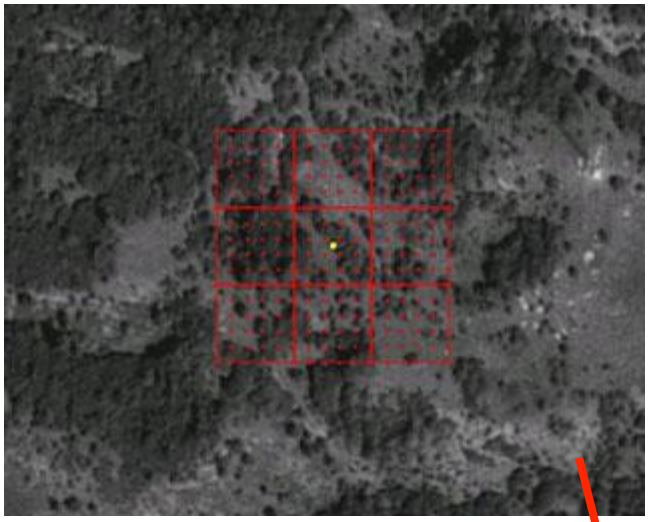
Reference year: 2005

http://www.sian.it/inventarioforestale/ http://www.infc.it Tabacchi et al., 2012

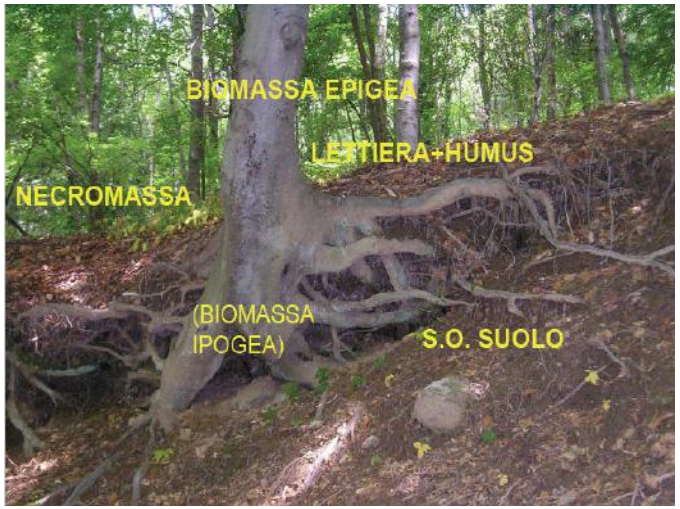
Italian Inventory of Forests and Carbon-INFC



Step 1
300,000
points

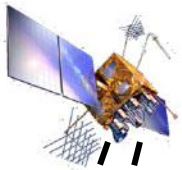


Step 2
30,000
points



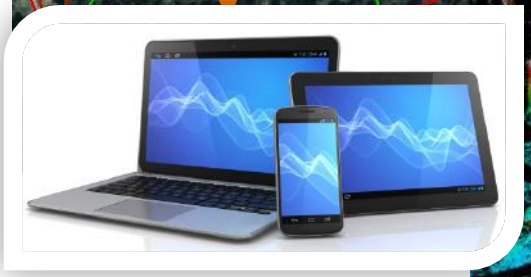
Step 3: 7,000
points on
biomass (step
3+ 1,700
points on
Soil-C)

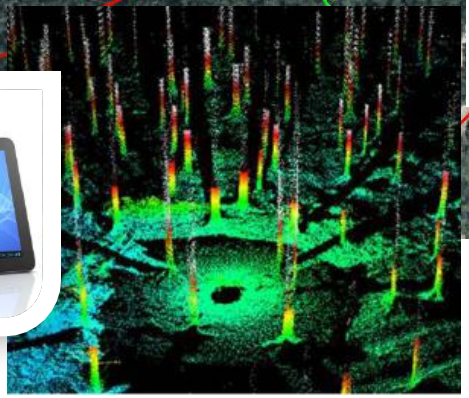
Project ALForLab: ForestWoodEnvironment Value Chain



ICT applied to forest sustainable management, inventory of ecosystem services, and wood mobilization

Informatica forestale, *mobile* e *desktop* GIS





LiDAR- terrestre

Fotogrammetria con droni

Consiglio Nazionale delle Ricerche

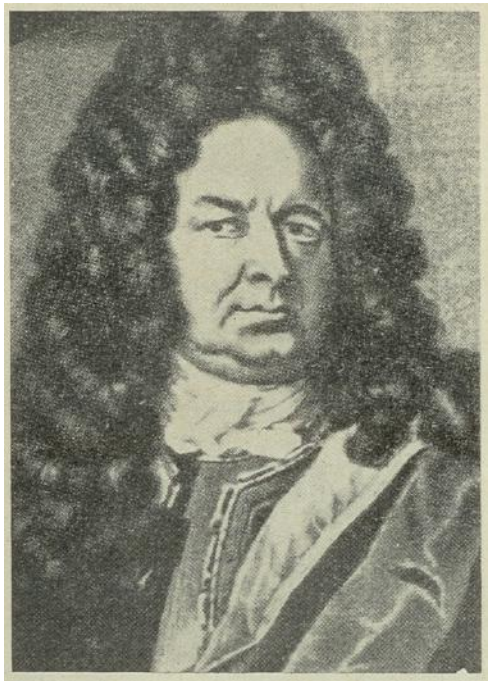
CRA CONSIGLIO PER LA RICERCA E LA SPERIMENTAZIONE IN AGRICOLTURA

UNIVERSITÀ DEGLI STUDI DELLA Tuscia

CURSA Consorzio Universitario per la Ricerca Socioeconomica e per l'Ambiente

(PON project in the Region Calabria)

LiDAR: animazione



Hans Carl von Carlowitz, German natural and mining scientist, 1645-1714

Holztes……nachhaltende Nutzung: «sustainable…. use of wood»

The role of forests in the bioeconomy, at European and global scale

A new economy and society based on bio-resources and the development of ecosystem services

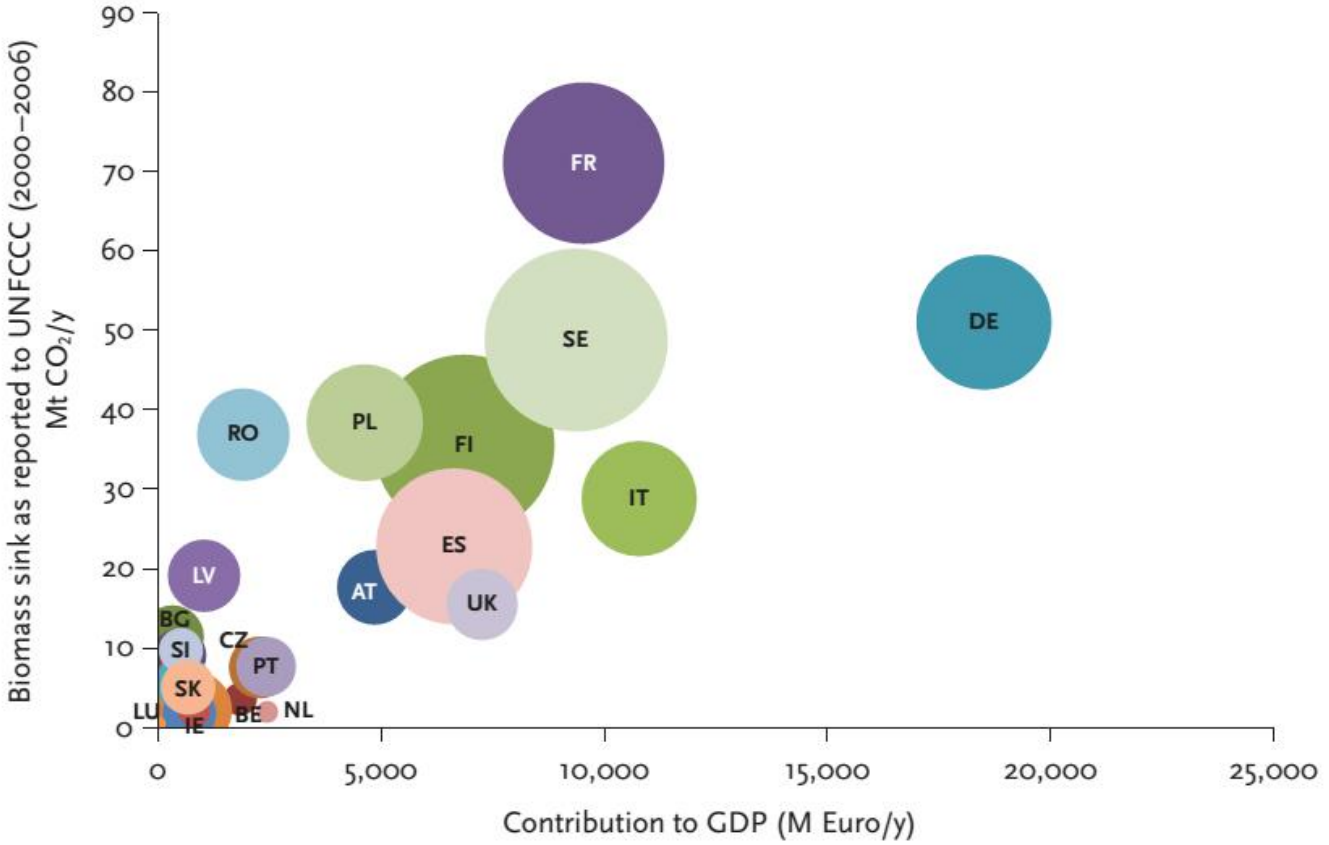


Figure 3. Correlation of national GDP and the CO2 sink in the 28 EU Member States' forests and forest sectors for the period 2000–2006. Ball size indicates the area of forest available for wood supply (FAWS). The graph suggests a positive correlation between strengthening the contribution of forests to GDP and the relative size of the CO_2 sink given the current structures. Eastern European countries tend to be relatively high in the scatter of balls, i.e. having a higher sink per Euro unit of GDP than the average in the EU countries. Western European countries, apart from France, tend to be more closely distributed along the diagonal. Large net importers tend to be more at the GDP side of scatter. Note that some small countries fall away behind larger balls.

Wood transformation and utilization

C-free, highly energy- efficient structural material; good quality of Italian wood resources, but poor planning

Foto da: Brunetti, 2008

Advantages of timber constructions

- High resistence to earthquake, reduced damages, low weight
- Fast implementation (short time interval)
- Environmental sustainability

Prova su tavola vibrante 2007, Miki (Giappone), Progetto SOFIE – Accelerogramma: JMA Kobe

(per gentile concessione del Prof. Ceccotti – CNR IVALSA)

Case study: Murray Grove, London

Originary plan: in concrete

Structural cost for timber option: 30% more (Xlam boards imported from Austria)

But……

Building interval: 17 weeks less for the timber construction (on a total of 66)

Xlam technology selected for economical reasons

Biorefineries for energy, chemicals, new materials, all from renewable resources: wood

Example of transformation to bioeconomy

Pulp Mill Today

Concept: One Company
Energy use: renewables + fossil

Pulp 0.5Mt

340 M€/year

Bioproduct Mill Tomorrow

Concept: Ecosystem of Companies
Energy use: 100% renewables

Pulp 1.3Mt

2017

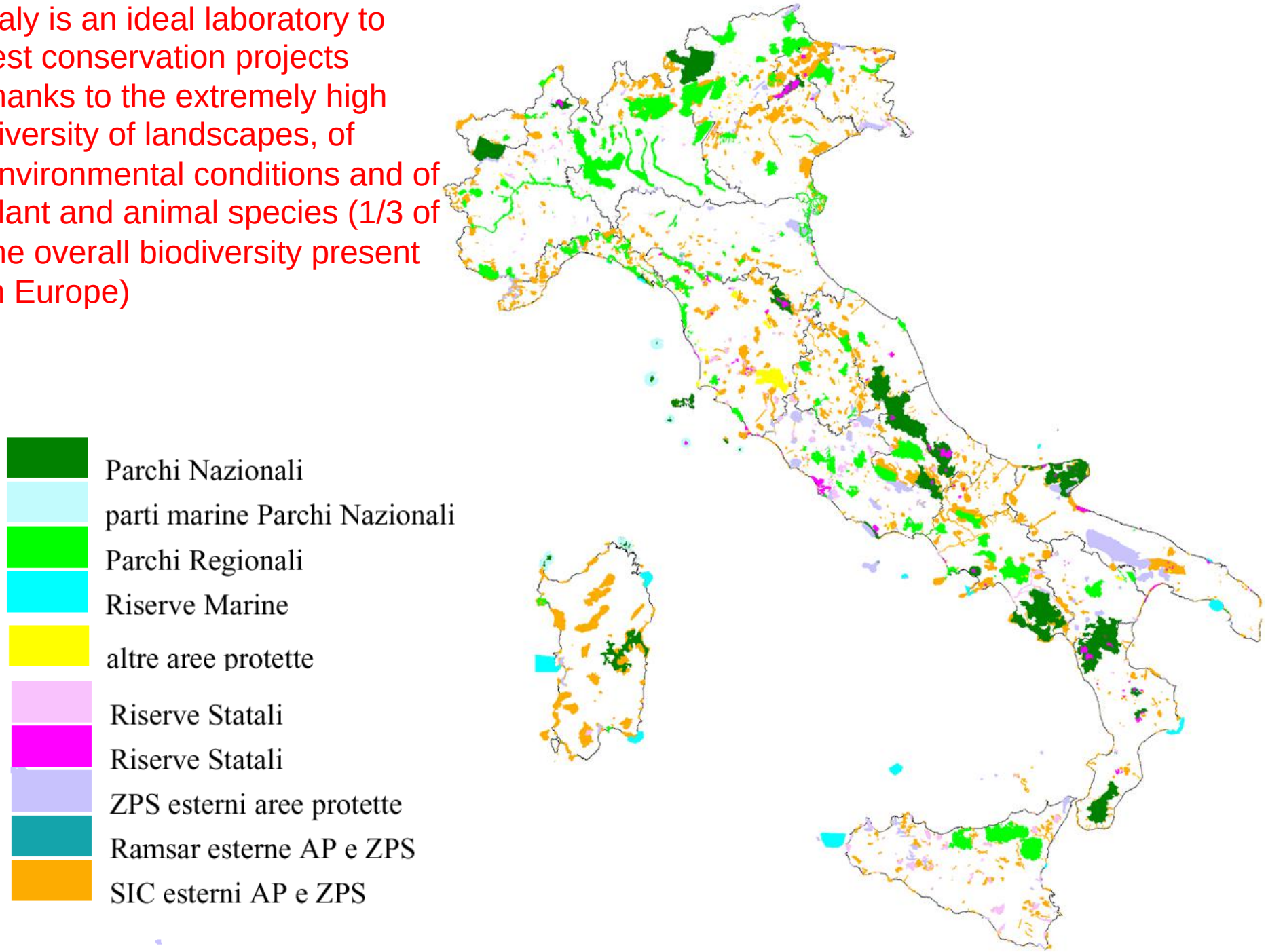
800 M€/year

Chemicals, energy, textiles, food, etc.

≈ 2020 -

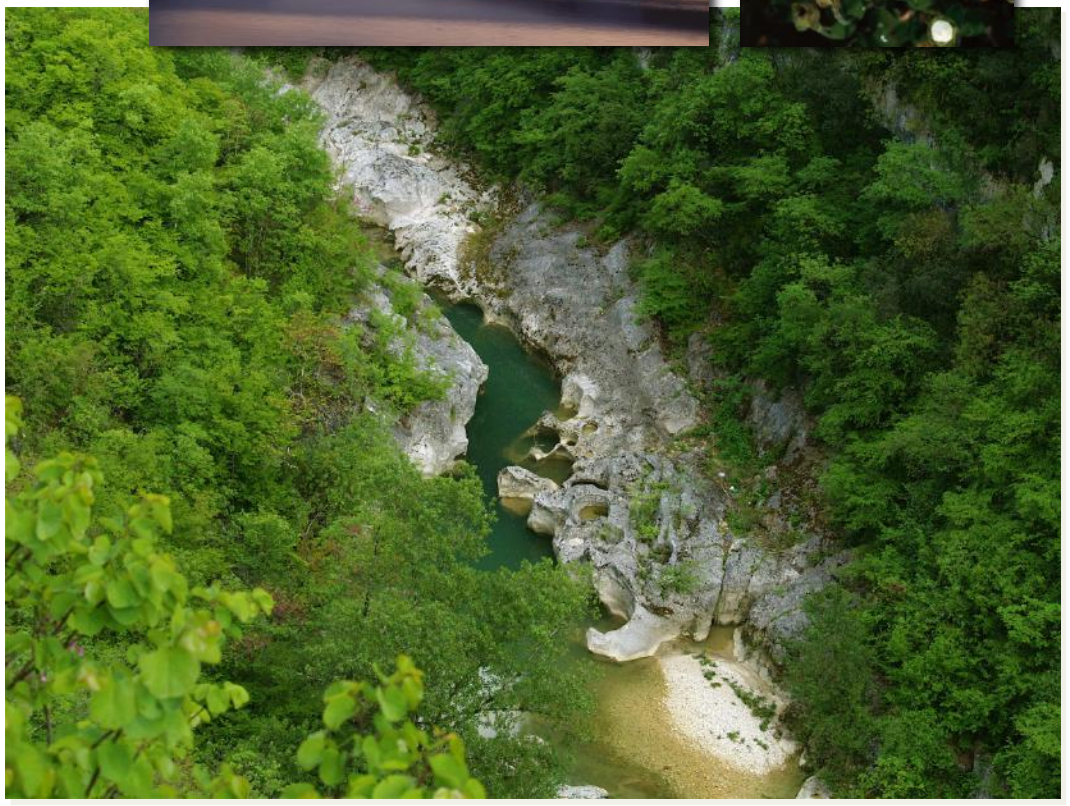
Over 1 billion €/year

Italy is an ideal laboratory to test conservation projects thanks to the extremely high diversity of landscapes, of environmental conditions and of plant and animal species (1/3 of the overall biodiversity present in Europe)



A natural capital for all

- 24 Parchi nazionali
- 24 Aree Marine Protette
- 148 Riserve Naturali statali
- 47 Zone Umide
- 135 Parchi Regionali
- 300 Riserve Naturali Regionali
- 160 altre Aree protette e Monumenti naturali
- 180 Aree protette gestite da Associazioni:
- Oggi sono più di 1.000 le Aree Protette che conservano il nostro patrimonio naturale e culturale. Ed il loro numero è in continua crescita.
- Proteggiamo il 34% delle nostre foreste!



La ricchezza della Biodiversità si esprime, in Italia, con 5.600 specie vegetali (la metà di tutte quelle europee e con il 13% di endemismi) e 57.000 specie animali.

Di queste, 56.168 sono di invertebrati e 1245 di vertebrati, tra cui:

93 specie di mammiferi, 473 di uccelli, 58 di rettili, 38 di anfibi, 473 di pesci ossei e 73 di pesci cartilaginei.

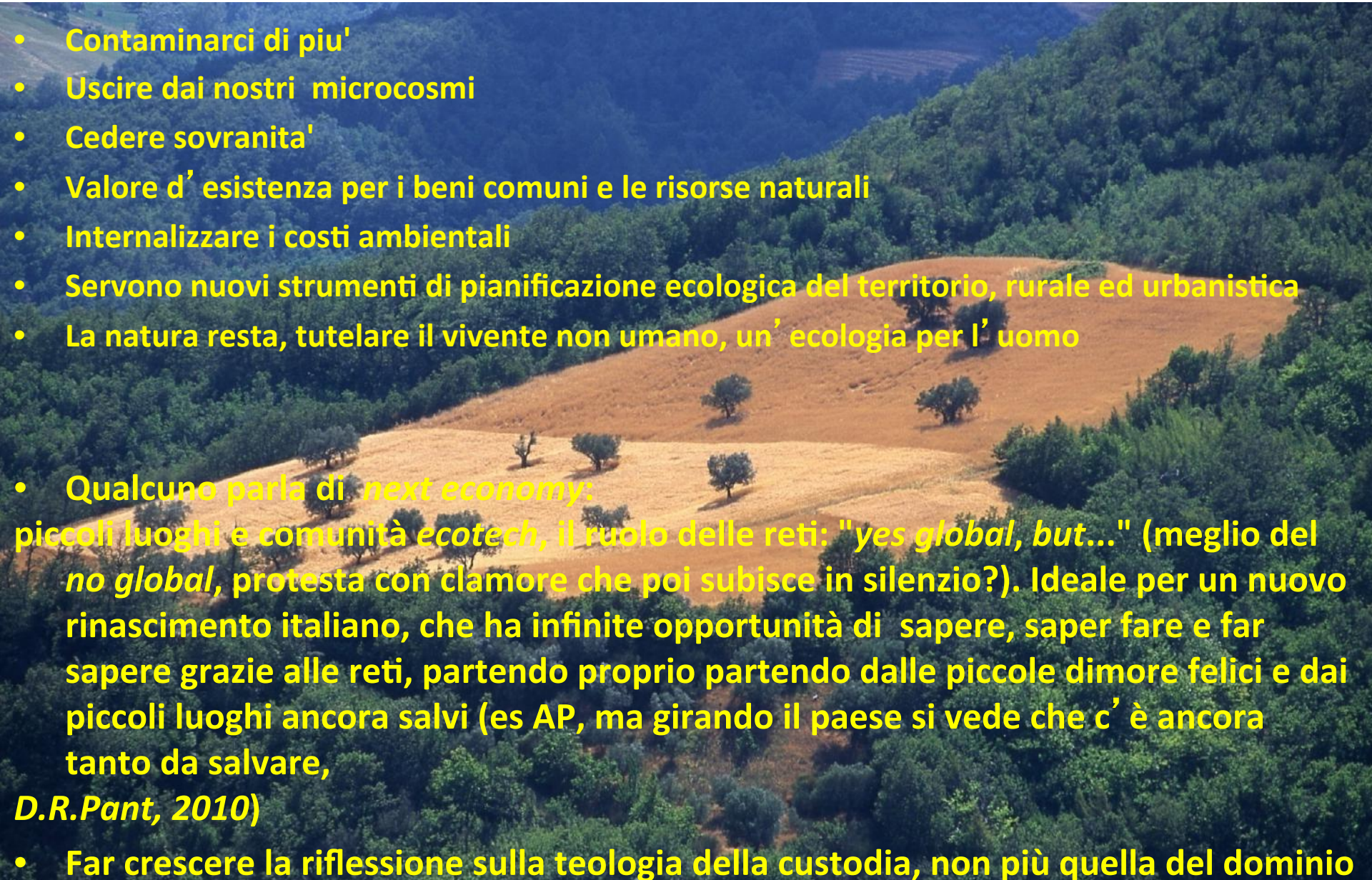
In the world 33 large cities out of 105 questioned from WB, receive their drinking water protected forest areas.

In Italy 50% of drinking water derives from protected areas

WWF/World Bank, 2003

Attention is growing in the scientific and public opinion for environmental protection, **biodiversity conservation** and for the values expressed by **natural habitats and ecosystem functions**

WHO SHOULD SUPPORT THE COSTS FOR BIODIVERSITY PROTECTION'?



- Contaminarci di piu'
- Uscire dai nostri microcosmi
- Cedere sovranita'
- Valore d'esistenza per i beni comuni e le risorse naturali
- Internalizzare i costi ambientali
- Servono nuovi strumenti di pianificazione ecologica del territorio, rurale ed urbanistica
- La natura resta, tutelare il vivente non umano, un'ecologia per l'uomo

- Qualcuno parla di *next economy*:

piccoli luoghi e comunità *ecotech*, il ruolo delle reti: "*yes global*, *but*..." (meglio del *no global*, protesta con clamore che poi subisce in silenzio?). Ideale per un nuovo rinascimento italiano, che ha infinite opportunità di sapere, saper fare e far sapere grazie alle reti, partendo proprio partendo dalle piccole dimore felici e dai piccoli luoghi ancora salvi (es AP, ma girando il paese si vede che c'è ancora tanto da salvare,

D.R.Pant, 2010)

- Far crescere la riflessione sulla teologia della custodia, non più quella del dominio

Dipartimento S.T.A.T
Università degli Studi del Molise

A synthetic indicator of the space devoted to Nature: “Variations land use/cover at national scale”

CORINE Land Cover

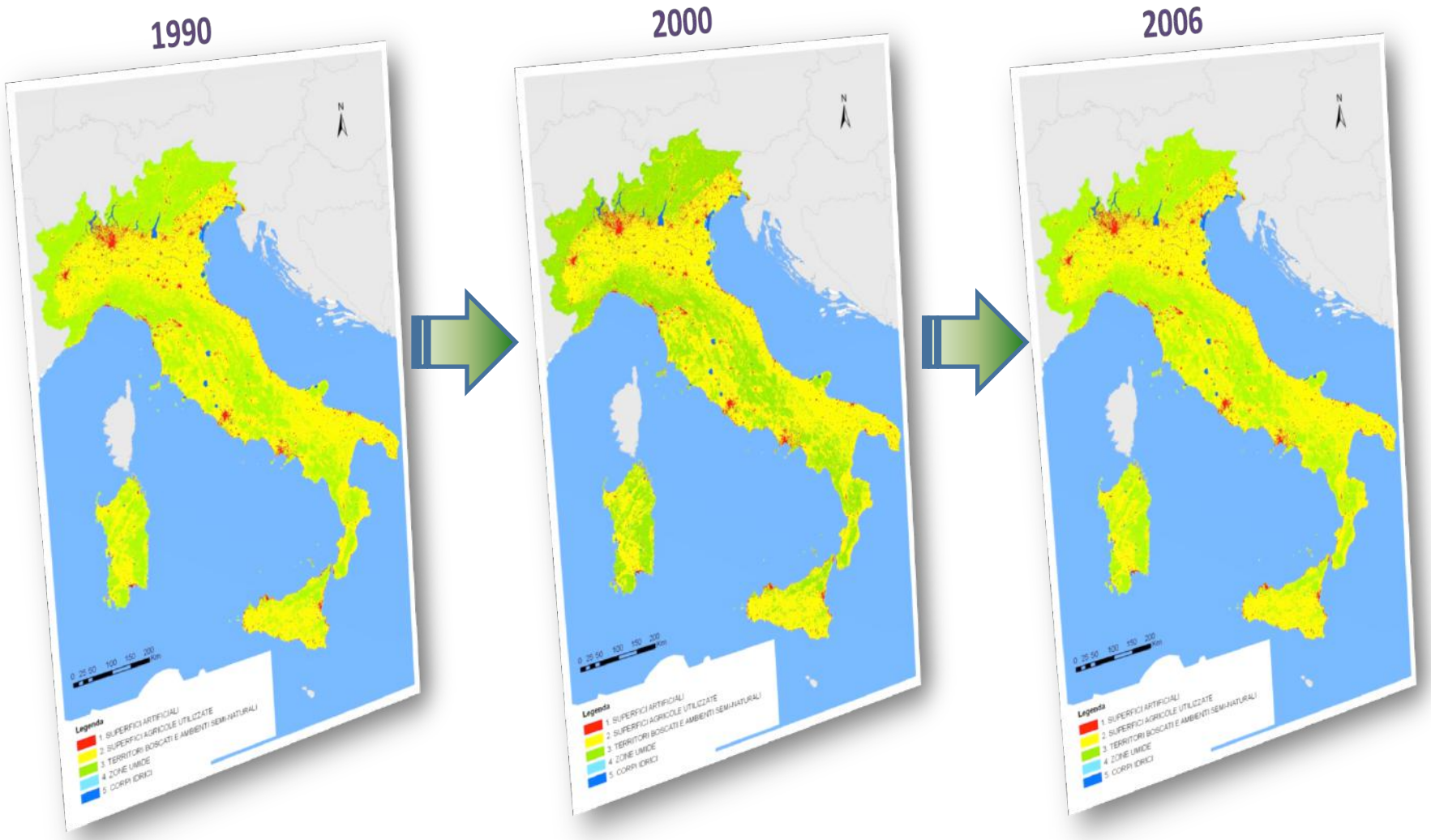


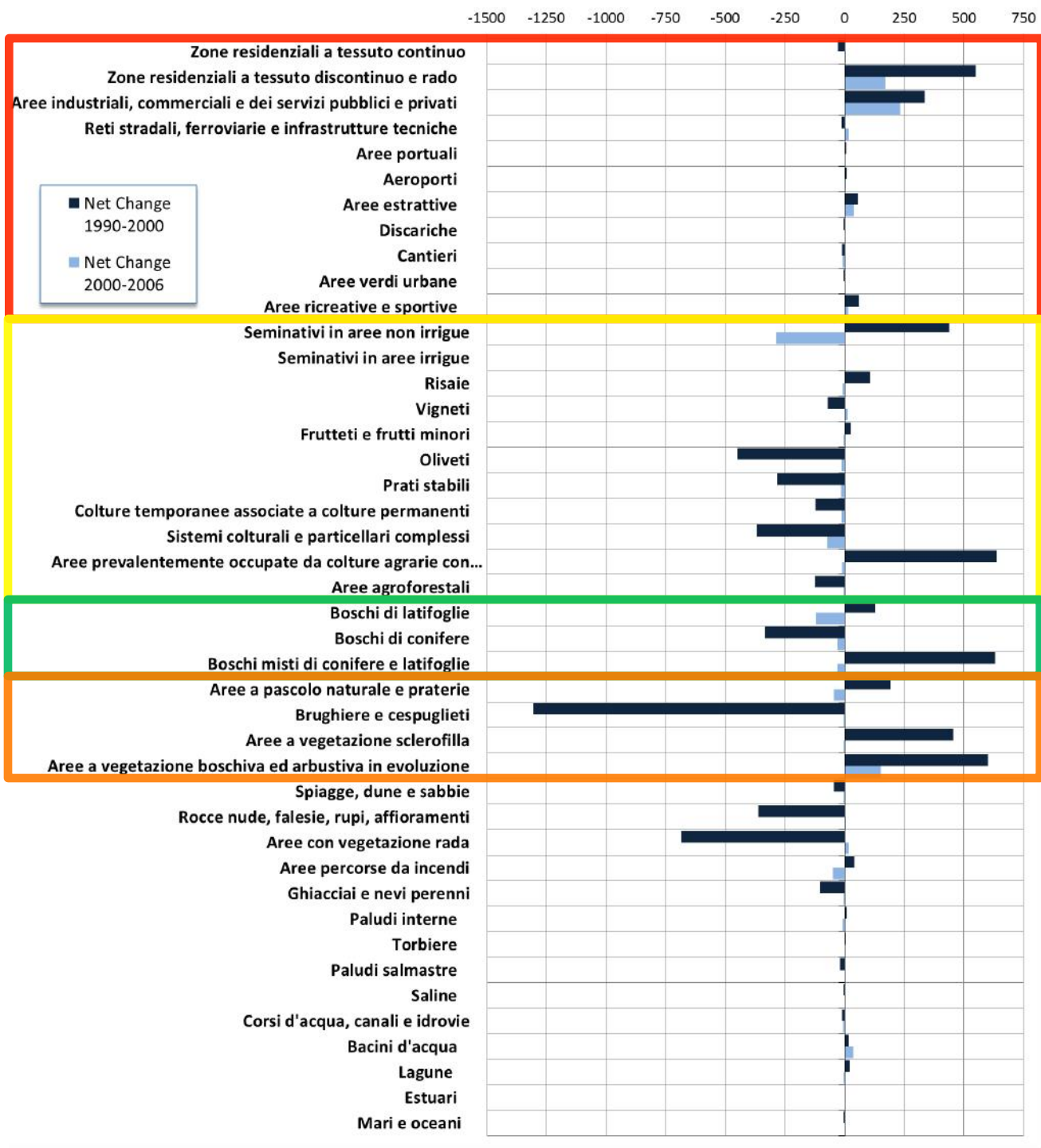
Diagramma di transizione dell'uso del suolo (CORINE 3° Livello) (Sup. kmq)

1. Superfici artificiali

2. Superfici agricole utilizzate

3.1. Zone boscate

3.2. Zone caratterizzate da vegetazione arbustiva e/o erbacea



Adapting management to landscape evolution

Landscape is a space, as perceived by humans, where natural factors interacts with man activities (Art. 1, *European Landscape Convention*, 2000). The visible landscape is the result of the use and the management of the territory, and provides identity and sense of ownership to human communities (Antrop, 2005; Piussi, 2005).

FOREST → **LANDSCAPE MATRIX**

the forest is the most common matrux (*sensu* Forman e Godron, 1986) of most of the European landscapes and is embedded in the western cutltures (Harrison, 1992; Logan, 2008)

LANDSCAPE DYNAMICS (*Landscape ecology)* →  → POLICY AND LAND-USE ACTIONS

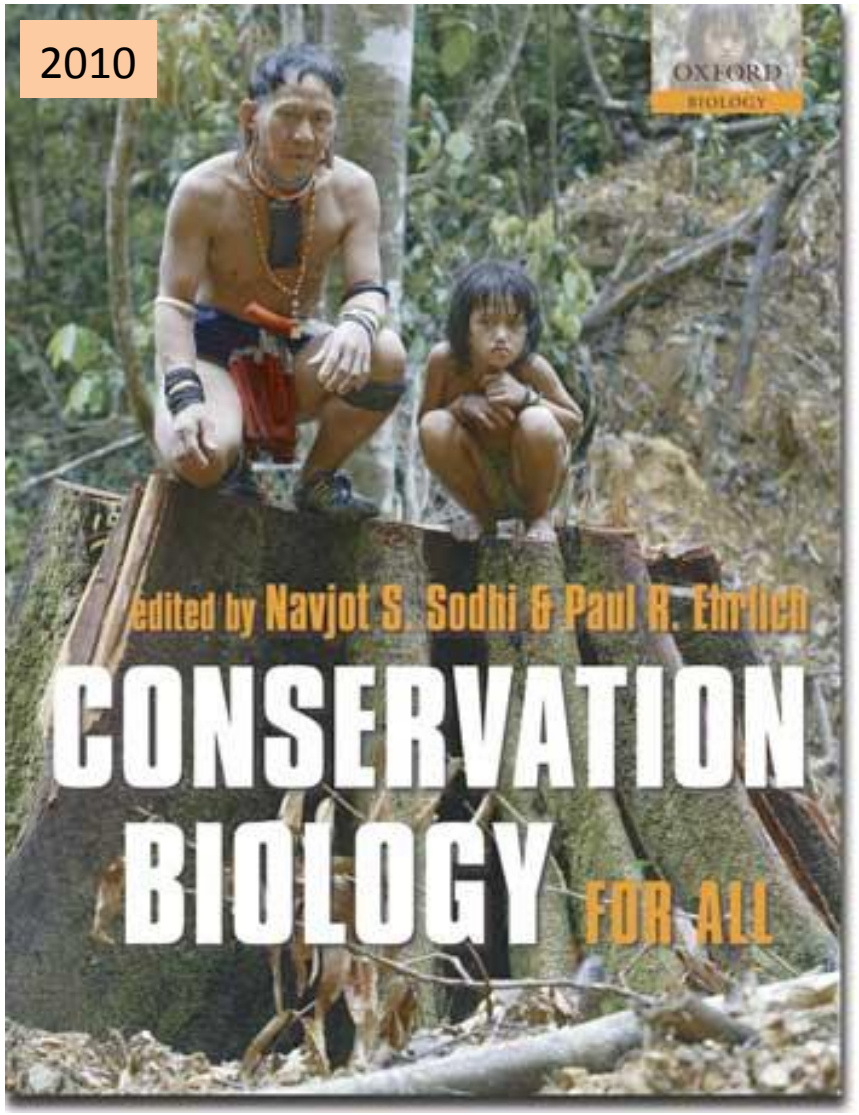
"Forests give us an incredible opportunity for harmonising local development and nature conservation, enhancing ecosystem services values"

Convention on Biological Diversity

CONFERENCE OF THE PARTIES TO THE CONVENTION ON BIOLOGICAL DIVERSITY
Tenth meeting
Nagoya, Japan, 18-29 October 2010
Agenda item 6.3

UNEP

- ***ob.5 COP10 CBD*, to half biodiversity loss by 2020**
- **promote conservation and sustainable use of all types of forests**
- **restoring forest ecosystems, paying particular attention to genetic diversity**



***REDD (Riduzione delle emissioni da deforestazione e degrado forestale*), approvato alla *COP16 del UNCCC* mira a proteggere le foreste finanziandone la conservazione invece della distruzione**

New functions, uses and socio-economic values of natural and rural spaces have increased the **importance**, but also the **complexity** of choices and decisions

Bisogna riconoscere valore ai Servizi Ecosistemici

Dalle funzioni ai valori:

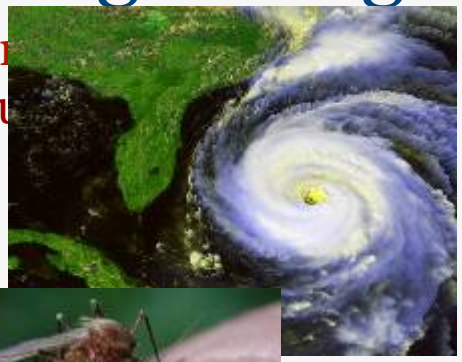
Ecosystem services, ovunque. Da noi i sistemi più critici sono quelli agrari

Provisioning

G…or

•Regulating

•Ber…
regu…



Cultural

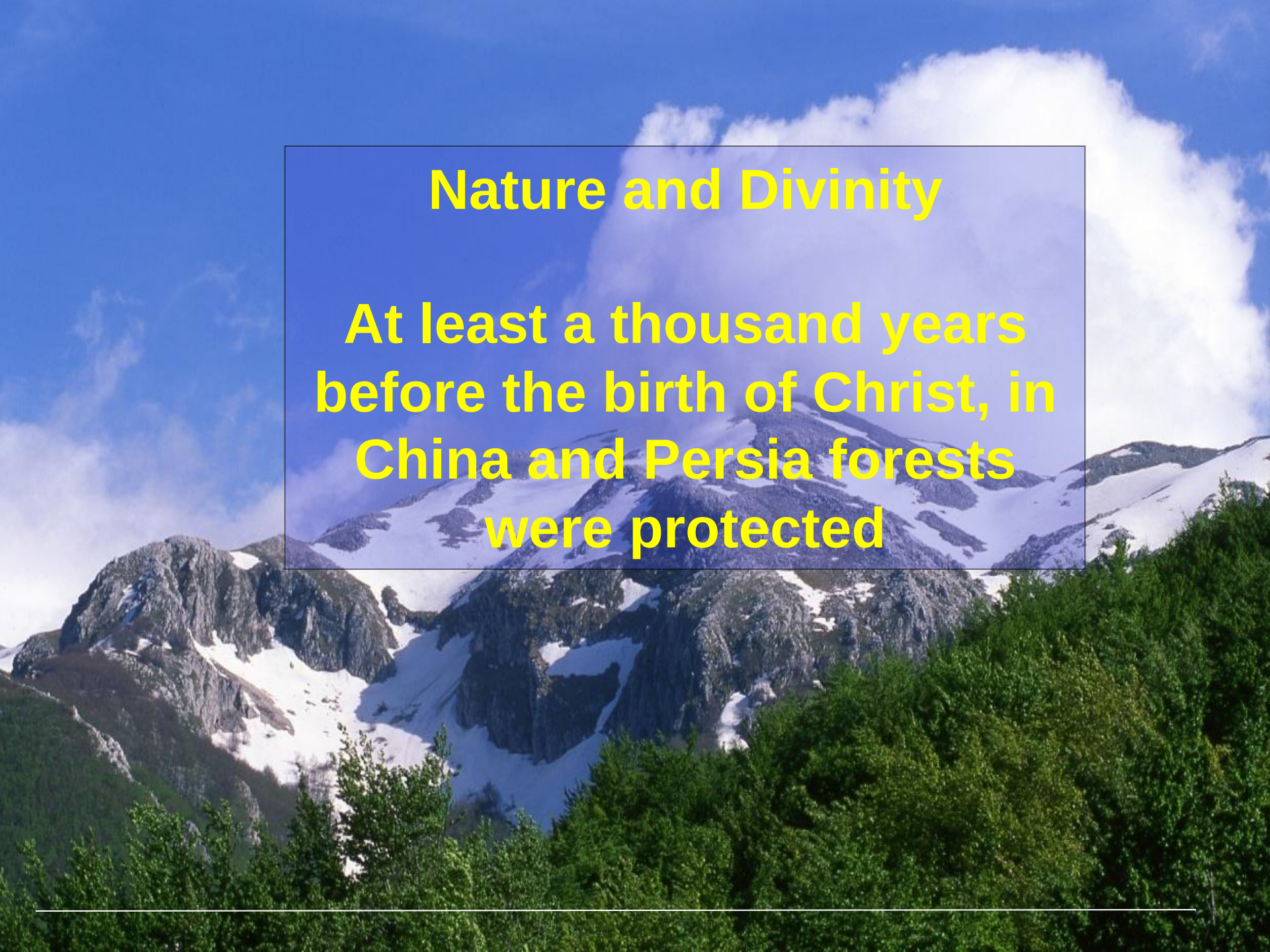
N…
b…
e…

Photo credits (left to right, top to bottom): Purdue University, WomenAid.org, LSUP, NASA, unknown, CEH Wallingford, unknown, W. Reid, Staffan Widstrand

COP CBD, Nagoya, 2010

- improve and restore ecosystems and ecosystem services wherever possible, by increasing the use of green infrastructures;
- restrain alien species, an increasing danger for biodiversity in UE (*Rewildering*);
- guarantee sustainability of agricultural and forest management (organic farming, eco-labeling and ecosystem approach in land-use planning, bioarchitecture)

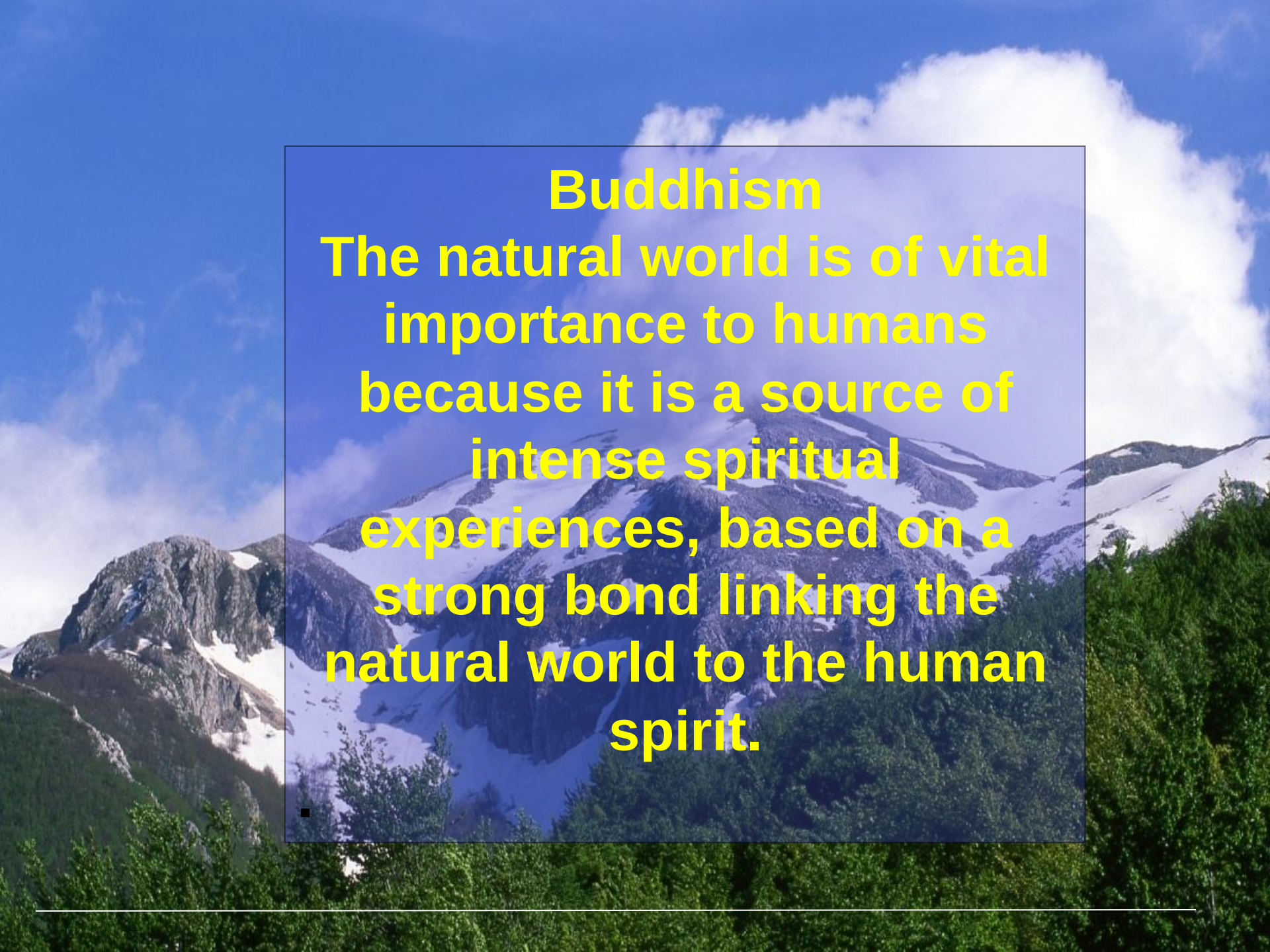

The concept of caring for nature and the origin of protected land


Nature and Divinity
At least a thousand years before the birth of Christ, in China and Persia forests were protected


Nature and divinity
At least a thousand years before the birth of Christ, in China and Persia, they protected forests.

Non-Western cultures

In many cultures the man is seen as an integral part of Nature, tied both spiritually and physically; the man-nature relationship is founded on the divinity of nature itself: therefore nature must be respected



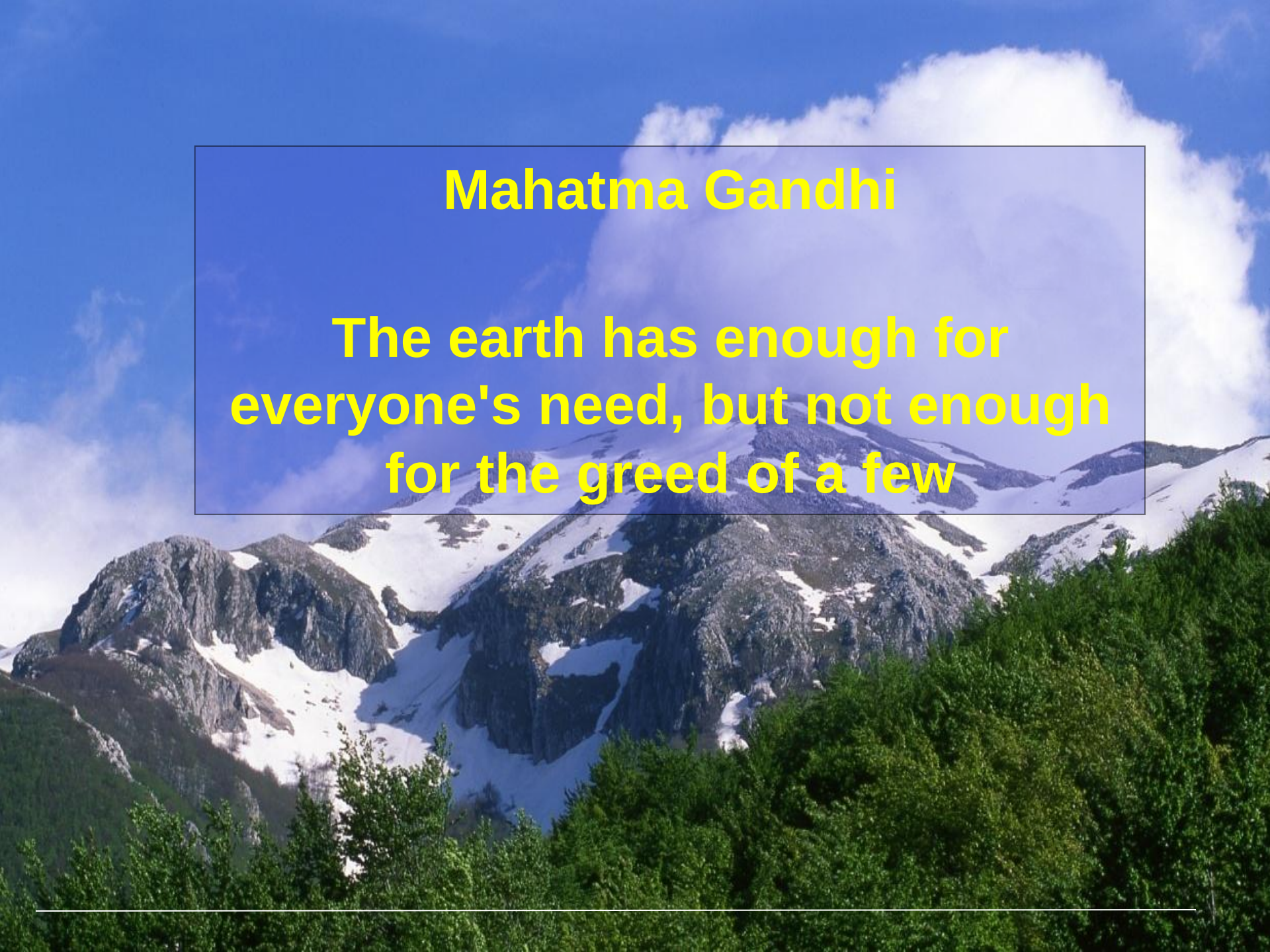
Buddhism

The natural world is of vital importance to humans because it is a source of intense spiritual experiences, based on a strong bond linking the natural world to the human spirit.


The Koran, XXIV. Surah light
God created all the animals from the water, and there are those that walk on their bellies and those that walk on two legs and those that walk on four legs ... God creates what he wants, and over all things is powerful

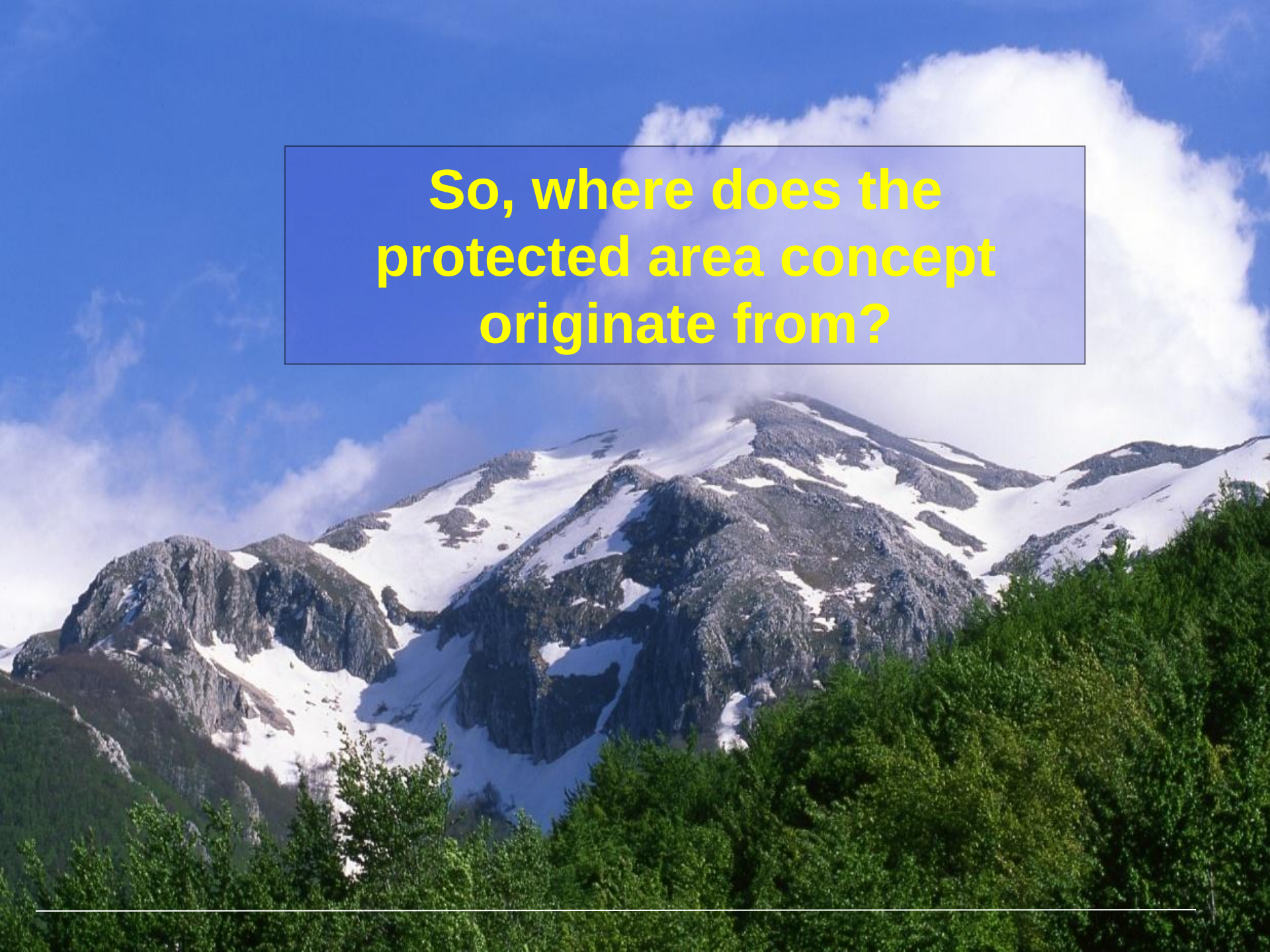
Old Testament

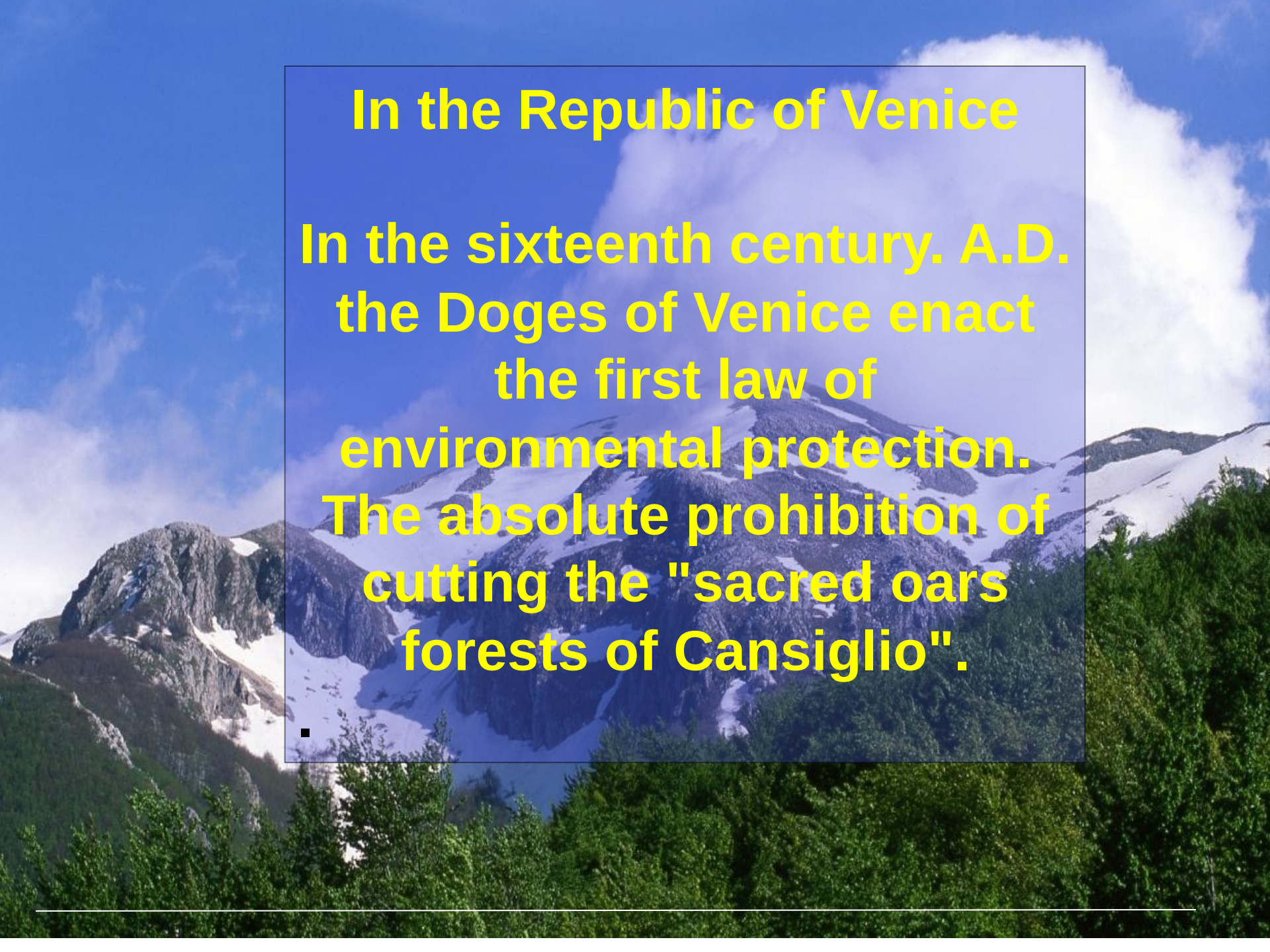
In the beginning God created the heaven and the earth ... and then he said, "the water shall abound with living creatures, and let birds fly above the earth in front of the firmament of heaven ... the earth bring forth living creatures after their kind: cattle and creeping organisms and wild animals" so it happened, and God saw that it was good


Mahatma Gandhi
The earth has enough for everyone's need, but not enough for the greed of a few

ROME

In the old Italy, the Romans following the traditions of other Italic peoples were protecting some sacred forests and groves (*Lucus*, often connected to water wells)


So, where does the protected area concept originate from?


In the Republic of Venice
In the sixteenth century. A.D. the Doges of Venice enact the first law of environmental protection. The absolute prohibition of cutting the "sacred oars forests of Cansiglio".

Hunting Reserves

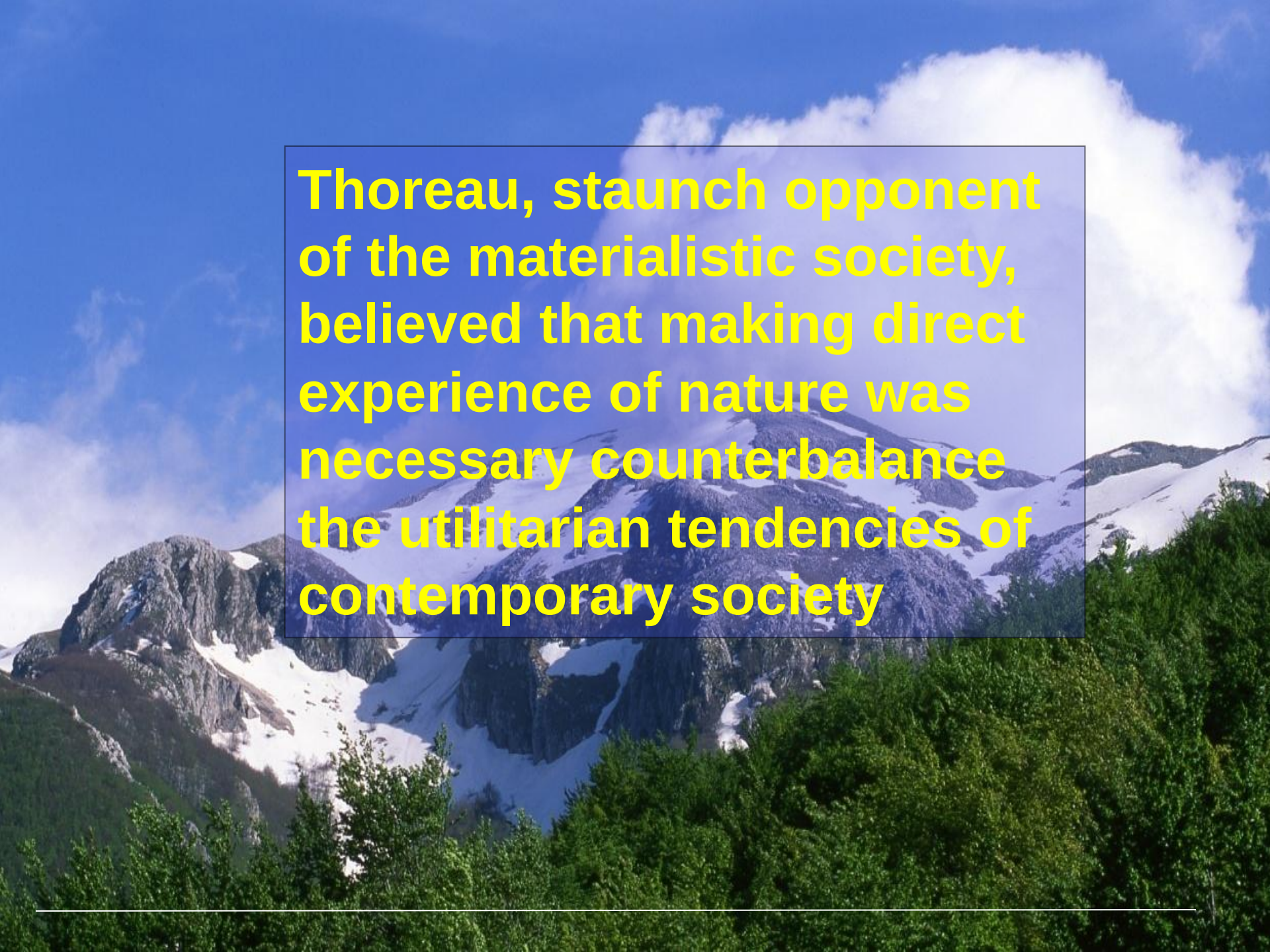
The hunt of the nobles
1400 A.D. Charles of Bohemia and the real forest protection rules.
1700 A.D. Russian Czar protect the Polish forest Bielowiezha and the King of France the Foret de Fontainebleau.and the

Nature: an inexhaustible source?

The idea of nature as an inexhaustible source of resources and matter for human needs has been handed down for centuries, albeit with isolated dissenting voices, and became an integral part of the thinking that dominated, until the Industrial Revolution

The nineteenth century

The first important conservation directives born in 1800, were intended to protect parts of territory and create game reserves, but also caused rising concerns for the future. Many species disappeared for hunting, with the spread of new and efficient weapons.
In Great Britain many species, and culturally important, were extinguished. The first conservation movements were established: the National Trust (1895) and the Royal Society for the Protection of Birds (1899).
In USA the first great figures of conservationists argued for the need to preserve nature. Philosophers like Ralph Waldo Emerson (1803-1882) and Henry David Thoreau (1817-1862) were very instrumental.


Thoreau, staunch opponent of the materialistic society, believed that making direct experience of nature was necessary counterbalance the utilitarian tendencies of contemporary society

An influential American geographer and politician: George P. Marsh

An artistic half-plate daguerreotype of George Perkins Marsh, gold toned, half-length portrait, head three-quarters to right, with spectacles, circa 1850, by Mathew Brady.

MAN AND NATURE;

OR,

PHYSICAL GEOGRAPHY

AS MODIFIED BY HUMAN ACTION.

BY

GEORGE P. MARSH.

"Not all the winds, and storms, and earthquakes, and seas, and seasons of the world, have done so much to revolutionize the earth as Man, the power of an endless life, has done since the day he came forth upon it, and received dominion over it."—H. BUSHNELL, *Sermon on the Power of an Endless Life.*

NEW YORK:
CHARLES SCRIBNER, 124 GRAND STREET.
1864.

Drastic, reckless deforestation in Vermont -the State of George Perkins Marsh's origin- in the

The twentieth century

At the beginning of the century defenders of nature, as the Scottish poet John Muir (1838-1914) and Aldo Leopold (1886-1948) discussed the importance of preserving the natural environment and to safeguard their status, both for its intrinsic value (which is independent of the presence of man) and because man is part of ecological systems, and therefore must live in harmony with them.

The New World

It‘s in the Americas that first was being shaped the policy for protected areas.
In 1834 it’s established the first nature reserve in the world: Hot Spring Arkansas.
From America to Europe:
1864 Sequoia and Yosemite reserves in California.
In the same year Fontainebleau, near Paris, became the first European nature reserve.
From reserves to parks:
1872 it’s established the first natural park in the world Yellowstone.
It is the starting of a story that will take us away…..

Ecosystem management

Gifford Pinchot (1865-1946) develops the idea of nature as a source of resources. Conservation and wildlife management must aim to draw benefits for the people, for as long as possible, caring about the future generations. From these insights, in the twentieth century, it will be developed the model of sustainable development..G. Pinchot was the founder of the US Forest Service

Protected areas: History of an Idea

Special areas because the object of mystical or religious worship.

Subject to special laws for economic reasons.

Hunting grounds for the nobles of the time.

Protection of places for large animals and the landscape.

Protected areas, a success story

I visitatori di tutti i parchi sono aumentati in 40 anni da 50 a 270 milioni. Saranno 340 milioni nel 2000 e mezzo miliardo nel 2010.

IUCN definition of national park

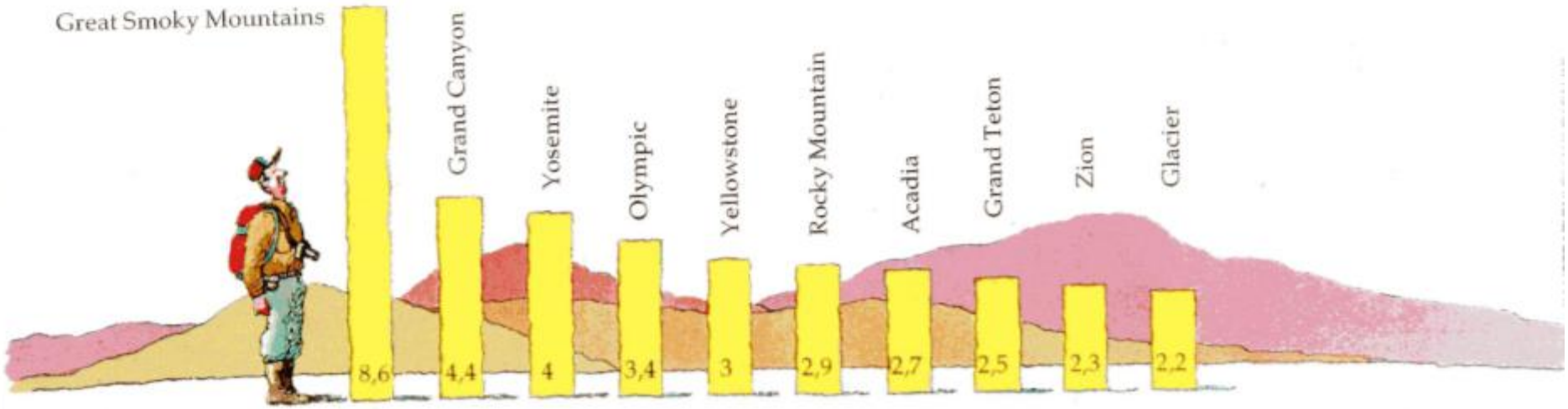
A relatively large area with the following defining characteristics

One or several ecosystems not materially altered by human exploitation and occupation, where plant and animal species, geomorphological sites and habitats are of special scientific, educational, and recreational interest or which contain a natural landscape of great beauty;

Highest competent authority of the country has taken steps to prevent or eliminate exploitation or occupation as soon as possible in the whole area and to effectively enforce the respect of ecological, geomorphological, or aesthetic features which have led to its establishment;

Visitors are allowed to enter, under special conditions, for inspirational, educative, cultural, and recreative purposes.

The most visited parks in the world



I parchi più visitati nel 1994 e il numero dei turisti (espresso in milioni). L'eccessivo numero di visitatori è una minaccia per molte aree protett

In Italy, the first conservationist pressures led to the institution of the Gran Paradiso (1922) and Abruzzo (1923) National Parks. To protect nature (aesthetic value), to put a stop to the hunting (protection from extinction of the chamois and ibex), limiting the disappearance of rare plant species, manage tourism and for the enjoyment of the wild environment.

Stop forest fires

15,000 forest fires a year in Italy. 42 per day, nearly 2 per hour. Almost 50,000 hectares of forest in smoke in 2003. In Aspromonte Nat. Park the method "prevention is better than cure“ is applied..

The average surface burned was knocked down by 85%, from 1,000 ha in the 90s to ca. 150 ha currently..


Nature and divinity
At least a thousand years before the birth of Christ, in China and Persia, they protected forests.


Nature and divinity
At least a thousand years before the birth of Christ, in China and Persia, they protected forests.

L'Italia della natura protetta:

145 riserve naturali statali
120 mila ettari

20 aree marine protette
170 mila ettari

370 riserve naturali regionali
215 mila ettari

137 altre aree naturali protette
600 mila ettari

21 parchi nazionali
1.450 mila ettari

128 parchi regionali
1.250 mila ettari

3.265.000 ettari in Italia
10,83%

L'economia nei parchi: 80.000 occupati

4.000 diretti – 12.000 nell'indotto –
4.000 ricerca e servizi –
60.000 indotto
turismo/agricoltura/artigianato/
commercio

500 progetti di ricerca

2.000 centri visita
strutture varie – aree attrezzate

30 milioni di visitatori l'anno

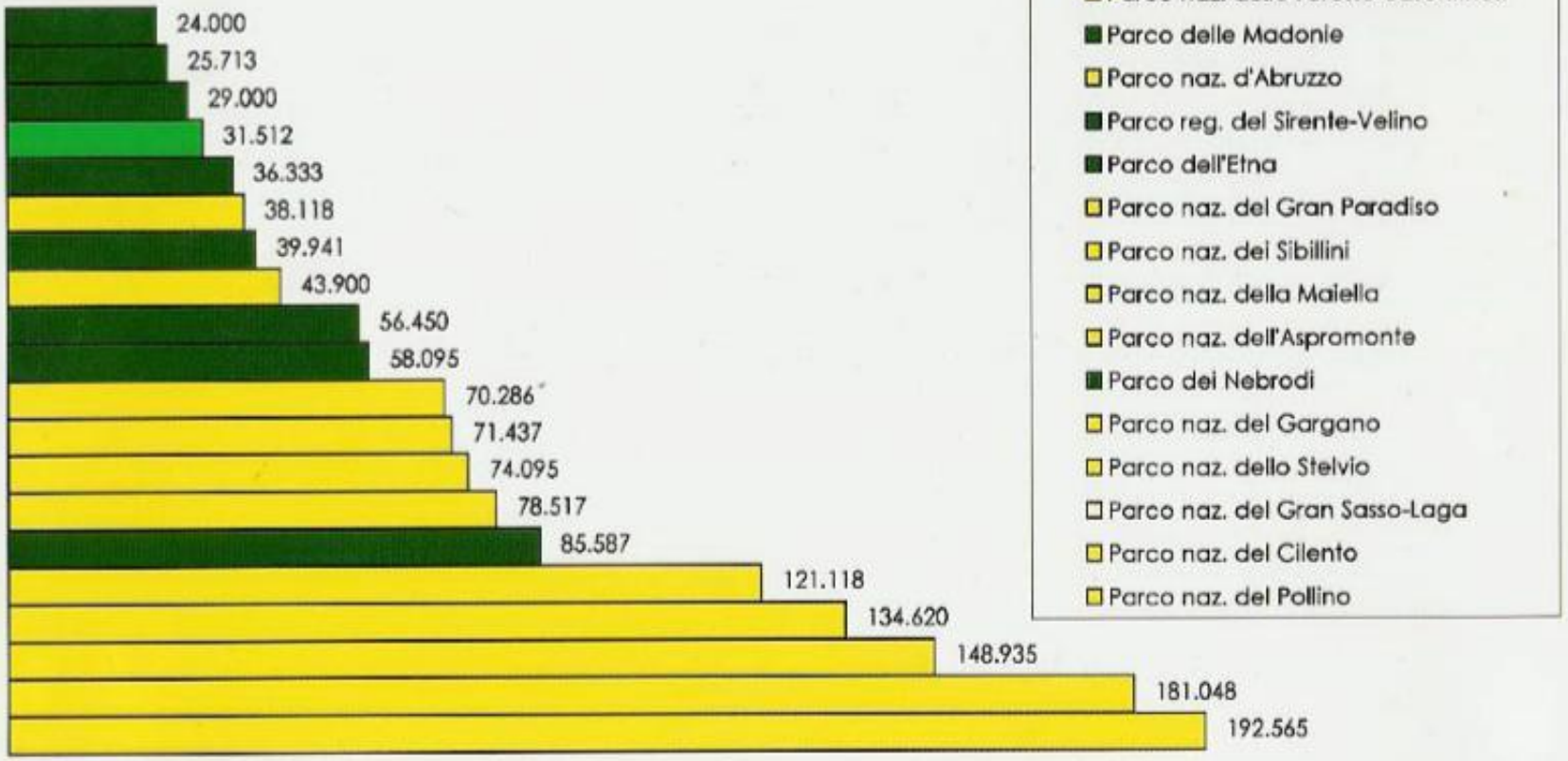
500 cooperative di lavoro

200 associazioni onlus

500 milioni di euro investiti

2.675 comuni interessati

I grandi Parchi in Italia (in ha)



dr. Nino Martino

HITPAR.XLS - 12/09/95

SIC and ZPS Natura 2000

Over 2,500 SIC and ZPS sites identified (including Sites of Community Importance, 43/92 Habitats Directive, and Special Protection Areas for Birds, Directive 409/79), representing 18% of the country (about 50% already protected areas).

The nature:

57,000 animal species, equal to 1/3 of those in all Europe, plant biodiversity as 5,600 species, 50% of European ones (of which 13.5% endemic).

▪

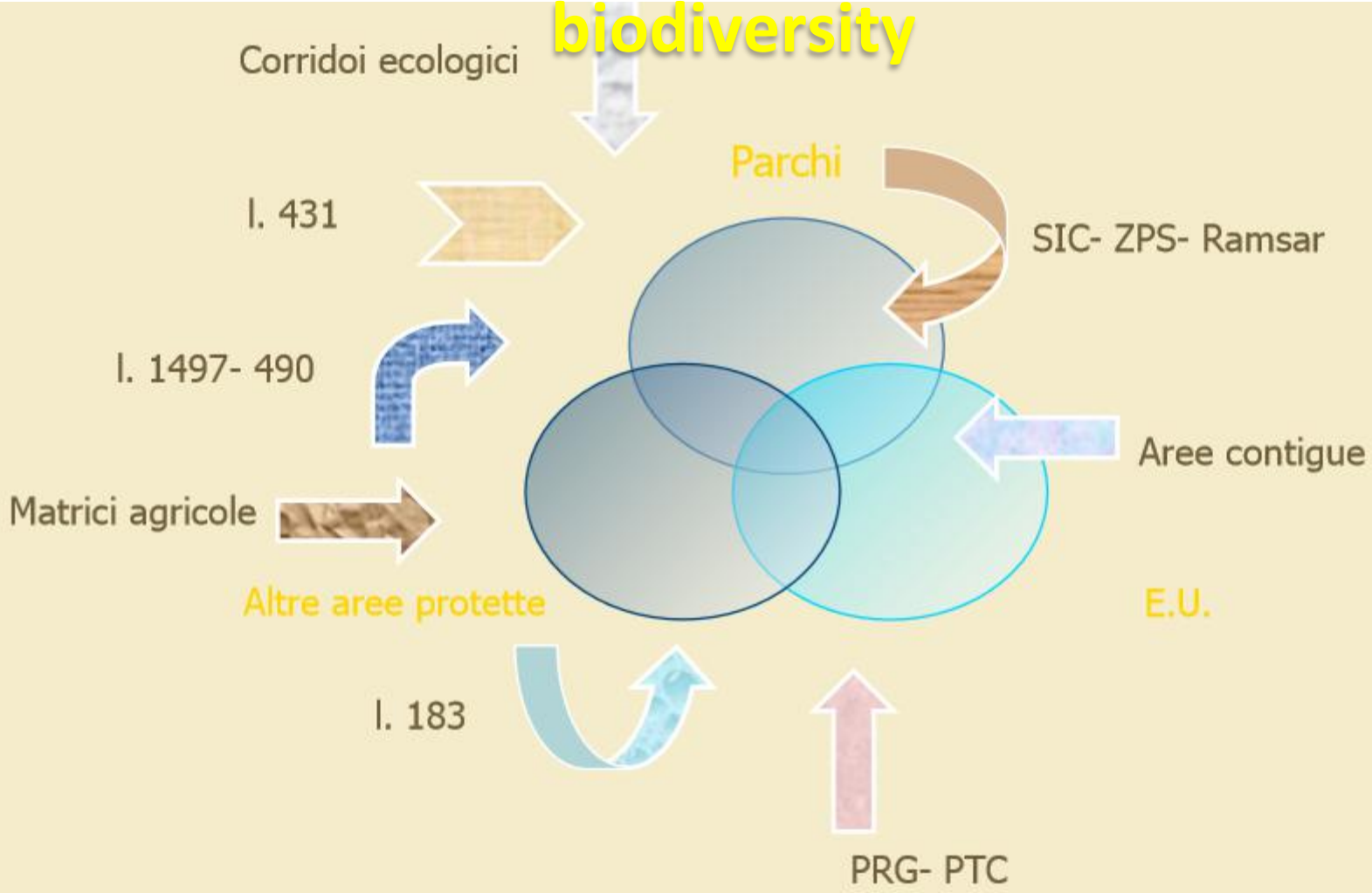
Conservation Biology

The diversity of species and biological communities should be preserved. The premature extinction of species and populations must be prevented. The complexity of ecological systems must be maintained. These actions need continuity over time. Biodiversity has intrinsic value.

Aree protette ed evoluzione delle strategie e dell'approccio culturale di gestione: una possibile chiave di lettura.

Periodo	Strategie & approccio culturale	Azioni
1870/1900	Approccio scientifico, esclusivo. Romanticismo	Protezione Controllo
1900/2000	Approccio scientifico, culturale, educativo, attenzione ai visitatori	Protezione Pianificazione territoriale Promozione
XXI secolo ???	Pianificazione dello sviluppo possibile, Gente+Ambiente, Tutela dei processi ecologici essenziali e della biodiversità: "da isole a reti".	Gestione orientata alla sostenibilità: AGENDE XXI Creazione di reti ecologiche.

A network of land for the protection and sustainable management of nature and biodiversity



Parchi Nazionali e Aree Marine Protette

www.minambiente.it

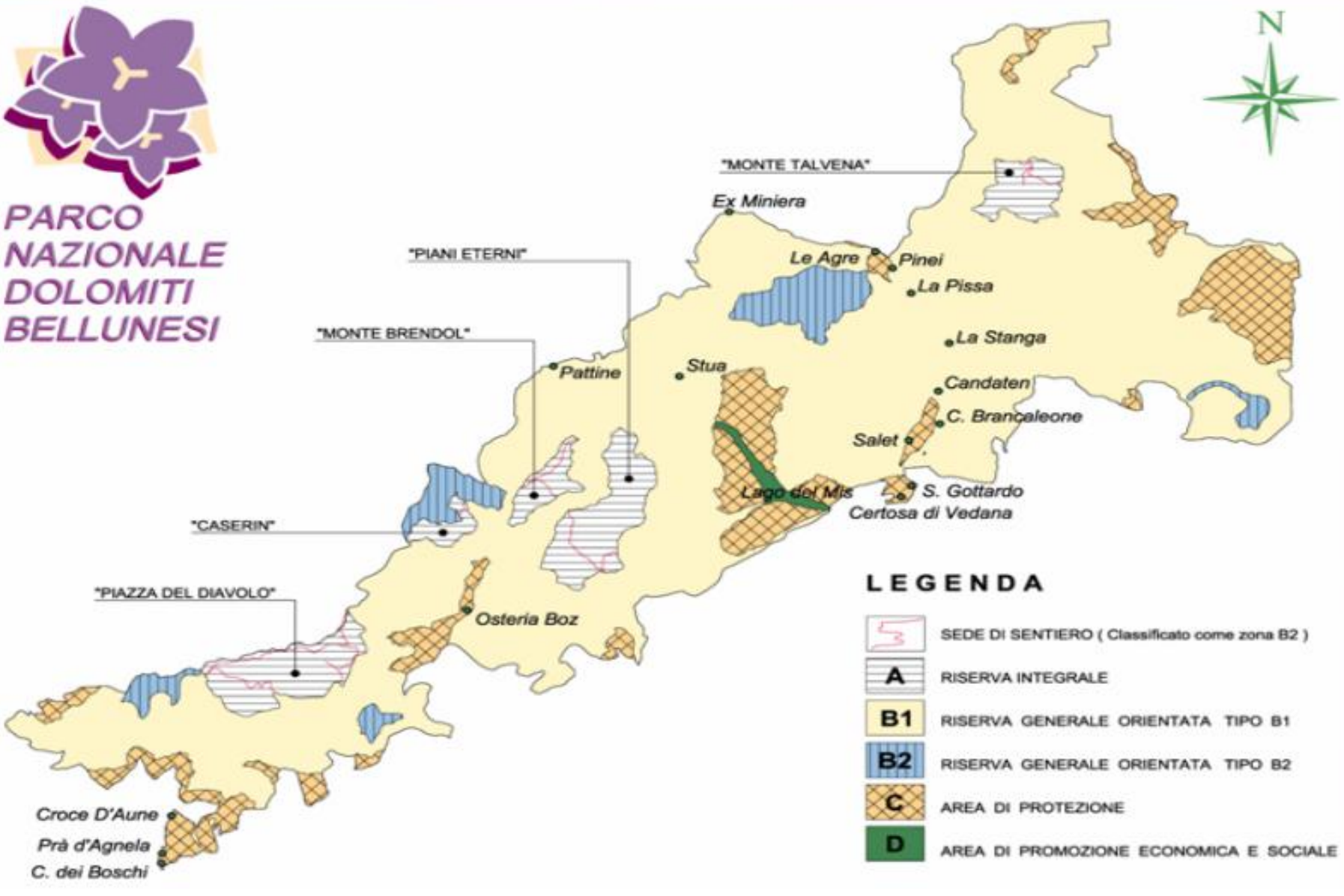
Realizzazione: ITINERARI e luoghi - www.itinerarieluoghi.it

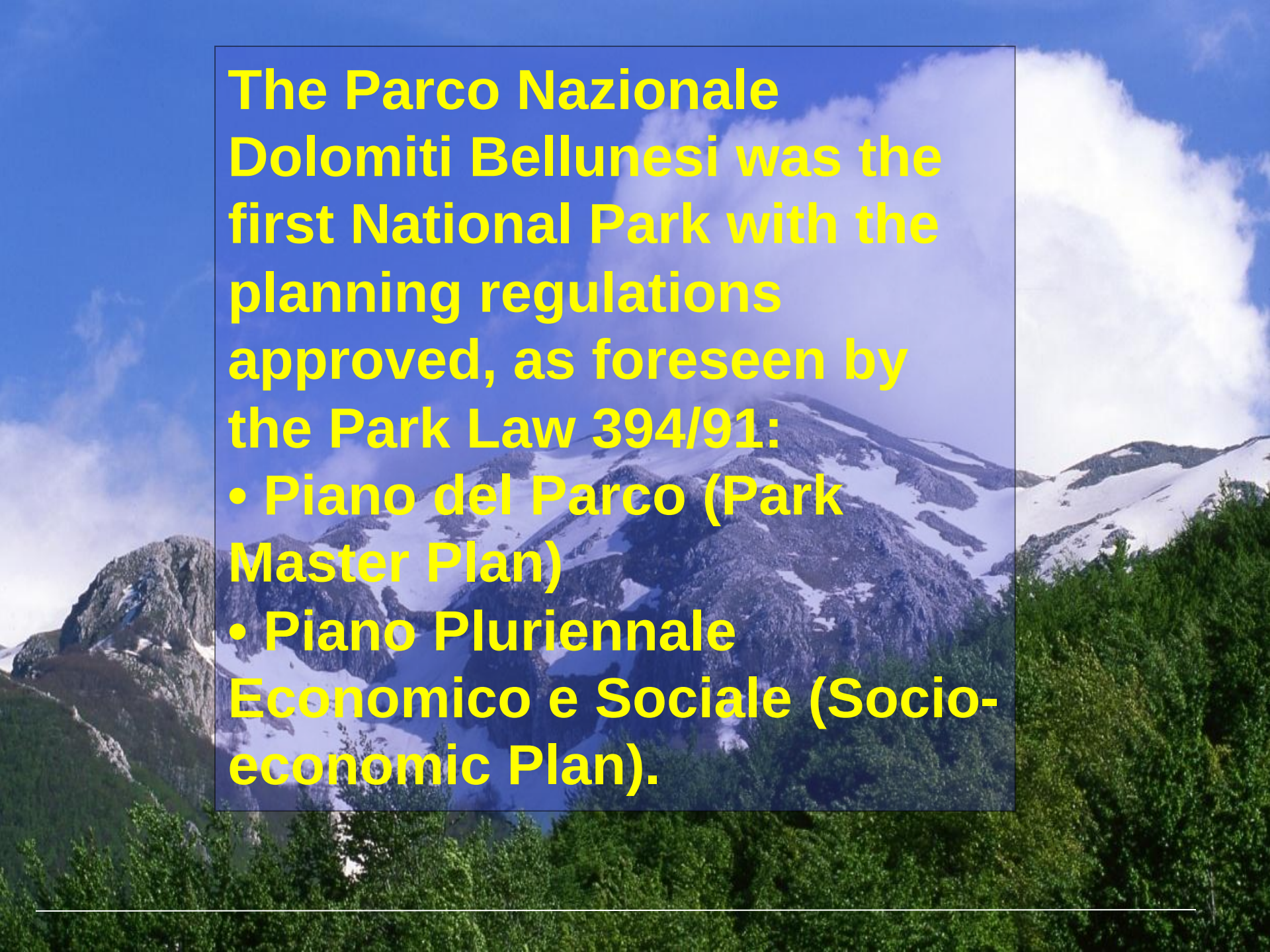
PARCHI NAZIONALI

1. Gran Paradiso
2. Val Grande
3. Stelvio
4. Dolomiti Bellunesi
5. Cinque Terre
6. Appennino Tosco-Emiliano
7. Foreste Casentinesi, Monte Falterona e Campigna
8. Arcipelago Toscano
9. Monti Sibillini
10. Gran Sasso e Monti della Laga
11. Maiella
12. Abruzzo, Lazio e Molise
13. Gargano
14. Circeo
15. Arcipelago di La Maddalena
16. Isola dell'Asinara
17. Vesuvio
18. Cilento e Vallo di Diano
19. Pollino
20. Aspromonte
21. Calabria
22. Golfo di Orosei e Gennargentu
23. Alta Murgia

AREE MARINE PROTETTE

1. Miramare
2. Portofino
3. Cinque Terre
4. Isole Tremiti
5. Secche di Tor Paterno
6. Tavolara - Punta Coda Cavallo
7. Isole di Ventotene e Santo Stefano
8. Punta Campanella
9. Torre Guaceto
10. Porto Cesareo
11. Penisola del Sinis – Isola Mal di Ventre
12. Capo Carbonara
13. Isola di Ustica
14. Capo Rizzuto
15. Isole Egadi
16. Isole Ciclopi
17. Capo Caccia - Isola Piana
18. Capo Gallo - Isola delle Femmine
19. Isole Pelagie
20. Santuario per i Mammiferi Marini
21. Parco sommerso di Baia
22. Parco sommerso di Gaiola
23. Isola dell'Asinara


PARCO NAZIONALE DOLOMITI BELLUNESI
N
"MONTE TALVENA"
Ex Miniera
"PIANI ETERNI"
Le Agre
Pinei
La Pissa
"MONTE BRENDOL"
La Stanga
Pattine
Stua
Candaten
C. Brancaleone
Salet
Lago del Mis
S. Gottardo
Certosa di Vedana
"CASERIN"
"PIAZZA DEL DIAVOLO"
Osteria Boz
Croce D'Aune
Prà d'Agnela
C. dei Boschi
LEGENDA
SEDE DI SENTIERO (Classificato come zona B2)
A
RISERVA INTEGRALE
B1
RISERVA GENERALE ORIENTATA TIPO B1
B2
RISERVA GENERALE ORIENTATA TIPO B2
C
AREA DI PROTEZIONE
D
AREA DI PROMOZIONE ECONOMICA E SOCIALE

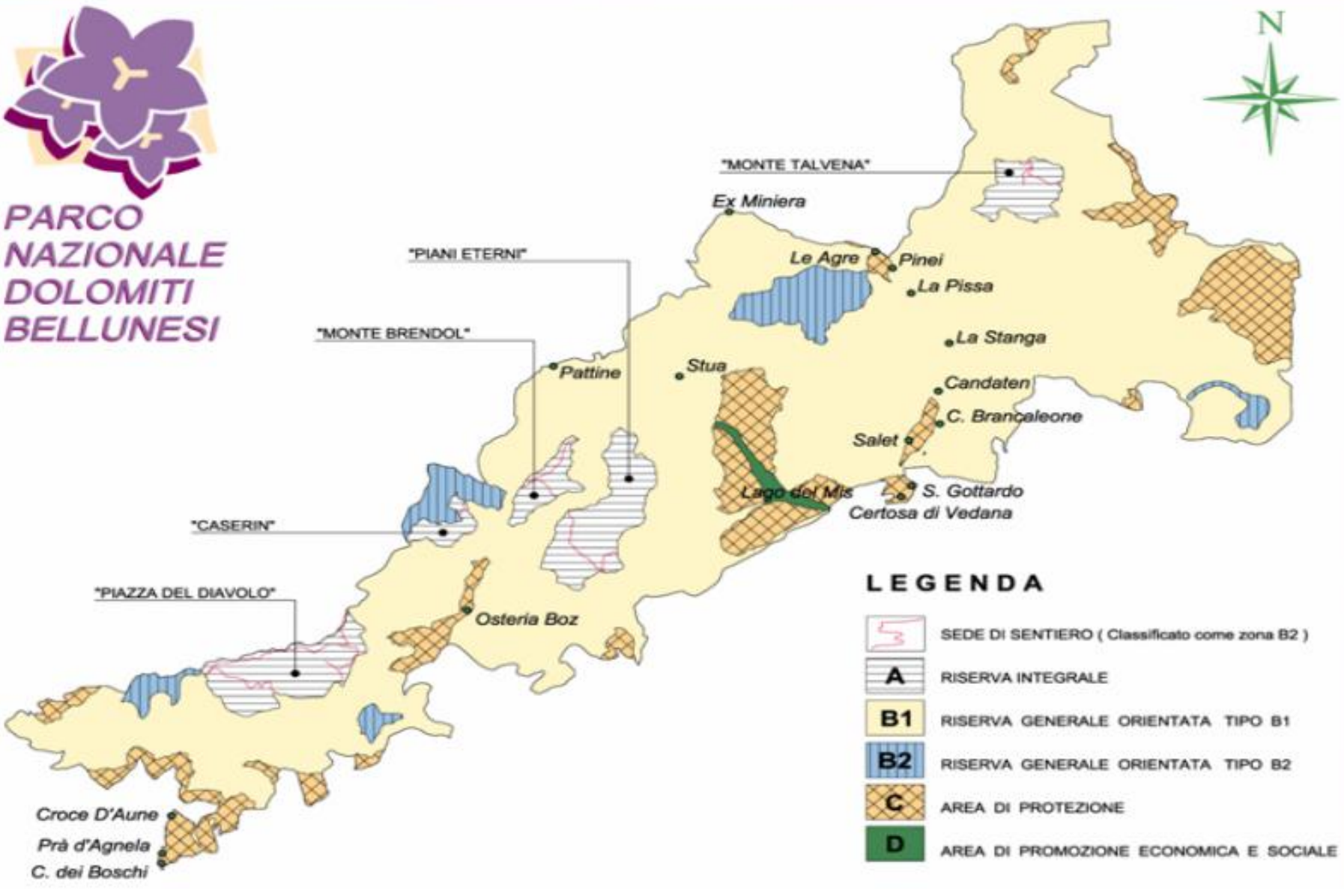


The Parco Nazionale Dolomiti Bellunesi was the first National Park with the planning regulations approved, as foreseen by the Park Law 394/91:

- Piano del Parco (Park Master Plan)
- Piano Pluriennale Economico e Sociale (Socio-economic Plan).

The Master Plan of the Park regulates:

- 1) zoning (general organization of the territory and its division into areas or parts characterized by different forms of use, enjoyment and protection);
- 2) implementing rules (constraints and destinations of public or private use within the various zones) which are used to define management strategies compatibile with the goals of the protected area;
- 3) systems of equipment and services and those of accessibility;
- 4) the guidelines and criteria for action relative to the flora and fauna and the natural environment in general


PARCO NAZIONALE DOLOMITI BELLUNESI
N
"MONTE TALVENA"
Ex Miniera
"PIANI ETERNI"
Le Agre
Pinei
La Pissa
"MONTE BRENDOL"
La Stanga
Pattine
Stua
Candaten
C. Brancaleone
Salet
Lago del Mis
S. Gottardo
Certosa di Vedana
"CASERIN"
"PIAZZA DEL DIAVOLO"
Osteria Boz
Croce D'Aune
Prà d'Agnela
C. dei Boschi
LEGENDA
SEDE DI SENTIERO (Classificato come zona B2)
A
RISERVA INTEGRALE
B1
RISERVA GENERALE ORIENTATA TIPO B1
B2
RISERVA GENERALE ORIENTATA TIPO B2
C
AREA DI PROTEZIONE
D
AREA DI PROMOZIONE ECONOMICA E SOCIALE

Zoning

A.Zone Integral Reserve

- They contain the highest natural values, in conditions close to natural equilibrium
- It is not allowed any intervention, "passive" protection
- Scientific research
- Transit along the trails

B. General Reserve Zone

- Used for forestry and pastoral purposes
- Natural systems in evolution
- Allowed interventions of naturalistic restoration to recover from degraded conditions
- Allowed pastoral and tourist use
- In special cases treated as integral reserves (B2)

C. Protection areas

- Forestry, breeding and grazing are practiced
- The Park Authority supports agropastoral and pastoral activities, integrating them with handcrafts and tourism

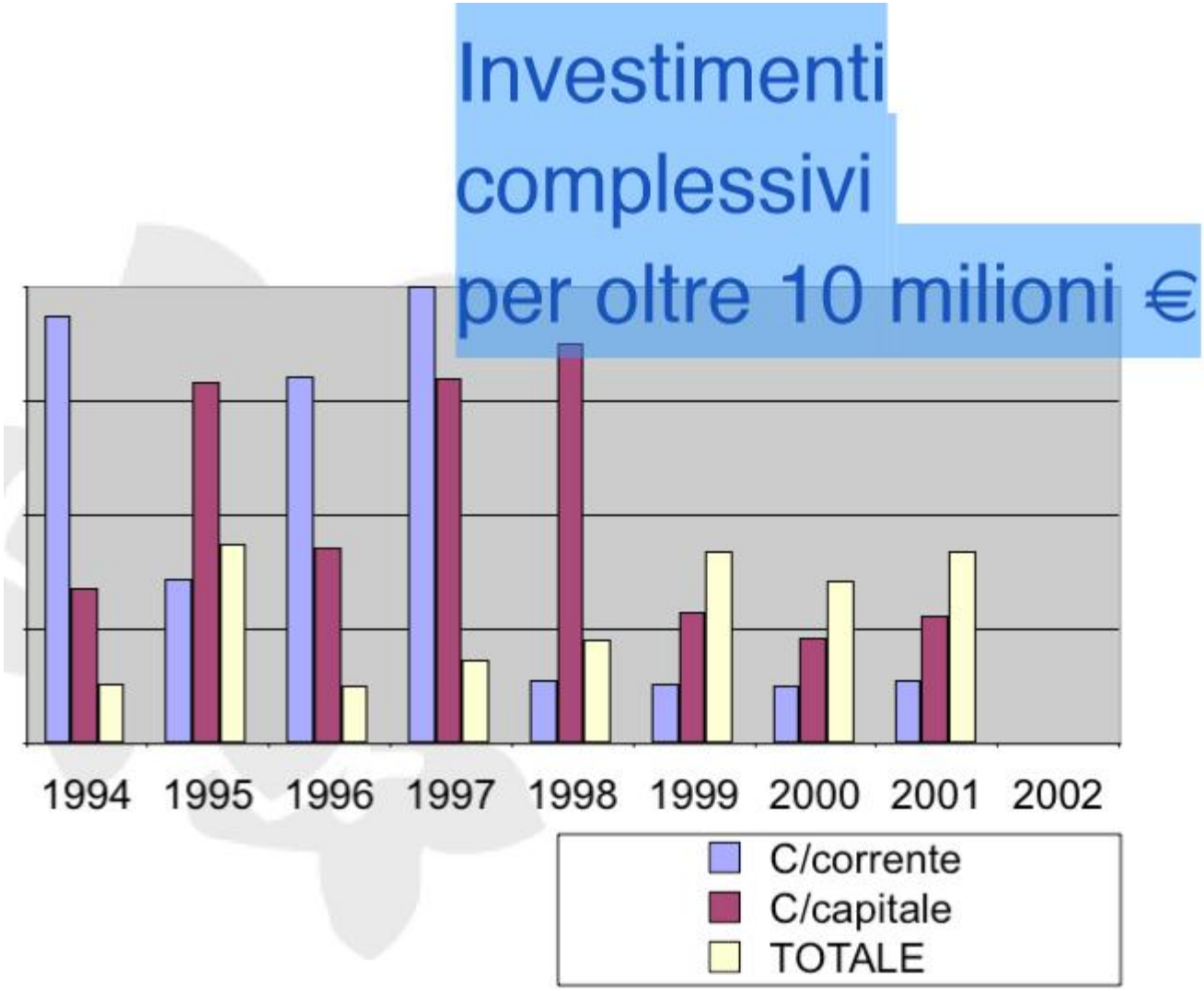
D. Areas of Economic and Social Promotion

- Areas where man lives and works: rural centers, access roads or crossing
- Accepted tourist and cultural activities
- Include touristic structures and facilities (parking areas, visitor centers)

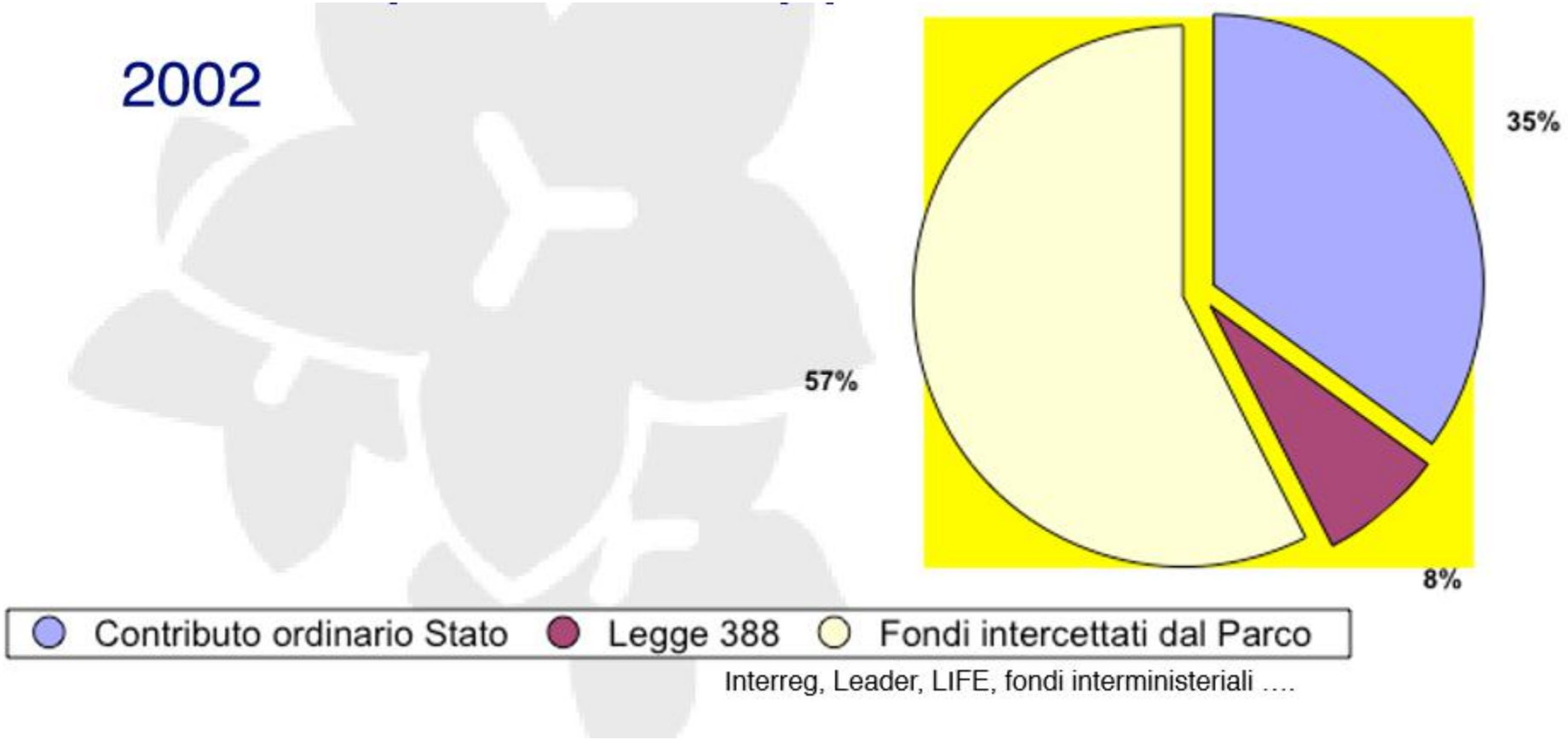
Pluri-annual Social and Economic Plan: a tool for the development of the Park Community, promoting economic activities compatible with nature protection.

It provides for: • Promotion of handcrafts, agro-silvo-pastoral productions, cultural, social services and any other initiatives that will foster, in compliance with conservation requirements , tourism development and related local activities.

Investments over 8-years interval: 10 Mln euros



Mostly with competitive grants



Public works on buildings in the Park villages

But also in the rural areas: barns, huts, forest roads and trails, etc.

Restructuring the visitor center…

Improving touristic infrastructures…(trails for biking, horses, hiking…)

Restoring and implementing renewable energy plants on barns and huts

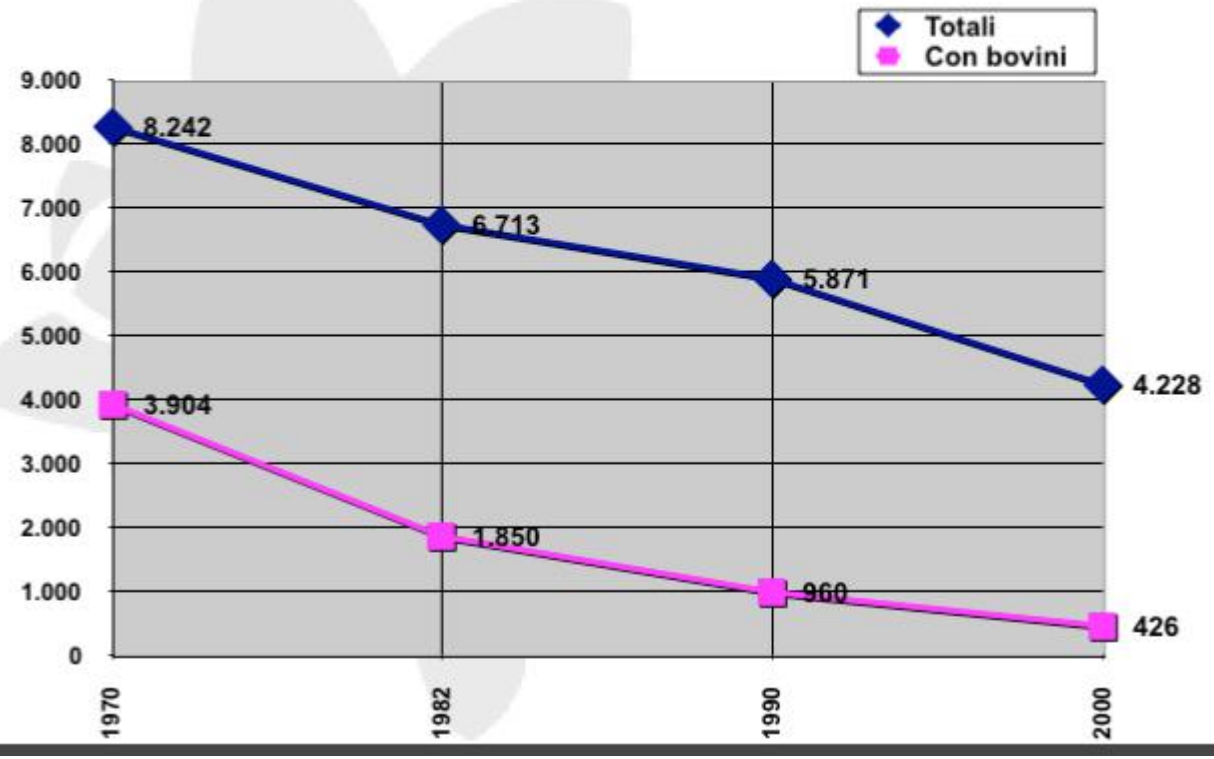
Water catchment systems

Renovating Alpine huts

Decreasing agricultural activities in the 15 villages of the Park

parco nazionale dolomiti bellunesi

Aziende agricole nei 15 Comuni (ISTAT)



However, pastoral activities are strongly supported within the area of the National Park……

parco nazionale dolomiti bellunesi

Malghe nei 15 Comuni

	Nel Parco	Fuori Parco
UBA potenziali	800	980
UBA effettive	774	406
UBA potenziali/ monticate	100%	42%

Il Parco per le malghe • Ristrutturazione completa di 4 malghe • Oltre 2 milioni di € di investimenti • Progetto “Recupero e gestione dei prati e dei pascoli e riqualificazione delle malghe”

La “malga modello” • Impiego di fonti alternative di energia (“Fossil free”) • Smaltimento reflui con fitodepurazione • Applicazione dei metodi della zootecnìa biologica • Multifunzionalità aziendale • Fattoria didattica

The Park for pastures • Complete 4 huts Restructuring • Over 2 million € of investments • Project "Recovery and management of meadows and pastures and redevelopment of huts

The "model hut" • Use of alternative energy sources ("Fossil free") • Disposal re fl ui fi todepurazione • Application of methods of organic livestock enterprise • Multifunctional • Farm

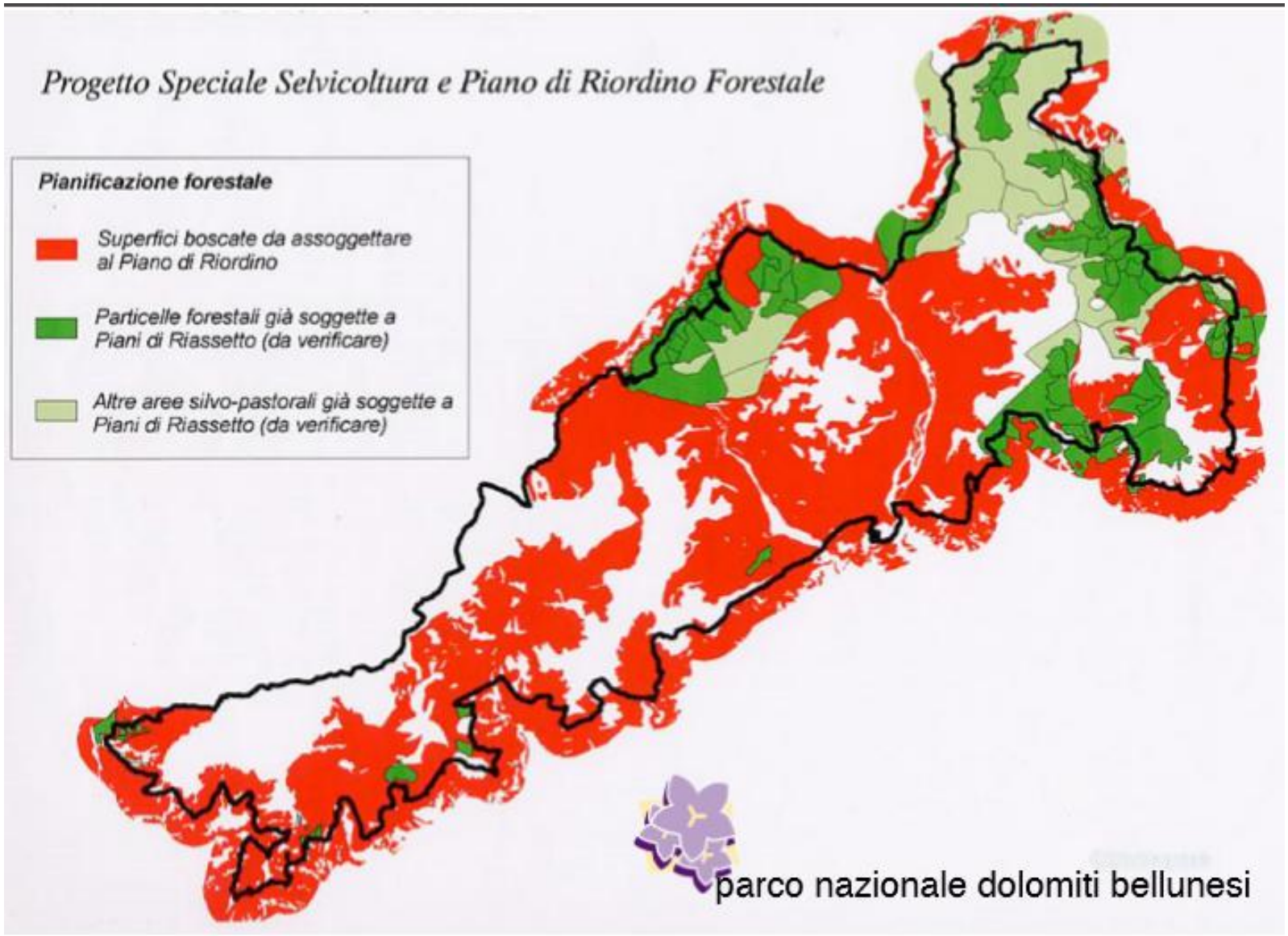
Cheese production…

Photovoltaic plant for an Alpine barn (malga)

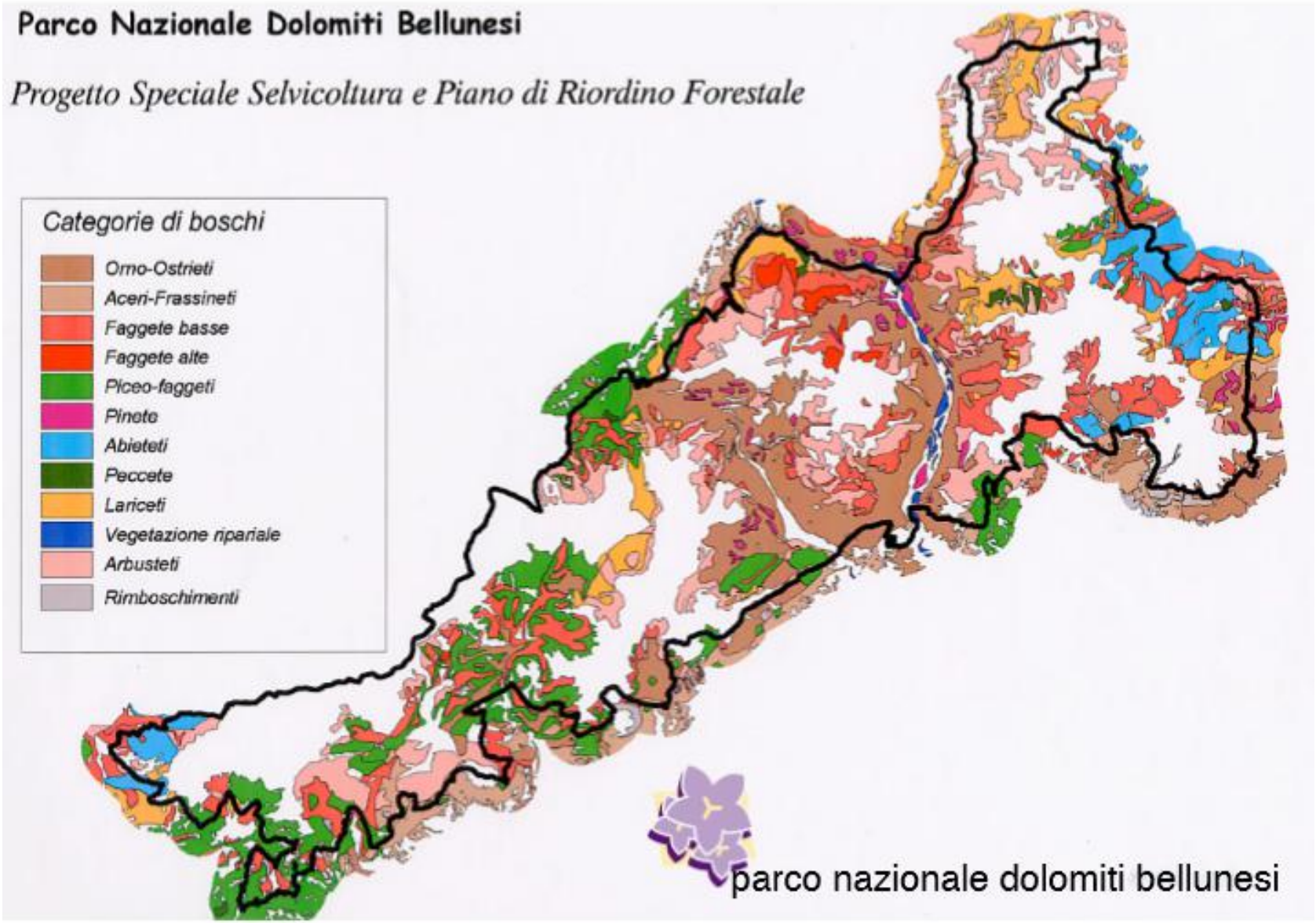
Other interventions for the pastoral activities

Agrotourism….

Forest investments for active management



Forest mapping….



Agrobiodiversity conservation and development

PARCO NAZIONALE DOLOMITI BELLUNESI

Progetto Biodiversità coltivata

In Europe 50% of the agro-biodiversity is related to extensive farming systems; genetic erosion is a major concern for agricultural varieties and animal races (ex. 80% of cultivated apples are from 3 cultivars)

	Ieri	Oggi
Specie coltivate	150	30
Specie utilizzate	12.000	¾ della dieta ottenuto da 8 spp.

Quality label for the products and services from the Park

i prodotti del parco
parco nazionale dolomiti bellunesi

Cos'è la carta qualità

Il Parco può concedere l'uso del proprio emblema a servizi e prodotti che presentino requisiti di qualità e soddisfino le finalità del parco (L. 394/91, art. 14)

Promozione globale del territorio:
natura e paesaggio, storia e cultura

PRODOTTI E SERVIZI DI QUALITA'

Activities included….

i prodotti del parco
parco nazionale dolomiti bellunesi

I settori di intervento

1. Turismo (agriturismo, alberghi, rifugi, B&B)
2. Produzioni agroalimentari
3. Produzioni artigianali
4. Educazione ambientale ed escursionismo
5. Servizi commerciali
6. Eventi e manifestazioni

How does it work the quality label: Rules to comply with, label concession, promotion

i prodotti del parco
parco nazionale dolomiti bellunesi

Come funziona la "carta"

1. Disciplinari:
   a. fissano i criteri di qualità ed ecocompatibilità
   b. requisiti: obbligatori/facoltativi
   c. Definiscono le procedure di controllo e mantenimento
2. Assegnazione del Marchio = qualifica di "fornitore di qualità ambientale"
3. Promozione
   a. Giornale del Parco
   b. Pieghevoli
   c. Fiere

Requirements for an agrotouritic activity with quality label

i prodotti del parco
parco nazionale dolomiti bellunesi

Agriturismo: requisiti

§ Attività produttive: adozione di metodi di agricoltura sostenibile
§ Servizi naturalistici e didattici
§ Tutela dell'ambiente e delle risorse naturali
§ Gestione ecologica delle strutture ricettive
§ Risparmio energetico e idrico
§ Riciclaggio e smaltimento dei rifiuti
§ Dotazioni e servizi ricettivi
§ Servizi turistici
§ Ristorazione
§ Trasporti e viabilità

Marking the agro-tourisms

i prodotti del parco
parco nazionale dolomiti bellunesi

Strutture ricettive: requisiti (esempio)

	AL	AG	BB	AF	RI
Area "Attività produttive"					
Adozione di metodi di agricoltura a basso impatto ambientale		þ			
Area "Servizi Naturalistici e Didattici"					
Informazioni sulle visite al Parco	þ	þ	þ	þ	þ
Area "Tutela dell'Ambiente e delle Risorse Naturali"					
Conformità al parametro PSD (*Diversità delle piante a livello di specie*)		þ			
Area "Gestione Ecologica delle strutture ricettive"					
Adozione dei metodi della bioarchitettura nei recuperi e nei restauri	þ	þ	þ	þ	þ
Acquisto di elettrodomestici a basso consumo di energia	þ	þ	þ	þ	þ
Area "Ristorazione"					
Almeno dieci prodotti locali nell'offerta di ristorazione	þ	þ			
Area "Trasporti e viabilità"					
Informare i futuri clienti sulle possibilità di arrivare con i mezzi pubblici	þ	þ	þ	þ	

AL: alberghi; AG: agriturismi; B: Bed&Breakfast; AF: affittacamere; RI: rifugio

Agro-food products

i prodotti del parco
parco nazionale dolomiti bellunesi

Agroalimentare: etichettatura

Promotion and advertising agro-food products from the Park

i prodotti del parco
parco nazionale dolomiti bellunesi

Agroalimentare: promozione

SANA 2002

Slowfood…

i prodotti del parco
parco nazionale dolomiti bellunesi

Agroalimentare: promozione

Salone del Gusto Torino 2002

"All things are connected. Man did not weave the web of life: he is a pro. Whatever he does to the plot, he does to himself "Chief Seattle 1854