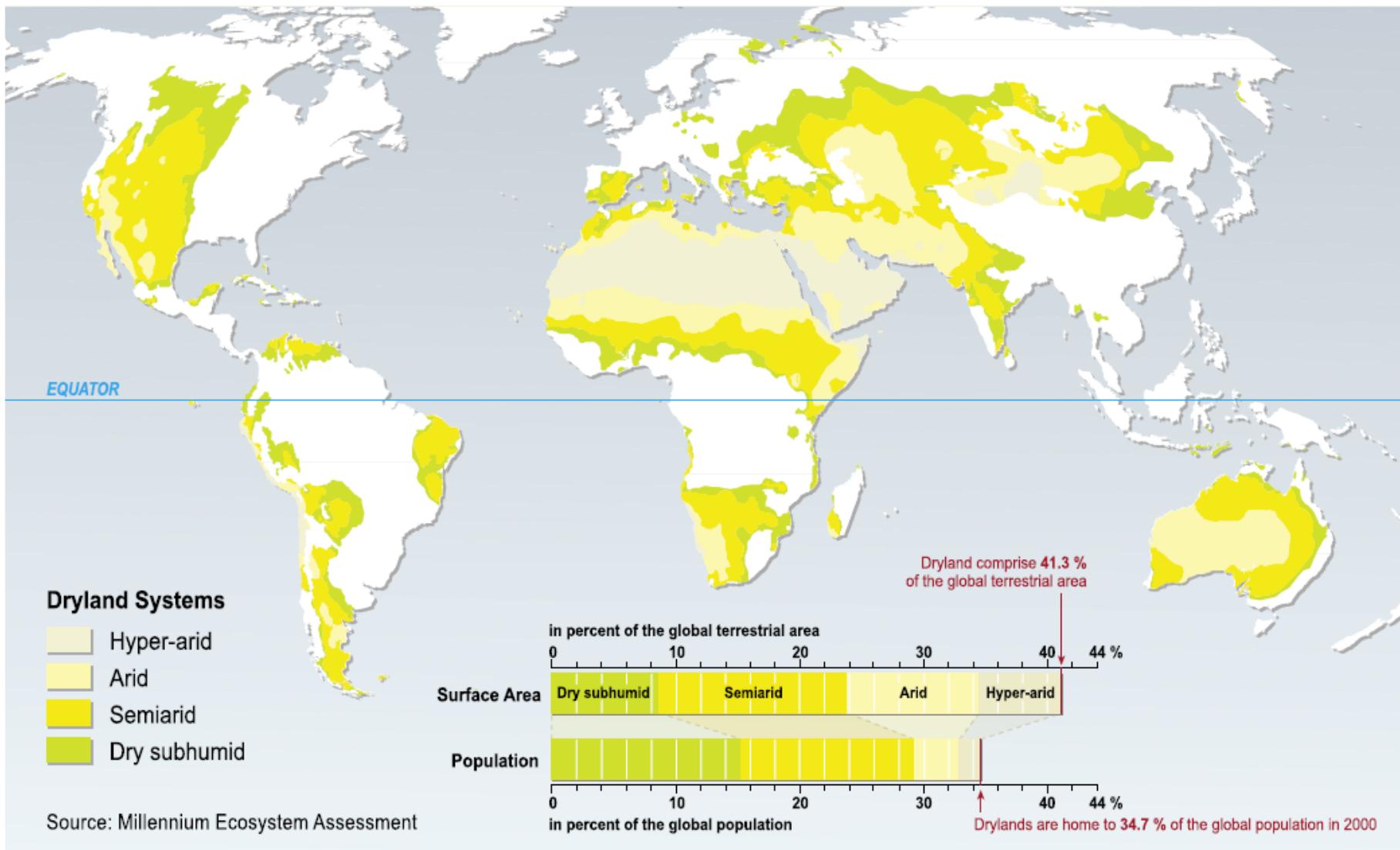




Rimboschimenti e  
lotta alla  
desertificazione in  
Italia  
Piermaria Corona

# global distribution of arid zones



# Environmentally Sensitive Area Index (ESAI)

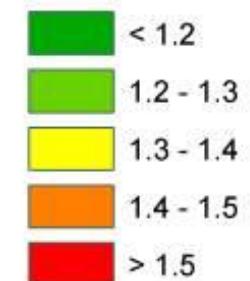
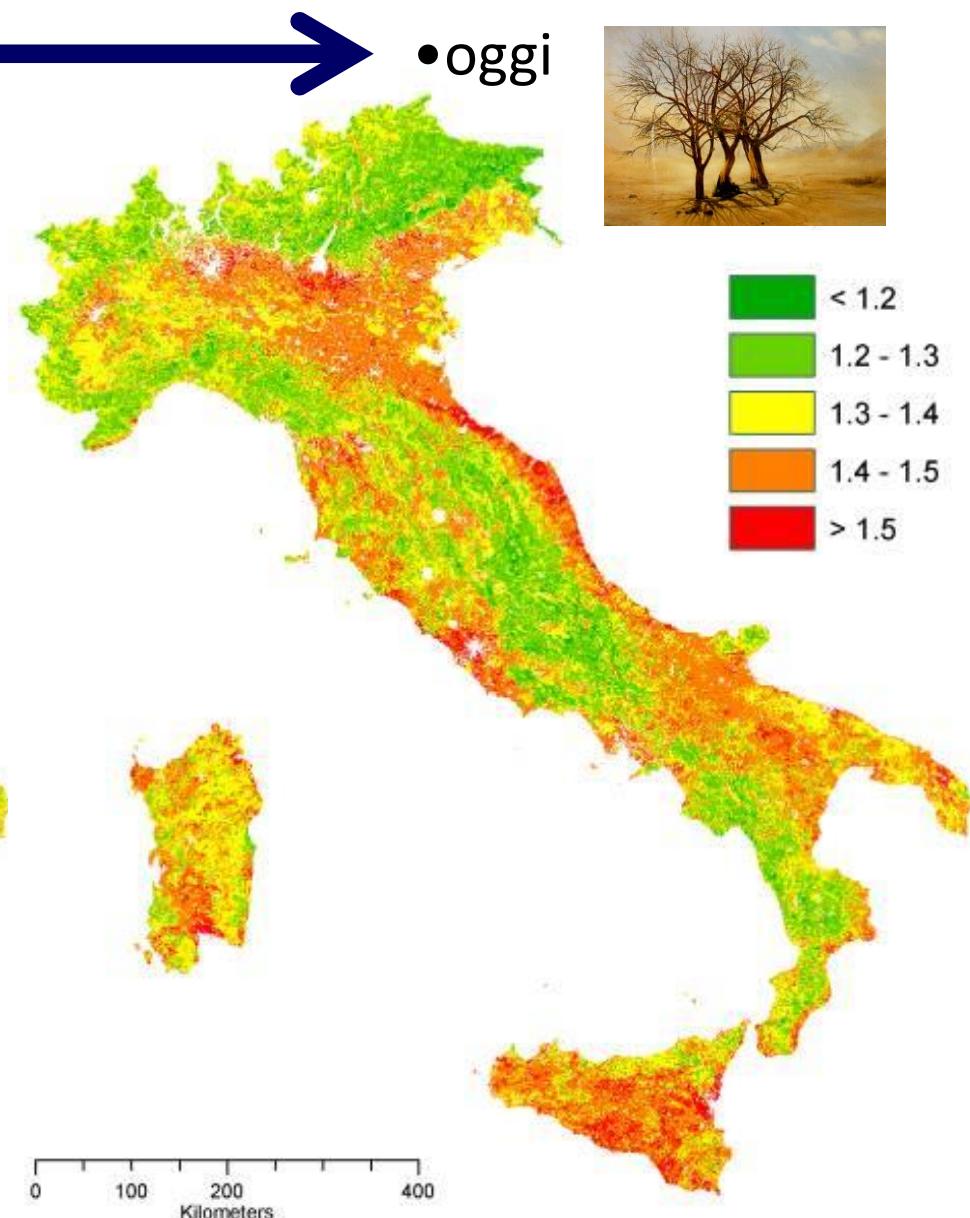
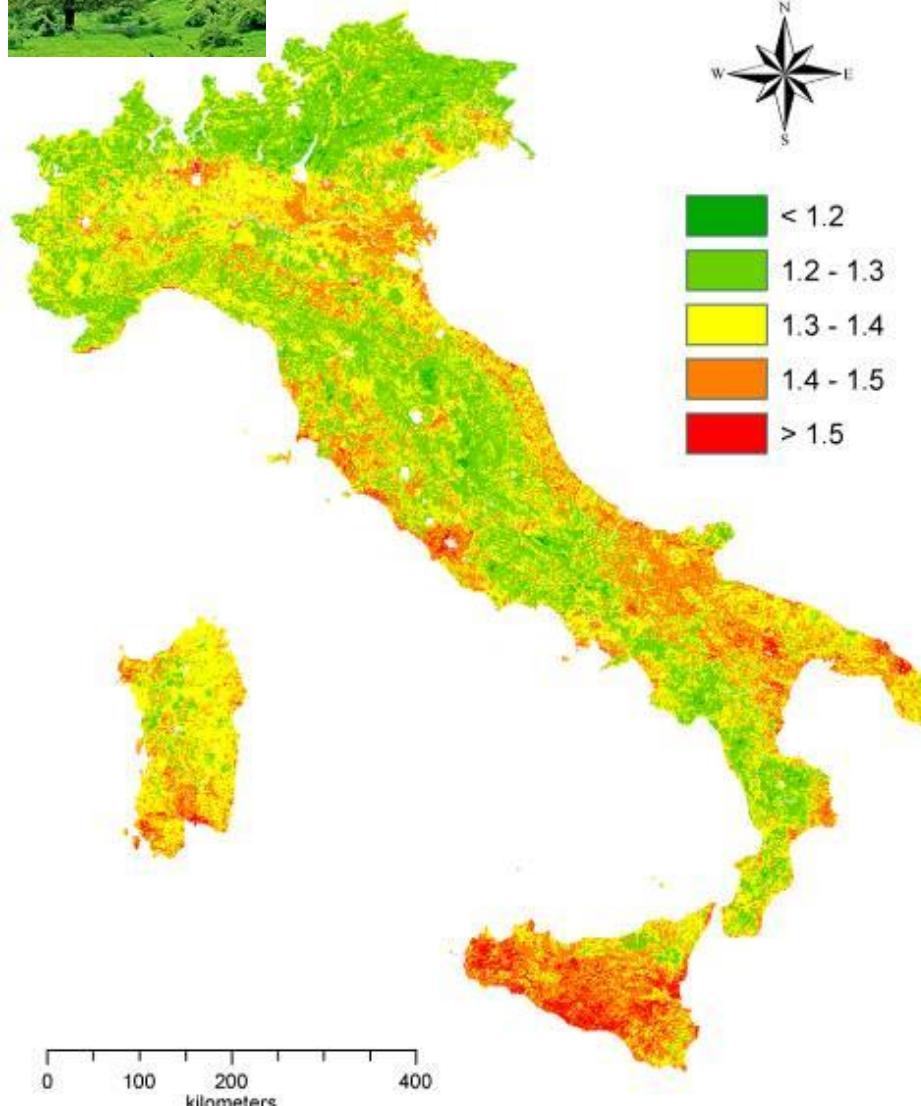
Manual on key indicators of desertification and mapping environmental sensitive areas to desertification. European Commission, Directorate General, Project ENV4-CT-95-0119 (EUR 18882), Brussels



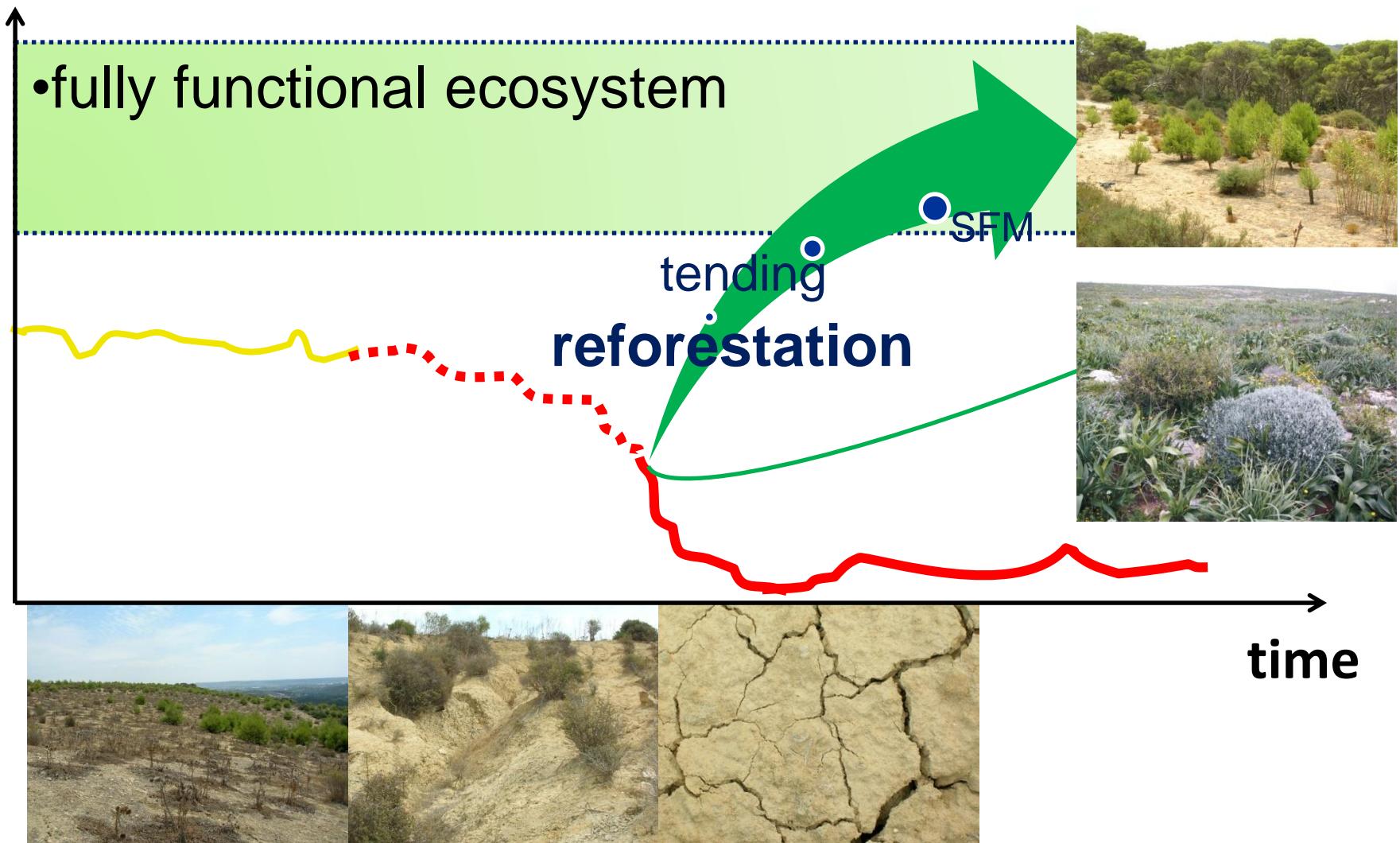
•1960



•oggi

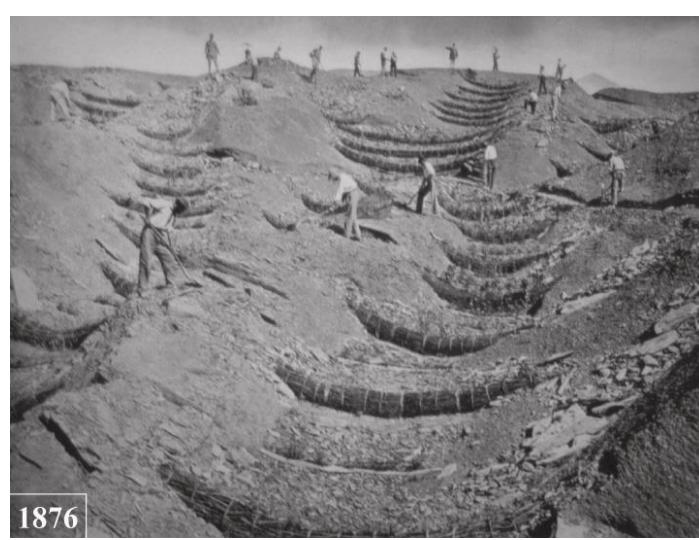


# functional efficiency



Regione/ PA	area(ha)	es(%)
Piemonte	33.294	12,1
Valle d'Aosta	1.541	49,6
Lombardia	35.264	11,9
Alto Adige	1.890	44,5
Trentino	7.568	21,7
Veneto	16.098	18,3
Friuli V.G.	20.715	12,4
Liguria	7.330	22,0
Emilia Romagna	36.514	11,9
Toscana	50.481	9,1
Umbria	12.347	19,0
Marche	23.100	15,4
Lazio	16.459	16,6
Abruzzo	20.265	13,2
Molise	8.023	24,9
Campania	19.433	16,1
Puglia	18.262	15,6
Basilicata	11.201	21,0
Calabria	70.999	7,1
Sicilia	78.132	7,5
Sardegna	80.912	7,1
Italia	569.827	2,8

**rimboschimenti in  
Italia = circa il 6%  
della superficie  
boscata (dati INFC2015)**



→ **hydro-  
geopedological  
restoration**

oggi



- Mt. Limbara, Sardinia 1939

→ landscape  
restoration



- Mt. Limbara, 2004

# → sand dune consolidation



oggi

# MILIZIA NAZIONALE FORESTALE

1<sup>a</sup> Coorte Autonoma

COMANDO CENTURIA DI SASSARI



**Foci Coghinas** (Castelsardo-Sedini)

Rimboschimento, previo imbrigliamento delle sabbie littoranee.

Anno XVII E. F.



*Tunisia, Tozeur province*





**Vallerani systems:**

i.e. the mechanization of traditional  
*water conservation & harvesting*  
techniques





→ phytoremediation  
(use of wastewater,  
biomass production, ...)

*Tamarix aphylla*



## A Forest is Not Only Trees

Photo: Eitan Vitkon, KKL-JNF Photo Archive, 2021

Using a special photographic technique, the forest becomes a photographed painting that contains movement, depth, color, and emotion.

The modern forest is not only a collection of trees, but rather an area that brings a great deal of benefit to humanity and the environment. The forests provide important ecological services such as sequestering carbon dioxide (a solution for climate change), supporting biodiversity, and preventing soil erosion. KKL-JNF's forests provide rest and recreation services in nature. KKL-JNF develops recreation areas and hiking paths in the forests, and preserves heritage sites located inside them. It has planted approximately 240 million trees in Israel so far. The State of Israel is among a very small number of countries in which the number of trees has grown over the past hundred years.



חובבים כוגן לכידת פחמן (מענה  
ל מפחחת ביערות חינויים ושבילי  
ם מאד של מדינת שבחן צומחים



### Climatic Sensitivity to Desertification

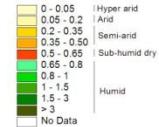
Aridity Index  
Structural analysis 1961 - 1990

Scale 1:5000000



Data analysis and map elaboration:  
DISSTAT Project  
Foundation for Applied Meteorology (FMA)  
Institute of Biometeorology  
of the National Research Council (Istituto Biometeo)  
Florence, ITALY - November 2003  
<http://dismed.eionet.eu.int>

#### Aridity Index Classification (Rainfall/PET)



Projection : Lambert Conformal Conic

Spheroid : WGS 84  
Central Meridian : 12  
Reference Ellipse : GRS 80  
Standard Parallel 1 : 20  
Standard Parallel 2 : 47

Data spatialization procedures:

- Rainfall spatialization procedure:
- Kriging interpolation
- Thin Plate Spline Linear interpolation

Temperature spatialization procedure:

- Multilinear regression using DEM, Latitude, Longitude and elevation procedure

PET calibration procedure:

- monthly calibration of Thunthwaite PET values with Pernam-Monsteiro PET values: spatialization using DEM, Latitude, Longitude, Elevation, Longitude and sea distance of the ratio between the two estimated PET to obtain 12 correction grids

Data sources

Coast Layer :

- ESRI Digital Chart of the World 1:1M

DEM (Digital Elevation Model) :

- USGS/EDC GTOPO 30

Meteorological data:

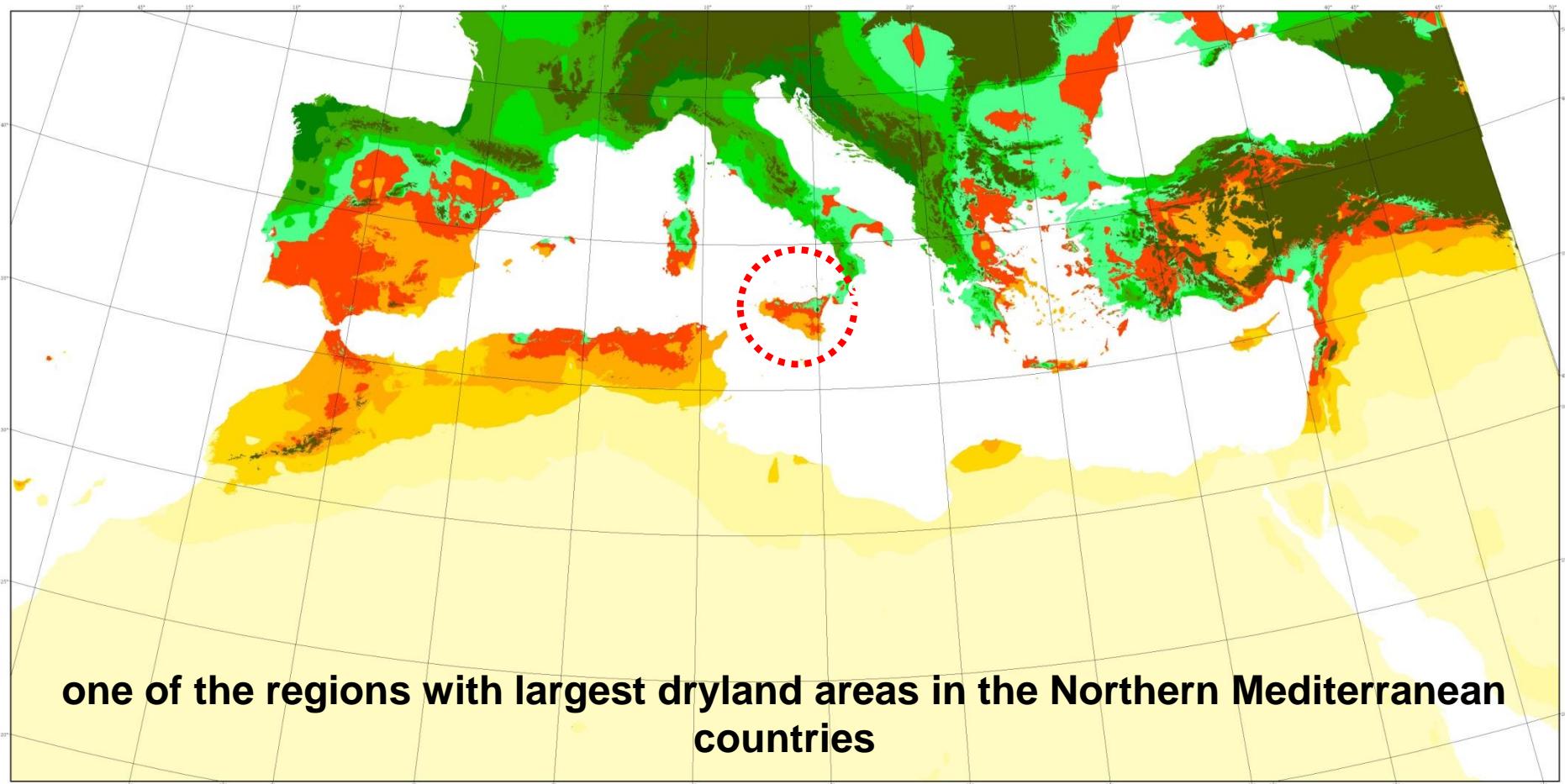
- FAOCLIM 2 database (version 2.0)
- CPC Global Climate Dataset 0.5 degrees 1961-90 Mean
- Meteorological Service of Canada
- Greek National Meteorological Service
- Hydrological Institute of Italy
- Portuguese Meteorological Institute
- Spanish Meteorological Institute (only for 1971-2000 period)
- Institut National de la Meteorologie - Tunisie

Temperature data:

- FAOCLIM 2 database (version 2.0)
- Canadian Meteorological Service
- MeteodB database Italy
- Portuguese Meteorological Institute
- Spanish Meteorological Institute (for 1971-2000 period)
- Institut National de la Meteorologie - Tunisie

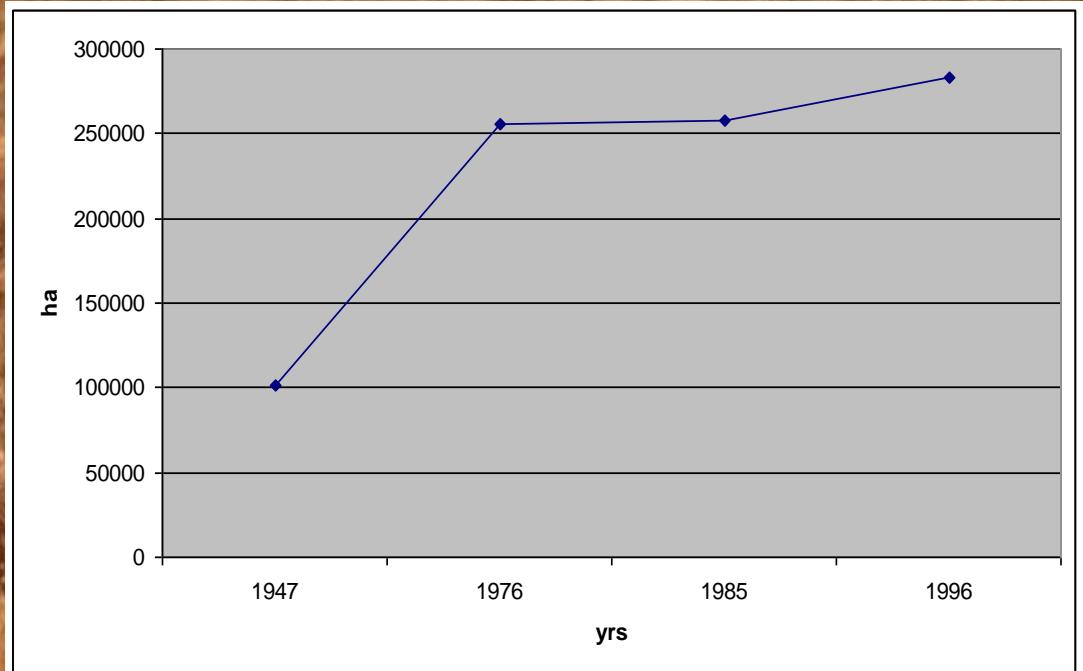
Precipitation data:

- FAOCLIM 2 database (version 2.0)
- Portuguese Meteorological Institute (for Portugal only)
- Institut National de la Meteorologie - Tunisie (for Tunisia only)



# *Artificial reforestation in Sicily*

1. rehabilitation of degraded drylands
2. development of a commercial wood-production sector for rural economic growth
3. temporary employment



Source: Sicily Regional Forest Service

increase of 278 % of  
Sicily forest area in 50 yrs

# Restoration success: targets for Mediterranean woodlands

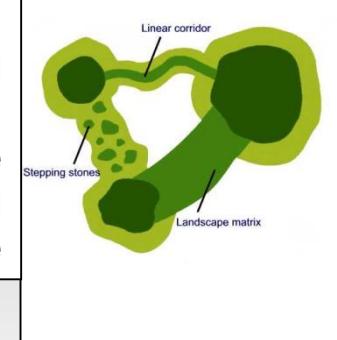
## 1. stopping degradation



**3. to assist secondary succession  
through stimulating natural  
regeneration**



**2. promoting  
improved  
ecosystem and  
landscape  
function and  
structure**



## 1. stopping degradation



## 2. promoting improved ecosystem function



$$\text{Index of Functional Efficiency (IEF)} = \frac{\text{NPP}_r}{\text{NPP}_p}$$



Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

SCIENCE @ DIRECT<sup>®</sup>

Remote Sensing of Environment 100 (2006) 563 – 575

Remote Sensing  
of  
Environment  
[www.elsevier.com/locate/rse](http://www.elsevier.com/locate/rse)

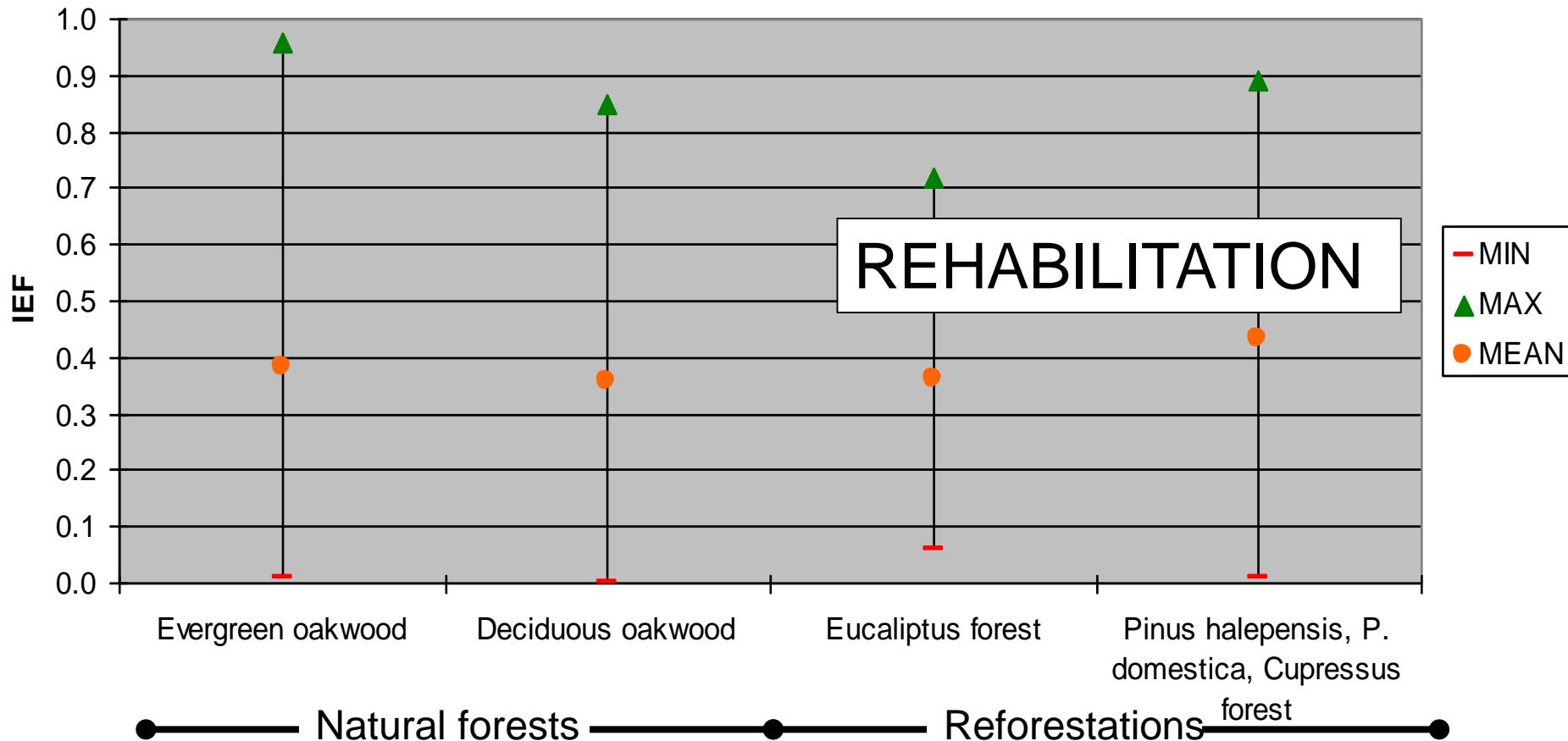
Use of remotely sensed and ancillary data for estimating forest gross primary productivity in Italy

Fabio Maselli <sup>a,\*</sup>, Anna Barbati <sup>b</sup>, Marta Chiesi <sup>a</sup>, Gherardo Chirici <sup>c</sup>, Piermaria Corona <sup>b</sup>

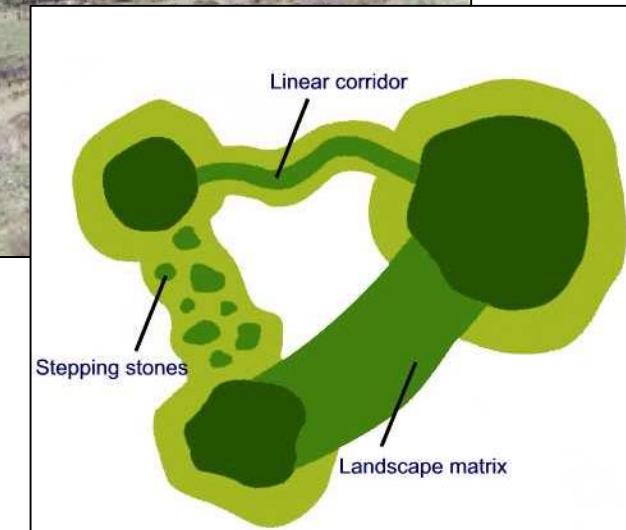
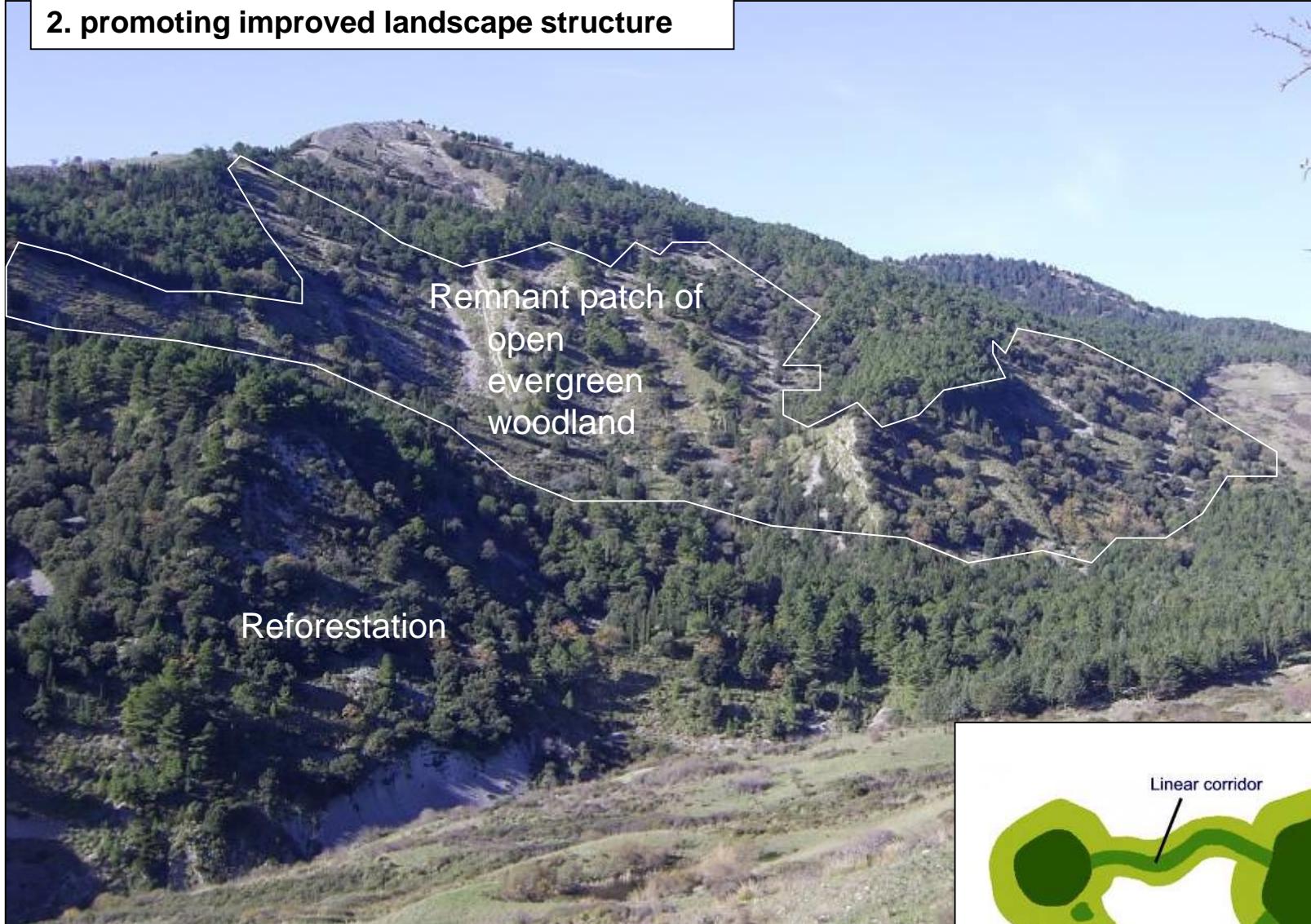
NPP<sub>p</sub> = potential Net Primary Productivity estimated by bioclimatic models (Lieth index)

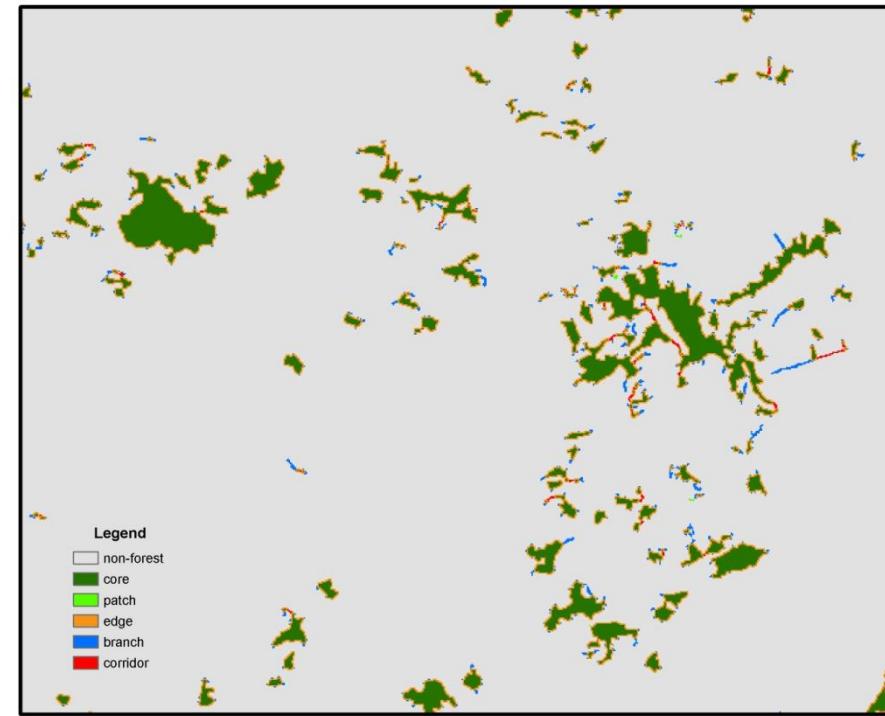
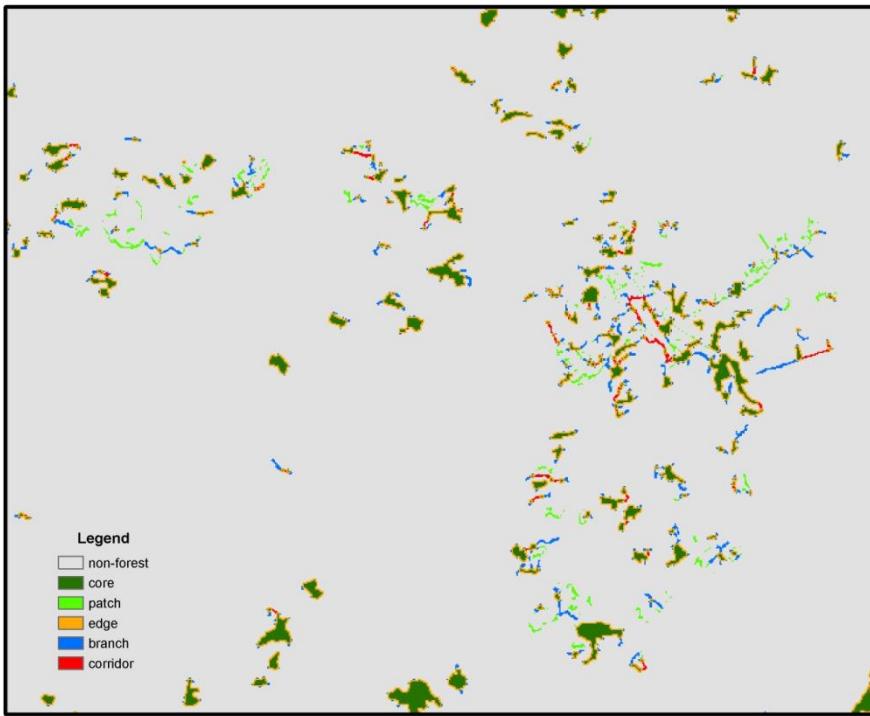
NPP<sub>r</sub> = real Net Primary Productivity, assessed from multitemporal NDVI

# IEF: natural forests vs reforestations

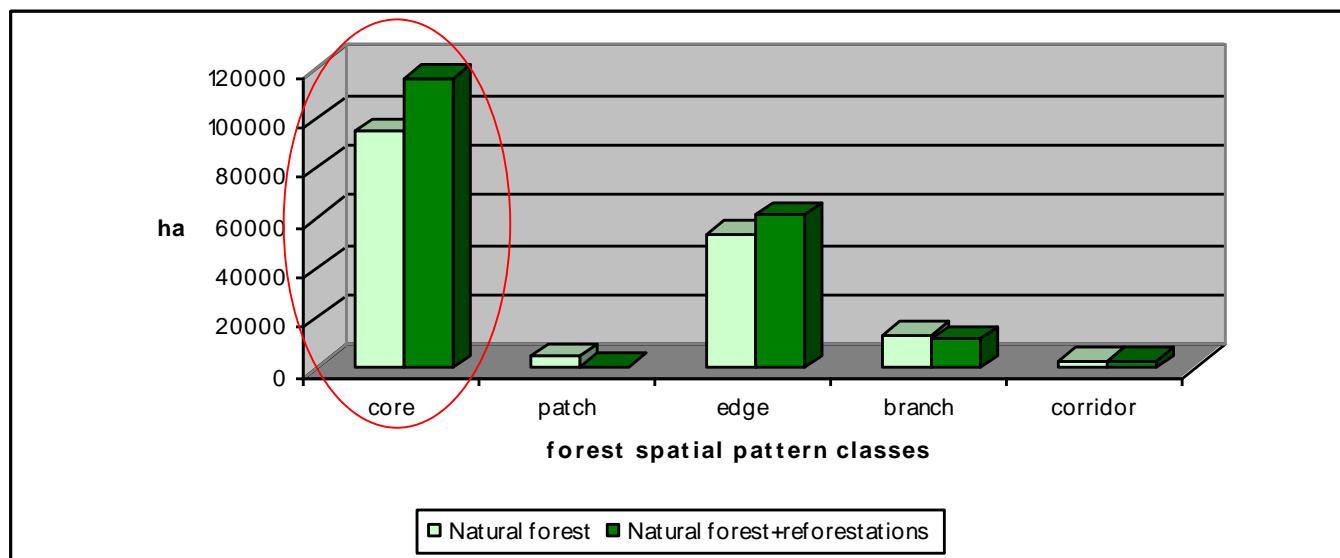


## 2. promoting improved landscape structure





**fragmentation reduction: increase of core, decrease of patches & branches ⇒  
closure of previously non forest areas into areas of core forest**



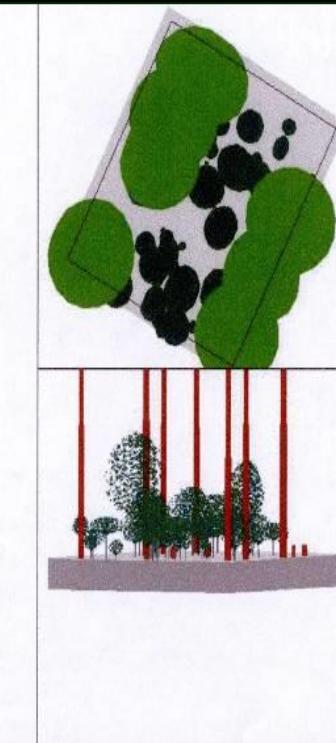
# success of forest restoration



**3. to assist secondary succession through stimulating  
natural regeneration**



Rimboschimento di *P. pinea* del 1928, con rinnovazione naturale di *Q. ilex*, mai percorso da incendio.



#### Caratteristiche dell'area

Forma: rettangolare

Dimensioni: 10 m x 5 m

Superficie: 50.00 mq

#### Leggenda

■ *P. pinea*

■ *Q. ilex*

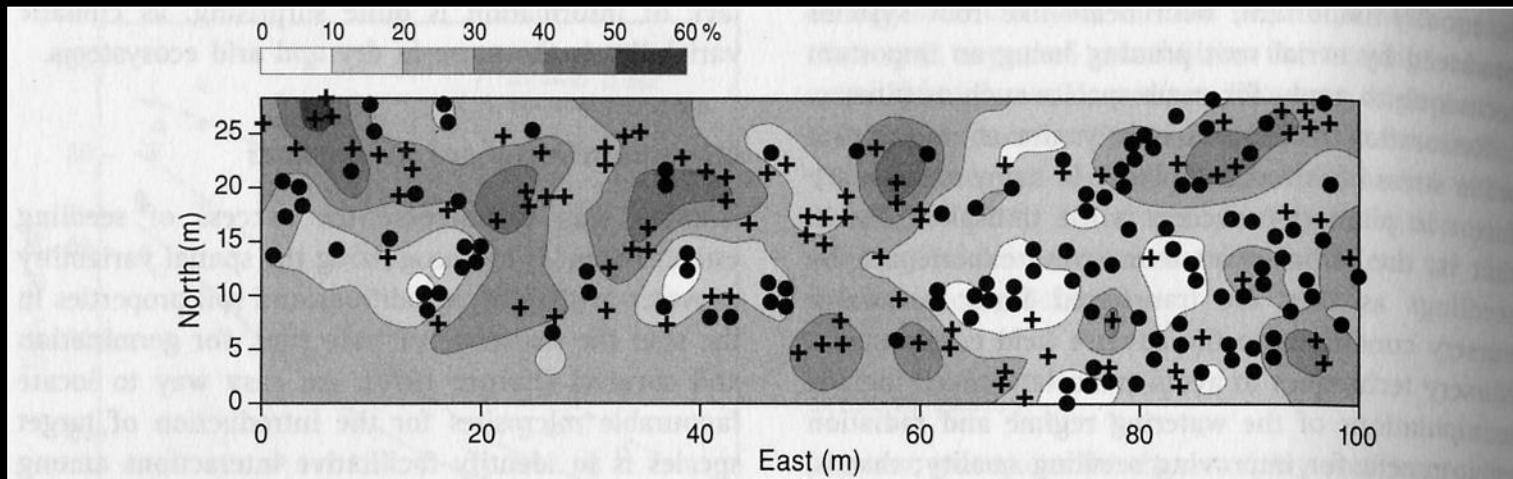
# take advantage of remnant patches of natural vegetation

natural colonization of abandoned agricultural land in a relative short timespan (1955-2000)



## lessons learned (*...inter alia*)

select reforestation sites around isolated vegetation patches acting as ‘resource islands’, which can also facilitate the survival of introduced seedlings (shade, soil depth and texture, nutrient availability, ...)



# native shrubs as ‘preparatory species’



*Anagyris foetida*



*Astragalus huetii*



- *Anagyris foetida*
- *Astragalus huetii*
- *Cistus parviflorus*
- *Coronilla valentina*  
subsp. *glauca*
- *Daphne gnidium*
- *Pistacia lentiscus*
- *Pistacia terebinthus*

Piermaria Corona - Barbara Ferrari  
Francesco Iovino - Tommaso La Mantia - Anna Barbuti

## Rimboschimenti e lotta alla desertificazione in Italia

[www.aracneeditrice.it/aracneweb/index.php/publicazione.html?item=9788854825499](http://www.aracneeditrice.it/aracneweb/index.php/publicazione.html?item=9788854825499)





... conoscere i percorsi concettuali ,  
le teorie e le tecniche che  
caratterizzano la storia e l'attualità  
delle scienze forestali a supporto



ogni paesaggio ha  
la sua storia: quella  
che leggiamo,  
quelli che  
sogniamo, e quelli  
che creiamo

(George M.S. Kennedy)

**piermaria.corona@crea.gov.it**