***2018 Bioregions Forum***

**Visions, approaches and experiences in the forest circular bioeconomy**

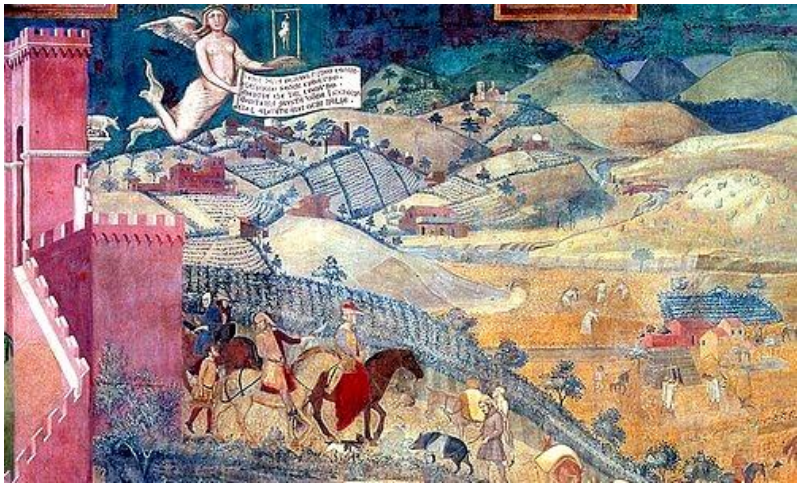
*Marco Marchetti*

# Environmental services, biodiversity and the bioeconomy

UNIVERSITÀ DEGLI STUDI DEL MOLISE

**Barcelona, 13 Nov 2018**

# A long-time history of Human-Nature co-evolution

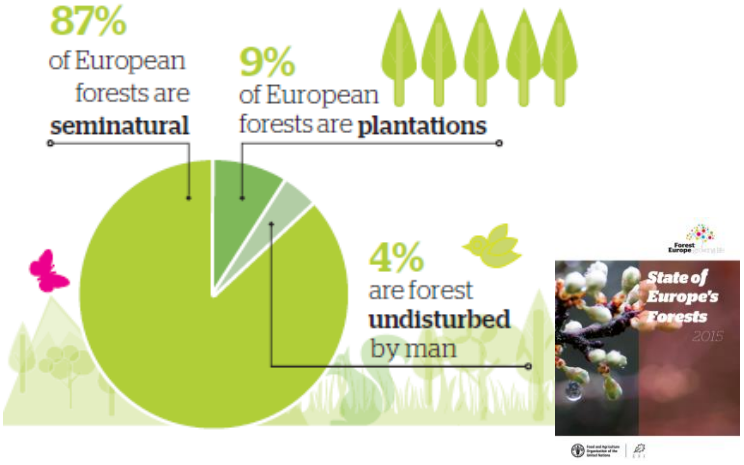



*Allegoria del Buon Governo, A.Lorenzetti, 1338, Siena*

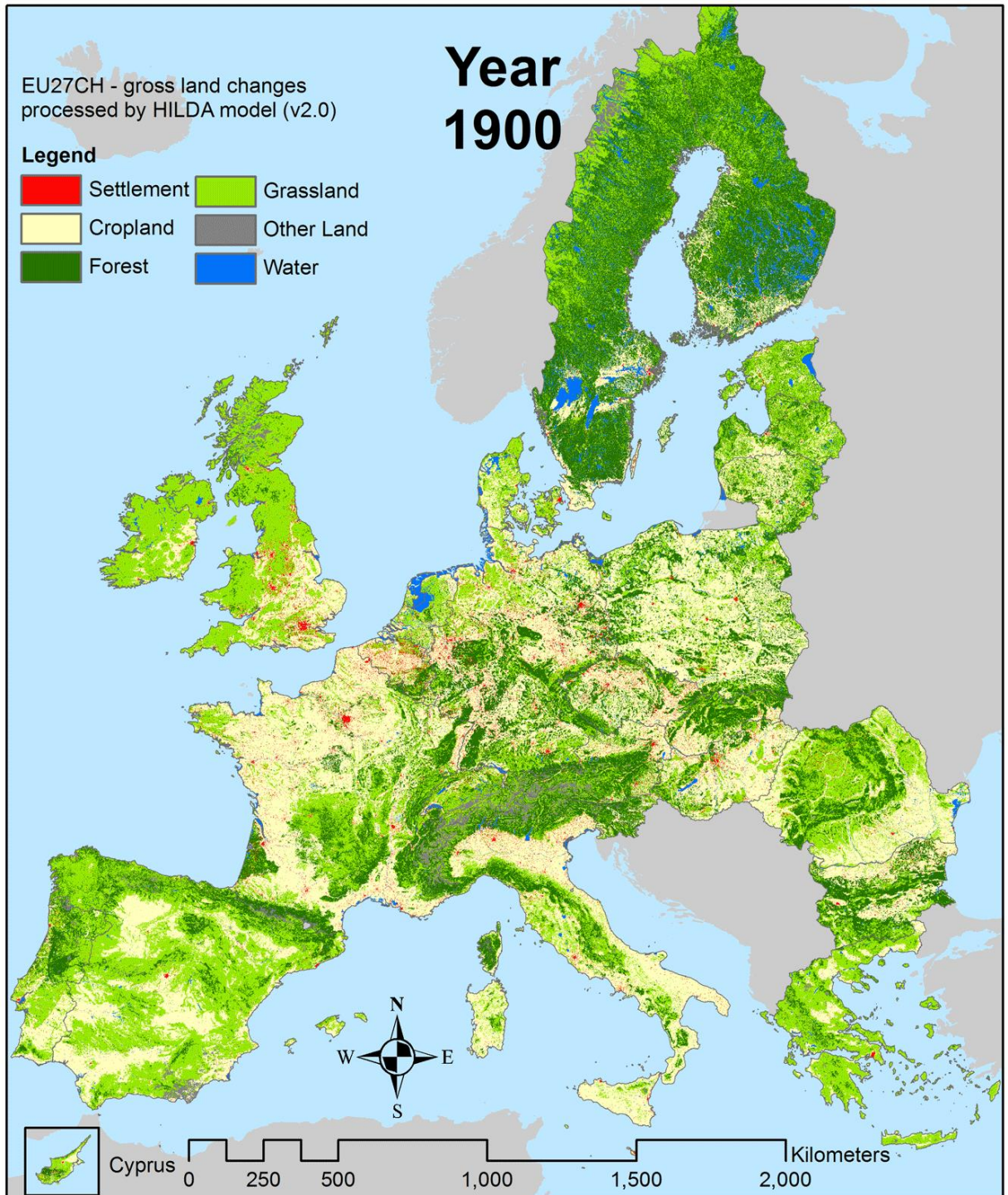
1) **Europe is the Continent with the lowest coverage of pristine forests**
2) **Cultural/historical/working landscapes**
3) **High Landscapes variability**

⟸ **Fire**

⟸ **Agriculture and grazing**

# 100 years of landscape evolution




In France, Spain and Italy, reforestation was particularly visible, last decades also at East

Re-forestation/natural re-growth processes had a visible impact as well as more people moved into urban areas

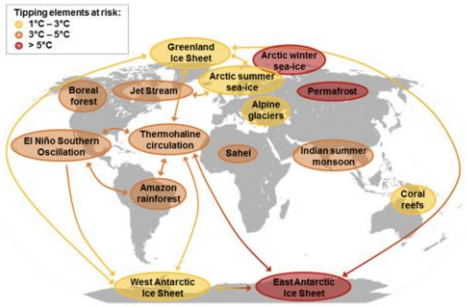
"Priority for forest management in Europe over the coming decades should not be mitigating climate change but rather adapting forests to such change to preserve the ecological, social and cultural services and goods they provide", **… producing wood** (*Luyssaert et al., 2018. Tradeoffs in using European forests to meet climate objectives. Nature, http://dx.doi.org/10.1038/s41586-018-0577-1*)

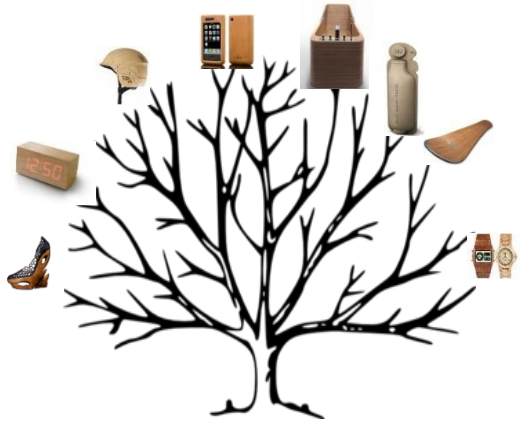
***Credits to Fuchs et al. (http://www.geo-informatie.nl/fuchs003/# )***

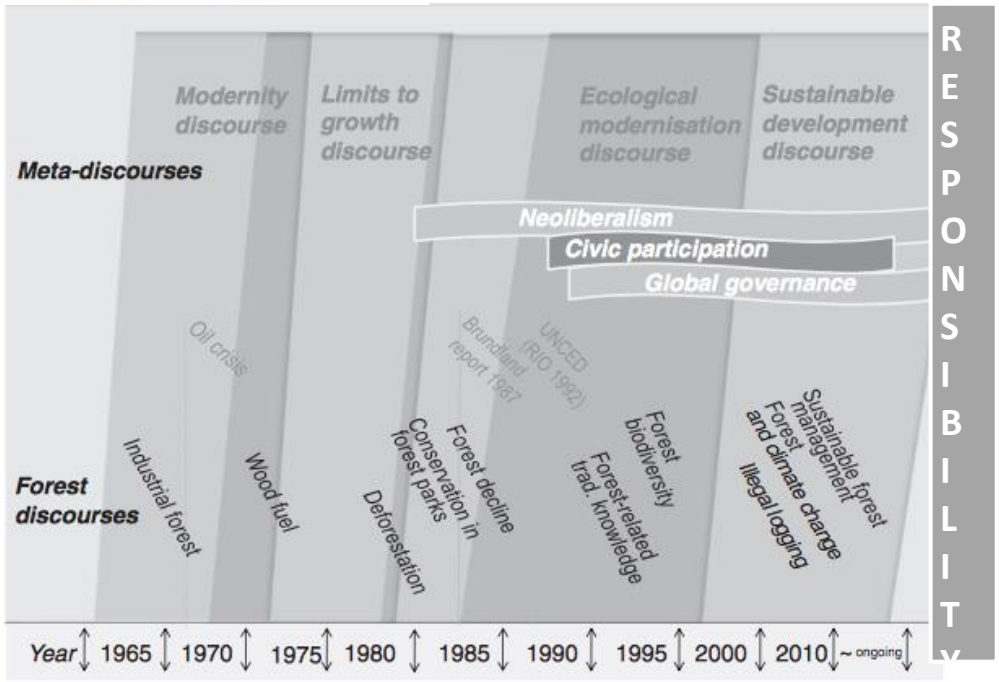
# Moving forward in the time of "great acceleration" and changes

- Land cover, land use and land management
- Threats and challenges (CC, megafires, extreme events, biodiversity loss)
- Societal demands and needs

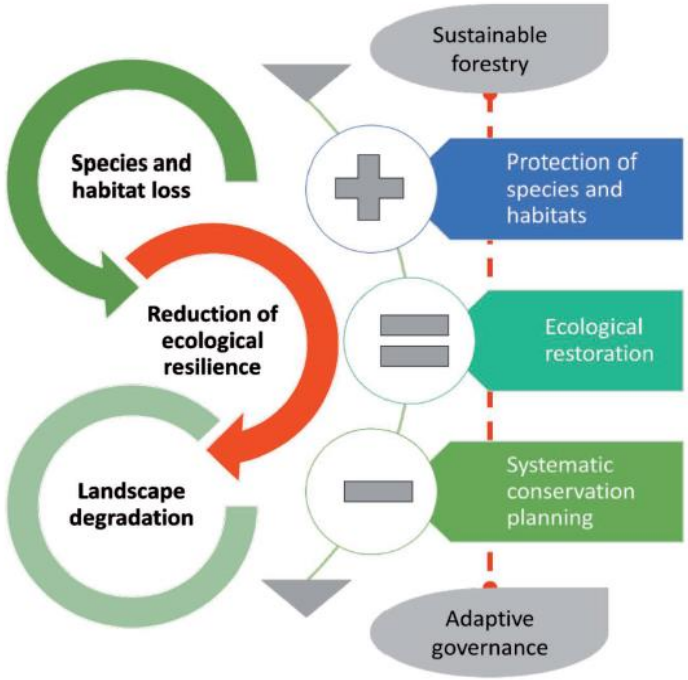
## Vision and perspective In the *rest-of-the-nature*






. Global meta and forest discourses.
Adapted from Arts et al. (2010).

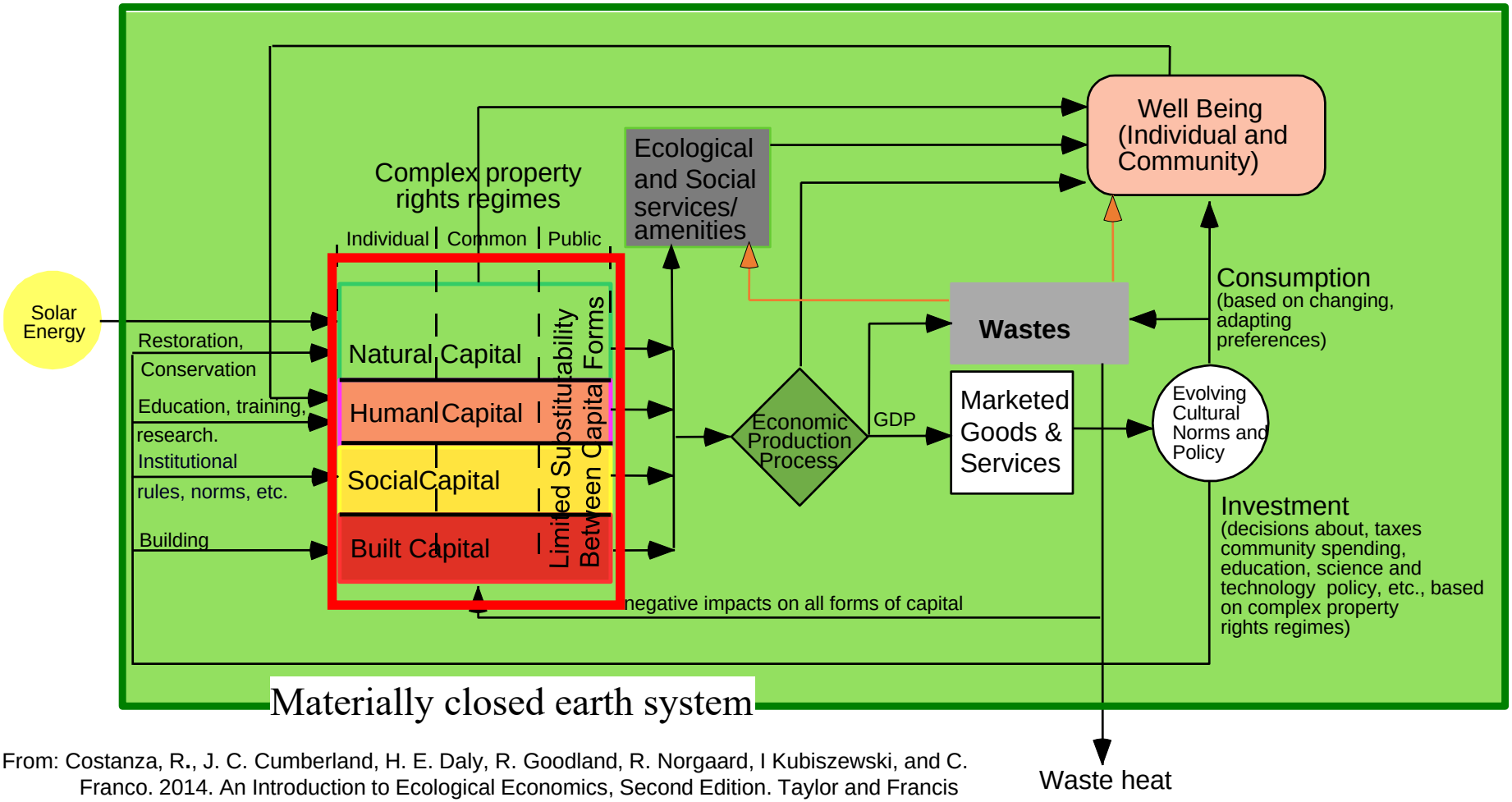



**Frontiers for forest conservation:**
**securing the future ecosystem services balance**


Marco Marchetti, Lorenzo Sallustio, Matteo Vizzarri

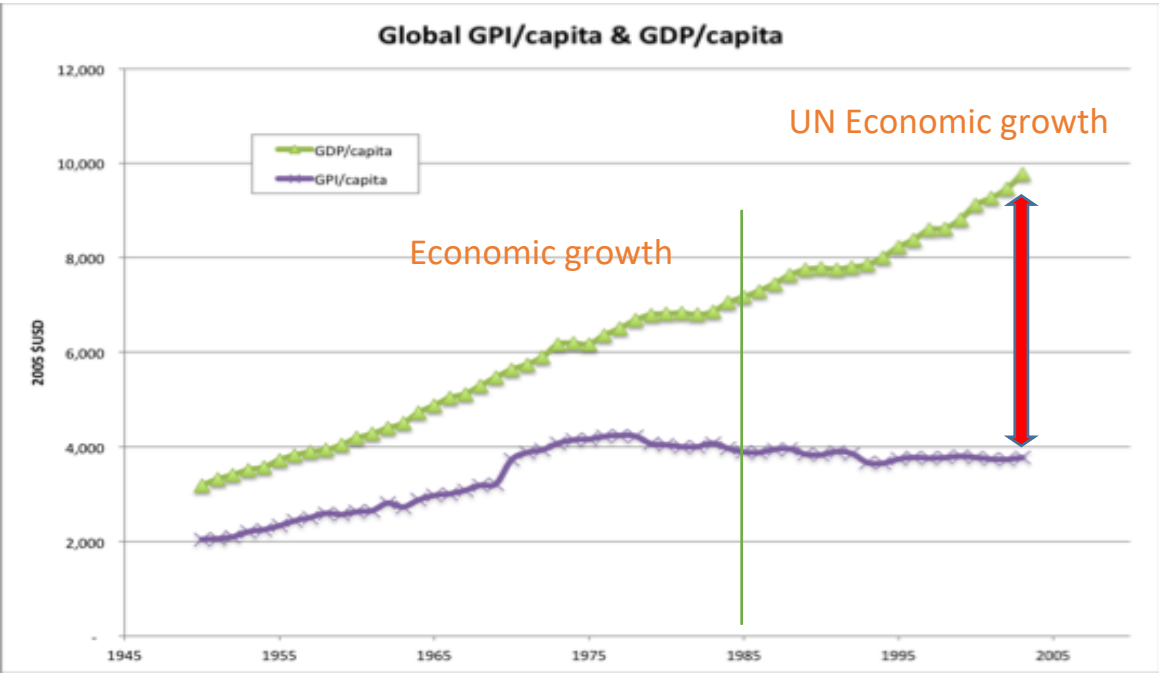
Centro di Ricerca per le Aree Interne e gli Appennini (ARIA), Dipartimento di Bioscienze e Territorio (DiBT)
Università degli Studi del Molise, Pesche (IS), Italy

# From “empty” to a “Full World” Vision of the Whole System




From: Costanza, R., J. C. Cumberland, H. E. Daly, R. Goodland, R. Norgaard, I Kubiszewski, and C. Franco. 2014. An Introduction to Ecological Economics, Second Edition. Taylor and Francis

# Gross Domestic Product
# vs
# Genuine Progress Indicator

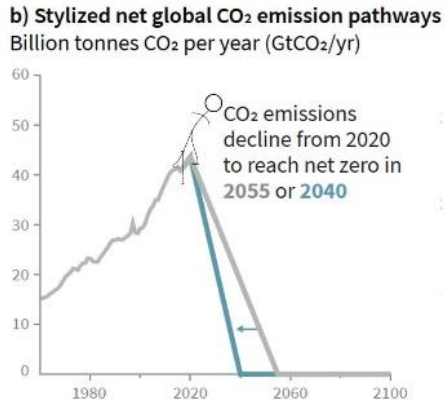




Time to leave GDP behind

Gross domestic product is a misleading measure of national success. Countries should act now to embrace new metrics, urge **Robert Costanza** and colleagues.

*Kubiszewski et al. 2013. Beyond GDP. Ecological Economics 93:57-68*


Europe is ready for climate impacts: Commission evaluates its strategy

**Adapting the EU regions and economic sectors to the impacts of climate change is now more urgent than forecast in the EU's 2013 adaptation strategy. This is one of the key findings of the Commission's evaluation of 2013 strategy published today - 12/11/2018**

# Overlapping Ideas for a "***better connection of***

Wellbeing Economy
Circular BioEconomy
Ecological Economy
Regenerative Economy
Ecological Civilization
Doughnut Economy
Steady State Economy
Civil Economy
Next Economy

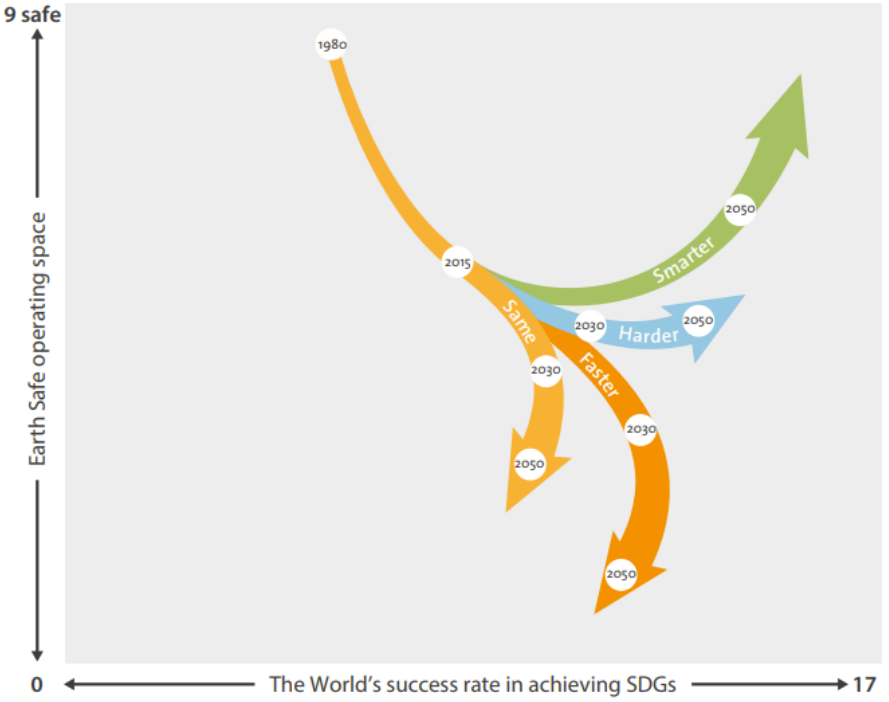
Prophetic Economies…

*Costanza, 2018, mod.*

# Can we do it with 5 transformative actions?

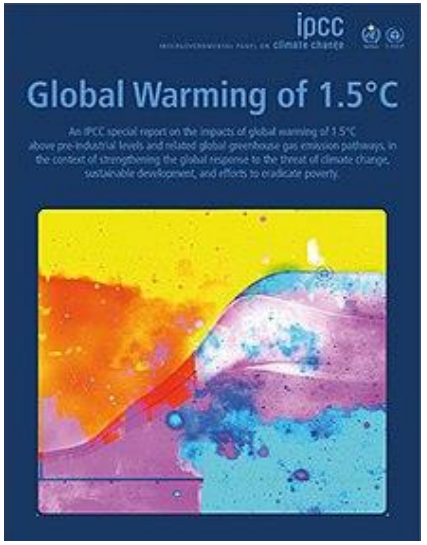
*J Rockstrom*

Figure 2.4.1. The gist of the **Smarter** scenario: Collaborating on the transformation of societies to fit within one Earth system; investing and rebuilding the economy for one planet living. .




1. **Rapid renewable energy growth**
   (halving emissions every decade from 2020)
2. **Accelerated sustainable food chains**
   (+1%/year better productivity)
3. **New development models in the poorer countries**
   (copying aspects of S-Korean / Chinese / Ethiopian successes)
4. **Active inequality reduction**
   (ensuring 10% richest < 40% of income)
5. **Investment in education to all, gender equality, health, family planning**
   (improves wellbeing with reduced ecological footprint)

# Any room for Forest?




1. The world's forests contain more carbon than exploitable oil, gas, and coal deposits. A**voiding forest carbon emissions is just as urgent as halting fossil fuel use**.
2. **Forests currently remove around a quarter of the CO2 humans add** to the atmosphere, keeping climate change from getting even worse
3. Achieving the 1.5°C goal also requires **massive forest restoration** to remove excess carbon dioxide from the atmosphere.
4. **Tropical forests cool** the air around them and the **entire planet**, as well as create humidity for growing food in their regions and beyond
5. **After 2030, all constructions must be carbon-neutral or carbon-negative,** to substitute energy-intensive materials (concrete and steel) with longer lived bio-products
6. **Bioenergy is not the <u>PRIMARY</u> solution… but Smart cascading use** of forests products empowers the **forest-based sector value chain**

Climate and Land Use Alliance
*Cultivating solutions for people and the planet*

In responding to the IPCC report, our message as scientists is simple: **Our planet's future climate is inextricably tied to the future of its forests**.


CRA Journals

Annals of Silvicultural Research
38 (2), 2014:62-73
http://ojs-cra.cilea.it/index.php/asr

ASR

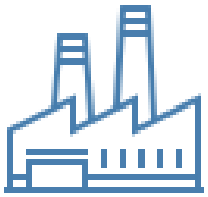
Conference paper

**Natural capital and bioeconomy: challenges and opportunities for forestry**

Marco Marchetti[a*], Matteo Vizzarri[1], Bruno Lasserre[1], Lorenzo Sallustio[1], Angela Tavone[1]

# BIOECONOMY AS TERRITORIAL REGENERATION

**…a feasible way to reconnect economy, environment and society**



## REGENERATION OF DEINDUSTRIALISED SITES

- Transforming world-first technologies into flagships.
- Biorefineries intended as bioeconomy infrastructures, **interconnected among them and connected with the local areas**

## LOW-IMPACT AND DEDICATED AGRICULTURAL VALUE CHAINS

- Through the **valorization of marginal land** and **not in competition with food production**
- **Integrated in the local areas and connected with the bioeconomy infrastructures**

## PRODUCTS CONCEIVED AS SOLUTIONS

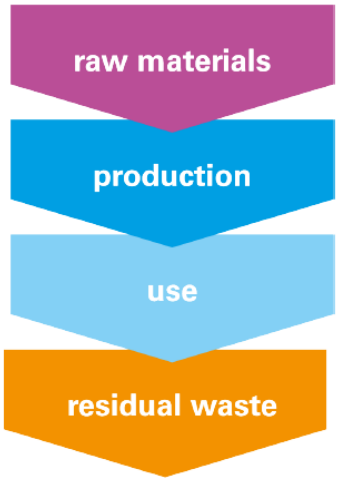
- Designed to tackle **real societal challenges**
- Providing **concrete solutions** to problems going far beyond the product itself

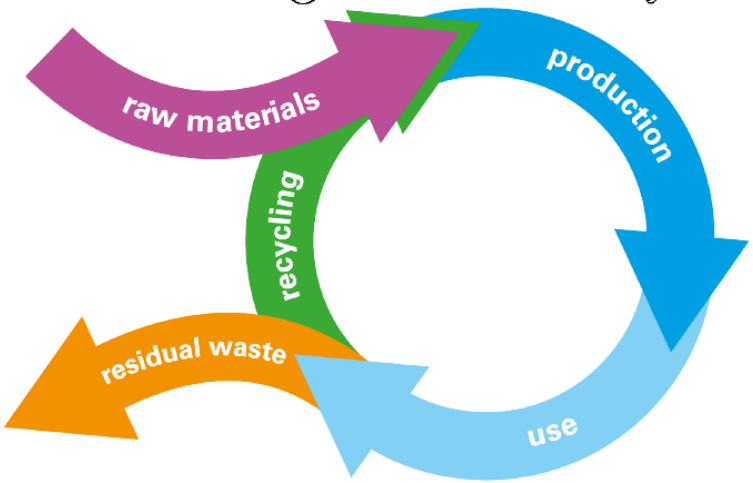
***Strengthening local integrated projects and their monitoring***

1. Change our paradigm in the way we perceive forest goods and services in the economy

*Picard et al., 2018*

Linear economy ☞ Cicular green economy



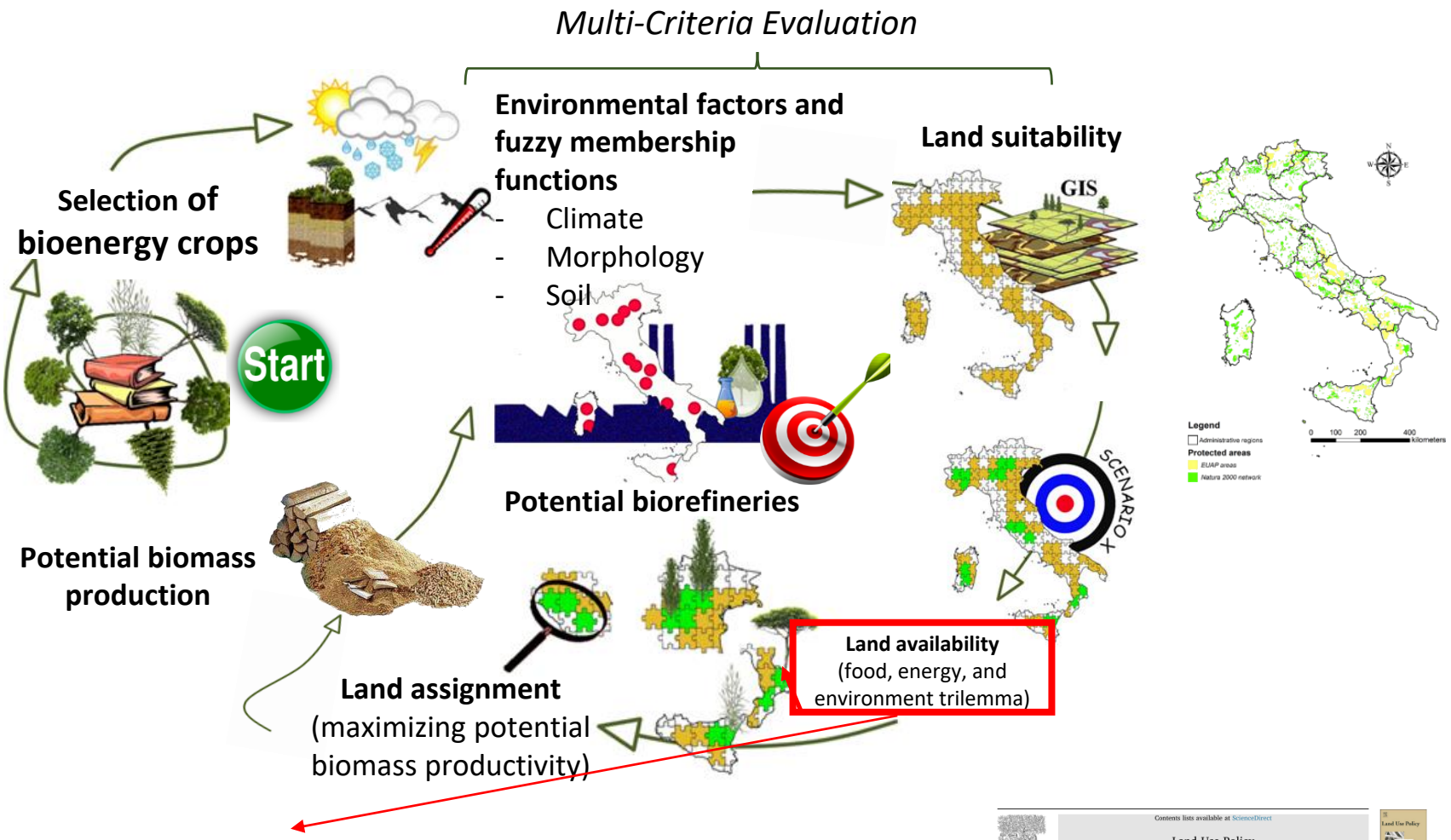

Take, make, waste

Resource-efficient, bio-based, low carbon and socially fair economy

2. Develop participatory approaches towards co-management of forest resources

Forest transition and over-conservation in one country can lead to over-exploitation and negative externalities somewhere else (displacement effects). "Think global, act local" (P. Geddes, 1915)

# Land Availability for Sustainable Lignocellulosic Biofuels in Italy



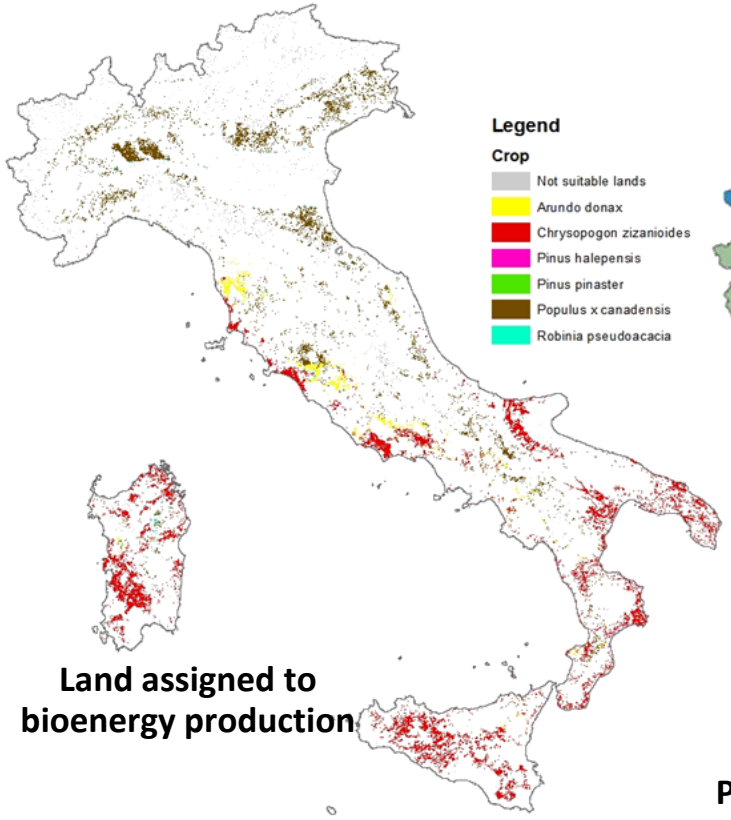

Limited competition with:

- **Food production**
- **Biodiversity conservation**

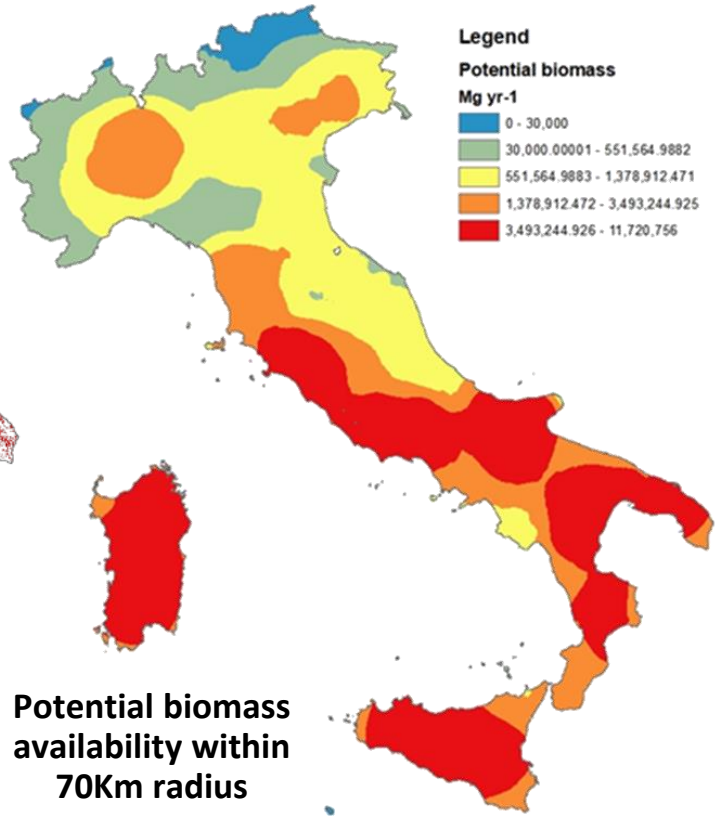
Contents lists available at ScienceDirect
Land Use Policy
journal homepage: www.elsevier.com/locate/landusepol
ELSEVIER

Assessing the economic marginality of agricultural lands in Italy to support land use planning

Lorenzo Sallustio[a,*], Davide Pettenella[b], Paolo Merlini[a], Raoul Romano[c], Luca Salvati[a], Marco Marchetti[a], Piermaria Corona[a]




**Land assigned to bioenergy production**




**Potential biomass availability within 70Km radius**

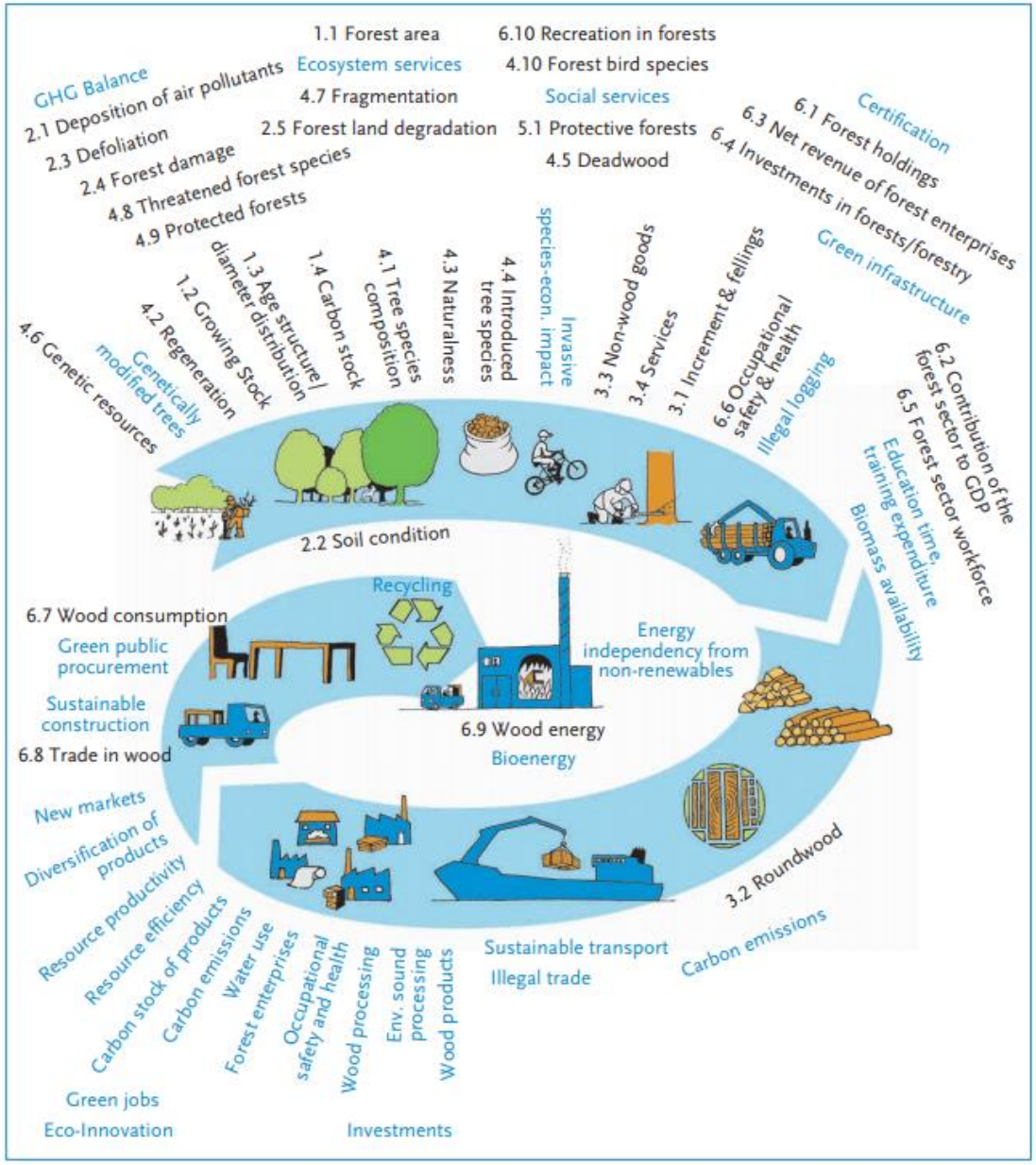
*Sallustio et al., sub.2018*

| Crop | Potential Area available (ha) | Potential Biomass Yield (Mg dm year$^{-1}$) | Potential bioethanol production (Bl year-1) | Percentage to Italian liquid fuel consumption |
|---|---|---|---|---|
| Arundo donax | 195,614 | 5,105,124 | 1.5 | 3.9% |
| Chrysopogon zizanioides | 1,565,896 | 75,163,026 | 22.5 | 57.8% |
| Pinus halepensis | 6,139 | 6,139 | 0.0 | 0.0% |
| Pinus pinaster | 35 | 35 | 0.0 | 0.0% |
| Populus x canadensis | 1,026,765 | 11,147,964 | 3.3 | 8.6% |
| Robinia pseudoacacia | 22,789 | 238,425 | 0.1 | 0.2% |
| **Total** | **2,817,237** | **91,660,712** | **27.5** | 70.5% |



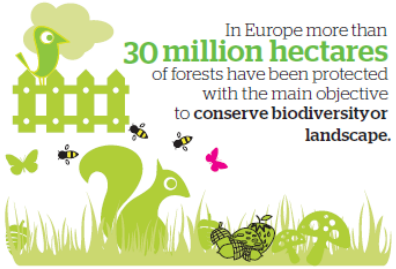

- **2.8M ha** of marginal lands potentially available for bioenergy
- **92M Mg** dry biomass yr$^{-1}$
- **27.5 Bl** of bioethanol yr$^{-1}$
- **70.5%** of the current national consumption

# 3M law: monitoring, minimizing and mitigating possible risks and drawbacks



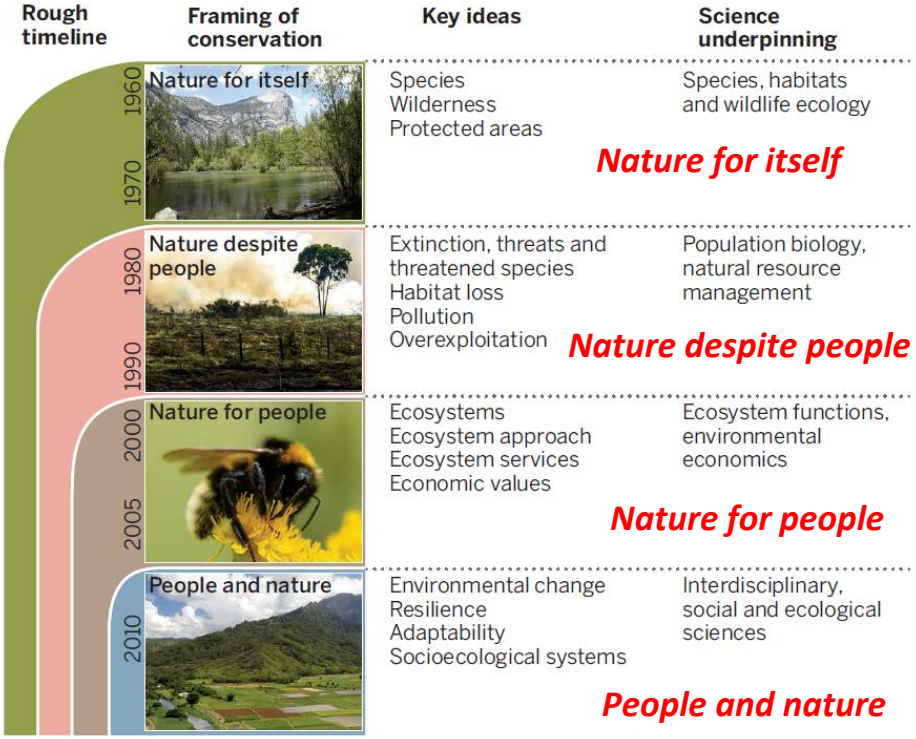

# Is there a real risk for biodiversity?

*Mace (2014)*

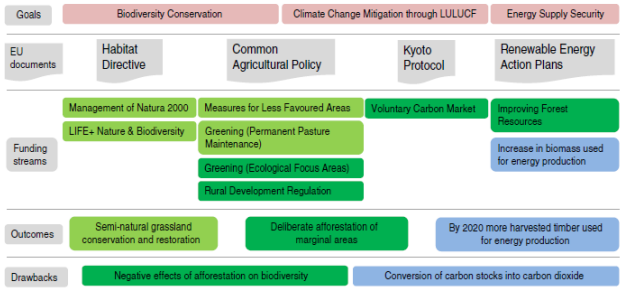




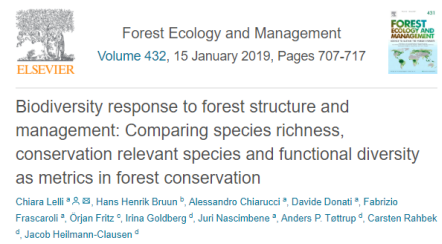
- **Forest covers 215M ha, still expanding**
- **Increments in EU forests exceed fellings**

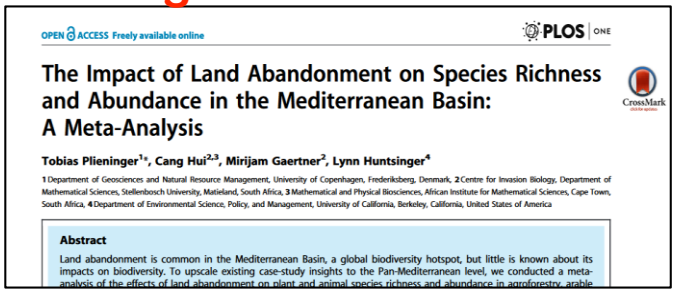



**Changing views of nature and conservation.** Over the past 50 years, the prevailing view of conservation has




**Rewilding is not always the best (and only) solution… even for biodiversity and ES provisioning!**

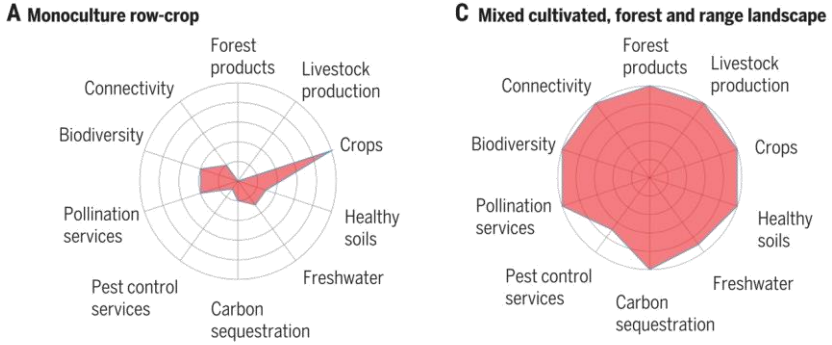
# How to deal with working landscape?

REVIEW SUMMARY

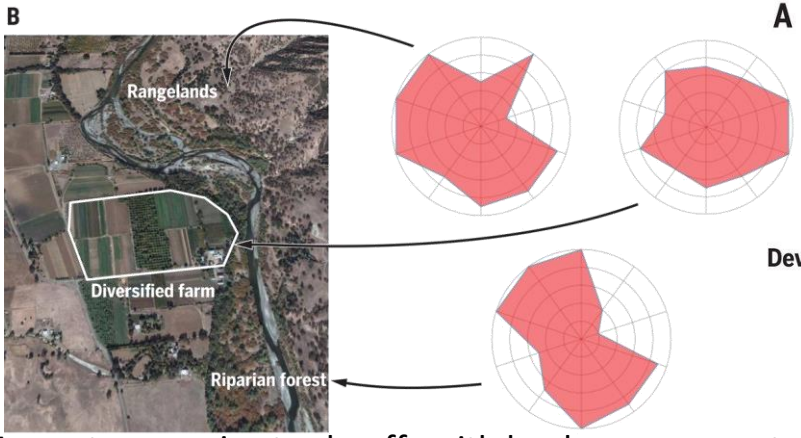
CONSERVATION

## Landscapes that work for biodiversity and people

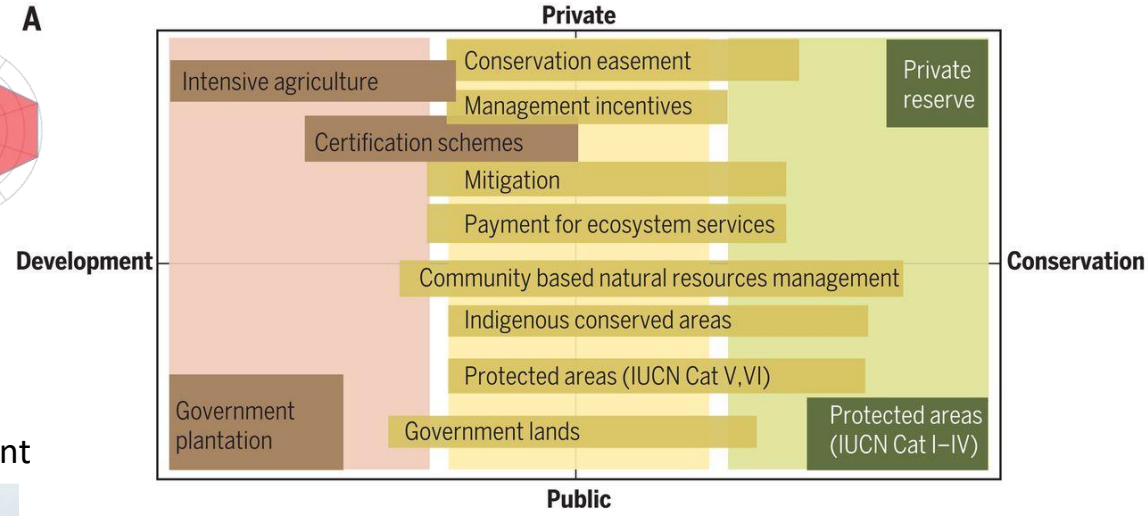
C. Kremen* and A. M. Merenlender

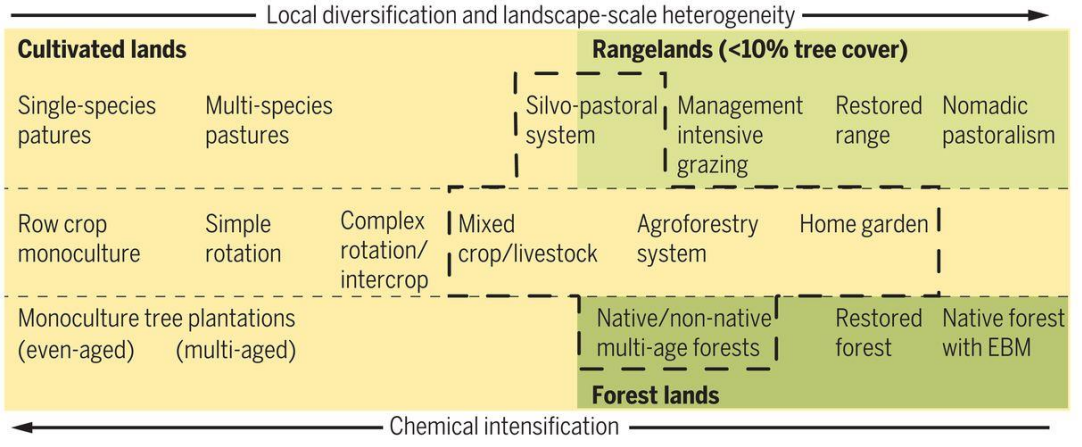



"*How do we handle the Anthropocene's triple challenge of preventing biodiversity loss, mitigating and adapting to climate change, and sustainably providing resources for a growing human population?*"

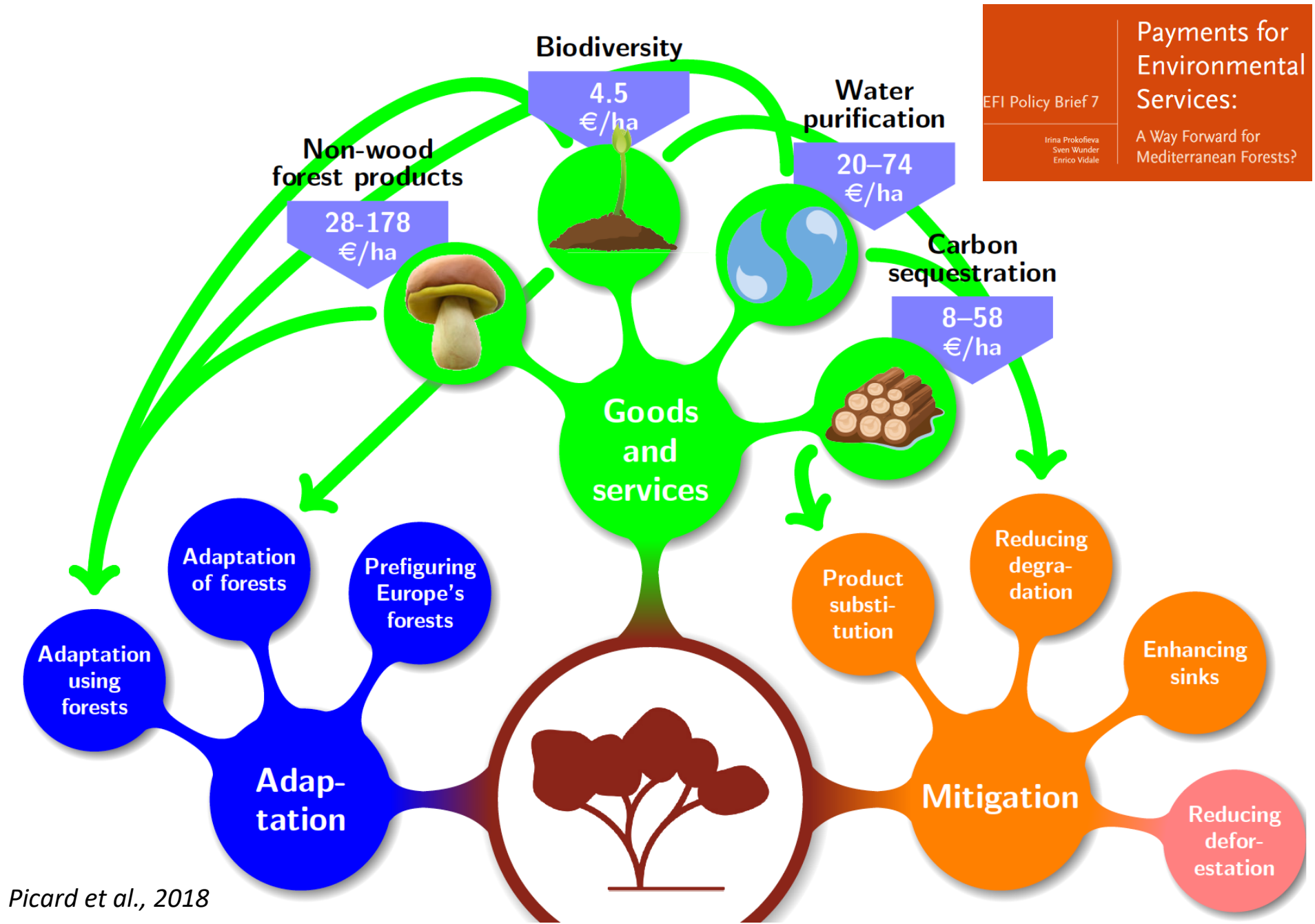



Ecosystem service trade-offs with land management



# Opportunities for sustainability purposes




EFI Policy Brief 7

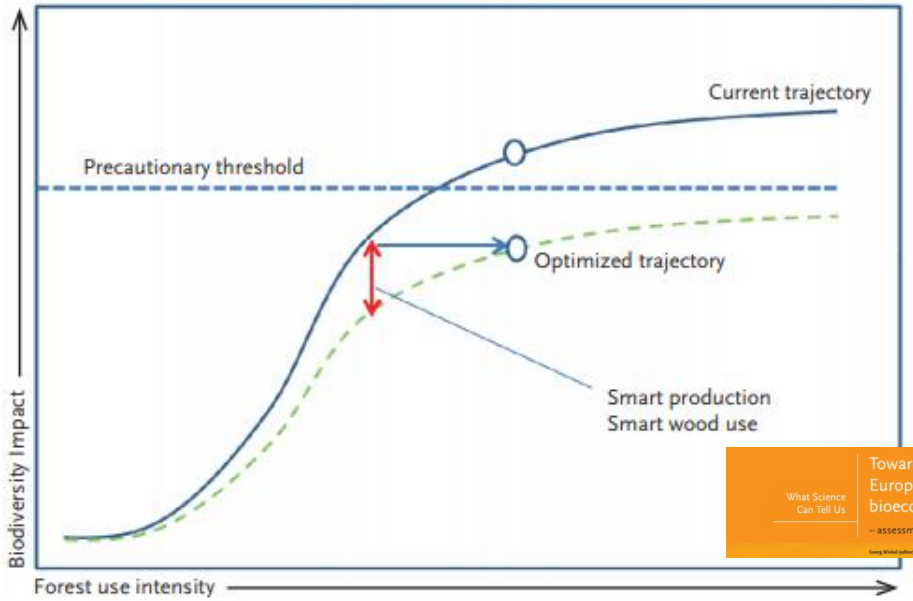
Payments for Environmental Services:

A Way Forward for Mediterranean Forests?

Irina Prokofieva
Sven Wunder
Enrico Vidale

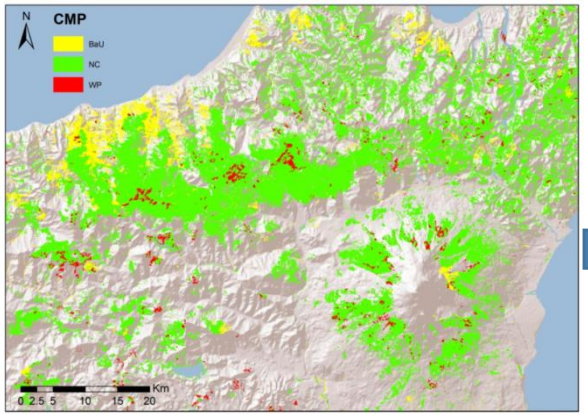
*Picard et al., 2018*

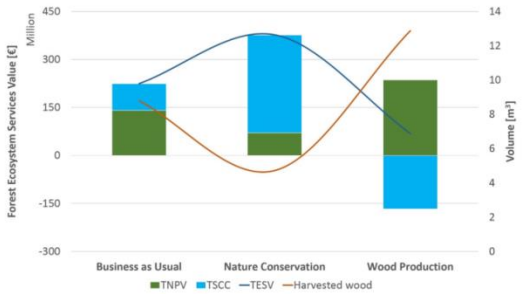
# The possibility to consider a sustainable intensification in forestry



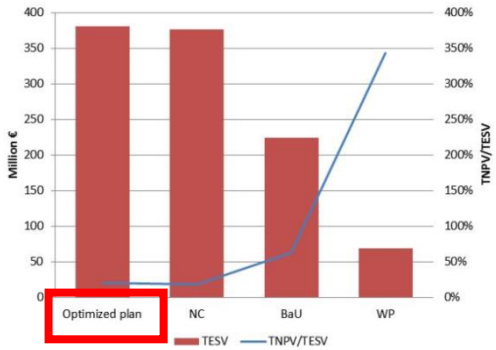


Optimized Forest Management Plan




1. M**ixed-species forests** to increase productivity of stands (as wel as **resistance, resilience, complexity**)
2. I**ntensification** in **selected parts** of the landscape to facilitate a higher level of habitat retention in the forest matrix and the **best balance and trade-offs** among multiple ES (**from forest parcel to forest landscape sustainability**)
3. M**ore efficient use of wood** to contribute to **reduce harvesting**
4. **I**mplementation of **new tech and approaches to Smart Forestry** (http://climo.unimol.it/ ) (big data, RS, Lidar, DSS etc.)





sustainability
MDPI
Article
The MIMOSE Approach to Support Sustainable Forest Management Planning at Regional Scale in Mediterranean Contexts
Matteo Vizzarri [1], Lorenzo Sallustio [1,*], Davide Travaglini [2], Francesca Bottalico [2], Gherardo Chirici [2], Vittorio Garfì [3], Raffaele Lafortezza [3,4], Donato Salvatore La Mela Veca [5], Fabio Lombardi [6], Federico Maetzke [5] and Marco Marchetti [1]

# Opportunities for Adaptive governance and bioeconomy

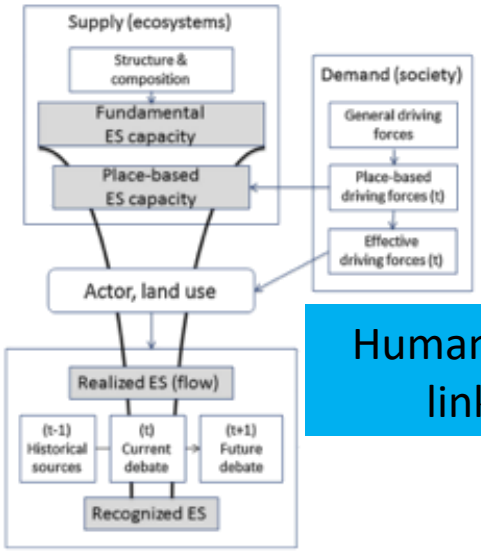
## A new EU Forest Strategy: for forests and the forest-based sector

COM(2013) 659 final
SWD(2013) 343 final


**Forest Action Plans for MSs**

**Efficient use of natural resources**

- Enhancing multifunctionality and maximizing ecosystem services for local communities
- Improving demand in bioeconomy and bioenergy sectors
- Improving efficiency in the forestry sector (climate actions to 2020)
- Protecting forest resources and biodiversity against climate change-related effects

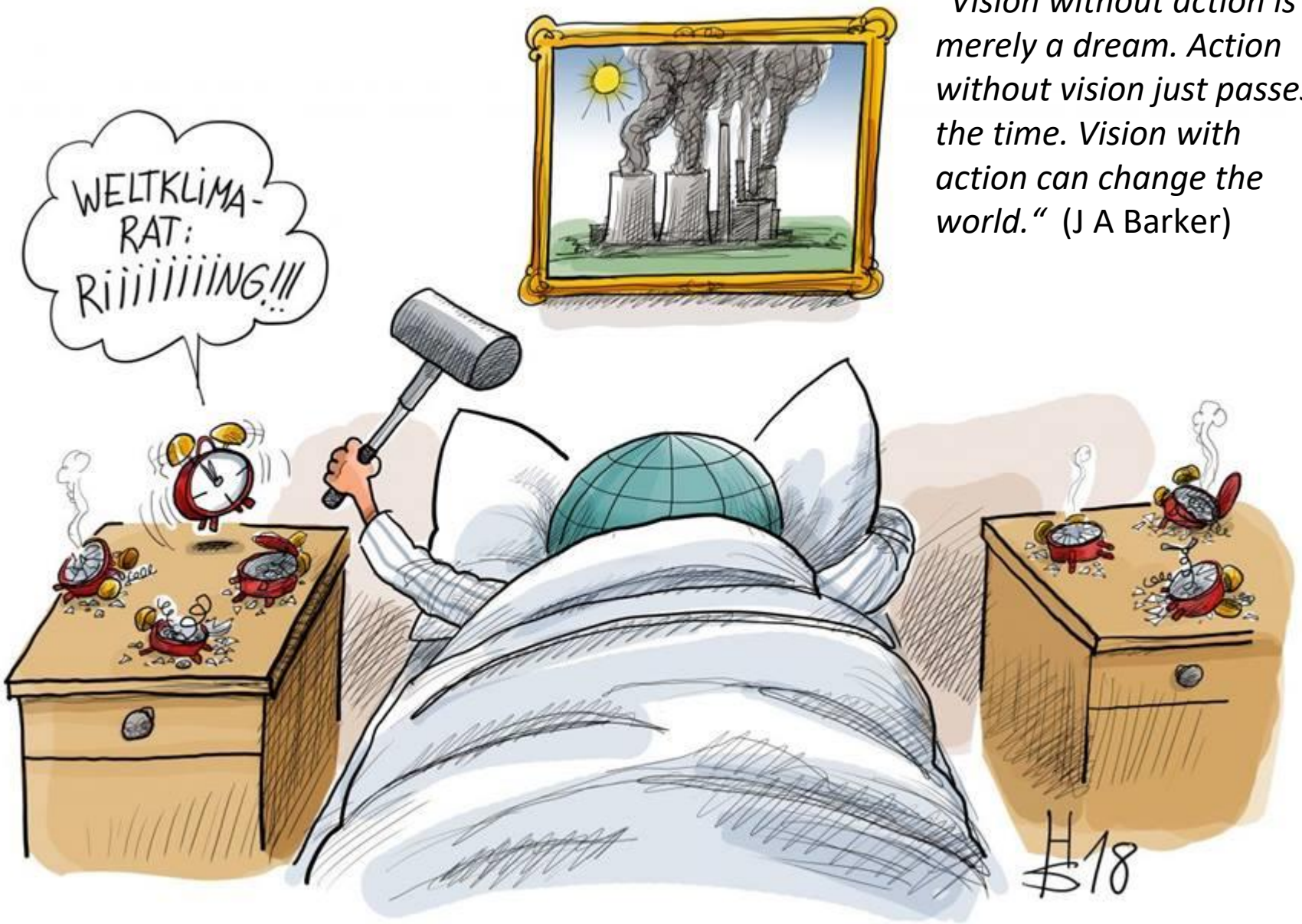


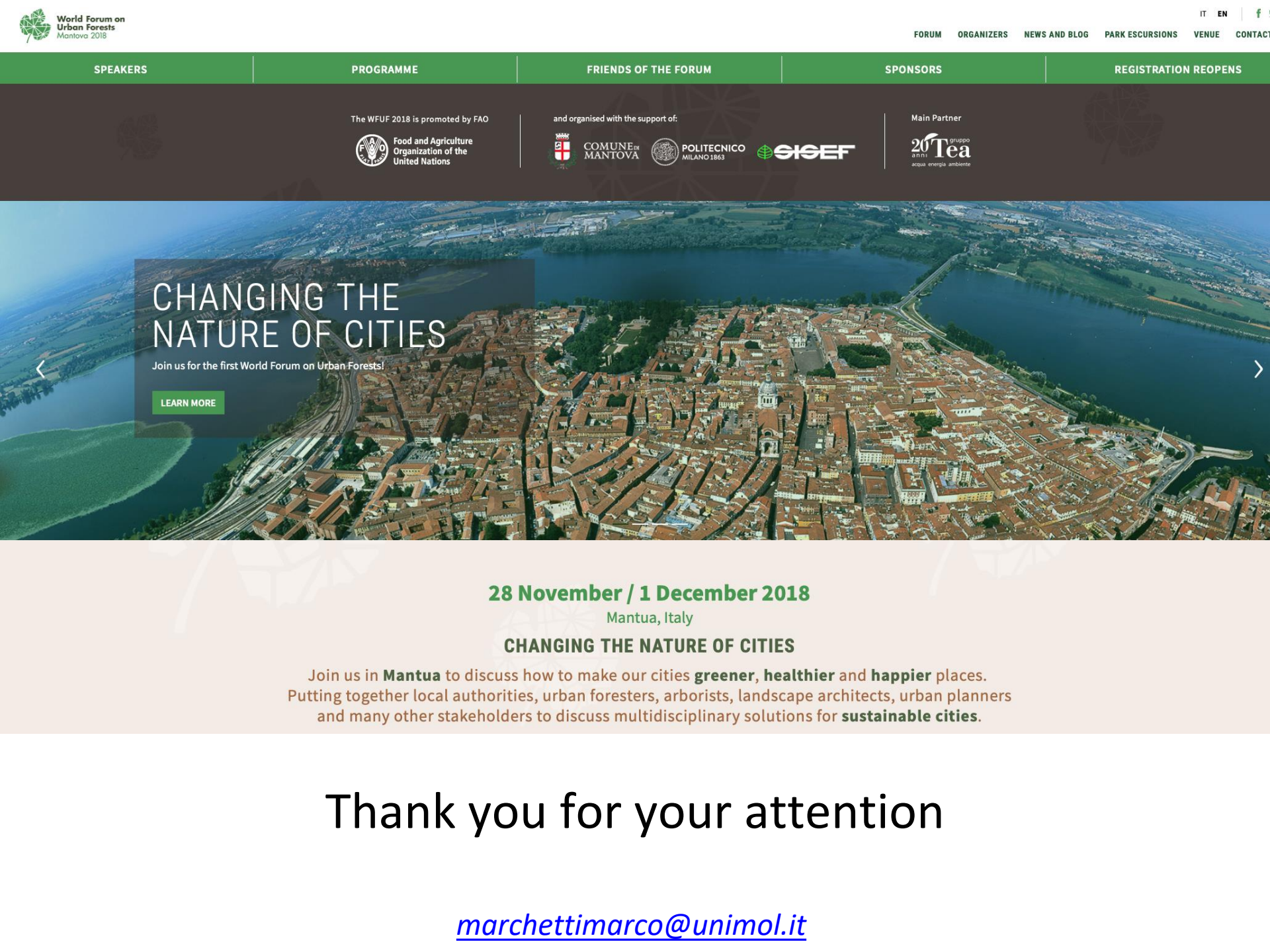

Human-nature linkage

*Bürgi et al. (2015)*

- Monitoring **potential effects** from climate and land use change (abandonment phenomena)
- Diversifying **land uses** at landscape scale (segregation vs. integration)
- Implementing **adaptive governance** for improving resilience and ecosystem services availability

*"Vision without action is merely a dream. Action without vision just passes the time. Vision with action can change the world."* (J A Barker)






# Thank you for your attention

marchettimarco@unimol.it