

# Unlocking the Bioeconomy for Nontimber Forest Products

A webinar series 2021/2022

Tuesday, August 31, 2021

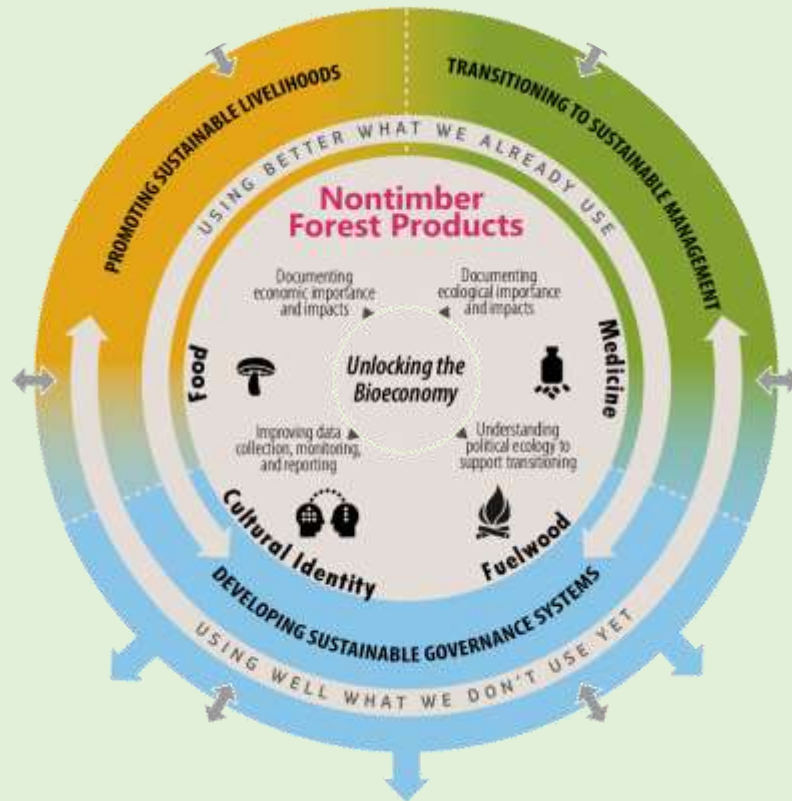
## *Non-wood provisioning from Mediterranean forest ecosystems*

Dr. Sven Mutke





Forest Research Centre (INIA, CSIC) / iuFOR Madrid (Spain)



IUFRO Research Group [1.08 Silviculture for edible NWFP](#)

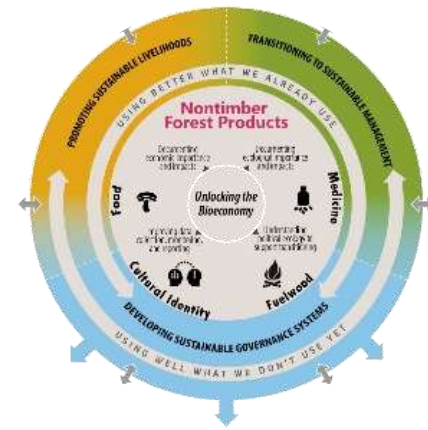


Webinar series hosted by

-  Task Force [Unlocking the BE for NTFP](#)
-  USDA Forest Service
-  The Forest History Society
-  Renmin University of China

# 1. Unlocking the Bioeconomy for Nontimber Forest Products

- **Bioeconomy** Knowledge-based production and use of natural resources  
**b3P: biological Products/Processes/Principles**
- **NTFP** “goods other than timber obtained from forests, other wooded lands, or trees out of forest.”
- **IUFRO Task Force on BE & NTFP** (s. 2019) for dialogue and knowledge sharing to propose frameworks that support the understanding and reporting of NTFP contributions to the transition to bioeconomy.
- **The current webinar series** (2021/22) is part of this effort. *Stay tuned* (one every month).



“Other wooded land” - open oak woodlands (ES)

## 2. Non wood provisioning from Mediterranean forest ecosystems

<https://foresthstory.org/education/presentations-and-discussions/ntfp-web-series/mediterranean-forest-ecosystems/>

# 0. The context of Global Change

**“an environmental, demographic and ethical crisis of humankind as whole”**

IPCC Sixth Assessment Report 2021-2022, [AR6](#)

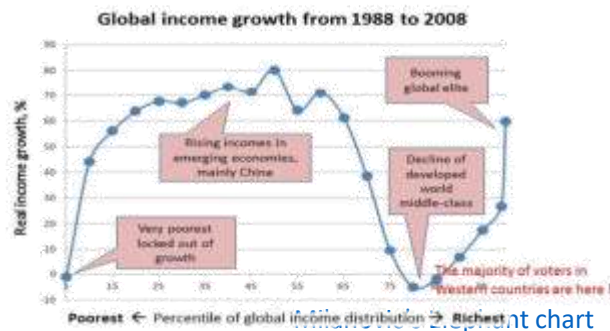
**Climate change:** Global Warming, increase of extreme weather events (20 M climate refugees/yr ), **2021 awareness “even in the global north”:** Floods in Germany or Tennessee, snow storms in Madrid or Texas, heatwaves in Canada, megafires...

**Land use changes:** industrialization, rural flight & megacities → industrial agribiz & corporative plantation forestry

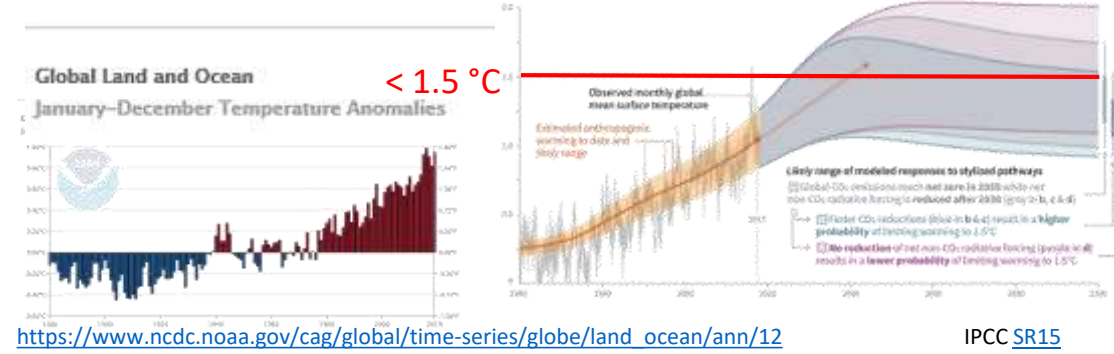
**Globalization** and hyper-globalization: global shipping and global processing dependence (*global shmoba*), spreading exotic species, pests & diseases, incl. forest-sourced zoonosis (COVID-19...)

**Build back better:** transitioning to zero-carbon economy by **resilient smart degrowth**

**A World ruled by greed (inequality)**



**...or rather by the UN 2030 Agenda?**



# 1. Bioeconomy – an essential need for the 2030 Agenda

## Def. Bioeconomy ([Rodríguez et al. 2017, CEPAL](#)) – **b3P: biological Products, Processes and Principles**

- a) sustainable production and consumption of goods and services derived from **biological resources**,
- b) taking advantage of the **knowledge** of **biological processes and principles** and
- c) of **technologies applicable** both to that transformation and to the emulation of these processes and principles.

## 3 competing approaches ([Bugge et al., 2016](#))

- (1) The bio-technology vision: reductionist to **biotech** research, its **industrial** application and **commercialization**.  
“*Conceptual hijacking of the term bioeconomy*” ([Hinderer et al., 2021](#))
- (2) The bio-resource vision: R&D on **biological raw materials** and new value chains,  
still often **without questioning** the outdated **economy model** (keep running the machinery replacing petrol by **palm oil**? 😞)
- (3) The bio-ecology vision: on **ecological processes and principles** that **integrate** and **optimize**  
the use of energy and nutrients, promote biodiversity, as well as warrant **sustainability** 😊

\* **Sustainability**: ecological, economic and social dimensions (fairness, legality, due diligence along supply chains, etc.)

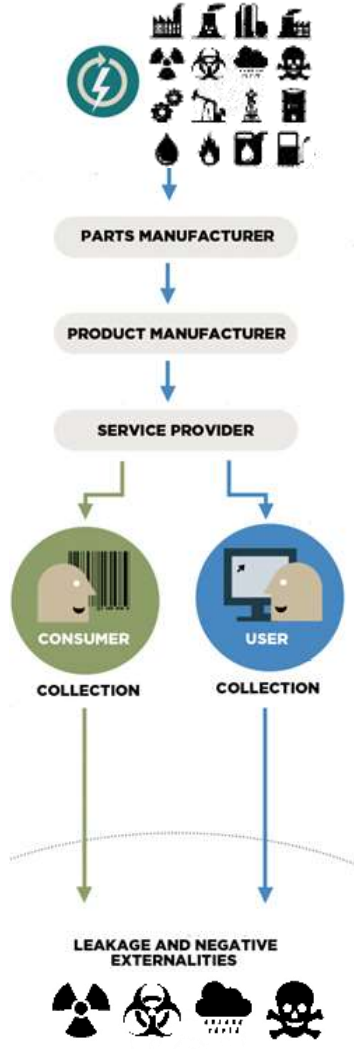


Before 1865, resin tapping in USA was a slavery-driven activity

# 1. Bioeconomy

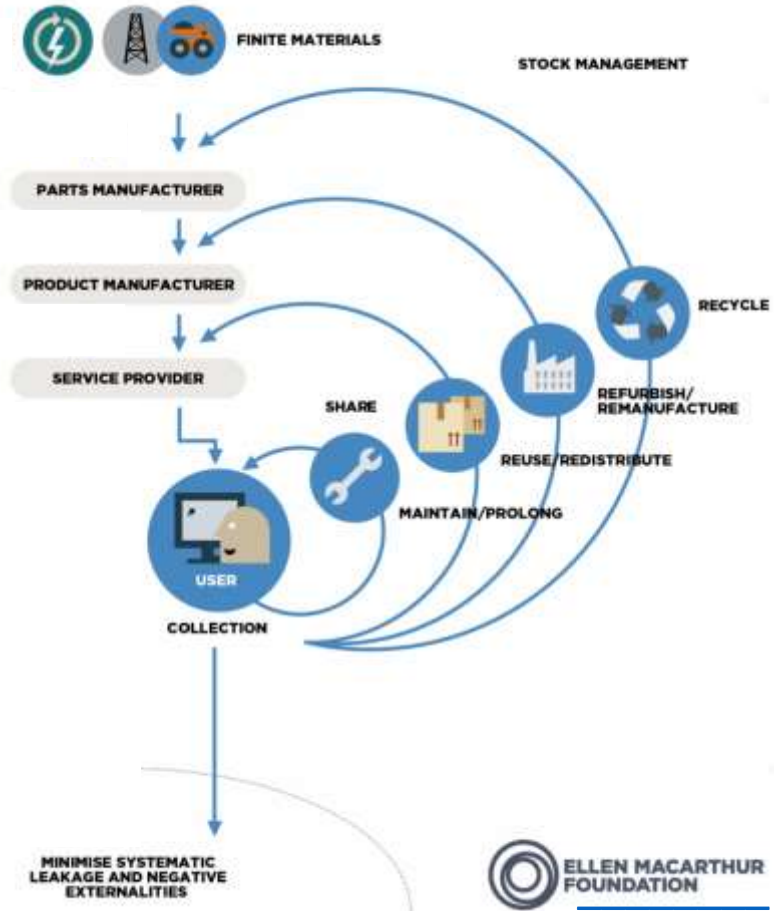
Business-as-usual

Linear economic model →  
 “Take-Make-Use-Dispose”



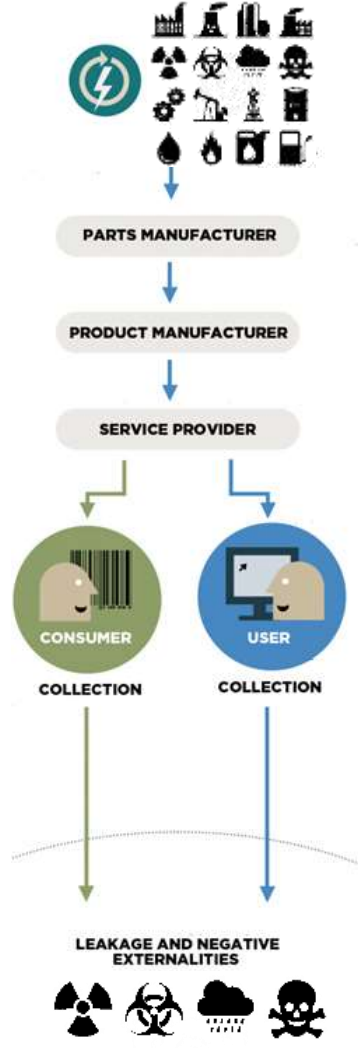
Proposal

Circular Economy  
 Material flow

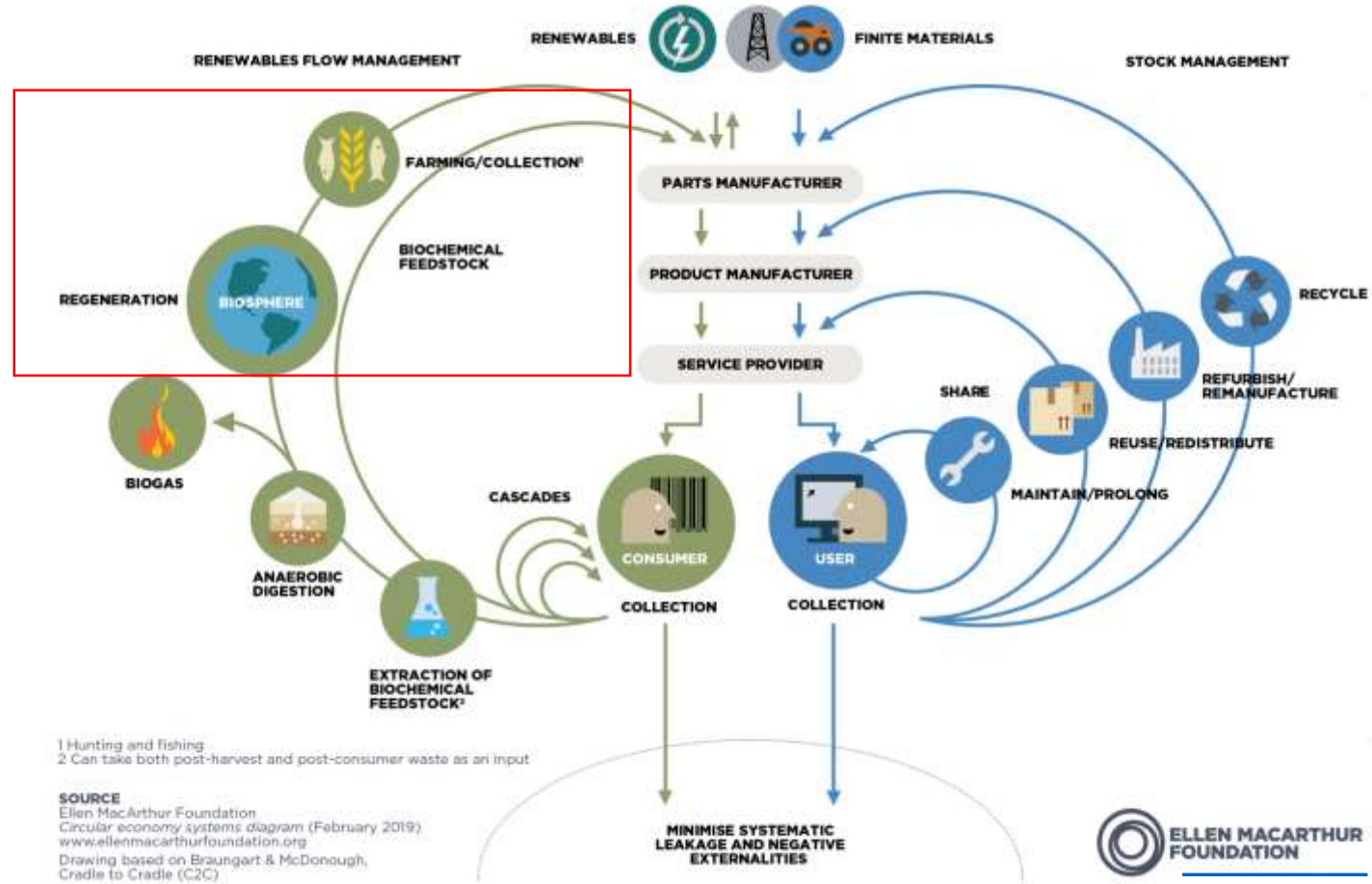


# 1. Bioeconomy

Business-as-usual  
**Linear economic model**  
“Take-Make-Use-Dispose”



Proposal  
**Circular Bioeconomy**  
The “butterfly” graphic for material flow

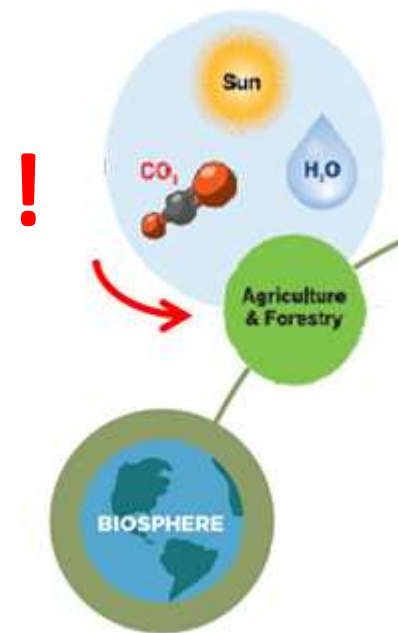
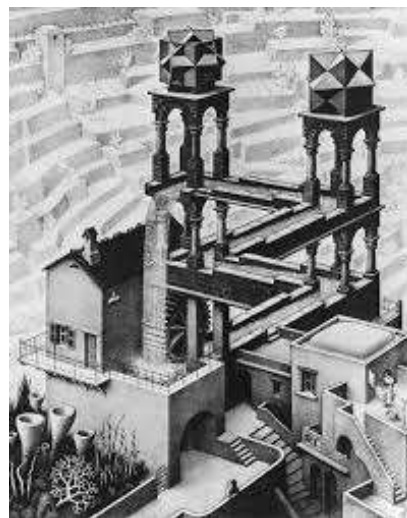
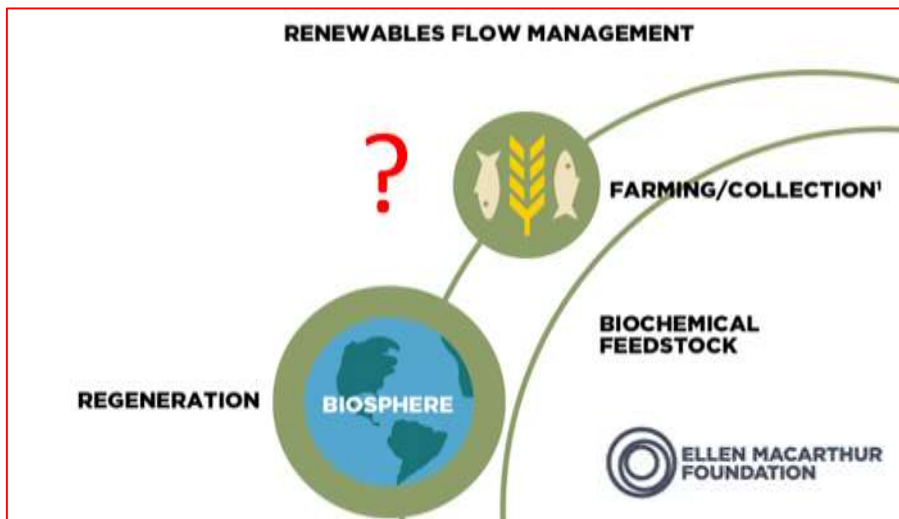


1 Hunting and fishing  
2 Can take both post-harvest and post-consumer waste as an input

SOURCE  
Ellen MacArthur Foundation  
Circular economy systems diagram (February 2019)  
www.ellenmacarthurfoundation.org  
Drawing based on Braungart & McDonough,  
Cradle to Cradle (C2C)

## 1. Bioeconomy

Criticism on the “butterfly” graphic:  
 only for material flows, but **not for energy** - “perpetual motion”?



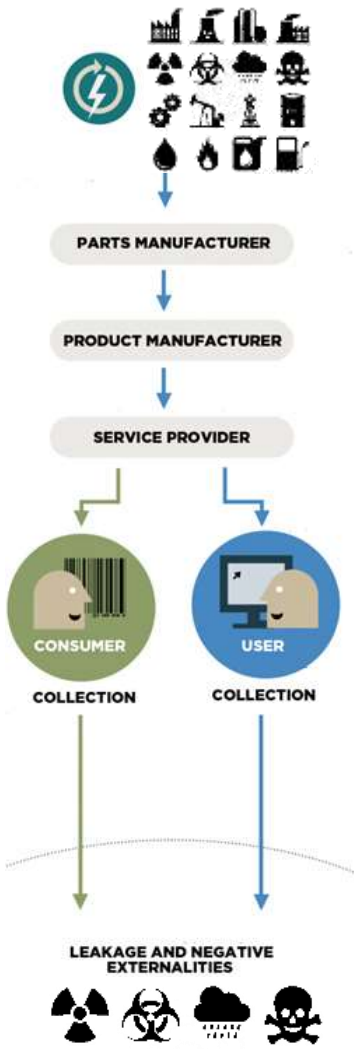
- 1.- Economy is subject to **thermodynamic**, not **mechanic principles** (*entropy!*)
- 2.- Earth, and biosphere upon, is an **open system** energetically sustained by **solar radiation**

(Georgescu-Roegen, 1975. *Energy and Economic Myths*)

“What is life? A *short* stay of a sunbeam on its way out into space.” ([t Haart, 1993](#))  
 [and Economy within]

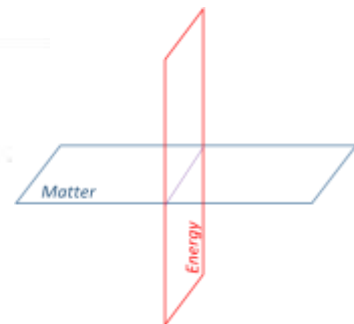
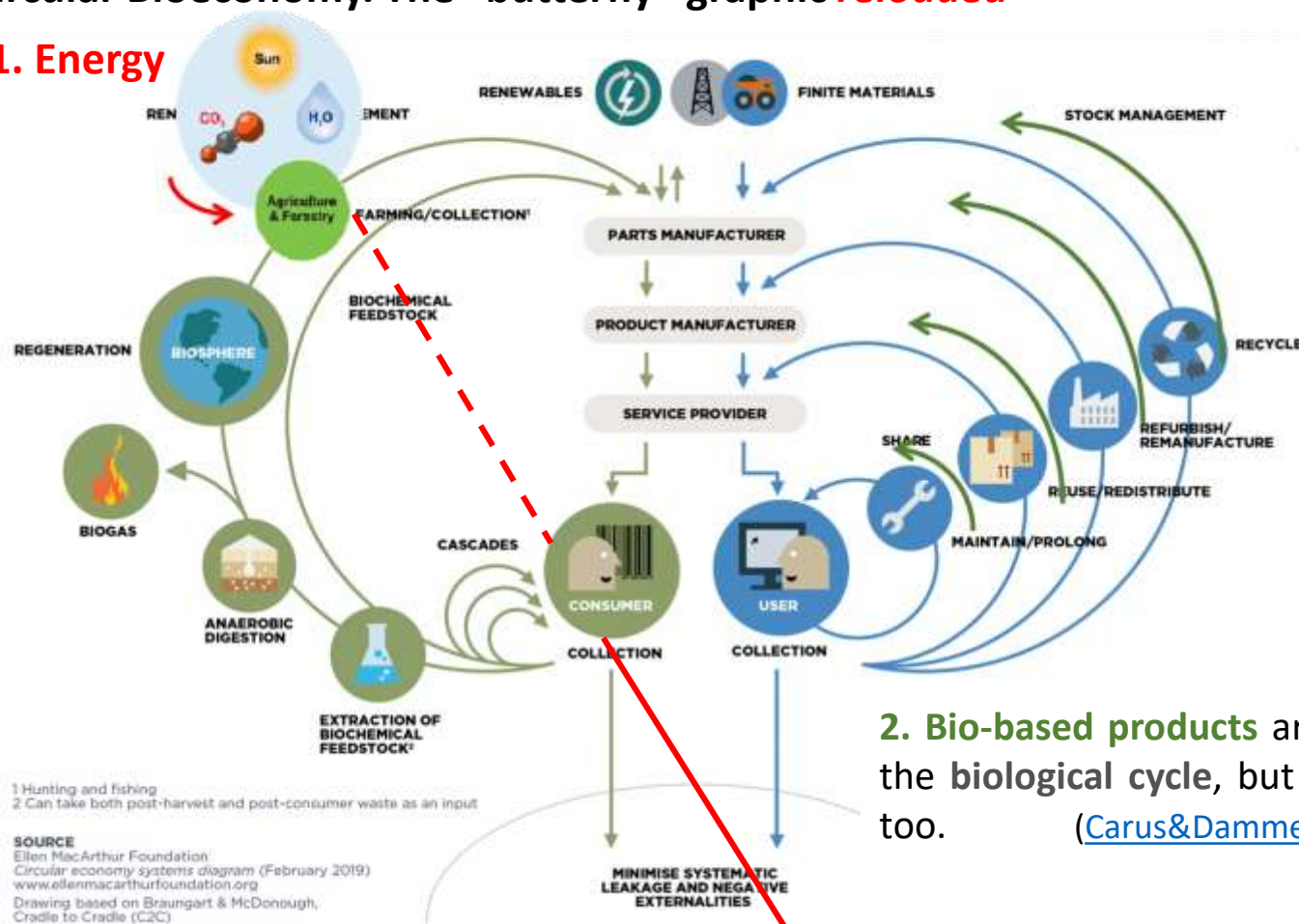
# 1. Bioeconomy

Business-as-usual  
 Linear economic model  
 “Take-Make-Use-Dispose”



# Circular Bioeconomy. The “butterfly” graphic *reloaded*

## 1. Energy



2. Bio-based products are not entering only the biological cycle, but the technical cycle, too. [\(Carus&Dammer, 2018. Novapaper#9\)](#)

**Entropy** “on its way out into space”

1 Hunting and fishing  
 2 Can take both post-harvest and post-consumer waste as an input  
 SOURCE  
 Ellen MacArthur Foundation  
 Circular economy systems diagram (February 2019)  
[www.ellenmacarthurfoundation.org](http://www.ellenmacarthurfoundation.org)  
 Drawing based on Braungart & McDonough, Cradle to Cradle (C2C)



Groundwork  
Green economy

## UK's green economy nearly four times larger than manufacturing sector, says report

Exclusive: Analysis reveals more than 1.2 million people are employed in low carbon industry

- Green revolution brings fresh hope to north-east England
- Abandoned pits of former mining town fuel green jobs

Matthew Taylor and Jillian Ambrose

Tue 10 Aug 2021 00:00 BST



<https://www.theguardian.com/environment/2021/aug/10/uks-green-economy-four-times-larger-than->



### Social and Economic Contribution of the Bioeconomic Sector in Ecuador: A Methodological Approach

3

Daniel Ortega-Pacheco, Pedro Luis Castro-Verdezoto, María-José Mendoza-Jiménez, Eduardo Almeida Benalcázar, and María-Pilar Castro

© 2021 [https://doi.org/10.1007/978-981-15-7321-7\\_3](https://doi.org/10.1007/978-981-15-7321-7_3)

*“In Ecuador the **bioeconomy** contributes with 20% of jobs and 18% of total production”*

**“Bioeconomy in Europe** is not a niche area – it is about growth and jobs.”

**>2 Trillion US\$** annual turnover  
**22 million jobs**

[EU Bioeconomy Strategy, 2012](#)

# 1. Bioeconomy- conceptual frameworks

“externalities” (environmental accounting, ...)

➤ **Ecosystem services** ([Millennium Ecosystem Assessment, 2003](#))

Def. ES: **Benefits people obtain from ecosystems**, including:

- ✓ Provisioning services
- ✓ Regulating services
- ✓ Supporting services
- ✓ Cultural services

*& ecosystem disservices*

➤ **Nature’s contributions to people** ([Diez et al., 2018](#))

➤ **Next shift: Nature-Based Economy (2021)**

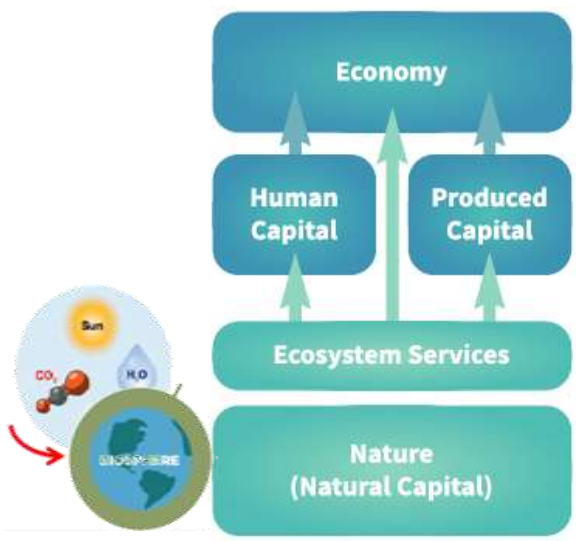
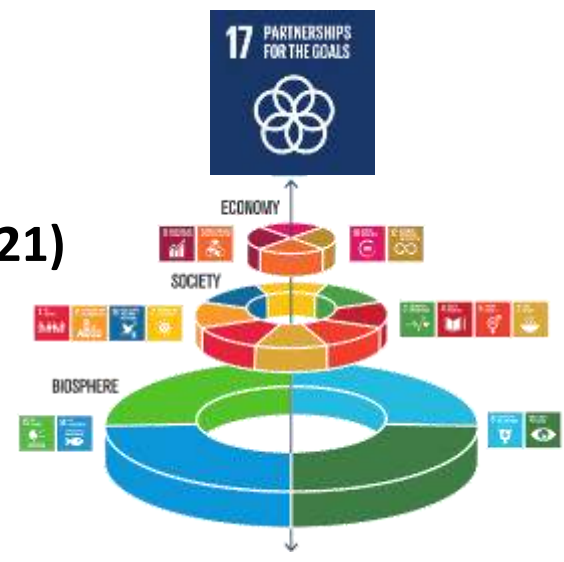


Exhibit 1: Links from Nature to the Economy (Adapted from Dasgupta, 2021, p. 17)



([McQuaid et al. 2021](#))



→ Long-term viability of human activities depends on sustainability (embedded in nature’s carrying capacity)  
*... or perish*

1. Bioeconomy: more than material economy

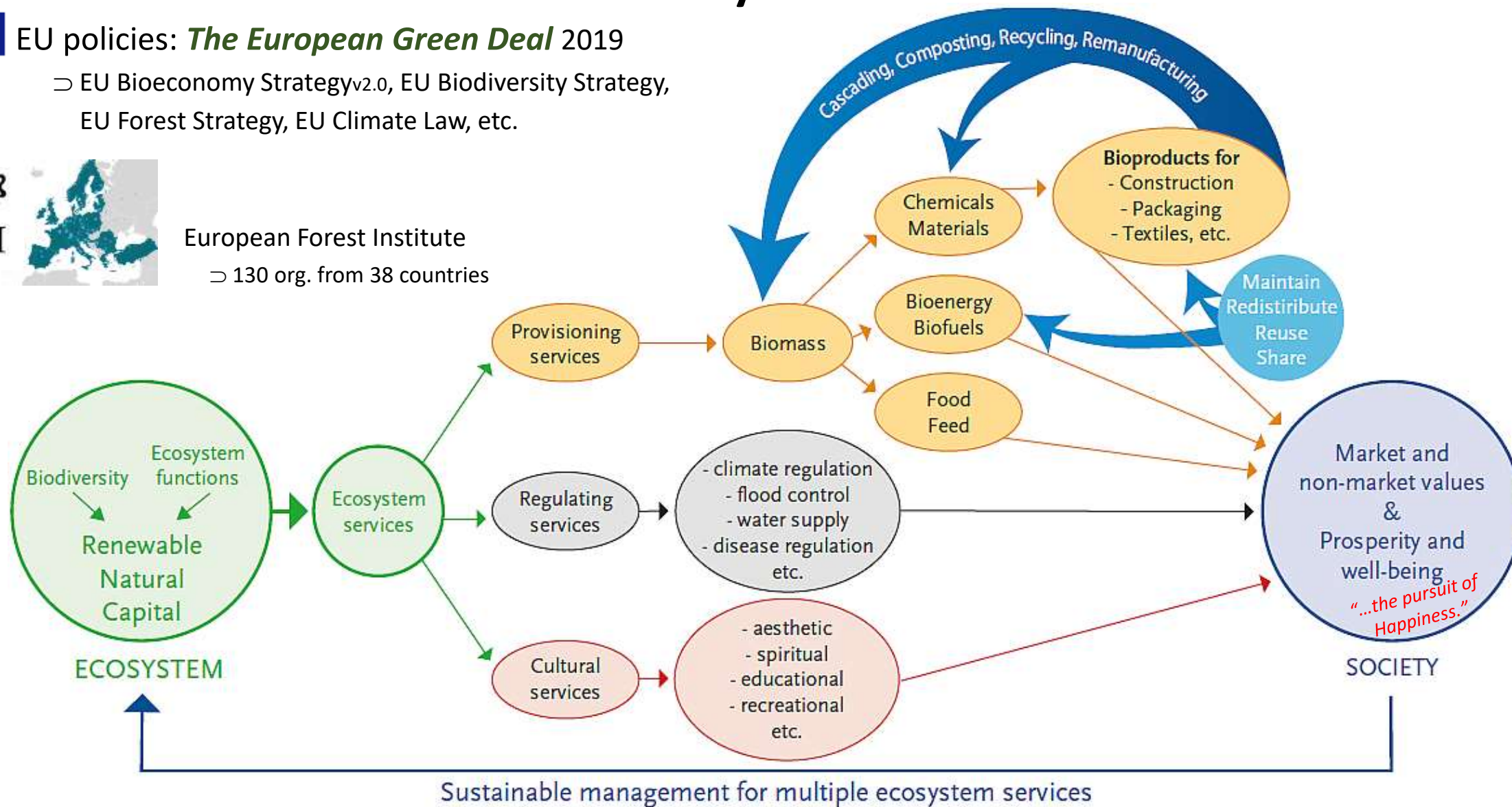
# ➤ Next shift: Nature-Based Economy

EU policies: *The European Green Deal* 2019

- ⊃ EU Bioeconomy Strategy v2.0, EU Biodiversity Strategy, EU Forest Strategy, EU Climate Law, etc.



European Forest Institute  
 ⊃ 130 org. from 38 countries



Hetemäki et al., 2017 EFI

## 2. Non-wood provisioning from *Mediterranean forest ecosystems*



### The Mediterranean



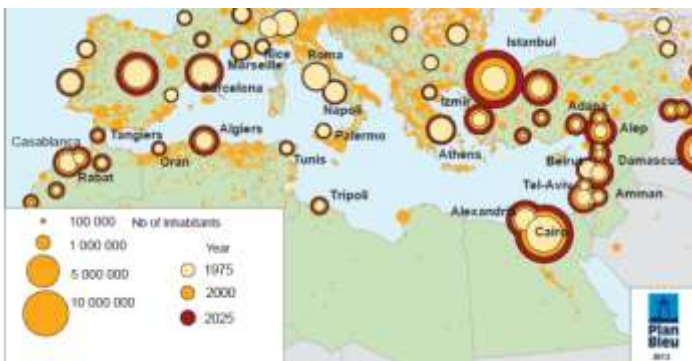
- Junction of 3 continents
- Melting pot since Antiquity
- **Cultural heritage and culinary traditions**
- *Sense of place*
- Landscapes and biodiversity hotspot



## 2. Non-wood provisioning from *Mediterranean forest ecosystems*



### The Mediterranean



- Junction of 3 continents
- Melting pot of Antiquity
- Cultural heritage and culinary traditions
- Sense of place
- Landscapes and biodiversity hotspot
- **500+ million inhabitants (7% global population)**
  - $\frac{1}{3}$  in coastal areas,
  - and also  $\frac{2}{3}$  in urban areas
  - *empty hinterlands* (and not only of S and E shores)
  - **Forest Transition**: encroachment of secondary forests  
e.g. Spain **12 Mha forests area (1970) to 18 Mha (2010)**  
i.e. **+50%** after rural flight (ongoing s. 1950s)

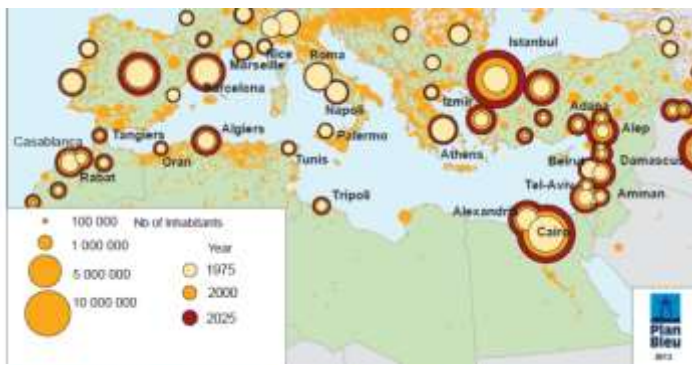
## 2. Non-wood provisioning from Mediterranean forest ecosystems



### The Mediterranean



- Junction of 3 continents
- Melting pot of ancient history
- Cultural heritage and culinary traditions
- Landscapes and biodiversity hotspot



- 500+ million inhabitants (7% global)  
 $\frac{1}{3}$  in coastal areas,  
 $\frac{2}{3}$  urbanites  
 (empty hinterlands)  
 & **intensive horti-fruticulture** (EU supply)



Figure 1.16. International tourism receipts in 2015 per capita and as a percentage of GDP in 2000 and 2015  
 Source: World Bank (2015b).

- The world's leading **tourist destination**  
 300 million international arrivals,  
 generating more than US\$ 330 billion,  
 i.e. more than 10% of GDP and jobs  
 (2016: before COVID)

FAO/Plan Bleu 2013 & 2018. [State of Mediterranean Forests](#)

➤ **...but increasing water scarcity**

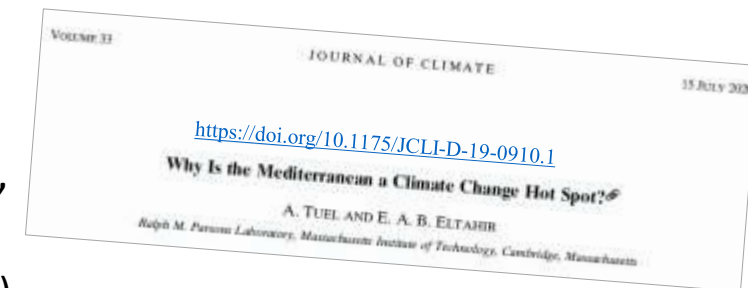
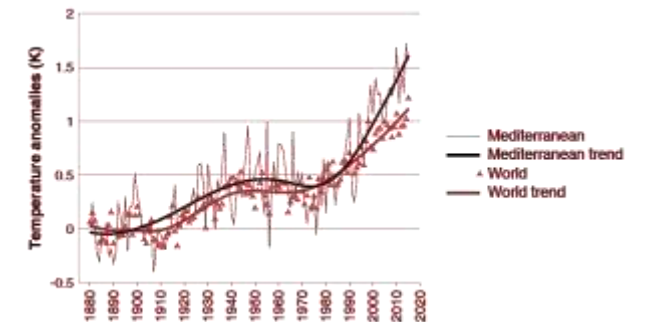
we are *on the knife's edge*...

Spain 1960-2010

Temperature **+1.5 °C MAT**; **+2.1 °C** in summer

**Precipitation -16%** ...and drying up

(Vicente-Serrano et al., 2014; Cramer et al., 2018)



## 2. Non-wood provisioning from Mediterranean forest ecosystems (MFE)

# Mediterranean forest ecosystems at stake

(cf. [SoMF2018](#) & Mediterranean Forest Research Agenda [MFRA 2030](#) )

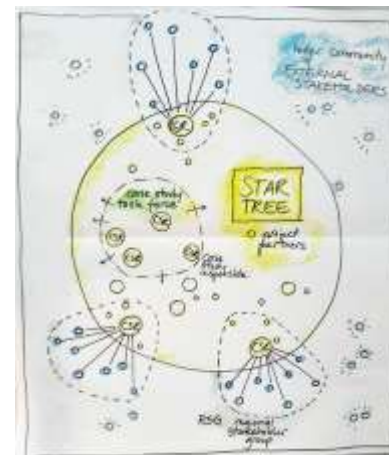
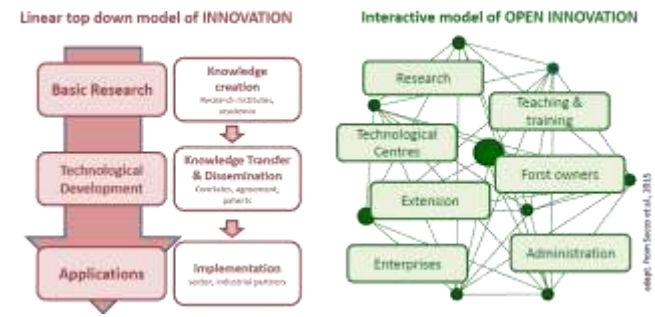
### Challenges

1. Active **soil & water** protection and conservation of **biodiversity** linked to cultural landscapes
2. Resilience to the impact of **ongoing climate & land-use changes & biotic risks**  
*africanization* of the climate, *gentrification* of the countryside & *under-used* forests
3. Integration of **wildfire** risk into management of land uses / landscape  
*supra-sectoral* issue: farmland, agroforestry & forest systems; urban-rural interface...
4. **Policy, economic and institutional innovations** (cf. [Rodrigues de Mello et al., 2020](#))

➤ Forest and rural woodlands need **integrated land and resource management**

Models and decision systems for optimizing multi-objective, multi-actor [& multi-scale!] issues

➤ **Social & ecological** research / modelling / toolboxes



## 2. Non-wood provisioning from Mediterranean forest ecosystems (MFE)

# Mediterranean Forest Ecosystems

- ~120 Mha hectares forests and other wooded lands (2% global)

and growing: since 2000 **+8 Mha** ([SoMF 2018](#))

Complex, adaptative **social and ecological systems**, shaped by **millennia of human land uses** (and lately, under-use and abandonment) ([Varela et al., 2020](#); [Sanz-Hernández, 2021](#)).

Historic relevance of woodland for **food & feed**: grazing, browsing, **pannage**

**staple food from trees** (chestnuts, acorns, pine nuts)

- Multifunctional & multipurpose forests

**W&NWFP provisioning** is but **one of many ecosystem services** that people benefits from [*Environmental Accounting Systems*]

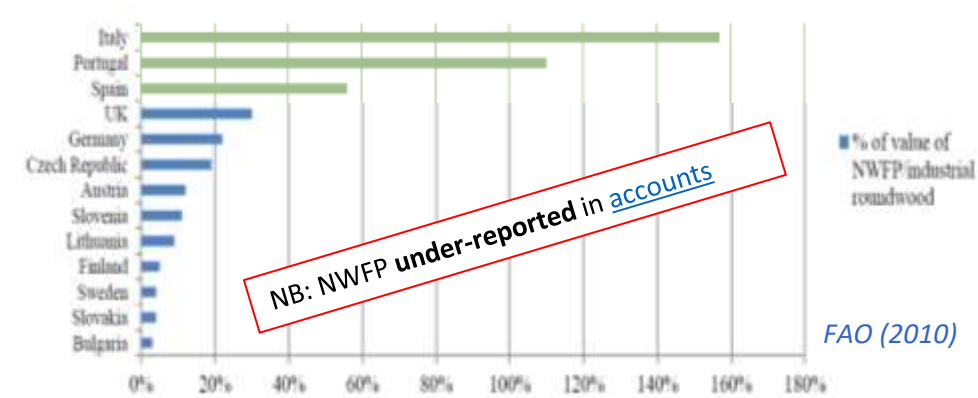
**Stem growth** often **< 1 m<sup>3</sup>/ha/yr** even “if” reaching rotation length (hazard-prone: **wildfire, droughts, pests**)

**Cork, pine nuts** or **truffles** are **more profitable for forest owners** than timber or firewood, plus their harvests are **more frequent/continued in time**, too (essential for smallholders)

Collection of most NWFP is **compatible** with timber yield, but they must be **co-managed** ([Sheppard et al., 2020](#); [Moreno-Fernández et al., 2021](#))

- Nature’s contribution to people through NWFP is not only **material for livelihood (economy)**, but also **nonmaterial**: cultural heritage, sense of place, spiritual-educational-recreational benefits, health & wellness...

NB, **non-commercial pickers** of many NTFP (25% EU pop.) are **self-consumers, local barterers, givers, or informal sellers**. The amount of “**not formally traded**” NTFP exceeds **several-fold** the official commercial statistics ([Lovrić et al., 2020](#)).





## 2. Non-wood provisioning from Mediterranean forest ecosystems

### 3 recent European projects on NWFP



EFI/FAO, 2021

- Cost Action FP1203

<https://www.nwfps.eu/>

(2012-2017)

cf. Harald Vacik's webinar October 20, 2021



Vacik et al., 2020

- FP7-**StarTree** *Multipurpose trees and NWFP: a challenge and opportunity*

<https://www.star-tree.eu/>

(2012-2016)



EFI, 2020

- H2020-**INCREDible** *Innovation Networks for Mediterranean NWFP*

<https://incredibleforest.net>

(2017-2021)

- NWFP knowledge repository

<https://repository.incredibleforest.net/oppla-factsheets>

- 5 Roadmaps: Cork, Wild nuts & berries, Resin, Mushrooms & truffles, M.A.P.





## 2. Non-wood provisioning from Mediterranean forest ecosystems

### Some genuine Mediterranean NWFP with *sense of place* (Vacik et al., 2020)



- **Cork.** Elastic bark, stripped every 9-12 years from living cork oaks, *Quercus suber*.
  - ✓ main use: cork stoppers for wine bottles, insulation, decorative, etc.
  - ✓ export of cork & products nearly **US\$ 2 billion** (2019), but unsecured future supply (over-mature cork oak stands)
  - ✓ 80%: PT & ES; Rest: MA, DZ, TN, IT, FR

**(cork, an unique strategic material from MFE)**

cf. Joana Paulo's webinar scheduled for early 2022

- **Mediterranean pine nut kernels.** Cones harvested annually from stone pine, *Pinus pinea*.
  - ✓ gourmet nut (**US\$ 100-120/kg in retail**)
  - ✓ around **US\$ 200 million (before 2012)** – but collapsed since due to an exotic pest, *Leptoglossus occidentalis*
  - ✓ PT, ES, TR, RL; IT, TN, MA, FR [competition by other pine nut species of from Eastern Asia]

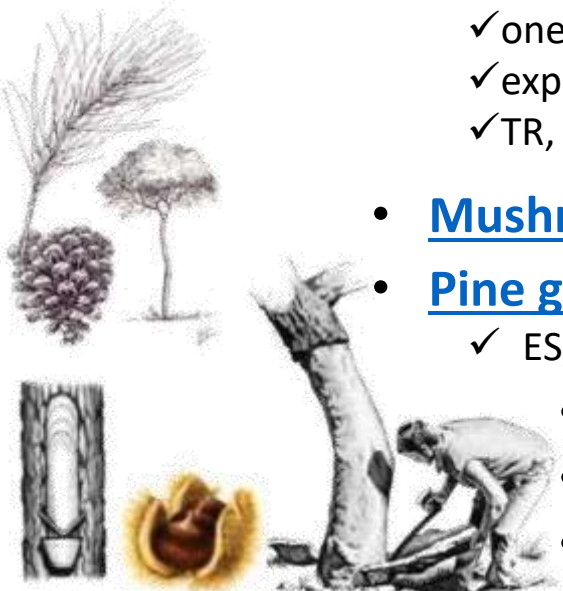


cf. Veronica Loewe's webinar September 30: <https://foresthistor.org/education/presentations-and-discussions/ntfp-web-series/stone-pine-cultivation/>

- **Sweet chestnuts.** Cultivated *Castanea sativa* groves.
  - ✓ one **historically cultivated staple food** (until 19<sup>th</sup>/20<sup>th</sup> century when ink disease and chestnut blight spread)
  - ✓ export **US\$ 220 million (2016)**, 70% global (21<sup>st</sup> century: control of exotic chestnut gall wasp by parasitoids)
  - ✓ TR, PT, ES, IT, GR; FR, AL [competition by other chestnut species from Eastern Asia]



- **Mushrooms, truffles.** *Tuber melanosp.*, US\$ 130-680/kg in origin, >3,000/kg retail (Reyna & García-Barreda, 2014)
- **Pine gum resin.** Tapped from living *Pinus pinaster*
  - ✓ ES, PT, about **US\$ 20 million** (2017) (competition by other pine species from tropics, tall oil, petrochemistry)



- **Medicinal and Aromatic Plants.** Herbs, leaves, essential oils, etc.
- **Argan oil.** *Argania spinosa* (MA) – rural livelihood or modern processing
- **Pine honey.** From honeydew on *Pinus brutia* and *P. halepensis* (TR, GR)



## 2. Non-wood provisioning from Mediterranean forest ecosystems

### NEED FOR INNOVATION

(technological, organizational, regulatory, social)

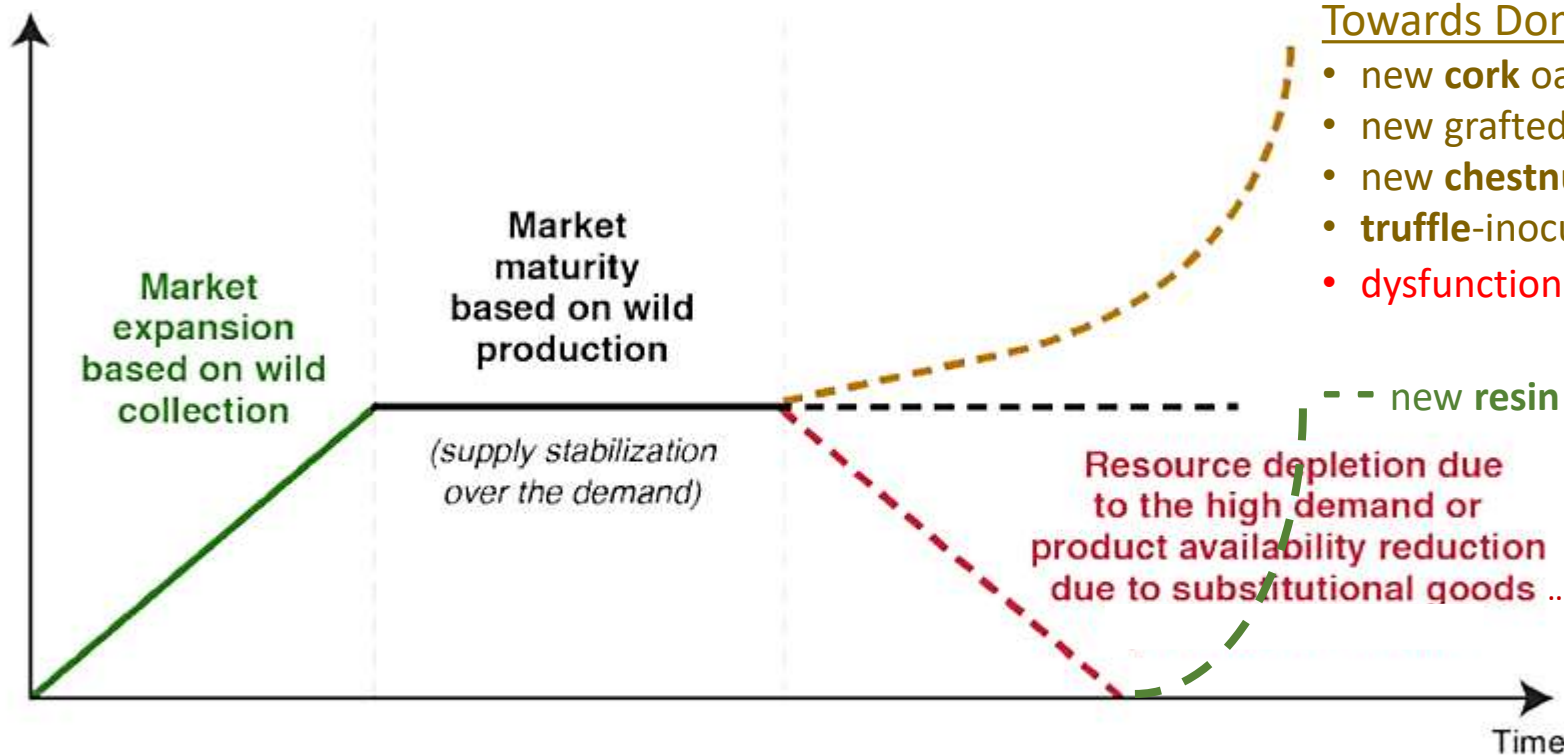


El pino piñonero en plantaciones agronómicas,

¿futuro o presente para satisfacer la demanda de piñón?

Mutke, 2020

Production



### Towards Domestication

- new **cork** oak plantations > 0.1 Mha, now even watered
- new grafted stone pine orchards for **pine nuts**
- new **chestnut** groves, integrated phytosanitary control
- **truffle**-inoculated oak plantations ([Oliach et al., 2021](#))
- **dysfunctional example: industrial blueberry agribiz (ES)**

- - new resin tapping techniques, certification (cosmetics)

Resource depletion due to the high demand or product availability reduction due to substitutional goods ...or due to decline: global change, pests & diseases

Figure 2. NWFP development paths.

Source: Pettenella<sup>55</sup> modified from Homma (1992). Many NWFP may be considered in the market expansion phase (green line) heading towards a maturity stage based on wild collection (black solid line). [EFI/FAO, 2021](#)

Anyway, NWFP are still **under-reported** in forest and trade statistics at all levels  
[FAO](#), UNECE, EU MS NFI harmonization

## 2. Non-wood provisioning from Mediterranean forest ecosystems



# Common challenges for innovation in Mediterranean NWFP

## Priorities in research & value chain development

1. **Biological production, collection, access rights/regulation**
2. **Processing & new products**
3. **Trade, marketing & consumers awareness** (informal & black markets, trafficking)
4. **Integration of multiple products, services “& experiences”** (*sense of place*)

Multipurpose forest management, co-sourcing, forest governance

Value chain integration (vt., hz.):

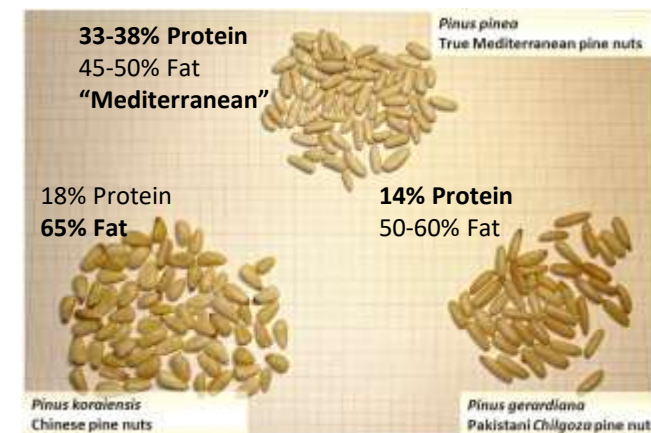
Product identity (*follow the success path of olive oil and high-end wines*)

Regional branding (DOP, IGP), associations, inter-professionals

Trading channels: direct trade, tackle monopsonies (hourglass-shaped value chains)

Both quality control & fair trade need: transparency, traceability - certification

Consumers information: education, awareness and responsibility



## Special attention is deserved by transversal issues

- **Innovative models** for rules, business and governance (cross-cutting lessons from other value chains/regions)
- Funding and technology **access for smallholders**, rural development & **extension**
- New technologies, ICT, QR tracing apps





## 2. Non-wood provisioning from Mediterranean forest ecosystems

# A White Paper based on lessons learned from around the Mediterranean

Drafts of the White Paper developed in the INCREdible network were discussed and validated

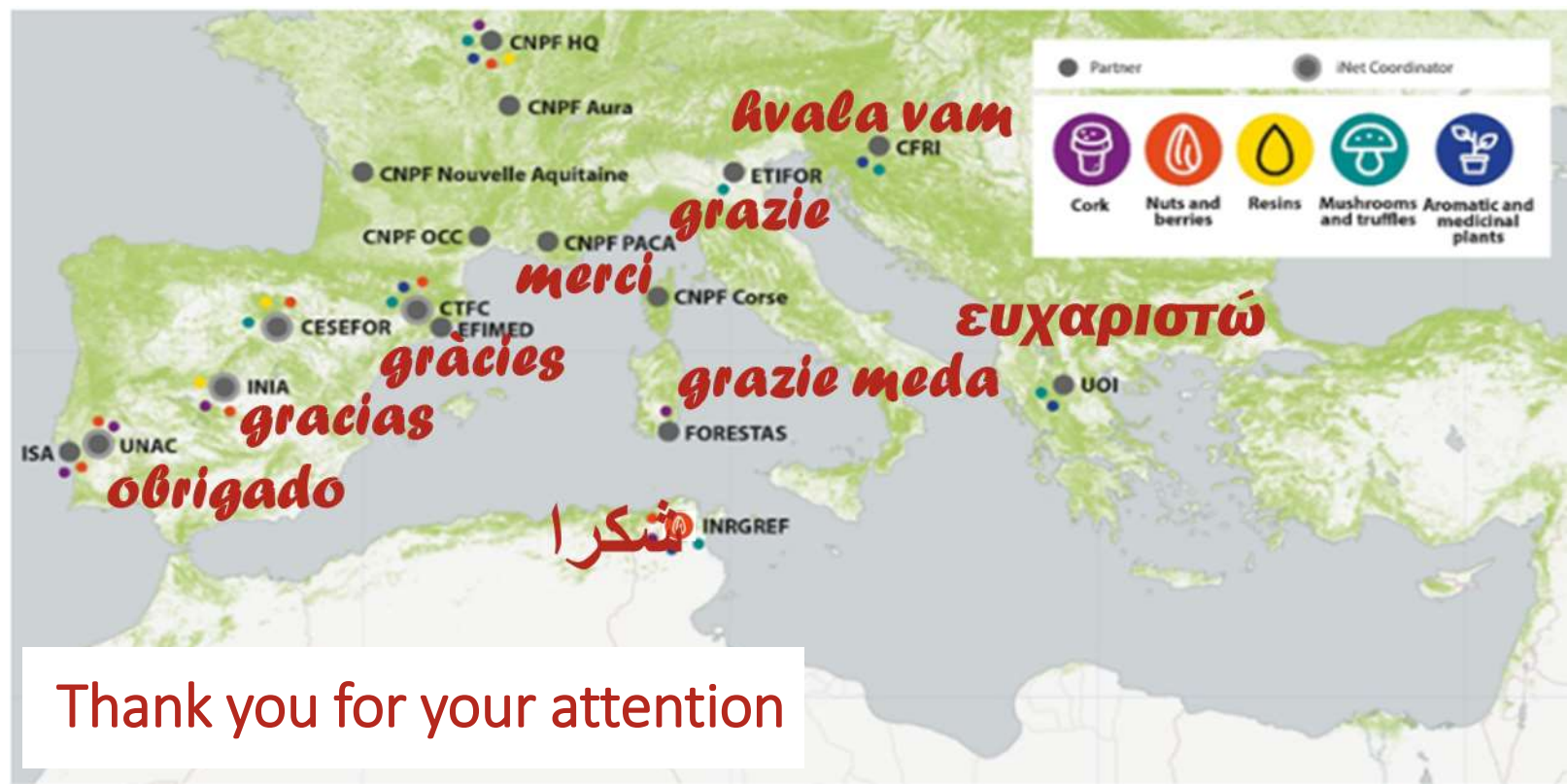
- ✓ in a webinar workshop co-organised with our **IUFRO Task Force [Unlocking the BE for NTFP](#)** in 9/2020 with 35 participants from 14 countries,
- ✓ and at the **Policy Forum [Untapping the potential of NWFP for Europe's green economy](#)** in 3/2021, co-organised with EFI and FAO, with 240 participants from 33 countries in 5 continents.
- ✓ Furthermore, participants of the Policy Forum endorsed the **Manifesto of Alghero [“A commitment to promote the contribution of non-wood forest products to inclusive and green growth and eco-social progress in Europe and worldwide”](#)**.
- ✓ The **FAO Silva Mediterranea Chair’s key note** during this event highlighted the relevance of NWFP for the Mediterranean and proposed SilvaMed as mechanism to support **implementation of the recommendations of the White Paper and Policy Forum**.
- ✓ The Forum and White Paper also **contributed to the inclusion of NWFP in the new [EU Forest Strategy](#)**, among others under chapter 2.3 “Promoting non-wood forest-based bioeconomy, including ecotourism”



[EFI/FAO, 2021](#)



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 774632



Thank you for your attention



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 774632

& my gratitude for hosting our webinar series also to the people at **USDA Forest Service**, the **Forest History Society** and the **Renmin University of China**.



Sven Mutke [✉ mutke@inia.es](mailto:mutke@inia.es)  
 Forest Research Centre (INIA, CSIC) /iuFOR UVa-INIA

IUFRO) IUFRO Research Group **1.08 Silviculture for edible NWFP**  
 IUFRO Task Force **Unlocking the BE for NTFP**