Unlocking the Bioeconomy for Nontimber Forest Products
A webinar series 2021/2022

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Non-wood provisioning from Mediterranean forest ecosystems

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Webinar series hosted by
- Task Force Unlocking the BE for NTFP
- USDA Forest Service
- The Forest History Society
- Renmin University of China

https://foresthistory.org/education/presentations-and-discussions/ntfp-web-series/mediterranean-forest-ecosystems/
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).

2. Non wood provisioning from Mediterranean forest ecosystems

  https://foresthistory.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 shmobal), 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?

The Fires in Greece Are a Terrifying Warning

Satellite image of Ever Given blocking the canal on 24 March 2021

https://en.wikipedia.org/wiki/Climate_change

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

**Proposal**

**Circular Economy**

**Material flow**

- **Business-as-usual**

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

  - PARTS MANUFACTURER
  - PRODUCT MANUFACTURER
  - SERVICE PROVIDER
  - USER/COLLECTION

  **Leakage and negative externalities**

- **Proposal**

  **Circular Economy**

  - PARTS MANUFACTURER
  - PRODUCT MANUFACTURER
  - SERVICE PROVIDER
  - USER/COLLECTION

  **Material flow**

  - **Stock management**
  - **Recycle**
  - **Repair/remanufacture**
  - **Share**
  - **Maintain/prolong**

  **Reduce systematic leakage and negative externalities**

  **Fいてのバイオエコノミー for Nottinmar Forest Products**

  Ellen Macarthur Foundation
1. Bioeconomy

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

Proposal
Circular Bioeconomy
The “butterfly” graphic for material flow

SOURCE
Ellen MacArthur Foundation
Circular Economy Systems Dialogue (February, 2019)
www.ellennmacarthurfoundation.org
Drawing based on Marquet & Mbongoum.
Credit to CSIC, INIA.
1. Economy is subject to **thermodynamic, not mechanic principles** (*entropy!*)

2. Earth, and biosphere upon, is an **open system** energetically sustained by **solar radiation**


   "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”
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 now full of green jobs

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

© 2021 https://doi.org/10.1007/978-981-15-7321-7_3

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)*

→ 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
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)
  - 1/3 in coastal areas,
  - and also 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)

- 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)


- ...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)
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)

https://www.star-tree.eu
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 m³/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” NFTP 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

- **Cost Action FP1203**
  
  [https://www.nwfps.eu/](https://www.nwfps.eu/)
  
  (2012-2017)

  cf. Harald Vacik’s webinar October 20, 2021

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

  [https://www.star-tree.eu/](https://www.star-tree.eu/)

  (2012-2016)

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

  [https://incredibleforest.net](https://incredibleforest.net)

  (2017-2021)

  - NWFP knowledge repository
    
    [https://repository.incredibleforest.net/oppla-factsheets](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)

- **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]


- **Sweet chestnuts.** Cultivated *Castanea sativa* groves.
  - one historically cultivated staple food (until 19th/20th century when ink disease and chestnut blight spread)
  - export **US$ 220 million** (2016), 70% global (21st 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 melanospor.* 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)

  cf. Joana Paulo’s webinar scheduled for early 2022
2. Non-wood provisioning from Mediterranean forest ecosystems

NEED FOR INNOVATION
(technological, organizational, regulatory, social)

- 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)

Towards Domestication

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

Anyway, NWFP are still under-reported in forest and trade statistics at all levels

Production
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”
& 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.

Thank you for your attention

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