

**NEXT GENERATION  
MOUNTAINS**

8 - 10 giugno 2023  
Malborghetto - Valbruna (UD)  
IX<sup>th</sup> Alpine Network  
International Conference

**Section 4**  
*Young generations' new opportunities:  
education and green jobs  
09<sup>th</sup> June 2023*

**Green jobs and education within the framework of  
forest-based ecosystem services: an overview and  
some considerations**




Dipartimento Territorio  
e Sistemi Agro-Forestali  
Università di Padova




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*Dipartimento TESAF – Università di Padova*

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**TESAF**



## Outline

- Green jobs and green jobs in the forest sector: an introduction
- Framing forest sector green jobs within ecosystem services
- Final considerations

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## Outline

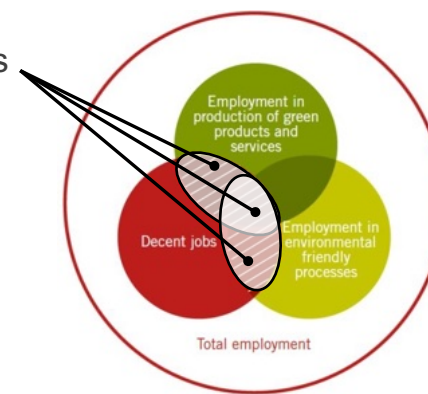
- Green jobs and green jobs in the forest sector: an introduction
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## Green jobs: a definition

Green jobs are **decent** jobs that contribute to **preserve or restore the environment**, be they in **traditional sectors** such as manufacturing and construction, **or in new, emerging green sectors** such as renewable energy and energy efficiency (ILO, 2016)




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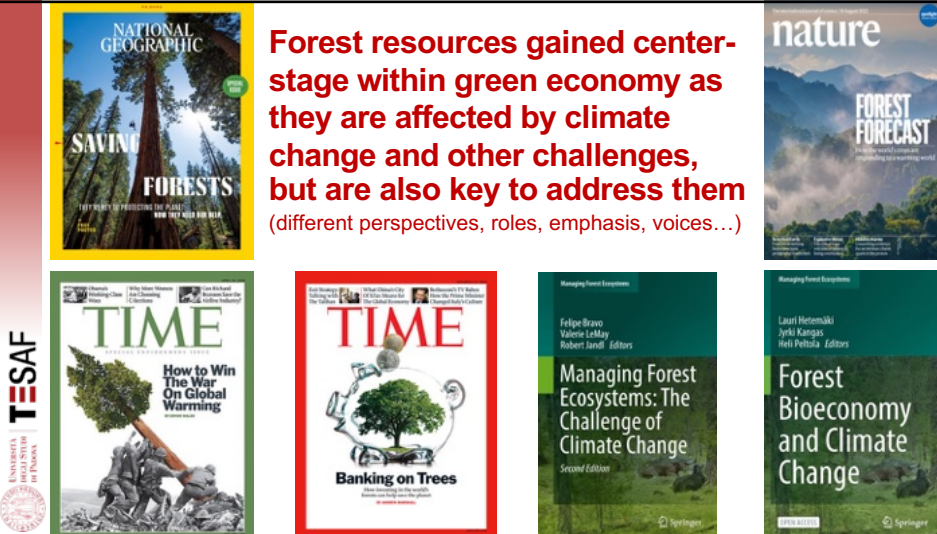
“(...) in the mid-term job destruction [due to Covid-19 and the economic crisis] will most likely be offset by job growth in the 'jobs of tomorrow'”  
(...)

The surging demand for workers who can fill green economy jobs [...however...] requires reskilling and upskilling opportunities since by 2025, **44% of the skills** that employees will need to perform their roles effectively **will change** and **about 40% of workers** need to **learn new skills** to accommodate the changes in skill demand”



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Forest resources gained center-stage within green economy as they are affected by climate change and other challenges, but are also key to address them  
(different perspectives, roles, emphasis, voices...)



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# Green jobs in the forest sector



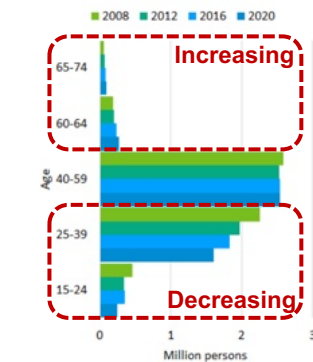
Green Forest Jobs provide **forest-related goods and services** while meeting the requirements of sustainable forest management and decent work

(Forest Europe, 2022)

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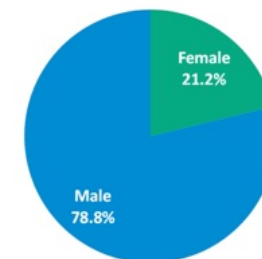
## Forest-related jobs and young generations? (Forest Europe, 2022)

Traditional\* forest sector workforce per age class in Europe (Mio persons, 2008-2020)



Total workforce 2010-2020  
variation: **-7%**  
(ILO, 2021)

Traditional\* forest sector workforce gender balance in Europe (ILO, 2021)



\*Forestry and logging (A02), manufacture of wood products (C16), manufacture of paper products (C17), printing (C18) and the manufacture of furniture (C31)

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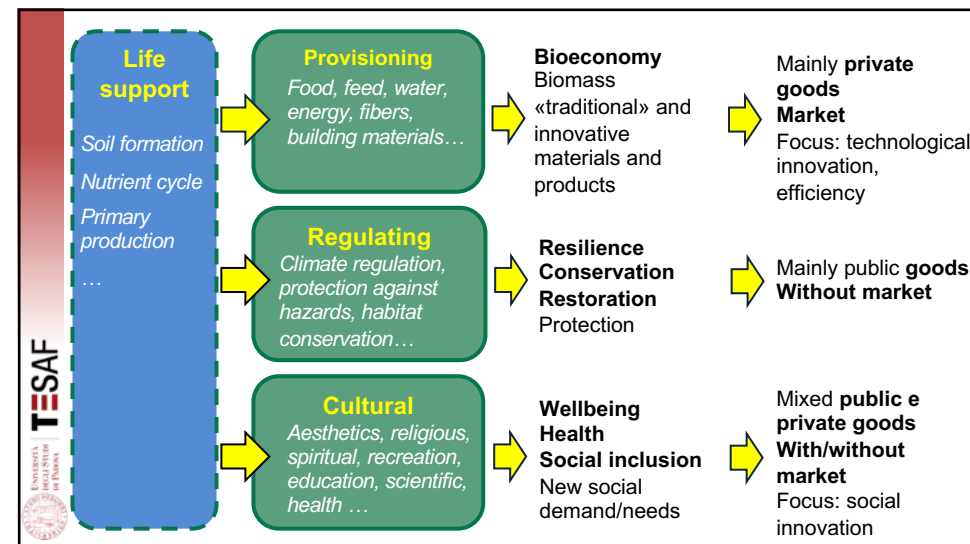


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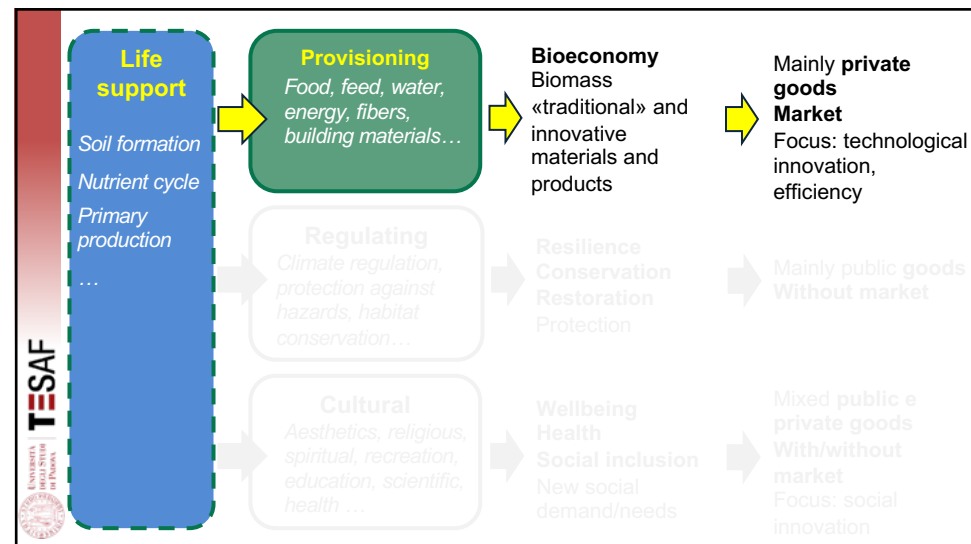


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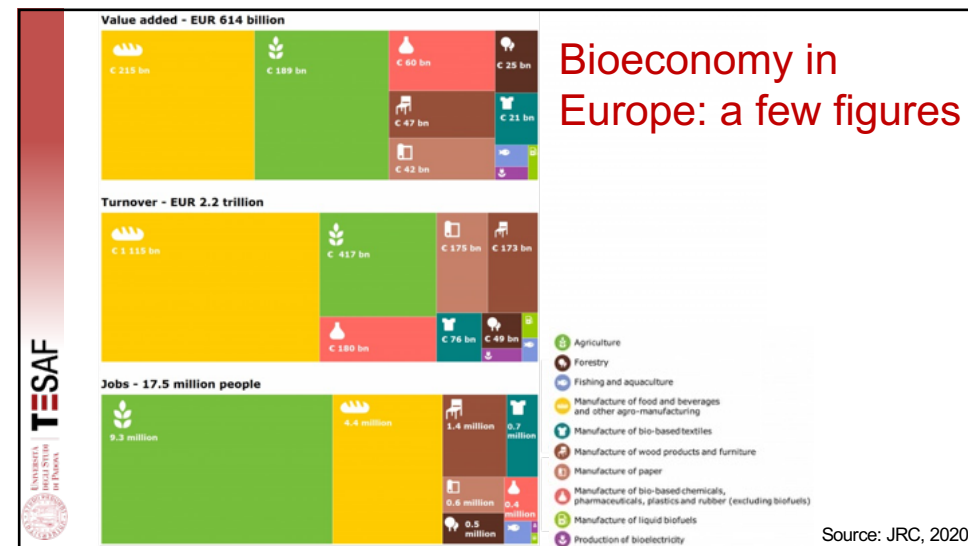


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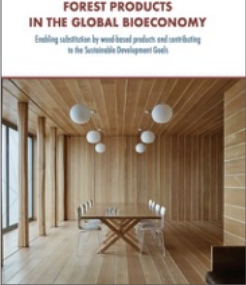



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## Bioeconomy

Innovative forest-based products and their main uses and applications (FAO, 2021) (1/2)

Product	Main uses and applications
Engineered wood products (CLT, LVL)	Building elements
 <p><b>FOREST PRODUCTS IN THE GLOBAL BIOECONOMY</b> Enabling substitution by wood-based products and contributing to the Sustainable Development Goals</p>	 <p><b>Cross-laminated timber (CLT) or X-LAM</b> +37% annual growth (2014-20)</p> <p><b>Laminated Veneer Lumber (LVL)</b> +6% annual growth (2014-2020)</p>

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## EU Forest Strategy to 2030

### 2.1 Promoting sustainable forest bioeconomy for long-lived wood products → New Bauhaus initiative

(...) the most important role of wood products is to help **turn the construction sector from a source of greenhouse gas emissions into a carbon sink** (...) There is considerable room for improvement. With less than 3% of market share, wood products are still only a tiny fraction of building materials in Europe



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## Bioeconomy

Innovative forest-based products and their main uses and applications (FAO, 2021) (2/2)

Product	Main uses and applications
Wood foam	Insulation (thermal and acoustic), packaging
Bioplastics	Packaging
Wood-based composites	Packaging, disposable products
Wood-based textile fibres	Textiles



Wood foam



Bioplastics



Wood-based composites



Wood-based textile fibres

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## Bioeconomy

Innovative forest-based products and their main uses and applications (FAO, 2021) (2/2)

Product	Main uses and applications
Wood foam	Insulation (thermal and acoustic), packaging
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- Low quality wood assortments inputs → a “cascading approach”
- Encouraging **intensive production-oriented** management (coppice, industrial plantations...) rather promoting **multifunctional forestry**?
- Competition with increasing demand for **bioenergy products**

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## EU Forest Strategy to 2030

### 2.2 Ensuring sustainable use of wood-based resources for bioenergy

Wood based bioenergy is currently the **main source of renewable energy, supplying 60% of EU's renewable energy use**. To meet the at least **55% emission reduction target by 2030 (...)** Bioenergy will continue to have a notable role to play in [the energy] mix



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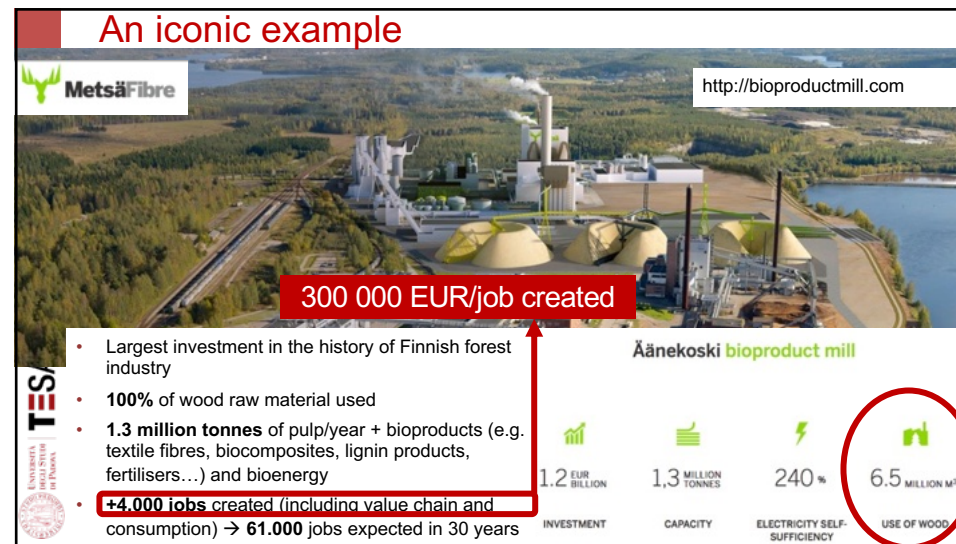
## A strong emphasis on biorefineries within the bioeconomy framework

- Biotechnology and the biorefinery concept are **essential components** of the bioeconomy (McCormick and Kautto, 2013)
- The bioeconomy is integrating traditional agricultural, forest and marine biomass feedstock production systems with a **range of biorefinery options and applications** (SCAR, 2014)
- A **key factor** in the transition to a bio-based economy will be the **development of biorefinery systems** (Scarlat *et al.*, 2015)
- Biorefineries are increasingly **at the core** of the bioeconomy vision at the EU level and worldwide (World Bioeconomy Summit, 2015)

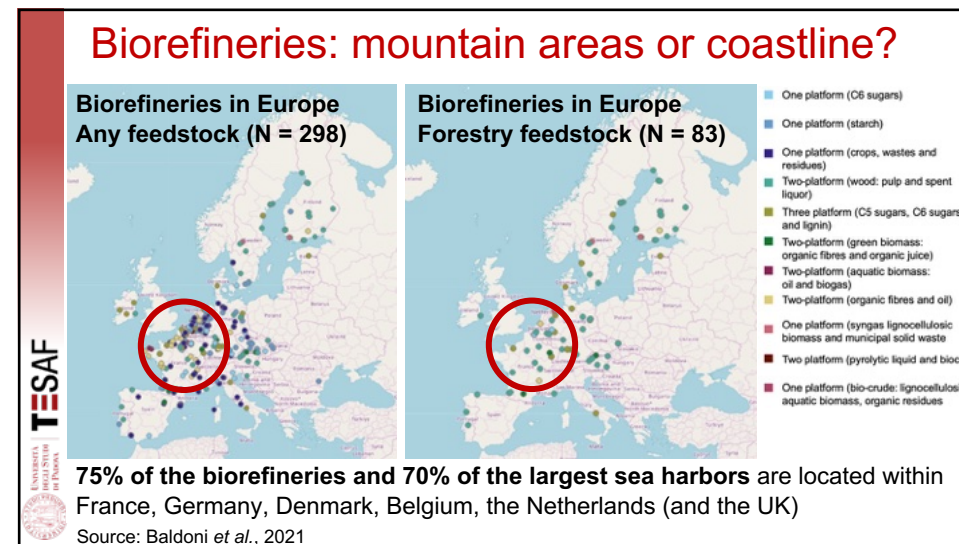


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# Education



<https://european-bioeconomy-university.eu/>

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# Education and training for fostering entrepreneurship in bioeconomy

FOEBE Erasmus+ project aims at equipping bioeconomy students at Master's and PhD levels with tailor-made sustainable entrepreneurship skills

## FOEBE - Fostering Entrepreneurship for the Bioeconomy

March 23 2022

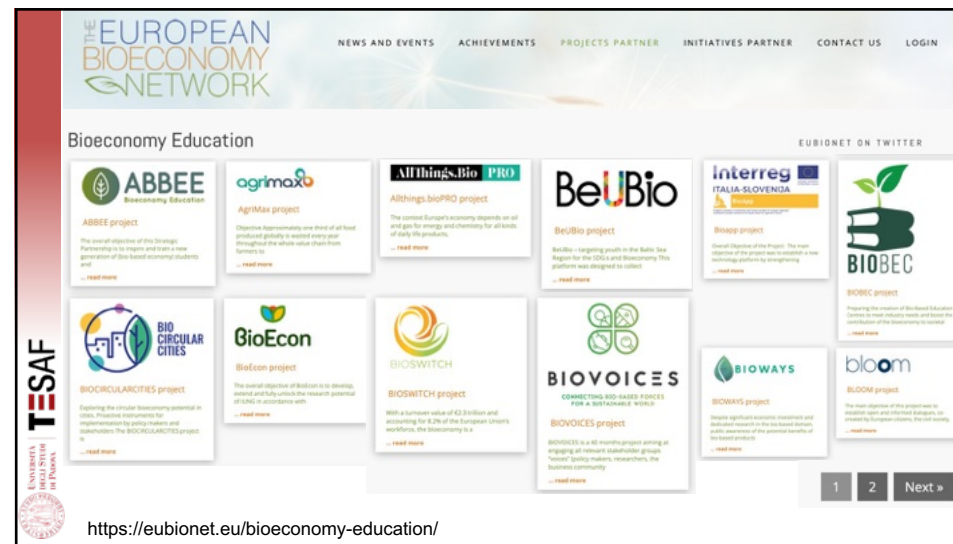
The FOEBE (Fostering Entrepreneurship for the Bioeconomy) project, jointly funded by the Erasmus+ program, aims to foster entrepreneurial skills in students in bioeconomics to accelerate the expansion of this sector within the European Union.

<https://eubionet.eu/foebe-project/>

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## Training on forest-based bioeconomy (an example)

Future Learn Subjects Courses FutureLearn for business

Online Courses / Nature & Environment

Introduction to Sustainable Bioeconomy

Discover what the bioeconomy is and how recent innovations in Europe's forest-based sectors affect the drive for sustainability.

★★★★★ 4.5 (13 reviews) 1,287 enrolled on this course

1,287 enrolled on this course

3 weeks

3 hours per week

Digital certificate when eligible

Open level

Join course

Find out more about how to join this course

Forest-bioeconomy massive open online course (MOOC) developed within the PerForm project cofinanced by the EFI Network Fund

Partner universities and research bodies:

UNIVERSITÄT FREIBURG BIO.KU SLU UNIVERSITY OF HELSINKI

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## Training for operators

# FOR

# italy

FORMAZIONE FORESTALE PER L'ITALIA

**Piedmont (leading), Basilicata, Calabria, Liguria, Lombardy, Sardinia, Sicily, Tuscany and Veneto**

7 courses  
6 demonstration sites  
ca. 90 trainers qualified (training of trainers)

Theoretical and technical aspects, machinery, health and safety...(90% practice)

[www.reterurale.it/FOR\\_ITALY](http://www.reterurale.it/FOR_ITALY)



Tree climbing



Naturalistic engineering



Forest Management

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## Beyond wood: wild forest products

(Non-wood forest products, NWFP)

Value of NWFP collected in Europe (2015):  
**€23 Bln/year**  
**€3.4 Bln/year marketed** (formally & informally)  
= same magnitude as revenues from roundwood







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Many traditional products... and new products (e.g. rattan-based bones for surgery)



<https://greenbone.it/>

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An example of training, networking and business development initiative



Developing Innovation Networks (iNets) around five different groups of NWFPs

Knowledge, best practices, success cases

Training

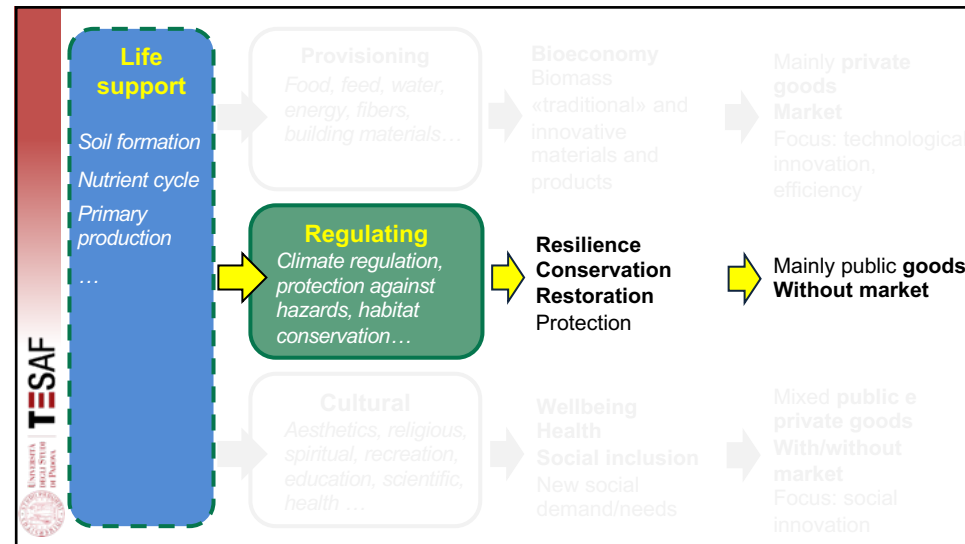
Replication and innovation

Acceleration of 5 selected business ideas

<https://incredibleforest.net/>

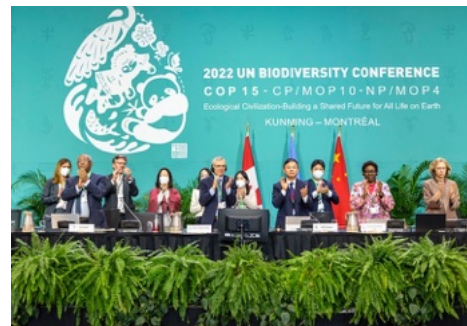
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## Kunming-Montreal Global Biodiversity Framework (COP15 – Dec. 2022)



### 4 goals and 27 targets

e.g. By 2030:

**Protect 30%** of Earth's lands, oceans, coastal areas, inland waters

**Restore 30%** of degraded ecosystems

**Mobilizing at least \$200 billion per year** in domestic and international biodiversity-related funding...

[www.cbd.int/article/cop15-cbd-press-release-final-19dec2022](http://www.cbd.int/article/cop15-cbd-press-release-final-19dec2022)

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## EU multiple binding targets and obligations: some examples

### Climate Regulation

- **-55%** emissions by **2030** and **Null Net Emissions** (Neutrality) by **2050**
- LULUCF Reg. 2018/841 (revision: 554/2021) Net fixation by 2030: **- 310 Mt CO<sub>2</sub>eq**

### Biodiversity Strategy to 2030

- Legally protect at least **30%** of the EU's land and sea areas (+4% for land and +19% for sea areas)
- **10%** of EU land and sea under **strictly Protected Areas**

### Forest Strategy to 2030

- All **primary and old growth forests** strictly protected
- **3 Billion trees pledge**

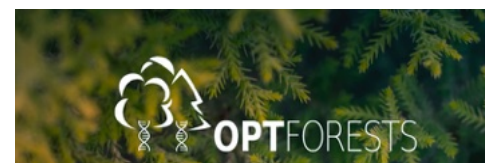
### Nature Restoration Law (proposal)

- Restoration measures covering at least **20%** of the EU's land and sea areas by **2030** and **all ecosystems in need of restoration by 2050**
- Planning and monitoring



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## Emerging job opportunities and training needs



### The Challenge

Faced with the challenges posed by climate change, new European policies call for new forest management aiming at increasing resilience of European forests and intensified efforts to restore forest ecosystems through massive tree plantations by 2030, in full respect of ecological principles. This can only be achieved if forest genetic resources (FGR) are better known, protected, and managed sustainably, and forest reproductive material (FRM), such as fruits, seeds, cones and plant parts, is used adequately, supported by a well-developed nursery sector and widespread social acceptance.

Identifying resilient tree species  
Collecting and studying forest phenological data  
Developing forest nurseries  
Testing forest genetic materials  
Afforestation/Reforestation...

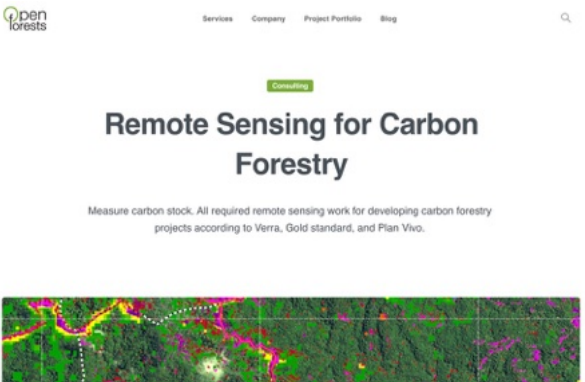
[www.optforests.eu/](http://www.optforests.eu/)



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## Emerging job opportunities and training needs



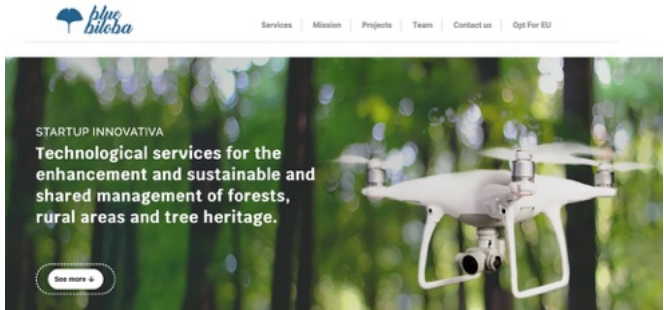
The screenshot shows the Open Forests website. The header includes the 'open forests' logo and navigation links: Services, Company, Project Portfolio, and Blog. A green 'Consulting' tag is positioned above the main heading 'Remote Sensing for Carbon Forestry'. Below the heading, a subtext reads: 'Measure carbon stock. All required remote sensing work for developing carbon forestry projects according to Verra, Gold standard, and Plan Vivo.' A satellite image of a forest with colored overlays is displayed at the bottom of the main content area.

Remote sensing measurement  
Satellite imagery  
Remote monitoring and real-time warning (e.g., wildfires)  
Forest information system design...

<https://openforests.com/>

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## Emerging job opportunities and training needs




The screenshot shows the Blue Bileba website. The header includes the 'blue bileba' logo and navigation links: Services, Mission, Projects, Team, Contact us, and Opt For EU. The main content area features a white drone flying over a forest. Text on the left reads: 'STARTUP INNOVATIVA Technological services for the enhancement and sustainable and shared management of forests, rural areas and tree heritage.' A 'See more >' button is located below the text.

Airborne vehicles (drones) for monitoring, data collection, planning ...


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# Carbon Pulse

News and intelligence on carbon markets, greenhouse gas pricing, and climate policy



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[GOV.UK](#)

## Experts forecast flood of biodiversity credit demand but urge regulation

Published 16:17 on May 22, 2023 / Last updated at 01:07 on May 23, 2023 / Biodiversity / No Comments

A strong wave of demand for biodiversity credits is expected within the next couple of years, experts speaking at an event in London on Monday predicted while urging standard-setting bodies to ensure rules exist to allow the market to scale with integrity.

Panelists at the Biodiversity and Nature Markets Summit 2023 became the latest to point to surging momentum behind the nascent biodiversity market in the wake of the historic agreement of the Global Biodiversity Framework (GBF) at COP15 talks in Montreal, which includes several calls to action for the financial sector to channel greater investment flows towards nature positive outcomes.

One means of doing this will be via crediting restoration and protection activities, with multiple companies and standards now working on methodologies and initiatives to enable the issuance of resulting units.

"Whether you like it or not, biodiversity credits are here," Helen Crowley, managing director at advisory firm Pollination, told the event in London organised by City & Financial Global.

She added that while there remained "huge challenges", stakeholders had now learned "a great deal" about how to properly build the market, namely in the wake of lessons learned from carbon markets which have been around for decades.

Source: <https://carbon-pulse.com>

## Understanding biodiversity net gain

Guidance

Guidance on what biodiversity net gain is and how it affects land managers, developers, and local planning authorities.

### What biodiversity net gain is

Biodiversity net gain (BNG) is a way to contribute to the recovery of nature while developing land. It is making sure the habitat for wildlife is in a better state than it was before development.

This will apply from November 2023 for developments in the Town and Country Planning Act 1990, unless exempt. It will apply to small sites from April 2024.

### Who it will affect

BNG will apply to you if you're a:

- land manager
- developer
- local planning authority (LPA)

### If you're a land manager


You can get paid by selling biodiversity units.


You must be a land manager with:

- land in England
- consent to register land if you're not the landowner
- a legal agreement for the land you're registering

[www.gov.uk/guidance/understanding-biodiversity-net-gain](https://www.gov.uk/guidance/understanding-biodiversity-net-gain)

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CBD/COP/15/L.25

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### Formal and informal education

22. Implementation of the framework requires transformative, innovative and transdisciplinary education, formal and informal, at all levels, including science-policy interface studies and lifelong learning processes, recognizing diverse world views, values and knowledge systems of indigenous peoples and local communities.

Source: Kunming-Montreal Global Biodiversity Framework (GBF)

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# An example

Competence-based blended learning for Europe's Natura 2000 and Protected Area Managers

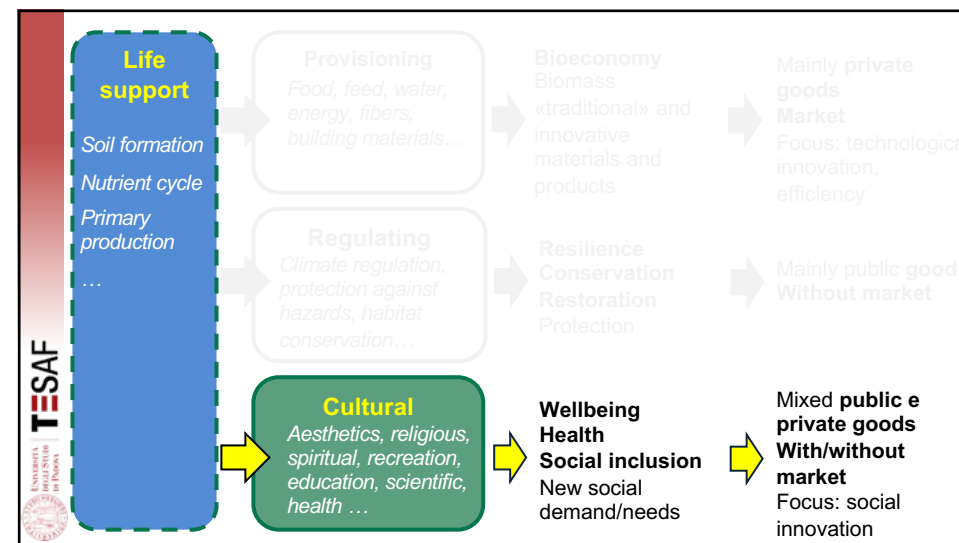
The European Nature Academy is an innovative tailor-made training hub designed to help Natura 2000 and Protected Area managers achieve their priorities for nature.

Strengthen your professional skills and network with you peers!

[Start the courses now](#)

<https://europeannatureacademy.com/>

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**Examples of forest-based cultural ecosystem services**

**Culture**  
(museums, exhibitions, concerts, events...)

**Tourism and recreation**  
(hiking, wild product collection, camping, forest/tree hotels...)

**Sport activities**  
(Nordic walking, mountain bike, orienteering, ...)

**Pedagogy and education**  
(forest kindergarten and school, environmental education, forest training...)

**Spiritual and religious**  
(meditation in forest areas, burial forests, ...)

**Green care**

**Social inclusion**  
(Inclusive activities for (potentially) marginalized groups e.g., elders, immigrants, people with disabilities ...)

**Human health and wellbeing**  
(forest bathing-Shinrin-Yoku, forest therapy, pet therapy, ...)

**TESAF**  
European Technical Advisory Forum on Forest-based Ecosystem Services in Protected Areas

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**More than 220 adventure parks in Italy**

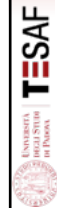
**TESAF**  
European Technical Advisory Forum on Forest-based Ecosystem Services in Protected Areas

[www.parchiavventuraitaliani.it/](http://www.parchiavventuraitaliani.it/)

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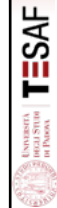


Many other initiatives not mapped

- >100 in total (estimated)**

<http://socialforest.org/en/>

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<http://socialforest.org/en/>



**Burial forests**

**BOSCHI VIVI**

Home Chi siamo Servizio Prenota Animali News

**I NOSTRI ALBERI**

Gli alberi che puoi scegliere sono di diverse tipologie: l'albero di comunità, l'albero personale e l'albero partner.

**ALBERO DI COMUNITÀ**

Il posto in albero di comunità è la scelta per chi ha uno spirito libero, che ama condividere i propri ideali con gli altri.

**PERSONALE**

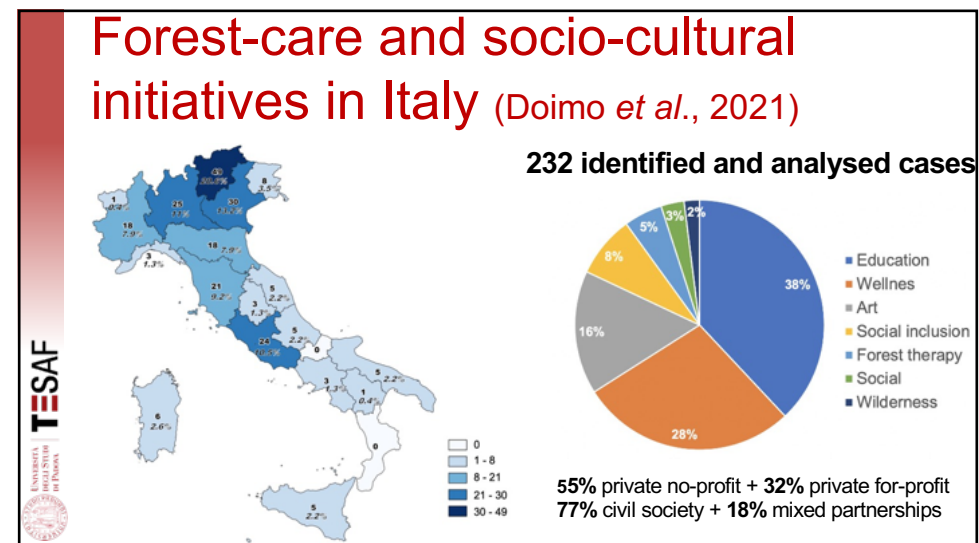
È la scelta ideale per chi ama un contatto personale e diretto con la natura.

Questo tipo di albero è ideale per una coppia che desidera condividere la memoria del proprio amore attraverso un tramite speciale.

Boschi Vivi offre la possibilità di interrimento delle ceneri del tuo animale

<http://boschivivi.it>

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## Training and promotion

The image shows two promotional materials. On the left is the GreenCare Finland website, featuring a header with navigation links (ABOUT US, MATERIALS, EVOLUTION, COMPETENCE, QUALITY, ASSOCIATION, SERVICES, CONTACT AREA) and a main banner titled "The power and care of nature" showing a person in a forest. Below the banner are "Upcoming events" and a footer with the URL [www.gcfinland.fi/](http://www.gcfinland.fi/). On the right is a poster for the "Cansiglio InVita" festival, dated 15-18 June 2023 in the Forest of Cansiglio (Treviso and Friuli-Venezia Giulia). The poster describes a festival dedicated to nature connection, with four days of events and activities. It lists specific events for each day: Thursday (Forest Bathing), Friday (Scientific Congress), Saturday (Experiential activities), and Sunday (Activities for children). It also mentions the festival is open to all, with a QR code for information and registration at [www.cansiglioinvita.it](http://www.cansiglioinvita.it). The poster includes logos of organizing and participating institutions.

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## Green for Care (Green4C) Erasmus+ KA (2020-2023)

- Development of **entrepreneurial skills and models for green care** (4 thematic sub-sectors)
- EU-wide assessment (4 **report/outlook studies**)
- 16 international **case studies**
- **Training needs assessment**
- **Training and support to business ideas/start-ups**

The infographic illustrates the four thematic sub-sectors of the Green4C project. At the top center is a logo with the text "HOW MUCH DO YOU KNOW ABOUT GREEN4C?". Below it are four panels, each representing a sub-sector with a brief description and a small image:

- FOREST-BASED CARE**: Have you ever tried forest bathing or forest therapy? Feeling good with yourself is easier in nature; woods and forests have a healing power, almost magical.
- SOCIAL AGRICULTURE**: A form of agriculture that allows the social and labor inclusion of more disadvantaged people through work and socially in agricultural practices.
- GREEN CARE TOURISM**: Enhancing and creating tourist products and destinations that focus on the health and well-being of users and providers, while keeping an eye on the sustainability of the territory.
- URBAN GREEN CARE**: Green spaces and urban spaces must coexist in harmony; community food growing and gardening, green exercise and horticulture therapy can contribute to recovery from stress caused by living in the city.

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

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# Training

green4c  
The project Join Learn Practice News

Green Care: from academic theory to entrepreneurial practice



<https://www.greenforcare.eu/e-learning-course/>

- October 2021 – January 2022
- 8 online modules
- *Target:* students and practitioners
- Business plan development
- Intensive acceleration course for selected business plan proposals (Padova, Summer 2022)

Course unit: GREEN CARE: FROM THEORY TO ENTREPRENEURIAL PRACTICE ACADEMIC: A.A. 2021/22	
Information concerning the students who enrolled in A.Y. 2021/22	
Information on the course unit	
Degree course	Second cycle degree in FOREST, CLIMATE - SCIENCE FORESTRY, AGRICULTURE, ENGINEERING ARCHITECTURE, A.Y. DESIGN, FOREST AND LAND MANAGEMENT (L5141)
Degree course track	Mark
Number of ECTS credits allocated	5.0
Type of assessment	Mark
Course unit English description	GREEN CARE: FROM THEORY TO ENTREPRENEURIAL PRACTICE
Website of the academic structure	UNIVERSITY OF PADUA, DEPARTMENT OF LAND, ENVIRONMENT, AGRICULTURE AND FORESTRY
Department of reference	UNIVERSITY OF PADUA, DEPARTMENT OF LAND, ENVIRONMENT, AGRICULTURE AND FORESTRY
E-learning modules	YES (Course unit is e-learning)
Mandatory attendance	No
Language of instruction	English
Branch	(FOREST) (F5)
Single Course unit	The Course unit can be attended under the option Single Course unit attendance
Optional Course unit	The Course unit can be chosen as Optional Course unit
Course unit for Erasmus students	The course unit can be attended by Erasmus+ and other exchange students

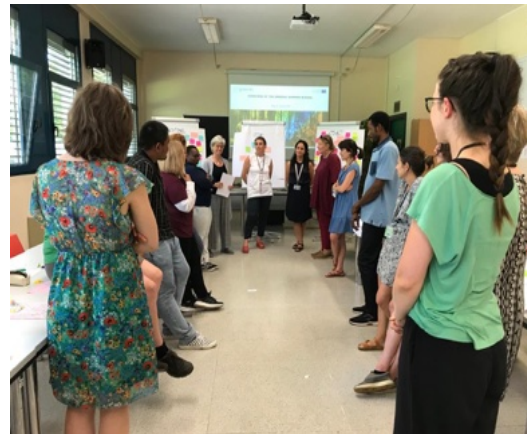
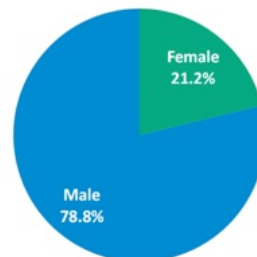


Print this page with you

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## Green care from academic theory to entrepreneurial practice (Green4C training – Summer 2022)

Traditional\* forest sector workforce gender balance in Europe (ILO, 2021)



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## Outline

- Green jobs and green jobs in the forest sector: an introduction
- Framing forest sector green jobs within ecosystem services
- Final considerations



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- Emerging green jobs opportunities and associated training needs within the forest sector
- Different trends and profiles depending on the group/class of ecosystem services (ES)
- A (preliminary) tentative qualitative summary matrix:

ES	Green jobs potential	Investment intensity	Innovation	Gender balance potential	Training needs
Provisioning	Medium-high	High	Mainly technological	? (likely as traditional forestry)	Moderate gaps
Regulating	Medium-Low	Medium-high	(Technological)	? (likely a bit higher than traditional forestry)	Moderate gaps
Cultural	Medium-high	Low	Mainly social	High	High gaps (emerging initiatives, existing gaps)



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## Some risks and criticisms (among others)

- Tradeoffs  
*e.g. provisioning (= biomass production) vs. regulating (= conservation, restoration, rewilding...)*
- Need of standards, training, qualified people (also to avoid greenwashing and cheating)
- Naive and simplistic narratives  
*e.g. plant trees vs. forest management*  
*Back to nature as a romantic perspective*
- Nature and mountains as a source
- Financialization of nature



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Promising developments and trends  
Keep moving towards ambitious goals  
Support ongoing “green” processes by developing appropriate/innovative tools/initiatives  
...still be realistic



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