

Non-wood forest products for people, nature and the green economy. Policy priorities for Europe

A white paper based on lessons-learned from around the Mediterranean



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Executive summary

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1. Aim of the white paper

Non-wood forest products (NWFPs) – such as cork, resins, gums, wild mushrooms, aromatic and medicinal plants, and wild nuts and berries – provide a multitude of social, cultural, environmental and economic contributions to human, economy and nature conservation in Europe.

This white paper is a call to recognise, and to leverage, the potential of non-wood forest products to contribute to the UN Sustainable Development Goals (SDGs)¹, and notably to rural development, nature conservation, human well-being, and – in line with the European Green Deal² – to a greener and more sustainable post-COVID economic restart. It identifies key policy areas that require urgent attention and suggests policy actions to be undertaken by decision makers, key stakeholders, and societal actors at global, regional, national and subnational levels in Europe and other parts of the world.

This white paper stems, mainly, from multi-stakeholder interactions and lessons learned from across the Mediterranean basin within the initiatives of the *INCREDIBLE Thematic Network*³, and the capitalisation of previous research carried out by the Seventh Framework Programme project StarTree⁴ and the COST ACTION FP1203 (European non-wood forest products network)⁵, and has received valuable inputs from the IUFRO (International Union of Forest Research Organizations) Task Force on Unlocking the Bioeconomy and Non-Timber Forest Products⁶. Altogether, these projects represent a comprehensive effort to understand and support the sustainable use of NWFPs, involving several hundred researchers, practitioners, forest owners, NWFP processors, and other experts.

In 1999, FAO defined NWFPs as “... products [that] consist of goods of biological origin other than wood, derived from forests, other wooded land and trees outside forests” (Focus 1). This white paper specifically addresses plant- and mushroom-based NWFPs (wild nuts and berries, wild mushrooms and truffles, aromatic and medicinal plants, cork, natural resins), with particular attention given to food products, after the recommendations from the Committee on World Food Security (2017) and the Global Forest Experts Panel (GFEP, 2015) on the contribution of forests to food security and nutrition⁷. Nevertheless, many of the issues discussed here also apply to animal-based products (game, wild meat, honey) and grazing, and to some intangible forest ecosystem services. In fact, they affect other products, not coming from forests, but from other habitat types, like high mountains, tundra, deserts, wetlands, rangelands, or coastal areas. Although this white paper has a strong Mediterranean flavour, its insights and recommendations are also valid across Europe and other regional contexts.

¹ <https://sdgs.un.org>

² https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

³ <https://incredibleforest.net>

⁴ <https://star-tree.eu>

⁵ <https://www.nwfps.eu>

⁶ <https://www.iufro.org/science/task-forces/bioeconomy-and-non-timber-forest-products>

⁷ <http://www.fao.org/3/i3710e/i3710e.pdf>

Focus 1. Non-wood forest products: a dynamic definition

“... goods of biological origin other than wood, derived from forests, other wooded land and trees outside the forest” (FAO, 1999)

“... goods derived from forests that are tangible and physical objects of biological origin other than wood” (FAO, 2015)

“wild and semi-wild non-wood forest species and products thereof, as well as products in the early stage of domestication [...] and with reference to specific services related to NWFPs [...]” (Wolfslehner et al., 2019)

2. The relevance of NWFPs: unveiling the invisible

2.1 NWFPs and the sustainable development goals

NWFPs are a central element of sustainable development and sustainable forest management. These concepts have been highlighted in international agreements since the Rio Summit (1992), such as in the Second and Third European Ministerial Conferences on the Protection of Forests in Europe (in particular Helsinki, 1993, and Lisbon, 1998)⁸. Despite fragmented data and persistent knowledge gaps, there is increasing evidence on the significant potential of NWFPs to contribute to the 17 SDGs, notably regarding their social and cultural, environmental and economic dimension, as described below.



Figure 1: The UN Sustainable Development Goals.

<https://sdgs.un.org/goals>

⁸ https://foresteurope.org/wp-content/uploads/2016/11/Commitments_all.pdf

Social and cultural dimensions (SDG1 No Poverty, SDG2 Zero Hunger, SDG3 Good Health and Well-being, SDG5 Gender Equality, SDG10 Reduced Inequalities)

- The collection and production of NWFPs are part of Europe's cultural heritage.** Before they were farmers, Europeans were hunter-gatherers, depending on wild resources. Agriculture has never fully substituted forests as providers of diverse types of resources, and until about 150 years ago forests were mainly used for multi-purpose objectives, and forest management was not timber-oriented. Recent research⁹ shows that 90% of European households regularly consume NWFPs, while 26% collect some type of NWFP, at least once a year, for self-consumption or sale. This makes up for more than 60 million European foragers, often organised in dynamic associations, such as those of mushroom pickers. These outdoor activities are the continuation of centuries-old traditional uses and knowledge, nurturing spiritual and cultural dimensions, as unique culinary traditions,¹⁰ and more active personal lifestyles.
- NWFPs contribute to health and well-being.** Many NWFPs are part of traditional food systems, nutritious, adapted to local conditions, and increasingly contribute to local, regional, and international food value chains (HLPF, 2017)¹¹. The role of diversified diets based on local biodiversity and traditional and indigenous foods, which include NWFPs, is well documented by case studies from around the world (FAO, 2009¹²; FAO, 2013b¹³). The trend for 'natural food' and 'superfoods' opens further opportunities to capitalise on traditional culture and food sources.
- NWFPs sustain household economies** and help maintain rural communities. NWFPs contribute to household food security and locally sourced products in many countries around the world, regardless of development status. In 2015, the economic value of marketed NWFPs in Europe was €4 billion, nearly 20% the value of marketed roundwood (Forest Europe, 2020¹⁴). Moreover, by including informally marketed and self-consumed products, the value of that figure may rise to some €23 billion yr⁻¹, which exceeds, by far, the revenues from roundwood. Around 85% is used for self-consumption, while the remaining 15% is sold in formal and informal markets, for an estimated €3.5 billion. This is an important additional income to thousands of families.
- NWFPs contribute to social integration, gender balance, and equality.** While the forestry and timber sector, which directly employs some 3.8 million people in Europe¹⁵, is clearly male dominated, in the collection, transformation, and trade of many NWFPs such as medicinal and aromatic plants (MAPs), women play a more central role. Harvesting NWFPs also provides rural jobs, and an important source of income for people that do not have many alternatives.

⁹ <https://www.sciencedirect.com/science/article/abs/pii/S1389934120300654?via%3Dihub>

¹⁰ See for example: Borelli, T.; Hunter, D.; Powell, B.; Ulian, T.; Mattana, E.; Termote, C.; Pawera, L.; Beltrame, D.; Penafiel, D.; Tan, A.; Taylor, M.; Engels, J. Born to Eat Wild: An Integrated Conservation Approach to Secure Wild Food Plants for Food Security and Nutrition. *Plants* 2020, 9, 1299. <https://doi.org/10.3390/plants9101299>

¹¹ <http://www.fao.org/3/i7395e/i7395e.pdf>

¹² <http://www.fao.org/3/i0370e/i0370e00.htm>

¹³ <http://www.fao.org/3/i3144e/i3144e00.htm>

¹⁴ https://foresteurope.org/wp-content/uploads/2016/08/SoEF_2020.pdf

¹⁵ 0.5 million people in forestry and 3.3 million people in wood industries. See <https://ec.europa.eu/eurostat/statistics-explained/pdfscache/29576.pdf>

Environmental dimension (SDG12 Responsible Consumption and Production, SDG13 Climate Action, SDG15 Life on Land)

- **NWFPs contribute to sustainable land management.** Most NWFPs are collected in forests not managed only for NWFP production; they provide complementary sources of income that are especially relevant in areas prone to wildfires and areas where timber value is low, as is often the case in the Mediterranean regions. Thus, they contribute to increasing the profitability of land uses, deterring rural abandonment, and providing opportunities to improve forest ecological condition through active management.
- **NWFPs diversify forests management in Europe**¹⁶. Over 5 million hectares (Mha) of forests are primarily managed for the production of different NWFPs or for coproduction with timber, pastures or other ecosystem services, including agroforestry systems. This includes 2.5 Mha of chestnut (*Castanea sativa*), 1.5 Mha cork oak (*Quercus suber*) and 1 Mha pines for pine nuts (*Pinus pinea*) and 0.2 Mha for resin (mainly *Pinus pinaster*). Management systems in these forests are generally extensive and multi-functional, with low environmental impacts, as harvesting levels are monitored and regulated. Expanding the area of forests managed for NWFPs offers interesting opportunities for management and habitat diversification.
- **NWFPs are instrumental in maintaining high biodiversity value agro-ecosystems and other priority habitats**, as the 4 million ha of open oak woodlands (the Portuguese *montado* and Spanish *dehesa*). Active co-management for cork, acorn mast, and often also for mushroom or other NWFPs, contributes to the maintenance of habitat types of European interest, e.g. Habitat 9330 “*Quercus suber* forests”, 9340 “*Quercus suber* and *Quercus rotundifolia* forests”, 6310 “*Dehesas with evergreen Quercus spp.*”, where biodiversity conservation is strictly related to human management¹⁷. There are other priority habitats such as 9540 “*Mediterranean pine forests with endemic Mesogean pines*”, that have been preserved, in great measure, for the provision of resin or pine nuts.

Economic dimension (SDG8 Decent Work and Economic Growth, SDG9 Industry, Innovation and Infrastructure, SDG12 Responsible Consumption and Production)

- The current and potential **economic dimension** of NWFPs escapes statistics and foresights, as many NWFPs are part of the informal economic or registered as agricultural products in official records. Nevertheless, the annual global income from NWFPs was estimated at US\$88 billion (€67 billion) in 2011¹⁸. Including the value of self-consumption and recreation could increase the figure by an order of magnitude.

¹⁶ INCREDIBLE experts consider that nowadays no more than 2% of European forests and other wooded land (FOWL) are primarily managed for NWFPs, although probably more than 80% of those FPWL, actually provide resources other than wood. Hunting occurs on more than 75% of the area, mushroom and berries are collected on more than 33% of the area, and grazing occurs on more than 5% of the area. As recently as 200 years ago, these uses were much more widespread than wood production and, probably, more than 95% of Europe's FOWLS were used for NWFPs. Recovering these uses would contribute to restore historical landscapes, traditional uses, and values of forests.

¹⁷ Bagella et al., 2016; Bugalho et al., 2011

¹⁸ FAO State of the World's Forests (2014) <http://www.fao.org/3/i3710e/i3710e.pdf>

- **NWFP supply raw materials for bio-based industrial sectors.** Cork is the second most relevant export sector in Portugal (€1.2 billion, i.e., 61% of world cork exports). European pine chemical industries have direct revenues of €2.5 billion (25% of global industry), and are based almost totally on imported resources. Natural tannins are a key element of the Italian leather industry. MAPs are playing an increased role in the cosmetics, nutraceutical, and pharmaceutical markets. Valued at €78.6 billion (2018), the European cosmetics and personal care market is the largest in the world, offering enormous potential for development.
- **Europe is a key player in the NWFP trade.** The legally declared international trade of NWFPs is in the range of €8.7 billion per year. The EU accounts for almost half of the imports (€4.2 billion) and 40% of exports (€3.4 billion), though domestic productions are not reflected in these international trade statistics. Europe is the global leader in the supply of cork and cork-based products, sweet chestnuts, and Mediterranean pine nuts, and is a relevant player in the markets for truffles, vegetable tannins, and wild mushrooms. For most NWFPs, however, Europe is a net importer. In 2014, for instance, Europe imported raw plant material with a value of €2.5 billion, 70% derived from wild collection of MAPs from developing countries.



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2.2 NWFPs – a necessary element to achieve Europe’s policy priorities

NWFPs are at the heart of *nature-based solutions* that protect and restore biodiversity for the benefit of nature and people. They can make a significant contribution to many European policy ambitions, such as those related to sustainable land management, biodiversity conservation, circular bioeconomy, green economic restart, healthy and resilient food systems, sustainable tourism, green jobs and public health and well-being.

1. The **European Green Deal** (2019)¹⁹. NWFPs can help in the transition towards a carbon neutral, circular, and bio-based economy. Natural resins and cork, along with non-energy uses of tall oil²⁰, and engineered wood products can significantly replace non-renewable, high carbon footprint materials in numerous applications. Edible NWFPs can contribute to a fair, healthy and environmentally-friendly food system, reducing the need to use chemical pesticides, fertilisers, and antibiotics. Territorial marketing and place-based development strategies can leverage the attraction of NWFPs to support rural green jobs, especially in mountainous and other marginalised areas.
2. The **post 2020 Common Agricultural Policy (CAP)**²¹ sets renewed ambitions for “*sustainability, safeguarding agriculture’s position at the heart of Europe’s society*”, and supporting “*the economic future of farmers by fostering a smart, resilient and diversified agricultural sector that strengthens the socio-economic fabric of rural areas.*” Agroforestry and NWFP value chains are excellent vehicles for farm income diversification, to sustain complex multi-service farming and to re-connect people with rural areas and natural ecosystems. Expanding agroforestry to 10-20% of EU abandoned land would greatly contribute to mitigating wildfire risk and provide valuable forage resources from 20 to 40 million ha of diversified habitats.
3. The **New Industrial Strategy for Europe** (2020)²². NWFPs can provide raw materials and high value molecules for different industrial sectors and notably, the green chemical industry. They can support the “*Mid Century Vision 2050*” of the European chemical industries²³, that identifies increased sustainability, reduced emissions, and circularity as some of its key challenges. Natural Origin ingredients can also play an increased role in the mission of the European cosmetics industries to support sustainable development²⁴, “*reducing environmental footprint, creating quality jobs, and enhancing the social value for communities where products are sourced, manufactured (including value chain), or purchased*”, increasing the reliance of the cosmetics industries on natural and organic ingredients. NWFPs such as cork, natural resin, and tannins can also play a role in greening the construction, manufacturing, and fashion sectors.
4. The **EU Biodiversity Strategy for 2030**²⁵ sets ambitious targets for *protecting nature and reversing the degradation of ecosystems* and aims to: expand and effectively manage

¹⁹ https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

²⁰ Tall oil is a by-product generated in the wood pulp production process.

²¹ https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/future-cap_en

²² https://ec.europa.eu/growth/industry/policy_en

²³ [European Chemical Industry Council \(CEFIC\) vision for 2050](#)

²⁴ [Cosmetics Europe initiatives for sustainable development](#)

²⁵ https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/actions-being-taken-eu/eu-biodiversity-strategy-2030_en

protected areas (up to cover 30% of land area); expand agro-ecological practices (to over 25% of the productive land area); reduce pesticide use by 50%; and restore land under organic management practices. For their intrinsic qualities, low and diversified management intensities and aesthetic values, NWFPs can significantly contribute to achieving these targets, as recognised by the *European Business for Biodiversity Platform*²⁶ and the *Business for Nature*²⁷ coalition.

5. The **Pharmaceutical Strategy for Europe (2020)**²⁸ intends to provide affordable, accessible, and safe medicines for all, supporting competitiveness, innovation, and sustainability of the EU's pharmaceutical industry. It looks for diversified, secure supply chains and promotes environmentally sustainable pharmaceuticals, that might largely be based on the existing European biodiversity and MAPs.
6. The **EU Farm to Fork Strategy (2020)**²⁹ aims at more healthy, affordable, and sustainable food for Europeans in 2030. Forests are a key component of food security at a global level, as recognised by the *FAO*³⁰ and the *Committee on World Food Security*³¹, and can also play an important role in food production, and vibrant food and gastronomic value chains, embedded in cultural and natural heritage. Extensive agroforestry systems, truffle cultivation, mushroom gastronomy, exemplify this potential. Increased attention to NWFPs can also generate new opportunities to decarbonise the food sector and create other environmental benefits and support viable agroforestry systems.
7. The **EU Forest Strategy**³² aims at promoting sustainable forest management in support of biodiversity conservation and climate change mitigation and other ecosystem services, and the provision of *sustainable growth and jobs to support rural development*³³. Simply said, in the absence of NWFPs value chains, it would not be possible to achieve those objectives in most European regions. Moreover, considering that Europe is the main importer of NWFPs, sustainable and fair trade of NWFPs can play a very significant contribution to preserving and restoring forests outside Europe, in line with the intention to *Step-up EU action to Protect and Restore the World's Forests (2019)*³⁴ and the proposed EU Forest Partnerships.
8. Finally, the **EU Climate Action**³⁵ is at the heart of the European Green Deal. The 2050 climate-neutrality objective will not be reached unless: active multi-purpose forest management is pursued; climate-smart forestry is applied; non-sustainable products are replaced by sustainable products; the role of agroforestry is promoted; there is a closer integration of forestry and agricultural activities; and more resilient landscapes are created.

²⁶ https://ec.europa.eu/environment/biodiversity/business/index_en.htm

²⁷ <https://www.businessfornature.org/>

²⁸ https://ec.europa.eu/commission/presscorner/detail/en/ip_20_2173

²⁹ https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

³⁰ <http://www.fao.org/forestry/food-security/en/>

³¹ <http://www.fao.org/3/l8877EN/l8877en.pdf>

³² https://ec.europa.eu/info/food-farming-fisheries/forestry/forestry-explained_en#theeforeststrategy

³³ https://ec.europa.eu/info/food-farming-fisheries/forestry/forestry-explained_en#theeforeststrategy

³⁴ https://ec.europa.eu/environment/forests/eu_comm_2019.htm

³⁵ https://ec.europa.eu/clima/policies/eu-climate-action_en

2.3 Untapped potentials and major challenges

Too many known unknowns thwart strategic decision making

The values of NWFP production presented in the previous section are an underestimation of the total contribution of NWFPs to sustainable development. There are very important knowledge gaps in relation to collected wild products and the functioning of informal 'grey' and illegal 'black' markets. There is also a lack of understanding on the value and jobs created in the transformation industries in diverse and divergent value chains. This is especially noticeable when it comes to understanding the value created through tourism and recreation services associated with the production and collection of NWFPs. Nor is it possible to estimate the presumably high impacts on public health and well-being, or the co-benefits produced when managing land for NWFPs, in terms of wildfire risk mitigation culture, traditional knowledge, and other ecosystem services, although these are thought to be significantly larger than market values can show. As an example, in Sardinia (Italy) the value of ecosystem water regulation has been assessed as being three times the value of cork (Corona et al., 2018).

Certainly, increased supply and substitution of imports offer enormous potential to strengthen important industrial value chains, to activate and complement sustainable forest and land management, and to sustain rural development strategies. In fact, across the globe, there is growing interest in natural, wild and traditional foods, superfoods and nutraceuticals, particularly among high income, health- and ecologically-minded consumers. Perceived as 'green', 'traditional' and 'local', NWFPs can play a major role in the design and implementation of rural development strategies (Pettenella et al., 2019).

A fragmented policy landscape jeopardises coherent action

NWFPs include a wide variety of products that feed into a wide diverging range of chains (food, feed, chemistry, pharmaceuticals, cosmetics, clothing, construction, etc.) and services (e.g. ecotourism, recreation, gastronomy, etc.); they are produced in many ways, from wild collection to different stages of domestication and cultivation; they encompass a wide range of land uses, from forests and agroforestry systems to other wooded land; and they present many different business models, with varied sizes and degrees of professionalisation and vertical or horizontal integration.

As a consequence, NWFPs are often at the boundary of different policy domains and this has often left them in a 'no man's land' when it comes to policy regulation and political action. Institutions across Europe have addressed specific regulatory needs, drawing ad hoc lines to separate *wild* from *farmed*, *forest* from *agricultural* products, and *plant-based* from *animal-based* products, etc. In doing so, certain products are either included or excluded from a given policy or regulation. This has created significant gaps and grey areas in strategic policies such as the 'Farm to Fork' strategy, the CAP, and related rural development measures. Moreover, products outside sectoral boundaries, will even fail to be represented in statistics and data gathering, posing further difficulties with respect to attracting political attention.

In short, the cross-sectoral reach, and the boundary nature of many NWFPs, results in a high degree of policy fragmentation. Many different regulations – at EU, national, and sub-national levels – have a strong impact on their current situation and are responsible for some of the pitfalls that hamper the development of NWFP value chains. Better coordination and harmonisation of several policy domains are therefore urgently needed.

NWFPs and the green economic restart: an increasing supply gap

Demand for many NWFPs (e.g. cork, resin, tannins, aromatic plants) is high and expected to increase. This demand is driven by: the need to reduce dependence on non-renewable resources and to transit towards a sustainable circular bioeconomy; the renewed interest in natural ingredients for healthy diets and personal care; the surge in demand for traditional products with strong cultural heritage; and also by growing interest in experiential services in tourism or recreation, such as wild food gathering.

Over the last century, Europe's capacity to supply and sustain NWFPs value chains profitably had been diminishing, with Europe becoming increasingly reliant on imported equivalents, or directly losing markets to fossil-based substitutes. Cork production has halved, from more than 400,000 t yr⁻¹ in 1963 to less than 180,000 t yr⁻¹ in the last years³⁶. In fact, limited supply is the biggest current constraint for the European cork industry, while paradoxically, one third of traditionally managed cork forests have been abandoned.

Similarly, for reasons of declining profitability pine resin production has declined from 300 000 t yr⁻¹ of the 1960s to less than 10 000 t yr⁻¹ in the early part 21st century. In recent years, a very tight global supply has allowed a recovery of European production to some 20 000 t yr⁻¹, but this covers less than 10% of domestic demand. Chestnut production has dropped from 1 million t yr⁻¹ around 1900 to 0.15 million t in 2020, a reduction of 85%, mainly as a consequence of reduced production caused by pests and diseases, while Europe imports about 17,000 t from non-EU countries. Europe is also a net importer, of mushrooms and MAPs. In this difficult context, climate change represents an additional challenge, that increases uncertainty of future supply.

In order to bridge the divide between supply and demand, it is important to identify existing barriers that are related to structural elements such as, inter alia, secured access to the resource, high costs of extraction, reduced innovation capacity, scarcity of a skilled workforce, land-use competition, or a lack of equitability along the value chains –real or perceived– that demobilises primary producers. To overcome these barriers, concerted action and strong public–private cooperation is needed. There is already some momentum to build upon. For example, 300 000 ha of cork oak have been planted in Iberia since the year 2000 – they will enter production in the coming decades. In Portugal, the area of *Pinus pinea* for pine nut production has grown fourfold from 50,000 to 195,000 ha (more than €40 million has been invested in this expansion), and in Spain, over 15 000 ha of forest have recently been brought into truffle production.

³⁶ Relevant sectoral reports will be referenced in the final version of this document

A need to secure sustainable harvesting and fair trade

In many areas of the world, notably in tropical and subtropical regions, NWFPs can represent a significant income for rural people. As the leading importer of NWFPs, Europe is responsible for sustainable harvesting and trade in the countries of origin. Without guarantees of sustainable forest management and labour conditions in these countries, NWFP consumption in EU markets might have unknown detrimental effects on environmental quality and social equitability, promoting ‘unsustainable harvesting’ or ‘imported deforestation’ in supplier countries³⁷.

The responsibility does not rely only with governments. NWFP operators and sectoral organisations must strengthen their sustainable supply, increase transparency to address the risks of illegal or unsustainable harvesting, submerged economies, social conflicts, compliance with labour standards, and implement traceability to guarantee food safety and resource sustainability.



Photo: © Adobe Stock

³⁷ Pettenella and Masiero, 2020 https://www.researchgate.net/publication/344668325_Deforestation_Made_in_Italy_Le_responsabilita_delle_impres_e_dei_consumatori_italiani_nella_deforestazione_dei_paesi_tropicali



3. Concerted actions to achieve core policy objectives

Better targeted and more coherent policies are needed, in order to realise the potential contribution of NWFPs to sustainable development, the development of a circular bioeconomy, nature conservation and well-being. Specifically, decisive actions must address four main objectives.

1. **Securing conservation and sustainable supply of NWFPs**, addressing the risk and negative impacts derived from climate and social change, including increased pressures on resources, unsustainable practices, and the erosion of cultural heritage.
2. **Support viable, competitive, and transparent value chains** for the integration of rural and urban economies, ensuring sufficient and equitable returns for local communities, land and forest managers/owners, harvesters, and a fair distribution of profit along the value chain.
3. **Ensure transparency on material and economic flows**, through improved data collection, and through adequate classification, labelling and communication over NWFP origins, qualities, and trade.
4. **Provide the necessary conditions** to support all actions in a coherent policy environment and an active and capable governance framework.

Action is needed at different territorial levels, from the international and European to the national, regional, and local, respecting the subsidiarity principle. States should take the lead, through national programmes as later proposed, but European action is needed in the coordination, harmonisation of regulations, integration and dissemination of information, mainly as part of bioeconomy and rural development policies. Action is also needed by the United Nations with respect to improving the collection and codification of trade statistics to promote sustainable and legal value chains and biodiversity conservation.



Photo: © Adobe Stock

Summary of key actions proposed

The policy actions are divided into four areas covering: supply; value chains; data and information; and enabling conditions.

3.1 Securing the conservation and sustainable supply of NWFPs

3.1.1 Enhance the resource base

- Focus on active forest management and diversification of existing stands
- Support long-term forest investments through appropriate economic instruments
- Recognise and support agroforestry systems as being especially rich in NWFPs
- Target forest management and planning on NWFP production and multifunctionality
- Invest in domestication, to secure supply of most demanded NWFPs

3.1.2 Ensure sustainable harvest levels and fair and secure access to the resource

- Guarantee fair, predictable and transparent access to forest resources
- Regulate and respect harvest rights for NWFPs
- Establish adequate and realistic control and monitoring responsibilities and procedures
- Train workers and collectors of NWFPs adequately
- Build capacities on NWFPs into and decisively develop forest advisory services

3.1.3 Set up and improve monitoring systems and inventories

- Embed NWFPs resource assessment in National Forest Inventories
- Support resource assessment of NWFPs at different spatial scales
- Establish innovative procedures to record quantitative information on wild NWFP collection and trade
- Fill the knowledge gaps in support of NWFP assessment and monitoring

3.2 Building competitive and equitable value chains

3.2.1 Develop innovative and territorial value chains

- Contractualise the relationships between landowners and collectors of NWFPs
- Favour co-management of public forests
- Promote new business models and downstream integration
- Realise synergies with tourism in territorial development strategies
- Support initiatives for market differentiation based on certification of quality, origin and sustainability
- Promote voluntary certification and labelling standards
- Incorporate systems of Payments for Environmental Services (PES) in the farmer's income

- Support place-based value chains and local networks

3.2.2 Innovative fiscal and labour regimes

- Define clear definitions and boundaries on who the producers are
- Adopt innovative fiscal regimes
- Adopt innovative labour policies to tackle seasonality and undeclared work

3.2.3 Equitability and the role of producer organisations

- Increase transparency of price setting and price observatories, linked to product quality standards
- Stimulate, strengthen and involve producer organisations

3.3 Transparency, data and information flow on NWFPs

3.3.1 Improve visibility of NWFPs

- Establish high-relevance NWFP species and derived products lists at European and country-level
- Improve official NWFP statistics in International Statistical Classifications Systems
- Integrate NWFPs in individual/household consumption surveys
- Complement information by targeted sectoral surveys and market surveys

3.3.2 Traceability and innovative labelling

- Enforce compliance with mandatory traceability for food and related labelling requirements
- Establish legal standards and due diligence systems
- Encourage voluntary certification and quality standards
- Inform and educate consumers through guarantee of origin
- Leverage the potential of mobile ICT solutions for labelling and traceability

3.3.3 Facilitate access to data on production, commercialisation, and trade

- Promote studies of costs, rents, trade, and prices for NWFP production systems
- Promote knowledge sharing through good practice guidelines and ICT platforms

3.4 Enabling conditions

3.4.1 Coherence of institutional action

- Increase policy coherence across all relevant policy domains
- Establish a consistent approach to nature and landscape conservation
- Develop a shared understanding of the social and ecological dimensions of NWFP
- Support compliance with food and chemical safety regulations
- Establish a level playfield implementing hierarchy of uses, cascade use and circular bioeconomy approaches
- Improve the role and coherence of CAP in facilitating NWFP conservation and development

- Develop coherent plans or programmes for the different NWFP sectors at different scales

3.4.2 Improve financial support

- Clarify eligibility for NWFPs and agroforestry land in the CAP direct payments
- Take a fresh look at rural development programmes
- Overcome barriers that prevent uptake and eligibility
- Better support NWFPs within existing programmes and funding sources

3.4.3 Foster innovation, knowledge transfer and extension capacity

- Build a systemic approach to promote innovation
- Increase research attention to the social-ecological dimensions of NWFPs and improve transnational cooperation
- Develop capacities in rural development agencies
- Strengthen forest advisory services
- Increase the attention given to NWFPs in vocational training schools

3.1 Securing the conservation and sustainable supply of NWFPs

Strong societal trends favouring bio-based, natural, wild, and unique products and experiences, are increasing demand for NWFPs. This opens enormous opportunities but can also have negative consequences. Resource scarcity is emerging as one of the limiting factors. For NWFPs mainly collected in the wild, increased demand may lead to unsuitable harvest levels, uncontrolled trade, biodiversity loss, and resource depletion. It could also generate conflicts between local communities and professional NWFPs collectors. For NWFPs produced in managed forest ecosystems, lack of supply is related to abandonment of forest management or intensification of agriculture in agroforestry systems, both in response to reduced profitability of primary production in absence of compensation or common-good ecosystem services they provide. European forests as we know them are both social and ecological systems, influenced for hundreds of years by human uses and management. Maintaining complex forest landscapes that provide a rich portfolio of wood and non-wood products requires active management. The capacity of forest systems to provide multiple ecosystem services sustainably, primarily but not limited to the provisioning of diverse resources, is in the core of forest restoration and conservation, offering nature-based solutions for renewable feedstock sourcing without forced input of agrochemicals, fertilizers, etc. Abandonment of forest uses and resources in Europe can also lead to over-exploitation in countries with weaker forest governance. In all cases, these risks are exacerbated by the negative impacts of land-use change and climate change.

Urgent action is needed to protect and enhance the resource base, to promote sustainable forest management, including sustainable harvesting practices and improved monitoring systems.

Focus 2. A three-headed Hydra threatening NWFP conservation and supply

Climate change is affecting the vitality, structure and function of forest and other woodland ecosystems, and thus, the availability of NWFPs. Of special concern are the impacts of ongoing reduction of precipitation – drought cycles – and increased aridification across the Mediterranean basin that is reducing NWFP availability and quality while increasing seasonality, jeopardising supply chains, as well as territorial marketing strategies. Of special concern are the effects on wild mushroom production and climate-mediated nut masts (i.e. yearly natural massive variation in nut production). In addition, climate change and global trade are accelerating the spread of exotic and local pests and diseases. Some worrisome cases include the decay of resin-tapped maritime pine (*Pinus pinaster*) in Portugal caused by the fatal pine wood nematode (*Bursaphelenchus xylophilus*), reduced production of pine nuts and chestnuts across the Mediterranean due to the western conifer seed bug (*Leptoglossus occidentalis*) and the chestnut gall wasp (*Dryocosmus kuriphilus*), respectively; and the greatly reduced quantity and quality of cork due to the flatheaded borer (*Coraebus undatus*) or the gypsy moth (*Lymantria dispar*).

Uncontrolled or untrained harvesting of NWFPs can lead to over-exploitation and to the use of **unsustainable and damaging practices** (e.g., the collection of immature specimens or damaging the vegetation while collecting). Frequently these threats are linked to the **illegal or informal trade**, but also to a **lack of a well-trained workforce** in otherwise legal operations. As an example, untrained or unprofessional cork-stripping or resin-tapping operations can lead to tree damage and ruin product quality and quantity for the remaining life of trees. Also, rural abandonment, loss of traditional knowledge, low profitability, seasonality, and remote location of the workplace, put additional barriers to the professionalisation of NWFP collectors. For most wild-collected products, knowledge and training is needed for implementation of good practices. Counter-intuitive scientific findings can challenge commonly accepted wisdom. For example, recent studies have shown that fewer pines per hectare can yield the same amount of resin as denser stands, because each tree produces more as a result of less competition; this increases resilience to climate change and improves profitability (by reducing workload).

"Focus 2" continues on next page...

Land-use changes are reducing the extension and vitality of extensively managed and NWFP-rich forests and agroforestry landscapes, as is the case of *dehesa* and *montado*, open oak woodlands, critically relevant for cork supply and acorn mast. Rural abandonment translates into forest expansion, densification, and simplification, as in the case of mixed oak stands, where cork oak is progressively outcompeted by holm oak (*Quercus ilex*) and lost for production in Sardinia. This leads to an increased wildfire risk and reduced plant diversity. Likewise, the loss of complex and open forests and agroforestry systems also reduces the diversity, availability, and accessibility of NWFPs (e.g. the range of different edible mushrooms). Moreover, rural abandonment generally encompasses the loss of traditional knowledge and of an available trained workforce, further hampering the production of NWFPs, as is the case for cork and natural resin. Paradoxically, most wild products come, at least in Europe, from managed forestry and agroforestry systems.

3.1.1 Enhance the resource base

The forest area in Europe is increasing at a rate with large areas of abandoned agricultural land becoming reforested. This process is especially intense in inland Mediterranean countries. Forest encroachment creates not only positive ecosystem services (e.g., carbon sequestration or soil restoration), but also ecosystem *disservices* (e.g., extreme fire events, less rainfall runoff and river discharge, or loss of open habitat species). The active, multi-functional management of these expanding forests is the first necessary step to guarantee healthy, sustainable ecosystems, and to achieve a balance of goods and services to address societal demands, and minimise the disservices. Specifically, increased emphasis is needed in sustainable multi-purpose forest management to ensure the complementarity of providing wood as well as NWFPs and other ecosystem services:

- The afforestation efforts during 20th century have played an important role in reversing deforestation of previous centuries and leading to the expansion of the forest area. Today, however, **efforts should focus on an active management and diversification** of those planted and the spontaneously expanding young forests, in order to overcome simplified ecosystems (single-cohort plantations, for increasing their resilience and value, and transitioning from timber-oriented forestry towards an integrated, more flexible multi-functional forest management at the landscape scale).
- **Public investment and specific economic instruments** are needed to overcome the long-term return on investments needed for the active management of spontaneous and planted forests or to address the lack of private profitability. Sound approaches are needed to upscale green investments – frequently restricted to specific issues like afforestation, carbon forestry, or wildfire prevention – to the multi-functional management of new, spontaneous or planted forests.
- **Agroforestry habitats are especially rich in NWFPs.** The recognition of the strategic importance of agroforestry systems made in the EU Green Deal must be translated into targeted policy support, inter alia, the strategic plans of the Farm to Fork and Biodiversity strategies, and the CAP and Rural Development Plans.

- **Forest management should target NWFP production and ensure multifunctionality** from the early stages and at all scales of planning. In some cases, forest regulations and/or management plans need increased flexibility, allowing for, and promoting the definition of specific management units, like resin-tapping *lease units* in pine forests, cork-stripping units, ‘mushroom hunting grounds’, or MAP collecting units, whose boundaries do not necessarily coincide with that of forest holdings or management units. Similarly, flexibility is needed with respect to revisiting traditional and developing new silvicultural systems more appropriate for NWFPs; for instance, coppicing can increase the yield and profitability of high-quality mushrooms and thinning regimes can increase the yield and profitability of light-demanding understory NWFPs.
- **Invest in domestication, to secure supply of the most demanded NWFPs**, reducing the pressure on wild populations and diversifying farm incomes (Figure 2). Examples of recent domestication successes in NWFPs are strawberry tree fruits (*Arbutus unedo*); Mediterranean pine nuts from *Pinus pinea*; mushrooms like *Agrocybe aegerita*, *Boletus edulis*, *Tuber melanosporum*, *T. magnatum*; or MAPs like *Argania spinosa* for argan oil in the Maghreb. However, successful domestication can put wild collection at risk. Origin, quality and ‘wild product’ labels, differential commercialisation, and territorial marketing approaches, can help maintain a certain market share for traditional wild collection.

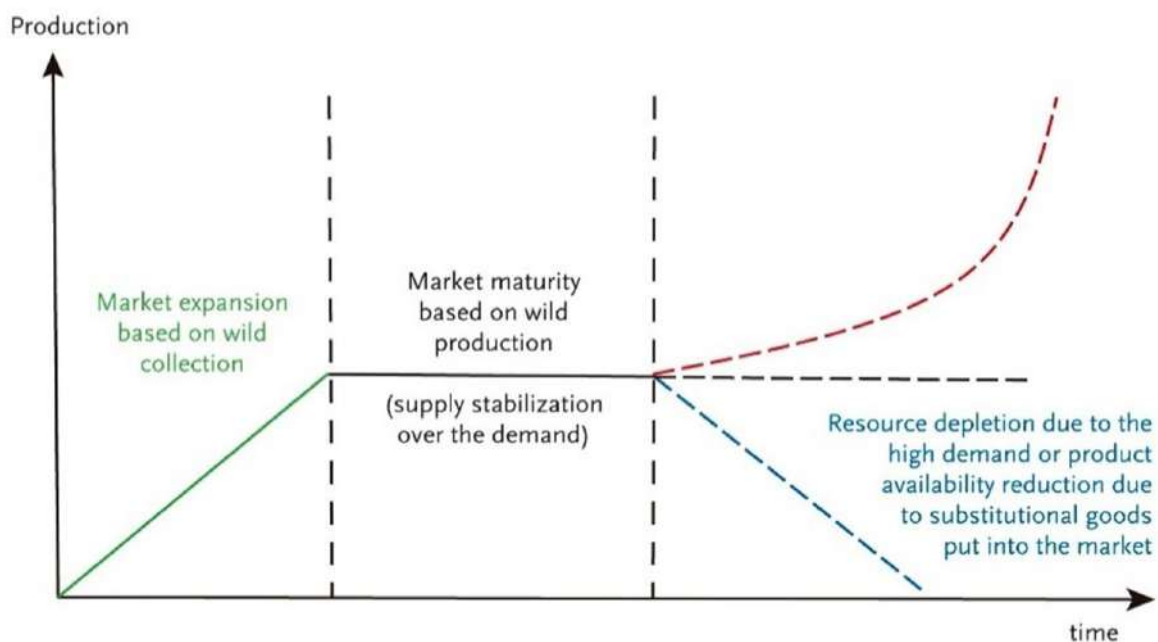


Figure 2: NWFP development paths. Source: Pettenella (in Wolfslehner et al., 2019) modified from Homma (1992). Many NWFPs may be considered in the market expansion phase (green line) heading towards a maturity stage based on wild collection (black solid line). Resource depletion may result from either over-exploitation or reduced collection due to the substitution by cheaper alternatives (blue dotted line). An increased production led by an increased demand may result from domestication or improved production processes (red dotted line), provided that differentiated labelling systems protect and valorise wild forest products, justifying their inherently higher prices.

3.1.2 Ensure sustainable harvest levels and fair and secure access to the resource

Developing competitive value chains based on NWFPs (e.g., essential oils) or their services (e.g., mushroom tourism) also requires secure and predictable access to resources. Significant knowledge and training gaps remain not only in relation to sustainable harvest levels, intensities, and techniques, but also in relation to the organisation and transparency of the value chains and the skills and motivation of harvesters of many wild-collected products. This is in sharp contrast with the wood supply chain, or that of some more industrial NWFPs like cork or resin. Existing uncertainties only exacerbate the need to assess, regulate, and control annual or seasonal harvest levels, and the need for resource monitoring, as the basis for a sound knowledge-based and sustainable management. For this to be possible urgent action is needed to:

- **Guarantee fair, predictable and transparent access to forest resources.** Frequently, harvesting rights for NWFPs from public forests (cork, resin, pine nuts, MAPs) are auctioned – or not – as an administrative procedure on an annual basis. This, together with masting and weather-driven yield variations, creates uncertainties for supply and jeopardises investments in processing and commercialisation. To overcome this situation, it is important that the responsible authorities make efforts to improve transparency and predictability of resource availability, developing early assessment methods and publishing information on accessible resources, with stability and the periodicity that is appropriate for the market.
- **Regulate and respect harvest rights.** In a similar way that specific civil laws regulate rights for fishing and hunting, access and collection rights must be clarified for mushrooms, truffles, aromatics, or wild berries; such rights frequently remain unclear. Once regulations become clearer, they have to be enforced. The basic requirement is that national and regional authorities have clarified the regime for each type of resource and land ownership, the legal requirements for harvesting (e.g., licences, permits, leases, technical prescriptions), as well as requirements and circumstances for placing the harvested material on the market, including, as appropriate, billing and/or taxation duties (see section 3.2.2). Access to resources might be completely free, or regulated but free of charge, or under fee, paid permit or, if exclusive, as lease by auction or other types of agreements (Box 1). Regulations of shared access should distinguish occasional pickers and hobbyists from professional harvesters, to protect the social relevance of NWFPs. In fact, regulation of picking activities can be the only way to prevent or address existing or potential conflicts among local/non-local or hobbyists/professional pickers; such conflicts have been emerging in several places across Europe.
- **Establish adequate and realistic control and monitoring responsibilities and procedures,** to guarantee compliance with harvesting and commercialisation regulations. The fulfilment and control of these systems is not easy to achieve. At the harvesting end, this control must build upon, as much as possible, individual responsibility (as in the tradition of everyman's right in Nordic and Baltic countries), on the involvement of local stakeholders, and collector associations (e.g. as in the shellfish collectors guild in Lourizán, Galicia, Spain)³⁸ but also empowering forest administration and guards. At the processing and consumer end, it should build upon due diligence systems, and voluntary certification schemes. It must be noted that regulation and control of wild harvesting is a necessary condition for professional harvesters to demonstrate compliance with organic and wild certification schemes.

Box 1. How contracts or picking permits can reward forest owners and control harvest pressure

In the Italian Apennines, near Bologna, a win–win agreement between landowners and a truffle picker association, '*Associazione Il Tartufo Bologna*', has emerged as a successful case study. Thanks to a lease agreement, the owner maintains his property rights and receives rents, while the truffle picker association manages the land and reserves the truffle harvesting right for its members, who pay an annual fixed fee. As a consequence, a forest system that would have been abandoned is now actively managed. In Spain, the national Forest Law-43/2003³⁹, clarified that mushrooms were also '*fruits of the land*' and thereby property of the landowner, if she or he wishes to declare it and protect it as such. This allows private and public owners to establish who can harvest, in what amounts, and under what circumstances (authorisation, communication).

Building upon this framework regulation, the region of Castilla y León (Spain) established a system of mushroom picking permits in 2003, widely accepted on a voluntary basis, and finally officially recognised by Regulation 31/2017 of mycological resources⁴⁰. More than 700 000 ha of forests have been grouped into mushroom management units⁴¹ and around 100 000 picking permits are sold every year, at an average price of €6 per weekend. Another 5,000 permits are commercially oriented and allow the pickers to sell their harvest to markets, and 25 local processing enterprises collectively manage the quality label '*Mushrooms of Castilla y León*'. Forest owners, mostly municipalities, dedicate the largest proportion of the revenues from permits (around €750 000 yr⁻¹) to maintenance, promotion and research, since the main objective of the system is to generate tourism rather than direct income from NWFPs.

- **Train workers and collectors adequately.** Correct execution of collection or harvesting operations is decisive for the protection of the resource and the quantity and quality of the NWFP sourced. For this reason, NWFP management and harvesting should be incorporated in vocational education programmes; relevant training centres dedicated to NWFPs have proved extremely valuable – e.g., CINCORK⁴² is a training centre for the cork industry in Portugal; it was created in 1985 as the result of a private–public collaboration. The Spanish experience shows that is not enough to define required skills and the corresponding professional certificates (e.g., UC-1291_1⁴³ for cork stripping and UC-1292_1 for collecting pine cones, wild fruits and mushrooms, plants, and for resin tapping), if those skills and certificates are not then offered in training centres, and incorporated into advisory services. The result is that NWFP workers only learn by practice and do not have formal training documentation of their skills; this poses barriers for mobility of a skilled workforce within Europe.
- **Build capacities on NWFPs into and decisively develop forest advisory services,** as part of the Agriculture Knowledge and Information Systems (AKIS). Forest advisory

³⁸ Confradia de Lourizan <https://www.cofradialourizan.es>

³⁹ National Forest Law-43/2003, (Article 6-i) <https://www.boe.es/buscar/doc.php?id=BOE-A-2003-21339>

⁴⁰ Regulation 31/2017 of mycological resources <https://bocyl.jcyl.es/html/2017/10/09/html/BOCYL-D-09102017-1.do>

⁴¹ Mushroom management units <https://servicios.jcyl.es/micoex/publico/consultaAcotados.action>

⁴² CINCORK https://www.cincork.com/articles/show/quem_somos.html

⁴³ http://incual.mecd.es/documents/20195/94271/AGA398_1+-+Q_Documento+publicado/b1a7e49e-226a-46d5-82f0-400503e00a1b

services are often missing or severely under-developed, within European AKIS. When they exist, they generally fail to incorporate advice or training capacities in NWFPs. Stronger extension services are necessary to improve the replication of best practices and the uptake of research outcomes, such as, for example, those linked to mechanisation in cork (e.g. GoSuber)⁴⁴, new resin extraction procedures (e.g. ResiMec, the SustForest, BoreHole techniques)⁴⁵, mechanically aided harvesting of nuts (e.g. tree shakers for pine cones; chestnut collector machines in Portugal, France or Italy)⁴⁶, or MAP collection protocols (e.g. FairWild's Manual for Sustainable Wild Collection Practices)⁴⁷.

3.1.3 Set up and improve monitoring systems and inventories

Most NWFPs are produced in annual, perishable and often fluctuating amounts. Unlike wood, they can be non-conspicuous for part of the year. In many cases, there is a lack of knowledge on the factors influencing production and on reliable procedure to measure stocks, production potentials, and thus, sustainable harvest levels. Although traditional knowledge, local knowledge, and collectors' knowledge have provided the basis for millennia of sustainable use of NWFPs, modern forest management requires data-based rules, especially when the commercial exploitation of natural resources is done by third parties under lease, licence, or permits. This is especially important in a context of climate change and emerging pests and diseases, as a complete lack of data in extreme cases does not allow to the alarm to be raised in the event of emergencies, or to gather political support for action. Examples of such extreme cases include: the case of a severe attack by *Leptoglossus occidentalis*⁴⁸, a conifer seed bug that resulted in the collapse of Mediterranean pine cone production in 2011 in most producing countries including, Spain, Portugal, Turkey, and Italy⁴⁹. In this respect, decisive action in the following areas is needed:

- **Embed NWFP resource assessment in National Forest Inventories.** National forest inventories and related modelling approaches have traditionally focused on forest growth and woody biomass yields and qualities based on stand and tree biometry. However, stocks and productivity of NWFPs require new variables to be measured and new functions and models to be developed. A coordinated effort is needed on behalf of public institutions and research centres, national or regional ministries, or at the European level, to solve this lack of basic information, as well as growth and yield models, among European countries and sectoral organisations (Box 2).
- **Support resource assessment of NWFPs at different spatial scales.** NWFP monitoring, sampling or periodic inventories are essential at the forest management unit level to assess the stock and the actual annual harvest. This will allow fair prices to be achieved at auction, lease, or permit sales, and also allow control of adequate extraction rates, avoiding over-exploitation. This monitoring effort must include the assessment of harvesting levels and procedures, necessary to implement adaptative management approaches that put the regeneration capacity and resilience of the ecosystem at the core of management. Egg

⁴⁴ <http://gosuber.es/>

⁴⁵ <https://www.fafcycle.es/project/grupo-operativo-resimec/> ; <https://www.sust-forest.eu/pt-pt/video/reportagem-do-canal-8-dedicada-resina-gem-e-ao-projecto-sustforest-plus> ; <https://www.youtube.com/watch?v=ETW0v80gbcM>

⁴⁶ Portugal: https://www.youtube.com/watch?v=B7XaW1_wFlo; France: <https://www.youtube.com/watch?v=Re7zigkAxcE>; Italy: <https://www.youtube.com/watch?v=eP4LrErpx4E>

⁴⁷ <https://static1.squarespace.com/static/5bec424b297114f64cb908d8/t/5cc9755b4785d307eac2e04d/1556706659380/IMO-Sustainable-Wild-Collection-Practices.pdf>

⁴⁸ INCREDIBLE Factsheet <https://repository.incredibleforest.net/oppla-factsheet/20770>

⁴⁹ Calama, R., Gordo, J., Mutke, S., Conde, M., Madrigal, G., Garriga, E., Arias, M.J., Piqué, M., Gandía, R., Montero, G., Pardos, M. 2020b. Decline in commercial pine nut and kernel yield in Mediterranean stone pine (*Pinus pinea* L.) in Spain. *iForest*13(4), 251-260. doi:10.3832/ifor3180-013

mass counts of Lepidopteran defoliators carried out annually in Sardinia, allow determination of whether cork debarking will be allowed in the following year and also definition of the intensity and location of phytosanitary treatments to preserve cork production. This entails continuous public investment and constant training of instructions.

- **Establish innovative procedures to record quantitative information on the collection and trade of wild MAPs, mushrooms and other NWFPs.** This information is either incomplete and scattered across different reports and data sets (e.g. Portuguese Information System on Pine Cones “SiP”, Portuguese Information System on Resin “SiResin”, or Spanish Statistics on NWFP⁵⁰). In many countries, there is simply no official data about wild plant collection (e.g. Sweden or Austria). To solve these gaps, innovative approaches are needed, such as those linked to new fiscal regimes (see section 3.2.1), traceability (see section 3.3.2), or inserting NWFP collection into the Farm Accountancy Data Network (FADN) procedures, that could provide information at the farm and regional levels.
- **Fill the knowledge gaps, in support of NWFP assessment and monitoring.** The growth and production rates of most NWFPs are less known, and inventory systems and techniques are missing or not sufficiently reliable or cost-effective. Mushrooms and truffles, for example, are organisms not visible above ground for all or part of the year, and whose mycelia are costly to detect. Production of nuts and berries are greatly affected by climatic and understory light conditions, or subject to masting years; these factors present challenges for modelling approaches. Even when assessment and modelling tools do exist, as in the case of resin, cork, or Mediterranean pine nuts, changing environmental conditions and the emergence of new pests and diseases require additional efforts to measure and estimate yields and associated qualities.

Box 2. Successful national or regional inventories and monitoring systems for NWFPs

Turkey has made a great effort to improve the national forest monitoring systems. The regulation (Tebliğ-297) was passed in 2013, including the conditions on production and trade of NWFPs. In 2015, more than 2800 species, with close to 14 000 records in 1.3 million ha had been monitored. A list of species (animals, plants and mushrooms) providing NWFPs in the country is being maintained. In **Castilla y León (Spain)**, the regional forest service keeps a record since the 1960s of pine cone production in public forests managed for pine nuts, and maintains two highly valuable networks of permanent sample plots: one for individual tree pine cone production, and another one mushroom production in pine forests with close to 30 years of data.

In **Greece**, in order to establish specific regulations for the collection, certification, and trade of wild edible mushrooms, an expert working group produced a report in 2020, suggesting national lists of mushrooms of commercial interest, amateur interest, and protected species, training for collectors and inspection, licensing, traceability, and labelling procedures. Proposals were discussed with various stakeholder groups and pilot implementation is underway.

"Box 2" continues on next page...

⁵⁰ Pine cone information system <http://www2.icnf.pt/portal/florestas/fileiras/regime-juridico-pinha-pm>; Pine resin information system: <http://www2.icnf.pt/portal/florestas/fileiras/resinagem-circulacao-resina>; Spanish statistics on NWFP: https://www.mapa.gob.es/es/desarrollo-rural/estadisticas/forestal_anual_otros_aprovechamientos.aspx

COST Action FP1203 and INCREDIBLE project actions in Greece offered a significant input throughout and after this procedure. In **Spain**, the National Forest Inventory has recently included the measurement of new tree parameters for maritime pine, which aim at predicting resin production based also on meteorological data.

3.2 Building competitive and equitable value chains

The number of downstream value chains deriving from NWFP resources is potentially huge, spanning from food chains and gastronomy, to the pharmaceutical, cosmetics, chemical, construction, and recreation and tourism sectors. The number of stakeholders directly or indirectly involved in the NWFP value chains is even greater, as they include self-consumers and non-professional collectors. The low bargaining power of producers and collectors, the existence of non-renewable substitutes and imported quasi-equivalents, along with a processors' landscape dominated by low-innovation small- and medium-sized enterprises (SMEs) creates high competitiveness in the markets and low profitability for producers and collectors at the first steps of the chains, and, therefore a high risk of abandonment of the activity, especially noticeable in higher income countries. It is necessary to revert this situation, to recognise the positive social and ecological externalities of NWFP value chains, and to reduce competition from non-renewable or, sometimes, domesticated counterparts. Specifically, action along the following lines is urgently needed.

Focus 3. Diverging value chains of NWFPs

'Semi-wild', 'managed for', and 'cultivated' NWFP value chains, such as chestnuts, cork, resin, pine nuts, or truffles, are characterised by an *hourglass shape*, with multiple producers, selling NWFPs to a reduced number of, generally sophisticated, processors (sometimes through intermediaries) that feed into multiple secondary and tertiary processors producing a wide array of products in different markets. They generally face tight competition from non-renewable substitutes (e.g., oil based derivatives for resin, aluminium or plastic stoppers for cork) or from imported quasi-equivalents (e.g., cheaper pine nuts, truffles, mushrooms of foreign untraced origin), resulting from lack of market differentiation and consumer awareness. Mainly due to reduced profitability for producers, several value chains have been abandoned, or greatly reduced, especially in higher income regions (e.g., cork and resin in France and Spain). This threat is greatly increased when lack of investment reduces the competitiveness of processing industries (e.g. cork in Sardinia, Italy).

'Wild' NWFP value chains, such as those of berries, mushrooms, truffles, and MAPs, are often based around hobby collectors and a reduced number of professional, low-wage pickers or harvesters, that sell their products to a diverse array of intermediaries, retailers, processing companies, or final users, like restaurants. Generally, processors are micro-, small, and medium-sized enterprises (MSMEs), with low innovation capacity, but able to leverage informal networks and trading channels. Frequently, products collected in the wild, face fierce – and unfair – competition with farmed production, unless appropriate labelling or marketing tools allow for discrimination from cultivated products. In these types of products, the added value increases exponentially downstream of the value chain, and thus, the value created for collectors, landowners, and communities is very limited, even when they incorporate primary processing or extraction of active substances (Figure 3).



Figure 3: Market derived from one kilogram of aromatic plant collected or produced. Source: R. Armengol (Provital)

3.2.1 Develop innovative and territorial value chains

It is necessary to insert NWFPs into the economic mainstream and to leverage their potential for territorial development. Action is needed to generate revenues for landowners, to secure not only access to the land for hobbyist and non-professional pickers, but also a fair income and working conditions for professional pickers, as well as jobs and livelihoods for the local communities at large. Evidently, there is no ‘one size fits all’, and this requires holistic and well-tailored strategies. However, some necessary conditions are the regularisation and professionalisation of labour, a well-tailored tax regime, as well as business models with capacity to generate and share income at all steps of the different value chains. To achieve this, several complementary strategies can be followed:

- **Contractualise the relationships between landowners and collectors of NWFP.** The development of picking permit systems has proven successful in many countries and for different NWFPs, helping control harvesting intensity and creating some revenue for the landowners. While it works very well for hobbyist pickers, regulating professional harvest and collection often requires a more comprehensive and robust approach. Contractualisation of collection rights improves access to the resource, while, if properly approached, facilitates horizontal collaboration (e.g., in cooperatives) and vertical development of value chains. It makes traceability possible and guarantees a fair income for the landowner, whether private or public, and improves working conditions. In Spain, for instance, Law 2/2000⁵¹, of agri-food contracts, defines a template for contracts between landowners and collectors – initially for resin and wild mushrooms – agreed by sectoral organisations, and supervised by the Ministry of Agriculture. Responsible authorities can build upon existing contractualisation experiences such as those developed for cork in Sicily, MAP collection in Doñana National Park (Spain)⁵², or *Arnica montana* collection in the Haute Vosges⁵³ regional park (France)⁵⁴.

⁵¹ Ley 2/2000, de 7 de enero, reguladora de los contratos tipo de productos agroalimentarios <https://www.boe.es/buscar/act.php?id=BOE-A-2000-413>

⁵² Synergies between forest owners and medicinal plant distiller: The case of Eucalyptus in Andalusia <https://repository.incredibleforest.net/oppla-factsheet/20472>

⁵³ A territorial and multi-stakeholder organization for sustainable harvesting of Arnica in its mountain stubble habitat (Hautes Vosges) <https://repository.incredibleforest.net/oppla-factsheet/20112>

⁵⁴ These cases are documented in the [Incredible knowledge repository](#) and [European Commission EIP-Agri database](#)

- **Favour co-management of public forests.** Co-management of public forests with local populations, grants access to land, and improves smallholder livelihoods. This could be achieved by means of incentives that encourage local populations to organise into cooperatives and production groups, as they have a greater capacity to reach markets, participate in tenders and improve the quality of management and products. Cooperative action by local stakeholders, under clear regulations and benefit sharing, has proved successful in many cases in delivering forest conservation, entrepreneurial growth and territorial development (Box 3).

Box 3. Harvest rights in Tunisia: the case of medicinal and aromatic plants

In Maghreb countries, production of various NWFPs mostly comes from lands owned by the state. In Tunisia, in particular, all forest areas are public and in order to use NWFPs – such as Aleppo pine (*Pinus halepensis*) cones, stone pine (*Pinus pinea*) cones, MAPs, or cork – producers and firms must go through a tendering procedure according to Article 18 of the Tunisian Forestry Code, organised each year by the Tunisian Forestry Authority. Usually, it is only larger private firms that have the sufficient price-negotiation and financial capacities to participate in the public tender. However, the local population represents the principal workforce hired to collect the plants and they may also collect plants for local use in small territories, as part of family projects and start-ups.

Each year around 120 000 ha of land are exploited for MAP collection in Tunisia, though they remain underexploited: for the period 2000–2015, only 63% and 34% of the potential of rosemary (*Rosmarinus officinalis*) and myrtle (*Myrtus spp.*) were exploited, respectively. Moreover, to favour SMEs that specialise in essential oils or resin production, the government is seeking general reforms for investments and to support SMEs by devising specific programmes that facilitate financial loans or small credit access. The inherent risk of these forms of support is to benefit larger enterprises while SMEs struggle to take part due to the lack of the necessary management skills and warranties.

- **Promote new business models and downstream integration.** As happens with most value chains contributing to the circular bioeconomy, the biggest share of added value is produced downstream, in secondary transformation and final products, limiting the attractiveness and even the economic sustainability of primary producers (cork, resin, pine nuts) or collectors (mushrooms, MAPs). Public–private collaboration is necessary to promote entrepreneurship, and support new industrial and commercial endeavours. Examples of successful vertical integration are local distilleries in the southern Mediterranean that export essential oils rather than raw plant materials. Also in Tunisia novel extracts been produced from *Pinus spp.*, *Urtica dioica*, *Eucalyptus spp.*, or *Melia azedarach*, (this extract has insecticidal effects), and new gourmet or cosmetic oils from, for example, *Pistacia lentiscus* or *Pinus halepensis* seeds in Tunisia. New opportunities lie in natural well-being, spa, and para-pharmaceutical products, or do-it-yourself cosmetic kits, leveraging LOHAS (Lifestyles of Health and Sustainability), and *halal* tourism megatrends. Pine resin distilleries in southwest Europe have also started to produce a wide variety of products for specialised markets, including chemicals (adhesives, printing ink, paints, and coatings), pharmaceuticals, health care, cosmetics, food industry, flavourings and fragrances, or agrochemicals.

- **Realise synergies with tourism in territorial development strategies.** Tourism and especially ecotourism strategies, can greatly benefit from increased interest in wild and traditional products, as well as in experiential activities in rural areas. This opens up the opportunity to generate synergies among services and products of a territory, making a tourism destination, more attractive, and expanding the markets for NWFPs-based products, experiences and other services, frequently supported by a well-recognised brand, such as *'Traditions and Flavours of Modena'*, or the *'Strada della mela e dei sapori delle valli di Non e di Sole'*⁵⁵. Inspiration can be drawn from an increasing number of successful examples and tools for *mycotourism*, that can be found all over the Mediterranean (Box 4).
- **Support initiatives for market differentiation based on certification of quality, origin, and sustainability.** They can be based on local varieties, geographic origin identification, etc., as they have the potential for improved margins (Trasmontana, Portugal; Corsica, France)⁵⁶, and can greatly increase the impact of territorial marketing strategies. Developing these certification schemes, in any case, requires a in- depth analysis of costs and benefits and market potential, the necessary knowledge to define and adhere to quality standards, as well as strong long-term commitment from private and public stakeholders, as transaction and certification costs can easily become cumbersome (FAO, 2019: "Geographical Indications for Sustainable Food Systems")⁵⁷.
- **Promote voluntary certification and labelling standards** (e.g., FairWild⁵⁸), to facilitate and guarantee sustainable and legal collection and respect for collector's rights in third countries, for example through public procurement and food labelling, as further discussed in section 3.3. This would support the implementation of relevant international Conventions such as CITES and the achievement of global targets as agreed under the Rio Conventions (United Nations Framework Convention on Climate Change, UNFCCC; Convention on Biological Diversity, CBD; United Nations Convention to Combat Desertification).

Box 4. The role of wild mushrooms and truffles in the tourism sector

Examples for the mushroom passion and mycotourism in Italy⁵⁹ are 'Save the Truffle', an authentic truffle hunting experience, 'Fungo di Borgotaro IGP', a mushroom label of a small town that attracts thousands of tourists and foodies, and the 'International Alba White Truffle Fair', a truffle fair at its 90th edition. In Greece⁶⁰, Grevena in Western Macedonia has created a new identity as the 'Town of mushrooms', with museums and restaurants dedicated to wild mushrooms and festivals, surveys, and training activities by local associations. The Spanish region of Castilla y León is another example of successful mycotourism, which now accounts for nearly 40% of the total returns from mycological resources (estimated at €65 million yr⁻¹).

In Portugal⁶¹, some municipalities have defined mycological walking paths linked to mycotourism activities. The European Mycological Institute is promoting the international event Trufforum⁶². The European project MYAS has developed an app, Micodata GIS-Europe, which provides information on mycological yield, resources, and services, mycology-related cultural events, and information on areas where harvesting requires permits. This is just one of many examples of technological developments and digitalisation of NWFP-related services.

⁵⁵ A trademark for local specialties, including wild bilberries, in a territory famous for parmesan cheese: <https://repository.incredibleforest.net/oppla-factsheet/19802>; Strada della mela: https://incredibleforest.net/sites/default/files/resource/files/6-presentazione_stradadellamela.pdf

⁵⁶ Longal Chestnut (Portugal): <https://repository.incredibleforest.net/oppla-factsheet/20768>; Pietra: a brand success that brings Corsican identity: <https://repository.incredibleforest.net/oppla-factsheet/20753>

⁵⁷ Geographical Indications for sustainable food systems. <http://www.fao.org/publications/card/en/c/CA5693EN/>

⁵⁸ The Fair Wild Standard <https://www.fairwild.org/the-fairwild-standard>

⁵⁹ Save the truffle: <https://repository.incredibleforest.net/oppla-factsheet/19800>; Fungo di Borgotaro: <https://repository.incredibleforest.net/oppla-factsheet/19799>; Fiera del tartufo bianco di Alba: <https://www.fieradeltartufo.org/en/>

⁶⁰ The town of mushrooms: <https://repository.incredibleforest.net/oppla-factsheet/20591>

⁶¹ Rota de Cogumelos: http://www.ecoparkazibo.com/uploads/2017/percursos/Percurso_Rota%20dos%20Cogumelos.pdf

⁶² Trufforum: <https://trufforum.com/>

- **Incorporate systems of Payments for Environmental Services (PES).** PES can be another income supply, when the value of NWFP producing systems is associated with their high natural value, rural setting, extensive or semi-extensive management models, stemming from traditional or historical practices with associated cultural values⁶³. Positive non-market externalities should be integrated into the economic balance of the forest owner through a process of acknowledgement, quantification, and rewarding from accredited certification systems, public institutions, market operators, industrial companies seeking green investments, the general public, and tourists. Assigning a value to these services is a first necessary step⁶⁴. To bridge the market failure that is jeopardising these systems, NGOs, producer associations and industries may come together to promote and create incentives for sustainable NWFPs production in protected and high value areas, under strict stewardship. Regulations have been developed, for instance, in Portugal or Italy⁶⁵, but implementation is still lagging behind. The most successful, but niche, examples in Europe, have been linked to sustainable management certification schemes (Box 5).

Box 5. Green Heart of Cork (GHoC)

A portfolio of ecosystem services provided by the cork oak forests in Portugal linked with good practices, audited within the certification scheme of the Forest Stewardship Council (FSC), allowed for the development of a voluntary market of PES where the enterprises choose the kind of services provided which they want to reward the landowner for. A connection with environmental NGOs and landowner associations that address the enterprises with the portfolio are important factors for success in market development. Promoting the creation of those associations and providing them with the means to operate is relevant to achieve the implementation of good practices, knowledge transfer, and certified areas, products and services.

- **Support place-based value chains and local networks.** Shortening NWFP value chains favours a closer connection between consumers, local producers and industrial entrepreneurs and dealers, often allowing for improved margins. The dimension of the local offer and demand, available local capacities and existing good practices are the conditioning success factors. Regional and national authorities should support existing initiatives or seek new opportunities for local value chain development (Box 6).

Box 6. Tools to help the connection between producers and industry consuming MAP

In Catalonia (Spain), most of the MAP producers follow a short chain model, where the company cultivates, collects and directly transforms the agricultural product into final products for the final consumer, benefiting the large Barcelona urban area. There is also an important industrial cluster consuming MAP raw material, but sometimes users do not know who the producer is. The *Directory of Medicinal and Aromatic Plant Producers*⁶⁶ is a tool to let industries meet producers and find out which species they are producing and under which production systems (Moré, 2020). This directory is maintained by the *Forest Observatory of Catalonia*⁶⁷, and provides information on different NWFP value chains.

⁶³ Such as the cultural value described for cork oak woodlands in Sardinia, <https://repository.incredibleforest.net/oppla-factsheet/20792>

⁶⁴ Corona et al, 2019. Towards the economic valuation of ecosystem production from cork oak forests in Sardinia (Italy). *iForest - Biogeosciences and Forestry*, Volume 11, Issue 5, Pages 660-667 (2018) doi: <https://doi.org/10.3832/ifor2558-011>

⁶⁵ Art. 70 of the National Law 221/2015: https://www.minambiente.it/sites/default/files/archivio/allegati/GPP/legge_28_12_2015_221.pdf

⁶⁶ <http://directori-pam.ctfc.cat/>

⁶⁷ <http://www.observatoriforestal.cat/>

3.2.2 Innovative fiscal and labour regimes

Grey markets pose a serious problem for companies, especially those dealing in international markets, as they cannot determine the origin of their NWFP raw material. The problem arises from the way they purchase the raw material, since their informal suppliers are often reluctant to sign any formal invoice, making traceability impossible. Their attitude is due to the potential, real or perceived, incompatibility of occasional, non-professional or semi-professional picking activities with receiving social subsidies (e.g. retirement pensions, unemployment payments), or other employment contracts (e.g. permanent public or private employees, police labour force contract, etc.). Nevertheless, without these suppliers, many wild or semi wild products would not enter the market, as picking or harvesting activities are rooted in the local culture of forest use, handed down from one household generation to the next. Grey markets also pose serious problems with regard to product quality guarantees, in the case of food NWFPs, and ensuring adequate working conditions and professional capacity of the workforce.

Fiscal, and labour regimes are generally not well adapted to NWFP primary production activities and in particular to the seasonal and complementary nature of NWFP harvesting incomes. This lack of fit of labour policies and tax regulation must be addressed, as this is a necessary condition to move away from frequently grey economy practices, towards the formalisation of the workforce, legal collection, increased mobilisation of NWFP resources and higher public and private investments in land management. Some critical aspects to be addressed are:

- **Define clear boundaries on who the producers are.** It is necessary to clarify who is actually considered a ‘producer’, by defining the conditions that apply in terms of labour and tax regimes. In fact, clarity on labour and fiscal regimes that producers (pickers of wild products, farmers, or a combination of the two typologies) must comply with favours their entrance into the formal, legal market. If reasonable in terms of tax burden and bureaucratic requirements, this sets the basis for traceability, consumer safety, improved professionalisation, and transparency in NWFP value chains.

Box 7. Official registers for NWFP collectors can actually work!

Between 10 and 25 million Europeans (some 2–5% of the population) are estimated to collect mushrooms every year, mostly for self-consumption. However, some of them actually sell part or all of their harvest, with no clear indications of whether they are allowed to do so or not, which may raise concerns regarding the traceability and safety implications for restaurants and retailers. Experience shows that compliance with registries is very low. In Italy, registers of commercial NWFP collectors have been established by the chambers of commerce; however, uncertain or unfavourable tax duties have deterred actual registration. In Portugal, compliance with mandatory registration for pine nut and resin harvesters, established in 2015, has also been low for similar reasons along with insufficient control and lack of sanctions. In Castilla y León (Spain), only some 20% of the 1500 NWFP producers/collectors of resin, mushrooms, and pine nuts are registered in the security system under the corresponding activity code. Therefore, innovative approaches and more decisive action is needed, to allow these activities to enter the official labour system; anybody can be a passionate NWFP collector, and flexible systems are needed to record all those participating in such activities, regardless of their main professional activity.

- **Adopt innovative fiscal regimes.** In order to address the seasonal and complementary nature of the incomes derived from NWFP production and commercialisation, with the aim of facilitating the development of a formal economy, countries have adopted different strategies to encourage the use of NWFPs and also to support the transparency of economic transactions, based on their regional conditions and cultural heritage.
 - A. A general tax exemption regime** may stimulate active placement into the NWFP market, increasing supply and boosting a sector with positive impacts in marginal or remote rural areas. This is the option selected in Finland, where income received from selling NWFPs is not subject to income tax if it is generated as an occasional activity and the total volume of selling remains below the € 10 000 per year⁶⁸. This policy together with the *everyman's right*⁶⁹ regime applied to the majority of wild forest products (all the ones that do not grow physically on a living tree – e.g. wild mushrooms, berries, etc.) has allowed the development of a stable and formal supply chain, able to compete in international markets despite the higher prices. This option requires a high level of cultural respect and understanding of nature's carrying capacity and is very common in Nordic countries.
 - B. An option for setting-up mandatory registration and tax exemption thresholds** to to differentiate, in fiscal terms, professional economically oriented producers/collectors from non-professional and occasional/amateur collectors. This formula has been adopted successfully in Italy, with national Law n. 145/2018⁷⁰ that established a threshold for income tax exemption of €7000 per year for occasional mushroom and truffle collectors (Box 8). Though there is no official data yet, sectoral observations report a dramatic increase of the formal transactions between occasional pickers and wholesaling companies since enactment of the law; also, the number of licenses has significantly increased, as well the number of professional pickers. A straightforward registration process, and the use of ICT tools also facilitated this success. This option seems very promising for many NWFPs and could be adopted by many countries or regions, provided that adequate monitoring and control on collection levels are designed and enforced.
 - C. Inclusion of NWFPs under the general flat-rate agriculture fiscal regime.** This would require, the explicit inclusion of wild gathering in Annex VII of the EU Value Added Tax Directive 112/2006⁷¹, making wild harvested products eligible for the EU's flat-rate tax scheme for agricultural activities, extending to other products the recognition already granted to some NWFPs subject to seasonal climatic risks. The core advantage of a flat-rate Value Added Tax (VAT) is to guarantee to NWFP producers and collectors, who are subject to the same constraints of other agricultural producers, such as seasonality, the same favourable conditions devised to support the primary sector.

⁶⁸ [Income Tax Law](#). Art 89. Income received by a collector from the supply of these products of wild cones, berries and mushrooms and wild plants or parts thereof collected for human consumption, medicine or the manufacture of a medicinal product shall not be taxable income unless the income is regarded as remuneration.

⁶⁹ Finland's legal concept of everyman's right gives everyone the basic right to roam freely in the countryside and to pick mushrooms and berries almost anywhere regardless of land ownership and without needing to obtain permits or permission, with due restrictions for protected areas or species <https://ym.fi/en/nature-conservation-legislation>

⁷⁰ <https://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:legge:2018-12-30:145>

⁷¹ <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32006L0112>

D. A New European fiscal regime for wild forest product gathering. This entails the design of a new special regime applied to the NACE⁷² category 02.30.00 “gathering of wild growing non-wood products” based on detaxation and de-contribution for social security. This option, would involve the creation of a special section of the EU Value Added Tax Directive 112/2006⁷³, referring directly to this NACE category and would allow each member state to design a VAT exemption threshold and to design at the same time an income tax scheme that fits with the existing procedures at the national level. The latter two approaches would also allow for increased fiscal harmonisation among EU countries, and contribute to a fair competition and dynamic markets across Europe. For instance, cork producers in Portugal are currently recognised as agricultural operators and pay a VAT of 6%, while in Italy raw cork is considered an industrial product, charged with a 22% VAT regime. This calls for a common and consistent fiscal coordination across the EU.

Box 8. An innovative taxation regime adopted for mushrooms and truffles in Italy

Most Italian truffle pickers are concentrated in a few regions such as Emilia Romagna, Abruzzo, Umbria, Marche, Toscana, and Piemonte. An interesting statistic showed that from the 1980s until 2014, the average age of truffle pickers dropped from 80 years old to 45 to 50 years old, which might suggest that picking mushroom/truffles is increasingly becoming a complementary activity for obtaining additional household incomes. The taxation regime was an obstacle for the Italian truffle sector from 2005 until 2019, because the high level of VAT and income taxes were two factors that placed the Italian truffle supply chain at a disadvantage with respect to foreign suppliers. After a long evaluation process started in 2016, the Italian Government adopted the National Law n.145, of 30 Dec 2018⁷⁴, on direct and indirect taxation for occasional pickers collecting wild forest products such as wild truffles.

The Value Added Tax (VAT) exemption up to €7 000 annual selling, for both a) farmers and b) pickers, and the flat income tax of €100/year made truffle collection both convenient and formal at the same time. VAT exemption thresholds and reduced taxation on profits, accompanied by a reduced bureaucratic/legal burden, made it convenient for most pickers to enter the formal legal market. The exemption thresholds in this law are shown in Figure 4.

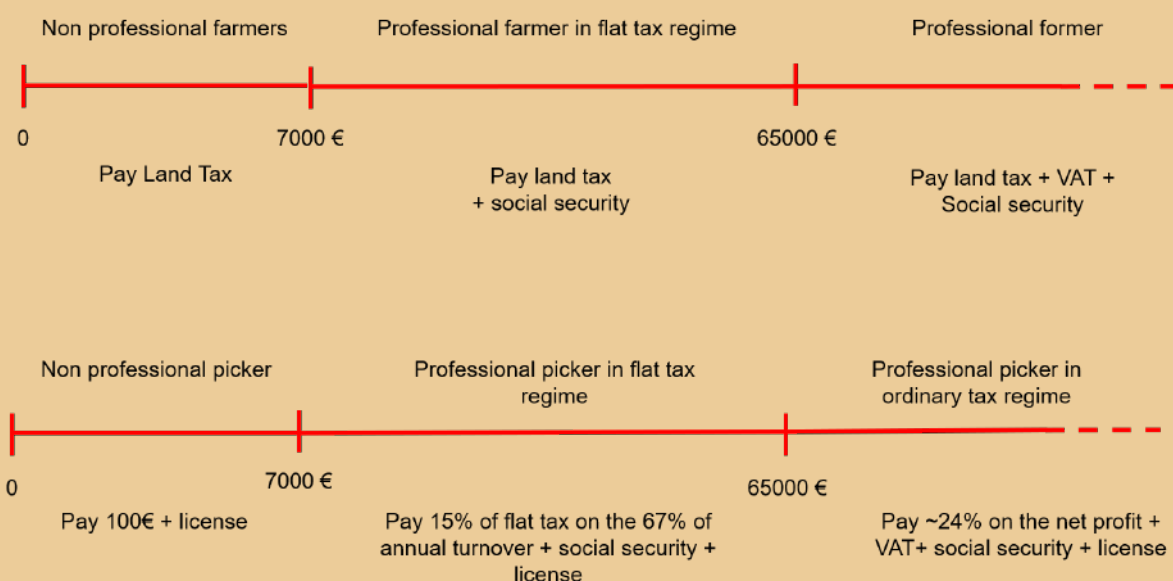


Figure 4: Innovative taxation reform in Italy under Law n. 145 of 30 December 2018.

⁷² NACE (Statistical Classification of Economic Activities in the European Community; French Nomenclature statistique des activités économiques dans la Communauté européenne)

⁷³ <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32006L0112>

⁷⁴ <https://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:legge:2018-12-30:145>

- **Adopt innovative labour policies to tackle seasonality and undeclared work.** Labour policies must work hand in hand with tax regimes to address the transition from the informal to formal economy, eliminating undeclared work, in line with the International Labour Organization's Recommendation 204⁷⁵, and the EU Employment Package⁷⁶. In the case of NWFPs, it is especially important to develop an adequate policy mix to overcome the limitations imposed by the strong seasonality of highly intensive labour activities, as this hampers the provision of secure and well-paid jobs, and the development of a stable, well prepared and declared workforce. This situation is especially acute in rural and depopulated areas, where labour policies must provide alternative activities and/or targeted subsidies to secure income during low workload months, contributing to social integration of low-income households. A success story is the case of Soria in Spain for resin tappers, which has been followed by other provincial governments (Box 9).

Box 9. Adequate fiscal and labour regimes for resin in Spain favours a sectoral renaissance

Plummeting Chinese resin exports in 2009 led to a renaissance⁷⁷ of the pine resin sector in Spain that has resulted in the incorporation of 1000 pine resin workers in five years since 2011 and the opening of three new industrial plants, with a capacity of more than 40 000 t yr⁻¹. A key initiative was the approval of a new labour and fiscal regime through the Treasury Order HAP/2222/2014⁷⁸, proposed by the *Regional Round Table of Resin*⁷⁹ based on a cost–benefit analysis. The government recognised that resin workers could be considered managers of agricultural holdings, thus benefiting from agriculture VAT regimes. Moreover, most resin tappers have the problem of lack of activity and income during the 3–4 winter months every year, resulting in low overall annual income (around €15 000 per worker).

Since 2014, the province of Soria has supported resin workers through three-month contracts for complementary forestry works⁸⁰ mitigating the seasonality of incomes from resin tapping. Soria is a province with a population density below 9 inhabitants km⁻², one of the lowest in Europe, with the population decreasing by 42% in the 20th century. Sustaining resin tapping is a strategy devised by the provincial administration to support rural development. The example has been followed by the provincial governments of Guadalajara (2017)⁸¹ and León (2019)⁸². Local and regional authorities and NWFP operators trust that the *Spanish National Strategy against depopulation and demographic challenges*⁸³ might increase and contribute to these types of support for value chains that are not supported by European schemes.

3.2.3 Equitability and the role of producer organisations

NWFP value chains are normally composed of a very large number of small forest owners or land managers and independent collectors that supply a much smaller number of intermediaries and first processors, frequently highly sophisticated with a good understanding of and access to global markets, that can often operate near to monopsony. As a consequence, primary producers have very limited capacity to commonly address sectoral challenges and very little bargaining power vis-à-vis intermediaries and processors. In order to guarantee the long-term and sustainable development of NWFP value chains it is important to:

⁷⁵ <https://www.ilo.org/global/topics/employment-promotion/informal-economy/lang--en/index.htm>

⁷⁶ <https://ec.europa.eu/social/main.jsp?catId=1039&langId=en>

⁷⁷ https://www.researchgate.net/publication/322233935_A_Spanish_Renaissance_Spain's_pine_chemicals_industry_is_on_the_brink_of_a_re-birth

⁷⁸ <https://www.boe.es/eli/es/o/2014/11/27/hap2222>

⁷⁹ <https://www.resinacyl.es/contenido/la-mesa-la-resina-castilla-leon>

⁸⁰ <http://www.dipsoria.es/actualidad/notas-de-prensa/aportacion-de-la-diputacion-de-soria-de-30000-al-sector-resinero-con-la-concesion-de-20-ayudas-para>

⁸¹ <https://boletin.dguadalajara.es/boletin/index.php/buscar-k2-menu/1-anuncio/35161-CONVOCATORIA-DE-SUBVENCIONES-DE-RESINER-OS-2019>

⁸² https://www.dipuleon.es/Ciudadanos/Desarrollo_Rural_y_MA/Ayudas_y_Subvenciones_7/RESINA?&i=0&p=1

⁸³ <https://www.lamoncloa.gob.es/consejodem Ministros/Paginas/enlaces/290319-enlace-reto.aspx>

- Increase transparency of price setting and price observatories, linked to product quality standards.** Provisions under agri-food regulation, such as the recent Directive (EU) 2019/633⁸⁴ on *unfair trading practices in business-to-business relationships in the agricultural and food supply chain*, are relevant and could be mimicked or extended to food and non-food NWFPs, in order to protect primary producers. In addition, decisive steps must be taken to steadily increase transparency in markets and price setting. In this respect, well-established, cost-effective, and generally accepted assessment of product quality is a necessary step to increase transparency and trust in price setting. In addition, price observatories linked to product quality can serve as reference value for individual producers. In this respect, state forest companies, owning large portions of public forests, can play a major role in setting the path for private owners by publishing qualities and associated tender prices, as well as implementing standard contracts with buyers. Important lessons can be learned from the approach of Portuguese cork producers (Box 10). The Portuguese Institute for Nature and Forest Conservation (ICNF) has created SIMeF⁸⁵, a system for monitoring prices of forest products, that will help producers of cork, resin, and pine cones.

Box 10. Assessing cork quality empowers procurers

In Portugal, a common protocol for assessing cork quality before harvesting and a price observatory for the different qualities have become valuable tools to increase their bargaining power of forest owners, the weakest point of the value chain, helping them receive a fair share of the profits.

Similar systems (but unfortunately not totally compatible) have been promoted by regional authorities in Spain (Extremadura⁸⁶ and Andalusia⁸⁷) to provide forest owners and managers with accurate information on the quality of their cork and seasonal market prices). These examples should be extended to other products and countries.



Cork samples with nine years growth showing different thickness and qualities
(Credits: UNAC)

- Stimulate, strengthen, and involve producer organisations.** All competent authorities in their respective domains, must stimulate and promote Producer Organisations (POs) and second-level Associations of POs (APOs) as they, in their diversity, represent different levels and approaches to horizontal integration. They typically provide technical and logistical assistance to their members, helping with quality management, transferring knowledge, and advocating for better regulation and public support. These organisations can provide advanced services bargaining power (Box 11) and joint commercialisation services, to increase the bargaining power of their members. Moreover, authorities and sectoral stakeholders need to facilitate the creation of interbranch organisations (IBOs), to promote vertical collaboration of sectoral associations, and should consider dedicated streams of

⁸⁴ <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:32019L0633>

⁸⁵ <https://simef.icnf.pt/>

⁸⁶ <http://cicytex.juntaex.es/es/centros/icmc/servicios/2/plan-de-calas>

⁸⁷ <http://www.juntadeandalucia.es/medioambiente/site/portalweb/menuitem.7e1cf46ddf59bb227a9ebe205510e1ca/?vgnext-toid=88060155290a7210VgnVCM1000001325e50aRCRD&vgnextchannel=4c3b545f021f4310VgnVCM1000001325e50aRCRD>

funding (e.g. through ‘operational programmes’), as they provide powerful means to define acceptable commercial arrangements, and mandatory contributions to sustain cooperation activities along the value chains. IBOs have existed in some agricultural sectors for more than 50 years; however, they are extremely rare in the NWFPs sector in Europe.

In most Mediterranean countries, forest producer associations have been relatively weak in terms of in capacity, resources, authority, and political vision for the forestry and NWFP sectors. They are often merged within farmer associations, where forestry loses out in competition with agriculture or animal rearing, and NWFPs lose out in competition with timber. In Middle East and North African countries, Greece or Cyprus, where most forests are public, producer organisations face specific challenges. Inspiration and good examples can be found in France (UCFF, *Union de la Coopération Forestière Française*⁸⁸) or Portugal⁸⁹ (UNAC⁹⁰, APCOR⁹¹, etc.), and in central and northern European countries where there is a long tradition of forest associations and cooperatives.

Finally, dedicated support should be granted to create necessary cross-border and international linkages and cooperation platforms for producer associations and cooperatives. Their relevance cannot be overestimated. Interesting references are international events and initiatives such as BioCASTANEA⁹² or TRUFFFORUM⁹³, and international associations such as the European Mycological Institute⁹⁴ or the European Truffle Association⁹⁵.

Box 11. Associations of wild collectors of medicinal and aromatic plants in France and Greece

In France, wild collectors have created the French association of professional wild plant collectors (AFC, *Association Française des professionnels de la Cueillette de plantes sauvages*⁹⁶). The main objectives of AFC are to bring together professionals in the collection of wild plants, namely MAPs, to promote the profession of collector, to ensure collaboration with other operators within the sector, and to participate in the horizontal integration of sustainable supply chains by identifying and disseminating good practices in commercial collection.

At this stage, AFC focusses on MAPs⁹⁷, but in the long term it might engage in other wild products such as mushrooms and plants used by other sectors such as ornamentals (moss, lichen, holly, boxwood, etc.), horticulture (snowdrop bulbs, narcissus, etc.), crafts or construction (phragmites/reeds). In Greece, the Association of Medicinal and Aromatic Plants of Greece (EAFFE, E.A.Φ.Φ.E.⁹⁸) is a civil non-profit company founded in 2013 with the purpose of valorising the Greek MAP sector, promoting research, production, distribution, and use.

⁸⁸ <https://lescooperativesforestieres.fr/>

⁸⁹ https://www.researchgate.net/publication/303882040_Forest_Owners'_Organisations_in_Portugal

⁹⁰ <https://www.unac.pt/>

⁹¹ <https://www.apcor.pt/>

⁹² <http://biocastanea.es/>

⁹³ <https://trufforum.com/>

⁹⁴ <https://eumi.eu/>

⁹⁵ <https://www.facebook.com/EuropeanTruffleAssociation/>

⁹⁶ <http://www.cueillettes-pro.org/>

⁹⁷ <https://repository.incredibleforest.net/oppla-factsheet/20028>

⁹⁸ <https://www.eaffe.org/>

3.3 Transparency, data, and information flow on NWFPs

Supply-chain transparency requires that: (i) all **operators** involved (including in production, manufacturing, trade, retail, etc.) are well known; (ii) the characteristics of **goods and services** exchanged are precisely determined; and (iii) that consumers, operators, and authorities have an adequate and balanced knowledge of **qualities and prices**. It is necessary to respect the right of consumers to be informed, and protected from fraud and from unlawful or unsustainable business practices. It is also necessary to safeguard the health and safety of communities, as well as to monitor the evolution of markets and trade, and the uptake and pressures on natural resources. Therefore, transparency is an essential condition for fair competition and trust along the different value chains.

Unfortunately, on European store-shelves and online sites, products are often inadequately classified (and labelled) products, failing to distinguish those NWFPs coming from different botanic species, ecological origins, or production and processing practices. They often lack guarantees of sustainable, fair, or equitable harvesting and trade, and may have unspecified properties and qualities. Frequently, the low cost of imported substitutes vs traditional local specialities, puts extra pressure on price and profitability, and weakens producers both in the country of origin, but also in the country of destination. Moreover, traditionally informal grey markets are further darkened by lack of data, or incomplete official data, on collection, processing, and trade. Only large volume traders benefit from this, and can sometimes seem to desire or even create consumer confusion. To overcome this situation, action is needed to: (i) improve the visibility of NWFPs in trade; (ii) improve traceability; and (iii) facilitate access to data on production, commercialisation, and trade.

Focus 4. Confusion about the origin and properties of NWFPs in Europe

Natural resin competes with fossil-based derivatives due to classification pitfalls.

European natural resin products, mostly rosin and turpentine, compete with fossil-based alternatives with no differentiation in official statistics, and no information provided to secondary processors and consumers. The *International Convention on the Harmonized Commodity Description*⁹⁹, does not distinguish natural resin products and tall oil-based products from the fossil-based alternatives. Improved classification systems, e.g. though a unique code for 'crude pine oleoresin', would allow markets to be monitored and sustainability criteria to be established. More ambitiously, they could also allow the tree species or origin to be distinguished, opening new opportunities to valorise both the quality of the product and the sustainability of the resource.

Pine nuts and chestnuts on your store shelf - Mediterranean or Eastern Asian imports?

Mediterranean pine nuts – collected exclusively from the stone pine, a typical species of western Mediterranean landscapes – are a gourmet ingredient in traditional cooking. In the last decades, they have faced strong and increasing competition from much cheaper Asian pine nuts¹⁰⁰, despite their very different taste and nutritional properties. The generic labelling of pine nuts, *Pinienkerne*, *piñones* helps to obscure precarious working conditions or illegal trade (as in the Russian Far East or Afghanistan) and confuses consumers, with variable quality or flavours. Unfair price competition jeopardises European production and collection.

"Focus 4" continues on next page...

⁹⁹ http://www.wcoomd.org/en/topics/nomenclature/instrument-and-tools/hs_convention.aspx

¹⁰⁰ <https://repository.incredibleforest.net/oppla-factsheet/20253>

Moreover, international trade codes do not allow for a distinction between pine species in trade declarations, obscuring market traceability, and making Mediterranean pine production and trade invisible. Similarly, in European supermarkets peeled chestnuts are labelled as “CHÂTAIGNES processed in FRANCE”; however, when reading the small print, they can turn out to be imported Chinese chestnut (*Castanea mollissima*), a different species from the European sweet chestnut (*C. sativa*)¹⁰¹.

3.3.1 Improve visibility of NWFPs

Sufficient and reliable data and information on NWFPs is vital for the development of effective policies and strategic planning of land and forest resources, and increasingly to contribute effectively to food system policy measures. However, many NWFPs are not, or only poorly, accounted for in official statistics. There are several reasons for this. The predominance of grey and informal market, the large array of NWFPs with multiple end-uses, limited statistical capacities in many countries, and failures to harmonise terminology are some of the key challenges that need to be overcome. For this, several steps can be taken at different scales to improve this situation. These include:

- **Establish *high relevance* NWFP species and derived products lists at European and country-level**

Priority lists of key species of NWFPs per country should be established according to agreed international criteria determined by the World Customs Organization (WCO), namely: (1) global trade in the order of > US\$50 million; (2) whether there are environmental concerns associated with production; and (3) whether the NWFP is important for food and nutrition security, particularly for lower- and middle-income countries.

These lists could then be expanded to a larger number of NWFPs in subsequent phases¹⁰². While, ideally, the list would be developed at a species level, the high diversity of NWFPs will necessitate, in some cases, the aggregation of data at a genus or other taxonomic levels, as is the case of Turkish list (see section 3.1.3). Eventually, the list could identify the different *primary* products derived from a given taxa (e.g. leaves, bark, nuts), to allow for greater clarity on end uses. For example, the Mediterranean stone pine (*Pinus pinea*) would appear in the Portuguese list as a provider of resin and pine nuts, but also potentially for the open cones for crafts and decoration and essential oils, if those new uses were to reach the agreed minimum level of estimated consumption. National correspondents for the FAO *Forest Resources Assessment* could lead the way, setting a NWFP reporting ‘standard’ adequate for all priority NWFPs in a more consistent manner. Based on the national lists, a *European list of the main NWFPs* could then be created and kept updated, well harmonised with the existing list of agricultural products. Capacity building for mandatory reporting in advisory services, institutions and professionals should be promoted, addressing, at least, the species listed in each country.

¹⁰¹ (UNECE standards, 2017)

¹⁰² This phased approach is proposed by Vantomme (2003) Compiling statistics on Non-Wood Forest Products as policy and decision-making tools at the national level. *International Forestry Review* 5(2):156-160. It allows countries to initially to focus on improved data collection, while the creation of specific product codes for major NWFPs will help evolve international statistical classifications.

- **Improve official NWFP statistics in International Statistical Classifications Systems**

National reporting should be compatible with, and enrich, existing international classification systems, namely: the Harmonized Commodity Description and Coding System (HS; developed and maintained by WCO); the Central Product Classification (CPC; developed and maintained by the United Nations Statistics Division, UNSD), the International Standard Industrial Classification of All Economic Activities (ISIC; developed and maintained by UNSD)¹⁰³.

In the latest revision of the HS202, FAO facilitated among others, the inclusion of 10 new product codes for NWFPs.¹⁰⁴ These include pine nuts (with the distinction of inshell and shelled pine nuts) and mushrooms (with the recognition of several genera, like *Boletus*, *Cantharellus*, *Tuber*, and others). More steps in this direction are needed – in coordination with FAO and UNSD – and particularly with respect to *activity classifications*, which show promise for capturing wild harvest activities with greater ease.¹⁰⁵

A clear priority is to clarify the boundaries between agriculture and forestry in international classification systems, and specifically with respect to the *placement of wild vs farmed products* in the agricultural and forest product statistics of the CPC classification. The current confusion has ‘disguised’ many NWFPs as agricultural products (actually, all those that can be domesticated even when produced in forest plantations or collected from the wild). Paradoxically, for example, chestnuts are considered *agricultural products*, while the timber from those same trees is classified as a *forest product*. This situation makes the contribution of forests to food security, livelihoods, and trade, ever more complex to untangle, with impacts in forest policies that are difficult to estimate with any accuracy¹⁰⁶.

Alignment with other mechanisms including chemical and biodiversity databases¹⁰⁷ – like the European Chemicals Agency (ECHA) or the CAS (Chemical Abstracts Service) of the American Chemical Society for chemicals, and the European Nature Information System (EUNIS) classification¹⁰⁸ for biological species and habitats – would strengthen the link with biodiversity and habitats conservation and facilitate international trade. For instance, because there are no CAS codes for pine resin or rosin, they have to be shipped as turpentine, which means that higher insurance premiums must be paid.

- **Integrate NWFPs in large-scale household consumption surveys**

Obtaining better data on diets is a global priority¹⁰⁹, and it is important to overcome the historical under-reporting on the contribution of NWFPs to diets. This renewed interest provides an opportunity to better account for wild forest foods in large-scale, systematic dietary surveys that are currently taking place in hundreds of countries. The information obtained, will be vital to better understand the relationship between food security, nutrition, and forests, and particularly, the contribution of NWFPs to healthy diets. FAO is currently working in this direction, developing improved methods to capture these and also to identify neglected and underutilised species.

¹⁰³ For a review of the current situation and specific recommendations see: Sorrenti, S. 2017. *Non-wood forest products in international statistical systems*. Non-wood Forest Products Series no. 22. Rome, FAO

¹⁰⁴ <http://www.wcoomd.org/en/topics/nomenclature/instrument-and-tools/hs-nomenclature-2022-edition.aspx>

¹⁰⁵ See Muir et al 2020 (full ref) for a comprehensive analysis

¹⁰⁶ A proposal to address this situation has been prepared by FAO for the HS 2022. See ([Ramaschiello 2017](#)) for a concrete proposal to overcome this situation.

¹⁰⁷ ECHA <https://echa.europa.eu/> and CAS <https://www.cas.org/support/documentation/cas-databases>

¹⁰⁸ <https://eunis.eea.europa.eu/>

¹⁰⁹ <https://www.nature.com/news/a-new-global-research-agenda-for-food-1.21052>

- **Complement information by targeted sectoral surveys and market surveys**

While necessary, the above measures will not be sufficient to fill the long-standing gaps related to NWFP data. Other complementary measures should be taken. These include, for example, more targeted sectoral surveys such as the EU StarTree survey¹¹⁰ which led to an unprecedented level of information on the extension and social implications of wild harvesting in Europe.

Furthermore, different sectoral organisations and industrial operators, have a wealth of information at their fingertips. Making this information *open access* – to the extent possible – would mitigate gaps in international and national statistical data collection activities in countries over-stretched by reporting burdens. Even if they are not systematically or regularly conducted, these types of surveys and reports, fill important knowledge gaps and allow for a better analysis and understanding of the multiple dimensions of NWFP value chains.

For instance, pine resin is a global commodity produced in more than 30 countries of Asia, America, Africa, Europe, and Oceania, and obtained from more than 10 pine species (Cunningham, 2012)¹¹¹ including *Pinus massoniana*, *P. yunnanensis*, *P. merkusii*, *P. elliottii*, *P. caribaea*, or *P. pinaster*, from natural and planted stands, but no international statistics provide information on the production, productivity, or prices by country, species, or origin. Private companies might be able to partially fill these gaps, but their information is not generally accessible.

Box 12. Key aspects for NWFP reporting

1. Improve country capacities to report on priority NWFPs as per international statistical criteria.
2. Continue to work through international classification systems to provide more detail on products traded, and especially to allow for a clear *distinction* between *agricultural vs forest products* and *wild vs farmed products*, in a similar way to the legal distinction between wild fisheries and aquaculture. This will remove a key driver for NWFP market failures.
3. Differentiate *primary products* from *derived* or *secondary products*. Primary products include pinecones, fresh mushrooms, bundles, twigs, and leaves, while secondary products include pine nuts and dry cones, dried mushrooms, and essential oils.
4. Enhance existing surveys (e.g. dietary) to improve reporting on edible NWFPs and support complementary methods when possible (such as periodic sectoral surveys, market surveys, value chain studies) to gather additional information necessary for development of evidence-based policies.
5. Promote public–private collaboration to adequately capture, production modes, technical descriptions, quality standards and material safety data sheets (MSDS), etc. Sectoral organisations should gather and make openly available, relevant information on: who the operators are; areas of production; primary and derived products and sub-products; quantities produced and traded; and, ideally, prices by product qualities or categories.
6. Describe the technical and safety descriptions of all relevant products and end uses, publishing them in the reference chemical databases (e.g. European ECHA or the American CAS).

¹¹⁰ Lovric et al 2020 <https://www.sciencedirect.com/science/article/abs/pii/S1389934120300654?via%3Dihub>

¹¹¹ Cunningham, A. (2012). Pine Resin: Biology, Chemistry and Applications, 2012: 1-8 ISBN: 978-81-308-0493-4 Editors: Arthur G. Fett-Neto and Kelly C. S. Rodrigues-Corrêa. https://www.academia.edu/32774574/Pine_resin_tapping_techniques_used_around_the_world

3.3.2 Traceability and innovative labelling

Traceability systems provide information on the origin, the process, and the operators involved in the value chain. Such systems are needed to guarantee safety, sustainability, and fair competition in the market, respecting consumers' rights to informed purchase decisions. It is also important to develop tools to engage consumers and to leverage the intrinsic value of NWFPs, which is linked to their origin, production mode, and properties of the NWFPs. In Europe there are major traceability failures in relation to food NWFPs (where traceability has been mandatory for over a decade now) and non-food NWFPs, that need to be addressed systematically.

- **Enforce compliance with mandatory traceability for food and related labelling requirements** of European regulation EC-178/2002 on food law (and derived national regulations), addressing the major implementation gaps that remain for wild-collected NWFPs, even when they are explicitly considered as a primary product. For example, the imported truffles, mushrooms, nuts, or berries that are consumed in Europe are not distinguished from EU products. The distinction between wild and cultivated production is also often confusing. Tracing products from the wild, requires innovative solutions at the initial *entry-into-the-market* step. Inspiration can be obtained from fish products, where there is a clear distinction between wild-caught and farmed products, and well-established worldwide production areas. Improved traceability is also of great concern in the case of pharmaceutical and nutraceutical products.
- **Establish legal standards and due diligence systems** requiring traceability and minimising the risk of unsustainable or non-ethical practices for non-food NWFPs. This could build on instruments developed within the EU's Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan, such as the European Timber Regulation (EUTR), that establishes due diligence systems for timber imports, but not currently for NWFP imports.
- **Encourage voluntary certification and quality standards.** Several third-party certification schemes, such as PEFC (Programme for the Endorsement of Forest Certification) or FSC (Forest Stewardship Council), on sustainable forest management do certify NWFPs¹¹². The FairWild¹¹³ certification scheme aims to ensure the sustainability and fair trade of plants collected in the wild. There are many certifications of relevance to NWFPs (organic, environmental performance, quality and food safety, socio-economic aspects like Fairtrade, etc.)¹¹⁴. However, their use is rather limited. It is important to understand and overcome the barriers (often related to the cost of certification) that prevent uptake of otherwise promising certification schemes. Private–public initiatives are needed to encourage the uptake of the schemes, and to successfully implement innovative approaches, such as *Participatory Guarantee Systems* (PGS), that can greatly reduce costs of compliance audits and monitoring (Box 13).

¹¹² PEFC <https://www.pefc.org/> and FSC <https://fsc.org/en>

¹¹³ FairWild <https://www.fairwild.org/the-fairwild-standard>

¹¹⁴ Economic, marketing and policies of NWFP https://www.researchgate.net/publication/343555733_Economics_marketing_and_policies_of_NWFP

Box 13. “Nature & Progrès” - a participatory guarantee system

Nature & Progrès¹¹⁵ is a French association and the name of a label which is used by food and cosmetic products that respect the environment, people, and animals. The label is based on the specifications of Nature & Progrès – including MAP collection practices – and the commitment of its members through a charter. The members of the association, consumers and professionals ensure compliance to the established specifications, in a Participatory Guarantee System, supported by IFOAM – Organics International (the International Federation of Organic Agriculture Movements).

- **Inform and educate consumers through guarantee of origin.** An increasing number of customers choose products with a recognisable origin, ascertained through voluntary schemes, such as Protected Designation of Origin (PDO), Protected Geographical Indication (PGI) and Tradition Specialities Guaranteed (TSG). Although there are many examples of successful implementation of these schemes that can radically increase the market value of NWFPs, there are also less successful examples in which implementation costs cannot be recovered. A solid and comprehensive approach is needed, such as that proposed in the FAO publication “*Linking people, places and products – A guide for promoting quality linked to geographical origin and sustainable geographical indications*”¹¹⁶. Several good examples already exist in Mediterranean Europe for mushrooms, truffles, chestnuts, and aromatic plants¹¹⁷; other examples cover secondary products based on NWFPs¹¹⁸.
- **Leverage the potential of mobile ICT solutions for labelling and traceability.** Different digital solutions to facilitate traceability and labelling of NWFPs are emerging, as private or public initiatives. They typically provide information on producers, ingredients, and cultivation, harvesting, and processing methods, well beyond what is reflected in the physical label. DNA barcoding can become an important tool to address challenges related to illegal collection and trade of endangered species or of specific populations, including valuable natural hybrids.

¹¹⁵ <https://www.natureetprogres.org/>

¹¹⁶ Linking people, places and products <http://www.fao.org/3/a-i1760e.pdf>

¹¹⁷ such as Fungo di Borgotaro I.G.P. and Tartufo Nero di Fragno, in Italy Castanha da Terra Fria or Setas de Castilla y León, in Iberia; Cèpes du Périgord or Thym de Provence in France

¹¹⁸ such as Orujo de Galicia, Cantueso alacantí, Pacharán Navarro and many others

3.3.3 Facilitate access to data on production, commercialisation, and trade

- **Promote studies of costs, rents, trade, and prices for NWFP production systems.** These types of studies are relevant for producers, policy makers, and other stakeholders, to evaluate the performance, and profitability of holdings and operators in each sector. While some analyses are regularly conducted, there is a lack of systematic and comparable studies. Increased coordination among institutions and producer or processor associations that own the necessary data would enable such studies to be conducted. In this respect NWFP associations and central food markets are an important source of information on trade and prices.
- **Promote knowledge sharing through good practice guidelines and ICT platforms.** Good practice manuals define practices that guarantee sustainable management of natural resources and often represent the starting point for certification. They can be used as a basis for reference agreements between landowners and pickers, as in some local initiatives for cork, mushrooms, and resin in Portugal, and for wild plants in France. As a matter of priority, these types of manuals should be widely disseminated and developed for as many species as possible. Moreover, they should be designed in strict cooperation with producers, as in the case of French MAP pickers¹¹⁹.

ICT platforms such as the OPPLA database on Natural Capital and Good Practices¹²⁰ are ideal tools for sharing an increasing knowledge base. The INCREDIBLE project has created an open repository¹²¹ within OPPLA, and contributed 250 factsheets, describing good practices and innovations in the NWFP sector (Box 14). It is important to maintain and interconnect these types of initiatives to overcome the short-lived nature of competitive research funding.

Box 14. The INCREDIBLE knowledge repository

This repository is a unique and user-friendly database that highlights numerous and diverse aspects of NWFPs that represent a source of revenue and development for Mediterranean rural societies and beyond. This knowledge was gathered and structured thanks to the effective ‘animation’ process of communities of practitioners–researchers. This collection of factsheets aims to bridge the gap between researchers and practitioners, by collecting, disseminating, and communicating relevant information on NWFP innovation from a diversity of sources, such as success stories, best practices, databases, technical reports, policies, research, and literature reviews.

¹¹⁹ Co-construction of good practice guidelines by French pickers of MAPs <https://repository.incredibleforest.net/oppla-factsheet/20463>

¹²⁰ OPPLA database on Natural Capital <https://oppla.eu/>

¹²¹ INCREDIBLE Knowledge Repository for NWFP <https://repository.incredibleforest.net/>

3.4 Enabling conditions

Developing a shared vision that can underpin, and provide coherence to the different policies affecting NWFPs, along with better targeted financial instruments in support of the forestry and agroforestry sectors is the most relevant enabling condition for the effectiveness of the actions described in the previous sections.

Focus 5. Fragmented governance in the NWFP sector: wild mushrooms

Across Europe, in the wild mushrooms sector, the roles and responsibilities are typically fragmented in different administrative silos: (a) the administration dealing with *forestry* may define conditions for collection and harvesting and control of picking permits; (b) picking often takes place in nature conservation areas, under the responsibility of environmental authorities; (c) the administration dealing with *food safety* maybe responsible for registration of operators and the production areas, in order to comply with the EU regulations on food hygiene¹²², (d) the administration dealing with *primary food markets*, which might be local administrations of rural areas, typically oversees the supply to industrial processors; (e) *local authorities* are the authorities that control the main central city food markets, where the main distribution to retailers take place, etc. As a consequence, only through shared information, visions, and goals, will it be possible to create the policy environment to stimulate and steer the NWFP value chains.

3.4.1 Coherence of institutional action

Increase policy coherence across all relevant policy domains

In order to bring coherence to this fragmented and multi-faceted sector, it is important to advance towards more coherent action across different policy areas related to NWFPs, including nature conservation, rural development, tourism, agro-food, industry, bioeconomy, and labour, taxation, and trade. This will only be possible by creating shared visions on the sustainable and desirable future of NWFPs in particular and forested landscapes in general. Some valuable elements to advance towards those shared visions could be:

- **A consistent approach to nature and landscape conservation** that aims to preserve the inter-linked natural and cultural heritages, including traditional management practices. This is especially relevant in Mediterranean countries like Spain, Greece, or Cyprus that already have some 30% of the land area under Natura 2000. The lack of consensus among stakeholders on the role of forestry and land management for nature conservation can damage agro-ecosystems with a high conservation value. An example is the effect of reduced sheep grazing in evergreen oak coppices (priority habitat 9340) in central Spain; the reduced grazing has led to reduced black truffle production and reduced biodiversity of in this habitat. Another example is the abandonment of cork oak forests in Sardinia, Italy. Multi-purpose management of forests as social and ecological systems does not preclude, but complements, conservation and re-wilding in other areas.
- **Shared understanding of the social and ecological dimensions of NWFPs**, in forests and agroforestry systems, including wild, semi-wild, and domesticated production. This will facilitate the adoption of '*NWFP aware*' sectoral policies and could remove unintended

¹²² EU-178/2002 and EU-852/2004

barriers to NWFP development and better contribute to desired policy goals (e.g. in relation to food safety, rural development, nature conservation). Some of the most troublesome barriers concern the lack of support or negative incentives resulting from taxation or labour regulations, or conditions for accessing CAP support; however, there are also barriers related to legal uncertainties or cumbersome product classification for specific uses.

- **Compliance with food and chemical safety regulations.** This will require decisive support to producers and processors in the compliance with complex and expensive regulation, as is the case of the safety classification for resin derivatives and essential oils in the *European Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals*¹²³ and the *Classification, Labelling and Packaging Regulation*¹²⁴. For example, for natural resin derivatives, a review of the use of gum rosin derivatives as food additives¹²⁵, like E445, based on up-to-date scientific data, could open very important added-value markets. In the case of food derivatives, solving the traceability conundrum is the first priority as discussed in section 3.3.2. The lack of commitment by different administrations, the lack of knowledge about their responsibilities, or lack of adequate resources limits the implementation of mandatory traceability requirements.
- **A level playing field in which hierarchy of uses, cascade use, and circular bioeconomy approaches are implemented** to secure positive environmental impacts, climate change mitigation, and resource efficiency, and in which positive externalities are internalised in markets through innovative mechanisms. This could mean, for example, the removal of incentives to burn crude tall oil as a biofuel¹²⁶, and thus, opening doors for higher added-value products and a stronger pine-chemistry sector based on natural resin and tall oil derivatives.
- **Improve the role and consistency of CAP in facilitating NWFP conservation and development.** The CAP and the Rural Development Programmes (RDP) are the most important sources of income and finance for landowners and farmers and are therefore relevant in orienting land management practices. They have a strong potential to encourage NWFP production in view of their contribution to multi-functionality, quality foods, and territorial development. In order to effectively achieve this, the following issues should be fully addressed:
 - A. EU regulation should address, in a more strategic and consistent approach, the distinction between agricultural land and forest land in Europe, and especially clarify the legal regime of agroforestry land. This would improve the current situation, in which inclusion of some NWFPs as agriculture, opening a completely different legal and support regime, seems arbitrary, or dependent on the lobbying capacity of countries or large operators.
 - B. It is important, even urgent, to remove perverse incentives, and to recognise within the CAP, the extraordinary ecological and cultural value of traditional and sustainable land uses, and particularly agroforestry systems, that are today largely neglected. This is the case of the CAP provision that excludes the area occupied by trees (except orchards) in any given agricultural piece of land from the extent

¹²³ REACH

¹²⁴ CLP

¹²⁵ EU rules on food additives https://ec.europa.eu/food/safety/food_improvement_agents/additives/eu_rules_en

¹²⁶ [Bio-based chemical industry victim of EU biofuel reform](#)

eligible for subsidies, resulting in premium incentive for farmlands void of trees. This is having a negative effect on NWFP rich agroforestry systems, such as cork oak (*Quercus suber*) and holm oak (*Q. ilex*) *dehesas* and *montados*, as farmers are incentivised to remove trees and intensify agriculture, reducing multi-functionally and jeopardising the long-term sustainability of the land.

- C. The strong focus on the farm level, leaves harvesters and collectors of wild NWFPs outside of support lines. Recognition of these type of operator should be pursued in future iterations of the CAP, integrating wild product pickers within the farm activities. In addition, specific support to forestry and agroforestry practices that benefit the sustainability and production of NWFPs should be increasingly included into CAP and RDP measures such as, for example, stand thinning and inoculations to improve mushroom production.

- **Develop coherent plans or programmes for the different NWFP sectors at different scales**

One of the most effective ways to increase policy coherence is through comprehensive plans or programmes on specific NWFP sectors from global to regional levels (Box 15). The successful experience of National Apiculture Programmes coordinated by the European Commission and supported by CAP and matching national funds, could be replicated for other relevant NWFPs, as this will allow coordination of actions across policy domains. These plans are not a guarantee of successful development since markets might act in unexpected ways, as they have with the massive imports of low-quality or adulterated honey; these consequences have proved difficult to counter.

Programmes should address sub-sectors with similar characteristics, differentiating wild and cultivated products. Candidate sectors for coordinated national programmes are:

- Cork
- Pine resin and tannins
- Truffles (white and black)
- Wild mushrooms
- Nuts and berries
- Medicinal and aromatic plants
- Vulnerable NWFPs¹²⁷

These programmes should be prepared on the basis of strong science and stakeholder participation, and address areas such as: (i) Information and statistics; (ii) Resource conservation, management, and planning; (iii) Domestication; (iv) Regulation, sectoral contracts, finance, taxation, and trade; (v) Processing, marketing, and rural development; (vi) Governance – structuring value chain, sectoral organisation and administrative coordination; and (vii) Training, education, extension, and research.

At the European Union level, coordination of national/regional plans and programmes should be pursued. Coordination at other international levels, such as the Mediterranean level, through *Silva Mediterranea*¹²⁸ and FAO or other committees, is also recommended. Programmes can be funded by member states, regions and operators, and supported by the European Agricultural Fund for Rural Development (EAFRD)¹²⁹ or other structural funds, but these resources could be used more intensively, and better targeted (see Box 15).

¹²⁷ such as those included in relevant annexes of the [Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora](#), and specifically Annex V referring to species of community interest whose collection in the wild may be subject to management measures.

¹²⁸ <http://www.fao.org/forestry/silva-mediterranea/88929/en/>

¹²⁹ https://ec.europa.eu/regional_policy/en/policy/what/glossary/e/european-agricultural-fund-for-rural-development

Box 15. Sectoral plans and programmes for NWFPs

Honey is the only NWFP sector for which the national programmes are coordinated at the EU level (National Apicultural Programmes – NAPs; regulations (EC) 1221/97¹³⁰) and CDRReg(EU) 1366/2015¹³¹), and is supported by a specific budget line within the CAP. For 2020–2022, the EU contribution is €40 million yr⁻¹ (EU implementing decision 2019/974¹³²). National and regional matching funding increases the available resources for the implementation of the NAPs to over €80 million yr⁻¹, for a sector of 600 000 beekeepers, with 16 million hives, producing 250 000 t yr⁻¹ of honey. The EU is the second biggest producer (with 12% of world production), after China (with 24% world production). Another relevant EU initiative, though partial and with limited scope, was the European Action Plan for Herbal Medicines 2010–2011¹³³, by the Committee on Herbal Medicinal Products (HMPC) of the European Medicines Agency (EMA), to improve knowledge, safety and clarify regulations in relation to the use of herbal medicines.

At the national level, the **Italian Ministry of Agriculture, Food and Forests** (MiPAAF) has set up multi-actor working groups dedicated to specific NWFP value chains – such as truffles, cork, nuts, and MAPs – in order to develop new national plans, or to update existing national plans. The recently realised National Truffle Plan (2017)¹³⁴ sets specific actions to achieve the following objectives: (1) national coordination of collection rules; (2) plan for production of truffles; (3) increase the level of knowledge of advisory services; (4) traceability of nursery propagation material; (5) definition of research lines on truffles; (6) coordination with European regulations; (7) redefine the tax system applied to the truffle; and (8) more efficient controls. Similar comprehensive plans for other NWFP sectors are in the pipeline. Similarly, in 2017 the **Ministry of Rural Development and Food of Greece** published the *Strategic Development Plan for the cultivation, processing and marketing of Aromatic and Medicinal Plants in Greece*¹³⁵, to ensure conservation of its rich biodiversity and to develop market high added-value products for the food, cosmetics, pharmaceutical, and plant protection sectors. The plan addresses key aspects related to protection of endemic species and populations, domestication, quality, and hygiene, organisation of producer groups, traceability, research, training, education, and awareness raising.

Outside the EU, Turkey, through the General Directorate of Forestry (GDF) – Department of NWFPs and Services established in 2011 – has approved seven NWFP programmes since 2014: resins, bay tree (*Laurus nobilis*), Vaccinium berries (including lingonberry *Vaccinium vitis-idaea*; blueberry *V. myrtillus*, Caucasian whortleberry *V. arctostaphylos*, bog blueberry *V. uliginosum*), truffles, mastic (*Pistacia lentiscus*), orchids, almonds (*Prunus dulcis*), and forest honey. These programmes are providing relevant information on resources and markets, allowing forest management to be improved and diversified, and particularly increasing the living standards of the inhabitants of forest villages, as well as increasing the international trade results of Turkey. Each plan has a similar format: introduction to the NWFP; geographical distribution and inventory; conservation, management, and utilisation rules; and procedures to be applied by GDF. As of 2019, the contribution of NWFPs to the national economy was calculated as US\$880 million and the contribution to forest villagers as US\$123 million. NWFPs are also an important export, and in 2019 approximately US\$200 million (thyme, laurel, chestnut, pistachio, pine, etc.) was exported, mainly to European countries.

¹³⁰ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A31997R1221>

¹³¹ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32015R1366>

¹³² <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32019D0974>

¹³³ <https://www.ema.europa.eu/en/action-plan-herbal-medicines-2010-2011>

¹³⁴ http://www.tartuficoltura-e-ambiente.it/wp-content/uploads/2017/12/piano_completo_finale_versDefinitiva20novembre2017.pdf

¹³⁵ http://www.minagric.gr/images/stories/docs/agrotis/Aromatika_Fyta/stratighko_sxedio_aff260218.pdf

3.4.2 Improve financial support

Although some NWFPs can benefit from CAP direct payments, the main financial support for the primary production of NWFPs in Europe comes from the EAFRD through measures that support forestry, as well as through cross-cutting measures in support of rural business, competitiveness and employment, and horizontal and territorial cooperation, including the strengthening of producer organisations, training and skills, etc. In addition, support can also be provided by the *European Regional Development Fund* (ERDF) (e.g. interregional cooperation) or the *European Social Fund* (ESF) (in support of employment and inclusion). EU funds are strategic, and they mobilise national co-funding.

Despite the lack of a comprehensive evaluation, the financial support to NWFPs, is rather small, fragmented in isolated initiatives, and widely unbalanced across countries and regions; this is also the case of forestry measures in general¹³⁶. To improve this situation, it is necessary to:

- **Clarify eligibility for NWFPs and agroforestry land in the CAP direct payments.** It is important to address the gaps and inconsistencies on the list of products that are eligible for support in *pillar one*¹³⁷. There are inconsistencies and grey areas with respect to the NWFPs that are included or covered within CAP. Notably, those NWFPs coming from agroforestry systems are generally excluded, and those produced in managed forest systems are sometimes included (e.g. cork, chestnuts, cultivated truffles, and most cultivated MAPs), but many are excluded (e.g. pine nuts, resin, and most wild products). Harmonisation of the list of agricultural products is needed, together with the recognition of the production method of wild/forest products, through a specific label.
- **Take a fresh look at rural development programmes.** The EAFRD offers opportunities to support sustainable and equitable NWFP value chains, and also to maximise positive impacts in rural development and climate change adaptation. Countries and regions should tap into these opportunities within the EAFRD, as forestry and NWFPs in particular, are generally receiving very limited and fragmented support. For this to become true, stronger political will, better structured sectors, and more integrated approaches are needed. Elements could be facilitated through comprehensive national or regional NWFP plans.
- **Overcome barriers that prevent uptake and eligibility.** At the national, regional, or provincial levels, a lack of official *standard output values*¹³⁸ associated with NWFPs quite often limits the possibility of producers to benefit from rural development funds and direct payments. Whenever there is a value for a managed or cropped NWFPs, the associated standard output values are often so low that a farmer is not eligible for any CAP policy measures. Working tables at the ministerial or regional levels should provide adequate and consistent variety of NWFPs and related standard output values that can be produced in farmland and forest (e.g. number of working days per hectare, annual production per hectare in terms of quantity and turnover).
- **Better support NWFPs within existing programmes and funding sources.** There are many other funding opportunities for NWFPs that seem to be underutilised. Awareness

¹³⁶ Support for forestry measures in EAFRD 2014-2020 period represented only €6.4 ha⁻¹ yr⁻¹ and less than 5% of all funding (EU Commission SWD (2019)-391). Total public expenditure in support of forests and forestry (including national and regional funds) was estimated at €17.9 ha⁻¹ yr⁻¹ in 2013, varying from less than €5 ha⁻¹ yr⁻¹ in Bulgaria to more than €105 ha⁻¹ yr⁻¹ in Hungary (State of Europe's Forests-2015). In contrast, EU Commission recommends and investment of €75 ha⁻¹ yr⁻¹ in managing Natura 2000 (not accomplished!) and invests €320 ha⁻¹ yr⁻¹ in agriculture.

¹³⁷ Annex 1 of regulation 1242/2008 <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32008R1242&from=EN>

¹³⁸ a parameter that allows the calculation of a theoretical (standard) annual gross production of the holding based on the type of cultivation (Regulation 1242/2008)

raising and capacity building among NWFP operators and increased political visibility *vis-à-vis* management authority will surely facilitate the uptake of resources from ERDF, ESF, and Life¹³⁹, and their equivalents outside the EU. While NWFP producers and associations should increasingly search for alternative sources of funding, some new instruments may be required. For example, the European Investment Bank (EIB) has a commitment with bioeconomy and climate change action and is supporting forestry¹⁴⁰ and forest-based industries, but its instruments are designed for large investments. Financial support lines that sustain small collectors or traders of wild forest product belonging to SMEs category through micro-credit should be sought.

3.4.3 Foster innovation, knowledge transfer and extension capacity

The creation and dissemination of knowledge, from science and experience, is a necessary condition for sustainable development and also, evidently for NWFPs. It is important to increase the investments in research, but also to build capacities to supporting innovation, the uptake of knowledge, and the development of professional skills. More specifically:

- **Build a systemic approach to promote innovation.** The experience of the European Innovation Partnerships, and its deployment in Thematic Networks and Operational Groups, are proving valuable in advancing towards multi-factor research, iterative innovation, and knowledge exchange. More efforts are needed in this direction. Moreover, facilitation of this knowledge-sharing processes needs to be complemented with a consistent approach to identify and overcome other barriers to innovation, such as those deriving from regulation, lack of social capital, difficult access to financial or other resources, etc.
- **Increase research attention to the social-ecological dimensions of NWFPs** and improve **transnational cooperation.** While there is a thriving research community addressing the different dimensions of NWFPs, more can be done to favour transdisciplinary and transnational research cooperation.
- **Develop capacities in rural development agencies,** so they can better support NWFP entrepreneurship, and specifically, empower those agencies in the development of territorial marketing strategies, as they require the concerted effort of multiple actors at different levels, and maybe be out of reach for individual entrepreneurs.
- **Strengthen forest advisory services,** that are currently underdeveloped in most European countries, in synergy with farm advisory services. In this respect, increased attention is required to: support social innovation; develop innovative business models; incorporate mechanisation and digitalisation; reinforce and integrate information systems; strengthen value chains and sectoral organisations; and improve governance.
- **Increase the attention given to NWFPs in vocational training schools,** and provide increased opportunities for continuous learning on harvesting and collection of NWFPs, product certification, etc. through, practical guides, short courses and workshops.

¹³⁹ <https://ec.europa.eu/easme/en/section/life/life-close-market-projects>

¹⁴⁰ Rejuvenating forests <https://www.eib.org/en/publications/rejuvenating-forests>

4. Conclusions

Intentionally left blank. To be developed after the Policy Forum