Multipurpose trees and non-wood forest products a challenge and opportunity

Rendicontazione

Informazioni relative al progetto

STAR TREE

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Final Report Summary - STAR TREE (Multipurpose trees and non-wood forest products a challenge and opportunity)

Executive Summary:
The EU FP7 project StarTree focused on the issue of (wild) non-wood forest products (NWFP) (e.g. mushrooms, berries, resin, aromatic and medicinal plants) and multi-purpose trees (MPT) (trees that are used for more than just wood production, like chestnut) and how to increase their contribution to rural development and European bioeconomy.
Already now European forests (35% of the EU's landmass) form an important part of Europe's bioeconomy, mostly by providing wooden biomass. For example, the bio-based products provided by the forest-based sector in Europe represent about 8% of the EU's manufacturing and income for about 16 million forest owners and create 3-4 million jobs, many of them in rural areas. However, forest is much more than source of wooden biomass. They provide multiple other, non-wooden goods and services (e.g. capturing 10% of EU's CO2 emissions, being the main host for biodiversity, providing high-quality water) to rural communities and society in general. Nevertheless, the potential of these forest products and services has been mostly neglected or is even unknown (e.g. lack of reliable data). Although they can significantly contribute to the creation of new business opportunities and jobs in the rural areas. However, to unlock their full potential requires new knowledge and tools to optimise their sustainable provision and profitability), and better understanding their market potentials.
Thus, the StarTree project strived to provide better understanding, knowledge, guidance and tools to support relevant stakeholders (e.g. forest owners, resource managers, enterprises, decision makers, other public and private entities) in optimising the management of multi-purpose trees and developing innovative approaches for increasing the marketability and profitability of NWFP for a more competitive rural economy. To address such a broad area the project consortium was composed of a multidisciplinary team, involving different actors along the NWFP value chain. Multiple data sources (e.g. questionnaires, interviews, focus groups, legal, technical and expert documents, trade, GIS and forest inventory data bases) and analysis techniques (policy and institutional analysis, statistical, network, econometric and GIS analysis, modelling and simulating of forest growth and yield, multi-criteria decision models and innovation studies) were utilized.
The main project messages can be summarized
NWFP provide benefits for rural development and opportunities for greener lifestyles
In addition to formal markets, informal and non-market activities substantially contribute to livelihood and well-being, as well as maintaining local and regional identities, an important carrier of rural development. There is an opportunity to strengthen the link between NWFP and current trends for organic products and nature-based solutions. Traditional products are prime for rediscovery and update in the light of a bio-based economy, while traditional lifestyles and subsistence economies could be maintained.
Improved understanding of WFP demand and production would offer fresh dimensions for marketed and non-marketed WFPs
WFP production, trade, and consumption is inadequately reported so the complete picture of WFP in Europe is unknown. A WFP classification scheme is needed to respond to product diversity and new raw and processed product groups. Better knowledge of non-commercial picking and consumption habits

would help forest owners.
Growing global demand for WFPs means that international trade is increasing, both as intra-trade flows within Europe and imports from outside. Future forest policies should consider enhancing production, so reducing international trade dependency while re-establishing an economic bridge between the WFP consumer and the producer located in remote rural areas.
Sustainable use of WFPs requires us to overcome institutional and regulatory fragmentation of WFP governance
WFP policies need support structures with adequate capacity to address the different aspects of a multifaceted WFP sector, including inventory, land management, harvesting, transportation, processing and trade. In most European countries such institutional structures either do not exist, or lack power and resources.
The sustainable use of WFPs is strongly linked to a clear definition of ownership, access, and rights of use. Pure restriction instruments are not usually successful due to lack of implementation and means to control. Information, awareness-rising campaigns and developing pathways are required to negotiate conflicts between users and owners, and prevent negative effects on the forest ecosystem.
Innovation in wild forest products must go beyond sectoral boundaries
WFPs are strongly linked to traditions and traditional lifestyles. While this is an asset in itself, there is much to explore in terms of innovative production and marketing concepts in order for WFPs to be fully embedded in an innovation society.
For a comprehensive overview on the full dimension of WFPs, a multi-sectoral approach is required. Sectoral fragmentation is an major reason for WFPs remaining invisible on the playground of natural resources in a bioeconomy.
Better management and marketing of forests for wild products offers new value chain potential and a wealth of social ecosystem services
To unravel the potential of WFP, optimised forest management concepts are needed to balance multiple claims on forests and forest resources. This requires new support tools and participatory forest management approaches.
Co-production and combined production in forests leads to coupled value chains for WFPs and sectors such as the food industry or tourism. In a multi-lateral bioeconomy, social effects such as the impacts of WFPs on human wellbeing need to be taken seriously, with increased recognition of the role of WFPs in outdoor activities, nature-based food and medicine, or social and educational purposes.

Project Context and Objectives:
Natural resources are a key element for the European and the global economy, and for the quality of our life. The growing global population and the related growing demand for commodities together with the negative impact of climate and land use change are expected to further increase the pressures on resources, which could jeopardise their sustainable supply. To better respond to this challenge, Europe has set a clear and ambitious strategy (Europe 2020 Strategy) to base its economy on a smart, sustainable and inclusive growth. Part of this concept is to initiate the development towards an innovative, resource efficient and bio-based (bio-economy) European economy. This concept foresees the sustainable production and conversion of renewable biomass, for a range of food, health, fibre and industrial products and energy, where renewable biomass encompasses any biological material to be used as raw material. Such a development should contribute to economic growth and the creation of jobs, while mitigating climate change effects and providing effective responses to address the need for carbon neutral energy. In

this framework, European forests (35% of the EU's landmass) provide multiple goods (wood and non-wood) and services (capturing 10% of EU's CO2 emissions, being the main host for biodiversity, providing high-quality water) to rural communities and society in general. The forest-based sector in Europe delivers a wide variety of bio-based products which represent 8% of the EU's manufacturing and provides income for about 16 million forest owners and creates 3-4 million jobs, many of them in rural areas. In this context, European forests and the forest-based sector play an increasingly important role in fostering smart, sustainable and inclusive growth in Europe based on the production of eco-services and eco-efficient products from wood and non-wood-based products.
Up to now the forest-based sector has been mainly build around wood based products due to the great economic importance of wood and the well-structured and competitive value chains. However, the potential of non-wood forest products (NWFP) (e.g. berries, mushrooms, cork, pine kernels, acorns, medicinal herbs, essential oils, chestnuts, resin, etc.) has been mostly neglected. Nevertheless, they can significantly contribute to the creation of new business opportunities and jobs in the rural areas. However, unlocking the full potential of NWFP requires (i) new knowledge and tools to optimise the sustainable provision and profitability of NWFP and services from multipurpose trees (MPT), (ii) better understanding on the potentials of markets for NWFP and of the role of innovation processes for new products and services.
The STARTREE project recognised the importance of MPT and NWFP in the context of strengthening and diversifying the economic activities in the rural areas. Thus, the STARTREE project was based on an integrated approach that addresses the above-mentioned elements, identifying shortcomings and proposing solutions to enhance the management, product development, innovation, multi-stakeholder dialogue and marketing of NWFP and MPT.
The ultimate goal of the STAR TREE project was to provide better understanding, knowledge, guidance and tools to support relevant stakeholders (e.g. forest owners, resource managers, enterprises, decision makers, other public and private entities) in optimising the management of multi-purpose trees and developing innovative approaches for increasing the marketability and profitability of NWFP for a more competitive rural economy.
To reach this overall goal STAR TREE focused on:
- Developing new knowledge and tools to optimise the sustainable and joint provision of wood, NWFP and related services as well as the management of MPT in a climate change context.
- Advance the understanding on the socio-economic importance and the potentials of markets for NWFP, including the role of public and private actors in supporting the innovation processes for new products and services based on consumers' behaviour and patterns;
- Establish solid strategic partnerships between key research organizations and specialised SMEs working on NWFP in Europe to ensure and speed up the transfer of research and innovations to markets. Such partnership will be based on an interactive, multi-scale and feedback-based approach and it will cover the whole NWFP value chain.

In this respect STARTREE has strived to:
- Generate sound empirical data that should contribute to a better general understanding of the current situation (strengths, weaknesses, threats and opportunities) in the NWFP sector in different regions across Europe;
- Involve relevant stakeholders along the value chain of NWFP and MPT to better understand their needs and preferences, and provide them with custom-tailored solutions;

- Develop decision support tools and management guidelines for optimizing the management of MPT and the provision of wood and NWFP and related services;
- Provide a proper understanding of the current structure and dynamics of the NWFP market, and its possible future development;
- Generate innovative tools that will guide small and medium enterprises (SME) in the development of successful marketing strategies to increase their competiveness;
- Identify existing policies and institutions at the European, national and regional level, affecting the NWFP sector, and propose adjustments to foster the competiveness of the sector at different scales;
- Provide extended knowledge about innovation systems and processes in the NWFP sector and about the roles of different public and private actors in supporting them;
- Generate a comprehensive overview of innovative NWFP examples, and develop and disseminate ideas on new NWFP;
- Generate an information source and support materials for relevant stakeholders that will facilitate an optimal utilization of opportunities offered by MPT and NWFP.

To reach the desired objectives and impacts the STARTREE project was interdisciplinary, including experts from natural and social sciences, and relied on strong collaboration between different actors along the value chain. Out of total of twenty-four project partners, thirteen were research institutes and universities. Each of these research partners has contributed to each of thematic work-packages.

Project Results:
IMPORTANT: Note that this full report makes extensive use of the FIGUREs attached to the report as pictures.

The StarTree project was organized in four topical work packages that were running a cross a set of 14 case studies, where each case-study has contributed to research activities of all work thematic packages. The coordination between the research activities and the case-studies was performed by work package 1 (Case study coordination and stakeholder). The thematic work-packages were:
- WP2: Resource management
- WP3: Economy and Marketing of NWFP
- WP4: Institutional dimensions of NWFP
- WP5: Innovation systems and processes

The work was organized through a series of tasks, where tasks leaders were selected from the projects' partner circle. Task leaders were responsible for fulfillments of the activities set by their tasks, and for the coordination of work across partner organizations and case studies. There are 14 Case Study Regions (CSR) which form the focus of data collection for StarTree. They are: Alentejo (Portugal), Bursa (Turkey), Catalonia (Spain), Eastern Scotland (UK), Latvia, North Karelia (Finland), Osrednjeslovenska (Slovenia), Suceava (Romania), Šumadija & Western Serbia (Serbia), Trentino-Alto Adige (Italy), Valladolid (Spain), Waldmärker (Germany) and West Wales & The Valleys (UK). In order to enhance the flow of information between case studies and the project's research community, a coordinator for each case-study region was selected from a research partner organization. In order to assess possible contribution of NWFPs to designing a more competitive rural economy, many research approaches have been utilized.

Data sources included questionnaires, interviews, focus groups, legal, technical and expert documents, trade, GIS and forest inventory data bases. Different analysis techniques were utilized, namely policy and institutional analysis, statistical, network, econometric and GIS analysis, modelling and simulating of forest growth and yield, multi-criteria decision models and innovation studies. In the following, we produce a comprehensive work package wise description of the main scientific results.

As engagement with stakeholders was an important element of the project, one of the first tasks in WP1 (Case study coordination and stakeholder consultation) was to develop guidelines on communication strategies for engaging stakeholders (deliverable 1.1). These guidelines describe the general setting for stakeholder engagement, where each case study has a responsible researcher assign to it, who also sets up regional stakeholder groups. These groups entail representatives of at least 10 important regional or national stakeholders in the field of NWFPs, and were central to the interaction with a wider stakeholder community as well as for facilitating access to key information for StarTree. At least two meetings have been organized with each regional stakeholder group. The members of these groups have also participated in the knowledge exchange events held together with StarTree General Assemblies. These events have served as venues for regular exchanges for stakeholders and their counterparts from other countries, where they had opportunity to learn and observe the process of innovation adoption.

Given the fact that creation of scientific findings is a long-term process which produces highly specialized and fragmented results, a single document has been produced which summarizes all the scientific findings of the first eighteen months of the project – Deliverable 1.3 (“State of the European NWFP”). The document covers topics of NWFP utilization, forest management, access and harvesting rights, role of innovation and implications for business development. The initial step in analyzing NWFPs is to provide its analytical definition. The Project has taken-up FAO’s definition that NWFPs are “products of biological origin other than wood derived from forests, other wooded land and trees outside forests”. The overview of products that fall into project’s scope are presented by Figure 1.

[INSERT FIGURE 1 ABOUT HERE]

The Deliverable shows that official statistics for production of NWFPs in Europe are derived from trade statistics which exclude much of the collection and use which is informally traded or personally used by the picker. Nevertheless, the available statistics for 2007 indicate a sector worth 2.76 billion €. This is only part of the story and there is a persistent lack of data on NWFP use in Europe. Nonetheless, global trade in NWFPs is significant and StarTree examined the position of the EU for four NWFPs in international trade: vegetable tannins, cork, chestnut and wild mushrooms. Vegetable tannin is extracted from wood and bark of chestnut and oak and is traditionally used in the leather and food industry. Production in Europe slumped in in the mid 1990’s in the face of competition from synthetic tannin and imports of tannins from tropical trees. However, recent changes in Europe are stimulating demand for vegetable tannin and this provides an opportunity to re-invigorate vegetable tannin production and thereby reinstate management of neglected chestnut groves. For global trade in cork, Europe is in a monopolistic position with Portugal and Spain as the world’s leading cork producers. Value addition, in particular the manufacture and export of cork bottle stoppers principally for wine bottles is an important component of cork trade. In recent years, demand for cork stoppers has been in decline with substitution by plastic stoppers and screw top caps and the industry is seeking innovations to reduce costs and improve the quality of stoppers and also to

diversify product lines. There are significant quantities of chestnuts produced and traded within Europe but with increasing dependence on global imports. This is caused by the fact that European production is not able to keep up with demand because of the time taken to establish new supply and also the deprecations of several pests that limit chestnut production (i.e. “chestnut gall wasp” and chestnut blight). The global wild mushroom trade has in recent years experienced a continuous increase in trade volume and value so that by 2011 wild mushrooms represented 45.6% of the 4.98 billion US$ global market in mushrooms. The majority of wild mushroom collection has moved away from Europe though there remains a large amount of intra-EU trade which offers possibilities for EU producers.

In order to find out which NWFPs actually exist in case study regions, a sector mapping exercise has been performed; and it has resulted with 432 NWFP taxa. The majority of these are plants, with a third being fungi and animals. The products most often mentioned by the CSRs are traditional wild forest food and drinks, herbal medicines and handicrafts or related to the use of natural products for soaps and cosmetics. There are relatively few industrial products and these are represented by only a few products e.g. cork, resin etc. in nine of the 14 regions. The sector mapping data shows that in all 14 StarTree regions at least half the NWFPs are harvested for personal use while for three regions this rises to 90% of records and in one of the regions (Waldmärker, Germany) there is very little trade and recreational use dominates the regional NWFP sector.

StarTree is only concerned with tangible products and these were grouped into three market sectors: mass market products in undifferentiated trade; specialized markets for niche products designed to appeal to and dominate small markets and embedded products where use is intrinsic to the sale of a service. Mass market products cover a wide range with the most universal being mushrooms and fruit & berries both traded by nine out of 14 regions while honey and foliage came next in terms of the number of regions involved in mass market trade. Trentino Alto Adige (Italy) and Catalonia (Spain) are both heavily involved in mass market trade in a wide number of products. In contrast, there is much more activity in terms of the diversity of resources collected and products made for specialized or niche markets across all regions. Embedded products are diverse and fall into several types with products marketed as an intrinsic part of tourism services (e.g. mushroom picking as part of a culinary experience); hobby activities (e.g. basket weaving courses); education (e.g. bushcraft or survival courses) and as an incentive for forest management (e.g. resin tapping to reduce fire risk). The development of embedded products is mostly at an early stage and may offer the prospect of improving the profitability of forest management for forest owners, as they “bundle” NWFPs with services, for which people may be willing to pay.

The collection and use of NWFPs are governed by legislation and policies at many levels. Within the StarTree countries there are six which include NWFPs in national forest law, two which have provision for NWFPs only at subnational level, two which have provisions at both national and sub-national levels, one which has no provision of NWFPs in forest laws and one where provisions are made in other acts or principles. In every country there is some provision for ‘everyman’s rights’ and variable levels and types of regulations governing commercial harvesting and use.

The sector mapping and a questionnaire put to professional foresters were used to examine issues to do with forest management for NWFPs. The majority of NWFP species are wild harvested from natural forests where they are not explicitly managed or included in management plans. However, NWFPs are

also picked from a wide range of other locations including urban gardens, degraded areas, hedgerows and hunting estates. Active management is mostly focused on a small number of products such as cork, pine nuts and truffles in Portugal and Spain. Here recent developments in silviculture are focused on grafting to improve stock and improvements to soil management in cork stands. Generally, few management practices such as pruning, thinning or mechanical harvesting are employed for NWFPs. It is therefore not surprising that the survey of professional foresters revealed that few knew of or used yield models for NWFP products. However, many of the foresters expressed an interest in models for a wide range of resources from birch sap to decorative foliage. There are a number of these which are the subject of research by the StarTree team and these can be made available at the end of the project. Decision-support systems are designed to help foresters to optimize management plans and there are few of these which include NWFPs and indeed few computer-based systems in use, with the main tool used being printed forest plans. Very few NWFP species have been assessed for conservation and this should be included in any programme to increase NWFP production, especially where this impacts on wild harvesting levels.

The ability of the forest owner to vary management of a forest to include or prioritize NWFPs is limited in some countries by regulations. In most of these the inclusion of NWFPs is possible if it is approved by the authorities as a part of the forest management plan. However, in several countries it is not possible to move away from timber production even with a management plan. This restricts the ability of the forest owner or manager to optimize NWFP co-production. Nevertheless, there are also instruments which are intended to act as an incentive for increased production of NWFPs though these are uncommon. The ones that have been identified typically focus on NWFP originating from trees - such as cork, pine nuts, chestnuts and resin; or honey. These are also the products with high commercial importance in the respective countries. Scientific advances in modelling mushroom and berry production, may justify the introduction of specific policy measures fostering the production of these NWFPs, as we can see is happening in Valladolid (Spain).

Most StarTree countries guarantee the public free access to forests, albeit subject to specified conditions, restrictions and prohibitions. Generally, a rule governing access to forests is that people entering must avoid damage and harm to the forest owner, to property and to the forest environment and ecosystem. However, there are countries which have specific restrictions. Analysis of access regulations at country level reveals differences in: the administrative level in which public access rights are enshrined; regulation of access rights between public and private forests; the extent and precision of formal access rights; definition of allowed activities by people entering the forest and the powers granted to (local) public authorities to regulate, restrict or prohibit access and activities.

Nevertheless, it was also discovered that although there are general regulations of access rights, in many regions these are modified by local practices or norms. The effect of these is to render forest owners unable to exercise their rights to restrict access to NWFPs. This is exacerbated by the lack of clear distinction between everyman’s rights to personal use and commercial exploitation. This is an enduring source of conflict between forest owners and NWFP users.

StarTree recognized five types of innovation; these being related to the creation, or improvement of: products, processes, marketing schemes, organization and institutions. Examples of each of these types

of innovations are being collected into a StarTree database. Innovation can happen spontaneously but it is also something which is actively promoted or supported by policies at any level, though it was found that national policies were most evident in the StarTree regions. Innovation policies can be found in many sectors. Eight sectors were scanned for policies that could be used to promote innovation for NWFPs. Of these, most policies were identified in the forestry sector followed by rural and regional development. Although the specific objectives of these are often set at national or regional level it was found that European funding through the Common Agricultural Policy often lay behind the programmes. 'LEADER' in particular is of interest for NWFPs with its focus on rural enterprise development and emphasis on innovation.

There are a number of support measures which are intended to promote rural development which can be used for NWFPs. These are intended to help overcome barriers and can be either public or private or mixed initiatives. Generally, they take the form of advice and subsidies to potential entrepreneurs. Through the expediency of questions based around scenarios for NWFP enterprise development a review of the regulations related to start-up enterprises was undertaken. This showed that there are a few permits needed for specific NWFPs (especially for honey) but most are related to the production of foodstuff and are generic food safety standards which apply to all products for human consumption.

The StarTree NWFP sector review has consolidated information from across the different disciplines represented in the consortium. The most significant of the gaps in knowledge which have been identified are:
- poor trade data arising from difficulty of tracking NWFPs though the HS system of customs codes
- no formal statistics on the numbers of people picking or volumes harvested for personal use
- little use of silvicultural prescriptions, models or decision support for NWFPs in forest management plans
- forest management advice only available for a limited number of mass market NWFPs
- limited assessment of conservation status of NWFPs
- conflict resolution between competing rights holders especially between personal and commercial users
- no clear legal distinction between personal use under everyman's rights and commercial harvesting under permits and licenses
- little is known of the relationship between enterprise activity especially for embedded products, well-being and forest culture
- the most effective means to foster rural development through creation and promotion of NWFP enterprises

Some of these challenges, notably those related to forest management, access rights, rural development and innovation are the subject of the StarTree project and are addressed in the text below. Others notably those related to the significance of personal use and wild harvesting are outside the scope of the present project.

The StarTree project contained an element of Action research (AR) led by SME partners in five of the StarTree case study regions. AR is a participatory, adaptive process whereby reflection from personal, group and external perspectives is employed to critically evaluate progress during project implementation and project goals and activities can be reformulated if required. The AR was focused on problems unique to the region: Catalonia: the development of a broad based strategy for the black truffle sector; Castilla y Leòn: design of an innovative mobile app to allow mushroom pickers to identify mushrooms with links to

regulations and licenses; Scotland: work to re-invigorate and develop a number of existing WFP branding and sector support initiatives; Austria: wild forest products for sale through the Nature Parks labelling scheme to enhance farm incomes; Wales: support for a range of small scale initiatives to develop woodland community group awareness of potential wild forest products for income.

Despite acknowledging the difficulty of identifying and engaging disparate stakeholders, the value of participatory approaches and the flexibility possible in AR was strongly emphasized in each of the five AR-regions. Listening carefully to stakeholders enabled each AR-facilitator to focus attention on issues and solutions which most motivated the stakeholders. The pay back for this was the release of the potential of all stakeholders especially with regards to innovation, accumulation of social capital and self-perpetuating activities and networks. It was found that for motivated AR participants, modest cash inputs spent on self-selected interventions were extremely good “value for money”. However, the AR process itself requires investment of skilled and empathic staff time which is often lacking from conventional business support programmes. The StarTree AR benefited greatly from being led by SMEs who are deeply embedded in their region, active and known within the regional forestry sector and have personal experience of small scale entrepreneurship.

Work package 2: Resource management had three strands of research: silviculture, models for forest growth and NWFP prediction and decision support systems for forest management. The initial step of analysis (Deliverable 2.1) was to assess the state of the art in these three fields, which was based on a literature review and a survey whose questionnaire was distributed to forest professionals in all 14 project’s case study regions (239 responses). The selected species and NWFP, based on their importance in the case studies associated with the institutions that participate in WP2, cover several tree fruits (walnuts, chestnuts, pine nuts, and several tree berries), other tree products (cork, resin, lime flowers and laurel leaves), mushrooms and understory berries. Overview of identified NWFPs across all case studies is presented in Figure 2.

[INSERT FIGURE 2 ABOUT HERE]

Given the inherent difference in viewpoint between the silvicultural requirements for NWFP and timber production two frameworks for the description of existing silvicultural practice were devised, the first from the view-point of timber production and the second from that of NWFP production. It was considered that a one-size-fits-all approach was inappropriate. A combination of frameworks was also suggested to be applicable. Analysis resulted with a full description of the autecology of the species under investigation as well as information about the associated NWFP incorporating product characteristics, utilization and yield. Special attention has been given to the description of silvicultural systems for each species including timber production (product requirements, stand initiation, bole formation and pruning, diameter growth and crown thinning, rotation/age of harvest), NWFP production (stand initiation and formative pruning, ongoing maintenance and thinning) and where possible combined timber and NWFP production (product requirements, stand initiation, bole formation. and pruning, diameter growth and crown thinning). Information was also sought regarding other potential (e.g. other options such as intercropping or agroforestry).

Only 8% of respondents know any forest models that include NWFPs within their outputs. Most of the

professional foresters think that models would be useful for any NWFP from their region except in Eastern Scotland, Latvia, Styria, Waldmärker and West Wales and The Valley. The identification and description of existing forest models showed that is the need to develop prediction models for several of the products, such as walnuts, chestnuts, tree berries, and resin. Based on the results obtained, several actions were planned for that: 1) data collection for the NWFP that have no yield equation available; 2) development of new statistical models – for the NWFP in relation to which no prediction model is available and new data is being collected under StarTree, new models will be developed, taking advantage of the large modelling expertise of some of the partners that may collaborate with other partners with less experience; 3) development of new expert-based models, again taking advantage of the expertise of some partners that have developed expert models for the NWFP important for their regions. This expertise may be shared with other partners in order to develop models for the same or other products of interest in their own regions; 4) combination of data bases from different countries to check the possibility to develop models with a larger range of applicability and that may take advantage of the strengths of different data bases; 5) Analysis of the existing stand simulators to check if it will be possible to share/complement computer code in order to obtain more user-friend interfaces that are appellative for forest owners and forest professionals that are responsible for forest management. When it comes to Decision Support Systems (DSS), forest owners rarely use themselves modern planning approaches (computerized DSSs including e.g. forest simulators for predicting tree growth, optimizers for selecting an appropriate harvesting schedule etc.). The professional foresters rarely know forest planning systems that include considerations of NWFP in their region - However, they show the need to have access to such systems. In general, DSS that include NWFPs are rare – and we have identified only seven such FMU or regional level forest DSSs.

Based on the findings from deliverable 2.1. StarTree project has updated several multi-purpose tree- and NWFP models, as well as developed several new models (Deliverable 2.1). The models that were already in development were focused on stone pine (Pinus pinea L.) cork oak (Quercus suber L.), mushrooms and berries. For the Portuguese cork oak model (SUBER 6.0) improvements entail a new function for site index estimation including soil and climate variables as predictors in the initialization module. In the tree growth and production module a model for tree total height growth in stands in the regeneration stage as well as a new model for crown width prediction have been completed. Several improvements have been to the Spanish cork oak model as well (ALCORNOQUE), including freely available simulator tool (wwwx.inia.es/alcornoqueWeb). The Spanish stone pine model (PINEA2) was also improved, with a new module for tree annual basal area increment, incorporating climate parameters. Similar situation is with the Portuguese model PINE_PT, where new module for pine cones production was development. Models for berries mostly correspond to Finland, where statistical model was estimated for cowberry using the dataset covering the whole country. The existing berry models were evaluated using an independent data set measured from North Karelia and the ‘best’ existing berry models were calibrated using the field measurements and literature. The calibrated models for bilberry and cowberry were linked to the existing stand simulators to describe the development of berry yields along the stand development. A new statistical model was estimated for bilberry using the dataset including also peatlands and covering the whole Finland. Models for the mushroom yield in Spain have been completed with the development of new empirical models that include soil characteristics as predictors. In the case of the mushroom models in Finland, the most important limitation is that the models developed are not suitable for numerical multiobjective planning since the information regarding site and stands characteristics have not been reported in mushroom inventories. In order to overcome this shortcoming, a new expert model was

estimated for Boletus edulis in Norway spruce stands in North Karelia (Finland). Also new statistical empirical models were estimated for marketed, edible mushrooms (B. edulis, Lactarius spp. and all marketed mushrooms) in Norway spruce stands in North Karelia (Finland) using a new set of sample plots in thinned and unthinned stands. In most of the cases, management schedules for the joint production of timber and NWFP are optimized.

StarTree project has also provided revision of current silvicultural practices (deliverable 2.3) for increasing the yields of both direct and indirect NWFPs. These silvicultural practices have been defined to 13 selected NWFPs distributed throughout Europe. The researchers also noted that the harvest of most NWFP within Europe has a long tradition and is commonly part of regional culture, and that the marginality of NWFPS in forest management is to a certain extent affected by the fact that often those who are responsible for the silvicultural management of forest stands are removed from those benefiting from the occurrence of NWFP. For some NWFP (for example mushrooms, cork (Quercus suber), cowberries (Vaccinium vitis-idaea) and bilberries (Vaccinium myrtillus) empirical studies have been conducted where NWFP yields have been measured under varied silvicultural conditions. Production cost and market prices have been factored within models aiming to estimate the ideal silvicultural system for the optimized production of both, wood and NWFP. For other NWFP (for example wild cherry (Prunus avium), lime (Tilia spp.) and sweet chestnut (Castanea sativa)) recommendations are made based on expert knowledge, and are thus, conjecturally based. The modification of one or more treatments within an existing prescription may allow for greater quantities or a more sustainable harvest of NWFP over time, while enabling the co-production of non-wood with wood. Some common silvicultural activities are suitable to promote the production of various NWFP such as the choice of provenance and genetics, choice of spacing/stand establishment, thinning regime and pruning activities. Those measures should therefore always be considered when establishing a NWFP-focused system. For instant it could be shown, that ceps (Boletus edulis) grow best in forest stands with a defined basal area; or that combined formative and high pruning can promote the production of cherry and high value timber concurrently.

The production of NWFP often involves a compromise (i.e. additional workload and/or a decrease in wood production). However, may also present additional benefits for the land holder, while risk diversification and an increase in biodiversity can be achieved. In conclusion, the compromise between wood and non-wood goals must be evaluated on an individual basis. The co-production of contrasting products is possible in many situations, but the land manager must appraise likely outcomes based on temporal and spatial constraints, site conditions (i.e. European location, climate and site productivity), market fluctuation, labor cost, individual species requirements and management capacities. Overview of the interaction of silvicultural practices for increased yield of different NWFPs with wood-based production is presented by Figure 3.

[INSERT FIGURE 3 ABOUT HERE]

As identified by deliverable 2.1 current usage of DSS for NWFPs has been very limited. This is not a favorable finding for NWFP practical management as solution from DSSs is a recommendation how to manage forest and it also includes measures that describe the outcomes of certain management regime. Therefore, the decision makers have not had information on how forest management affects the yields of various NWFPs or how the yield of certain NWFPs could be increased. The deliverable 2.4. alleviates

these problems by reporting how the existing forest DSSs have been improved and what kind of new DSSs are available for optimizing forest management that considers both timber production and NWFPs. The Deliverable presented optimized treatment schedules for some new (e.g. pine honey, cork production in Spain and ecosystem services) and improved solutions for several other NWFPs (e.g. berries including picking costs). At FMU (Forest Management Unit)-level, the examples from Finland, Portugal, Spain and Turkey showed that multi-objective forest management approach based on the development and evaluation of FMU-level alternatives is strengthening. Through alternatives, preconditions to evaluate the trade-offs between goal variables and analysis of economic consequences can be improved. A specific attention was given to visualization of the results through production possibility frontiers and thematic maps. Interestingly, also three region level use situations to consider the production possibilities of NWFPs were given. In these, the large-scale forest DSSs were developed and applied to better meet the information needs related to NWFPs and potentially existing in forest policy preparation processes. In addition, the developed expert knowledge-based multi-method DSS was advanced in at least three important dimensions. First, it is able to consider the operational environment more broadly than only from forest perspective. Second, it includes a possibility to examine both the FMU and region level capabilities of NWFPs production. Third, it is able to consider several predefined NWFPs at the same time.

Work package 3: Economy and Marketing of NWFP was going from macro to micro level of analysis. The initial economic dimensions of NWFPs that was explored was its international trade (D3.1.). UN Comtrade as a data base was selected, as it is most encompassing data base on international trade that exists. Main groups of products that have been analyzed are: tannins, cork, nuts, mushrooms, foliage, berries and honey. The international trade of the selected NWFP commodity groups reached 12 billion US$ in 2011. However, part of the considered commodities that compose this value are cultivated. For example, nut plantations have been considered in several countries (also European) as components of the forestry sector. It was estimated that the trade value for 2011 would be 62.2% lower if only accounting for commodities from forests (see Figure 4). The value was calculated selecting just the commodity codes that contain wild harvested NWFP. A more prudential estimation would decrease the value by 61%, assessing the global trade of wild harvested NWFP at 4.69 billion US$.

[INSERT FIGURE 4 ABOUT HERE]

The EU has a strategic role in the international NWFP market, accounting for 50.4% of the total export value of commodities based on raw or processed NWFP. The main NWFP in which the EU dominates as the global supplier are truffles and cork. Also in the case of chestnuts, the EU exports accounted for 51.1% of the global trade. This is a significant increase it is compared to the year 2000 when this share was not exceeding 25%. On the contrary, the high dependence on international trade for wild mushrooms and nuts should make the policy makers think if the quality standards and the quantity of the supplied commodities will be maintained also in the future through the implementation of new standards and rules at the European level. The implicit export of European food and environmental standards have already been translated into a higher quality of the imported commodities, but the competitive emerging markets with standards lower than of European Union may push the international suppliers to have a shortage of raw materials. While it is unrealistic to cover the demand for all the NWFP from European forests, more attention should be given to the enhancement of the standards and overall quality of the internal supply in order to differentiate the market and to cover the high quality segments (i.e. higher prices). This target can

be reach with an increase in innovation in production techniques, in marketing and in general with and more advanced entrepreneurship by NWFP internal producers and processors. The distinction between cultivated and wild harvested origins for the same product is not relevant to those agencies that collect and publish trade statistics on international commodities, but for a policy maker it might be a strategic information in order to design better policy tools. More detailed trade data is required to study complex commodity groups (i.e. tannins, mushroom, berries, nuts, etc.). For instance, the use of databases with higher commodity specification will help to trace global trade at the species level, which would then lead to more detailed conclusions, needed by the policy makers.

The second step in economic analysis was to assess the supply chains of NWFPs (Deliverable 3.2) ranging from global to local. The main data source for this analysis was obtained from in 14 regional case studies across Europe, where the geographical distribution of identified supply chains is presented in Figure 5.

[INSERT FIGURE 5 ABOUT HERE]

NWFP market relays on different specialized supply chains that link the forest to the end user; the chains are differentiated by products and geographical distribution of the economic actors, with a clear dualistic structure of the market with the main end-users situated in the western European countries and the main producing companies located in the East of Europe. The dualistic structure of the NWFP market does not refer only to the division of the NWFP demand and supply between Western and Eastern Europe, but also to another and hidden dualism that is referred to formal and informal market, this last still relaying on NWFP collected and consumed locally in restaurants and local handcrafts. The main target of the analysis was the formal market and the general understanding of the structure of the formal NWFP supply chains; nevertheless, during the data collection, flourishing business activities were observed in several regions that that fulfil the local demand of NWFP based on local production of NWFP: a challenging issue to be considered in a political framework. Among the solutions highlighted in different case study regions, the case of North Karelia (Finland) is worth to be mentioned as active solution for rising up the informal market to formal market. Tax exemption for the NWFP informal producer (wild mushroom and berry pickers) allows for transposing the fiscal pressure to the second actor in the supply chain, which might be a processor, wholesaler or retailer; and simply account the purchasing volume and value without any additional taxation to the fiscal agency. On the contrary, case like Italy, where both informal producers and NWFP buyers are taxed, shows a trend toward the creation or stabilization of the informal market. In this situation, only few processors and wholesalers relay on the local production, and the international market become the main supplier for their needs. If the companies move from local to international market, the policy marker should be careful to the defining of the labelling policies in order to protect not only the local production, but also the local “know-how”; probably the core knowledge needed to create added value on the use of a given NWFP. Likely, in the mid or long time frame, productions of several NWFP may slowly turn to be economically exploitable also in the Western Europe (due to the welfare enhancement of the supplying countries). Nevertheless, in the meanwhile, NWFP research should propose models to help new entrepreneurs to step into the NWFP market or use supply chain indicators to help the coordination and enhancement of the existing NWFP chains: still a very challenging task if looking at the wide gap between the aims of researchers and SMEs.

The third step in economic analysis of NWFPs was to capture the trends in regional NWFPs and to assess their collection and consumption patterns (deliverable 3.3). As share of informal market in the regional trade of NWFPs is high, there are no reliable official estimation on the topic. In order to supplement the supply-chain study in the previous step, a Delphi study was launched in eight case-study regions in order to re-estimate the number of actors involved in NWFP markets (total of 63 respondents). The Delphi study showed that its results were valid for the central part of the supply-chain, but weak in the estimations of producers and retailers. It also showed a diffuse informal market in which informal pickers supply regularly local companies with products harvested within the regional boundaries, and it showed that share of informal market is positively related with 'stiffness' of the legal and fiscal system. The estimations of NWFP quantity showed great variance among the respondents. The results highlighted important numbers of companies and employees beyond the economical exploitation of wild mushrooms. Around 450 processors and wholesalers, employing over 8000 people, in five countries, represent a crucial information to underline there is a branch of the forest sector that relay on an alternative and valuable raw material other than wood.

Collection and consumption of NWFPs was assessed with a survey that covered 28 European countries: Serbia, Turkey and European part of Russia as well as all EU28 members except Malta, Cyprus and Luxemburg. CAWI (Computer-Assisted Web Interviewing) was used to distribute the questionnaire, which was done by professional pooling agencies. Households where main unit of analysis, where the targeted statistical parameters were 95% confidence level with 5% confidence interval on national level. The survey resulted with 17 346 valid responses, and with 95%confidence level, mean confidence interval was 4.21%. Questions entailed 14 consumption products, 45 collection products and different socio-economic parameters. Results show that 89.6% of households have consumed NWFPs in 2015, and that 25.2% of households have picked at least one of them in the same year. The collection figure equates to 20% of population, which marks collection of NWFPs as an important social activity. Consumption of NWFP products and collection of groups of NWFP products can be seen in Figure 6 and Figure 7.

[INSERT FIGURES 6 AND 7 ABOUT HERE]

NWFPs are predominantly purchased in shops, and most frequently purchased products are fresh and dried nuts and fresh berries. Wild berries and wild mushrooms are the most frequently picked groups of NWFPs. Looking just at the households whose members have picked NWFPs in 2015, majority of them have done so 3-12 times a year, did not attend any courses on the recognition of plants and fungi and did not have any problems during picking. For 0.5% of total households, the picking NWFPs activity represents main source of income, which clearly demonstrates their economic importance. Both collection and consumption of NWFPs increase from West to East Europe. Higher percentage of households picks NWFPs in rural environment (35%) than it is the case with urban households (22%). There is almost no relation between income on one side and consumption and collection of NWFPs in another. On average, 77% of NWFPs are picketed solely for consumption, where only 49% of truffles are picked solely for consumption.

In order to assess the relation between rural development and NWFPs (deliverable 3.4) a total of ten case studies throughout Europe have been taken-up. The goal of analysis was to look at innovative uses of NWFPs both from economic and governance perspective, and to assess how entrepreneurs, associations,

public authorities or other private and public organizations are able to create added value from them. Each case study is characterized by different market tools and regulations to deal with NWFPs promotion: some case studies create added value from raw NWFPs, others from processed NWFPs or from NWFPs -based services. Case studies differ by number of the actors (from few, public or private, to several ones), by the contractual links and social ties, by formal or informal relationships. These relations have been analyzed through the use of Social Network Analysis (SNA) implemented through a system of indicators created ad hoc. Example of such analysis is the case of Poblet (Catalonia, Spain), where a fee for authorization for mushroom picking has been established. The area is also a Natural park, and the income of the fee is aimed for improvement of forest management. As the payment mechanism was introduced with approval from different stakeholders, and was subsequently successfully implemented, the research wanted to explore the relations between the involved actors. Figure 5 (attribute-based layout) shows one of such relations, i.e. 'talk and collaboration' networks in design and implementation phase of the policy. Node size represents decision making power (influence), node color represents "scale" (bordeaux is local, red is county, orange is province and yellow is region), node shape represents "sector" (circle is public, square is private, triangle is conservationist, diamond is research), and arrow size represents the number of relationships (absence, only talk, both talk and collaboration).

[INSERT FIGURE 8 ABOUT HERE]

The differences between the two networks are evident: in the implementation phase the density and reciprocity is higher, there are no isolated nodes, and external experts have a higher collaboration among themselves. It is interesting to see that the role of key actors does not change in the two networks, and that there are always some local protected area management board members (bordeaux color) in the top positions of the node centrality main measures' rankings. It may be read in two ways: a) only people that had formal power covered a key role in the policy implementation, despite the effort of enlargement of stakeholder participation; but at the same time b) it means that the interest is high among members, and that external experts always report their actions to someone internal.

When summing-up experiences from all case studies, some were able to generate added value from raw NWFPs, others needed to process it or to create a service. Few case studies were based on the initiative of single actors; the majority took advantage of the strong social ties of the local community. Half of the analyzed case studies were characterized by mixed partners, both public and private stakeholders. Private actors were SME, associations or single citizens. Most of the case studies created added value through formal supply chains, the remaining ones were based on informal relations among the actors. In the majority of these cases study was able to quantify the monetary difference between the raw product and the price of the final product or the service sold to the end consumer. In some cases, study was also able to assess the societal added value. Only in few case studies it was possible to quantify to which extent local population is using WFP for self-consumption. Based on the results of each case-study, utility, exchange and societal values of NWFPs were assessed through a total of ten indicators.

The results show that market-based instruments to NWFP management are positively correlated with creation of exchange value, that the number of actors involved does not have an impact on the creation of added value, and that the regulatory instruments do not generate strong added value in short term - as its effects are probably less direct and more linked with the long period. The main innovative ways through

which NWFPs can create added value are:
- Participation in horizontal networks, which helps in getting the central positions of the collaborative networks, through a knowledge and ideas sharing (Llais and Goedwig, Venues in Eastern Scotland, Šumadija and Western Serbia, Tuote ja Vihannes).
- Population representativeness of key actors in decision making, which creates social cohesion when a governance approach is used to develop initiatives such as a permit for mushrooms picking (Poblet, Magnifica Comunità di Fiemme).
- Internalization of the supply chain, which increases efficiency (Del Monte de Tabuyo, Forsthof Schildfeld)
- Coopetitive relationship, which includes both competitive and cooperative interactions, and can help companies to be more innovative (Tuote ja Vihannes).
- Differentiation of selling channels and final products, which is a portfolio strategy that in the medium-long run increases the market allocation and generates new customers (Del Monte de Tabuyo).
- Interconnection between SMEs or individuals' market approach and the territory, which helps the rise inhabitants interest and of other connected local initiatives (Del Monte de Tabuyo, venues in Eastern Scotland, Šumadija and Western Serbia).
- Different level of participative inclusion at each step of the value chain, which improves efficiency and helps in monitoring employees/partners expectation (Forsthof Schildfeld, Llais and Goedwig).
- Communication and transparency, which are the key prerequisites for involving stakeholders (Südsteiermark, Forsthof Schildfeld, Del Monte de Tabuyo)
- Income redistribution and investments at local level, which are the driving forces to increase the perceived value of WFP and to raise the society attitude towards the WFP business (Magnifica Comunità di Fiemme, Poblet)
- Overlapping of formal and informal networks, because it helps communication and aims sharing (Tuote ja Vihannes, Magnifica Comunità di Fiemme).

All of these conclusions are based on case-study specific findings; and generalization should be done with care. Nevertheless, due to many similarities among case studies, the use of both qualitative and quantitative tools for analyzing data, and the use of social network analysis to give an answer to common research questions has allowed for validation of the obtained results, and can serve as a foundation for future research. However, the generalization of all the economic research conducted in this work package to a set of concrete policy recommendations was possible (D3.6) where three key messages are:
- NWFP as they are defined now based on the list of species should be re-defined based on the economic activity carried out in (semi)natural forests, and to a term that has clear intuitive meaning by the general public. Proposed terms are "forest products from the wild" or simply "wild forest products".
- Classification of commodity groups as used in data bases on international trade should be re-arranged in order to fit to the actual NWFP market developments, and expanded by new commodity group codes.
- There is no EU-level policy support to NWFP supply chains, and the regulative framework greatly varies across its members states. The legislative factors that greatly enhance the economic potential of NWFPs and decrease the informal market are scaling-down of bureaucratic restrictions, moving away the taxation from the collector upwards in the supply chain, and higher fiscal exemption levels of collection. These elements affect economic potential of NWFPs more than property and harvesting rights

The final section in the analysis of NWFP's economic aspects is the preparation of 'Marketing insights' manual (deliverable 3.5) for a training course, aimed to address forest owners and entrepreneurs. The

Manual consists out of following elements: (1) Marketing stimuli: the course chapters provide basic knowledge of marketing and focus particularly on the marketing of wild forest products and forest services; (2) Product examples: there are about 100 product examples which aim at giving marketing ideas to the users and provide them with practical solutions to marketing tasks; (3) Join-in activity guidelines: aim at the immediate implementation of marketing ideas in the users own forest enterprises and (4) Presentations: make the course practicable to a broad audience of trainers, lecturers and advisers. The coursework has been developed in Germany. Thus, some bias to the situation in Germany is unavoidable. However, all work documents (folder, presentations and supplements) are available in both German and English. The coursework can therefore be adapted and translated into other languages. The study material for the marketing course for wild forest products and forest services “Marketing insights” can be adjusted to fit the different approaches of the scope of the course. The overall objective of the course is to motivate the participants to develop something of their own and to create a product concept regarding wild forest products and forest services. Given the frame of a one day course, only a presentation of the course content can be held and a Do-it-Yourself-instruction can be provided. A two-day course offers the opportunity for every participant to develop a compact concept (individually). For this purpose the checklists (“Do it Yourself”) can be used as non-obligatory guideline. A three-day course provides sufficient time for an interactive marketing game. The participants can present their results and give each other feedback that can be incorporated into the product concept. A university course can be extended almost at will, by providing the students only with certain impulses in the presentation and letting them read up on further content in the provided literature. As an outcome the product concept can be handed in either with or without a presentation of the group results.

Work package 4: Institutional dimensions of NWFP started with an Exploratory analysis of institutional dimensions of NWFPs, which is summarized in deliverable 4.1. Institutions – that is, policies, legislation, property rights and policy instruments have a fundamental importance for Non-Food Forest Products (NWFP) sector development. The findings of this analysis come from 14 case studies of the Startree project on formal institutions. In the European Union the role of formulation of forest policies is pertinence of the member states. The EU role consists in formulating general rules, which each member state can freely assume and adapt to its own national legislation, according to the principle of subsidiarity. Although there is no a common forest policy, EU can influence national forest policies with political processes. At European Union level, there are neither policies nor legislation specifically and exclusively targeting non-wood forest products. However, the recognition of the ecologic, economic and social role of NWFP and the willingness to promote them is highlighted in different European and international policies and agreements concerning forests. The research on property rights specifically aims at the identification of the relation between landownership and users upon the access, harvesting, exclusion and management of the rights on NWFPs, resource. Specific local property rights arrangements operate in each case study region, driven by a combination of national, regional and/or local legal rules, local ground practices and customary rights governing the use of the resource and different levels of enforcement. For this reason, the distinction between economic rights and legal rights is useful to understand the complexity of rules determining further the business conditions. The property rights system was studied for each case study, but also for each forest-product (forest attribute) considered relevant for the case study, for four categories of forest ownership (private, public - State, municipal and community forests) and for two final uses – personal consumption and commercial collection for economic gain (for trading purposes). A commonality of the case studies is the fact that, in practice, the ownership on the NWFPs is acquired based on the first

claimant rule – for most of the NWFPs the collector become de facto the owner of the products grabbed. In general, the distinction between the commercial and personal use of NWFPs does not always operate in practice, while the selling of the right to collect and the leasing are generally known, but practiced in few cases. For commercial harvesting of NWFPs, the owner or the right holder (authorized collector) are subject to different administrative procedures (quota, harvesting plans), however in practice they might be never implemented or enforced. The management of the resource for enhanced NWFPs production is possible in most of the regions, with prior approval from the authorities or based on traditional forest management planning procedures. The weak enforcement of exclusion rights is not always an impeding factor of enterprise development, but a trend exists to regulate at least the relationship between users and landowners (or outsiders and local communities) concerning the exclusive use of NWFPs for commercial purposes. As for policy instruments, in total, over 160 instruments addressing NWFPs have been identified in the case studies. The NWFP category for which the highest number of instruments have been identified – a total of 44 instruments, is that of mushrooms, truffles and other fungi, followed by instruments addressing game and hunting, fruits and nuts, berries and other NWFP. The overwhelming majority of the identified instruments – as many as 70 – address in one way or another collection or harvesting of NWFPs. They are followed by instruments related to consumption and trade, while the least number of instruments has been identified on the side of production, that is, those instruments addressing primarily forest owners or forest managers. Among the latter ones, economic instruments, that is subsidies or tax exemptions dominate. Regulatory instruments on the production side are mainly related to game management regulations and permits for the installation of bee hives. Harvesting instruments, on the contrary, tend to be mainly of regulatory nature, among them one can find legislation concerning harvesting rights, permits and quotas, as well as the limitation of areas where harvesting can take place. Among consumption instruments the overwhelming majority are informational instruments (83%) – predominantly certification and label of origin schemes. They are complemented by regulatory instruments, such as sanitary requirements, mandatory quality controls and species lists. Trade instruments are also dominated by regulatory instruments – typically different types of sales permits or trade bans. Economic instruments also have their fair share, including mainly direct financial support to businesses or different tax exemptions.

The same case studies have been taken-up in order to find out the conditions for establishment of NWFP business practices (deliverable 4.2). The Deliverable aimed to understand formal conditions (e.g. financial, legal) and requirements for the start of a business (e.g. ease or difficulty and length of time for starting a business, access to credit, etc.) and the availability of institutional support for this endeavor. The main results are:

1. Support and credits for entrepreneurs and start-up companies
In all the case study regions, there is economic support for start-up companies and it is mostly provided by the government (public economic support). In 12 of the 14 case study regions there is also a specific support dedicated to rural areas which is mainly given by the government (in 9 case study regions). The majorities of case study regions have organizations (public organizations or private companies) dedicated to support start-up business and related to the rural sector. A wide range of possibilities was observed in all case study regions related to credits options as in some cases international microfinance institutions were found (e.g Romania), finance institutions (Catalonia- Catalan Finance Institute, the official Credit Institute in Castilla y León), national and private banks offering different types of loans depending on the type of company and the activity, networks of business angels (BANCAL created in Castilla y León) ,

private investors acting like private sponsors or banks with loans orientated specifically to SMEs (in the case of the Osrednje region- Slovenia).

2. Needs for permits and licenses specific for the NWFP sector

When asking about the licenses and permits specific for the NWFP sector in each partner country, two scenarios were considered: in which companies produce or process NWFPs. In the case of producing NWFPs, in the majority of case study regions (8 of the 14 case studies), there is a special need for a license or permit : two cases studies (Trentino-Alto Adige region and Eastern-Scotland) specify that this permit corresponds to the landowner's permission and can take a form of a written or verbal agreement, for five case studies it is a permit specific for NWFPs (game license for Osrednje and Styriacork/pine kernels/truffles in Catalonia, wild flora/fauna/fungi in Serbia, pine kernels/pine resin/mushroom in Valladolid). In the case of processing them, in the majority of cases studies there is no need of permits or licenses in order to operate in the rural environment.

3. Steps, cost and length of administrative procedures to start-up a business

Regarding the length and cost of administrative procedures, there is quite a disparity between all case study regions as the time needed to gather and fill in all the administrative papers ranges between one day (Portugal) and several months (12 months being the longest period reported from Castilla y León) in the case of companies producing NWFPs. The differences between administrative procedures depend on several factors; the ability to register a business on-line can significantly speed up the process (and this isoften the intent with the installation of on-line procedures), the number of steps and authorizations required from several entities can slow down procedures. In terms of the costs incurred, the cost varies between 1 euro and 50.000 Euros. In the majority of the case study regions a prospective company has to demonstrate it has access to a minimum starting capital.

Stakeholder perceptions on role of institutions (deliverable 4.3) related to NWFP economic activities have been assessed in ten case study regions. Among the most remarkable findings it can mentioned that in most regions there exist informal institutions, either concerning the harvesting rights or the harvesting practices, or both, and their importance vis-à-vis formal institutions (if there are any) typically depends on various factors, such as the resource itself (e.g. perception of scarcity), or the community of its users and relations within this community (e.g. populations of different types of users). When it comes to profiles of the pickers, three distinct types can be identified in all case studies:

1. Recreational picker: Local recreational picker typically comes from the nearby, picks small amounts of product mainly for self-consumption or for giving it as a present to relatives and/or friends. Product is typically either consumed/stored unprocessed or is preserved in a processed form for later consumption (e.g. berry jams, juices, pickled mushrooms). The picker is typically considered to know the area well, and to practice respectful picking (e.g. not picking everything). Pickers coming from further away tend to have different picking patterns (e.g. come only on weekends), and arguably know the territory far less than local pickers, and hence may be ignorant of local picking practices. Some pickers coming from far away also fall into this category, as their picking is mainly related to recreational experience than with the picking experience as such

2. Commercial picker: may come from the area or may be from a further away. The distinctive feature of this picker, is that (s)he picks mainly for sales and is income oriented. Among commercial pickers there are those who pick for living or those who pick as a side income. The latter ones resemble in some way local pickers. Due to high volumes of harvesting amounts, is sometimes believed not always to follow good picking practices, and is believed to harvest everything in sight (including immature berries or small

mushrooms). However, there is evidence that in some cases pickers truly care about the sustainability of the resource. Product is typically sold unprocessed to intermediaries or to local restaurants/markets, although in some cases processing indeed takes place to increase the value of the product (e.g. berry jams). Commercial pickers are believed to move around larger areas, and may also pick rare species and operate outside the typical season (beginning or end of the season).
3. External picker: can be either recreational picker or commercial picker; the distinct feature is that comes from outside the area (or region). For this reason, is considered to have low familiarity with the area and its products, have few or no knowledge of good harvesting practices, and hence, cause damage to the forests of the area or to resources
Good harvesting practices are typically well known, at least by local population, and followed by some and in many cases, by the majority of pickers, but there are also those who do not follow these good practices. Opinions about those who do not follow good practices and why they do not do it typically depend on the case study; the overview of which is presented by Figure 9.

[INSERT FIGURE 9 ABOUT HERE]

Regarding broader impacts of institutions on the NWFP sector, both national and EU-level regulations seem to play an important role both in promoting and in hindering the development of the sector (depending on the country, legal and policy framework, and product). Major impeding factors for NWFP sector development are considered to be the seasonality of products, the unprofessional market, and lack of profitability of NWFPs, as well as the lack of coherent institutional support for the operation of the sector. Moreover, consulted experts claim that the sector is not taken seriously and with few exceptions it still remains at the level of grey or at best niche market. Despite the abundance of research results in some areas, there are still serious gaps on other (e.g. less traditional products), and the existing knowledge does not yet reach practitioners and entrepreneurs, limiting their use potential. There seems to be a general lack of understanding of the opportunities that NWFP represent across the supply chain, and decision-makers are faced with the lack of knowledge regarding NWFP practices. From the ecological point of view, there is little information regarding the ability of the forest resource to cope with an expansion of the market for NWFP, and it is not evident that the push towards forest diversification would be compatible with larger scale harvesting and extraction of NWFP.

How can institutional change support the development of NWFP sector? This was the research question of deliverable 4.4. whose data sources include Delphi study from deliverable 3.3 expert questionnaires from deliverable 3.4 and meetings with regional stakeholder groups (focus groups) in the case-study regions of the Project. The main results of analysis are:
- Improving coordination of policies across countries and domains, both at the EU level and at national/sub-national levels. Coordination of policies and regulations at supra-national level (e.g. EU) is especially relevant for products that are traded at international markets (e.g. mushrooms), and consequently in case regions where such trade plays an important role (e.g. Italy, Castilla-Leon). National and sub-national policy coordination, in turn, is important for every NWFP and nearly in every region, to eliminate inconsistencies and incompatibilities between different regulations for different activities in the sector, enhance interregional coordination and control, as well as improve coordination between agricultural and forestry management. There is also a need to promote an EU framework on wild forest products.

- Extending the agricultural production regime to NWFP to be able to benefit from a full range of support measures available to agricultural producers. For example, stakeholders consider that companies purchasing wild mushrooms from commercial pickers should be considered a primary producer of the primary sector
- Improving legal and policy framework for NWFP at national and sub-national levels. In several case regions, stakeholders have claimed clarifications regarding land ownership and NWFP harvesting rights, especially as we witness increasing trend of foraging for wild forest products across Europe. Cultivation or semi-cultivation of non-wood forest products (e.g. truffles, chaga mushroom) also calls for modification of existing regulations (e.g. Catalonia, Finland).
- Clarifying and raising awareness among the population about NWFP harvesting rights. The issue of unclear harvesting regulations has been brought up in several case studies – especially in case regions where foraging for wild forest products is not extremely extended among population or where roaming regulations are otherwise complex (e.g. Wales), and hence, stakeholders in these case studies call for information campaigns to improve the knowledge of harvesting rights among the general population. Similarly, the differences in regulation of commercial vs. recreational harvesting have also been brought up.
- Raising awareness on NWFP among the civil society and decision-makers. One of the biggest problems that stakeholders mentioned was related to the lack of awareness about NWFP among policy-makers on the one hand, and population on the other hand. Policy-makers seem to lack information on the profitability of the activity and its potential contribution to rural and regional development. Society (including SMEs), on the other hand, seems to lack information on the broad spectrum of NWFP that can be potentially utilized (e.g. research shows that most foragers harvest only a few NWFP species), as well as on the opportunities for income generation from these products.
- Enhancing research and development activities oriented at the promotion of the sector, and transfer of knowledge from science to business and policy makers. R&D activities are especially needed to identify sustainable harvesting limits for the majority of NWFP species as well as the economic value and economic potential of NWFP. SMEs also claimed for improved transfer of knowledge from science to practice, especially regarding product design and market research.
- Increased effort oriented at sector promotion and advocacy. Many stakeholders stressed that one of the biggest constraints for the sector is the lack of specific advocacy groups to defend the interests of the diverse NWFP sector at national and European levels. With a few exceptions (e.g. advocacy groups for cork), such advocacy groups either do not exist or are still in the emerging stage. Associations of enterprises as well as public administration and research organizations are, according to the stakeholders, the best suitable actors to take on this role.
- Promotion of networking and cooperation among different stakeholders involved in or related to the NWFP supply chains. Networking and cooperation are especially relevant for SMEs, as well as among forest owners, and public and private bodies (e.g. territorial stakeholders), as the lack of such cooperation was considered an important hindering factor for sector development.
- Education and training of different actors in the NWFP supply chains – starting from forest managers/owners to harvesters/pickers and NWFP entrepreneurs. For example, stakeholders consider that public authorities should guarantee that forest owners, managers and technicians receive adequate triaging on specific management techniques that improve the production of wild forest products. Such training can be done with a small cost for economic actors involved in the supply chain.

The first scientific task Work package 5 (Innovation systems and processes) was to explore which ‘new’ forest products and chemical substances can be used as a basis for innovation and subsequent increase in the economic importance of NWFPs (deliverable 5.2). Due to synthetic medicines, traditional pharmaceutical knowledge gradually decreased over the last few decades. However, developing trend proves an increased interest of society in herbal medicines for self-medication and as a complement to a conventional medical approach (not as replacement). Pharmaceutical value of a plant is defined by the type, amount and mixture of Secondary Metabolites (SM). Stimulating factors for the SM synthesis are defense and attraction. Therefore, wild grown plants show a higher SM production, compared to cultivated individuals. NWFPs form an ideal source for promising chemical substances. The Deliverable gives an overview of typical botanicals used in traditional medicine and of the pharmaceutically active compounds. Challenging for the developing market of phytopharmaceuticals is the slow and partially even lacking adaption of European laws and policies. Black cherry (Prunus serotina) is a so far unexploited recurrent species in German forests containing a here proven significant content of amygdalin, which is currently rediscovered in cancer research, thus Prunus serotina forms an innovative NWFPs with untapped potential. A harvest field trial has been made in summer 2014 showing methodological hurdles, whereas chemical analysis is promising. Altogether the unused and forgotten potential of chemical substances in NWFPs is tremendous, but legal frameworks and monetary barriers often slow down evolution of products and the market itself.

The subsequent step was to analyze innovation related policies on European and national levels relevant for NWFPs (deliverable 5.3). Analysis has been based on nine case-study regions, and has encompassed relevant regulations, financing instruments for innovation, diversification and sustainable rural development and informational instruments such as statistics, planning and extension services. In conclusion, innovation policies in the forest sector do very much intersect with other policy areas such as forestry policy, forest based industry policies, rural and regional development policy and also renewable energy policy. First, at the EU level, all these policies are coordinated by formally existing central coordination bodies, namely the European Commission and the Committee of the Regions. The related policy documents are reflecting increasing mainstreaming of forestry issues with the policy goal of fostering “innovativeness”. Second, at the national level it was found that only a third of the countries covered in study show an inclusion and mentioning of “innovativeness” as an economic tool. As such, it should foster forestry and the production of NWFPs for the creation of new jobs, the founding of new businesses and the change towards a greener and diverse economy. However, these tend to be rather “divided” between the sphere of forestry legislation and the sphere of innovation and development legislation (separated into forest management, timber production versus high-tech R&D innovation and foremost bigger sectors which compose of larger companies and (multi-)national enterprises). Rural development policies are the relevant ones for NWFPs, although, being typically oriented towards the agricultural sector in the narrow sense, they are not often taken up in forestry and/or for NWFPs. Finally, however, it can be shown that there are increasingly integrative policy approaches in the existing national forestry policies, particularly in the case of Wales, Scotland and Finland.

The link between the innovation policies identified in deliverable 5.3 and actors involved in innovation systems was the topic of deliverable 5.4. The results show that NWFPs are not linked only to the forest sector but also to other market sectors (Food & Beverage, Tourism & recreation, chemical products, cosmetics, decoration and others) which include a variety of (possible) support mechanisms in the

innovation systems. The importance and roles of sectoral (incl. forestry, agriculture, tourism, etc.) and regional innovation systems of various types on different geographical-administrational levels has been studied for this report. The analysis of innovation systems (IS) includes the relevant public and private actors and their roles in the innovation process; the institutional frameworks such as legal regulations and policies; and their interrelations. The analysis carves out types of innovations in the regions, as well as fostering and hindering factors. First, the analysis confirms that the majority of innovations are product innovations (goods and services) and the largest portion out of these are edible products. Second, the second rank is covered by several types of "institutional innovations" in a variety of subtypes, including the introduction of new rules or regulations, or the formation of organizations and cooperatives. Third, for all innovations, the strongest hindering factor is a lack of finances and monetary support according to the interviewed actors. Overview of innovations identified in Projects' case study regions is presented by Figure 10.

[INSERT FIGURE 10 ABOUT HERE]

When asked about "information needs", the interviewees did much less report a lack of "information on finances" but rather a lack of "information about marketing". Most actors are well informed about the possibilities for finances but that there seem to be structural gaps in the systems for actual financial support. The need for marketing information shows that there are needs for support in access to markets and marketing know-how through the policy system for innovations in NWFPs. Fourth, in what concerns the sectoral orientation of the innovation systems in the regions, slightly more of the relevant actors are active in other sectors than the forest sector. The policies that have been indicated to be of relevance for innovation in NWFPs, are foremost forest sector policies (including "rural development" policies, i.e. agriculture and forestry). In the policies dedicated explicitly to financial support of innovations also the forest policies prevail in the answers (also including "rural development" policies). Furthermore, the regionally relevant innovation actors are more involved in the initiation and technical consultation of innovative projects and start-ups than in the financial support or financial consulting of them. Finally, the procurement of partners for cooperation is also in a strong position amongst the types of support, which shows that support for cooperation and networking is already developed in the regions. Still, there is a need for strengthening sectoral coordination with other sectors than the forest sector. This would involve intensified cooperation between forestry and non-forestry actors in order to also coordinate target instruments and measures for financial support as well as the provision of information on markets and the marketing of NWFPs.

The final segment of innovation analysis was to assess innovation systems and processes at enterprise level (deliverable 5.6). This also includes comparison across regions and across different types of product and service innovations within the NWFP sector. Results contribute to an understanding of entrepreneurial behavior in innovation processes as a very individual and context-specific undertaking on the one hand and as a "universal" activity with common features and attributes on the other. More empirical research on the individual level of analysis is necessary as it enables a better understanding of the forms and ways, the "how" of innovation processes, in which landowners act as entrepreneurs and create innovations. Within the forestry sector, there are not many comprehensive innovation policies formulated the policies that touch upon innovation in the sector are of cross-sectoral nature. Moreover, NWFPs are very often not seen as part of the "forest sector" and rather by-products by policy-responsible actors. NWFPs as non-timber

products are dealt with by administrators as somewhere in-between several sectors such as food and beverage industry, tourism and energy. This way, external innovation support systems are hardly active in supporting early stages of innovations of small scale NWFP start-ups. Specific support aiming at the development of new products and services in the forest sector is practically missing. This calls for maintaining and developing further more openness towards bottom-up ideas and towards cross-sectoral connections at the level of entrepreneurs. It requires more policy instruments that foster cross-sectoral interaction and information exchange via especially low-bureaucratic and small-scale funding. Concerning innovation systems as support function, the present report shows that the sectoral orientation of the innovation systems in NWFPs also have vast potentials for more involvement from actors from the forestry sector, such as forest owner associations, forestry departments, firms and industry, research and consultancies. With exception of Finland, there still seems to be an indication that wild forest products and services are not thoroughly seen as an important business opportunity. Especially the actors at institutional levels (forestry and industry associations as well as forest owner's associations) would have to engage more into the promotion of entrepreneurship, the provision of market information and the support of interactions amongst landowners and across the different sectors mentioned above. Other institutional and instrumental policy aspects, such as the European Union LEADER instrument for rural development have positive impacts but also could be much more used for innovation support in the risky start-up phases. As a result of expert interviews it turns out that in recent years there has been a tendency of 'watering down' such initiatives and with higher levels of organization grade by public administrations the positive effects of thorough bottom-up aspects are losing weight more and more. This is confirmed by the change in the current LEADER period, where the fund giving is turning out to become more and more bureaucratic, following EU-funding logics. As a result, they lose attractiveness and especially their effectiveness in marginalized rural areas. The examples of innovations in NWFP sector have shown that entrepreneurship is undertaken by very small forest holdings or even only individual farmers who do not have the administrative resources nor skills for organizing extensive applications for such EU-funding schemes. It might be even more so than the general wider forestry sector. It is recommended to reconsider the strategies for fostering innovation in such contexts. The new uses of forests for other purposes than mere timber production in many of the cases in our studies have often been introduced from outside sectors such as energy, biodiversity conservation, recreation or tourism.

The innovation cases that have been analyzed in the work package five have been systematically described in the StarTree Innovation Database (deliverable 5.5). The Database contains 44 detailed cases from the following 15 countries: Austria (7), Belarus (1), Denmark (1), Finland (6), Germany (1), Italy (3), Latvia (4), Macedonia (1), Portugal (2), Russia (6), Scotland (4), Serbia (1), Slovenia (1), Spain (2) and Wales (4). Each case contains the following characteristics: title of the innovation case, name of the company, country, description of the innovation, general information about the company (type and size), relevance to the market, chronology of the innovation development, information related to the outcomes and a brief analysis of the innovation case. From analyzing all the cases, the following patterns can be identified. The majority of collected innovation cases are run by micro and small companies, are new to the sector and are marketing innovations. They mostly belong to the sphere of food and beverages, but there are also innovations in other areas, such as providing trainings, the NWFP-specialized services, using chemical and pharmaceutics gained from NWFPs in industry, and organizing many outdoor activities and entertainment around NWFPs. This wide scope of fields is remarkable and means on the one hand a great potential and opportunities for activities of forest holdings, on the other hand it is an important challenge as

they need expertise from quite different knowledge fields as well as network connections in various different sectors. It seems typical that cases often connect to modern lifestyles which re-appreciate traditions, wild, natural and/or sustainable products, often in a high-price segment such as organic or health products.
This data base is one central element in the StarTree Innovation Generator (IG; deliverable 5.7) installed at StarTree's website. The IG aims to disseminate innovation support material for companies and institutional actors in a comprehensive package on the project website. The IG builds on the work done in Task 5.6 "Innovation strategies, recommendations and support materials", which were developed in an inter- and transdisciplinary way by researchers and practitioners. The IG itself was developed in a cooperation between WPs 5 and 6. The StarTree Innovation Generator has a page on the project website and contains the following elements: a link to the innovation case database, inspiring questions, stories and a collection of tools and guidelines. The elements of the IG are assembled in a way that a comprehensive appearance of the IG is reached as a tool or "machine" with a number of distinct but connected elements. The "Innovation case database" is a collection of real innovation examples from the field all across Europe that we came across in the project or from literature and web-search. It is a classical web-based database with search functions and giving short case descriptions, links and additional material if available (see D5.5). One of the inspirational components is a collection of "Inspiring questions" – unexpected, thought-provoking questions. They appear unexpectedly on the screen, connected with different images, and should be unusual or even a bit disturbing – in order to catch the readers' attention and provoke new lines of thought. There are 15 such questions. Another component is the "Inspiring stories" which picture crucial moments or critical points in innovation projects. These insightful stories are taken from interviews, case studies or any talks with practitioners that we had during the project, with innovators, entrepreneurs, managers, researchers, advisors or consultants, etc. At the moment, there are 11 stories on the IG. The IG furthermore includes tools, guidelines, checklists or similar instruments useful in developing new products or new businesses in wild forest products. They present knowledge on established or new instruments or tools in product or business development. The tools refer to the various stages or phases of innovation processes, including: researching and developing, producing, selling and marketing, and communicating. In total, 15 tools and lessons learnt documents are prepared.

Potential Impact:
The StarTree project set out to foster the "non-wood" forest sector in Europe inter alia by stimulating the management of the whole palette of natural resources that constitute the "non-wood" sector, taking advantage of the vast knowledge available among related stakeholder groups and bridging gaps in data availability as well as data quality. The ultimate goal of StarTree, that has already been defined at the early stages of project development, was to provide better understanding, knowledge, guidance and tools to support relevant stakeholders in optimising the management of multi-purpose trees and developing innovative approaches for increasing the marketability and profitability of non-wood forest products (NWFPs) for a more competitive rural economy. It was one of the ambitions to pinpoint the multiplicity of the sector, and thus promote existing as well as latent opportunities towards a more bio-based "circular" European economy, taking into consideration the various dimensions according to four major themes: i) resource base, ii) markets, iii) institutions, and iv) innovations. In order to fully grasp the latent potential of "non-wood" raw materials it was of utmost importance to understand and identify the essentials of the resource base.

Socio-economic impact and wider societal implications

Forests and the forest-based sector have the potential to play a significant role in shifting Europe towards a more innovative, resource efficient and bio-based as well as circular economy. Utilizing the whole palette of forest products and services wisely, inter alia by taking into consideration the holistic understanding of forest ecosystem management, provides benefits to (forest) ecosystem integrity and thus contributes to the well-being of European societies. The StarTree project was particularly concerned with the economic potential of non-wood forest products, hence investigating their socio-economic dimensions and unravelling the non-distinctive state of the European non-wood forest sector. This project was among the first ones who conducted systematic research on this issue in Europe. Starting from the notion that NWFPs play a minor role in European forestry but are understood as an essential element of sustainable forest management, the latest report on the state of Europe´s forests (Forest Europe 2015) highlighted the total value of NWFPs in the Forest Europe region with € 2.27 billion. Compared to the value of total roundwood removals across its member states this sums up to almost 10 percent and can be interpreted as a considerable contribution to sustaining livelihoods in various parts of Europe. Especially in the Mediterranean region, where an immense diversity of NWFPs combines with low profitability of wood, they constitute a major part of the total forestry production (Figure 11)

[INSERT FIGURE 11 ABOUT HERE]

Considering deficiencies in data collection (only a few countries report regular statistics on NWFPs) and taking into account the multiplicity of resources available, together with Europe´s rich forest owner landscape that builds upon the interests of around 16 million private forest owners who manage approximately 60 % of forests in Europe (CEPF s.a.) there seems to be high latent potential to positively contribute to the development of rural economies.

However, to a large degree the realization of this potential depends, on one hand, on the obstacles that enterprises may need to overcome before they can operate with NWFPs, and on the other hand, on the support they receive from public administration and private bodies. Both aspects are largely determined by the legal framework as well as policies and regulations affecting the management and use of non-wood forest resources. At country level, the most important sectorial legislation and policies include Laws, Acts or Codes on Forests, Forest Policies, as well as National Forest Programmes. Provisions in the forest laws are binding and thus have a direct impact on the NWFP sector. At European Union level, there are no policies or legislation specifically or exclusively targeting NWFPs. However, the recognition of the ecologic, economic and social role of NWFPs and the willingness to promote them is highlighted in different European and International policies and agreements related to forests (e.g. EU Forest Strategy, EU Forest Action Plan, Forest Europe & MCPFE resolutions). European forest related policies call for a commitment by the Member States to update their National Forest Programmes and framework legislation in order to address the concept of multi-functionality, which includes the provision of NWFPs. Moreover, the New EU Forest Strategy in particular, emphasizes that impacts of other policies on forests as well as developments taking place beyond forest boundaries should be taken into account. Other important factors are i) access to forests, and ii) NWFP harvesting rights.

Most of StarTree countries guarantee free access to forests, albeit subject to specified conditions,

restrictions and prohibitions:
• whether public access rights to forests are regulated by the forest law or other legislation, and the administrative level (state, regional etc.) this regulation in encoded;
• regulation of access rights between private and public forests;
• the extent of formally acknowledged access rights and the precision with which they are described;
• defining the activities people entering the forests are permitted to do; and
• powers granted to public authorities (mostly local) to regulate, restrict or prohibit the entrance and certain practices.

In most of the StarTree countries, the public has the right to use at least some NWFPs. According to differences in regulations across countries, several groups of countries can be distinguished, namely:
• countries where the public has general rights to use NWFP, but where land owners may restrict or prohibit the use of certain products by using adequate signs or may charge fees for their collection as in Italy, Latvia, Serbia, or Spain;
• countries where harvesting is generally free of restriction, as in Finland;
• countries where the restrictions are only for commercial purposes, as in Scotland, or when collection can be forbidden when the forest owner holds a permit to harvest NWFP for production, as in Slovenia;
• countries where collection can be totally prohibited, for example, in private forests such as in Turkey.

Even though legal restrictions on NWFPs are often modified by local practices, counteracting existing rules, or owners are unable to enforce them (e.g. such as the right to exclude the public from personal use), some restrictions on forest management could be a significant barrier to the introduction of NWFP management. The formulation of regulations and the ability to exercise rights are important structural elements of the NWFP sector. Innovation may be key to resolving some of these conflicts and addressing respective needs. It can be fostered by specific instruments, supporting the reinvigoration of NWFPs which in turn has the potential to stimulate a reawakening an updating of forest culture in Europe. For now, it appears that the NWFP sector is alive with innovations, bristling with new products as well as enterprises across Europe.

Main dissemination activities and exploitation of results
From among the many terms used for products harvested from forests which are not wood or timber StarTree adopted the term NWFP and the definition proposed by FAO (1999) “products of biological origin other than wood derived from forests, other wooded land and trees outside forests”. This definition includes a very wide range of resources and products including plants, fungi, fauna and soil (Wong & Prokofieva, 2014). However, taking into consideration both the negative notion of “non-wood” and the progressing understanding of the four major themes during the project lifetime (see above i to iv), it was agreed within StarTree to strive for a new perception of the resource base – Wild Forest Products (WFPs), a term that stems from an alternative legal definition provided by the EU calling wild products those that result from the “collection of edible plants and parts thereof, growing naturally in natural areas, forests and agricultural areas” (Art- 12, comma 2, Reg. 834/07 “organic law”). So StarTree defined WFPs as “products other than wood derived from wild and semi-wild forests, as well as from sources in early stages of domestication, such as fruit trees, bushes, and orchards. It should be noted, however, that the decision on terminology was taken by project partners mid-way through the project so some earlier dissemination products use the term NWFP”. With this terminology, StarTree aims to reflect not only these products, but

also their importance as regards social services, relation to lifestyle and health, and nature protection aspects, as part of wilderness and a not entirely domesticated and cultivated environment.

Since “Knowledge-Based Bio-Economy” (KBBE) projects like StarTree particularly aimed at the production of knowledge that can be directly used by an array of end-users, multiple target groups have been identified in the very beginning of the project that were supposed to be key audiences of related outputs. Throughout the StarTree project diverse communication and dissemination formats were established, each of them specifically tailored towards individual needs of respective target groups. A brief description on the typology of key target groups, as defined in the call according to the KBBE strategy, is given in Figure 12.

[INSERT FIGURE 12 ABOUT HERE]

Considering the wide range of identified target audiences as well as their specific characteristics and needs, StarTree developed a detailed dissemination plan to safeguard the utilization of the most effective and appropriate dissemination methods for each target group.

A very central element of StarTree was the case study approach. The StarTree project built on 14 case studies (Table 2), spread across Europe to mirror the diverse ecological as well as socio-economic situations on a continental scale, fostering a strong communication with regional stakeholders directly or indirectly involved in the WFP value chain. In each region, a Regional Stakeholder Group (RSG) was established consisting of a well-balanced panel of representatives of each of the key target groups, serving multiple purposes (e.g. bilateral learning processes, knowledge sharing & transfer, data collection, networking, rural development).

[INSERT FIGURE 13 ABOUT HERE]

Knowledge exchange was one of the key issues within StarTree. Several formats have been developed in order to foster the transfer of ideas, experiences as well as best-practices or worst-cases at the interfaces science – practice – policy – society. On a bi-annual basis, the entire project consortium gathered together for a General Assembly (GA) meeting which was on the one hand dedicated to project work, and on the other facilitated the understanding of WFP markets in selected regions as each of the meetings was organized in a different partner country. The latter was supported by so-called “Knowledge Exchange Events” (KEEs), usually organized as a combined approach of a field trip and a “market place”, both aiming to raise awareness on the multiplicity of regionally available WFPs and related challenges for involved stakeholders. The market place highlighted examples of WFP entrepreneurs (similar to a fair) and provided the opportunity for StarTree researchers to engage directly with regional practitioners as well as to hand back most recent findings to its main supporters. Eight such events were organized throughout the project lifetime (see Figure 14).

[INSERT FIGURE 14 ABOUT HERE]

Building on emerging project results and continuously growing experiences the KEEs evolved over time and developed towards an efficient target-group specific transfer of project findings from the StarTree

consortium to its key stakeholders (i.e. mainly members of the Regional Stakeholder Groups that were invited to participate in the GA meetings, also beyond the KEEs) and the demonstration of practical issues from stakeholders to consortium partners (e.g. supportive and hampering factors for WFP businesses from local to international scales). With its stakeholder oriented approach, StarTree strongly built on its Regional Case Studies in order to stimulate the transfer of scientific results to applications in regional NWFP businesses.

Deliverable D 6.5 “StarTree Pathways” the StarTree project delivered a full dissemination package that provides all relevant outputs of the project in a concise way. This cumulative report was designed to be applicable to a broader suite of potential users, distinguishing three levels:
- Policy-makers’ domain (EU and national level)
- Regional stakeholders and Regional Stakeholder Groups (RSG), wider public
- Research community

A suite of dissemination products, conveying central elements and main lessons learnt, synthesizes the major findings of StarTree along these interfaces (i.e. science – policy, science – practice & public, science – science). Figure 15indicates the dissemination products and their respective online pathways.

[INSERT FIGURE 15 ABOUT HERE]

The approach to disseminate StarTree findings to the policy-making community builds on a multi-layer structure. Central element is the StarTree deliverable D 1.3 the State of the Sector Report (“SoSR”; Wong & Prokofieva, 2014) and derivates of it, which entail:
- StarTree policy brief
- What Science Can Tell Us - WILD FOREST PRODUCTS IN EUROPE: Seeing the forest around the trees
- “Glossy” SoSR report (key findings, recommendations, future outlook)
- Full SoSR report

StarTree aimed to bring benefits of the project to the wider society and its results are thus for dissemination at various levels across European societies. The multi-layer design of this StarTree dissemination branch, specifically tailored to efficiently reach out towards the general public, is structured as follows:
- Implementation concept on the webportal (i.e. logical access to information)
- Links to public deliverables
- StarTree Reader
- Snapshots
- Infografics
- Innovation Generator

Hence, the StarTree web portal (http://star-tree.eu/) is the fundamental hub for all material produced during the project life cycle. Since it launching (April 2013) it attracted almost 140,000 visitors. In particular, in the last year, since most of the project outputs were made publicly available the number of visitors increased. Detailed web statistics for the web portal are shown in Figure 16. Given the importance

of the website as the main dissemination tool, it will be maintained for a minimum of 3 years after end of the project.

[INSERT FIGURE 16 ABOUT HERE]

As a research project StarTree was also aiming at particular scientific progress, adding momentum to the creation of new knowledge and trying to fill existing gaps as well as to overcome actual shortcomings. At current state there are 15 scientific articles published and in most cases made accessible online via the StarTree webportal (i.e. downloadable pdf). Forthcoming publications are planned and will be uploaded upon availability. As a final concluding event, an open science conference on “Wild Forest Products in Europe” was organized together with the COST Action FP 1203 “European Non-Wood´Forest Products (NWFPS) Network” from October 13-14, 2016 in Barcelona (Spain). This international, trans-disciplinary event provided a platform for exchange on the new state-of-the-art as well as the potential future development of WFPs and included invited keynote talks, sessions with contributed oral presentations, a poster exhibition, and a panel discussion in context of a European bioeconomy and issues at stake for the forest and WFP sector. The conference hosted around ninety participants and gave stage to a diverse portfolio of presentations from around Europe and beyond on wild forest products, trade, management, regulation, innovation and more.

Apart from the final products various dissemination materials were compiled already at the early stages of the StarTree project, separate from a suite of regionally specific compilations of StarTree findings that were distributed across Regional Stakeholder Groups (most often in local languages), in order to disseminate the StarTree project at various levels from the very beginning (e.g. Fact sheets, postcards).

List of Websites:
http://www.star-tree.eu

Ultimo aggiornamento: 11 Maggio 2017

Permalink: https://cordis.europa.eu/project/id/311919/reporting/it