



Non-wood forest products

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Slovenia has a long tradition of using non-wood forest products. The definition of non-wood forest products (NWFP) here follows the Millennium Ecosystem Assessment report, being "products of biological origin other than wood derived from forests, other wooded land and trees outside forests", namely mushrooms, forest fruits, medicinal herbs, chestnuts, pine kernels, acorns, game meat, pelts, resins, etc. The popularity of different products varies in time and partially reflects the related market demands/options, although a significant portion of non-wood forest products is probably used or consumed directly (within families or local communities) without registered trading.

Around 10% of the overall production of forest goods in Slovenia is attributed to NWFP (Wong and Prokofieva, 2014). The most evident reasons for this are cultural tradition, ecological conditions and value chain organization. While the timber industry has a long tradition and is well organized with relatively strong intrapreneurial linkages, the NWFP sub-sector is different. In many countries those goods are related to everyman's right, while timber production is not. Many of the peculiarities related to the NWFP sub-sector are closely connected with the high level of self-consumption, widespread grey market, eruption of conflicts between users and landowners, and the weak connection with official forest management. NWFP are being increasingly recognized as having potential for the creation of new green jobs, especially in rural areas, an important element in achieving a circular economy and one of stepping stones towards a bio-economy, which was made very clear in the 2018 revision of the Bio-economy Strategy (Updated Bioeconomy Strategy, 2018). An important aspect of NWFP is the variety in type of goods. More than 160 fungi species, approximately 25 taxa of lower plants and almost 450 of higher plants are either picked in the wild or cultivated, all as NWFP. And this is not even counting animal-based products. Almost half (47%) of all the NWFP value generated in 28 EU countries in 2010 came from ornamental plant production, 30% from foods, and a fifth (21%) from other plant products (excluding animal-based products) (Forest Europe, 2015).

NWFP are not only important in terms of entrepreneurship; they are deeply rooted in several cultures to sustain communities and as an outdoor activity related to spending time in forests, socializing, and learning about nature. In 2016 more than half of all households in Slovenia went into the forest and picked a NWFP at least once (Vidale et al., 2015a). The results from the 28 EU countries indicate great variety in such activities, and rank Slovenia third from the top. This well-established culture of NWFP picking in Slovenia has its origins in securing one's livelihood and nowadays plays an important role in re-connecting with nature and as a recreational activity among the general public. Households in Slovenia collect wild berries (47%), especially bilberries, strawberries and blackberries, aromatic and medicinal herbs (38%), such as elderberries, forest nuts (32%), especially sweet chestnut, mushrooms (30%), ornamental greenery (25%), like flowers, kernels, moss, foliage and branches, along with a few who collect tree sap (3%) and very few truffles (0.2%). The low collection rates for tree sap and truffles seem reasonable, as lots of knowledge and special equipment is needed for both, and the same survey showed that almost three quarters (74%) of all household members that collected NWFP had no special training in plant or fungi identification. Four fifths (80%) also indicated that NWFP collection did not contribute to their overall household income.

The NWFP market in Slovenia is poorly structured in terms of value chains and flow of goods. Only a few entrepreneurs are registered in the official registry of enterprises (e.g. 30 for mushroom picking and selling), although research shows a greater extent of collection and trade (Vidale et al., 2015b). A more focused analysis of value chains for forest honey and mushrooms reveals that entrepreneurs often act as sole traders and combine the activities of collection, possible processing and selling, and that the producer has the key role in price generation. A poorly developed market with little specialization of individual production, processing and marketing phases is present, limiting the room for innovation. Competitiveness in terms of new products or business models is not consistently

pursued, and may be restricted to larger firms, which generally act as wholesalers/retailers. There are only a few of these, and they secure a large part of their merchandise from imports, mainly from east and south-east Europe. Presumably there is a large grey market that is mostly represented by single-person producers, who sell much of their products to either middlemen or individual end-users, such as households and restaurants.

Many challenges to market development derive from the regulatory framework, which vaguely distinguishes between recreational picking and collecting NWFP as a business activity. The relatively strict limitation on what one is allowed to collect, such as 2 kg of mushrooms per person per day (Rules on Forest Protection, 2009), hampers entrepreneurship where larger quantities are needed to meet the market demand, despite the recent introduction of vouchers, which upon tax-related payment allows the collection and trade of NWFP as a business activity. The landowner as a key subject is omitted from this arrangement. However, beekeeping and especially hunting are more effectively regulated, because both have received more attention in terms of the government either establishing development programmes (such as for beekeeping) or placing concessions and generating revenue (with hunting). Several tools are available for small- and medium-sized enterprises to implement innovative products or processes, like the Rural Development Programme, loans from the state development bank and especially the Slovene Enterprise Fund. Those businesses that offer the most innovative NWFP-based products, like pharmaceuticals, often apply for such start-up initiatives.

Truffles, the most valuable mycorrhizal fungi distributed in most northern hemisphere forest ecosystems, are traditionally the best known and highly exploited non-woody forest product in Mediterranean countries, with annual outcome estimate over EUR 500 million, while in other areas in Europe and globally they remain understudied. Apart from their ecological importance they have a high economic impact with the potential for ensuring work in rural forested areas and ensuring a better forest-based income for many underdeveloped areas in central, southern and southeastern Europe. The environmental changes, high human impact on forest ecosystems, intensification of forest management approaches and truffle hunting in native truffle sites all resulted in a drastic fall in truffle production over the last century, along with the reduced importance of natural sites and increased truffle production in agroforestry plantations. The trend of neglecting of natural truffle sites could be changed with modified forest management. However, in most European countries there is still a significant lack of knowledge and information about the cultivation of truffles in controlled forests or agroforestry systems. The large knowledge pool with regard to truffle biology in the Mediterranean area and their high global economic value makes truffles unique and as an ideal model or test example of other NWFP, and the subsequent development of well-planned approaches for their cultivation in forest- and agroforestry ecosystems. The high economic value of truffles has an enormous potential to trigger various technical, technological and organizational innovations, particularly when dealing with the monitoring of soil conditions, tracing of mature truffles in soil, optimization of cultivation in forests and agroforestry systems, prolonged truffle storage possibilities and uses. This potential should not be limited to Mediterranean climates and countries only, but should involve all the main parts of the truffle areas in Europe, within their otherwise circumboreal distribution.

Future challenges

Providing a consistent regulatory framework is the first key step in designing transparent and secure entrepreneurship environment to further mobilize forest resources and provide opportunities for the creation of new jobs in forestry. Secondly, financial support needs to be provided in order to establish new firms which will not be operating in a hi-tech area, such as pharmaceuticals. Some NWFP simply offer a limited array of products that do not involve technologically advanced approaches, but still provide market niches with potentially high added value. Finally, efforts should be made to promote environmentally friendly and locally produced goods, as this might further increase the interest of consumers, although this needs to be approached strategically, with one valuable example from practice being the Slovenian honey trademark.

Literature

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Figure 39: Black truffle (*Tuber melanosporum* Vitt.) (Photo: M. Čater)