

## THE POTENTIAL FOR NON-TIMBER FOREST PRODUCTS IN IRELAND

Dr. Sasha van der Sleesen

Sylvan Consulting Ecologists and Forest Management Group, GMIT

30A Ashleigh Grove, Galway

Email [info@sylvaneco.com](mailto:info@sylvaneco.com) or [sashatrees@hotmail.com](mailto:sashatrees@hotmail.com)

Tel.: 087-6685836

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### Abstract

Non-timber forest products (NTFP) are elements from a forest that can be sold and which do not involve harvesting timber. NTFP comprise a wide range of products, from Brazil nuts to carbon sequestration. NTFP are often associated with the diverse forests of the tropics, where forest foods and fodder may still be important parts of rural livelihoods, but old traditions in Ireland include NTFP such as collecting fruits, nuts, herbal remedies, honey, and leaves for fodder. Potential NTFP in Ireland today include foliage and mosses in floral arrangements, photographs of wildlife, and dyes made from higher plants and lichens.

Other ecosystem services, such as contribution to landscape and conservation of biodiversity, are also important potential products but are harder to value because they are only sold indirectly in the marketplace. These services, however, may be essential either for human physical health, such as protection of watersheds from flooding, or psychological health, such as places that inspire artists and places for people to recreate.

It is important not to assume that any elements of an ecosystem can be harvested without consideration of population dynamics and ability to replenish. Bryophyte harvesting currently ongoing in North America, for example, may be unsustainable as branches cleared five years ago have not yet regrown their moss mats. Biodiversity is a key concept in forest policy today, and therefore using any aspect of the diversity, whether trees or other components of the ecosystem, should be undertaken carefully and with harvest levels deemed sustainable with the best of ecological knowledge.

### Introduction

Forest owners often like to have the option of generating income by selling products from their forests. Timber has for years been seen as the primary product to be derived from Irish woodlands, but recently other forest products and services have been gaining attention. Non-timber forest products (NTFP) are elements of a forest that can be sold but do not involve cutting timber. NTFP comprise a wide range of products, from nuts to resins to carbon sequestration. They can be used directly by the people harvesting them, sold regionally, or exported. The total value of world trade in NTFP is estimated to be about US\$11 billion ([www.tropenbos.nl](http://www.tropenbos.nl)).

### Definitions

NTFP are biological resources that are not timber and which can be harvested from forests for subsistence and/or for trade. There are several different terms used to refer to non-wood products, many of which have definitions that are slightly at variance with one another. It is important to be aware of the exact meaning of a term to know the boundaries of the topic under discussion. For example, some definitions of non-timber forest products exclude marketable services, such as carbon sequestration or coppice rods. Table 1 presents common terms and the limits of their definitions:

Table 1. Common terms used to refer to forest products and services not including timber

Term	Meaning	Includes	Limitations of term
Non-timber forest products	Products (can be sold in marketplace) harvested from a forest that do not include timber.	Nuts, sap products like maple syrup and birch beer, mushrooms such as truffles, fruit and honey.	Focus on products. Place of wood products like coppice and carbon sequestration not clear.
Non-wood forest products	Similar to NTFP but a greater emphasis that all wood and bark products are excluded.	Similar to NTFP	Focus on products. Wood products such as coppice and bark mulch excluded. Place of carbon sequestration unclear, as wood is the main store of carbon.
Alternative forest products	Products alternative to the main product (generally timber).	NTFP plus wood products such as elm burrs for high value furniture, coppicing, fresh stems as fodder for elephants in zoos.	Implies only one main product and that other products are subsidiary
Minor forest products	Products harvested in smaller numbers or bringing less income than the major products.	Same as above.	Implies one or more main products and that other products are of lesser importance
Ecosystem services	Four subgroups: provisioning (food, water, fuel, fibre, genetic resources, biochemicals), regulating (climate, disease, water), supporting (soil formation, primary productivity), and cultural (spiritual, aesthetic, recreation, educational) services.	All forest products, timber and NTFP, plus services such as carbon sequestration, conserving biodiversity, and landscape.	Broad but this broadens the definition of possible products. Linked to human well-being rather than marketplace. Some services are hard to price although valuable. Not specific to forests.

In this article, the term non-timber forest products will be used, but the broad concept of ecosystem services will also be kept in consideration.

Another way of considering the wide range of products provided by forests is that of De Groot (1992). He describes the functions or role of nature, including forests (see Table 2). Consideration of these functions of nature may help to broaden perceptions of possible forest products and services.

Table 2. *Functions of nature* (De Groot, 1992: 15, explanation pp17-138, see also Hart, 1991; Kassioumis, 1981; Madras, 1984: 129-144; Van Maaren, 1984: 6)

Function	I/D*	Function	I/D*
<b>Production functions</b>			
Oxygen		Water (for drinking, irrigation, industry, etc.)	I
Food and nutritious drinks	D	Genetic resources	D
Medicinal resources	D	Raw materials for clothing and household fabrics	D
Fuel and energy	D	Fodder and fertiliser	D
Raw materials for building, construction and industrial use			D
<b>Information functions</b>			
Aesthetic information	I	Spiritual and religious information	I
Historic information (heritage value)	I	Cultural and artistic inspiration	I
Scientific and educational information, from schools to environmental monitoring			I
<b>Carrier functions: providing space and a suitable substrate for</b>			
Human habitation and (indigenous) settlements	I	Nature protection, which may be combined with other functions such as genetic diversity, water protection, etc.	I
Energy conversion		Recreation and tourism	
Cultivation (crop growing, animal husbandry, aquaculture; types that allow conservation are shifting agriculture of small areas, agro-forestry, and selection cutting)			D/I
<b>Regulation functions</b>			
Protection against harmful cosmic influences		Regulation of local and global energy balance	
Regulation of the chemical composition of the atmosphere		Regulation of the chemical composition of the ocean	
Regulation of the local and global climate (including the hydrological cycle)	I	Regulation of runoff and flood-prevention (watershed protection)	I
Water catchment and groundwater-recharge	I	Prevention of soil erosion and sediment control	I
Formation of topsoil and maintenance of soil fertility	I	Fixation of solar energy and biomass production	D
Storage and recycling of organic matter		Storage and recycling of nutrients	
Storage and recycling of human waste including pollution, sound, dust, etc.	I	Regulation of biological control mechanisms including pest control and pollination	I
Maintenance of migration and nursery habitats	I	Maintenance of biological (and genetic) diversity	I

\* D = direct product; can be harvested and sold from the forest (possible NTFP).

I = indirect; important product that can be priced through indirect means but forest owner usually not rewarded with income

(Blank) = support; a crucial and usually unrecognised function with supports and maintains human life.

Table 2 shows the astonishing array of services provided by forests and other ecosystems, many of which are often taken for granted. Until recently, it has been common practise to value only those services that can be sold through the marketplace, i.e. the products. These are classified with a 'D' for direct pricing in the table above. The limitation of this type of valuing is that many contributions of natural ecosystems are sold indirectly, such as a landscape that attracts tourists, or represent benefits which accrue to the general population, such as flood prevention. In these cases, estimating the cost of replacing the function is the only way to assign a financial value. There are currently movements both to expand the valuation of services beyond the traditional marketplace valuation (see Alcamo *et al.*, 2003) and to acknowledge the growing interest in the purchase of previously non-market services (see Pukkala, 2002 and [http://www.forest-trends.org/whoweare/pdf/bc2000/bc2000\\_proceedings2.pdf](http://www.forest-trends.org/whoweare/pdf/bc2000/bc2000_proceedings2.pdf)). This means that consideration of what NTFP could be harvested from Irish woodlands may include broader, indirect services, such as maintenance of the diversity of life.

A broad range of ecosystem services should always be kept in mind with regard to NTFP in Ireland. Cultural services, such as education, heritage, and artistic inspiration, are important services of nature. Medieval Irish nature poetry abounds with examples of artistic and spiritual inspiration from ecological processes:

*The music of the woodlands is like the playing of harps; the melody brings perfect peace; a haze rises from every hill-fortress, a mist from the full-pooled lake.*

*(Old Irish poem dated at around the 7th century, trans. Carney 1971 quoted in Smyth 1996: 308-9; see also poems in Jackson 1935).*

Another example of the cultural significance of natural processes in the past in Ireland is auguring: an early lawgiver describes how a just king brings benefits to his people, including a good crop of tree fruits, fertile women and crops, full milk in the cows, many fish in the rivers, and peace in the country; an unjust king brings catastrophe such as defeat in war and famine on the people of his nation (Kelly, 1997; MacNiocaill, 1988). In the 12<sup>th</sup> century, Connaught leader Rory O'Connor was supported in his bid to become high king, at least in part because omens of good fortune were seen in the abundance of nuts and other things created by God in 1168 (Ó Cróinín, 1995).

Although these support and cultural functions may arguably be the most important services provided by ecosystems, owners are more likely to consider direct products that can be sold in the marketplace. One way to consider these is to look at what products were derived from Irish woodlands in the past.

### Products – direct harvest in the past

Food, medicine, dyes, and fibres from woodlands were used in the past in Ireland, and this may give some indication of potential NTFP today. For example, wild garlic (*Allium ursinum*) was a common food, and an annual garlic feast in the early spring, consisting of wild garlic with cheese and milk was part of the rent given to the lord (Kelly, 1997: 309). Other food plants were pignut (*Conopodium majus*; the tuber is what is eaten), nettle (*Urtica dioica*), and sorrel (probably *Oxalis acetosella*), although the last two were eaten primarily when other food was not available (Kelly, 1997). Hazelnuts (*Corylus avellana*), which can be kept over the winter, were sold, while acorns (*Quercus* sp.) may have been eaten when other food was hard to get (Kelly, 1997). A wide variety of woodland fruits were collected for food, including cherry (*Prunus avium*), rowan berries (*Sorbus aucuparia*), crab apples (*Malus sylvestris*), elderberry (*Sambucus nigra*), hawthorn berries (*Crataegus monogyna*), sloes (*Prunus spinosa*), rose hips (*Rosa* sp.), blackberry (*Rubus fruticosus* agg.), bilberries (*Vaccinium myrtillus*), and strawberries (*Fragaria vesca*; Kelly, 1997). Apples were highly valued, as they provided a source of vitamins during the winter, and the wild plant was brought into cultivation by the 8<sup>th</sup> century (Kelly, 1997). Bilberry (*Vaccinium myrtillus*) was found in Dublin excavations of Viking and Anglo-Norman times, while Irish language documents show that it was considered so valuable that it was included in the gifts presented to kings (Kelly, 1997). An 18<sup>th</sup> century physician noted that many plants were sold on the streets of Dublin for medicine, including bilberries, and also royal fern (*Osmunda regalis*) for obstructions of the liver (Nelson, 1991). Many of these products are still in use today. For example, herbal treatments including hawthorn, birch leaves, and nettle can be found on the shelves of many contemporary Irish herb shops.

Woodland plants were not only used as human food but also to feed domestic animals. Fodder plants included elm (*Ulmus* sp.) and holly (*Ilex aquifolium*), which was used in winter and scorched to remove the prickles (Kelly, 1997; Neeson, 1991; Lamb & Bowe, 1995). Other NTFP included the production of game and domestic stock: pigs (but not cattle) were grazed in medieval Irish woodlands with acorns being a prime pig-feed, and some birds found in or near woodland were hunted, including woodcock, snipe, wild duck, red grouse, and wild goose (Kelly, 1997).

Plants were also used for fibre and dyes. Bracken (*Pteridium aquilinum*) was used for making soap, bedding, and bleaching linen (Neeson, 1991), while elm bark was used to make ropes (Kelly, 1997). Pine resin was used for caulking boats (Kelly, 1997; Neeson, 1991). Although social norms dictated the colours people could wear, plants provided the colours: bracken for a yellowish green, lady's bedstraw (*Galium verum*) for grey, and juniper (*Juniperus communis*) for brown (Kelly, 1997).

### NTFP in the temperate zone today

Another way to explore possible non-timber products from Irish woodlands is to look at products currently being extracted from other temperate forests. Ciesla (2002) reports many different types of NTFP in use in temperate Europe, mostly for food and drink, including:

- beer, wine, spirit and vinegar made from birch sap (*Betula* sp.),
- jam and cider from the red berries of the whitebeam and rowan genus (*Sorbus* spp.),
- preserves, wines, salad dressings, and desserts from hawthorn berries (*Crataegus mongyna*),
- wine, pie, lemonade and herbal teas made from elderberries (*Sambucus nigra*)
- jelly and liqueurs made from the fruit of the strawberry tree (*Arbutus unedo*) in the Mediterranean region,
- coffee substitute and food from the acorns of the pedunculate oak (*Quercus robur*),
- oil for cooking, coffee substitute, and fodder for pigs from the nuts of the beech tree (*Fagus sylvatica*),
- nuts, nut chocolate, flour for bread, and edible and industrial grade oil from the hazelnut tree (*Corylus avellana*), and
- edible mushrooms including truffles (*Tuber melanosporum*, *T. magnatum* and *T. aestivum*) and morels (*Morchella* spp.).

Considering the range of NTFP produced in the past in Ireland and those which are still being harvested from temperate forests, what can we conclude? The potential NTFP for Ireland today are luxury items, like wild forest mushrooms or ornaments which remind us of either the relaxation from being in nature or the inspiration one can find in natural forms. Possible products include mushrooms and herbs, ferns and holly for decorations, bryophytes and lichens for floral arrangements, and cloth dyes from plants and lichens. Additional products might be identified by considering the broad list of forest functions listed by De Groot (1992), including ornaments, energy and raw materials for fabrics. Large-scale, cost-effective production is not the aim, as the likely customer for NTFP in Ireland is someone who is willing to pay more for ecologically sensitive or local products. They are likely to be concerned about the environment and to seek and be reassured by quality labels such as a certification standard label. This is because these environmentally conscious customers may be aware that harvesting components of a forest ecosystem could affect the balance of processes within that ecosystem.

### Harvesting NTFP

One of the misconceptions often held about NTFP is that they are 'greener' or their harvest is inherently less damaging to the ecosystem than harvest of other products, such as timber. Transport is an environmental cost: Irish grocery stores are currently selling bouquets of flowers which contain greenery from the Pacific Northwest of the US ('salal'). The use instead of local material would keep income local and reduce the environmental cost of ships or planes carrying floral material around the world. In addition, NTFP can be overharvested, and their harvest can affect the abundance of other species. The amount of harvest that will

not damage the continuation of the population depends on the population dynamics of the target species, the proportion harvested, and whether the other components of the environment continue to be suitable for perpetuation of the population. In the forests of northwestern North America, bryophytes are harvested for the floral trade, and the target species include some which also occur in Ireland such as *Isoetecium myosuroides* (Brid.) and *Rhytidiadelphus loreus* (Hedw.; Peck, pers. comm.). One could thus conceivably harvest these species in Ireland. However, the standard method is to remove the entire mat of epiphytic bryophytes, including bryophyte species that are not used by the floral industry, and later sort the material, discarding the unwanted species. A comparison study also found that these bryophyte mats contain nearly 200 species of macro invertebrates (Peck, pers. comm.). These species, some of which may be rare, are being removed from their habitats and then discarded as they are not of use to the florists (Peck, pers. comm.). In addition, a study monitoring recovery of the mats (Peck, pers. comm.) found that the epiphytic bryophyte mats have regrown after five years to cover the branch but not as thickly. The volumes of the five-year-old mats average about 1/5<sup>th</sup> of the pre-harvest volume. These results indicate that expected recovery time, or 'rotation', is fifteen to twenty years (Peck, pers. comm.). In the Irish context, with low woodland cover, these results imply that the quantity of bryophytes that could be sustainably harvested in Ireland is low. In addition, loss of rare species remains a concern in any removal of large amounts of material, especially that containing many species that are small and therefore easily overlooked.

## Conclusions

Potential NTFP in Ireland today include mushrooms, foliage and mosses for floral arrangements, wildlife photographs, and dyes made from higher plants and lichens. The very broad range of services that ecosystems provide should be considered when searching for new potential NTFP. The potential customers should also be considered: they are likely to be people who are concerned about environmental issues and have the finances to pay for a luxury products. Implementation of a quality label such as the Forest Stewardship Council (FSC) standards for NTFP would help increase the marketability of Irish NTFP (see, for example, <http://www.rainforest-alliance.org/programs/forestry/smartwood/certification/non-timber-forest-products.html>).

It is important to recognise that non-timber forest products cannot be harvested in bulk from forests without consideration of population dynamics, effects of accidental removal of non-target species, and the ability of both target and non-target species to replenish themselves. The bryophyte harvesting for the floral industry currently taking place in the large forests of the Pacific Northwest of the US, for example, may be unsustainable and would be untenable in the smaller forest areas of Ireland. Biodiversity is a key concept in forest policy today; therefore, harvesting any component of the forest, whether trees or other components of the ecosystem, should be undertaken carefully and at sustainable levels of harvest. The quantity and frequency of harvesting must be based on the ecology of each species and its place in the ecosystem. Small organisms, such as the bryophytes mentioned above, may have very limited dispersal mechanisms, making the reinvasion of a 'cleared' site difficult. Fungi, however, may be more resilient to harvesting (see Dowding, this volume) and luxury mushrooms for consumption may be the most suitable NTFP available from Irish forests.

Harvesting, whether of timber or non-timber products, is only sustainable if it avoids damage to the continued functioning of the whole ecosystem. Relatively little is known about many of the small organisms in our woodlands, and therefore use of any NTFP must follow the principles of 'adaptive management', collecting data continually and using it to tweak the management (see [http://www.iucn.org/themes/cem/ea/docs/ecosystem\\_approach.doc](http://www.iucn.org/themes/cem/ea/docs/ecosystem_approach.doc)). Continued unimpaired functioning of the whole ecosystem should be the primary objective in management and harvesting in Irish woodlands today.

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