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WWF has been present in the Mediterranean for over 30 years. Today it has institutional presence in several countries bordering the Mediterranean. Co-ordination of the Mediterranean Programme is based in Rome, Italy. The overall goal of WWF's strategy is a Mediterranean where nature is maintained and restored, where resources are used sustainably for the benefit of all life and in which social and cultural characteristics are valued.

A longer referenced version of this paper can be found at: <http://www.fao.org/waicent/faoinfo/forestry/nwfp/public.htm>

Traditional honey production within oak bark, Feija, Tunisia

arborvitæ

Supplement

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Forest Harvest: Mediterranean woodlands and the importance of non-timber forest products to forest conservation

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“To these people the land delivers many riches - on the mountains the oak tree gives acorns from the crown and honeybees from the trunk”

Hesiod, Works and Days (7-8th century BC Greek poet)

There is a long history of sustainable use of non-timber forest products (NTFPs), carried out in balance with forest ecosystems, throughout the Mediterranean. These systems of sustainable production can still enhance forest conservation in the region. However, to integrate NTFP production into Mediterranean forest conservation activities, questions related to NTFP ecology and harvesting need to be answered. This *arborvitæ* special investigates these issues and proposes a draft strategy for the commercialisation of NTFPs in the region.

Mediterranean forest conservation strategies need to reflect the different socio-economic conditions of the north and southern/eastern shore of the basin. In the north, rural abandonment has resulted in the collapse of many of the traditional, sustainable forest management activities. In the south, human population growth has resulted in over-exploitation of forest resources and consequent forest depletion.

The problems facing NTFP production in the Mediterranean reflect these broader trends. Rural abandonment has caused a decline in multiple purpose forest management, resulting in the decline of managed ecosystems such as the different *maquis* woodlands in the north. Elsewhere, increasing demand has resulted in the over-exploitation of many NTFPs, such as medicinal plants, herbs, bulbs and wild greens, whilst foreign production and chemical substitutes have contributed to the collapse in the market of NTFPs such as resin. The destruction of natural habitats and the introduction of modern cultivation, which neglects local varieties, are also resulting in a narrowing of genetic diversity in both wild and cultivated species.

Non-timber forest products (NTFPs) are defined as biological resources of plant and animal origin, which are harvested from natural forests, plantations, wooded land and trees outside forests. NTFPs are distinguished from agricultural products by their wild or semi-domesticated mode of production.

A draft strategic methodology for NTFP commercialisation

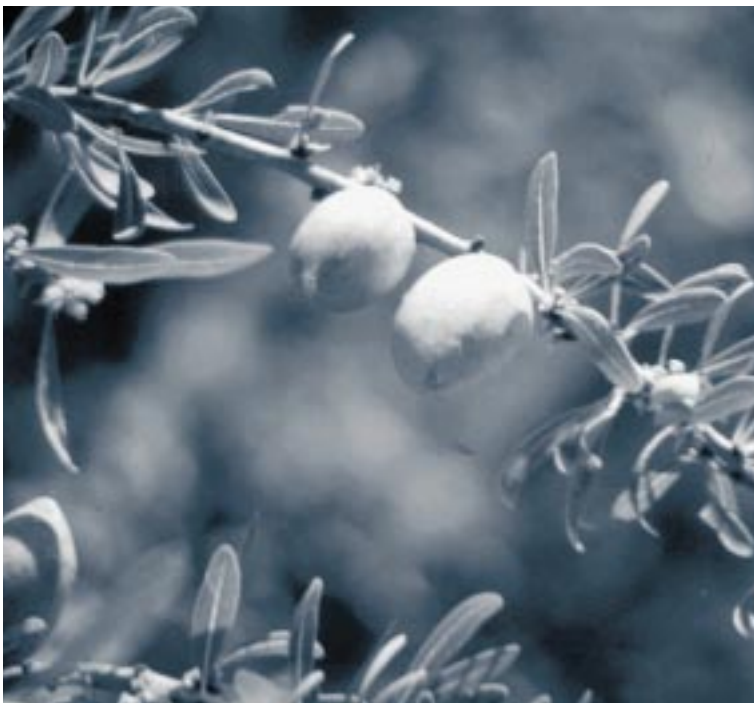
NTFP gathering can have negative ecological impacts, especially where intensification of gathering activities has taken place, as is the case for medicinal plants and herbs in the Mediterranean region. Thus, any attempt at commercialisation should not assume that NTFP production is always sustainable, but should be accompanied by designing a basic management strategy, similar to the ones proposed for the more thoroughly investigated tropical NTFPs.

There are some existing commercialisation strategies for direct NTFP gathering, although modifications need to be made in the case of NTFPs coming from agroforestry systems. One strategy, drawn up by Peters in 1996, suggests five basic steps: initial planning, development of a forest inventory, species selection, yield studies and definition of sustainable harvest. This gives some overall perspective of the ecological relations of specific NTFPs to the wider woodland ecosystem.

Initial planning operations are based on information collected on the physical and biological characteristics of the woodland environment and, more specifically, on the woodland management area including NTFPs.

The second step, a detailed forest inventory, includes more accurate documentation of existing resources within the selected management area. The forest inventory needs to be conducted through systematic sampling in transect lines.

Argan fruit, southwest Morocco



Species selection is crucial in cases where the management area offers a variety of NTFPs and selection needs to be made for commercialisation. Species selection needs to consider parallel studies that identify NTFPs having the highest market value, or the greatest potential for future market expansion. Social factors, indicating which NTFPs have been exploited traditionally by the adjacent rural communities, also need to be considered. In this way, cultural traditions of forest use can be maintained. Also, species selection should be dictated by the proven abilities of proposed species to withstand the pressure of continuous extraction. The selection needs to consider life cycle characteristics, multiplicity of uses, types of resources produced, abundance in different types of woodlands and size-class distributions of species population.

Yield studies give an indication of the productivity of the selected NTFP, or the likely productivity of existing populations. Yield studies are the crucial steps needed to define the sustainable harvest level for a particular NTFP. Their output is a reasonable estimation of the quantity of the selected species produced, within a defined management area.

Given the results of yield studies, the management area will be divided into distinct population units. In this way, forest types or habitats within the management area are associated with certain species, where maximum productivity is achieved. Selected NTFP extraction will therefore take place from well-defined units.

Finally a sustainable harvest for the selected species in the defined units should be determined. This could be achieved by 'a successive approximation' technique where the population impact of exploitation is monitored and adjustment to harvest levels takes place to obtain a sustainable yield. More detailed methods can be incorporated in the form of demographic data collection, which involves quantitative analysis of the reasons behind population responses and processes information through plant demography matrix models with the aid of computer modelling.

NTFP certification

The Forest Stewardship Council (FSC) is investigating ways to incorporate NTFP management into its accreditation programme. The issue of NTFP certification is complex, reflecting the variety of extraction methods and the socio-economic environment that dictate NTFP production.

Overall, the prospect of NTFP certification is positive. By putting an emphasis on NTFPs, certification will concentrate efforts to evaluate the real worth of NTFP producing woodlands, which in the past has been neglected. Developing 'gourmet' markets will enhance the economy of rural populations and conservation efforts in the region. However, certification efforts should proceed with caution in situations where increases in demand could negatively interfere with sensitive subsistence patterns.



Resin production, Greece

Socio-economic benefits from NTFP commercialisation

At present, there are many factors that have hindered the commercial development of NTFPs, the principal ones being:

- the predominant bias against the quality of non-domesticated resources and the positive predisposition of agricultural professionals towards products that need higher technological input and complicated processing
- the lack of appreciation about the economic potential of NTFPs
- ignorance of the importance of NTFPs to rural societies
- substitution of many natural substances by synthetics
- a general lack of knowledge on NTFPs

The fact that NTFPs are used locally for subsistence or rural markets, often results in their exclusion from official statistics. The division of official governmental agencies between forestry and agriculture hinders the consideration of NTFP commodities because they fall into a 'grey area', being considered neither by foresters or agronomists. Finally, the mainstream forestry view that the value of forest resources clearly reflects their timber production capacity has resulted in only incidental and fragmented consideration of NTFPs.

However, certain trends are emerging that help to overcome past prejudices. These trends can be summarised as follows:

- deteriorating socio-economic conditions in the southern and eastern Mediterranean that increase the reliance on local natural resources
- increasing awareness regarding the positive role of NTFPs in socio-economic development and nature conservation
- green consumerism, which creates the demand for natural products and an increasing demand for 'ethnic' products
- increasing awareness and demands for new chemicals and pharmaceuticals.

The most important positive trend is the fact that among the three groups involved in NTFP production and consumption (rural populations, traders and urban consumers) the numbers of traders and urban consumers is increasing.

There is therefore considerable potential for Mediterranean countries to develop NTFP production and generate positive socio-economic benefits for rural populations that are compatible with conservation values. However, to deliver this potential there is a need to modify the current economic notions which govern Mediterranean forest management. This needs to take place alongside conservation efforts and, in many cases, with the restoration of woodland resources.

Actions needed to pave the way for increased production include continuing conservation efforts, amelioration of prevailing living conditions of rural communities, improvement of the quality and promotion of existing products and support for enterprises and industries that produce NTFPs. These developments should be undertaken by coalitions of experts, including representatives from local communities, non-governmental and governmental organisations, which will follow a multidisciplinary approach to the issue. In this way gatherers and producers will receive the maximum benefits from commercialisation and develop positive attitudes, or even participate, in on-going environmental conservation efforts.

Finally, comprehensive statistical data on production and trade of NTFPs are needed for an accurate estimation of their true socio-economic contribution to sustainable development. Accurate information will assist the elaboration of appropriate policies for NTFP production and promotion.

Conclusions

Fritz Shumacher has argued that land management should define health, beauty and permanence as its three main goals. Unfortunately, up until recently, the only goal accepted by development experts was productivity, leading to negative impacts on ecological and social stability. Furthermore, there has been little understanding of the fact that management practices, which target the three prime goals, can also eventually lead to increased productivity.

Managing woodlands for NTFPs can contribute to the maintenance of the health, beauty and permanence of Mediterranean landscapes. To do so, investments need to locate and capitalise on existing knowledge of multiple use forestry. Any aid given for the introduction of new economic activities should follow a piecemeal approach and be based on the existing potential of Mediterranean woodland resources. In the north, where abandonment has led to the decline of traditional management and population migration, reconsidering the values of NTFPs could create new opportunities. In the south, where intensification has disturbed natural ecological balances and led to intensified production, there is a need to establish small to medium scale operations, which would address the ecological and social needs of rural populations and preserve the centuries – old rich natural and cultural landscape.

Towards a Network for the Sustainable Use of NTFPs in the Mediterranean Region

WWF's global targets for forest conservation include an increase in protected forest areas and in environmentally sound forest management outside protected areas. The second target is expressed in terms of independent certification of well-managed forests. In the Mediterranean these two forms of forest protection are closely linked and an artificial separation is therefore problematic. In many cases, biodiversity conservation in the region depends on the continuation of those traditional management systems that are compatible with nature protection. The establishment of forest protected areas in the region should therefore retain such systems, as their exclusion can actually have detrimental effects to conservation efforts. In general, timber production has not been the predominant aspect of traditional management. Thus, any effort targeting sound forest management in the Mediterranean should not be based exclusively on timber certification, but has to be multidimensional, reflecting the multi-use aspect of the forests. If certification through Forest Stewardship Council (FSC) guidelines (see box on page 5) offers a strong vehicle leading to sound forest management for timber production, then it is important to investigate the incorporation of guidelines for NTFP certification in the FSC criteria.

The assessment of the ecological and socio-economic role of NTFPs in forest conservation has always posed something of a challenge to WWF, which has, in the past, tended to address the role of NTFPs in terms of conservation and rural development. However, NTFPs should also be considered directly under strategies relating to sustainable forest management. In the Mediterranean region in particular, any serious forest conservation investment has to investigate the role of NTFPs, both in the natural system and in relation to the socio-economic welfare of rural communities.

The Mediterranean eco-region is one of outstanding biodiversity at a global scale. Located in the Northern Hemisphere subtropical zone, the lands surrounding the Mediterranean Sea, on the three continents of Africa, Europe and Asia, constitute a unique mosaic of terrestrial, freshwater and marine ecosystems.

The rich natural landscape of the Mediterranean is a result of a distinct regional climate imprinted on a dynamic topography. It is an area of exceptional biodiversity value exhibiting high endemism, second only to the tropical Andes, with around 25,000 vascular plant species. In general, Mediterranean forest ecosystems constitute mosaic-like landscapes, which have been intensively modified by human activities.

WWF's Mediterranean Programme (MedPO) has implemented projects in the key forest ecosystems of the region by building partnerships with a number of environmental groups and institutions. Pursuing an integrated approach, MedPO has initiated a project: *Towards a Network for the Sustainable Use of NTFPs in the Mediterranean Region*. This targets the conservation of important forest areas in the Mediterranean and the promotion of rural community economic development through the sustainable production and management of NTFPs. In particular, the project intends to increase technical knowledge regarding the role of NTFPs in forest conservation, promote awareness and build capacity to manage NTFP production.

Currently, seven pilot areas are included or have expressed their interest in joining the network:

1. The forest region around Feija National Park, Jendouba, Tunisia
2. The Guadiana Valley Natural Park, Alentejo, Portugal
3. The *Argania spinosa* sylvo-pastoral system, Essaouira, Morocco
4. The area around the Chouf Forest Protected Area, Lebanon
5. The Monte Arcosu Nature Reserve, Sardinia, Italy
6. The Tramuntana Mountain Range, Mallorca, Spain
7. The Parnon Mountain Range, Peloponnese, Greece

Cork oak trees, Tunisia





LOWLAND MEDITERRANEAN PINE FORESTS

were more extensive in the past, but have declined due to intensive timber exploitation. In the eastern Mediterranean, Aleppo pine (*Pinus halepensis*) and brutia pine (*Pinus brutia*) forests are important for resin, fuelwood, forest honey production and livestock grazing. Maritime pine (*Pinus pinaster*) is important for resin production in the Iberian Peninsula. In North Africa, thuya (*Tetraclinis articulata*) and *Pinus halepensis* woodlands constitute the transition to sub-desert plant communities such as alpha grass (*Stipa tenacissima*) which is important in the production of pulp and fibre. Stone pine (*Pinus pinea*) produces popular edible nuts.

Example: In general, Mediterranean forests have been managed for all types of resins or resin-like substances since prehistoric times. *Resins* are plant chemicals produced by several plant taxa and the order *Coniferales*. The term embraces a group of sticky, liquid, organic substances that usually harden when exposed to air into brittle, amorphous, solid substances.

Resin collection has always played a significant role in the welfare of forest communities in Mediterranean countries. In some low-income areas, it has long been the only reliable source of labour and many resin producing forests are run by community co-operatives. A system of multiple use forestry also allows for apiculture, herbaceous plant gathering, animal husbandry and employment in recreation. The low economic value of resin has reduced production in the Mediterranean. Although world production has remained almost constant since 1961, production has moved to developing countries, mainly due to the cheaper labour costs.


MEDITERRANEAN MOUNTAINS include some very productive coppice forest systems such as mixed deciduous oak together with maple, hornbeam, ash and other trees. These systems are important for fodder and food production (chestnuts, walnuts etc.). Walnut tree systems (*Juglans regia*) are managed for walnuts, wheat and livestock. In high mountain and plateau areas, juniper woodland silvo-pastoral systems are managed for pasture and cattle raising.

Example: Chestnut (*Castanea sativa*) woodlands occur both naturally and in plantations over about 1,000 ha of the Parnon mountain range in the Peloponnese, southern Greece. Average chestnut production is about 250 tonnes per year. The area is biologically rich and has over 80 endemic plants, including many threatened and rare species.

There is an urgent need to develop activities that enhance the sustainable management and production of chestnuts and at the same time raise awareness of the importance of chestnut production for conservation and development. There are plans to create a national park.

One positive step is the recent establishment of a co-operative to co-ordinate chestnut producers, which aims to pave the way for the development of appropriate management practices through production and marketing. About one third of the woodland has organic certification.

Stone pine woodland, Lebanon



Traditional forest management in the Mediterranean is diverse – NTFP production ranges from simple gathering to complex agro-sylvo-pastoral management. Some NTFPs are produced for local consumption (informal economic sector) while others have entered the market and are used by industry (formal sector), with the main examples being pine resin and cork from the bark of the evergreen oak *Quercus suber*. However, many of the locally consumed NTFPs have a strong potential to enter the organised market and bring benefits to producing communities.

Difficulties arise in trying to quantify the economics of the informal sector, and in many cases intensive logging, clearing and forest substitution by plantations has taken place because the value of NTFPs has not been included in resource assessments or influenced decision making. This results in the loss of important resources that could bring sustainable income to local communities.

Some examples of non-timber forest products in the Mediterranean

The following overview and examples give a brief introduction to several aspects of Mediterranean forest management and the associated NTFPs.

MAQUIS WOODLAND is the source of many domesticated species in the Mediterranean, such as the olive tree, *Olea europaea*. Although olive groves are considered agricultural systems, traditional olive plantations, which have been maintained for hundreds of years by means of pruning and grafting of new stock, contribute to landscape conservation. Recently, however, two opposite trends have modified the olive production in the region – *abandonment* in areas of rural depopulation, especially in uplands, and *intensification* of production, reliant on pesticides, chemical fertilisers and intensive soil cultivation. Both lead to system degradation.

Other NTFP maquis species include the carob tree (*Ceratonia siliqua*), used in chocolate and pastry manufacturing and for photographic emulsions, and fig trees (*Ficus carica*), which are managed for fruit while in North Africa they are planted to buffer desertification.

Example: Mastic gum is a natural resin extracted from a variety of *Pistacia lentiscus*. Although a common species in the region, large-scale mastic production takes place only on the Greek island of Chios, from where mastic is exported to 50 countries. The trade is worth US\$14.4 million per annum to the 21 villages involved, who have a monopoly on production. *Pistacia lentiscus* var. *chia* is a slow growing, cold sensitive tree that grows in limestone soil. It reaches full size in 40-50 years, and although gum can be collected after the 5-6 years, full production potential is not until 12-15 years. Production, which averages 100 grams per year, takes place between June and mid-October.

Products using mastic include gumdrops, culinary ingredients, by-products used in varnishes and coatings and a cement called asphalt mastic. There is also extensive research to test medical properties.

SYLVO-PASTORAL WOODLANDS represent a number of efficient and rational management schemes in the Mediterranean region. These systems have adapted to the adverse environmental conditions imposed by low quality soil and harsh climatic conditions. The partial maintenance of the natural structure of the canopy and the understory within the systems has preserved several important elements of biodiversity. The main factors determining the type of system are the partial domestication or natural status of the trees and the partial modification of the forest structure. The different types of sylvo-pastoral systems have influenced cultural development in the Mediterranean and defined the dominant socio-economic patterns.

Example: The “Dehesas” oak woodlands of Spain are anthropogenic sylvo-pastoral landscapes, which for centuries have preserved woodland cover with natural resource use. Dehesas woodlands are mainly mixed formations of *Quercus* species, with *Q. ilex* dominating. The mosaic-like structure depends on management, soil conditions and topographic relief.

The diversified production includes pasture, acorns, tannin, fodder, firewood, agriculture, honey, aromatic plants, cork, livestock and game.

ARID TRANSITION SYLVO-PASTORAL WOODLAND is an important habitat of the Mediterranean-desert climatic zone, with a range of species and associated management systems.

Example: The argan tree (*Argania spinosa*) is a spiny, evergreen tree, endemic to Morocco. It is a Tertiary relic species and is the only member of the tropical *Sapotaceae* to occur north of the Sahara on the African mainland. Argan's ecological and social values make it one of the most important tree species in North Africa. Argan woodlands cover an area of about 820,000 hectares in southwest Morocco (about 7 per cent of total Moroccan forest cover). The woodlands exist in a region where rainfall hardly exceeds 200 – 300 mm/year.

Argania spinosa is managed for oil production, pasture and fuelwood, commodities that ensure the subsistence of 2 million rural Moroccans. Despite the granting of protection status, which, since 1925, regulates the rights of use by local people, argan woodlands suffer from continuous degradation. Fuelwood collection, unsustainable fruit gathering and grazing magnify existing natural regeneration problems.

Prior to the beginning of the 20th century there was a balance between grazing pressure and natural regeneration, today, however, argan woodland regression is estimated at 600 hectares/year at a minimum. Argan conservation issues are typical of the plight of forest resources in Northern Africa. Among the priorities, the sound management (and survival) of argan forests is the most important, as their loss will not only lead to the extinction of an important relic species but will also have adverse effects on the millions who subsist on their resources.