

OVERVIEW OF MAP RESOURCES USE AND MANAGEMENT IN SOUTHEAST EUROPE

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Introduction

Together with growth in global demand for medicinal plants, the pressure on their existing populations has rapidly increased during the last few decades. About 15,000 species of medicinal plants are globally threatened. The key causes include loss of habitat and habitat fragmentation, over-harvesting, improper collecting practices and pollution.

In order to stop further biodiversity loss of natural resources of medicinal and aromatic plants (MAP), it is needed to evaluate the remaining stocks of MAP populations and to perform their sustainable and continuous use in order to conserve this essential part of our natural and cultural heritage (Johns, 2002). The main general and long-term goals of conservation of target MAP species are protection, management and monitoring of selected populations in the direction of maintenance of the natural evolutionary processes, permitting new variations in the gene pool allowing the species to adapt to changing environmental conditions (Heywood, 2004).

There are three main global conservation strategies of MAP species: *in situ* (protection of their habitats), *ex situ* (conservation at species and germplasm level through field collections, botanical gardens and gene banks out of their natural habitats) and domestication/reintroduction and cultivation which could be conducted either *in situ* or *ex situ* (Dajic, 2004).

Biodiversity of MAP in Southeast Europe: quantitative and qualitative evaluation

The wild-harvesting of MAP and Non Wood Forest Products (NWFP) in the Balkans has a long tradition. The local use of natural plant resources for medicinal purposes is an integral part of folk medicine in the whole region. Together with the increasing importance of international trade, the use of MAPs as export goods has become more and more important during the last 100 years or more. Most of over than 2,000 different plant species that are used for producing medicine or other herbal products in Europe are collected from the wild. A surprisingly large share — about 8 per cent of the global medicinal plants trade — originates from the Balkans (Kathe et al., 2003).

The Balkan Peninsula is the most diverse part of Europe in terms of vascular plants, with more than 8000 species recorded. Number of plant species ranges from about 1800 reported for Kosovo to over than 5300 known for Croatia. Among such a high number of autochthonous plant species, an accurate number of species that are collected from the wild is very difficult to determine. Most likely, a number of NWFPs (including MAP) in SEE region reaches 1500-2000 of species, out of significantly smaller number is actually used, accounting for somewhat between 300 and 500. Concerning the economy importance and trade of wild collected species, only 15-20 could be targeted as ones visibly contributing to the

local/country economy. The list of most collected species in the SEE countries shows that among MAP the yarrow (*Achillea* spp.), dog rose (*Rosa canina*), juniper (*Juniperus* spp.), bilberry (*Vaccinium myrtillus*) St John's wort (*Hypericum perforatum*) and hawthorn (*Crataegus* spp.), are collected throughout the whole region.

Tab. 1 Most collected MAP and NWFPs in Balkans

Country Species	Albania	BIH	Croatia	Macedonia	Montenegro	Kosovo	Serbia
<i>Achillea millefolium</i>	√	√		√	√	√	√
<i>Acorus calamus</i>			√				
<i>Adonis vernalis</i>				√			
<i>Aesculus hippocastanum</i>		√					
<i>Agrimonia eupatoria</i>				√			
<i>Agropyrum repens</i>				√			
<i>Allium ursinum</i>		√					√
<i>Althaea officinalis</i>		√	√				√
<i>Anthyllis vulneraria</i>			√				
<i>Arctium lappa</i>				√			
<i>Arctostaphylos uva-ursi</i>		√		√	√		
<i>Artemisia absinthium</i>		√		√	√		
<i>Betula pendula</i>	√			√		√	
<i>Calluna vulgaris</i>			√				
<i>Capsella bursa-pastoris</i>				√			
<i>Chelidonium majus</i>				√			
<i>Colchicum autumnale</i>	√			√	√		
<i>Cornus mas</i>		√				√	√
<i>Corylus avellana</i>				√			
<i>Crataegus monogyna</i>	√	√	√	√	√	√	√
<i>Cyclamen hederifolium</i>				√			
<i>Dryopteris filix-mas</i>			√				
<i>Equisetum arvense</i>				√			
<i>Fragaria vesca</i>		√		√			√
<i>Galanthus nivalis</i>				√			
<i>Gentiana lutea</i>	√	√		√	√		
<i>Helychrysum</i> spp.			√	√			
<i>Hypericum perforatum</i>	√	√	√	√	√	√	√
<i>Jasminum officinalis</i>					√		
<i>Juglans regia</i>				√			
<i>Juniperus</i> spp.	√	√		√	√	√	√
<i>Laurus nobilis</i>	√		√		√		
<i>Lavandula officinalis</i>	√				√		
<i>Mallus sylvestris</i>						√	
<i>Melissa officinalis</i>	√	√		√			
<i>Nerium oleander</i>					√		
<i>Orchis morio</i>	√	√					
<i>Origanum vulgare</i>	√			√	√	√	

<i>Plantago</i> spp.				√			√
<i>Potentilla erecta</i>			√	√			
<i>Primula</i> spp.	√			√	√	√	√
<i>Rosa canina</i>	√	√	√	√	√	√	√
<i>Rosmarinus officinalis</i>	√	√			√		
<i>Rubus</i> spp.	√	√		√			√
<i>Ruscus hypoglossum</i>			√				√
<i>Salvia</i> spp.	√	√			√		
<i>Sambucus nigra</i>		√		√		√	√
<i>Satureja montana</i>	√	√			√		√
<i>Sideritis reaseri</i>	√			√			
<i>Solidago gigantea</i>			√				
<i>Taraxacum officinale</i>		√					
<i>Thymus</i> spp.	√		√	√	√	√	√
<i>Tilia</i> spp.		√		√			√
<i>Trifolium</i> spp.	√						
<i>Typha latifolia</i>			√				
<i>Urtica</i> spp.	√	√		√		√	√
<i>Vaccinium myrtillus</i>	√	√	√	√	√	√	√
<i>Valeriana officinalis</i>			√	√	√		
<i>Viscum album</i>	√			√			

√ **wild-collected species** √ **endangered species**

According to the former surveys on quantities and trade of the wild collected MAP in SEE (Kathe et al., 2003), the most used species include: yarrow (*Achillea* spp.), nettle (*Urtica dioica*), St. John's worth (*Hypericum perforatum*), marshmallow (*Althaea officinalis*), cowslip (*Primula* spp.), elder (*Sambucus nigra*), rosehip (*Rosa* spp.), linden (*Tilia* spp.), wild thyme (*Thymus serpyllum*), savory (*Satureja montana*), hawthorn (*Crataegus* spp.), plantain (*Plantago* spp.), blueberry (*Vaccinium myrtillus*), sage (*Salvia officinalis*), oregano (*Origanum vulgare*), juniper (*Juniperus communis*), wild garlic (*Allium ursinum*) and some others. Despite the sufficient resources and generally high distribution of these species throughout the region, there is particular threat for maintaining of their genetic diversity and preservation of populations exposed to excessive use.

The special feature of the Balkan's flora is high endemism, also referring to MAP species. In general, endemic MAP species of SEE are not sufficiently researched and many of them are in fact unknown for their chemical profiles and related biological activity. Knowing the importance of searching for new phytochemicals and natural sources of high biological effectiveness, much more attention should be paid on comprehensive and coordinated research of MAP endemics, out of some have already shown promising performances.

Apart of the high MAP diversity at the species level, there is significant diversity of habitats particularly rich in MAP. There are many plant communities of different vegetation types (forests, shrub and herbaceous vegetation) characteristic for predomination of one or two MAP species, thus forming characteristic "MAP plant community". Among them, the highest distribution in the SEE region exhibit the communities of *Vaccinium* spp. and *Juniperus* spp. of the sub-alpine zone along with the high mountain conifer communities of *Abies alba* and *Pinus* spp., as well as deciduous forests of linden (*Tilia* spp.), birch (*Betula* spp.) and poly-dominant oak forests with hawthorn (*Crataegus* spp.) highly distributed within the hilly

region. Such plant communities actually could be treated as “MAP vegetation” which needs to be further evaluated in terms of distribution, ecological features, floristic composition, as well as main factors affecting their existence.

Economy and trade of MAP in SEE

There is a global tendency of strong increase in use of MAP, whereas total trade of herbs, herbal remedies and herbal food supplements on the world market has reached about 60 billion of USA \$. During few last decades there was rapid growing demand for herbs and their products, especially in EU, US and Canada. European Union represents the largest global market for medicinal and aromatic plants with annual average import of about 120.000 tones in value of 200 million of USA \$ for period 1991-2000 (Donnelly et al., 2003). Annual rate of demand increases for 5% to 10%. EU is also the largest producer of herbs with total area under MAPs of 62.700 ha. The most important suppliers of herbs in EU are US (15, 8%), India (8, 1%), China (7, 45%), Bulgaria (6, 44%), Egypt (5, 47%) and recently Turkey.

In general, the East and Southeast European countries represent the area of a cheap source of NWFPs and MAPs. On export, the average price per tonne was US\$ 1,790 during the 1990s, which is only half of the average European export price of US\$ 3,280. Moreover, this figure is less than 40 % of the German (US\$ 4,640/tonne) and French (US\$ 4,990/tonne) average export prices, and only 1/5 of the Swiss (US\$ 9,200/tonne) and the UK average export prices (US\$ 10,120/tonne), which are the highest within Europe. In the 1990s, East and Southeast European countries reported exports of an average 36,360 tons of the commodity pharmaceutical plants (at a value of US\$ 65.1 million) (Kathe et al., 2003).

The Balkans is among the most important export regions for medicinal and aromatic plants in Europe. West and Central European countries in particular import large quantities of MAPs from the Balkans. Traditionally, wild-harvesting of MAPs predominates in this region (Lange, 2001, 2002). However, much has changed since early 90's when state-controlled system of collection and trade had lost its overall influence following political changes. However, during the last decade the collection, processing, trade and export of different NWFPs has been significantly improved, together with an increased interest for cultivation of some wild fruits and especially medicinal plants led to and cultivation of medicinal and aromatic plants. At the present, the average annual export of medicinal plants and wild fruits in SEE countries is something between 1500 and 2000 tons, whereas in Albania exceeds 7000 tons.

The awareness of sustainable use of NWFPs and MAPs strengthens, and much effort is put in marketing, branding and certification. All of these facts resulted in enlarged annual export of NWFPs from SEE region, approximated at about US\$ 80 million.

In order to preserve the biodiversity of European importance in the SEE region, most countries have adopted modern laws on nature conservation in recent years, already taking into account the EC Birds and Habitats Directives. They have become parties to international conventions such as the CBD, Convention on International Trade in Endangered Species of Wild Fauna and Flora, and the Bern Convention. National Biodiversity strategies and Environmental Action Plans, according to the CBD, have been developed in all the SEE countries.

Impacts and threats for MAP resources conservation in SEE

There are several factors strongly affecting the MAP biodiversity and further maintenance of MAP resources in SEE, which are mainly related to loss and/or habitat alterations, over-harvesting and improper use and management of natural resources which is all tightly linked with complex issues of social and economic period of transition.

In addition to livestock production, in hilly-mountainous rural areas of SEE, the activities focused on wild collection of MAP are important tool for conservation of natural and semi-natural habitats, the grasslands and forests. Knowing that mountain forests and grasslands are the most valuable biodiversity pools and are of the highest conservation value, the sector of MAP production and processing should be thus much more supported and further developed. The identification and survey of Important Plant Areas (IPAs) in the SEE region underlined the land abandonment as key cause of biodiversity. Traditional human activities in agriculture (mainly mowing and grazing), rural tourism and use of MAP and NWFP, solely or combined, represent the only way for preservation of habitats rich in biodiversity and an efficient measure for prevention the loss of species exposed to spontaneous vegetation successions of the abandoned habitats.

Habitat alteration and loss of MAP resources also refers to former and current expansion of agriculture, industry, urbanization and tourism in particular parts of SEE, which additionally diminishes the resources of MAP.

Over-harvesting is mainly a consequence of not adequate position of collectors and not coordinated and weakly established system of retail centers. In order to gather as much as possible of a quantity of the species, the collectors perform unsustainable and improper harvesting practices. In case of collecting the underground plant organs (roots, rhizomes and tubers) the whole plant is pulling out, whereas parts containing buds are not returned back into the soil, to ensure the reproduction of the plant. The huge problem represents the illegal harvesting of protected species, mainly due to lack of control and inspection in wild collecting and trade. It is well known that many protected species are still harvested and traded through black market channels. As a consequence of over-harvesting, there is a group of common endangered species in SEE region, including: *Gentiana lutea*, *G. punctata*, *Arnica montana*, *Arctostaphylos uva ursi*, *Acorus calamus*, *Adonis vernalis*, *Ruta graveolens*, *Ilex aquifolium*, *Sideritis* ssp, *Salvia officinalis*, *Helichrysum* ssp., *Paeonia officinalis*, *Swertia punctata*, *Glycyrrhiza glabra*, etc.

The key common obstruction for preservation of MAP biodiversity in the frame of sustainable use of bio-resources and development of the herbal sector in SEE countries is definitely dramatic decrease of collectors, especially in light of loss of traditional knowledge on plant's diversity, their use in folk and veterinary medicine, as well as practices of wild collecting and primary processing. For example, in Serbia there are nowadays about 50,000 people involved in collecting of both NWFPs and MAP, comparing with about 150,000 people in the late 1980s. Together with definite loss of experienced collectors, the ethnobotanical knowledge, old recipes and many of local brands containing herbs, berries or mushrooms were irreversibly lost.

Opportunities and challenges for herbal sector in SEE

It is quite clear and well accepted that conservation is not considered anymore as purely fundamental, biological approach, protecting the species and their habitats by strict preventing of use and exclusion of all human activities within the protected area. New conservation concepts, however, address much more attention to socio-economic issues and dependence of global, local and regional development on sustainable use of natural resources, aiming at both nature conservation and preservation of traditional knowledge and practices in use of bio-resources. Thus, there is very strong mutual relation between MAP resources conservation and their sustainable use, being dependent in much extent on human activities in PAs and other areas of conservation importance.

International Standard for Sustainable Wild Collection of Medicinal and Aromatic Plants (ISSC-MAP, 2007), developed by BfN, WWF, TRAFFIC and IUCN, provide a strong base of expertise, practical standards and criteria for sustainable MAP wild-crafting (Klingenstein et al., 2004). Together with WHO Guidelines on good agricultural and collection practices (GACP) for medicinal plants (WHO, 2003) these guidelines offer the background supporting documents for many national and international initiatives, programs and frameworks in order to improve the knowledge on distribution, abundance, sustainable management and use of medicinal plants worldwide. Finally, the newest standards related to conservation and sustainable use of MAP, developed by FairWild Foundation of WWF and Traffic, include several principles (the wild collection and conservation requirements, legal and ethical requirements, management and business practices, relationships with collectors, fair labor conditions, and obligations for companies and buyers of MAP) aiming at sustainability of the whole value chain of use of MAP.

Cultivation of MAP may reduce harvesting pressure on some wild species, particularly rare and threatened species, and thus can also be an important production strategy that supports conservation. However, cultivation must not be used as a reason for failing to safeguard viable wild populations of medicinal plant species and their natural habitats or undertaken without consideration of the impact on local users and rural harvesters. In many cases a mixture of production systems will be needed to satisfy the world's demands for herbal medicines. Reintroduction means a measure of (re)planting of the species into the same, similar or other appropriate habitat to renew endangered or even extinct populations of MAPs.

Sustainability of SEE herbal sector is depending on both size and structure of natural MAP populations and position of MAP collectors as key, but marginalized element within the whole value chain. Long term period of free access to MAP resources lacking in mechanisms of control of the wild collection in the past, followed with increased habitat alteration and remaining of much smaller collecting areas at present led to over-harvesting and decline in stocks of resources of many important MAP species. In order to preserve the MAP biodiversity and develop the herbal sector in SEE there is a need for a long-term and complex strategy, able to ensure implementation of standards, certification and quality control system harmonized with those in EU. In medium term period, efforts put in strong increasing of activities on MAP collection, cultivation and processing could lead to establishment of a network of small and medium enterprises, farms, collecting centres and ethno-villages aiming to revive abandoned and insufficiently utilized rural landscapes of the region. High priority to programs for the conservation of medicinal plants should be justified on the basis of savings that the plants generate for national health expenditure and thus to the national economy. The concept of sustainable biodiversity use aiming at its conservation is the only model that could strongly contribute to the mountain rural development. Moreover, there is a need of upgrading

of the existing regulatory framework and strengthening of its enforcement, especially in light of monitoring of MAP resources and evaluation of its ecosystem services.

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