Medicinal Plant Conservation


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Chaired by Danna J. Leaman

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Focus on Latin America

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Chair's Note

The current 2000-2004 IUCN quadrennium will draw to a close, and the new quadrennium will begin, with the 3rd IUCN World Conservation Congress in Bangkok, Thailand, 16-25 November. Dr David Brackett will have completed his second term as Chair of the Species Survival Commission (SSC). All SSC Specialist Groups, including the MPSG, will be dissolved and reconstituted at the invitation of the new SSC Chair. This process creates an opportunity for review, renewal, and expansion of Specialist Group membership.

The MPSG has made good progress on objectives for this period, particularly on developing projects and sources of funding, restructuring the membership, and establishing a website. A report on MPSG's activities and achievements 2000-2004 will appear in the upcoming issue (number 42) of Species, the SSC newsletter. Our principal activities and achievements since the publication of volume 8 of *Medicinal Plant Conservation* are summarized below.

MPSG's new website: http://mpsg.org

I am delighted to announce that the MPSG now has a website. Many of you have already discovered and visited the site. For those of you who have not, you can reach it by several different routes. The shortcut is http://mpsg.org. The full site address is http://iucn.org/themes/ssc/sgs/mpsg/. You can also find our website by following links from the IUCN-The World Conservation Union homepage at http://iucn.org to the Species Survival Commission (under "Our Work/Commissions/Species Survival" and then to "Specialist Groups/Plant Specialist Groups/Medicinal Plant Specialist Group"). Our website has been designed by Dr Reza Azmi, an MPSG member who manages a network supporting natural history research and ecotourism/community conservation efforts in Malaysia (http://wildasia.net). Reza responded to my call for help with designing and launching our website in my previous Chair's Note (vol. 8). Recent issues of *Medicinal Plant Conservation* are posted on the site, along with details of our programme, activities, membership, and relevant publications.

In addition to my thanks to Reza for his many hours of work on the website, I wish to thank Natalie Hofbauer, who coordinates the production of this newsletter and manages our mailing list, for many helpful comments on the site design and organizing previous issues and contents of *Medicinal Plant Conservation* as electronic files for the website. Thanks also to Deni Bown and Tony Cunningham for permission to use their photographs of medicinal plants on our website, to the WWF-UK Plant Programme for the links from the photographs to their factsheets on these medicinal plant species, and to the Information Management team and the SSC Communications group at IUCN Headquarters in Gland, Switzerland, for helping us to launch our website on the IUCN server.

We would like to add relevant member's publications and information about specific global and regional medicinal plant conservation activities, particularly as the regional sub-groups are established and begin to develop regional strategies. Your ideas about how to keep the site current and useful are most welcome.

We're sorry...

... that due to other urgent commitments in our agency we have not been able to provide *Medicinal Plant Conservation* volume 9 in time. However, to make up for the long delay we prepared this comprehensive double issue volume 9/10 containing a focus on Latin America.

We hope that you, dear readers, enjoy this issue, and that it contains useful information for you.

The Editor

Status of MPSG membership and restructuring

The South Asia sub-group of MPSG has made further progress in identifying current and new members who can act as national focal points in India, Nepal, Pakistan, Sri Lanka, Bhutan, and Bangladesh, and is beginning to fill gaps in membership and discuss a regional strategy for MPSG's work on medicinal plant conservation in South Asia. The Vice-Chair for South Asia, Vinay Tandon, provides an update on these efforts in this volume. Winrock International India is supporting the South Asia sub-group with a two-year grant for networking and internet capacity.

We made substantial progress on establishing a regional MPSG sub-group in Southern America at the VII Latin American Botanical Congress / II Colombian Botanical Congress held in November 2002 in Cartagena, Colombia. On behalf of MPSG, regional Vice-Chair Sonia Lagos-Witte and I coordinated a Round Table on Medicinal Plant Conservation. Summaries of the papers presented appear in this volume. We also report on an open satellite meeting of MPSG members and others to discuss the role of an MPSG sub-group for Southern America, and have begun to review and fill gaps in our membership, focusing less in this region on national representation, and more on linkages with a variety of different research communities working on medicinal plant

conservation and sustainable use. One of these linkages is with the Latin American Botanical Association (Associación Latinoamericana de Botánica), of which Sonia Lagos-Witte, our regional Vice-Chair, is the newly elected President. Congratulations, Sonia!

Efforts to sort out leadership and membership of regional sub-groups in the Pacific, Europe, and North America are underway. Other regions, such as Southeast Asia, North Asia, and Africa are particularly challenging owing to our relatively small number of members from these regions.

Revised Guidelines on the Conservation of Medicinal Plants

These *Guidelines* were published in 1993 by WHO, IUCN, and WWF, based on an international consultation in Chiang Mai, Thailand in 1988. They have provided a framework and direction for conservation on medicinal plants throughout the last decade. However, the context for conservation of medicinal plants and other biodiversity resources has changed in numerous ways with the implementation of the UN Convention on Biological Diversity and growing knowledge and experience of the principles and practice of conservation applied to medicinal plants. In May 2003, the three original partners, together with TRAFFIC, agreed to collaborate on revising the 1993 *Guidelines* to reflect current opportunities and challenges for medicinal plant conservation. MPSG members have several roles in this undertaking:

- Together with the SSC Wildlife Trade Programme, we represent IUCN on the Steering Committee for this collaborative undertaking.
- Numerous MPSG members provided comments on a draft outline of the revised Guidelines, and the entire MPSG membership was recently invited to comment on the first complete draft. I hope you have done, or will do so.
- Eleven MPSG members were among the participants in a small stakeholders workshop on revising the *Guideline*s, held in Kunming, China, 28-30 June 2004, hosted by the Kunming Institute of Botany, Chinese Academy of Sciences, and funded by WWF-UK.

The task of drafting the revised *Guidelines*, evaluating and incorporating the comments of hundreds of reviewers, has fallen to yet another MPSG member, Alan Pierce. The Steering Committee aims to present a final draft of the *Guidelines* at the 3rd IUCN World Conservation Congress and host a round-table discussion for IUCN members and Congress participants. The *Guidelines* will be published in 2005, if funding for translation and printing can be found.

Revision of CITES #-Annotations for medicinal and aromatic plants

At its 13th meeting (Geneva, August 2003), the CITES Plants Committee recommended that a consultant be contracted to identify problems that may arise because of unclear annotations regarding medicinal plant species included in the Appendices of CITES. The CITES Secretariat invited the MPSG to take on this work under a Memorandum of Understanding, which was signed on 18 December 2003 by the Chair on behalf of MPSG. The terms of reference for this work include the following tasks:

1. Identify all plant species in the CITES Appendices which are frequently and predominantly traded because of their medicinal or aromatic value, indication for each their distribution and the major exporting countries.

2. Identify the specimens, parts and derivatives or commodities of these species that enter international trade. Assess the current overall volume of international trade in each of these commodities for the species concerned, or, where this is not possible, assess or estimate the proportion of the total trade volume of the commodities for each species (e.g.: 80% dried roots, 20% powdered roots).

3. Make recommendations regarding the specimens, parts and derivatives or commodities of each of the identified plant species that would need to be included in the Appendices of CITES to adequately regulate international trade to ensure sustainable utilization and long-term conservation of the species concerned.

4. For each species propose amendments to exiting #-Annotations or draft new #-Annotations where necessary and as appropriate.

5. Provide a glossary explaining and accurately defining all the terms and definitions that are used in the #-Annotations.

6. Liaise with the members of the supervisory group established by PC13 through its Chair (Uwe Schippmann).

7. Submit an interim report on progress in implementing the MoU for presentation at the 14th meeting of the Plants Committee (Windhoek, February 2004), and submit a final report 60 days before its 15th meeting in 2005.

8. Produce the results of the revision in formats which can be developed into training materials (e.g. Powerpoint presentations, booklets or exercises), and that illustrate and visualize the content of the new annotations, the terms used and their practical application during enforcement controls.

An interim report was prepared as an information document (Inf. Doc. PC 14) for the 14th meeting of Plants Committee in Windhoek, February 2004. The Plants Committee has prepared a document for the 13th Meeting of the Conference of the Parties to CITES based on this report (CoP 13 Doc. 58, http://www.cites.org/eng/cop/13/docs/E13-58.pdf).

Red List Assessment and Management Planning for Medicinal Plants

Members of the MPSG South Asia regional sub-group continue to make this region an active centre of medicinal plant conservation status assessment, applying the IUCN Red List criteria and methods for conservation management planning (the CAMP process) developed by the SSC Conservation Breeding Specialist Group (CBSG). D.K. Ved reports on the recent workshop in this volume of MPC (see page 73). Two Red List training and conservation assessment planning workshops were held in February and April of this year in the Caribbean (Dominican Republic) and Central America (Panama City), in collaboration with the TRAMIL network project "Biodiversity Conservation and Integration of Traditional Knowledge on Medicinal Plants in National Primary Health Care Policy in Central America and Caribbean", with funding from UNEP-GEF (see the report by Sonia Lagos-Witte in MPC volume 8). A summary report on these workshops appears in this issue of MPC (see page 68).

At the request of the SSC Chair, I have agreed to establish a Red List Authority for medicinal plants under the auspices of the Medicinal Plant Specialist Group. The formal terms of reference for Red List Authorities (see Box) may require some flexibility in their application to medicinal plants, given the diversity of taxa included in this group, and the overlapping taxonomic and regional Red List authority of other Specialist Groups . At present, I feel we need to focus our efforts on collaborating with Red List authorities for taxonomic groups that include threatened or potentially threatened species of medicinal plants, ensuring that any activities involving Red List assessments of medicinal plants (such as Conservation Assessment and Management Planning – CAMP workshops) are applying the current IUCN Red List Categories appropriately (version 3.1, 2001, http://www.iucn.org/themes/ssc/redlists/RLcats2001booklet.html), reporting the assessment results adequately to the SSC Red List Programme, and creating training opportunities to

Terms of Reference for Red List Authorities

The Red List Authority takes responsibility for ensuring that taxa specified in the appointment contract are evaluated against the IUCN Red List Categories. The Red List Authority (RLA) will ensure that each taxon within its mandate that has already been evaluated against the Categories is re-evaluated at least every 10 years, and if possible every 5 years. The Red List Authority will also seek to expand the number of taxa evaluated against the Categories in particular in response to the priorities identified in collaboration with the SSC Red List Programme. Each Red List Authority will appoint a Red List focal point person for the Authority to liaise with the Red List Programme Officer. A Red List Authority can comprise as many people as required (but a minimum of two is necessary). How each RLA is constructed and how it operates is entirely at the discretion of each group but the terms of reference outlined above need to be borne in mind.

Each RLA focal point person will be responsible for verifying Red List assessments through:

1. ensuring that at least two named evaluators agree the status of each taxon assessed;
2. ensuring that the evaluators are competent in the relevant fields;
3. ensuring that the evaluators are familiar with and up-to date with the Red List Categories and Criteria, and their application;
4. requiring evaluators to take full account of present and past literature (published and grey) and other reliable sources of information, relating to the taxon;
5. assisting evaluators to seek and locate the best available background data relating to the threats likely to affect the taxon;
6. requiring the evaluators to consult internally within the Red List Authority, and externally with appropriate specialists and other interest groups;
7. ensuring that for each evaluation, the evaluators provide supporting information in line with the documentation requirements, as set out in the Annex 2 to these terms of reference;
8. ensuring that for each evaluation, the evaluators adhere to the taxonomic standards, as set out in Annex 3 to these terms of reference;
9. in the case of a petition against the listing of any taxon for which the Authority is responsible, following the process for handling petitions as set out in Annex 4 to these terms of reference, and abide by any decisions of the arbitrating Red List Standards Working Group; and
10. submitting the results of new assessments including changes in categorisation to the IUCN Red List Officer in the format required and within schedules set for annual and occasional updates of the IUCN Red List of Threatened Species.

increase Red List capacity for researchers working on medicinal plants. We are also doing what we can through our members and broader network of contacts to provide information for revisions of Red List assessments. Two taxa currently in need of revision are *Prunus africana* and *Aquilaria* spp.

The Global Strategy for Plant Conservation – What can it mean for medicinal plants?

Danna J. Leaman

Plant conservation has long been overshadowed by conservation efforts directed towards animals, and has also been much divided among efforts focused on different production sectors that rely on plant resources – forestry, agriculture, non-wood forest products – and efforts targeting different types of ecosystems. Direct and coherent efforts to conserve plant species have received relatively little policy attention and research support. In the 1980s, IUCN and WWF began to redress this imbalance by creating the Joint IUCN/WWF Plants Conservation Programme, but this was disbanded early in the 1990s as these organizations began to develop their own plant conservation programmes. An effort to revive and expand collaboration on plant conservation has gained global attention and momentum with the adoption of a Global Strategy for Plant Conservation by the Parties to the Convention on Biological Diversity (CBD) in April 2002.

This Strategy is unique among the various progammes and strategies adopted under the CBD. In a statement on the history of the Strategy and challenges for its implementation, David Bramwell, Peter Raven, and Hugh Synge describe its significance to plant conservation and to the implementation of the objectives of the CBD (BRAMWELL et al. 2002):

> "Indeed, it is the first agreement under the Biodiversity Convention (CBD) to have targets that are focused on real outcomes on the ground, like creating protected areas, rather than targets focused on UN processes, such as holding committee meetings and writing reports. The eyes of all those involved in the Biodiversity Convention will be on this agreement and whether it delivers. For once, plant conservation is in the vanguard of the environmental movement, not trailing in the rear."

How can the Strategy support medicinal plant conservation? The Strategy sets out 16 outcome-oriented global targets for 2010. Target 2 (see Box 1) clearly supports the work of the IUCN Species Survival Commission through the Specialist Groups and the Red List Programme. A more concerted effort to review existing Red List assessments of medicinal plants and to expand this work through mechanisms such as regional Conservation Assessment and Management Planning (CAMP) workshops would contribute to this target. Targets 9, 12, and 13 specifically identify plants used as medicines and in health care. Many of the current activities of MPSG members and associated institutions already contribute to these targets – we can make a substantial contribution by documenting these efforts and linking them to the Strategy targets.

The work we are proposing within the Top 50 programme and the Centres of Medicinal Plant Diversity, in collaboration with a variety of development, research, and non-government organizations would contribute to these targets, as well, and perhaps more importantly, to other more general targets within the Strategy that concern capacity building, development of research models, public awareness, and networking.

The major challenge will be to find the resources and create the opportunities not only to implement these on-the-ground regional projects, but also to link them to the Strategy implementation process. In November 2002, an expert liaison group met in Cartagena, Colombia, to discuss the scope of activities to be undertaken under the 16 targets of the Strategy, and to recommend a process for setting sub-targets and milestones to be used by the Conference of the Parties to the CBD to assess progress on implementation at its seventh meeting in 2004. This group proposed a series of global and regional stakeholder consultations, and suggested lead organizations to help organize and facilitate these consultations: e.g., IUCN for Target 2; FAO and IPGRI for Targets 9 and 12; and FAO, IPGRI, and the People and Plants Working Group (WWF) for Target 13. These consultations are to be completed in time for reporting to the ninth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA), 14-18 November 2003.

Information about the Global Strategy for Plant Conservation

- Website for documents and process concerning the Global Strategy for Plant Conservation within the CBD: www.biodiv.org/programmes/cross-cutting/plant/ (viewed 14.5.2004).
- UNEP/CBD/COP/6/20/. Decision VI/9. pp. 141-153. Global Strategy for Plant Conservation. www.biodiv.org/decisions/default.asp?dec=VI/9 (viewed 14.5.2004).
- BRAMWELL, D., P. RAVEN, & H. SYNGE (2002). Implementing the Global Strategy for Plant Conservation. – Plant Talk 30: 32-37.

Box 1: The Importance of Medicinal Plants to Global Plant Conservation.
Source: Global Strategy for Plant Conservation: www.biodiv.org/decisions/default.asp?dec=VI/9 (viewed 14.5.2004).

Target 2: *A preliminary assessment of the conservation status of all known plant species, at national, regional and international levels*

Over 60,000 species have been evaluated for conservation status according to internationally accepted criteria, of which 34,000 are classified as globally threatened with extinction (IUCN, 1997). In addition, many countries have assessed the conservation status of their own floras. There are currently about 270,000 known species. Of those still to be evaluated, sufficient information for a full assessment is only available for a proportion. Thus, only a preliminary assessment will have been carried out on the remaining, "data-deficient" species. Subsequently, further fieldwork will be essential to enable more comprehensive assessments to be undertaken.

Target 9: *70 per cent of the genetic diversity of crops and other major socio-economically valuable plant species conserved, and associated indigenous and local knowledge maintained*

Theory and practice demonstrate that, with an appropriate strategy, 70% of the genetic diversity of a crop can be contained in a relatively small sample (generally, less than one thousand accessions). For any one species, therefore, the target is readily attainable. For some 200-300 crops, it is expected that 70% of genetic diversity is already conserved *ex situ* in gene banks. Genetic diversity is also conserved through on farm management. By working with local communities, associated indigenous and local knowledge can also be maintained. Combining genebank, on farm, and other in situ approaches, the target could be reached for all crops in production, as well as major forage and tree species Other major socio-economically important species, such as medicinal plants, could be selected on a case-by-case basis, according to national priorities. Through the combined actions of countries, some 2,000 or 3,000 species could be covered in all.

Target 12: *30 per cent of plant-based products derived from sources that are sustainably managed*

1. Plant-based products include food products, timber, paper and other wood-based products, other fibre products, and ornamental, medicinal and other plants for direct use.

2. Sources that are sustainably managed are understood to include:

- Natural or semi-natural ecosystems that are sustainably managed (by avoiding over-harvesting of products, or damage to other components of the ecosystem), excepting that commercial extraction of resources from some primary forests and near-pristine ecosystems of important conservation value might be excluded.
- Sustainably managed, plantation forests and agricultural lands.

3. In both cases, sustainable management should be understood to integrate social and environmental considerations, such as the fair and equitable sharing of benefits and the participation of indigenous and local communities.

4. Indicators for progress might include:

- Direct measures e.g.: products meeting relevant verified standards (such as for organic food, certified timber, and intermediate standards that codify good practices for sustainable agriculture and forestry);
- Indirect measures e.g.: products from sources considered to be sustainable, or near-sustainable, on the basis of farming system analyses, taking into account the adoption of integrated production methods. Assessment of progress will be assisted by the development of criteria and indicators of sustainable agricultural and forest management.

5. Certified organic foods and timber currently account for about 2% of production globally. For several product categories, examples exist of 10-20% of products meeting intermediate standards. Against this baseline, the target is considered to be attainable. It would be applied to each category of plant-based products, understanding that for some categories it will be more difficult to reach and more difficult to monitor progress. Implementation would require a combination of product-specific and sector-wide approaches, consistent with the Convention's programme of work on agricultural biodiversity.

Target 13: *The decline of plant resources, and associated indigenous and local knowledge innovations and practices, that support sustainable livelihoods, local food security and health care, halted.*

Plant diversity underpins livelihoods, food security and health care. This target is consistent with one of the widely agreed international development targets, namely to "ensure that current trends in the loss of environmental resources are effectively reversed at both global and national levels by 2015". It is recommended feasible to halt the decline by 2010 and subsequently to reverse the decline. Relevant plant resources and methods to address their decline are largely site specific and thus implementation must be locally driven. The scope of the target is understood to encompass plant resources and associated ethnobotanical knowledge. Measures to address the decline in associated indigenous and local knowledge should be implemented consistent with the Convention's programme of work on Article 8(j) and related provisions.

• WYSE JACKSON, P.S. (2002). Development and adoption of the Global Strategy for Plant Conservation by the Convention on Biological Diversity: an NGO's perspective. – Botanic Gardens Conservation News 3 (8): 25-32.

For author's address see imprint.

Sustainable wild collection of medicinal and aromatic plants: Practice standards and performance criteria

Danna J. Leaman

Background

Medicinal and aromatic plants (MAP) have been an important resource for human health care from prehistoric times to the present day. Between 40,000 and 50,000 plant species are known to be used in traditional and modern medicine systems throughout the world. Relatively few MAP species are cultivated. The great majority is still provided by collection from the wild (LANGE & SCHIPPMANN 1997, SRIVASTAVA et al. 1996, XIAO PEI-GEN 1991). This trend is likely to continue over the long term due to numerous factors: most medicinal plants are traded locally and regionally rather than internationally, the costs of domestication and cultivation are high, and land for cultivation of non-food crops is limited. Moreover, cultivation is not necessarily the most beneficial production system. Wild collection practices secure valuable income for many rural households, especially in developing countries, may provide incentives for conservation and sustainable use of forest and other important plant areas, and can be an important factor in the source countries' local economies (SCHIPPMANN et al. 2002).

However, over-harvesting of MAP, land conversion, and habitat loss increasingly threaten a considerable portion of the world's MAP species and populations. For these reasons, approaches to wild MAP collection that balance the needs of local, regional, and international markets with the need for conservation and sustainable use are urgently needed.

In recent years a number of initiatives have been launched to achieve a better framework for the sustainable use of biological diversity, particularly the Convention on Biological Diversity (CBD). Under the CBD, more specific guidance for the ecological, socio-economic, and equity basis for conservation and sustainable use of biodiversity has been articulated in the *Ecosystem Approach*, the *Bonn Guidelines on Access to Genetic Resources and Fair and Equitable Sharing of the Benefits Arising out of their Utilization*, the *Global Strategy for Plant Conservation*, and the *Addis Ababa Principles and Guidelines for the Sustainable Use of Biodiversity* (Cf. CBD: http://www.biodiv.org/).

Preparing Guidelines

Recognizing the need to develop and introduce standards and criteria for wild collection of non-timber forest products (NTFP), several efforts have been made to consider the relevance and application of various models aimed at certification of sustainable wild collection. For example, standards and criteria for ecological, social, and fair business practice elements of certification systems have been developed for application to NTFP by agricultural organizations and fair trade associations (SHANLEY et al. 2002).

More specifically relevant to medicinal plants, the 1993 WHO/IUCN/WWF Guidelines on the Conservation of Medicinal Plants (WHO et al. 1993) and the 2004 WHO Guidelines on Good Agricultural and Collection Practices (GACP) for Medicinal Plants (WHO 2003) provide general guidance and principles for the development of a global framework of practice standards and performance criteria for MAP. Of these documents, only the 1993 Guidelines directly address ecological and socio-economic/equity issues related to sustainable wild harvest, and these are now out of date. WHO, IUCN, WWF and TRAFFIC are currently revising these Guidelines through an international consultation process with the intent to incorporate broader guidance and principles related to sustainable use of biological diversity, access and benefit sharing, and fair business practices (see also page 54).

Need for a subset of Criteria and Indicators

Existing principles and guidelines for conservation and sustainable use of medicinal plants address primarily the national and international political level, but only indirectly provide the medicinal plant industry and other stakeholders, including collectors, with specific guidance on sustainable sourcing practices. For example, the revised WHO/IUCN/WWF/TRAFFIC *Guidelines on the Conservation of Medicinal Plants* will provide general principles addressed mainly to governments and other political stakeholders, NGOs, IGOs and businesses world-wide. These guidelines call for the development of concrete practice standards and performance criteria for the conservation and sustainable use of medicinal plants as a necessary practical interface between the general principles set out in the *Guidelines*, and management plans that must be developed for particular species and specific situations.

Other existing guidelines for the sustainable collection of non-timber forest products provide useful models for MAP, but do not cover the range of guidance needed for MAP on topics such as access and benefit sharing, participatory management practices, and quality control. The proposed work will build on these existing principles, guidelines, and standards, but will expand and extend these to provide relevant standards and criteria for the sustainable wild collection of MAP. These will benefit forest managers, industry, and local collectors by providing reputable standards of practice for sustainable wild collection against which local performance can be tested with criteria relevant to MAP.

Initiative by WWF, IUCN and BfN

The initiative by WWF Germany, the IUCN Medicinal Plant Specialist Group (MPSG) and the German Federal Agency for Nature Conservation (BfN) will provide a draft framework of practice standards and performance criteria for the sustainable wild collection of MAPs. These should be applicable to the wide array of geographic, ecological, cultural, economic and trade conditions in which MAP are found. It is intended that the draft framework will build on existing standards, particularly those relevant to non-timber forest products (PIERCE & LAIRD 2003).

Testing the draft framework will be done in worldwide model projects carried out by other agencies, using a framework to be developed by WWF-Germany and an international Advisory Board. An iterative evaluation of the relevance of the draft standards and criteria to these model projects will be incorporated into the process and will ensure that the draft will be constantly adapted to feedback from projects and stakeholder consultations.

The drafting and consultation process will involve the expert members of the MPSG and a wide range of relevant stakeholders. This will be ensured by the formation of a technical Advisory Board which will accompany the process. Also, a network of conferences and workshops will be used to present the draft work stages to the relevant audiences and collect their feedback. These events will include the November 2004 World Conservation Forum of IUCN in Bangkok, the International Botanical Congress in Vienna 2005 and others.

The process will provide workable and tested criteria and indicators by 2006. Funding for the process is secured through 2005 from the German Ministry of Environment, Nature Conservation and Nuclear Safety. Funding of the testing in selected harvesting situations is still being sought.

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For author's address see imprint.

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Focus on Latin America

Conservation and Sustainable Use of Medicinal Plants in Latin America

Danna J. Leaman

The medicinal flora of Central and South America, and the Caribbean Islands, has been the focus of much ethnobotanical research and also bioprospecting over the last two decades. The current and potential value of medicinal plants as traditional remedies and commercial pharmaceuticals is widely acknowledged. However, efforts to understand the conservation needs of even the most important species of medicinal plants in these regions have received relatively little attention and support.

The following articles of Edelmira Linares, Carlos Villamil, Catherine Potvin, and Ximena Buitrón are abstracted from presentations to a Round Table on Conservation and sustainable Use of Medicinal Plants as part of the VIII Latin American Botanical Congress and II Colombian Congress of Botany, 13-18 October 2002, in Cartagena, Colombia. The Round Table was coordinated by Dra Sonia Lagos-Witte, Vice-Chair for Southern America, and myself on behalf of MPSG. These presentations provide a summary of current research in Central and South America, and the Caribbean Islands that contributes to the conservation and sustainable use of medicinal plant species in these regions.

Participants in the Round Table discussion emphasized the following research priorities for medicinal plant conservation in Latin America:

- inventories of native medicinal plants species and their conservation status, particularly those threatened by commercialisation and regional or international trade;
- identification of important geographic areas for medicinal plant conservation;
- specific conservation action for medicinal plants in danger of extinction;
- development of capacity of local communities to be actively involved in conservation and management of medicinal plants;
- collaboration in networks and networking focused on existing strengths and reinforce local initiatives;
- clarity concerning intellectual property involving traditional knowledge of medicinal plants;
- incorporation of local communities' own vision concerning medicinal plants in all aspects of discussion of this theme; and
- support for pilot projects with local application to medicinal plant conservation.

The Role of Education in the Conservation of Medicinal Plants

Edelmira Linares, Robert Bye & Teodolinda Balcázar

In 1995 the authors began working with the International Cooperation for Biodiversity Group (ICBG) on the project "Bioactive agents in Latin American desert plants", with Robert Bye and Rachel Mata in charge of the Mexican section of the project. The National Autonomous University of Mexico (Universidad Nacional Autónoma de México, UNAM), the University of Arizona (USA), various Argentine universities and the Catholic University of Chile are involved in the project.

Our part of the project consists in studying native medicinal plants from arid and semiarid regions in Mexico as well as doing research on new chemical products.

We are interested in plants growing in deserts, in seasonally dry tropical forests known as deciduous seasonal forests and dry pine oak forests which respectively cover 50%, 21% and 17% of Mexico's surface.

Ever since pre-Hispanic times, people in Mexico have been interested in medicinal plants; their usage today is still influenced by century-old traditions of each local culture. For this reason, research for the ICBG-Mexico project takes place in different regions of the country to allow us to learn about our national medicinal flora which has been used for centuries and has become part of today's trading system (BYE et al. 1997).

While doing this research we have become aware that the ecosystems from where the medicinal plants are extracted have been under a constant deteriorating process which has gotten worse due to climatic change – expressed in long lasting droughts – and to an increase in the demand for these plant remedies, which is an aspect that needs immediate attention or these resources will be lost.

One of the main objectives of the ICBG programme is to promote the participation of the local communities, increasing their responsibility in the conservation of the biological diversity. For this reason we are interested in promoting and supporting *in situ* conservation based on the idea that the best way to preserve the resources is to use them wisely and to manage them in a sustainable manner, with the participation of the communities and the social actors directly involved in the extraction and commercialization pro-

cesses of the medicinal plants.

In order to support this conservation idea, ICBG-Mexico has developed education programmes for the different communities we are working with.

A method that has rendered positive results approaching the community has been: a) to set interviews with the authorities to explain ICBG's interest in working directly with the teachers and students from different schools, encouraging them to learn about the importance of the appropriate use of the resources as they are invaluable for their livelihood, or b) to approach other organized groups in the community – that already know us – being interested in our education programmes.

Two education programmes implemented in two different communities in the state of Oaxaca are described here.

The first one was developed in Tlacolula, on the southern Pacific coast of the country, where we were invited to collaborate (because of our past support to the community) in the creation of an Ethnobotanical Historical Garden in the exconvent of Santo Domingo de Guzmán, in the city of Oaxaca, one of the most important 16th century convents in Mexico, considered part of Humanity's Heritage. This convent was completely restored and today it is known as the Cultural Center of Santo Domingo.

A very important part of the restoration process was the transformation of the convent's kitchen garden into an Ethnobotanical Garden. Several non-government organizations (NGO's), one of which is the group called "Los Médicos Tradicionales de Oaxaca" (Traditional Doctors of Oaxaca), were involved in this transformation process: they provided the plants they considered to be the most important ones in their respective regions, creating, in this way, a garden that would represent today's use of the state's plants, in this case, the medicinal plants. The garden was to offer, also, an area where the different groups could organize cultural activities.

With this interaction we were able to combine our interests with the possibility of exchanging ideas and knowledge from the groups of "curanderos" (healers) from this southern region of the country. Traditional healers in Oaxaca approached us asking for academic support for their organization.

Before starting, several meetings were held to learn about the ways in which we could be of help and about their interests. We were asked to teach them to make herbarium specimens, as they were interested in keeping samples of their plants to be able to show them to their children and pupils, so that, on the healers' death, the knowledge would not "go away with them". They also wanted us to show them – if we knew of any – new uses for their plants, or that we would teach them about other plants that would substitute those that have become scarce.

With these specific objectives, and with the support of the ICBG, the Botanical Garden at IB-UNAM (Institute of Biology-UNAM) and the Ethnobotanical Historical Garden at Santo Domingo, in 1997 we organized a workshop that included the following aspects:

a) *general aspects of some botanical families* of medicinal importance in the area,

b) practices of *preparing and mounting of botanical samples*,

c) medicinal uses of plants and the importance of maintaining *high quality control*,

d) *conservation and sustainable management of these resources*.

During the first stages of the workshop the participants were not too comfortable about revealing important aspects relative to the plants they used in their different communities, as they considered that this knowledge was too intimate and/or personal, but as the workshop developed they saw that most of the participants knew about the plants being studied, some of them even described other uses for the plants. Little by little they got the courage to exchange their ideas, but it must be said that the process was not easy (Figure 1).

Figure 1. View of the workshop for traditional doctors of Oaxaca; the practice included observations on plant morphology (Photo: R. Bye 1997).

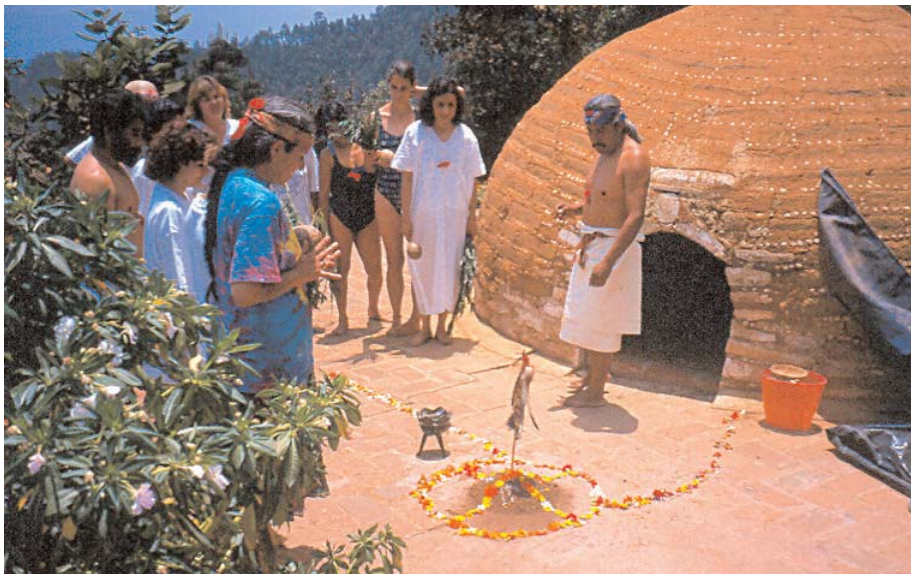

Figure 2. The second workshop had a complementary class by those same Traditional Healers which included, among other things, the ceremony and ritualistic bathing in Temascal, a century's-old tradition which is still practiced by certain indigenous groups in Mexico (Photo: E. LINARES 1997).

Then, in 1999, we were invited to teach a one week course on Mexican medicinal plants, organized by the Botanical Gardens at the Interdisciplinary Center of Regional Research (Centro Interdisciplinario de Investigaciones Regionales), which belongs to the National Polytechnic Institute (IPN), in Oaxaca. Anyone interested could attend the course, and we were pleased to see that among the participants were some of the healers we had met in the 1997 workshop: these healers offered to teach a complementary class on ritual healing in "temascal" baths which began, among other things, with the collection of the medicinal plants used for the ceremony, many of which had been studied in the '97 workshop (Figure 2).

The education programmes mentioned here have taught that, in order to develop successful actions in the communities, it is necessary to follow certain rules such as: 1) to be respectful of the community's system of authority, asking for their authorization before beginning and describing to them the nature of the activities, 2) to support the development of the project with locally well known organized groups 3) to learn about the community's expectations and interests and include them in the activities, 4) to look for funding and support from our institutions or projects, which will allow to develop the activities without them becoming a burden for the communities, and to have the communities contribute to the project with something they can afford (housing, organization, promotion, food, etc.), 5) to demonstrate clearly that the community participants will be the ones benefiting from the project and that our profits will be solely academic, 6) to underline the importance of the conservation of their resources and the community's responsibility in preserving them and in giving them sustainable use, and 7) that we are answering a request and are there as their guests; that we are not intruders in the community. The programme must also include the local academic institutions. Conservation and education programmes will be better appreciated if these rules are followed (Figure 3).

Final Comments

Education programmes are a vital complement to ethnobotanical projects and should be provided as a way of giving the community something in exchange (LINARES et al. 1997; LINARES et al. 1999). With these programmes people can be made aware of the importance of their natural resources and the need to preserve them through sustainable management. We hope that our contribution will allow future generations to continue using medicinal plants, and that their extraction will improve the livelihood of the local populations.

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Figure 3. Reading of the ICBG program to the community of Mazatlán Villa de Flores (Oaxaca) interested in having us support them in a sustainable plant propagation project (Photo: V. CHAVEZ 2002).

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Conservation of medicinal plants in the southern cone of South America

Carlos B.Villamil

An estimation frequently quoted indicates that 75-80% of the population of the world depends on medicinal plants for their health.

What is the situation in the southern cone of South America? Four countries are included in the region: Argentina, Chile, Paraguay and Uruguay. In comparison to the other countries in the continent, the indigenous population has been diminished in three of them. The exception is Paraguay, where the guaraní culture is very influential. In all these countries the level of education varies in different sectors of society, and political power is in the hands of the part of the population of European origin. One consequence of this is the small contribution made to the dominant culture by the indigenous people.

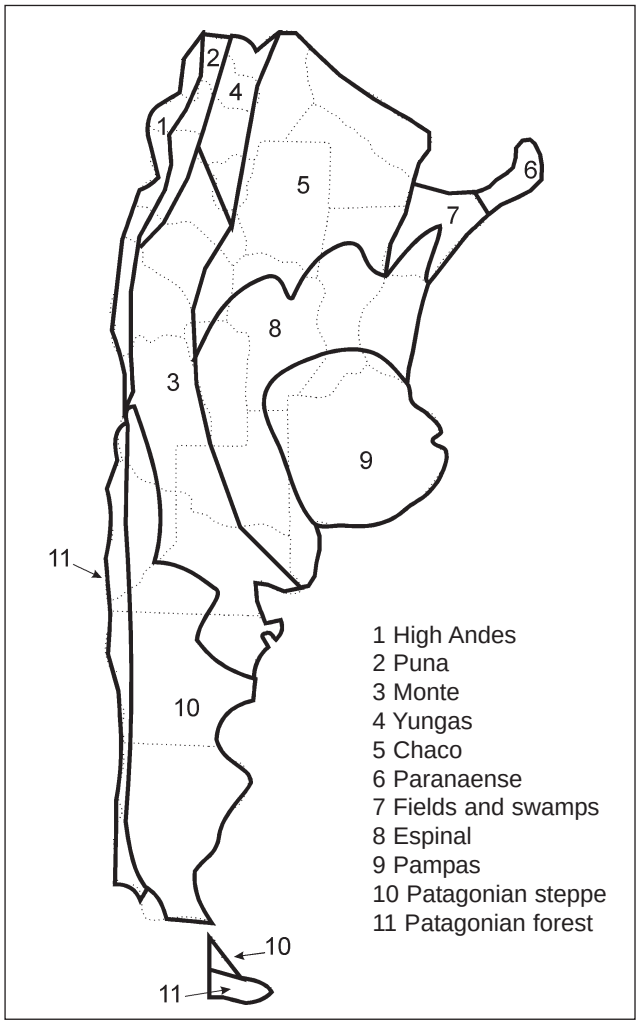

Figure 1. Eco-regions of Argentina (adapted from BURKART et al. 1999)

The flora of the region roughly comprises a total of 12,000 species, distributed in several eco-regions (Figure 1), of which 7,000 are found in temperate areas.

Although the traditional use of plants as medicines has been one of the main reasons to justify their conservation, none of the four countries in the region has yet prepared an official catalogue of "medicinal plants".

In the following some points regarding the conservation of medicinal plants are made using examples from Argentina.

In Argentina the native population is represented by 15 ethnic groups (IUCN 1994) concentrated in the areas furthest away from the Pampas region, which occupies the centre of the country (Figure 2). Whilst some ethnic groups, as the yamanas and sel nam, have almost disappeared, others still make up important components of the population in the northwest (kolla), Chaco (chane, chiriguano, chorote, chulupi, matacowichi, mocovi, pilaga tapiete, toba), and Patagonia (araucanos, tehuelches). In contrast to other regions of America the cultures of these ethnic groups were not very well developed before the arrival of Europeans, with the exception of the kollas, of Incan origin.

In the Pampas, where the main economic activities of the country are concentrated, the native groups have lost their identity and have become totally absorbed by the national culture. This situation is reflected in the use of medicinal plants by the people. In rural areas it is still common to go to the "curandero". However, these days their use of medicinal plants is distorted, as they often prescribe "herbs" as cures, but they do so from a "westernized" perspective. The names used often correspond to traditional hispanic medicine, but the plants utilized usually have nothing to do with the original ones. In Argentina the name "poleo" is used for *Lippia turbinata* (Verbenaceae), included as a drug in the national Pharmacopoeia, but the name in Europe is applied to *Mentha pulegium* (Lamiaceae) belonging to a different family. In this case it would not cause any serious problems since both plants are only used as digestive teas, with mild therapeutic action. The situation is more serious when it is believed that the prescribed medicine has the properties of "consuelda" (*Symphytum officinale*, Boraginaceae), used to relieve sorethroats and pharyngitis, but in fact the plant prescribed is "duraznillo blan-

co" (*Solanum glaucophyllum*, Solanaceae) which causes "enteque seco", a disease which alters the metabolism of calcium. The origin of these confusions is cultural: for many years the "know-how" of these prescriptions has been adapted from European publications and the names applied to a variety of different plants. This "knowledge" is easily available to those who can read, but not accessible to much of the native population. Today the "curanderos" in the Pampas region are no longer aboriginal and do not use traditional knowledge but these types of substitutes. This is quite paradoxical since the mere fact of being able to read does not guarantee the quality of the knowledge, but rather contributes to create confusion.

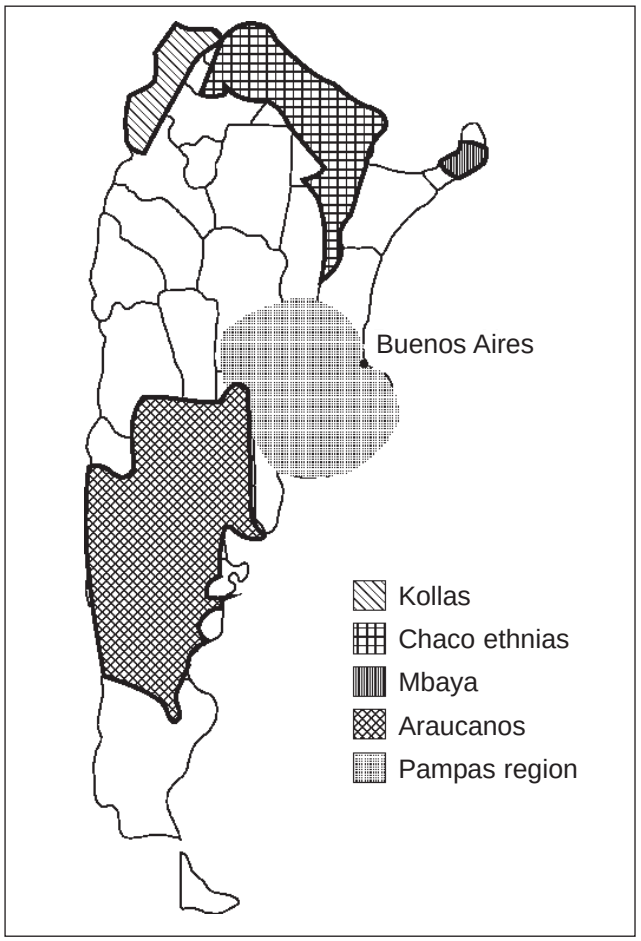

Figure 2. Map of the ethnic peoples of Argentina (adapted from IUCN 1994).

Only 35% of the 150 species used as medicinal plants in Bahia Blanca, in the southwest of the Pampas, are native (CAMBI et al. 1999, Table 1), and of the 29 species that are most sold in pharmacies and health stores 45% are native (CAMBI & HERMANN 2001, Table 1). However in Río Cuarto, at the northern limit of the region, eight of the ten species most commonly used as medicinal plants are native (BOCCO et al. 1997, Table 1).

Table 1. Use of medicinal plants in urban centres.

Source	City	Total	Native
CAMBI et al. 1999	Bahía Blanca	150	35%
CAMBI & HERMANN 2001	Bahía Blanca	29	45%
BOCCO et al. 1997	Río Cuarto	10	80%

Although there are many publications concerning medicinal plants we still do not know how many species are used in the country for this purpose. In one of the more reliable publications 602 native species are included (TOURSARKISSIAN 1980), however in another only 50 species are mentioned (SORARU & BANDONI 1978), whereas RATERA & RATERA (1980) included 161 native and exotic species (Table 2).

Available information about real threats to the conservation of these species is scarce, and it is often obtained indirectly from surveys carried out among users, opinions of local people, revision of herbaria, etc. (CAMBI & HERMANN 2001, CAMBI et al. 1999, HERMANN et al. 2001, LAGROTTERIA et al. 1986; NOHER DE HALAC et al. 1985). There are almost no demographic studies on the real state of populations of native medicinal plants.

The most serious problem in relation to over-harvesting of the resource, and the consequent impact on its conservation, appears to be massive collection for commercialization in urban centres (NOHER DE HALAC et al. 1985) rather than the effect that local use by indigenous groups would have on the plant populations.

Surprisingly, and in spite of the important economic activity that it could create, cultivation of medicinal plants is an enterprise that has not been well developed in Argentina. In one of the more important technical publications on this topic only three of the species mentioned are native (MILANO 1964).

Among the most pertinent aspects likely to be encountered in the conservation of these species the most obvious are:

- The botanical identification of these taxa is in general well defined, and so this does not cause a serious problem for conservationist action.
- The state of conservation of natural populations is little documented.
- The legislation concerning trade is insufficient.

Among the immediate actions that are necessary to insure the survival of these plants, and the opportunity to use them sustainably, the following should be mentioned:

- preparation of an up-to-date list of species used for medical purposes in the countries of the region;
- survey of the state of their conservation using the categories of threat;
- legislation concerning trade needs to be revised and its enforcement strengthened;
- development of methods of cultivation;
- publicity campaign to instruct the public about this issue;
- establishment of a national seed or germplasm bank.

Table 2. Number of plants cited as medicinal in Argentina.

Source	Number of species	Status
Soraru & Bandoni 1978	50	native
Lahitte et al. 1998	150	mostly native
Ratera & Ratera 1980	161	native and exotic
Toursarkissian 1980	602	native

In summary, the problems concerning the conservation of medicinal plants in the temperate region of South America are, in general, similar to those of the other plants. Perhaps popular appreciation of the value of these species could be used as a favorable factor to create awareness of the significance of biodiversity loss in the region. It is to be hoped that medicinal plants could become one of the "flagships" which are needed to attract the attention of the general public concerning the survival of plant species.

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Conservation of medicinal plants in an Emberá community of Panama: property rights and knowledge transmission

Catherine Potvin & Héctor Barrios

Background

With 38% of its landscape still covered by virgin forests and 13.8% of the inhabitants being indigenous, Panamá is a magnet for ethnobotanical work. Darién, the easternmost province of Panamá, is one of the most species rich regions of Latin America and one of the least populated areas of Central America. Darién hosts one of the two remaining frontier forests of Central America and is the physical junction between Central and South America. It is the homeland of three indigenous nations: the Emberá, the Wounaan and the Kuna. They depend upon many native plant species for building materials, food, medicine, and raw materials for household items and artesania, or traditional crafts. As the forests of Darién are being cleared for lumber and cash crops, more than biodiversity is lost; traditional knowledge evolved over hundreds of years is being eroded. Forest destruction threatens the unique life-style of indigenous people (Cansari 2001).

Our research project aims to work at promoting the conservation of Emberá medicinal plants as well as the traditional knowledge associated with these plants. Of all components of biological diversity, medicinal plants are attracting special attention. They represent an important and highly spiritual part of indigenous culture; they may provide sustainable and accessible health care for local populations, as well as cures for diseases, benefiting humankind in general. Medicinal plants have become increasingly visible in the debate surrounding the protection of biodiversity because of their possible high potential economic value. A debate has thus begun relative to just compensation for traditional knowledge, especially on medicinal plants (POSEY & DUTFIELD 1996). Rich knowledge of medicinal plants is still prolific in many regions of Darién (DUKE 1970, 1975, 1986). Currently TRAMIL researchers are examining the safety and efficacy of the most widely and commonly used remedies in the Caribbean, including Panamá. However, very little, if any, attention has been given to the conservation of medicinal plants and associated traditional knowledge.

Discourse on traditional medical knowledge is polarized over the question of intellectual property rights. Indigenous people tend to feel that the legal system and current laws are inefficient and inadequate at protecting their knowledge. There is a generalized fear that pharmaceutical companies might steel traditional medicinal knowledge. Amongst indigenous people, there is a general belief that these companies derive huge profits from medicinal plants without returning benefits to local communities. At the same time, indigenous leaders fear that, as traditional knowledge on medicinal plants is eroded, a central part of indigenous culture is being lost (ATENCIO LOPEZ, pers. com.).

The research project

Our work took place in the community of Ipetí-Emberá. Ipetí is a village located on the side of the Ipetí River near the foothills of Serrenia Maje, province of Panamá, in the biogeographical reagion of Darién. Ipetí is organized as an indigenous "Tierras colectivas" of 3,198 ha. The largely forested indigenous territory is embedded in a matrix of land used by colonists for cattle ranching. There are 50 houses in Ipetí and we estimate the population to be around 400 people. Most inhabitants of Ipetí speak Spanish with the exception of some older women; the younger generation tends to use Spanish rather than Emberá in daily activities. Three different strategies were adopted to develop, with the people of Ipetí, an understanding of their vision of property rights issues. In September 2000, a "think-tank" was formed of the traditional chiefs (Cacique and dirigente) as well as the three members of the local organization, OUDCIE (Organisacion para la Unidad y el Desarollo de la Comunidad de Ipetí-Emberá), and local traditional healers (botánicos). The group met 12 times over six months and discussed issues of property rights, transmission and compensation for traditional medical knowledge. Another discussion group was formed with women of the community to discuss the same issues. Membership of that second group was open, different women participated in each of the four meetings. Finally in Panamá, national legislation refers to intellectual property rights in the Constitution (1972), in the Civil Code and in the "Codigo Administrativo". There is also a Law (Law 15, August 8th 1994) on copyright and related rights and a bill on property rights of indigenous people is being studied by the assembly. We thus organized a two-day workshop on intellectual property rights in which three lawyers participated. The workshop took place in March 2002 and was attended by 35 members of the community.

At first the "think-tank" suggested that the only members of the community with traditional medical knowledge were the botánicos. But discussion with the women provided a more complete portrait of the current knowledge in Ipetí, one that is now recognized by all inhabitants of Ipetí. Medicinal plant knowledge can apparently be separated in three groups: (1) plants of common use, (2) specialized plants known to the botánicos, and (3) plants used by women only. The plants of common use are generally administered by the women and commonly grown near the houses. They are used to readily treat minor ailments.

Having established the three broad categories of medicinal plants, we examined the question of property rights. Specifically we were interested in two questions: (1) who are the "owners" of medicinal plant knowledge? and (2) who should be compensated for this knowledge? Table 1 suggests an absence of consensus among the different stakeholders of Ipetí regarding these questions.

Our research further documented an interesting situation regarding knowledge transmission. Knowledge includes species identification, collection, preparation, and treatment administration. The different "owners" of medicinal plant knowledge reported having different modes of transmission (Table 2). A complicating factor appears to be the fact that women with traditional knowledge of plants generally do not share this knowledge outside of their extended family. The fear of "poisoning" was voiced by many women. It explains why, normally, a woman would not seek help of someone outside her family.

Table 1. Opinions of different stakeholders in Ipetí regarding property rights and benefit sharing.

Informants	Knowledge owner	Compensation
Botánicos	Botánicos	Botánicos
Women group	Specialized diseases: Botánicos Common plants: all women	Specialized diseases: Botánicos Common plants: collective benefit sharing
Workshop	Collective property	Community and Botánicos to share benefit
Individual questionnaire	Botánicos (66%), collective property (12%)	Botánicos

Interestingly, the specialized knowledge of the botánico has a clear monetary value. There is a consensus in the community that this is the case. Women, for example, explained to us that botánicos are like specialized doctors. They argued that in as much as you pay a medical doctor, you should pay a botánico. The botánicos further explained that medicinal plants would loose their power if they were not bought. Discussions with elders suggest that, at least in the last three generations, there always had been some sort of compensation involved for traditional medical knowledge. Traditionally, payment could have been through trading (work, chicken, crops, etc.), while currently payment uses formal currency. The price attached to knowledge of medicinal plants appears to depend on the targeted disease. A standard price is US$ 50.00 per plant (Table 3). Plants used for rare ailments or diseases difficult to cure tend to be more expensive.

Table 2. Learning paths and knowledge transmission for different groups of traditional healers. The columns women (1) and (2) refer respectively to common plants and plants for female ailments.

	Botánico	Women (1)	Women (2)
Professors	Other botánicos	Anyone who knows	Another woman in the family
Learning	For payment	Free	Free
Teaching	For payment	Free	Only in the family
Curing	For payment	Free	Free

The last three diseases in Table 3 clearly have "magical" components. Only our four male informants shared prices with us. The female "botánica" never indicated that she had paid for her knowledge and therefore is excluded for the present table.

In Emberá communities, we observed that market economy is putting the transmission of medicinal plant knowledge in jeopardy. Local botánicos, who need money for a living, are not willing to transmit their knowledge for free (Table 3). At the same time, young people who might be interested in learning traditional medicine might not have the financial resources to compensate a botánico for training. Our project examined solutions to this crisis and developed strategies for capacity building in traditional medicine. The "think-tank" mentioned earlier formally assessed this aspect in their discussion. It was decided that the project would calculate the mean price for a disease, based on Table 3, and pay the botánicos and the botánica to teach to chosen members of the community. The price would be paid once, regardless of the number of students working with each botánico. The training program catered to six students in total, one of the botánicos having two students.

Our observations further suggest that the wider access to western health care might be one of the factors eroding traditional medicine. There clearly are economical issues at stake, since western medical care is free in Panamá. Conversely, besides selling the knowledge to their students, botánicos are also paid for their services, when they perform treatments. Western medicine thus provides a good affordable alternative to traditional healers. This issue is currently being discussed in Ipetí by the botánicos, the traditional chiefs and several community members. The discussion aims to find a way to allow the botánicos to cure community members at affordable costs. Discussions with women however highlighted the fact that, regardless of economics, villagers will turn either to western doctors or traditional healers depending on the type of ailment that they suffer (Table 4).

Biological information also constituted a component of the project on the conservation of Emberá medicinal plants. For this component, work was realized in collaboration with two students from McGill University, Renee Peñaloza and Adrienne Telford, in the context of a research course. They collected 131 different plant species of which 12 completely eluded identification while 12 others were only identified as per their family. We therefore have 97 plant species with good voucher specimens and confirmed identification. These include 29 plants known by women. For both plants of common knowledge and plants known by the botánicos, tree is the

Table 3. Variation in prices (US$) indicated by the four different male botánicos of Ipetí-Emberá in order to cure a range of diseases.

Diseases	Botánico 1	Botánico 2	Botánico 3	Botánico 4
Snake bite	125	100	60	100
Cold	n.a.	20	n.a.	20
Cancer	80	n.a.	60	100
Fracture	20	25	n.a.	n.a.
Toothache	5	5	50	20
Headache	5.50	10	50	n.a.
Rheumatism	25	15	60	n.a.
Hemorrhage	n.a.	15	60	20
Vagina bleeding	n.a.	n.a.	n.a.	50
Asthma	10	n.a.	n.a.	n.a.
Parasites	6	n.a.	n.a.	n.a.
Stop bleeding	3	n.a.	n.a.	n.a.
"Cojida del rastro"	80	50	50	n.a.
"Mal de vista"	6	n.a.	n.a.	n.a.
"Maleficio"	50	50	60	100

n.a. = not available (indicates that a given botánico does not cure this specific disease)

most common life form. Once species were identified, we examined the overlap in knowledge between botánicos using Jacquard's similarity coefficient. Shared species ranged between 37% and 23%, the highest similarity coefficient was found between one botánico and the botánica. They are father and daughter and she learned medicinal plants with him. The lowest overlap was between two botánicos who have never worked or studied together.

Conclusions

We believe that the vision that women brought to the project resulted in a more encompassing approach than originally planned. Instead of focussing only on the specialist knowledge of the botánicos, the participation of women allowed to open the project to a wider variety of plants and to reach a broader sector of the community. Together with the open discussion that took place in the workshop, meetings with the women confirmed that Emberá recognized that botánicos have, at least partially, individual property rights towards their knowledge of medicinal plants. This might stem from the peculiar economics of Emberá traditional medicine. It became clear to us that it would be a mistake to consider that all medicinal plants knowledge should be considered only under the concept of collective property rights. Our results suggest that legislation and compensation for medicinal plant knowledge should not proceed according to a dichotomous approach of individual vs. collective knowledge. All members of the community of Ipetí recognized at least some level of individual property rights to the botánicos. At the same time there is a consensus in the community that traditional medical knowledge is also a collective property. The reality pertaining to medicinal plant knowledge in Emberá community is clearly complex, and creative thinking will be necessary to resolve issues of property rights and benefit sharing in keeping with the perception of local people.

Acknowledgements

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Table 4. Preferred choice of therapists based on diseases as per discussion with the women group of Ipetí.

Disease	Botánico	Hospital
Cold	X	X
Cholera		X
Dehydration		X
Vaginal infection	X	
Headache	X	X
Snake bite	X	
Cancer	X	
"Maleficio"	X	

Personal communications

Atencio Lopez

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Understanding the medicinal plant trade in South America

Ximena Buitrón

South American cultures practice a variety of health traditions and religious rituals that depend on medicinal plants. These practices involve the harvest, export, import and re-export of raw material and products derived from many exotic and native species of medicinal plants. Traditional practices combined with a growing interest in natural products have increased the overall demand for and trade in medicinal plants. Unsustainable patterns of harvest and trade threaten natural populations of native species, and therefore also threaten local development and health care.

Medicinal plants are a global programme priority for the TRAFFIC International network (TRAFFIC International 2000), and a regional priority for the TRAFFIC programme in South America (TRAFFIC 2002). Support for TRAFFIC South America's work on the medicinal plant trade was provided by Government of Germany through the Bundesministerium für Wirtschaftliche Zusammenarbeit (BMZ). Working in Ecuador, Colombia, Peru, Bolivia, Brazil, and Venezuela, TRAFFIC's research and activities focused on support for more effective management of the trade in medicinal plants. Detailed market studies were developed in Ecuador and Colombia, while preliminary market surveys were conducted in Brazil, Peru, Bolivia, and Venezuela.

Ecuador

Work in Ecuador highlighted the importance of medicinal plants to healthcare and the environment, as well as the legal aspects of these issues, including access to genetic resources and benefit sharing. Market research identified species in trade, emphasizing those traded in the highest frequencies and volumes, and highlighting unsustainable levels of harvest and trade. Results indicated species of conservation concern and those requiring further research, as well as suggesting where conservation initiatives are needed. Control of harvest, raw material supply, and quality associated with the production of plant-based medicines were investigated. The study noted the need for an integrating approach among government ministries responsible for various aspects of health and environment related to medicinal plants.

The number of species found to be in common use is 228, and 125 species were found to be widely traded. An estimated 90% of medicinally-used plant materials are of wild origin. The study results, compiled in BUITRÓN (1999), were discussed in a national workshop convened by TRAFFIC, resulting in recommendations for further actions.

Colombia

TRAFFIC's research in Colombia was undertaken in collaboration with the national Ministry of Environment, focussing both on national laws related to environment and healthcare, and on a survey of the markets of Bogotá. In Bogotá, the capital city, open-air markets, natural products shops and laboratories were visited to document species and plant parts in trade and to estimate trade volumes and routes. The survey identified 100 to 240 plant species for sale in open-air markets, of which many were not included in the list of species approved by the government for medicinal use, and of which approximately half were native to the country. No system was in place to control sales.

The results of the case study "Medicinal Plant Trade in Bogotá City" (SALAMANCA 2000) were presented during a national workshop co-organized by TRAFFIC, The Ministry of Environment and Instituto von Humboldt. The workshop aimed to identify existing gaps and problems in the trade chain from harvest to export, and to identify priority actions to improve sustainable use and trade. The results and recommendation of these studies, and of the national workshop, are summarized in RIVERA, BUITRÓN & RODRIGUEZ (2000). This report has provided a basis for development of the national Action Plan for Medicinal Plants in Colombia.

Brazil

In Brazil, TRAFFIC engaged in a dialogue concerning the medicinal plant trade with Brazil's Institute of Environment and Renewable Natural Resources (IBAMA). As in other countries, research focused on medicinal plant species in trade, emphasizing those

subject to IBAMA's control and register systems. In contrast to other countries involved in the study, Brazil had measures in place to control and track medicinal plant exports. TRAFFIC's study identified gaps in the register system, and a lack of clear regulation of management. The need for better information about the major species in trade was identified, as well as the need to build links between IBAMA, other government and non-government agencies, and experts to facilitate development of integrated management responses for conservation concerns. These links will provide a foundation for more detailed studies and development of management plans for priority species. Information was compiled in a joint TRAFFIC and IBAMA report (SILVA, BUITRÓN, DE OLIVEIRA & MARTINS 2001), which provided the foundation for a medicinal plant database developed by IBAMA and promoted the creation of a Medicinal and Aromatic Plant Conservation Centre.

Peru

TRAFFIC's research in Peru focused on new regulations for the medicinal plants trade and on two of the most highly traded species, Cat's Claw *(Uncaria tomentosa)* and Dragon's Blood *(Croton lechleri)*. Emphasis was also placed on developing contacts and seeking information on existing processes that promote better trade and use of medicinal plant resources.

Venezuela and Bolivia

TRAFFIC's work in Venezuela and Bolivia focused on identifying research priorities, the main species in trade, and legislation related to harvest and trade controls. In both countries, this legislation is based in the Common Regime for Access to Genetic Resources of the Cartagena Agreement or Decision 391. In Venezuela, the project resulted in a preliminary list of the 50 most commonly used species among the more than 800 documented species used medicinally, a priority list of 20 species for research and conservation, and a list of the Amazonian and Andean regions that are most important for conservation as areas of origin of the species in greatest demand for trade (GUÁNCHEZ 2000).

In Bolivia 311 natural resources are approved through the Regulation for Natural, Traditional and Homeopathic Medicines. This Regulation was based on several sources, including the Colombian regulation, the British Pharmacopoeia, knowledge of Amazonian plants, knowledge of traditional medicine and in the Homoeopathic Pharmacopoeia, and experiences of different programmes of the region. The Bolivian Society of Traditional Medicine (SOBOMETRA) has 1600 members within the country and is allowed to store the most widely used medicinal plants (GIMÉNEZ TURBA 2001).

Achievements, obstacles, and opportunities

The TRAFFIC medicinal plants programme in South America has increased awareness of the threat to health and local development from overexploitation of medicinal plants, has increased awareness of the complex and inter-related issues surrounding the use of medicinal plants, and has contributed to a better understanding of the need for an integrated approach to achieving sustainable use, identification of priorities, actions and recommendations. Cross sector collaboration is ongoing in Ecuador and Colombia to develop criteria for identifying priority medicinal plant species meriting further study, and to undertake more detailed research. In Brazil IBAMA is initiating discussion with representatives of other agencies to address conservation concerns.

Unfortunately, there is still little known about the medicinal plant trade, the origin of many plant materials, their destination, the volume in trade, or whether these are used in a sustainable fashion. The medicinal plant trade is considered a marginal economic activity and is therefore given little importance in official statistics. It is documented as part of more general categories that include other resources and products, which makes it very difficult to identify individual species. Identification of plants is often not accurate, particularly where several different species are known by the same common name. This can also cause adulteration problems in the material in trade and in the final products. There are also problems with contradictory laws and regulations. Ongoing work is needed with authorities in charge of trade and harvest controls at local and regional levels to implement existing laws, regulations and control measures, as well as to work with industrial and market sectors.

There are opportunities to address these problems. Local and regional priorities for continuing work on the South American trade in medicinal plants have been identified through the TRAFFIC study:

- Field research on medicinal plant trade to determine the impact on natural populations, including species defined as priorities for research and conservation. The following criteria were used in Ecuador, Brazil and Venezuela:
  - species cited in several references in publications;
  - domestication (wild species: high priority);
  - distribution range (more restricted: high priority);
  - part of the plant used (when the harvest of part used threatens the plant: higher priority);
  - regeneration, ecology;
  - local and international demand and use;

- regions where the harvest is frequent.

- Support for the identified national priorities and local processes, follow up, assessment, funding;
- Promotion of the rational use of medicinal natural resources;
- Stronger national action plans or strategies;
- Scientific and market research with emphasis on the impact of trade in natural populations and conservation status on priority species;
- A systematic diagnosis of the related national and regional regulations;
- Stronger relations and work with related networks promoting collaboration and links.

TRAFFIC's way forward

TRAFFIC's work in Ecuador, Colombia and Brazil demonstrated the need for comprehensive national policies and programmes addressing the use of medicinal plant resources in the context of both conservation and development, including healthcare and quality control, influenced discussions and policy development to address measures for conservation and management of these resources.

TRAFFIC South America has been invited to participate in other local, regional and international initiatives such as the UNCTAD Biotrade Initiative, the Medicinal Plants Fair Trade Network RICOPLAM (as part of the RIPROFITO-CYTED Programme), WIEGO, and to assess different sectors in medicinal plant trade, legal, scientific and practical issues.

TRAFFIC continues to provide input to different processes and several organizations in various sectors not only in the countries where studies have already developed but also within Paraguay and Argentina, and other countries in the southern cone of South America.

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Meeting of the MPSG in Cartagena, Colombia

Danna J. Leaman & Sonia Lagos-Witte

Members of the MPSG attending the VIII Latin American Botanical Congress and II Colombian Congress of Botany, 13-18 October 2002, in Cartagena, Colombia, met in the afternoon of 18 October in a satellite session of the Congress. Members attending the meeting included Ximena Buitrón Cisneros, Edelmira Linares Mazari, Rafael Ocampo Sanchez, in addition to MPSG Chair Danna Leaman and Sonia Lagos-Witte, regional Vice-Chair. The meeting was open and was attended by more than 50 other Congress participants, including Carlos Villamil, Chair of the IUCN Temperate South American Plant Specialist Group.

Danna Leaman gave a presentation on the objectives and structure of the MPSG, emphasizing the reorganization of the group into regional sub-groups, and inviting discussion of three central questions. First, what are the regional priorities for medicinal plant conser-

vation? Second, what would be a meaningful role for the MPSG in Latin America? Third, what would be a sensible way of engaging with existing regional efforts relevant to medicinal plant conservation?

Priorities for the region include assessment of existing information on the conservation status of medicinal plants, and research directed toward sustainable use. The activities considered important included validation, valorization, and legalization of traditional remedies, cultivation of medicinal plants, and education concerning the importance of medicinal plants. The question was then posed: Are these actions sufficient for medicinal plant conservation? It was generally agreed that capacity building in conservation research methodologies is crucial in this region, and that building this capacity in association with an existing ethnobotanical research community will be an effective approach. Immediate research activities needed to identify conservation priorities include:

- market surveys (such as those undertaken by TRAFFIC South America in Ecuador, Colombia, and Brazil) (see article by X. BUITRON on page 18 in this issue);
- identification of conservation status of medicinal plants
- local conservation priorities based on traditional knowledge and practice; and
- species native to forests.

Based on discussion during this meeting and during the Congress, the current regional membership is being expanded to include a broader range of institutional and professional expertise needed to carry out these priorities and to work toward a regional strategy.

For Danna Leaman's address see imprint.

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Boldo (*Peumus boldus* Mol.) – Exploitation from the wild and domestication studies

Hermine Vogel

Botanical description and distribution

Boldo (*Peumus boldus* Mol., Monimiaceae) is a medicinal plant native and endemic to Chile, being the only species of the genus *Peumus*. It is an evergreen tree or shrub with several principal stems when exploited which regrow easily after cutting. Being a dioecious species, boldo flowers from July to September, during the southern hemispheric winter. The aromatic leaves are perennial, hard, green, hairy, and rolled up when exposed to sun, characteristics that adapt the species to the climatic conditions of its natural habitat (Figure 1).

Figure 1. Fresh Boldo leaves (Photo: H. VOGEL 2002).

Boldo grows naturally in Chile between the latitudes of about 30º to 41º S extending from 1,000 m above sea level in the Andes mountain chain down to the Pacific coast from 34° latitude southward. However, in the northern part of its habitat it is not found in mountain areas. Boldo is distributed mainly over the Mediterranean climate zones of Chile, with hot, dry summers and cold, rainy winters. It resists light frost periods, but temperatures below zero damage principally the flowers and exposed, young shoots. Boldo is mostly found in sclerophytic or hardleaf vegetation areas classified as Lithraeo-Cryptocaryetea (OBERDORFER 1960). GRAU & ZIZKA (1992) suppose that this vegetation form is quite ancient, and that boldo in combination with *Lithrea* indicates that the actual vegetation form is a relic of former boldo-woods that suffered severe transformations by human intervention. Actually, the extensive space between the woody plants is covered by herbs and geophytes, which only show active growth during the rainy season. These areas are highly exposed to erosion. DEL FIERRO & RIVERA (2001) indicate that sclerophytic vegetation covers about 350,000 ha in central Chile. They classify boldo as a species in vulnerable conservation state, being in danger of extinction in some zones of its natural habitat.

Besides the social and medicinal benefits of boldo for the Chilean population, this species also contributes to the environmental stability by maintaining the vegetal cover in its natural habitat, protecting soils against erosion, and providing soil with organic matter to improve water conservation (HOMANN & MATTE 1967).

Medicinal use

Boldo, described in several Pharmacopoeias, was widely used among the Chilean indigenous people long before the arrival of the Spanish conquerors. Medicinal use of boldo leaves was already indicated at the end of the 19th century for indigestion, liver problems, and rheumatism (PABST 1887, MURILLO 1889, REICHE 1901). MONTES & WILKOMIRSKY (1988) emphasize the choleretic and cholagogue properties of boldo with sedative effects. Boldo is still widely used among the Chilean population, with an estimated consumption of leaves at about 30 tons per year (ROACH 2001).

As active principals alkaloids (boldine), essential oils with the main compound ascaridole, and flavonoids are reported (MONTES & WILKOMIRSKY 1988, MUÑOZ et al. 2001). Recently, powerful antioxidant properties of boldo extracts have been proven (MUÑOZ et al. 2001; SCHMEDA-HIRSCHMANN et al. 2003).

Export

The annual export of the last five years has reached about 1,500 t of dried leaves and, in small amounts, boldo bark. The main destinations are Latin-American countries, especially Brazil and Argentina, which all together consume more than 80% of the total production. About 18% is exported to European countries, mainly France and Germany. The low prices attract attention: one kilogram of dried boldo leaves costs only 0.20 US$ at the collection site (ROACH 2001) and 0.55 to 0.70 US$ at the Chilean ports, an amount that does not even cover fair labour payment for its collection, as one man hour costs at least 0.75 to 0.85 US$.

Traditional exploitation of wild boldo

Because of its medicinal properties wild boldo has been exploited for several decades. Until now wild collection is the only source of boldo leaves. Leaves are harvested by cutting the woody shoots at about 25 cm from the tree base, selecting, piling up, shaking off, and carrying the product to the collection point. Then leaves are selected, weighed, and packed (Figure 2).

Boldo exploitation has been regulated by the Chilean law (D.S.N° 366, 1944) permitting the extraction of trees from April to July, and cutting and exploiting leaves between December and March every year. It is not allowed to cut trees growing near natural water sources. To exploit boldo that form part of a forest, it is necessary to submit a management programme according to the Chilean Forest Law N° 4,363 of 1931.

The harvest product in the wild collection of boldo is principally composed of the stem, 51.6 %, and the branches 34.8 % (TORAL et al. 1988), which are the part of the plant that are used commercially only in some cases for local charcoal production. The bark represents 4.1 % of the total harvest and is a small portion of the exports destined for boldine extraction.

Figure 2. Boldo cut at the tree base (Photo: VOGEL 2003).

The leaves are the main commercial product with only 9.5 % of the total yield. According to TORAL et al. (1988) dry leaf yield per wild plant ranges from about 0.6 to 1.0 kg. To produce the 1,500 t of dried leaves that are exported yearly it would be necessary to exploit between 3,500 and 60,000 hectares of native forests with population densities between 440 and 40 individuals per hectare, respectively. Depending on the frequency of harvest the total affected area is even more extensive, as each tree can be exploited only every four or five years.

As boldo regenerates easily when cut, the wild existence of this species is maintained even though it is considerably exploited. Nevertheless, the natural resources do not rejuvenate as young plants are rarely found in the natural habitat. A combination of circumstances, such as difficulties in seed germination and rooting, the very arid environmental conditions, and overgrazing of the natural habitat may explain this fact.

To assure long term-production of boldo HOMANN & MATTE (1967) proposed cutting the stems near the ground leaving four or more principal stems per plant, leaving a minimum of five years between one exploitation and the next, and prohibiting boldo exploitation in areas exposed to erosion.

Domestication studies and cultivation

Besides the ecological problems, the wild collection of medicinal plants generally involves several disadvantages, such as heterogeneity of the raw material, problems of taxonomic identification, uncontrolled contamination, and unsustainability of the production. Looking for the production of high quality leaves without damaging the wild populations we

started to study boldo with the aim of cultivation.

Germination of the hard seed may take from several months up to years obtaining very low germination rates of about 2 % without any treatment. The application of gibberellic acid improves germination considerably, reaching percentages of over 50 % in about three months. It is also very difficult to propagate boldo vegetatively. The cuttings survive for more than one year in the nursery, but only very juvenile plant material roots (VOGEL et al. 1998). As a two-year-old plant produces only a few cuttings, propagation of boldo by seeds is recommended.

Young plants show very good survival rates in the nursery when protected from rodents. They can be transplanted to the field when about one year old. Independent of the age, boldo does not show any aerial growth after transplanting during the first year. But once established the plant can be harvested from the end of the second year on by cutting the shoots at about 20 cm from the ground. After four years plants that were harvested first at the age of two or three show similar annual leaf yields to unharvested plants with about 65-80 g dry matter per plant. This shows the excellent ability of boldo for recovering biomass that permits the exploitation of young, cultivated plants. When comparing the annual yields per plant with those of adult, wild trees, leaf production of the latter is only twice or three times higher, 150 to 250 g dry leaves when harvesting every four years, despite the great differences of plant size.

TORAL et al. (1988) found in wild boldo trees from ages 9 to 128 years that the most vigorous growth in height takes place up to the age of 10 years. After that growing rates decrease until stabilizing at about 90 years. They recommend first harvest of wild boldo at the age of 33 years. For cultivated boldo, we propose taking advantage of the capacity to develop during the first years maintaining the plants in active growth.

The low growing rates of boldo prompted us to study a high-density cultivation with the aim of harvesting the plants every year by cutting them near the ground. Best leaf yields per plant were obtained in the plantation of 1.4 plants per square meter, with about 90 to 120 g dry leaves per plant yearly. Leaf yield per area increases with plant density, reaching between 0.6 and 11 g/m^2 yearly in the wild habitat, whereas cultivated boldo plants produce from 90 up to 500 g of dry leaves/m^2, values obtained with 1.4 and 16 plants/m^2, respectively.

As boldo is well adapted to dry climatic conditions, irrigation intensity in the plantation was studied during two seasons. The good adaptation of boldo to arid conditions was confirmed as no differences between treatments (20 and 65% field capacity) could be found for leaf yield, height of the plants, relation of leaf weight to total aerial weight, and alkaloid content in the leaves. Only the essential oil concentration proved to be higher in better-irrigated plants.

In the natural habitat boldo is found both as single individuals and in forests. Although in wild trees we observed higher alkaloid and essential oil concentrations in leaves grown under shade compared with those exposed to full sun light (VOGEL et al. 1996), these results could not be confirmed in cultivated plants growing under different light conditions (SCHNEEBERGER 2001; ACEVEDO 2003). This indicates that boldo can be cultivated both as a monoculture as well as by being inserted in forests.

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Regional File

Conservation and sustainable use of medicinal plants in Bulgaria

Liuba Evstatieva & Rayna Hardalova

People of Bulgaria often used medicinal plants not only as an alternative to the expensive and lacking medicine, but also for trade. The herb products rely to a large degree on wild-collection.

Substantial political and social-economical changes have been observed during the last 13 years in the Republic of Bulgaria. Many private companies for buying and processing of herbs have been established, a land reform has pursued the restitution of the land possession to the owners. It affected seriously the trade and the nature protection measures handling medicinal plants. The trade in herbs increased by some 80% related to 1990, the annual export reached 15,000 t (referred to 1997 and 1998). Thus, Bulgaria has become the biggest exporter of herbs in Europe for that period (LANGE 1998, 2002).

At present time, Bulgaria is trading medicinal plants to more than 40 countries around the world. Most exports of medicinal plants from Bulgaria are destined to Germany (more than 50%), followed by Spain, Italy, France, Austria, and the USA (Table 1). In the other 35 countries the trade quantity is among 8-14%.

More than 200 medicinal drugs of more than 150 medicinal plant species are exported every year. Only a limited number of species constitutes the bulk of exported herbs and also many of them are cultivated. Basically, around 10-15 species are of primary interest for the international markets, which make up around 65% of the quantities declared for export (Table 2) (usually, the declared export quantities are higher than the real exports. However, due to only one common batch number for most of the herbs in the Bulgarian trade statistics there are no exact numbers available for the real exports). Bulgaria is aiming to keep its position on the international markets by improving the quality of exported drugs.

A change of the standards for quality of the organic herbs is foreseen by the full adoption of International Standards ISO 9000 for medicinal plants and species, 1991-1995. The introduction of organic agriculture for cultivation of medicinal plants will bring ecologically sound production.

The measures undertaken by the government will allow exports to the international market of high quality biological products of medicinal plants meeting the international standards.

Not less than 75-80% of medicinal plant material in trade is obtained from wild stock (HARDALOVA 1997, HARDALOVA et al. 1998). As a result of the over-exploitation and destructive harvesting techniques there is a big threat for the biodiversity and for the wild medicinal plants populations.

Many plant species are endangered or have even become extinct. There is a high risk of destroying the natural resources of economically valuable plants, if they are not managed properly according to the principles of sustainable long term use.

The Medicinal Plants Act (2000) regulates the management of the activities for conservation and sustainable use of medicinal plants, including their collection and marketing. In accordance with this Act an estimation of the resources of medicinal plants must

Table 1. Import quantities of medicinal and aromatic plant material from Bulgaria to the six most important countries from 1996-1998 and 2001. Figures for 1999 and 2000 are not available. Source: Bulgarian Ministry of Environment and Water.

No.	1996		1997		1998		2001		Average	
	Country	**%**	**Country**	**%**	**Country**	**%**	**Country**	**%**	**Country**	**%**
1	Germany	68	Germany	50	Germany	56	Germany	46	**Germany**	**55**
2	Spain	8	Italy	11	Spain	13	Spain	17	**Spain**	**12**
3	Italy	4	Spain	10	Austria	8	Italy	11	**Italy**	**7**
4	France	4	France	8	France	4	France	9	**France**	**6.25**
5	Austria	3	Austria	3	USA	4	Macedonia	5	**Austria**	**3.75**
6	Netherlands	2	USA	3	Swiss	4	Greece	4	**USA**	**2.67**
7	USA	1			Italy	2	Austria	1		
	Total	90		85		91		93		**89,75**

be accomplished depending on the industry resources and in relation to the quantity harvested (see Table 3, groups III, IV and V). Such estimation is being done in the frame of the Management Plans of the Rila and Central Balkan National Parks as well as of the Rila Monastery Nature Park.

These parks cover considerable areas of thousands of hectares including both forest and open land territories – representative ecosystems of forests, meadows and pastures, which have been traditionally used by the local people for logging, agriculture, stock-breading, etc. The restrictions imposed by the national parks regime affect directly or indirectly the economic activities providing for the livelihood of the people in the region. This causes tension and conflicts with the local people and pushes nature conservation into the background.

For preventing or minimizing these conflicts it is either necessary to propose activities alternative to the existing ones or to determine the framework of the permissible use of natural resources in the national park territories. This will give the opportunity to consider the local people's interests and to combine them with the principles and standards for conservation of the environmental quality, biological diversity and the ecological balance.

This applies especially to the period of socio-economic difficulties our country goes through, because for the people living in the small villages around national parks the mountains and nature are the only sources of income after closing the state enterprises.

In the last years profound scientific investigations were made in these protected areas in terms of their biodiversity, population status and natural resources. The studies show that most of medicinal plants used in the country (about 65-70%) are distributed in the Parks and are subject to harvesting as herbs and fruits. The plants are classified into five groups on the basis of their conservation status, resources of natural habitats and possibility of collecting. Groups I and II include about 15% of species, which are of conservation concern, groups III and IV include about 30% of species that have very good and good utilisation resources and group V (65%) with distinct distribution

Table 2. Export figures for the 11 most exported medicinal and aromatic plant species from Bulgaria. The figures shown indicate export quantities declared for export with certificate. Figures for 1999 and 2000 are not available. Source: Ministry of Environment and Water.

No.	Medicinal plant species	Drug	Volume (tonnes)					% of average total declared export
			1996	1997	1998	2001	Average	
1	*Mentha piperita*	folia	3600	3100	2300	1970	2743	10.4
2	*Hypericum perforatum*	herba	1400	5000	10400	340	4285	16.3
3	*Rosa canina*	fructus	1000	2400	1900	1500	1700	6.5
4	*Coryandrum sativum*	semen	600	1400	1300	2900	1550	5.9
5	*Tilia sp.*	flos	1800	1600	1200	1200	1450	5.5
6	*Prunus spinosa*	fructus	1400	1200	1600	142	1086	4.1
7	*Aesculus hippocastanum*	semen	700	1700	1300	618	1080	4.1
8	*Sambucus ebulus*	fructus	700	1400	1100	650	963	3.7
9	*Urtica dioica*	folia	1000	900	1200	600	925	3.5
10	*Crataegus monogyna*	flos	700	800	900	710	778	3.0
11	*Silybum marianum*	semen	1300	1000	200	150	663	2.5
	Total of top 11		14200	20500	23400	10780	17220	65.6
	Total declared export		18500	29400	31600	25500	26250	100.0
	Total **real** export vols.		**10800**	**13800**	**15500**	**11500**	**12900**	49.1

Table 3. Status of some important medicinal plants in national and nature parks. Source: EVSTATIEVA & HARDALOVA (2000), EVSTATIEVA & VITKOVA (2000), VITKOVA & EVSTATIEVA (2000), EVSTATIEVA (2003).

Medicinal plant species	**Central Balkan** National Park	**Rila** National Park	**Rila Monastery** Nature Park
Group I – Protected by the Biodiversity Protection Act (total protection)			
Alchemilla mollis	+		
Aquilegia vulgaris		+	+
Drosera rotundifolia	+	+	
Galanthus nivalis	+	+	
Gentiana lutea	+	+	+
Gentiana punctata	+	+	+
Menyanthes trifoliata	+	+	
Pulsatilla vernalis			+
Rheum rhaponticum			+
Rhodiola rosea	+		+
Taxus baccata			+
Group II – Under special regime of protection and use (including prohibition for commercial use in the national parks)			
Alchemilla vulgaris complex	+	+	+
Angelica pancicii	+	+	+
Arctostaphylos uva-ursi	+	+	+
Asplenium trichomanes	+	+	+
Atropa belladonna	+	+	+
Betonica officinalis	+	+	+
Carlina acanthifolia	+	+	
Cetraria islandica	+	+	+
Galium odoratum	+	+	+
Huperzia selago	+	+	+
Lycopodium clavatum	+	+	+
Primula veris	+	+	+
Sedum acre	+	+	+
Valeriana officinalis	+	+	+
Group III – With good exploitation resources (controlled use)			
Hieracium pilosella	+		
Hypericum perforatum	+	+	+
Rumex alpinus	+	+	+
Thymus sp.	+	+	+
Juniperus sibirica	+	+	+
Vaccinium myrtillus	+	+	+
Vaccinium vitis-idaea	+	+	
Urtica dioica	+	+	+
Rubus idaeus	+	+	+
Veratrum lobelianum	+	+	+
Pteridium aquilinum	+	+	+
Group IV – species with dense populations but limited distribution and resources			
Achillea millefolium	+	+	+
Corylus avellana	+	+	+
Euphrasia officinalis		+	+
Galium odoratum	+	+	+
Galium verum	+	+	+
Geranium macrorhizum		+	+

continued...

Table 3. (...continued)

Medicinal plant species	**Central Balkan** National Park	**Rila** National Park	**Rila Monastery** Nature Park
Geranium sanguineum	+	+	+
Mentha spicata	+	+	
Origanum vulgare	+	+	+
Plantago lanceolata	+	+	+
Plantago major	+	+	+
Rosa canina	+	+	+
Rubus caesius	+	+	+
Sambucus ebulus	+	+	+
Sambucus nigra	+	+	+
Solidago virgaurea	+	+	+
Tanacetum vulgare	+	+	+
Teucrium chamaedrys	+	+	+
Tussilago farfara	+	+	+
Verbascum longifolium			
Veronica officinalis			
Group V – species scarcely spread, with single populations with small areas and limited resources (= with no economic importance)			
Agrimonia eupatoria	+	+	+
Angelica sylvestris	+	+	+
Arctium lappa	+	+	+
Artemisia vulgaris	+	+	+
Astragalus glycyphyllos	+	+	+
Caltha palustris	+	+	+
Centaurium erythraea	+	+	+
Chenopodium bonus-henricus	+	+	+
Clematis vitalba	+	+	+
Colchicum autumnale	+	+	+
Digitalis lanata	+	+	+
Dryopteris filix-mas	+	+	+
Filipendula ulmaria	+	+	+
Filipendula vulgaris	+	+	+
Galeopsis tetrahit	+	+	+
Galium odoratum	+	+	+
Galium verum	+	+	+
Gentiana asclepiadea	+	+	+
Gentiana crucieta	+	+	+
Geum urbanum	+	+	+
Heracleum sibiricum	+	+	+
Linaria vulgaris	+	+	+
Polypodium vulgare	+	+	+
Polygala major	+	+	+
Polygonum aviculare	+	+	+
Potentilla erecta	+	+	+
Sanguisorba officinalis	+	+	+
Scrophularia nodosa	+	+	+
Taraxacum officinale	+	+	+
Veronica officinalis	+	+	+
Viola odorata	+	+	+
Viola tricolor	+	+	+

+ = presence of resources

and no economic importance (Table 3). The diversity of threatened and economically important medicinal plants and fruits with their resources is characteristic for the national parks and some nature parks. Area, annual estimated and permitted production are published for the territory of Central Balkan National Park (EVSTATIEVA & HARDALOVA 2000, EVSTATIEVA & VITKOVA 2000), Rila National Park (VITKOVA & EVSTATIEVA 2000), and Rila Monastery Nature Park (EVSTATIEVA 2003, EVSTATIEVA et al. 2003). Our studies proved that in alpine and subalpine belts the protected medicinal plants prevail (Table 3). Their biological resources are smaller and threatened by extinction. In the forests, a large diversity of economically important medicinal plant populations covers considerable areas which can be used by sustainable collection. Recommendations for conservation and sustainable utilisation of medicinal plants are made (EVSTATIEVA 2003, EVSTATIEVA et al. 2003).

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Management priorities amongst the harvested medicinal plants of Myohyang Mountains Protected Area, DPR Korea

Tom Evans, Ro Jong Sam[1] & William Duckworth

Introduction

Myohyang Mountains Protected Area (PA) lies mainly within North Pyongan province, with overlap into South Pyongan and Chagan Provinces, central DPR Korea. It covers 240 km^2, of which 170 km^2 is designated as 'nature reserve' and the remainder as 'nature park'. It was established in 1954 and is the oldest protected area in the country.

The government of DPR Korea is strengthening ecological and biodiversity conservation measures at the national level. As part of this process, Myohyang PA's national and indeed international importance as a site for biodiversity conservation is receiving priority recognition. Management aims and practices are being restructured so that the area will accord with IUCN criteria for a Category II Protected Area ("National Park"). This restructuring is taking place through a major joint project between the government and several international organisations (see Acknowledgements for details).

One key aim of this process is to manage medicinal plant harvests so that long-term biodiversity values are not harmed, while simultaneously maximising immediate benefits to the surrounding human communities. A team of national staff is working on this

[1] = abbreviated in text as RJS

issue, with outside technical assistance (EVANS 2001, 2002). This paper reports on some aspects of this process and in doing so also presents new data both on harvesting practices in DPR Korea and on the status and use of some poorly known East Asian species.

Site description

The PA lies at 70-1900 m altitude at the edge of a mountain range abutting the northeastern end of the Korean lowlands (centred on approximately 39° 14' N 126° 00' E), at the transition between the northern and southern temperate forests of Korea. Due to the prevailing westerly winds it receives over 1300 mm of rain *per annum*, compared with 1000-1200 mm over most of Korea; most falls within May-September. Snow usually lies for several months during the winter.

The terrain is mostly very steep and is almost entirely covered in extensive tracts of undegraded forest. However, the small areas of flat lowland habitat in the valley bottoms have been largely cleared and this habitat has also apparently disappeared from surrounding areas outside the PA. Tree species dominant in one or more forest types in the PA include *Quercus mongolica, Betula schmidtii, Betula ermani, Pinus densiflora, Abies nephrolepis,* and *Picea jezoensis.* The craggy, exposed main peaks support small areas of dwarfed alpine vegetation but there is no true treeline. The PA is isolated from other natural habitats except to the northeast, where forest stretches along the mountain spine to Mount Rangrim Nature Reserve, 150-200 km away.

The PA supports a large flora (approximately 1070 species recorded to date) and has been visited by many botanists. The Korean Peninsula is a centre of plant endemism (WANG et al. 1995) and the PA is known to support at least 21 of the 339 Korean endemic species. One of these, *Saussurea myokoensis* Kitamura, is only known from Myohyang.

Few socio-economic data are available. The PA lies very close to the county town of Hyangsan and borders extensive lowland areas with a fairly large population. These communities are known to use the PA extensively for collecting firewood, edible and medicinal plants and other products, but the levels and patterns of use are under investigation. The volume of harvested edible plants is probably large – for example, in season hundreds of people collecting acorns (*Quercus* spp.) are sometimes thought to be in the reserve at one time (authors' pers. obs.). An estimated 400,000 tourists visit the PA each year, mainly on group excursions. A network of well-maintained trails leads from a road in central valley to viewpoints and a series of ancient forest temples.

Harvesting regimes

Medicinal plant harvests in the PA can be classed as 'official' or 'unofficial'. The county Koryo Medicinal Plant Resources Management Unit (MPMU) conducts 'official' collection since it is ultimately responsible for supplying raw materials to the Ministry of Health for drug production. They receive annual collection targets for a wide variety of species which are then sourced from plantations or from the wild, using a mixture of full-time MPMU collectors and local freelance collectors. Records of total recorded harvests from the district covering the central part of the PA during 1998-2002 are presented in the Appendix. It was not possible to clarify the precise area over which these harvests were collected. The majority probably come from the Hyangam-ri sector of the PA but some harvests from other sectors, or even from outside the PA, may also be included. Data before 1998 were not supplied, apparently because harvests were generally much lower than since economic conditions were more favourable to the production of synthetic pharmaceuticals. Although central-level legislation prohibits extractive use of natural resources from PAs of the class of Myohyang, the official harvests from the PA appear to have been treated as effectively legal for a number of years up to 2002. It is reported that during 2002 the MPMU was discouraged from harvesting inside the PA, pending development of a new zonation system (see below).

There is also extensive 'unofficial' harvesting conducted by local residents. This is said to be partly for family use, partly for sale to local physicians/pharmacists and partly to supply trade over longer distances. There is some overlap with the official harvest (see above). No quantitative data exist but local government staff have considerable anecdotal knowledge of this type of harvest. Unofficial harvesting is generally considered to be illegal within the PA, and these collectors may have their loads confiscated if caught by PA rangers.

Opportunistic collection by tourists is likely to occur but has not been considered a major issue since most only have access to a small proportion of the PA.

Review of conservation priorities

Over 500 plant species in the PA are known to have some medicinal value (IM LOK-ZO 1998). Around 100 of these are believed to experience significant harvests (RJS pers. obs., CHO CHUN GIL, pers. comm.), but in many cases the harvest is not thought to be detrimental. To identify the most urgent management needs a prioritisation exercise was conducted during 2001-2002. RJS led this process after developing the method in conjunction with the other two authors.

Table 1. Types of data used to assess a species' priority for action.	
Class of data	**Examples**
Threat status	Global threat: WALTER & GILLETT (1998) or, for trees, OLDFIELD et al. (1998) National threat: as listed by PLANT PROTECTION SOCIETY (2000)
Characteristics of the harvest	Size of market (local/national/international) Declines in availability observed by local collectors Unavailability, inferred from substitution with inferior products in trade Number of different significant uses, and other notes.
Quantitative records of collection or confiscation	Graphed in relation to year, known targets and known harvest ceilings. Where possible, consideration given to confounding factors such as changing effort, shifting harvest areas etc. Opinions also gathered on relative size of unofficial harvest.
Ecological indicators	Life form, perennial vs annual habit Organ harvested (e.g. root, bark, fruit, leaf), and ability to regrow Preferred habitat and successional stage Rarity (altitudinal range, abundance of habitat, abundance within habitat)

Data analysis was done in collaboration with the head of the county MPMU and with input from various other interested parties. This consensus approach was intended to reduce the subjectivity of the outcome and increase its acceptability to decision makers. First a list of candidate species believed to be harvested in significant quantities was compiled from the MPMU's harvest records and from other sources relevant to the PA (see EVANS 2001, 2002 for details). Then each was subjectively assigned to one of five categories of priority for action. The rate of population decline relative to population size determined the degree of threat. Declines were considered more worrying amongst species for which the population in the PA had greater national significance. Since direct, relevant survey information was lacking for all species, indirect indicators had to be used to estimate declines and population sizes.

A datasheet was designed to collate the four types of indicators that were available for each species (see Table 1). The ecological and harvest indicators were largely based on CUNNINGHAM (2001) and PETERS (1994). They had to be derived intuitively since no robust, empirically-validated system of indicators for this purpose has been published. Further discussion of the method, in particular the many pitfalls in use of official harvest records, can be found in EVANS (2001).

The results of the review are tabulated in the Appendix and summarised in Table 2.

In total 34 harvested medicinal species and 18 non-harvested species were considered priorities for action, with 10 and 5 respectively in the highest category. Many additional non-harvested species and species harvested for other purposes are present, but were not assessed in this exercise. A large proportion (59/93) of the species with significant medicinal harvests was not considered to be at significant risk in the PA. This appears reassuring, but needs to be treated cautiously since the data for these assessments were relatively sparse and subjective – additional data may well show that some of these species do require conservation action.

Table 2. Numbers of species from the PA in different classes of priority for action.

Priority Class	Species with significant medicinal harvest	Species with no significant harvest
1 (highest)	10	5
2	13	5
3	11	8
0 (no concern)	59	4
Insufficient data	0	10
Total	93	32

Harvesting is believed to be the principal threat to most harvested plant species; other threats are not so far known to be serious problems, although this may partly be due to incomplete data. The balance of official:unofficial collection appears to vary according to the species, although data on unofficial collection are very poor. As noted above, MPMU harvesting in the PA has reportedly been suspended, awaiting new regulations. The MPMU is developing cultivated sources for some species and can obtain others from forests outside the PA, but a list of 11 species has been proposed for which the PA is the only potential source in the county for the foreseeable future (see Appendix

– species printed in bold). All are in priority classes 1-3, and so require careful management if harvests are to continue. It is intended to halt unofficial harvests in the PA of most or all species, but so far there are no data on the ability of local communities to find alternative sources of essential medicinal plants.

Proposed management and monitoring regime

The principal mechanism for management is expected to be a zonation system, which will also have to take account of needs for wildlife conservation, tourism and the supply of plants for medicine, food and firewood. The system will include one or more large Totally Protected Zones (TPZs) where no harvesting will be allowed, probably covering >65% of the total area, and one or more Controlled Use Zones (CUZs). Here managed harvests will take place over the medium term, with the aim of eventually phasing them out. In principle, IUCN Category II protected areas do not involve extractive use (www.unep-wcmc.org/protected_areas/categories/, viewed 4.6.2004), but in Myohyang as in many other places, a time period for adaptation towards this stringent standard is needed.

Design of the zones is currently underway. Ideally, the exact distributions of plant and animal species would be used in this process but these cannot be determined with the time and resources available. Therefore, the internal zone boundaries will be proposed based on the knowledge of local specialists, open to modification following initial surveys and perhaps again after a few years of operational experience. The TPZs will be designed to contain the full range of habitats and altitudes, with an emphasis on the scarce and vulnerable lowland habitats. Boundaries with the CUZs will be carefully considered to make policing as easy as possible. There will probably be several CUZs, to ensure that each administrative unit around the PA has some access to resources, and these will have to cover a range of altitudes since the desired species include both highland and lowland species.

It is proposed to make initial foot surveys of both the CUZs and TPZs at the appropriate season to ensure that substantial quantities of the target species occur in each. It seems unlikely that biometrically reliable density surveys can be conducted, given the likely cost and the added constraints that neither gridded maps nor GPS units are available. This will make it necessary to be very cautious in setting initial quotas. The simplest conservative approach is likely to be to estimate the average official harvest per km^2 of suitable habitat during 1998-2000, to reduce this by a factor of 25-75% (depending on the perceived degree of overharvesting for each species during that period) and then to apply this rate to the area of suitable habitat in each CUZ. These estimates will provide a starting place for refining the harvest levels by trial and error, based on the results of annual monitoring. Suggestions for monitoring have been made by EVANS (2002): again, biometrically rigorous surveys will be the exception due to budgetary constraints although some may be attempted. EVANS & VIENGKHAM (2001) have recently highlighted the costliness of surveys precise enough to have high power to detect declines in harvested wild plants. An approach such as that outlined by PILZ & MOLINA (2002) or IHALAINEN et al. (2002) might be an eventual goal but initial steps need to follow less data-hungry approaches with no reliance on volunteer surveyors or elaborate data analysis. The difficulties experienced in identifying useful yet affordable monitoring tools echo those described by DANIELSEN et al. (2000); our proposals closely resemble some of theirs. A key method is likely to involve training PA rangers to record their observations of the key medicinal plant species, both during general patrolling work and, more rigorously, during repeated visits to a preselected list of monitoring sites. In addition, further searches by botanists will be aimed at locating colonies of the rarest species.

Notes on some species of interest

Given the great scarcity of published information on the conservation status of plants in DPR Korea, the following observations on particular species are likely to be of some interest. However, the names should be treated with caution since they are not supported by voucher specimens available to researchers outside DPR Korea. Many key data sources for this review used written records presented as Korean common names or Korean specialist medicinal ones. These have been converted to scientific names using standard texts (LI CHONG-O 1964, IM LOK-ZO 1998), but this process can lead to errors (BERLIN 1992, CUNNINGHAM 2001), in part due to mismatches between the species concepts used by rural people, traditional medical practitioners and botanists.

Table 3 gives information relevant to the global threat status on those species reviewed (following the process outlined in this paper) that are either globally threatened, threatened in China, or endemic to the PA. An in depth review of the global status of these species is beyond the scope of this paper, but these comments can contribute to such a process and where a reconsideration is strongly indicated by the data given, this is shown.

Five other species are considered top priority for action in the PA but are not listed as threatened globally or in China (Table 4). Some of them seem likely to be under high harvesting pressure in many parts of their ranges

Table 3. Data relevant to the global threat status of species reviewed during the current study that are globally threatened, threatened in China or endemic to the PA (for notes on column headings, see Appendix notes [2, 3, 4, 5]).

	Global threat[2]	Chinese threat[3]	National threat[4]	PA threat[5]	Comments relevant to global threat category. (Chinese data from FU 1992)
Astragalus membranaceus	*	VU	3	1	Significant harvests are not reported in the PA, but the population is small and vulnerable. The main population is in the Mount Paektu protected area. Most, if not all demand in DPRK is met from cultivation. Massive over-harvesting is (or at least, was) a problem in China.
Eleutherococcus (= *Acanthopanax*) *senticosus*	*	VU		1 [h]	Very rare in PA, usually at 800-1500 m. Sometimes handled by MPMU in small quantities. Quite widespread in north half of DPRK. Drastically reduced in its limited range in NE China.
Gastrodia elata		VU	1	1 [h]	Very rare in PA and has declined. Opportunistically collected by the few people knowing of its value. Widespread but very rare throughout DPRK. Widespread in China and beyond, often cultivated, trade in wild plants continues to cause declines.
Magnolia sieboldii		VU	0	3	As a national flower it has strong legal protection in DPRK. Found on nearly all DPRK mountains except in Ryanggang Province. Quite widespread in China, threatened by forest clearance.
Oplopanax (= Echinopanax) *elatus*	R*	VU	3	1 [h]	Very rare in PA, invariably above 1500 m. It is a 'treelet' and so it is not clear if its international status was re-evaluated by OLDFIELD et al. (1998) or not. Restricted to DPRK (five provinces), China (Changbai and Qianshu Mts, where severely overharvested) and Russia (Ussuriland).
Panax ginseng	*	EN	1	1 [h]	Opportunistically collected by everyone, but seldom seen (e.g. RJS has encountered only 4 times during many months of fieldwork in the PA). Widespread but extremely rare in DPRK.
Phellodendron amurense	*	VU	0 (2)	1 [h]	MPMU and unofficial harvests have occurred. More than the permitted 1/3 of bark is often taken, reducing tree survival, and declines noted. Almost throughout DPRK but not abundant. In China overcutting has been severe.
Phyllitis japonica		R	2	1	Not known to be harvested in the PA, but believed to be very rare there; no recent records. Present elsewhere in Rangrim range, but very rare. No specific threats in China but range small.
Rhododendron chrysanthum	VU	VU	2	2	Harvests in PA are very small, since it is not worthwhile for collectors to travel to the remote peaks where they occur. Harvests elsewhere (e.g. Mt Paektu) much more significant.
Rhododendron redowskianum	I*	VU	0	0	This species appears to be common both in Myohyang and various other sites in DPR Korea. It seems unlikely to be under any threat at a national level.
[*Sasamorpha borealis* var. *chiisanensis*]	[R]		0	0 [h]	Now treated as synonymous with *Sasa borealis* which is not listed as threatened globally or in China (OHRENBERGER 1999).
Saussurea diamantiaca	R*		0	0	There is no record of this species being harvested in the PA. Occurs across four provinces.

continued...

Table 3. (... continued)

	Global threat[2]	Chinese threat[3]	National threat[4]	PA threat[5]	Comments relevant to global threat category. (Chinese data from FU 1992)
Saussurea myokoensis			0 (3)	1	This species was described in 1936 but has only been recorded from Myohyang. Current levels of habitat protection are believed to make the species of least concern, since no other threats are known or suspected.
Saxifraga oblongifolia	R*		0	0	Appears to be of no conservation concern either nationally or within the PA. Also found on other high mountains from the upper part of N Pyongan Province.
Scopolia parviflora	R*		3	2 [h]	Harvesting has greatly increased in past ten years due to rising national and overseas demand. Unofficial harvest appears to exceed official but both are significant. A clustering species, rendering whole clumps vulnerable to harvest. Still moderately common in the PA but declining. Scattered presence in four provinces.
Thuja koraiensis	(R),DD	VU	3	2	Grows in moderate numbers around the higher peaks. Harvest (mainly of leaves) occurs on a very small scale and is not considered a threat. Found on most other DPRK mountains, usually above 1000 m. Logging and forest loss are threats in its limited range in China (Changbai Mountains).
Vaccinium koreanum	R		0	0	There is no record of this species being harvested in the PA. Almost throughout DPRK but not common.
Weigela subsessilis	R		2	2	There is no record of this species being harvested in the PA. It occurs in six provinces.

[*] Detailed reconsideration of the global threat category of this species is suggested by the data given here.
[h] Species with significant harvest in the PA.

in East Asia and may deserve closer attention.

A health-related trade ban now exists for the genus *Aristolochia* and its substitutes in the UK and other west European countries (LORD et al. 1999, DEPARTMENT OF HEALTH 2001; LEON, pers. comm. 2003). This is a close relative of *Asarum* (see Table 4). If ongoing tests found *Asarum* to contain the same harmful compounds it may too experience trade bans (and thus reduced demand), but this is not proposed on the basis of current evidence.

Table 4. Harvested plants with the highest priority for action in the PA but not listed in Table 3.

Scientific Name	Nat. Cat.[1]	Distribution in PA	Remarks
Aralia continentalis	3	<500 m, very rare	Only unofficial harvest comes from wild. MPMU uses cultivated plants.
Asarum heterotropoides	0 (2)	<1000 m, has declined	Highly targeted for official harvest in recent years due to overseas demand. Believed to regenerate quite rapidly (RO JONG SAM, pers. comm.). In China, some cultivation occurs (LEON, pers. comm.).
Cardamine yezoensis		400-1000 m, very rare	Demand (national and international) has soared in past 10 years.
Picrasma quassioides		Sporadic, has declined	Large official harvest has occurred. Does not resprout after felling. Continued collection is planned in Controlled Use Zones, but sustainable harvest levels are likely to be low.
Taxus cuspidata		>1000 m, scattered	Has been cut on a large scale outside the PA, also inside. *Taxus* wood souvenirs are extensively sold in tourist areas of PA.

[1] See Appendix note [4] for explanation.

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Appendix. Data on species assessed in the prioritisation exercise.

Species[1]	Threat status			PA rank[5]					Harv[6]	Official harvest[7,8]		
	IUCN[2]	China[3]	Nat. cat.[4]	1	2	3	0	?		1998	1999	2000
Acanthopanax sessiliflorum					**2**				**+**	**159**	**63**	**240**
Acer mono							0		+		150	305
Aconitum jaluense							0		+	3	5	5
Aconitum koreanum					2				+			
Agastache rugosa						**3**			**+**	**197**	**176**	**666**
Alnus sibirica							0		+		150	130
Alnus vermicularis			3					?				
Angelica dahurica						3			+	11	150	28
Angelica gigas			**3**		**2**				**+**	**70**	**18**	**42**
Aralia continentalis			3	1					+	214	184	70
Aralia elata							0		+			
Arisaema amurense			3				0		+	14*	7.5*	15*
Arisaema convolutum			3		2				+	*	*	*
Arisaema heterophyllum			3				0		+	*	*	*
Arisaema japonicum			3			3			+	*	*	*
Arisaema peninsulae			3				0		+	*	*	*
Arisaema robustum			3				0		+	*	*	*
Artemisia messerschmidiana							0		+	2276	4400	3890
Asarum heterotropoides			0 (2)	1					+	27	15	101
Astilbe chinensis							0		+			
Astragalus membranaceus		VU	3	1								
Atractylodes koreana							0		+			
Atractylodes ovata						**3**			**+**	**367**	**390**	**1050**
Berberis koreana			3		2							
Bergenia pacifica			2	1								
Bistorta incana			3					?				
Broussonetia kazinoki			0 (2)					?				
Bupleurum komarovianum			3		2				+	3	15	12
Caltha gracilis						3						
Cardamine yezoensis				1					+			
Castanea crenata							0		+			
Chelidonium majus							0		+		3	7
Cimicifuga dahurica							0		+	*	*	*
Cimicifuga foetida							0		+	*	*	*
Cimicifuga heracleifolia						3			+	48*	32*	68*
Cimicifuga ussuriensis							0		+	*	*	*
Clematis brachyura			3				0		+			
Clematis mandshurica					**2**				**+**	**13**	**15**	**17**
Cnidium officinale							0		+	15	101	10
Codonopsis lanceolata							0		+			

continued...

Appendix. (...continued)

Species[1]	Threat status			PA rank[5]					Harv[6]	Official harvest[7,8]		
	IUCN[2]	China[3]	Nat. cat.[4]	1	2	3	0	?		1998	1999	2000
Codonopsis pilosula					2				+			
Convallaria keiskei							0		+			
Crataegus pinnatifida							0		+	373	153	445
Cynanchum wilfordi					2				+			
Deutzia coreana								?				
Dictamnus dasycarpus							0		+			
Dioscorea batatas			0 (3)					?				
Dioscorea nipponica			3		2				+	311	40	82
Dryopteris crassirhiaoma							0		+			
Eleutherococcus senticosus		VU		1					+			
Epimedium koreanum						**3**			**+**	**130**	**70**	**26**
Fraxinus rhynchophylla							0		+	419	480	686
Gastrodia elata		VU	1	1					+			
Gentiana axillariflora[10]			3					?				
Gentiana scabra							0		+			
Geranium sibiricum						**3**			**+**	**485**	**85**	**97**
Gypsophila oldhamiana							0		+			
Jeffersonia dubia							0		+			
Kalopanax pictus							0		+			
Ledebouriella divaricata							0		+			
Leontice microrrhyncha			2					?				
Leontopodium discolor						3						
Leonurus sibiricus							0		+	30	208	121
Lilium lancifolium							0		+			
Lonicera japonica							0		+		6	2
Lycoctonum pseudolaeve							0		+			
Magnolia sieboldii		VU				3						
Oplopanax elatus	R	VU	3	1					+			
Paeonia japonica							0		+	87	180	18
Paeonia obovata					2				+			
Panax ginseng		EN	1	1					+			
Patrinia scabiosaefolia							0		+	20	13	16
Phellodendron amurense		VU	0 (2)	1					+	56	140	123
Phyllitis japonica		R	2	1								
Picrasma quassioides				**1**					**+**	**1005**	**2040**	**1360**
Pinellia ternata							0		+			
Pinus densiflora	(R) lc						0		+			
Pinus koraiensis						3			+			
Pinus pumila			3			3						

continued...

Appendix. (...continued)

Species[1]	Threat status			PA rank[5]					Harv[6]	Official harvest[7,8]		
	IUCN[2]	China[3]	Nat. cat.[4]	1	2	3	0	?		1998	1999	2000
Plantago asiatica							0		+		12	21
Platycodon glaucus							0		+			
Platycodon grandiflorum[11]					2				+	120	155	120
Polygonatum odoratum						3			+	29	15	43
Populus koreana							0		+			
Potentilla chinensis							0		+			
Primula seiboldii							0		+			
Prunus persica							0		+	116	76	20
Pueraria lobata							0		+	282	125	204
Pueraria thunbergiana							0		+			
Pulsatilla koreana							0		+	32	15	47
Quercus mongolica							0		+	254		
Reynoutria japonica			3		2				+			
Rhodiola elongata			2	1								
Rhododendron chrysanthum[9]	VU	VU	2		2							
Rhododendron redowskianum	I	VU					0					
Rhododendron schlippenbachii							0		+	24		
Rhus javanica							0		+			
Rubus koreanus							0		+	17	32	9
Rumex crispus							0		+		10	
Sabina chinensis							0		+			
Sabina sargentii			3			3						
Salix maximoviczii			3					?				
Sanguisorba officinalis							0		+			
Sasamorpha chiisanensis[12]	R						0		+			
Sasamorpha purpurascens							0		+			
Saussurea diamantiaca	R						0					
Saussurea eriophylla						3						
Saussurea myokoensis			0 (3)	1								
Saxifraga oblongifolia	R		0				0					
Schizandra chinensis						**3**			**+**	**18**	**10**	**10**
Scopolia parviflora	**R**		**3**		**2**				**+**	**61**	**90**	**178**
Sophora flavescens							0		+	895	520	1083
Sorbaria sorbifolia							0		+	3968	3948	3980
Sorbus commixta						**3**			**+**	**29**	**25**	**40**
Styrax obassia			3			3						
Syringa dilatata							0		+		17	60
Taxus cuspidata				1					+			
Thuja koraiensis	(R) DD	VU	3		2							

continued...

Appendix. (...continued)

Species[1]	Threat status			PA rank[5]					Harv[6]	Official harvest[7,8]		
	IUCN[2]	China[3]	Nat. cat.[4]	1	2	3	0	?		1998	1999	2000
Thymus quinquecostatus			3			3						
Vaccinium koreanum	R						0					
Valeriana fauriei							0		+			
Veratrum alpestre			3					?				
Viburnum koreanum			3					?				
Viola websteri			2		2							
Weigela subsessilis	R		2		2							

1 Species list follows an unpublished checklist of plants in the PA, with some additional species inserted. Species in **bold** are those for which continued official harvesting is proposed in controlled use zones. Names are those currently in use in DPRK; an extensive review of synonyms has not been attempted.

2 **Global conservation status**: taxa listed as Globally Threatened by either WALTER & GILLETT (1998) or OLDFIELD et al. (1998). Where a species is covered by the latter (trees only) the obsolete evaluation from the former is given in brackets. VU = Vulnerable; R = Rare; I = Indeterminate; DD = Data Deficient; lc = Least Concern (not threatened).

3 **Chinese threat status** (FU 1992). Abbreviations VU = Vulnerable, EN = Endangered, but categories not directly equivalent to IUCN global categories.

4 **National conservation status**. Categories from 2000 given in all cases, from 3 (significant concern) to 1 (highest concern) with 0 = no concern (PLANT PROTECTION SOCIETY 2000). Where known, the category from the draft update for 2002/3 is given in brackets.

5 **PA rank**: PA management action category (see also Table 2; ? = insufficient data)

6 Species harvested in significant quantities in the PA.

7 Dry weight, kg, of recorded official plant collection in Hyangam-ri District by the Koryo Medicinal Plant Resources Management Unit (MPMU).

8 The original MPMU list gives Korean medical names and these have been converted to scientific names using LI CHONG-O (1964). When official harvest is all from cultivated sources, no quantity is given here, but when sources are mixed, only the total is known,

9 Called *R. fauriei* by EVANS (2001).

10 The variety *coreana* is Globally Threatened (Rare) but it is not clear which variety occurs in Myohyang.

11 Harvest formerly wild-collected, now entirely from cultivated stock.

12 See Table 3 for discussion.

* In these genera several species are known to be grouped under the one name listed by MPMU - figures are placed under the main species but probably include small amounts of all the others, which have similar medicinal value.

The German foreign trade in medicinal and aromatic plants during the 1990s

Dagmar Lange

Summary

The German foreign trade in medicinal and aromatic plants for the period 1991-2000 is investigated. For this purpose the commodity groups HS 1211 of the German Foreign Trade Statistics and SITC.3 *pharmaceutical plants* compiled in the COMTRADE database of the UN have been evaluated. Based on this, the role of Germany as a trade centre and consumer country on international and European level is shortly discussed. An overview over the German foreign trade in botanicals is given, the most important source and destination countries of this commodity are pointed out and striking trends in this trade are presented. Further German import and export prices and those of Germany's most important trade partners are compared and discussed.

Introduction

Medicinal and aromatic plants (MAP) are produced and offered in a wide variety of products, i.a. in pharmaceuticals, herbal remedies, teas, spirits, cosmetics, sweets, dietary supplements, varnishes, and insecticides (OHRMANN 1991, LANGE 1996, GORECKI 2002). The use

of botanical raw material is in many cases much cheaper than to use chemical alternative substances. As a consequence, there is an enormous demand in botanicals resulting in a huge trade – on local, regional, national and international level. As the production of botanicals still relies to a large degree on wild-collection (i.a. BHATTARAI 1997, HE & SHENG 1997, LANGE 1998, 2002, ROBBINS 1999, KUPKE et al. 2000, KATHE et al. 2003), knowledge in trade, size, structure and streams as well as in the commodities, the traded quantities and their origin is essential for assessing its impact on the plant populations concerned.

A study done in the beginning of the 1990s revealed Germany being the biggest importer of MAP within Europe (LEWINGTON 1993). Subsequently, a lot of investigations in the German (LANGE 1996, LANGE & SCHIPPMANN 1997) and European (i.a. LANGE & MLADENOVA 1997, LANGE 1998, KATHE et al. 2003) MAP trade were done. The analysis of national and international external trade statistics gave an overview on the main features of the MAP trade, in particular on the significance of the market, the main trade streams and the main acting countries, and revealed Germany's particular role in international and European context and its main trade partners.

The analyses of international trade figures have been updated several times (LANGE 1997a, 2002, 2003, 2004b), however, analyses of the German foreign trade figures are only presented for the period 1975-1979 (ITC 1980) and for 1991-1994 (LANGE 1996, 1997b). Overviews on the extra-EU trade of 1997-1999 and of 1999-2001 are published by CBI (2001, 2003). Because of Germany's importance in the MAP trade, to update the analysis of the German foreign trade is of great interest. To receive most substantial results, international and German foreign trade figures of the ten-years-period from 1991 to 2000 are examined.

Botanicals in Customs codifications for foreign trade statistics

All commodities have to be declared on import into and export from a country in accordance with the prevailing tariff regulations providing product name, quantity, value and country of origin or destination country respectively. For this purpose goods are classified in trade according to different Customs codes, which classify and codify merchandise into commodity groups.

In Germany, they are grouped according the *Harmonized Commodity Description and Coding System* (HS), developed by the WCO (World Customs Organisation), introduced in 1988, and today used by more than 177 countries and economies (CBI 2001). The HS is divided into sections, chapters, sub-chapters, and headings. The HS-Code is a six-digit-code which may be, if desired, further subdivided for national use into subheadings. The HS shall improve to record and to analyse statistical data on international level as well as the assessment and review of trade streams, and shall facilitate the comparability of foreign trade statistics and the transfer of data from country to country (BRAND 1990).

Germany's foreign trade statistics are based on an eight-digit-code aligned to a great extent with the *Combined Nomenclature* (CN), which is the European Community's classification of goods, which meets requirements in terms of external trade statistics (both intra- and extra-Community) and of customs tariff, and is based on the HS, the text of which is taken over in full and subdivided only for the requirements of external trade statistics, law on agricultural matters or the customs tariff.

German trade figures are compiled and published by the *German Federal Agency for Statistics* in Wiesbaden, and those of the EU, by EUROSTAT in Brussels, Belgium. On demand of public authorities, commerce and industry, the CN may be modified annually.

In the HS or the CN respectively, botanicals are included in several chapters and headings of section II *Vegetable products*. In this context, the most important and substantial commodity group is tariff heading *plants and parts of plants, incl. seeds and fruits, of a kind used primarily in perfumery, medicaments or for insecticidal, fungicidal or similar purposes, fresh or dried, whether or not cut, crushed or powdered*. The most common botanicals of this heading are compiled in the Explanatory Notes to the HS (latest edition of 23.10.2002; reprint of the 1996-edition see for German language LANGE 1996 and for English language LANGE & SCHIPPMANN 1997).

Within tariff heading 1211, only a few botanicals of especially high commercial value like Liquorice roots (1211.10.00) and Ginseng roots (1211.20.00) are listed separately. Subheadings are often modified or even changed: until 1992 Peruvian bark (1211.90.50) was an own tariff heading, from 1993 to 1996 Mint (1211.90.40), Verbena (1211.90.65), and Linden flowers and leaves (1211.90.60) were classified separately; and in the periods 1993-2003, Sage (1211. 90.75) and Wild marjoram (1211.90.70) and 1988-2000 Pyrethrum (1211.90.10) were categorized as own commodity groups. Consequently, analysis and comparability of trade figures are complicated. Furthermore, botanicals are also included in tariff heading 1212 as well as in chapter 7, 9, 13 and 14 (for details see LANGE 1996, 2004a).

Since 1962, foreign trade figures of presently almost 180 countries have been compiled in the COM-

TRADE (= COMMODITY TRADE STATISTICS) database by the United Nations Statistics Division, New York. The goods are classified according to the internationally agreed *Standard International Trade Classification* (SITC). The first edition was introduced in 1950 being revised several times: 1960, 1975 (SITC.2 = Revision 2) and 1985 (SITC.3 = Revision 3) (ANON. 1975, 1986, BRAND 1990).

MAP are mainly classified in Section 2 *Crude materials, inedible, except fuels*, but also included in Section 0 *Food and live animals* (ANON. 1986). The tariff heading HS 1211 corresponds exactly to commodity group 292.4 of SITC.3, described in the following as *pharmaceutical plants*. In many cases, the SITC is less subdivided than the HS, which limits the comparability of foreign trade statistics based on different tariff codes (LANGE 2004a).

The analyzed trade figures

Owing to the limits in the comparability of external trade figures, the presented analysis is only based on the evaluation of the tariff headings HS 1211 of the German Foreign Trade Statistics and SITC.3 292.4 of the COMTRADE database of the UN, completed in a few cases by selected data of the Bulgarian and Albanian foreign trade statistics (LANGE 2003). The trade figures are analyzed for the period 1991-2000, as of 1991, both German and international external trade figures have reported the trade of the reunified Germany.

In the following, trade figures are, if not otherwise mentioned, average values for this ten-years-period. The quantities are always given in metric tonnes, the values either according to the German Foreign Trade Statistics in DM, and in US$ when taken from the COMTRADE database. Quantities and values are rounded up or down.

From 1991 to 2000, 141 countries reported an export or import of *pharmaceutical plants* to the COMTRADE database. However, export and import figures of some countries are not available for the whole period due to (1) political changes that happened in particular in Eastern Europe, (2) the warfare in parts of the former Yugoslavia, and (3) because some countries first began to report their trade statistics according to the SITC.3 or the HS during the 1990s (LANGE 2003, 2004a). These facts were considered when calculating the mean export and import value.

The delimitation of the regions and continents are based on HOLLIS & BRUMMITT (1992), who divided the world into nine broad geographical units. However, the countries of the former USSR are not allocated to one of these units due to the political changes having taken place during the investigated period, and because the USSR as well as the succeeding Russian Federation extends from Europe to temperate Asia. The European Union (EU) is regarded in its borders of the year 2000.

Germany's place in global and European trade

Global and European trade analyses have been published and updated several times during the last years by the author, just recently for the 1990s (LANGE 2003, 2004a, 2004b). In the following, the most important results are shortly summarized focusing in particular on Germany. For more details see LANGE (2004a, 2004b).

In the 1990s, the reported annual global import of *pharmaceutical plants* amounted on average to 400,000 tonnes valued at US$ 1,224 million. A main feature of the international trade is the dominance of only few countries: About 80% of the world-wide imports and exports are traded by only 12 countries, with the temperate Asian and European countries dominating. Germany imported 11% of the world-wide import, ranking on place four of the world's top 12 countries of import after Hong Kong, Japan and the USA. Concerning the global exports, Germany was also listed on place four after China, Hong Kong[1] and India, but before the USA. Its share of the world-wide exports was 3%. The high ranking on both the export and import side highlights Germany as an important trade centre in the MAP trade similar to Hong Kong and the USA. Furthermore, Germany is also the third most important consumer country of botanicals worldwide, showing high positive average net imports of some 30,000 tonnes exceeded only by Japan and the USA. Consumer countries generally import raw material or at least partly processed material which is mainly processed in the country's enormous industry to e.g. extracts, aromas, teas, cosmetics, or (phyto-) pharmaceuticals, and then sold as finished products either on the domestic market or exported as such. In these cases, the export is often included in other tariff headings than 1211.

Europe as a whole as well as many European countries are important actors in the world-wide botanicals' trade with EU Member States dominating the import side and east and southeast European countries dominating the export side (LANGE 1998, 2001, 2002, 2003, 2004a). The dominance of Germany in the intra-European trade is evident, as (1) one third of the overall quantities of *pharmaceutical plants* imported into Europe were destined to Germany; (2) the share of the country's exports is approximately one fifth in terms of quantities; (3) moreover, Germany acts as a

1 = China HK SAR (Hong Kong Special Administrative Region).

link between the markets of eastern and southeastern Europe and those of western and Central Europe, as it imported two third of the plant material exported from eastern and southeastern European countries, and exported it above all to Central and western European countries (LANGE 2003, 2004a).

plant material (Figure 1): 19,120 tonnes or 43% of the German imports were of European origin. Regarding quantities, imports from Africa were on second place with a share of 16% (7,190 tonnes), followed by South/Mesoamerica with 12% (5,570 tonnes) and tropical Asia with 11% (5,170 tonnes). The imports from

Table 1. The German foreign trade in commodity group HS 1211 *pharmaceutical plants*. The most important countries of origin and destination listed according to average import and export quantities in the period 1991-2000. – Source: Foreign trade statistics, German Federal Agency for Statistics, Wiesbaden.

Country of origin	Quantity (t)	Value (DM)	Country of destination	Quantity (t)	Value (DM)
Bulgaria	5,220	16,507,200	Austria	2,130	14,019,400
India	4,240	7,129,300	Switzerland	1,470	15,195,000
Poland	3,850	14,005,900	USA	1,390	10,353,700
Sudan	2,600	5,960,400	Italy	1,260	9,265,500
Chile	2,570	11,792,000	Spain[1]	1,060	9,140,800
Hungary	2,220	6,426,900	Great Britain	1,050	7,372,200
Egypt	2,080	8,282,000	France	950	8,809,700
China	2,070	10,060,600	Netherlands	780	6,227,200
USA	1,980	12,857,600	Poland	640	3,098,800
Albania	1,900	6,044,300	Belgium/Luxembourg	580	4,151,900
Argentina	1,710	11,567,400	Czech Republic (since 1993)	410	2,776,100
Turkey	1,540	6,253,300	Denmark	260	2,257,900
Total import TOP 12	**31,990**	**116,886,900**	**Total export TOP 12**	**11,970**	**92,668,200**
Total import	**45,380**	**186,487,600**	**Total export**	**15,520**	**120,294,700**

[1] incl. Canary Islands

Imports of *pharmaceutical plants* into Germany

From 1991 to 2000, Germany reported to import annually on average 45,380 tonnes of *pharmaceutical plants* valued at about DM 186.5 million. During this period, the imports originated from at least 142 countries[2] , of which only 12 were responsible for 70% of the imports (Table 1, left column). Bulgaria is Germany's most important source country for these botanicals, showing annual average exports of 5,220 tonnes of a value of DM 16.5 million. India is on second place, exporting on average 4,240 tonnes (value DM 7.13 million) to Germany, followed by Poland with 3,850 tonnes (value DM 14 million). Further, Germany imported on average more than 2,000 tonnes of this commodity from the following countries: Sudan (2,600 tonnes), Chile (2,570 tonnes), Hungary (2,220 tonnes), Egypt (2,080 tonnes), and China (2,070 tonnes). A breakdown of the imports according to regions or continents shows a considerable share of intra-European origin of the

temperate Asia amounted to 4,260 tonnes or 9% and those from North America to 5% or 2,200 tonnes. The imports from Australia and New Zealand (460 tonnes), the countries of the former USSR (370 tonnes), the Pacific Islands (220 tonnes), and of the categories Confidential countries and Unknown countries (730 tonnes) are summarized into Other countries (4%) in Figure 1. Only few countries of each region export considerable quantities to Germany. Within Africa, most exports are allotted to the Sudan and Egypt, within South/Mesoamerica to Chile and Argentina, within North America to the USA, within tropical Asia above all to India and China, and to Turkey within temperate Asia. All these countries belong to the top 12 countries of origin for *pharmaceutical plants* to Germany (Table 1).

Trends in imports during the 1990s

From 1991 to 2000 the imports of *pharmaceutical plants* increased from 37,770 tonnes in 1991 by just one fifth to 44,530 tonnes in 2000 (Table 2). Accordingly, the German import increase was much lower than the global one of just 50 % (LANGE 2004b). However, in the mean time, the imported quantities had exceeded 50,000 tonnes: 52,210 tonnes in 1996 and

[2] The German Foreign Trade Statistics reported imports from 142 countries. In addition, imports of the categories *Confidential countries* and *Unknown countries* were mentioned.

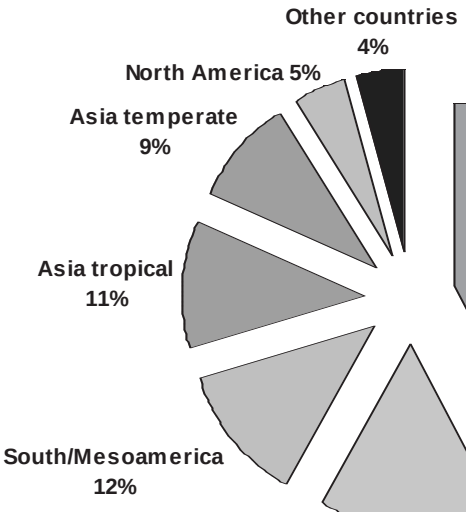

Figure 1. Average imports of the commodity group HS 1211 pharmaceutical plants into Germany from selected regions and continents in the period 1991-2000. – Source: Foreign trade statistics, German Federal Agency for Statistics, Wiesbaden.

53,280 tonnes in 1998 (Table 2). The imports from many countries fluctuated clearly in this ten-years-period, for example, the imports from Hungary increased and decreased by several hundreds of tonnes during the 1990s (Table 2). Reasons for this may include changes in demand in individual products, but also may depend simply on imports at the turn of the year being assigned to different years. Table 2 shows, that the imports from China did not increase considerably, a striking fact, as China doubled its exports during the 1990s (LANGE 2004b). On the other side, the importance of some countries as a source for *pharmaceutical plants* for Germany has changed considerably during the 1990s. For example, the imports from Bulgaria increased from 3,640 tonnes in 1991 to just 6,000 tonnes in 2000, extending even to 8,350 tonnes in 1998 (Table 2). Further, imports from Poland increased from 2,210 tonnes by 140% to 5,290 tonnes.

In all, Germany's imports from European countries increased in the examined period by 37%, from 14,390 tonnes to 19,790 tonnes, exceeding even 20,000 tonnes in the years 1995, 1996 and 1998. The maximum import was 24,630 tonnes in 1998 (Table 2). Higher increases showed exports from Africa and North America (Table 2): imports from African countries increased by 60%, above all those from Sudan (80%) and Egypt (60%). Exports from USA increased by 50% and those from North America by 82%. In contrast, the importance of India, which had been by far the most important German source country for *pharmaceutical plants* until the midth of the 1990s (LANGE 1996), decreased considerably: the German imports decreased from 1991 to 2000 by 60% from 6,040 tonnes to 2,300 tonnes. In all, the imports of tropical Asian countries were cut in half (Table 2). Any trends in imports from temperate Asian countries and South/Mesoamerica may not be recognized, as the imports fluctuated up to 40% to the corresponding average imports (LANGE 2004a). The obviously different developments in the German imports from indivual countries may be due to changes in political and trade relations, changes in the demand in individual products, or changes in the degree of processing of the exported commodity by a trade partner. For example, products mixed for use for therapeutic or prophylactic purposes, or unmixed products, but put up in measured doses for retail sale, for the same purposes are excluded from tariff heading 1211.

Exports of *pharmaceutical plants* from Germany

From 1991 to 2000, Germany exported on average about 15,520 tonnes of *pharmaceutical plants* each year, which is one third of the imported commodity. The value amounted to DM 120.3 million. During the investigated period, the exports were destined to 147 countries, of which 12 were responsible for 77% of the exports (Table 1, right column). The most important destination was Austria buying annually on average 2,130 tonnes of this commodity valued at DM 14 million. Switzerland was on second place, importing 1,470 tonnes (value DM 15.2 million), directly followed by the USA with 1,390 tonnes (value DM 10.4 million) and Italy with 1,260 tonnes (value DM 9.3 million).

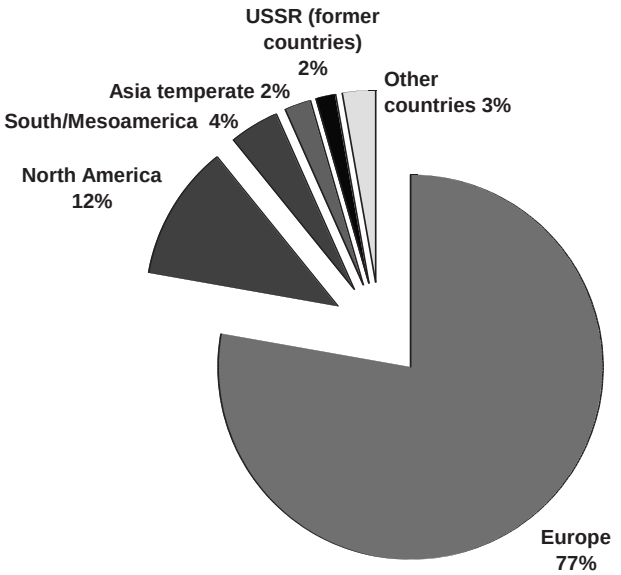

Figure 2. Average exports of the commodity group HS 1211 pharmaceutical plants from Germany into selected regions and continents in the period 1991-2000. – Source: Foreign trade statistics, German Federal Agency for Statistics, Wiesbaden.

Further, Germany exported annually on average more than 500 tonnes of *pharmaceutical plants* to Spain (1,060 tonnes), Great Britain (1,050 tonnes), France (950 tonnes), the Netherlands (780 tonnes), Poland (640 tonnes) as well as to Belgium and Luxembourg (580 tonnes). In all, only one non-European country, the USA, is listed among the German top 12 countries of export. Eight of the remaining countries are EU Member States to which 52% of the German exports are allotted. These facts are clearly visible in Figure 2 showing a breakdown of the German exports according to regions or continents: 77% or 12,060 exported tonnes were allotted to European countries. In terms of quantity, exports to North America, mainly to the USA, followed on second place with a share of 12% (1,800 tonnes). The remaining 11% of the exports were allotted to South/Mesoamerica (4%, 620 tonnes), the temperate Asian countries (2%, 370 tonnes), the countries of the former USSR with just below 2% (240 tonnes) as well as to Other countries (3%). The latter included exports to Australia and New Zealand (160 tonnes), Africa (150 tonnes), tropical Asia (100 tonnes), and to the category *Unknown countries* (26 tonnes). Only few countries of each region import *pharmaceutical plants* in considerable quantities from Germany. In Africa, the main destination country is South Africa (120 tonnes), in South/Mesoamerica Brazil and Argentina with each importing about 170 tonnes, in temperate Asia Japan (160 tonnes) and Israel (70 tonnes) and in tropical Asia India and Indonesia each importing some 30 tonnes.

Trends in exports during the 1990s

From 1991 to 2000 exports of *pharmaceutical plants* increased from 13,090 tonnes in 1991 by just 12% to 14,600 tonnes in 2000 (Table 3). Accordingly, the increase is similar to the global one (LANGE 2004b), but is much lower than the European one, which doubled in this period (LANGE 2004b). Similar to the imports, the exports to most countries fluctuated over these 10 years. Very often, an export maximum is recognizable in the midth of the 1990s reflecting the development of the global trade (LANGE 2004b). For example, the German exports to Switzerland and Italy increased and decreased several times by several hundreds of tonnes (Table 3) with top-exports of 3,430 tonnes to Italy in 1995 and of some 2,000 tonnes to Switzerland in 1999. This trend is also visible when considering the German export to all European countries: The highest export of 13,070 tonnes was done in 1995 (Table 3). Further, trends in exports to North America are similar, increasing and decreasing several times and showing maxima in 1998 (2,560 tonnes) and 1999 (2,950 tonnes) clearly reflecting the exports of the USA, the main destination country of German exports in this region (Table 3). In general, trends in exports to many countries are difficult to detect, as the exports are generally too low. However, Germany was able to increase its exports to a few countries, again in many cases with export maxima in the midth of the 1990s. The exports to France and Great Britain increased by 23% resp. 50% from 1991 to 2000 with maximum exports to France in 1998 (Table 3). The exports to the Czech Republic and Poland clearly increased: those to the Czech Republic increased from 160 tonnes in 1993 to 430 tonnes in 2000 with higher values in the years 1995-1997, and the exports to Poland increased by 45% showing also higher values 1996-1998. In contrast, the exports to Austria decreased from 2,620 tonnes in 1991 to 1,160 tonnes in 2000 (Table 3). In addition to the reasons discussed in the context of the import trends, decrease in exports may also be a consequence of changes in the kind of purchasing botanicals by German trade partners: to purchase the commodity directly in a country of origin is mostly cheaper than via Germany.

Germany's import and export prices

In the period 1991-2000, the German average import price per tonne amounted to DM 4,110 or US$ 2,430. In world-wide and in European context, this value is quite low: the global average import price amounted to US$ 3,070/tonne and those of other important import countries of *pharmaceutical plants* like USA and Japan to US$ 2,730/tonne resp. US$ 2,650/tonne. The average import price of Europe as a whole amounted to US$ 2,860/tonne, and imports to Austria obtained per tonne US$ 3,450, to Switzerland US$ 4,130, to Denmark US$ 6,030, and to Sweden US$ 7,250.

Germany's average export price per tonne amounted to DM 7,750 equal to US$ 4,580. In contrast to the import price, the value exceeded clearly the global average export price of US$ 2,800 (LANGE 2004b). Accordingly, the benefit per tonne was on average DM 3,640 or US$ 2,150. This surplus value points out the higher degree of processing of the commodity on export than on import. However, the German export price is lower, even sometimes much lower, than those of other countries with huge MAP-processing-industries like USA (US$ 7,900/tonne), Switzerland (US$ 8,770/tonne), Japan (US$ 27,500/tonne), and the Republic of Korea (US$ 31,500/tonne) (LANGE 2004b). At first glance this is a striking fact, but it highlights Germany's role as a trade centre in world-wide and European context as the share of raw material or at least semi-finished products on export is comparably high.

On import, the prices per tonne of *pharmaceutical plants* of the most important source countries (Table 1, left column) were lower than the German average

Table 2. Quantities (in tonnes) of German imports of the commodity group HS 1211 *pharmaceutical plants* from selected regions and countries in the period 1991-2000. – Source: Foreign trade statistics, German Federal Agency for Statistics, Wiesbaden.

[1] Europe = excl. Turkey and the European countries of the former USSR.

[2] Total import = overall import of *pharmaceutical plants* into Germany

Country or region of origin	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**Average**
Europe[1]	14,390	16,140	15,200	18,620	22,330	22,000	19,450	24,630	18,610	19,790	19,120
Bulgaria	3,640	3,530	2,590	4,890	6,470	6,420	5,630	8,350	4,790	5,910	5,220
Poland	2,210	2,150	3,140	3,220	3,150	4,510	4,680	5,060	5,100	5,290	3,850
Hungary	1,620	2,170	2,120	2,240	3,260	2,620	1,870	2,330	2,070	1,910	2,220
Africa	5,480	5,950	6,480	7,800	7,710	8,180	7,900	7,370	6,220	8,850	7,190
Sudan	1,660	1,950	2,890	3,760	3,070	2,560	3,160	2,270	1,650	2,990	2,600
Egypt	1,990	1,690	1,510	1,800	1,660	1,920	2,650	2,240	2,130	3,190	2,080
North America	1,380	2,090	1,990	2,270	1,870	2,610	2,370	2,040	2,800	2,510	2,190
USA	1,120	1,770	1,780	2,180	1,760	2,250	2,170	1,930	2,580	2,260	1,980
South/Mesoamerica	4,360	6,170	5,390	3,980	5,260	6,530	6,630	7,880	4,940	4,520	5,570
Asia temperate	3,150	4,110	3,270	4,350	4,310	4,790	4,960	5,620	3,940	4,090	4,260
China	1,780	2,090	1,740	2,070	2,250	2,110	2,380	2,460	1,760	2,080	2,070
Asia tropical	6,850	5,720	5,390	5,150	6,760	6,340	5,350	3,470	3,640	3,070	5,170
India	6,040	3,980	4,290	4,260	5,990	5,590	4,460	2,560	2,960	2,300	4,240
Total import[2]	37,770	42,350	39,470	43,620	49,670	52,210	48,650	53,280	42,250	44,530	45,380

Table 3. Quantities (in tonnes) of German exports of the commodity group HS 1211 *pharmaceutical plants* into selected regions and countries in the period 1991-2000. – Source: Foreign trade statistics, German Federal Agency for Statistics, Wiesbaden.

[1] Europe = excl. Turkey and the European countries of the former USSR.

[2] Total export = overall export of *pharmaceutical plants* into Germany

Country or region of destination	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**Average**
Europe[1]	10,940	11,780	11,040	11,110	13,070	11,950	12,750	12,140	11,170	10,970	12,060
France	830	850	850	980	810	830	1,030	1,330	1,000	1,020	950
Great Britain	970	870	810	910	870	1,080	1,170	1,140	1,220	1,460	1,050
Italy	970	1,110	470	920	3,430	950	1,710	1,170	1,110	780	1,260
Netherlands	1,940	1,450	570	480	580	620	570	500	530	530	780
Austria	2,620	2,770	3,480	2,850	1,720	2,010	2,020	1,550	1,140	1,160	2,130
Poland	430	440	520	610	410	740	940	1,000	680	620	640
Switzerland	70	1,320	1,500	1,310	1,670	2,020	1,470	1,610	2,190	1,560	1,470
Czech Republic (since 1993)	–	–	160	290	660	520	450	380	380	430	410
North America	950	1,310	1,590	1,930	1,580	1,650	2,140	2,560	2,950	1,300	1,800
USA	790	1,150	1,390	1,660	1,360	1,390	1,920	2,200	1,060	940	1,390
Total export[2]	13,090	14,250	13,890	14,580	16,450	15,440	16,300	16,510	16,120	14,600	15,520

import price of DM 4,110: Germany paid DM 4,070/tonne for Turkish products, DM 3,640 for Polish, DM 3,170 for Albanian, DM 3,160 for Bulgarian, DM 2,890 for Hungarian, DM 2,300 for Sudanese, and for a tonne originating in India even only DM 1,680. Very cheap sources for botanicals were Estonia (DM 990/tonne), Belarus (DM 940/tonne), Jordan (DM 650/tonne), and Afghanistan (DM 740/tonne), although the imported quantities were low. While import prices for European products (DM 3,910/tonne) were only some lower as the German average import price, those for African products (DM 3,200/tonne) and for products from tropical Asian countries (DM 2,130/tonne) were much lower. Low prices may indicate a high share of raw or wild-collected material, but may depend also on political or socioeconomical reasons in the countries of origin, i.a. high level of unemployment, poverty or low incomes.

On the other side, Germany paid above average prices for commodities originating in Chile (4,580/tonne), China (DM 4,860/tonne), USA (DM 6,500/tonne), Argentina (DM 6,750/tonne), and Australia and New Zealand (DM 6,860/tonne). Between DM 10,000 and 20,000 per tonne obtained, for example, products from Hong Kong (DM 10,920), Austria (DM 11,650), Great Britain (DM 12,280), Switzerland (DM 12,190), Israel (DM 15,330), the Republic of Korea (DM 16,480), Finland, (DM 17,630), and Canada (DM 18,280). The highest prices had to be paid for one tonne exported from Japan (DM 26,750), Taiwan (DM 39,500) and the Democratic People's Republic of Korea (DM 60,730). Higher prices have to be paid for half-finished material, for finished products which remain classified in HS 1211 (e.g. tea bags consisting of plant parts of a single species), for organic products, as in the case of Austria, or for valuable individual botanicals, e.g. Ginseng roots. The latter is above all responsible for the high prices of the products originating in the Republic of Korea and in the Democratic People's Republic of Korea.

Exports to the most important destination countries (Table 3) obtained average prices of about DM 7,000-10,000. For example, 1 tonne exported to Austria cost DM 6,580, to Switzerland DM 10,310, to France DM 9,240, to Spain DM 8,710, to the Netherlands DM 8,010 and to USA DM 7,470. Much higher above average prices for 1 tonne were achieved by selling botanicals to Japan (DM 12,470), to Australia (DM 15,020) or to Iceland (DM 25,740).

Resumé

Based on the analysis of the international and German Foreign Trade Statistics of *pharmaceutical plants* (HS 1211 and SITC 3 292.4) for the period 1991-2000 the following conclusions may be drawn:

(1) Germany plays an important role in the international MAP trade and is besides Hong Kong and USA one of the three world-wide trade centres for botanicals.

(2) Germany dominates the intra-European trade ranking on the first place among the European countries with regard to both imports and exports.

(3) East- and southeast European countries are Germany's important and cheap sources for plant raw material; furthermore, Germany is the most important buyer of their products.

(4) Germany's exports are mainly destined to its surrounding countries or the EU Member States respectively.

(5) Germany imports mainly plant raw material or at least little processed products, but on export the degree of processing is increased.

To summarize it, Germany is an important processing country of the raw material, but also an important hub of commerce in the intra-European trade importing botanicals above all from East and Southeast Europe and supplying mainly the EU Member States with this commodity.

Acknowledgements

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Taxon File

Candelilla (*Euphorbia antisyphilitica*): Utilisation in Mexico and international trade

Frank Barsch[1]

Summary

The distribution of *Euphorbia antisyphilitica* Zucc. is restricted to Mexico and the southern parts of the USA, it is mainly found in the Chihuahuan desert. In the Mexican part of its distribution area the plant is collected in the wild to refine a high value wax. The most intensive use of the stocks takes place in the state of Coahuila. Cultivation of the species is not known to exist. The plant is marketed nationally and internationally, 60-80 % of the Mexican production (in total ca. 3,000 t/a) are exported. The main impor-

1 Translated from German by Natalie Hofbauer.

ters are the USA with an estimated 1,000 t/a and the European Union with ca. 350 t/a. Total import volume to Germany is approximately 200 t/a.

In Mexico utilisation regulations with regard to sustainable harvest have been developed, which are not always applied in the rural areas. The present use cannot be regarded as extremely threatening for the species, however, locally to regionally wild growing stocks are reduced or have disappeared, because use without controlled management leads to the decline of populations.

Like all other succulent species of the genus, *Euphorbia antisyphilitica* is included in CITES Appendix II. However, the commodity "Candelilla wax" has obviously not been associated with a succulent *Euphorbia*. Therefore, with the exception of Mexico and Germany, most of the trade seems to go on without CITES permits.

Other similar species from the family Euphorbiaceae are also suitable for wax extraction, and may be used for production and export. *Pedilanthus* is mentioned as a source for Candelilla wax. This species grows sympatrically with *E. antisiphilitica*.

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Biology of *Euphorbia antisyphilitica*

Synonyms: *Euphorbia cerifera* ALCOCER; *Tirucallia antisyphilitica, Trichosterigma antisyphiliticum* (CARTER & EGGLI 2003)

Common names: Candelilla (Spanish; English)

Trade names: Candelilla wax, Candelilla Wachs, Cera de Candelilla, Candelilla cera

Euphorbia antisyphilitica Zucc. is a perennial, succulent plant of the family Euphorbiaceae. The pencil-like stems are growing clonally forming larger groups. They reach a maximum height of 90 cm and rarely form branches. The stems are coated with a wax that reduces evaporation considerably. The species is an anemophilous plant spread by seeds (ANON. 2003a).

Euphorbia antisyphilitica is native to the Chihuahuan desert in Mexico. It is distributed in the states of Durango, Zacatecas, Chihuahua, Nuevo León, San Luis Potosí, Tamaulipas, and Coahila. Additionally, the plant occurs in southwest Texas (particularly in the Big Bend National Park) and in New Mexico. Due to its frost sensitiveness it does not grow further in the north or in mountainous regions. The species is naturalised as a neophyte in India and other subtropical regions.

The plant is characteristic for arid zones of Mexico, where it grows under extreme site conditions on karst soils in the vegetation formation "matorral xerofilo", preferably on limestone. The habitats are characterised by annual average precipitation from 120 to 200 mm and a mean temperature from 18 to 22 °C.

The common name "Candelilla" means "little candle" in Spanish. The species epithet "antisyphilitica" describes the historic usage as remedy for syphilis. The drug does not act antibiotically. As with other *Euphorbia* species the milky sap is poisonous and irritating to the skin.

Collecting methods and resource management

BARRIGA RUIZ (2003) estimates that an area of 630,500 ha with *Euphorbia antisyphilitica* populations is available for collection, which theoretically may produce a total annual yield of 15,000 t of wax. In 1993 only 152,520 ha were harvested. Collection is most intense in the state of Coahuila: about 80% of the world production originate from there (BARRIGA RUIZ 2003). The smaller US populations are not utilised.

Candelilla is exclusively collected from wild populations. There is no cultivation of *Euphorbia antisyphilitica*, and cultivation trials apparently do not exist (HERNANDEZ MACÍAS, pers. comm.).

Collecting the plants is most effective in the dry winter months, because during that time they exude the highest wax amounts to prevent water loss. The plants are collected as a whole inclusive shoots and roots. The collecting sites are located in distances of up to 35 km away from the collectors' villages (ZAMORA & TORRES 2001). During the harvest, the collectors ("candelilleros"), mostly ordinary farmers, go there either by walking, using pack animals or handcarts, rarely also motor vehicles. REYES (pers. comm.) reports that plant populations close to the villages are extinct.

Mexico's Instituto Nacional de Investigaciones Forestales, Agricolas y Pecuarias (INIFAP) conducted *in-situ* regeneration experiments. The recolonisation of harvested areas through seed dispersal yielded 28 kg of wax per hectare. Comparative studies showed that the yield can be increased up to 252 kg per hectare by vegetative propagation through cuttings. This exceeds the yield of 189 kg per hectare of non-managed populations. The findings of these studies resulted in the development of management rules to ensure the conservation of the populations (ZAMORA & TORRES 2001).

At many collection sites, cuttings are planted after harvest to ensure their regeneration. These measures are organised by the refiners, who are interested in the regeneration of the populations for economical reasons (pers. comm. with traders[2]).

2 Trade information has been received and documented through several interviews with traders held in late 2003 and early 2004.

Extraction of the Candelilla wax in Mexico

The methods for wax production have been developed at the beginning of the 20th century and have remained almost unchanged until present time (ZAMORA & TORRES 2001):

- Acidified water is brought to the boil in big pots, called "pailas". 240 to 260 kg of plant material are added and mixed with sulphuric acid (8% related to the plant mass).

- Through this treatment the wax is being solved from the cuticula and deposited. This unpurified wax, which is called "cortador", is skimmed off and heated again while adding sulphuric acid. Inclusions like roots, earth, and other particles deposit. The result of this separation is a pure wax ("cerote").

- In the next refinement step liquid sulphuric acid is added to the crude "cerote". After this treatment the wax is almost free of solid suspended matter. It is moulded, and after cooling it is broken into lumps.

This way of wax production is very labour-intensive. Nevertheless, the wax still contains considerable quantities of resins reducing the quality. Further refinement steps are necessary to eliminate these resins and to fabricate a high-quality product. The final refinement (and bleaching) is also carried out in Mexico (pers. comm. with traders).

Candelilla wax uses

Candelilla wax consists of long-chained hydro-carbons (ca. 50%, C29-C33), esters, free fatty acids and alcohols, and resins. Due to its very good oil retention properties this relatively hard natural wax improves the stability and structure of technical and cosmetical products (ANON. 2003c). Other applications include depilatories and lubricants.

Main purchaser of the wax is the cosmetic industry. Here it is primarily used for cosmetic (and pharmaceutical) stick products, where it provides good mould release, firmness, pay-off and surface gloss. (ANON. 2003c). In lipstick production the wax is superior to substitutes that would downgrade quality (pers. comm. with traders).

As a food additive Candelilla is widely used in the coating of soft candy, chocolate, fruit, and in industrial bakeries as a release agent. (ANON. 2003c).

In the technical sector the wax is needed for various purposes. As moulding wax it is used e.g. in record or gum production. Its water repellence makes it useful in (furniture) polishes and natural dyes. Other applications include electronic and electrical products, paint removers, pyrotechnics, adhesives, or paper making additives (ANON. 2004d).

Trade in *Euphorbia antisyphilitica*

Utilisation of *Euphorbia antisyphilitica* first became economically significant around 1900 (BACON 2004). Economically and socially, *Euphorbia antisyphilitica* is one of the most important commercial plants in the dry areas of Mexico (ZAMORA 2003).

Primarily, *Euphorbia antisyphilitica* is used for Candelilla wax production. Additionally, other species of the Euphorbiaceae family, e.g. *Pedilanthus pavonis bracteatus* (synonym: *Pedilanthus pavonis*), are suitable for wax extraction, and used for production (LANGE, pers. comm., ANON. 2003b). It is, however, not clear what portion in trade other species may have and a more detailed review on trade and use in this respect is necessary.

Candelilla wax is traded in two qualities: (a) Cerote, relatively crude and rich in resin, is imported as lumps and used in the technical sector, e.g. as moulding wax; and (b) Candelilla wax of higher quality (poor in resin) is imported as flakes und primarily demanded by the cosmetic industry. Both qualities have an equal share in the total trade volume (pers. comm. with traders).

The wax is of excellent quality, and there is a great national and international demand for it. About 260 brokers and 8,500 farmers in the arid zones of the states Coahuila, Chihuahua, Durango, and Zacatecas are living on the Candelilla plant (BARRIGA RUIZ 2003). Annually, over 3,000 t of cerote (pre-refined wax) are produced, for which about 150,000 t of plant material are used (ZAMORA & TORRES 2001). For 1993, a trade value of 3,600,000 US$ is reported (BARRIGA RUIZ 2003).

The Mexican wax production meets the worldwide demand of ca. 3,000t. 60 to 80% of the production are intended for export. Major importer is the US with an annual import of ca. 1,000 t, followed by the United Kingdom and Spain. The European demand amounts to a maximum of 350t/a. Generally, Candelilla wax can be regarded as a niche product on the European market with stable or slightly decreasing sales (pers. comm. with traders).

The worldwide demand for Candelilla wax has been stable for many years. Several substitutes are offered on the wax market, which, however, have not displaced Candelilla wax. For the cosmetic industry it is irreplacable in lipstick production (pers. comm. with traders).

CITES regulations

All succulent species of the genus *Euphorbia* are included in Appendix II of CITES. Accordingly, all "parts and derivatives" of *Euphorbia antisyphilitica* are subject to the trade provisions, except seeds, spores and

pollen, seedling or tissue cultures, and cut flowers of artificially propagated plants (www.cites.org/eng/append/appendices.shtml; viewed 2.7.2004). The "CITES checklist of succulent Euphorbia taxa" (CARTER, S. & U. EGGLI 2003) is the standard reference clarifying which *Euphorbia* species are covered by CITES controls.

CITES Annual Report data provided by UNEP-WCMC show that only the trade between Mexico and Germany is documented:

Year	Imp	Exp	Import Quantity	Export Quantity	Units	Term
2001	Germany	Mexico	16025	98,000	kg	extract
2001	United States	Mexico	5			live
2002	Germany	Mexico	195000	208,000	kg	wax

Harvest and utilisation of the species are regulated by the Mexican regulations NOM-005-RECNAT-1997 (CARABIAS LILLO 1997a) and NOM-007-RECNAT-1997 (CARABIAS LILLO 1997b), which implement CITES regulations nationally.

A survey among the German companies made clear that CITES permits are not being demanded by most countries involved in trade. Until recently, many medicinal plant trade experts have not been aware of the significance of *Euphorbia antisyphilitica* in international trade (LANGE, pers. comm.). The species is also not listed in the CITES checklist of medicinal and aromatic plants (LANGE & SCHIPPMANN 1999). When exported, the product is usually declared as "Candelilla Wax", "Candelilla Cera", or "Cera de Candelilla", which makes it difficult for the customs officers to realise that this is a protected species. Probably for these reasons the CITES relevance of the imports has escaped attention of the customs authorities in the countries concerned until recently.

Impact of wild collection on the populations of *Euphorbia antisyphilitica*

According to HERNANDEZ (pers. comm.), the utilisation of *Euphorbia antisyphilitica* has a direct and negative influence on the Mexican populations. Although widely distributed, the species is restricted to extreme habitats. Excessive collection without propagation by cuttings may therefore rapidly lead to regional decline and local extinction of the species. In most cases, the INIFAP guidelines for sustainable utilisation are not applied by the rural population or they are unknown (REYES, pers. comm.).

In the north of San Luis Potosí populations of *Euphorbia antisyphilitica* have clearly declined compared to the stocks that could be found there a few decades ago. Local harvesters see this directly connected to an over-utilisation of the stocks. For economical reasons collection in this region has been partly abandoned (BARSCH, pers. notice).

One trade representative argued that destructive utilisation is unlikely since the species has been traded for more than 60 years at similar levels without supply problems during that time. Also it may be argued that only a quarter of the total stocks of *Euphorbia antisyphilitica* are under harvest (BARRIGA RUIZ 2003). Presumably, collection pressure on the species will not increase, because the market has been stable for many years.

Overgrazing of the sensitive ecosystem Chihuahuan desert can be regarded as additional threat factor. Goats in particular have a negative impact on the vegetation and contribute to desertification in this region (BARSCH 2002). Due to its toxicity, *Euphorbia antisyphilitica* itself is protected against browsing. However, this species is affected by vegetation changes, erosion, and trampling caused by live-stock. On a number of sites, limestone is quarried for road construction.

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Conferences and Meetings

Coming up

Natalie Hofbauer

4th Planta Europa Conference. 17-20 September 2004, Valencia, Spain.

Contact: Planta Europa Coordinator • Plantlife International • 14 Rollestone Street • Salisbury • Wiltshire SP1 1DX • United Kingdom • Tel.: +44/ 1722/342730 • Fax: +44/1722/329035 • E-mail: nadia.bystriakova@plantlife.org.uk • Website: www.plantaeuropa.org/ (viewed 21.7.2004).

3rd International Conference on Biological Invasions, NEOBIOTA – From Ecology to Control. 30 September-1 October 2004, Bern, Switzerland.

Contact: Zoological Institute • University of Bern • Baltzerstr. 6 • 3012 Bern • Switzerland • Fax: +41/31/631-4888 • E-mail: neobiota@zos.unibe.ch • Website: www.neobiota.unibe.ch/ (viewed 21.7.2004).

CITES 13th Conference of the Parties. 2-14 October 2004, Bangkok, Thailand.

Contact: CITES Secretariat, International Environment House • Chemin des Anémones • 1219 Châtelaine, Geneva • Switzerland • Tel: +41/22/917-8139/40 • Fax: +41/22/797-3417 • E-mail: cites@unep.ch • Website: www.cites.org (viewed 21.7.2004).

3rd IUCN World Conservation Congress. 17-25 November 2004, Bangkok, Thailand.

Contact: Dr. Steve Edwards (Senior Advisor) • IUCN – The World Conservation Union • 28 Rue Mauverney • 1196 Gland • Switzerland • Tel.: +41/22/ 999-0224 • Fax: +41/22/999-0020 • E-mail: steve.edwards@iucn.org • Website: www.iucn.org/congress/about/welcome.htm (viewed 20.7.2004).

XVII International Botanical Congress. 18-23 July 2005, Vienna, Austria.

Contact: Dr. Josef Greimler (Secretary General XVII IBC 2005) • Institute of Botany • University of Vienna • Rennweg 14 • 1030 Vienna • Austria • Tel. +43/1/4277-54123 • Fax: +43/1/4277-9541 • E-mail: office@ibc2005.ac.at • Website: www.ibc2005.ac.at (viewed 20.7.2004).

IX Congreso Latinoamericano de Botánica (IX Latin American Congress of Botany). 19-25 June 2006, Santo Domingo, Dominican Republic.

Contact: Sonia Lagos-Witte • Dirección, Coordinación General IX Congreso Latinoamericano de Botánica • Jardín Botánico Nacional • Apartado Postal 21-9 • Santo Domingo • Dominican Republic • Tel.: +1/809/385-2611, -2612, -2613 x 224 • Fax: +1/809/385-0446 • E-mail: j.botanico@codetel.net.do • Websites: www.botanica-alb.org/ or www.botanica-alb.org/CongresoPreins.pdf (viewed 21.7.2004).

CITES CoP 13

Uwe Schippmann

The 13th Conference of the Parties to CITES (CoP 13) will be held in Bangkok (Thailand) from 2-14 October 2004. One of the main tasks of this body is to discuss and decide upon proposals by member states to list additional plant and animal species on Appendices I and II, or to make changes to existing listings.

Like in earlier occasions, a number of proposals have been put forward which deal with medicinal plant species.

All species of the genus *Hoodia* spp. have been proposed for listing in Appendix II by three countries: Botswana, Namibia and South Africa (Prop. 37). This

is in response to the marketing of an appetite suppressor extracted and derived from *Hoodia gordonii* which has created considerable public debate on IPR and benefit sharing issues. It remains to be seen whether the international trade in *Hoodia* derivatives is significant and has a detrimental impact on the populations to warrant an inclusion in Appendix II.

Indonesia proposes to include all species of the related genera *Aquilaria* spp. and *Gyrinops* spp. (Prop. 49) because many of their species are negatively affected by the demand for agarwood. Presently only one species is on App. II: *A. malaccensis*. Since its inclusion in 1995 it has been argued that several other species need to be covered as well.

Taxus chinensis, T. cuspidata, T. fuana, and *T. sumatrana* are proposed for inclusion in Appendix II by China and the US (Prop. 48). The inclusion of these Himalayan species would support the listing of *Taxus wallichiana* which is on Appendix II since 16.2.1995. All species are in high demand for their anti-cancer activities.

Two other species proposals have been put forward to change the circumscription of which plant parts and derivatives have to be controlled: *Cistanche deserticola* (China) and *Taxus wallichiana* (China, US).

More than 20 internationally traded medicinal plant species are on the CITES Appendices, mainly on App. II. For them it is important, which so-called "parts and derivatives" (commodities) are specified for inclusion under the CITES provisions. The Plants Committee has long noticed that many of the Annotations coined for this purpose do not necessarily include the commodities relevant in trade. Upon request by the CITES Secretariat, the MPSG is involved in a process to improve the Annotations for some CITES medicinal species and to include the major commodities in the CITES listing. This will lead to a meaningful trade monitoring and will enable the CITES parties to take adequate conservation decisions. The two proposals mentioned on *Cistanche deserticola* and *Taxus wallichiana* made by China and the US are a first outcome of this process.

13th meeting of the
Conference of the Parties
2-14 October 2004, Bangkok, Thailand

Reports from Meetings

Sustained use and conservation of wild plants: building on traditional knowledge at the local people and protected area interface

Nan C. Vance

A symposium entitled "Sustained use and conservation of wild plants: building on traditional knowledge at the local people and protected area interface" was convened on the Kent University campus at the 16th annual meeting of the Society for Conservation Biology. The meeting was held from July 14th through the 19th 2002 and co-hosted by the Durrell Institute of Conservation and Ecology, The University of Kent at Canterbury and the British Ecological Society. Co-convened by Tony Cunningham and Nan Vance the symposium sought to bring awareness and understanding of the uses and interdependency of wild plants and people and to evaluate the kinds of strategies that have been and are being implemented to sustain and conserve plant species that have served people for centuries and continue to do so today. Under this broad rubric the presentations that addressed medicinal plants discussed key issues and problems, and introduced new approaches to addressing these issues. Primary among the issues were sustainability and access, and the need of greater ethno-ecological understanding at the nexus of conservation and use.

Terry Turner, OBE, Lecturer, Welsh School of Pharmacy, University of Wales, Cardiff began the symposium with the presentation "Medicinal Plants in Wales; historic perspective and current developments". He recounted how man's earliest association with wild plants was the recognition that in addition to their use as hunting and 'warrior' poisons they could also be used to alleviate sickness and bodily afflictions. This knowledge base was called 'wortcunning' and in common with all cultures, it was passed from generation to generation. Pharmacological advances that occurred in the 20th century in analgesics, steroid therapy, antineoplastic agents, antihypertensives, antiarrythmic agents and others were initiated by the observed bioactivity of plant constituents. Industrialized benefits that have accrued from investigating plant sources emphasize the need to sustain and conserve those species with known medicinal value with the majority yet to be investigated. The twelfth century physicians of Mydffai in central Wales left a written record of their remedies with formulations. These and other historical texts provide another source of local, indigenous knowledge that may have application to

modern medicine in addition to better understanding of the historical role and value of plant species native to the British Isles. The Welsh National Botanic Garden is currently initiating a research programme on the Mydffai remedies with particular emphasis on sustained use and conservation of plant species with clinical potential.

A major theme in natural resource use is one of access. Often access limitations despite good intentions create conflicts that are counterproductive. The conflict between local residents and the conservation community created by the closure of the Ugandan national park and World Heritage site, Bwindi Impenetrable Forest, resulted in restricted access and limited harvests for the herbalists. In a presentation entitled "Conflict, conservation and complexity: Reviewing multiple-use zone implementation around Bwindi-Impenetrable National Park, Uganda, 1991-2001", Tony Cunningham, WWF/UNESCO/Kew People and Plants Initiative, Fremantle, Australia, reviewed an attempt to address the conflict between the surrounding local community and conservation of Bwindi-Impenetrable National Park which followed its gazettement as a national park in 1991 from its earlier status as a forest reserve for over half a century.

The rising level of conflict and incidents of active damage to the park resulted in the introduction of multiple-use zones, from which registered users, including herbalists, would be allowed to harvest limited amounts of specified resources. Medius Kyoshabire, Remigius Bukenya-Ziraba, and Robert Höft, UNESCO-Nairobi, Kenya, in asking "Bwindi's herbalists (Uganda): What do they collect and where" presented a study of the people most affected by limiting access to forest resources (KYOSHABIRE 1998). It compared four categories of medicinal plant users: traditional birth attendants, women general herbalists, male herbalists and male non-specialists. From each of the 100 interviewees, information about the plants collected, parts used, and their habitats were recorded. More than two-thirds of the 295 species of herbs or shrubs listed grew outside the protected area. Most plants were used in mixtures with leaves as the most commonly used plant part. Men generally collected most medicinal resources from the forest and often used roots and bark while women relied on fallows and secondary bushland to collect mostly leaf material. Harvesting often required the performance of certain rituals which tended to protect the resource. Specialists applied more conservative harvesting methods than general users. The findings suggest that sustainable harvesting of medicinal plants is possible and should be preferred to a 'no use' approach.

Nancy Turner and Ann Garibaldi, Department of Biology, School of Environmental Studies, University of Victoria, Victoria, B.C., proposed a new approach to biological conservation of medicinal plant resources in their presentation "Cultural keystone species: Implications for ecological conservation and restoration." They suggested that certain species form the contextual underpinnings of a culture, as reflected in their fundamental roles in diet, as materials, or in medicine (TURNER et al. 2000). Cultural keystone species may be recognized by having all the characteristics of species that are an integral part of peoples' cultures and cultural identities:

- widely featured in language/vocabulary;
- have important roles in stories, narratives;
- featured in ceremonies, rituals, dances, songs, names;
- ubiquitous in dialogue (talked about frequently in conversation).

Without these key species, a culture itself would be completely different. An obvious example is western red-cedar (*Thuja plicata*) for Northwest Coast cultures of North America. Other examples are Blue camas (*Camassia quamash*) for Coast Salish and Nez Perce peoples of western North America, Saskatoon (*Amelanchier alnifolia*) berries for Interior Salish Peoples and Plains peoples, Bitterroot (*Lewisia rediviva*) for Okanagan Plateau peoples, and devil's club (*Oplopanax horridus*) for Haida, Haisla, Tlingit and other northern NW Coast Peoples. These cultural keystone species should be abundant enough for widespread and frequent use – often harvested in large quantities, and intensively managed for quality and productivity. Given that biological conservation and ecological restoration embrace human cultures as integral ecosystem components, one approach that may contribute to success in such projects is to recognize and include cultural keystone species in project design.

Trevor Lantz, School of Environmental Studies, University of Victoria, Victoria, B.C., discussed "A thorny issue: Devil's club (*Oplopanax horridus*) commodification, conservation and cultural knowledge" from his thesis work on a species that exemplifies unresolved issues associated with commercialization of local products and associated indigenous knowledge. Devil's club, identified by Professor Nancy Turner as a "cultural keystone species" is one of the most culturally important plants for indigenous peoples living within its range in northwestern North America (Figure 1).

Recognized for its commercial potential in international medicinal plant trade, increased harvest and sale of devil's club, raises concerns that over-harvesting may

lead to population declines, and that commercial use without protection and compensation for traditional medicinal knowledge associated with this species is inappropriate. Data from devil's club experimental harvesting indicate that intense commercial harvesting practices in which large portions of decumbent stem and roots are removed deplete the vegetative bud bank upon which regeneration and recruitment depend, potentially preventing long-term population persistence (LANTZ & ANTOS 2002). Surveys of cultural knowledge associated with devil's club and data from experimental harvesting trials emulating several traditional harvesting practices suggest that traditional harvesting methods can potentially aid in the development of sustainable management guidelines. However, this species' profound cultural significance, evidenced by the data on traditional use, does not appear to be compatible with commercialization, and raises the potential for future conflict.

Figure 1. Devil's club (*Oplopanax horridus*) is a medicinal plant of cultural importance to coastal people of northwestern North America who used sustainable techniques for centuries in gathering its roots and stems; however, the increasing commercial harvest of this species, in not using sustainable methods, has implications for its future survival.

A similar approach co-investigating how harvest practices affect population dynamics, and the indigenous knowledge of the region was employed by Suresh Ghimire, Central Department of Botany, Tribhuvan University, Kirtipur, Kathmandu, Nepal, and Yildiz Aumeeruddy-Thomas, CEFE/CNRS, Montpellier, France. The scientists addressed the prevailing issue of lack of needed information to develop sustainable utilization of medicinal and aromatic plants – in this case in the Himalayas. Their presentation "Ecological sustainability and management of highly threatened medicinal plants in the Nepal Himalaya" covered an ethnobotanical project initiated in 1997 in northwest Nepal that had two main approaches: One included monitoring population dynamics and simulating harvesting impacts of two highly threatened clonal plant species; and the other, an ethnoecological study that revealed and documented the rich knowledge of resource classification, use and management by the healers of the region. The authors reported that populations of jatamansi (*Nardostachys grandiflora*) and kutki (*Neopicrorhiza scrophulariiflora*) were dominated by regeneration of ramets through vegetative means. Negative correlations were found on ramet recruitment and survivorship with harvesting intensities. Kutki showed more rapid and successful multiplication and recovery of ramet than jatamansi. They also reported that jatamansi is more vulnerable to harvesting than kutki, due to its different morphology and low reproductive success.

Laurie Monti and Gary Nabhan, Center for Sustainable Environments, Northern Arizona University, Flagstaff, Arizona, determined that in the Sonoran Desert more than 60 medicinal plants are associated with the ecological and cultural keystone species known as Desert Ironwood (*Olneya tesota*), a dominant component of many plant communities (NABHAN & CARR 1994). This hardwood species has been rapidly depleted over the last 20 years for charcoal production for U.S. export, and as a result, the number of safe sites for germination and establishment of many other medicinal plants have been drastically reduced. Their message is clear that medicinal plant conservation is dependent on habitat conservation and is not exclusively related to the overexploitation of the plants themselves. Unless ironwood habitat is protected as it was in 2000 when Secretary of the Interior Bruce Babbitt created the Ironwood Forest National Monument on 129,000 acres of Arizona land, many valuable and useful plant species will have their numbers diminished beyond the level of sustainability.

Nan Vance, U.S. Forest Service, Pacific Northwest Research Station, discussed a five-year study of plants and fungi of commercial importance found on public lands in the presentation "From *Taxus* to *Trillium:* The collection and use of native plants in the northwestern United States." Of the native vascular plants in the northwestern United States that are harvested for personal and commercial purposes, the vast majority are medicinal plants. These widely sought after plants are harvested by diverse peoples, many from urban envi-

ronments with little knowledge of the species. A practical guide that could be used to educate the wild plant collector and user in conservation, conservative harvest practices, and to recognize species that are vulnerable, rare, or sensitive was identified as a useful tool for increasing awareness of appropriate collection and use of species growing in the wild on public lands. A literature search, along with interviews and meetings with resource managers, interested people from the local communities, harvesters, people of local regional tribes, and conservationists resulted in the assessment of 76 vascular plant taxa of which 90% were native, and of those, 75% were medicinal plants. The guide provides species descriptions, biological and ecological information, wild harvest methods and alternatives to wild harvest (VANCE et al. 2001). A set of criteria was applied in identifying species vulnerable to harvest. Areas of concern were reported with regard to species conservation and importance to indigenous peoples. The majority of these plant species can be cultivated, which has implications for their conservation and sustainable management on public and private lands. Members of the Plant Conservation Alliance, Medicinal Plant Working Group supported the effort and have helped considerably in using it as a model information tool.

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Revision of the "WHO/IUCN/WWF Guidelines on the Conservation of Medicinal Plants"

Wolfgang Kathe & Alan Pierce

The *WHO/IUCN/WWF Guidelines on the Conservation of Medicinal Plants* (IUCN 1993), originally published in 1993, can be traced back to a historic meeting of health care and conservation specialists convened by the World Health Organization (WHO), IUCN – The International Conservation Union and the World Wide Fund For Nature (WWF) in Chiang Mai, Thailand in March 1988. This meeting resulted in the publication of the Chiang Mai Declaration: 'Saving Lives by Saving Plants'. The Chiang Mai Declaration emphasized the world-wide importance of medicinal plants for human health care and expressed concern over the continuing loss of habitats and medicinal plant resources in many regions across the globe.

The *WHO/IUCN/WWF Guidelines on the Conservation of Medicinal Plants* (hereafter called *Guidelines*) provided a framework for the development of national strategies on the conservation and sustainable use of medicinal plants and put medicinal plant conservation on the international agenda for a diverse set of stakeholders, including national health authorities, environmental and trade authorities, conservation groups and policy makers. The *Guidelines* constituted an action plan for the development of IUCN's *Medicinal Plant Specialist Group*, founded in 1994, were considered while forming WWF's *People and Plants Initiative*, and had an influence on WHO's *Traditional Medicine Strategy 2002-2005*.

Since the *Guidelines* were first published, several important developments have taken place in international conservation, medicinal plants and health care policies and sustainable use of natural resources. The Convention on Biological Diversity (CBD) in particular had a strong impact and influence on how the use of natural resources could be managed to improve sustainability; for the first time, an internationally acknowledged conservation convention considered social equity a cornerstone of sustainable use of natural resources such as medicinal plants. In 2002, the Global Strategy for Plant Conservation was published and subsequently translated into regional strategies and action plants, e.g. in Africa and Europe.

In addition, governments and companies in all parts of the world have become increasingly aware of the importance of quality and safety issues in product development and health care. 'Best Practices' standards have been developed nationally and regionally to ensure the quality of medicinal plant raw material and

products. On the international level, WHO recently developed quality and best practices guidelines through an international consultation process. These *Guidelines on Good Agricultural and Collection Practices (GACP) for Medicinal Plants* were published by WHO in early 2004[1], and cover mainly safety- and quality-relevant issues relating to the harvest and handling of medicinal plants from cultivated and wild sources, but also include several aspects of sustainable medicinal plant collection and farming.

Considering these fairly recent developments, a review of the 1993 *WHO/IUCN/WWF Guidelines on the Conservation of Medicinal Plants* found the document to be out of date in several respects. The urgent need for effective medicinal plants conservation strategies and actions including sustainable resources management, however, has not decreased since 1993. For this reason, representatives from WHO, IUCN, WWF, TRAFFIC and several other medicinal plants experts came together in Oxford, UK in May 2003 to discuss how to best achieve these goals. The participants agreed to initiate a revision of the *Guidelines* through an international consultation process and, as a second step, develop a set of standards and criteria for the sustainable sourcing of medicinal plants from the wild.

In August 2003, the first draft outline of the revised *Guidelines* was made available and subsequently circulated for consultation both within the networks of the author organisations and to more than 250 medicinal plants experts world-wide. Care was taken to achieve a balanced geographical and stakeholder representation. A particularly large number of specialists consulted reside in the world's largest source regions and consumer countries, namely South Asia, China, North America and Central Europe. Representatives from government agencies and ministries, intergovernmental organisations, NGOs, trade companies and associations, pharmaceutical companies, donors, universities and other academic institutions were among the experts included in this consultation.

More than 70 comments were received during the first consultation round. These comments were incorporated into the newly revised draft of the Guidelines, released in May 2004. This draft has been sent out to an even larger group of over 400 external medicinal plants experts. Comments were expected back by e-mail until the end of July 2004.

In parallel, an international workshop on the revision of the *Guidelines* was organised by the Kunming Institute of Botany, Chinese Academy of Sciences in co-operation with WWF-UK. This workshop was held in late June 2004. About 30 medicinal plant experts from Asia, Africa, Latin America, North America and Europe have been invited and discussed the most important, controversial, and/or unresolved issues included in the revised draft Guidelines.

The results of both the workshop and the e-mail consultation will be integrated into a new draft of the revised *Guidelines*. The next draft is expected to be ready by early October 2004, and will be sent out for consultation again. It is hoped that a final draft of the *Guidelines* will be available for presentation at the IUCN World-Conservation Congress in Bangkok in November 2004. The revision process will be finalized in the first half of 2005, followed by translation into several languages and subsequent publication of the revised *Guidelines*.

The revised edition of the *WHO/IUCN/WWF/TRAFFIC Guidelines on the Conservation of Medicinal Plants* carries forth the spirit of the original document published in 1993, the Chiang Mai Declaration, the Bangalore Declaration, and the CBD. The revised *Guidelines* will be less descriptive and more clearly structured as compared to the original document. Several new sections will be added and it is planned to supplement the text with 'example boxes' set aside from the main body of the text and illustrating the recommendations of each section through concrete examples and project experience. The target audience of the revised *Guidelines* has been broadened to address not only governments and intergovernmental organisations but also NGOs and the commercial medicinal plant sector.

Sections newly developed for this revised draft document include 'equity' (covering issues such as access and benefit sharing and intellectual property rights), 'responsible business practices' and 'sustainable production'. The draft *Guidelines* address medicinal plants obtained from wild and cultivated sources, including all intermediate forms of medicinal plant management and harvest.

With these revised Guidelines, WHO, IUCN, WWF and TRAFFIC strive for developing an important framework document with a world-wide impact. The Guidelines may serve as the starting point to initiate further developments towards applicable standards and criteria for the sustainable collection of medicinal plants from the wild, such as the recent initiative taken by the German Federal Agency for Nature Conservation (BfN), together with WWF, IUCN and other partners (see also LEAMAN on page 7 of this issue). These *Guidelines* may also influence company policies

[1] See also PIERCE & KATHE in this issue of the Newsletter. The full text of the GACP can be found on WHO's website: www.who.int/medicines/library/trm/medicinalplants/agricultural.pdf.

and company guidelines and standards, the development of codes of conduct, and management plans for sustainable resources management.

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WHO releases Guidelines on Good Agricultural and Collection Practices (GACP) for medicinal plants

Alan Pierce & Wolfgang Kathe

In late 2003, the World Health Organization (WHO) published its *Guidelines on Good Agricultural and Collection Practices (GACP) for Medicinal Plants*. The development of the GACP guidelines is the culmination of a two year consultative process spearheaded by the Traditional Medicine (TRM) team at the WHO's Department of Essential Drugs and Medicines Policy. As is the usual practice at WHO for developing any technical guideline or standard, the consultation process involved circulation of several iterations of the document to WHO Member States, relevant organizations, institutions, authorities and individual experts worldwide for comment as well as one working group meeting and a WHO consultation at which the draft guidelines were reviewed and finalized.

The WHO GACP guidelines represent one of many outputs envisioned in the implementation of the *WHO Traditional Medicines Strategy: 2002-2005* (WHO 2002), which includes a four-prong strategy of 1) framing policy, 2) ensuring safety, efficacy and quality, 3) enhancing access, and 4) promoting rational use. The WHO GACP guidelines support the objectives of WHO's Traditional Medicine Strategy by promoting the quality, safety, and efficacy of herbal medicines and encouraging the conservation of medicinal plants and the environment in general.

As use of herbal medicines continues to grow worldwide, the safety of herbal medicines and raw medicinal plant materials has become a topic of concern, particularly in light of recent reports indicating adverse effects directly attributable to quality issues. The WHO GACP guidelines are a response to a resolution on traditional medicine adopted by the World Health Assembly (WHA56.31), wherein Member States requested WHO "to provide technical support for development of methodology to monitor or ensure product safety, efficiency and quality, preparation of guidelines, and promotion of exchange of information."

WHO's GACP guidelines contain four sections: a) good agricultural practices for medicinal plants; b) good collection practices for medicinal plants; c) common technical aspects of good agricultural practices for medicinal plants and good collection practices for medicinal plants; and d) other relevant issues (focusing on additional research needs). The scope of the document is broad and outlines processes and protocols that will improve the quality of starting materials for herbal medicines. Sanitation and handling criteria are consistent with several existing Good Agricultural Practices documents, including those of the People's Republic of China, the EU, and Japan, which form annexes to the document.

While issues of environmental protection and social justice are considered in the WHO GACP guidelines, they are not covered comprehensively, as they are beyond the focus of the document. The GACP guidelines cross-reference several other WHO guidelines relating to quality assurance and control, Codex Alimentarius and the *WHO/IUCN/WWF Guidelines on the Conservation of Medicinal Plants* (1993), which is currently under revision (for further details, see KATHE & PIERCE on page 54 in this issue).

As is the case with other WHO guidelines, the GACP guidelines will not be legally binding for Member States. Rather its purpose is to serve as a reference document for best handling and sourcing practices of medicinal plants to WHO's Member States, national and international organizations, and the medicinal plant trade. As such, the document has the potential to influence a wide range of stakeholders as well as future standards-drafting efforts in the medicinal plant sector. The GACP guidelines are available in hard copy and for download (www.who.int/medicines/library/trm/medicinalplants/agricultural.pdf; viewed 8.6.2004) in English. The document is also being translated into Arabic, Chinese, French, Russian and Spanish.

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Seminar on MAPs and protected areas in SE Europe

Sustainable use of medicinal and aromatic plants for financial support of protected areas in southeast Europe

Wolfgang Kathe & Susanne Honnef

Introduction

Southeast Europe is and has traditionally been one of Europe's most important source regions for medicinal and aromatic plants (MAP). The sourcing of and trade in these plants is a major economic factor in many southeast European countries. West and Central European countries are prime destinations for large quantities of medicinal and aromatic plants from the Balkans. The trade links to Germany, which is one of the main importing countries for MAP from southeast Europe, are particularly intensive (LANGE 1996, 1998, 2002).

Discussions on the harvesting and trade in MAP in the Balkans have to deal with at least three equally important dimensions: the ecological, the social and the economic issues. For a sustainable development of MAP harvesting, all three dimensions have to be considered. The Balkans' richness in natural resources and biodiversity is remarkable, which makes the area a key region for the conservation of Europe's natural heritage. However, southeast Europe's biodiversity is threatened by various impacts. Most countries in the region are in a political and economic process of transition, which offers chances of development in various sectors but – at the same time – exerts considerable pressure on the countries' political economics. Administrative authorities and responsibilities are being re-structured, and the legal system of many countries of the region is or has been structurally reorganised.

Nature conservation is currently not regarded as a priority issue in most southeast European countries. Many ecosystems of the region suffer from a variety of detrimental impacts such as small- to large-scale habitat destruction and over-exploitation of natural resources. In some countries, the political instabilities resulted in ethnic tensions, sometimes followed by armed conflicts. The effects of such warfare were – besides the loss of lives and the destruction of infrastructure – the impairment of and damage to ecosystems such as forests or grasslands by burning, minefields, and mechanical destruction through armed forces, companies, the impoverished population or refugees. Surfaces stripped bare of their natural vegetation are often prone to erosion, which is a development of major concern in many regions of southeast Europe.

This development endangers not only the plant species and their habitats but also the livelihoods of the people involved in MAP collection and trade. Most harvesters belong to poorer and under-privileged groups in society and quite often depend on the additional income generated by harvesting MAP from the wild. Consequently, over-exploitation of these natural resources has a negative impact on the plant species, the welfare of the harvesters and the economy of the countries.

In recent years, the network of protected areas has been improved in most southeast European countries. Areas of special beauty, uniqueness or richness in biological or geological diversity have become protected areas, which have mostly been classified according to the IUCN categories. Depending on the country and on the status of the protected area (national park, biosphere reserve, nature park and others) the collection of medicinal and aromatic plants from the wild may be restricted or totally prohibited. In some protected areas, the sustainable use of natural biological resources such as medicinal and aromatic plants is permitted or even encouraged. The valorisation of natural environments for both the local population and the politically and economically acting persons and groups is essential in order to protect the wild-stock of native medicinal and aromatic plant species and populations, which may also be or become a factor in protected area financing.

For these reasons, the German Federal Agency for Nature Conservation (BfN) has started to discuss the subject of sustainable use of MAP and the current and potential links to nature conservation in the Balkans. The BfN has commissioned a study about the current sourcing of and trade in MAP and the possibilities to use parts of the income generated from the trade in MAP for nature conservation in protected areas in five selected countries: Albania, Bosnia-Herzegovina, Bulgaria, Croatia, and Romania. This background study and the relating report were carried out by WWF Germany and TRAFFIC Europe who – jointly with the BfN – also organised a seminar on the same topic. The seminar should offer participants from the region information on the current status of MAP sourcing and trade in southeast Europe and of links between nature conservation and the sustainable use of natural resources in other countries of the region. The seminar was to provide a forum to discuss future initiatives and activities, evaluate the potential for co-operations and find out if a system could be established to partly finance nature conservation in protected areas through revenues from the sale of sustainably harvested MAP sourced from the territory or in the vicinity of the protected area.

Background study on "Medicinal and Aromatic Plants in Albania, Bosnia-Herzegovina, Bulgaria, Croatia and Romania.

Based on existing links and working relationships between WWF Germany and several NGOs and academic institutions in southeast Europe, experts in the MAP sector of the five selected countries were asked to answer to a detailed questionnaire on the current use of medicinal and aromatic plants in and outside protected areas in their respective countries.

The aims of the study were to:

- Assess and give an overview of the current status of wild-collection and cultivation of MAP in the five countries selected;
- Analyse the current MAP wild-collection activities in a number of selected protected areas in each country;
- List and describe the national, European and international legislations relevant to nature conservation and to the sourcing of natural bio-resources, especially relating to MAP;
- Select and describe pilot projects linking the sustainable use of MAP to financing nature conservation in southeast Europe or other regions;
- Find out if there are options to use parts of the income generated by the trade in MAP sourced from within or from around protected areas for nature conservation purposes.

The results of the research carried out showed that all five countries share some aspects related to MAP sourcing and trade, in particular

(i) They are important source countries for MAP and other NTFP.

(ii) Wild-collection of MAP dominates over cultivation (in terms of species and in terms of harvest volumes).

(iii) Wild-collection of MAP is usually performed by poorer or marginalized groups in society.

(iv) They suffer from a high biodiversity loss, and erosion is a serious problem in many regions.

(v) The quantities of MAP used for domestic processing and the manufacture of finished herbal products is still low compared to the export quantities of MAP raw material (partly except for Romania).

(vi) Except for Bosnia-Herzegovina, all countries have a fairly well developed system of protected areas; however, their management seems to be mostly still insufficient.

(vii) Nature conservation and sustainability aspects have started to become an issue in the five countries' national legislation, but – partly except for Bulgaria – law implementation and enforcement is still weak.

Despite the common conditions, there are many country-specific aspects relating to MAP sourcing, trade and use.

Albania

The harvesting of MAP from the wild is still widely common with the rural population, because it creates a much-needed additional income (LANGE 1998); in some regions the wild-collection of MAP is even becoming increasingly important. According to a survey, the wild-harvesting and sale of MAP is the second-most important source of income for poorer rural households in Albania (KUPKE et al. 2000). Over-exploitation of wood and NTFP, including many MAP species, resulted in amendments to the Albanian 'Law on Environmental Protection' and the foundation of a National Environmental Agency (NEA), recently re-named 'Ministry of Environment', which subjected MAP and other NTFP collection to licensing and issues environmental permits (SEED HQ 2000). However, the effectiveness of the licensing system is questionable. Today, Albania faces the highest rate of biodiversity loss in Europe (REC 2000a). Wild-harvesting accounts for over 90% of Albania's MAP sourcing; cultivation of MAP is still uncommon, although trading companies are requesting that the domestication and cultivation of MAP and other herb species be intensified; prime target species include, among others, *Rosmarinus officinalis*, *Lavandula officinalis*, and *Satureja montana* (DEDEJ, pers. comm.). In national parks the collection of MAP from the wild is basically permitted, but it can be restricted if required. In most other protected areas the wild-harvesting of MAP for commercial purposes is not allowed (DEDEJ, pers. comm.).

Bosnia-Herzegovina (BiH)

The 'Bosnian War' had a tremendous impact on the wild-harvesting of MAP, as well as on the use of timber and other NTFP. The most important long-term effects are (REC 2000b):

(i) Damage to natural resources by illegal and almost uncontrolled cutting, collection and export of timber and NTFP such as MAP;

(ii) Poor infrastructure and logistics; low productivity;

(iii) 20% of the forest land is still mined;

(iv) Complicated and diverse political and legal structures in BiH (two entities – Republika Srpska and the Federation of BiH – with widely independent legislation and authorities).

The consequences resulting from this situation are an increase in deforestation and erosion, the further en-

dangering of some plant species and a general loss of biodiversity. In addition, many people were killed or driven from their homeland in both cities and rural areas; with them a great deal of knowledge relating to the collection of MAP was lost. Yet, there is no survey to discover in which regions MAP wild-harvesting was most strongly affected by the consequences of the war.

In the late 1990s, the MAP species reported to be collected from the wild in larger quantities were – amongst others – *Arctostaphylos uva-ursi, Tilia* spp., *Urtica* spp., *Hypericum perforatum, Rosa canina,* and *Gentiana lutea* (Seed HQ 2000). In 2001, *Juniperus* spp. and *Salvia* spp. were – in terms of volume – by far the most intensively harvested MAP species in BiH (PECANAC, pers. comm.). Except for some species used for timber production, no plant species are explicitly protected by national legislation ('Forest Laws' of Republika Srpska [RS] and the Federation of Bosnia and Herzegovina [FBiH]); however, a 'Red List of Protected Plant Species' in FBiH is under preparation (PECANAC, pers. comm.). Cultivation of MAP in BiH is still uncommon; only an area of 200-300 hectares of agricultural land is supposedly used to grow MAP, in particular *Lavandula angustifolia, Matricaria recutita,* and *Mentha* spp. (SEED HQ 2000; PECANAC, pers. comm.). In protected areas, MAP and other NTFP harvesting is strictly forbidden; it is believed that in some of these areas (e.g. in Kozara National Park and Blidinje Nature Park) MAP are collected illegally, however only on a small scale and for private use.

Bulgaria

With an annual export of about 10,000 tonnes of dried MAP raw material Bulgaria is the largest MAP exporting country in southeast Europe (LANGE 2002). In Bulgaria, like in most other countries of the Balkans, the wild-harvesting accounts for the majority (75-80%) of MAP traded at the domestic and international markets (EVSTATIEVA & HARDALOVA 2004); only an estimated 20-25% is sourced from cultivation (LANGE & MLADENOVA 1997). 66 medicinal plant species are protected, 35 are currently under 'restricted regime', and 30 species are cultivated (including 10 species that are sourced from both cultivation and wild-collection) (EVSTATIEVA, pers. comm.). Wild-collection is still an important economic factor for parts of the rural population, especially for older people who sometimes depend on this additional income. Most small or medium sized regional or national trading companies employ individual collectors or families to provide the raw material for trade on request. Most collectors in Bulgaria, however, are not contracted by trading companies but work on their own and sell the MAP raw material to intermediate traders. The total number of people involved in commercial MAP wild-collection in Bulgaria is estimated at about 400,000 (ZHELEV, pers. comm.). Today, the MAP species wild-collected in the largest quantities in Bulgaria are *Rosa canina* s.l. (fruits; about 1,000 tonnes/year), *Prunus spinosa* (fruits, flowers; about 500 tonnes/year), *Urtica dioica* (herb; about 450 tonnes/year), *Crataegus monogyna* (fruits, flowers, leaves; about 400 tonnes/year), and *Vaccinium myrtillus* (fruits; about 300 tonnes/year) (ZHELEV & EVSTATIEVA, pers. comm.).

The wild-collection of MAP and other NTFP is mainly controlled through licence fees and taxes collected by the regional governmental authorities. In addition, the Ministry of Environment collects fees for import and export certificates to be issued for the commercial trade in MAP and other NTFP. According to the relatively new 'Law on Medicinal Plants' (SJ No. 29, 2000) the collection has to be controlled on-site by municipalities, which have a mandate from the Ministry of Environment. There is a monitoring system for wild-collection, which is reported to operate fairly effectively. In addition, an annually revised quota system is applicable to certain species (LANGE & MLADENOVA 1997).

In protected areas the wild collection of medicinal and aromatic plants is basically permitted, but it can be restricted by legal provisions.

Croatia

It is difficult to obtain data about current and species-specific amounts of MAP collected in Croatia. Available, however, is a list of 22 MAP species for which the Ministry of Environmental Protection and Physical Planning issued collection permits and set quotas higher than 1,000 kg in 2001. The MAP species with the highest quotas set in 2001 were *Urtica dioica, Equisetum arvense, Castanea sativa, Juniperus communis,* and *Aesculus hippocastanum* (STRBENAC, pers. comm.). In 2001, quotas were set for 87 plant species, and nine companies were given harvesting permits; the total harvest yield in these species was about 108.9 tonnes in 2001 (Šatovic, pers. comm.).

The wild-harvesting of medicinal and aromatic plants is controlled by the Ministry of Environmental Protection and Physical Planning. According to the 'Law on Nature Protection', an approval for collectors and companies harvesting plants from the wild that are not protected by the law has to be issued by the ministry, if plants are collected for processing, commercial or trading purposes.

The Croatian 'Law on Nature Protection' protects 44 plant species, five of which are traditionally used as

medicinal plants in folk medicine: *Anacamptis pyramidalis, Gentiana acaulis, Gentiana lutea* ssp. *symphyandra, Paeonia mascula* ssp. *mascula* and *Trollius europaeus* (ŠATOVIC, pers. comm.). The Ministry of Environmental Protection and Physical Planning is currently working on a Rule Book to regulate the protection of all plant species listed in the Croatian Red Data Book (SAFNER, pers. comm.).

Medicinal and aromatic plants are only scarcely cultivated in Croatia. In 2001, MAP were cultivated on an area of about 2,000 ha, which equals about 0.16% of the total arable land (ŠATOVIC, pers. comm.). The most important species cultivated are: *Matricaria recutita, Mentha x piperita, Lavandula angustifolia, Salvia officinalis, Althaea officinalis,* and *Calendula officinalis* (ŠATOVIC, pers. comm.).

As in Bosnia-Herzegovina, the collection of medicinal and aromatic plants and other NTFP in protected areas is strictly prohibited by the law. However, small-scale collection of MAP for personal use is said to take place in some Croatian protected areas.

Romania

Currently, the most important of over 300 species collected in Romania are *Vaccinium myrtillus* (fruits, ca. 2,500 tonnes in 2001) and *Rubus idaeus* (fruits, ca. 1,500 tonnes in 2001). MURARIU (2002) estimates that about 11,280 tonnes of dried MAP raw material were collected from the wild in 2001. This estimate seems relatively high, compared to Romania's export statistics (LANGE in chapter 8 of the background study [KATHE, W., S. HONNEF & A. HEYM (2003)]), because it would mean that only about 10% of the raw material collected in Romania enters the international market and 90% are either traded locally or processed by national companies.

Most MAP collectors are seasonal workers gaining additional income by the collection of MAP during the spring and summer months. Only a few small communities – e.g. in the Muntii Apuseni region – live entirely on the collection of MAP from the wild (BLUMER and MICHLER, pers. comm.). Wild-collection of MAP in Romania is controlled by the federal government. Inspectors of the Environment Protection Agency (EPA), which represents the Ministry of Water and Environment Protection, regularly control collectors in the field and at storage points. The controls are based on a monitoring and quota system that results in the issue of Environmental Permits. In 1999, Environmental Permits were issued for 2,300 tonnes of medicinal and aromatic plants. Some MAP species are protected by Romanian legislation and not allowed to be harvested from the wild. The Nature Conservancy Council of the Romanian Academy determined the status of 'protected species' including the MAP species *Adonis vernalis, Convallaria majalis,* and *Ruscus aculeatus* (COLDEA, pers. comm.). The collection of plant species listed in the Red Lists is prohibited in and outside protected areas (Law No. 462/2001).

The cultivation of MAP has a long tradition in Romania. About 50 different species (52, according to MURARIU 2002) are cultivated, above all *Hippophae rhamnoides* (about 650 ha) and *Aesculus hippocastanum* (about 120 ha). Yields from the cultivation of *Calendula officinalis* and *Salvia officinalis* predominantly enter the international market.

The wild-collection of medicinal and aromatic plants from protected areas is in most cases not explicitly forbidden in Romania, but as a rule it is not encouraged by the authorities either.

Seminar on the Isle of Vilm

A seminar on the status of MAP sourcing and the perspective of a link between sustainable sourcing of MAP and protected area financing in Southeast Europe was held at the International Academy for Nature Conservation (INA) on the Isle of Vilm, Germany, between December 2 and 6, 2002. Representatives from management authorities, NGOs, park authorities and other institutions and associations from Albania, Bosnia-Herzegovina, Bulgaria, Croatia, and Romania were invited (with observers from Kyrgyzstan).

The seminar was divided into four sections:

Background Presentations: The seminar started with four background presentations: 1) Presentation of the background study; 2) Funding structures of protected areas in the Balkans; 3) protected areas and related legal regulations in the Balkans; and 4) The role of southeast Europe in international MAP trade.

Country Reports and Pilot Projects: The current situation in the MAP sector of all five countries was presented by representatives from each country and the observer country Kyrgyzstan. In addition, five pilot projects from different countries and with different targets and strategies cast a spotlight on the variety of options: 1) The use of *Arnica montana* in the Apuseni region, Romania; 2) The establishment of Ohrid and Prespa National Park in Albania; 3) The GTZ-project on the cultivation of *Gentiana lutea* in Bosnia and Herzegovina; 4) The sustainable wild-collection of *Vaccinium myrtillus* in Central Balkan National Park, Bulgaria; and 5) The Ramsar-project 'Bolsa Amazônia' in Brazil.

In the third and fourth section **Thematic** and **Country Group Workshops** were held. The Country Group

Workshops offered the participants the opportunity to develop their own, country-specific ideas of how a sustainable use of MAP in or near protected areas could be initiated (addressing all aspects of sustainability), and what options there were to link this with PA financing.

The abstracts of the presentations, the main results of the workshops and a summary of the discussions can be found in the proceedings to the seminar, which can be obtained from the German Federal Agency for Nature Conservation (BfN).

Conclusions

Having analysed the current situation of MAP sourcing and trade and its potential links to financing protected areas in southeast Europe it becomes evident that the most urgent and crucial issue is to find ways to guarantee the sustainability of the use of natural bio-resources such as MAP. The participants of the seminar agreed upon the 'Declaration of Vilm' listing the recognized status quo with regard to the MAP sector and making recommendations to responsible bodies on how to directly and indirectly improve the sustainability of MAP sourcing, trade, production and use on different levels (the 'Declaration of Vilm' can be viewed on the CD-ROM with the proceedings of the seminar).

To achieve this, the basic requirements are to:

- invest in comprehensive research projects to assess MAP populations, build up an inventory and establish effective and continuous monitoring systems;
- raise awareness of the importance of a sustainable use of bio-resources such as MAP among all people and stakeholders involved in sourcing, trade, and production;
- develop criteria for the sustainable sourcing of MAP and analyse the demands of the national and international markets;
- discuss, develop and establish individual and comprehensive management plans for protected areas and for MAP and other NTFP sourcing activities in and outside protected areas;
- identify suitable financial instruments to support pilot projects;
- support the participation of the local population in all stages of developing and carrying out sustainable MAP sourcing projects;
- promote fair and transparent trade, guarantee equal benefit sharing (e.g. through domestic processing and production of finished herbal medicine) in order to strengthen the people's and the countries' economy and to reduce poverty;
- improve law enforcement and trade control systems.

If progress is made in these basic requirements it may be easier to establish mechanisms to use part of the income generated by the collection of and the trade in MAP for nature conservation and environmental protection purposes such as financing nature conservation activities in protected areas.

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Participants of the MAP seminar on the Isle of Vilm from 2-6 December 2002. Photo: Bundesamt für Naturschutz 2002.

The background study (print version) can be obtained from:

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The proceedings of the seminar as well as the study are available on CD-ROM and can be ordered from *Martina.Finger@bfn-vilm.de*. The CD-ROM also contains the 'Declaration of Vilm'.

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The importance of ethnobotanical survey and medicinal plant collection monitoring for biodiversity conservation in Piatra Craiului National Park (Romania)

Oliviu Pop

Introduction

Conserving biodiversity, alongside of knowledge of traditional use, can have considerable medical and economic benefits, and ethnobotanical surveys can help to evaluate the conservational, economic and cultural importance of natural habitats. The local classification of plants and illnesses is likely to show some differences compared to those used by a botanist or doctor. The main objectives of an ethnobotanical field survey are usually to document the first category, relate it to the second category and evaluate quantitatively the use and management of the plants in the region (Martin 1995). Traditional knowledge is often astonishing being especially important in a National Park to know and promote local communities' traditions closely related to biodiversity conservation.

The data presented in this paper is a part of an ongoing survey (2000-2005), which takes place in Piatra Craiului National Nark. The aims of this study are:

- Identification of medicinal, aromatic and ceremonial plant species used by local people through ethnobotanical research correlated with data provided by botanical scientific research (presence, distribution and abundance of plant species on park's territory);
- Quantitative evaluation of the use and management of this plant species in the park;
- Medicinal plants collection monitoring;
- Medicinal plants collection management.

1. Information regarding the presence and abundance of medicinal and aromatic plants (MAP) in the park

These data were obtained during a literature survey conducted by the park administration. A total number of 1,108 plant taxa (species and subspecies) were identified on the park's territory (14,800 ha). Among these, about 300 plant species have medicinal properties. Compared with high plant species diversity the abundance of the majority of MAP on this territory is rather low.

2. Ethnobotanical survey

In order to assess the traditional use of plant species,

the Park Management Authority conducted an ethnobotanical survey.

Until now, the ethnobotanical study was conducted in two settlements of Brasov County: Magura village (680 inhabitants) placed in the eastern part of Piatra Craiului National Park, inside the park boundaries and Zarnesti, a small town (26,600 inhabitants), placed near the northeastern boundary of the park. These settlements are close to each other and have strong traditional bounds.

Figure 1. Magura village on the eastern edge of Piatra Craiului National Park (Photo: O. POP 2002).

Fieldwork was carried out from June to September 2000 and from July to September 2001. Information was obtained through ethnobotanical interviews with residents in the study area. Each species the informant mentioned was listed, with data of parts used, preparation and function. A card index for each informant was used, giving the age, sex, marital status, education, and other useful information, and a simple statistical analysis of general uses of medicinal plant in the local communities was made.

We present here only a preliminary list of 63 plant species used by local people as medicinal, aromatic, alimentary and ceremonial plants, listed in alphabetical order, followed by family and local Romanian names (Table 1).

The people from the study area use the diversity of plant species in the meadows, forests, gardens, and abandoned lands as herbal medicine to treat various ailments or as ceremonial plants. Some of these species have other primary uses, such as fruits (*Fragaria vesca, Rubus idaeus, Rubus caesius, Vaccinium myrtillus* etc.), flavouring food (*Origanum vulgare, Carum carvi*) or as vegetables (*Allium ursinum, Chenopodium album, Taraxacum officinale, Urtica dioica* etc.). Various weeds are also used (*Arctium lappa, Lamium album* etc.).

Among the 63 recorded species local people mentioned the medicinal properties of 56 plants, the alimentary uses of 21, the colouring properties of 9, and the ceremonial use of 11 plant species. The most collected and used medicinal species in local communities are: *Taraxacum officinale, Mentha longifolia, Sambucus nigra, Equisetum arvense, Abies alba, Rosa* sp., *Crategus monogyna, Hypericum* sp., *Achillea millefolium, Thymus* sp., *Urtica dioica, Ranunculus ficaria, Vaccinum myrtillus, Corylus avellana* etc.

Preliminary results of the study show that knowledge and use of herbal medicine for the treatment of various ailments among local villagers is still a major part of their life and culture, even if some knowledge of few plant species uses are almost lost.

The local communities consistently use some species as ceremonial plants in local or religious holidays. This demonstrates an ancient history of traditional plant uses in the surrounding settlements of Piatra Craiului National Park.

Further research is needed to complete the list of plant species used by the local people in all settlements surrounding the park. There appears to be necessary, as well, a more detailed statistical analysis of the final data in order to assess the plants' use and plant collection on the park's territory.

3. Medicinal plant collection monitoring and management

The collection of the medicinal and aromatic plants must be limited to avoid the spoliation and extensive use of this resource for industrial purposes. This is achieved through the park's "Biodiversity Monitoring Plan" and management measures included in the park's "Management Plan". The "Management Plan Piatra Craiului National Park" contains the main management actions necessary to maintain the park's integrity (landscape, biodiversity, local traditions etc.). The priority and the intensity of the management measures are adapted permanently according the results of the monitoring protocols included in the "Piatra Craiului Biodiversity Monitoring Plan". The main aim of the monitoring protocols included in this plan is to asses the success of each management action reflected by the response of one or more selected indicators.

The monitoring plan has been developed in close correspondence with the management plan for Piatra Craiului National Park. The elaboration of the "Management Plan" was a participative process implying all stakeholders, taking into account the socio-economic situation of local communities. So, in the same way the "Biodiversity Monitoring Plan", derived from the management plan, is more a realistic, practical than a scientific one, as well. Given the constraints in

Table 1. Preliminary list of 63 plant species used by local people as medicinal, aromatic, alimentary, and ceremonial plants.	
Scientific name	**Romanian name**
Abies alba Mill. (Pinaceae)	Brad, brad alb
Achillea millefolium L. (Asteraceae)	Coada °oricelului
Allium ursinum L. (Alliaceae)	Leurdã
Alnus glutinosa (L.) Gaertn. (Betulaceae)	Anin negru
Alnus incana (L.) Moench (Betulaceae)	Anin alb
Arctium lappa L. (Asteraceae)	Brusture, scai
Arctium tomentosum Miller (Asteraceae)	Brusture, scai
Athyrium filix-femina L. (Woodsiaceae)	Ferigã
Betula pendula Roth (Betulaceae)	Mesteacãn
Calendula officinalis L. (Asteraceae)	Gãlbenele
Capsella bursa-pastoris (L.) Moench (Brassicaceae)	Traista ciobanului
Carlina acaulis L. (Asteraceae)	Turtea, turtã, turtele
Carum carvi L. (Apiaceae)	Chimion, chimãn, chimen
Centaurium erythraea Rafin. (Gentianaceae)	Þintaurã, fierea pãmântului
Chelidonium majus L. (Fumariaceae)	Rostopascã, laptele câinelui
Chenopodium album L. (Chenopodiaceae)	Lobodã, lobodã porceascã, lobodã sãlbaticã
Cichorium intybus L. (Asteraceae)	Cicoare
Corylus avellana L. (Corylaceae)	Alun
Crataegus monogyna Jacq. (Rosaceae)	Pãducel
Dryopteris filix-mas (L.) Schott (Dryopteridaceae)	Ferigã
Dianthus carthusianorum L. (Caryophyllaceae)	Floarea ruºinii, garoafã sãlbatecã
Dianthus henteri Heuff. (Caryophyllaceae)	Floarea ruºinii, garoafã sãlbatecã
Dianthus tenuifolius Schur (Caryophyllaceae)	Floarea ruºinii, garoafã sãlbatecã
Equisetum arvense L. (Equisetaceae)	Coada calului
Fragaria vesca L. (Rosaceae)	Frag, cãpºunã
Galium verum L. (Rubiaceae)	Sânziene
Gentiana asclepiadea L. (Gentianaceae)	Lumânãricã
Hypericum perforatum L. (Hypericaceae)	Sunãtoare
Hypericum maculatum Crantz (Hypericaceae)	Sunãtoare
Hypericum tetrapterum Fries (Hypericaceae)	Sunãtoare
Lamium album L. (Lamiaceae)	Urzicã moartã, urzicã albã
Leucanthemum vulgare Lam. (Asteraceae)	Ochiul boului
Matricaria suaveolens (Pursh) Rydb. (Asteraceae)	Muºeþel, muºeþel bun
Mentha aquatica L. (Lamiaceae)	Izma broaºtei
Mentha longifolia (L.) Nath. (Lamiaceae)	Mentã, mentã sãlbaticã.
Origanum vulgare L. (Lamiaceae)	ª ovârc, sovârc.
Oxalis acetosella L. (Oxalidaceae)	Mãcriº, mãcriº de pãdure
Picea abies (L.) Karst. (Pinaceae)	Molid, brad roºu
Pinus mugo Turra (Pinaceae)	Jneapãn
Plantago lanceolata L. (Plantaginaceae)	Patlaginã ingustã, limba oii
Plantago major L. (Plantaginaceae)	Pãtlaginã, plãmânarã
Plantago media L. (Plantaginaceae)	Pãtlaginã, plãmânarã
Potentilla anserina L. (Rosaceae)	Coada racului
Primula veris L. (Primulaceae)	Þâþa vacii
Primula elatior (L.) Hill (Primulaceae)	Þâþa vacii
Ranunculus ficaria L. (Ranunculaceae)	Rotunjor
Rosa canina L. (Rosaceae)	Mãceº
continued...	

Table 1. ...continued	
Scientific name	**Romanian name**
Rosa pendulina L. (Rosaceae)	Mãceº
Rosa tomentosa Sm. (Rosaceae)	Mãceº
Rubus idaeus L. (Rosaceae)	Zmeur
Rubus caesius L. (Rosaceae)	Mur
Rubus hirtus Waldst & Kit. (Rosaceae)	Mur
Sambucus ebulus L. (Caprifoliaceae)	Boz, boziu
Sambucus nigra L. (Caprifoliaceae)	Soc
Symphytum officinale L. (Boraginaceae)	Tãtãneasã
Taraxacum officinale Webber ex Wiggers s.l. (Asteraceae)	Pãpãdie
Thymus balcanus Borb. (Lamiaceae)	Cimbriºor, cimbru de munte, cimbru sãlbatic
Thymus comosus Heuff. (Lamiaceae)	Cimbriºor, cimbru de munte, cimbru sãlbatic
Thymus pulcherrimus Schur. (Lamiaceae)	Cimbriºor, cimbru de munte, cimbru sãlbatic
Thymus pulegioides L. (Lamiaceae)	Cimbriºor, cimbru de munte, cimbru sãlbatic
Tussilago farfara L. (Asteraceae)	Podbal
Urtica dioica L. (Urticaceae)	Urzicã, urzicã vie
Vaccinium myrtillus L. (Ericaceae)	Afin

the human capacity and financial resources available for protected area management after the end of the Global Environment Facility (GEF) funding we developed a biodiversity monitoring plan containing monitoring protocols, pragmatic and adaptable and yet rigorous and repeatable and not relying on high levels of technical specialism.

The "Biodiversity Monitoring Plan" for Piatra Craiului National Park is developed to provide a basis for long-term assessment of the status of the biodiversity in the park and the effectiveness of management activity in protecting the park's biodiversity and landscapes. A series of monitoring questions were derived from the management plan, reflecting the need to determine whether the biodiversity of Piatra Craiului National Park is being effectively maintained. The monitoring plan was developed within the current and future context of the park system in Romania. Thus the protocols have been developed to rely upon minimal equipment and resource inputs, and to take into account the constraints on staff time and limited future funding to pay for outside specialist assistance. In order to maximize information generation certain protocols have been designed to involve rangers and volunteers (with only basic identification skills) and to collect incidental information from local forest users. The necessary approaches for data analysis have been considered within the protocols, and this has fed back into the design of sampling approaches within the protocols.

There are several monitoring protocols referring to medicinal plants and non-timber forest products included in the "Biodiversity Monitoring Plan of Piatra Craiului National Park". The most important monitoring protocol is based on field interviews with local people in some selected key access points in the park, responding to the following main questions: (i) are levels of medicinal plants use increasing?, (ii) is the availability of medicinal plants being maintained?, (iii) are there indications of changes in abundance or distribution of medicinal plants? The attributes used are the quantity and type of outtake of selected indicators (fruits, mushrooms, and medicinal plants). A standard interview format is used (see Figure 2 and Annex).

Based on the data provided by monitoring activities the proper management measures will be taken according to the "Management Plan". This can imply a severe reduction of some medicinal plant species (or all species) collection in some affected areas or in the entire park.

Acknowledgements

All the results presented in this article have been sponsored by Piatra Craiului Craiului National Park Administration through the Biodiversity Conservation Management in Romania Project sponsored by the Global Environmental Found through the World Bank. This project is meant to support the creation of the Romanian Protected Areas Network.

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Data:

Name of surveyor:

Location of observation point:

Geographical coordinates:

Whether[1]: rain | cloudy whether | sunny whether

No.	Sex	Approx. age	Type of activity	Entering the site	Living the site	Type of products removed (collected)	Estimate quantity

Interview sheet

Data:

Name of surveyor:

Location of observation point:

Geographical coordinates:

Name of interviewed person	Sex	Age	Profession

[1] Tick the appropriate box

Figure 1. NTFP Monitoring Sheet

Annex. Monitoring protocol – NTFP use and village interviews

Monitoring question/s addressed: Are levels of NTFP/ use or poaching increasing? Is the availability of NTFPs being maintained? Are there indications of other changes in biodiversity?

Measure/Indicator: NTFP (fruits, mushrooms, and medicinal plants)

Justification: Local people used NTFP from long time ago for their own necessities. It is important to maintain collection of NTFP under control to avoid the spoliation of this natural resource and to avoid its over-exploitation for industrial purposes. On the other hand local people collecting NTFP could provide valuable information regarding plants, wildlife and changes in biodiversity, illegal activities on park surface (e.g. illegal cutting, grazing in the forest, poaching etc.)

Attributes: quantity and type of outtake.

Sampling protocols

- **Number of plots/sites for monitoring**

A selection of up to ten key access points will be watched on regular occasions, with random samples of people interviewed (about one in ten people). In addition, interviews with villagers will be conducted occasionally. Incidental records of activities within the forest will be collected.

- **Distribution and selection of plots/ sites for monitoring**

At least ten observation sites will be established next to key access points to forests, in areas popular for the collection of NTFPs.

For the village interviews a target stratified random approach will be used, listing the number of people of each sex, age and activity group in the community to be interviewed (e.g. 3 old people, 4 shepherds, 3 women etc. to represent the community). This will be designed with the community outreach specialist.

- **Size of plots/sites for monitoring**

Records will be taken of the number of individuals entering and leaving the forest area, along with records of the NTFPs removed at that time. In addition, it is aimed to complete ten interviews (randomly selected, but targeting all levels of the community, including women) with community members within at least ten key communities around the park. Volunteers and rangers will conduct interviews.

- **Location/marking of specific plots**

Marked on map with a description/GPS.

Data collection protocols

- Detailed information regarding collected data and the data collection modality

A member of park staff will spend a day watching activities at key access points to forests within the park. People entering and leaving the forest will be recorded, including some assessment of the types of activities being undertaken (including NTFP collection and tourism). Any products removed from the forest will be recorded.

A selection of the people seen will be approached and interviewed to find out more about how they use the forest and the wildlife. These interviews will be conducted in a non-confrontational way as an information collecting exercise.

In addition, when visiting villages and other communities opportunities will be taken to collect further information on the collection of NTFPs and biodiversity from those within the community who use the forest regularly. Over time changes in resource use and availability can be assessed qualitatively. In addition, community interviews can be an important source of information in changes in key species that can be easily observed by local people.

- Data collection formats

Standard interview format will be used.

- Quality assurance and standardization mechanisms

All staff involved will be given basic training in conducting semi-structured interviews, and in recording appropriate data on use. Where unusual responses are collected, some verification may be required.

- Frequency and timing of repeat monitoring

Monitoring at key sites will take place during key times of resource use (ideally twice a year). In addition, village interviews will be conducted as opportunities arise, but with a focus on seasons of high level of NTFP collection.

Data management and analysis protocols

- Data storage and management information

A basic spreadsheet will be used to record incidences of collection at key sites. A separate database will be used to record data from interviews, and to classify resource use by gender, age and area. All electronic data will be backed up, and original data sheets will be retained.

- Data analysis procedures and details of statistical methods to be used

Changes in the levels of observed resource use will be plotted over time. In addition, any indication of changes in the use or availability of resources or biodiversity from interview data will be assessed based on the number and levels of responses.

- Report format and process for communicating results to management

Indications of changes in resource use or availability will be argued in a short one side report with bullet points, indicating the type of evidence (including anecdotal) and how this has been both verified and interpreted (including alternative interpretations of the trends). For example, reduction in the collection of NTFP might reflect declining resources or may indicate that alternative incomes are available to local villagers – only interviews would separate these interpretations.

Resource allocation protocols

- Number of staff involved, roles and training requirements

The observation at key sites could take between 10 and 20 days each year, and could be conducted by the Park Biologist/Head Ranger, the Community Specialist, or by a trained ranger. Interviews in villages will be conducted as opportunity arises (around other activities) by any member of the park staff (but could take the equivalent of 10 days per year). Interviews would also provide an important opportunity to provide information or raise awareness (and to monitor awareness about the park). Three days will be put aside for data analysis.

- Resources/equipment required

Vehicle and petrol to reach the sites; interview sheets and clipboard/pen; binoculars.

GTZ Project "Agricultural Sector Support in Bosnia and Herzegovina (BiH)"

Dragana Pecanac

Bosnia and Herzegovina is a small country in Southeastern Europe, bordering the Adriatic Sea, Croatia, and Serbia and Montenegro. The country covers a total area of 51 000 km^2, 45% of which is forest and 50% agricultural land. About four fifth of the country can be considered as mountainous area. Except for the Mediterranean and the upper mountain areas, the climate is moderately continental with hot summers and cold winters.

From 1999 until the end of 2003 the German Agency for Technical Cooperation (GTZ) carried out a project on "Agricultural Sector Support in Bosnia and Herzegovina" on behalf of the German Federal Ministry of Economic Cooperation and Development (BMZ). The GTZ Sector of Medicinal and Aromatic Plants was actively involved in the development of controlled and sustainable wild collection of medicinal and aromatic plants in Bosnia and Herzegovina.

Project objective

In the past, the wild-collection of MAPs was mainly characterised by an uncontrolled and unsustainable use of the biodiversity, through which the national heritage of rare plant species (e.g. *Gentiana lutea, Arctostaphylos uva-ursi*) was endangered.

The main project objective was to support the change from traditional collection and traditional business management towards a sustainable use of the biodiversity under the overall objective of rural income generation, value addition, and modern supply chain management.

Wild collection

The agro-industrial sub-sector of medicinal and aromatic plants in Bosnia and Herzegovina is dominated by wild-collection that has a long tradition. First documents are dated from the 13th century. The numbers of collectors affiliated to the companies participating in the GTZ programme range from 50 to an estimated 10,000 collectors with established companies. Altogether approximately 100,000 people are involved in the collection of medicinal and aromatic plants. Processing into value added natural products like essential oils, spices and teas has been established in more than 250 small and medium enterprises.

The responsibility for the sector is with the Forestry Departments in the Ministries of Agriculture of both political entities (the Federation of Bosnia and Herzegovina, the Republic of Srpska). The executing bodies are the respective forestry holdings at entity

level: "BH Sume" in Sarajevo and "HB Sume" in Mostar for the Federation of BiH and "RS Sume" in Banjaluka for the Republic of Srpska.

The management of the forests is the objective of the public-owned 'Forest Enterprises' organised by the 3 holdings. 45 public-owned 'Forest Enterprises' are in the Federation of BiH (Mostar and Sarajevo) and 43 in the Republic of Srpska (Banjaluka). The holdings comprise a planning section responsible for the medium term management plan (10-20 years) of the forestry offices. The management plans will be approved by the Forest Department in both entity Ministries of Agriculture.

It is understood that the companies will have to receive their official access rights granted through the public forest enterprises. This is a process which has not been established, but it seems to be the starting point of every documentation and certification of controlled and sustainable wild-collection.

GTZ activities

The sustainable use of the wild resources accompanied by proper management plans and bio-certification leads to an innovative marketing package including the product and its proper documentation that will fit into the Good Manufacturing Practises of potential clients.

GTZ supported this objective with the following activities:

• Company counselling regarding the incorporation of sustainability aspects, quality management, economic aspects and organising the seminar "Train the Trainers" for collectors;

• Supporting marketing through the organisation of seller-buyer-meetings on local, regional and international level, the introduction of bio-certification for 18 companies and the participation at international trade fairs;

• Strengthening Sector Associations and Business Support Services;

• Improving the overall development through the establishment of EU-compatible product standards, the improvement of the legal framework, the development of the national strategy for sustainable use and the preservation of medicinal and aromatic plants.

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CAMP Workshops

Summary Report: Red List Training/ CAMP Workshops in Central America

Santo Domingo, 3-5 February 2004 /
Panama City, 31 March-3 April 2004

Danna J. Leaman & Sonia Lagos-Witte

Background

The principal goal of the TRAMIL-GEF/UNEP Project (GFL / 2713 - 01 - 4356) *Biodiversity Conservation and Integration of Traditional Knowledge on Medicinal Plants in National Primary Health Care Policy in Central America and Caribbean* is "to support the conservation of forest ecosystems in Central America and the Caribbean through the rational and sustainable use of medicinal plant resources." Expected project outcomes include:

• conservation status assessment for important medicinal plant species and habitats;

• agreement on priorities for management and conservation actions among communities, resource managers, and other stakeholders; and

• design and implementation of conservation and management strategies for priority species and habitats in priority eco-regions of each country involved in the project (the Dominican Republic, Panama, Nicaragua, and Honduras).

During the first two years of implementation of this project, a survey process was developed and implemented by the project partners to identify community conservation priorities for medicinal plants and medicinal plant habitats based on the knowledge and experience of healers, collectors, and resource managers. This survey process and the resulting information complements the TRAMIL ethnobotanical surveys carried out in each of the eight priority research sites and communities participating in this project: this component adds conservation and sustainable use to the criteria applied to the evaluation and validation of plant-based remedies for promotion in national public health programmes. An electronic data management system has been designed to enable regional comparison of survey results, and is currently managed by one of the project partners and TRAMIL network members, CIFLORPAN (Centro de Investigaciones Farmacognostica de la Flora Panameña), Faculty of Pharmacy, University of Panama. This data management system has been developed in consultation with the Medicinal Plant Specialist Group, in order to facilitate its establishment as a regional node, or nodes, of the IUCN-SSC Species Information System (SIS) in the Caribbean and Central

America.

The results of the conservation surveys conducted with communities and resource managers in the eight selected project sites were evaluated by the national project partners to select priority species for assessment of threat using the IUCN Red List categories and criteria (see Table 1). These priority species and their natural habitats were the focus of two regional workshops on conservation assessment and management planning held early in 2004.

Objectives and methodology of the workshops

The general objective of both workshops was training of the participants in the application of the IUCN Red List categories of threat, extinction risk assessment, integrated planning of conservation efforts, and raising awareness of the need for sustainable development in view of the fulfillment of the requirements of the Convention on Biological Diversity (CBD).

The specific objectives of both workshops were:

- Up-to-date assessment of the conservation status of the selected medicinal plant species according to the IUCN Categories of Threat, with particular attention to the local, national, and regional applications.
- Stronger co-operation between botanists, conservationists, horticulturists, protected areas managers, and communities, expanding a network of contacts between medicinal plants specialists.
- Joint development of strategies for the conservation and sustainable use of medicinal plants.
- Production of a report summarizing the current conservation status of the selected species and recommending conservation and sustainable use strategies.

Methodologies of these workshops focused on the application of the IUCN Red List criteria for global and regional assessment of conservation status as developed by the Red List Programme of the Species Survival Comission of IUCN - The World Conservation Union, and included elements of management planning based on the Conservation Assessment and Management Planning (CAMP) process as developed by the IUCN Conservation Breeding Specialist Group (CBSG).

Implementation and outcomes of the workshops

The first of these workshops was held in the Dominican Republic, 3-5 February 2004, hosted by the National Botanical Garden "Dr. Rafael Ma. Moscoso" in Santo Domingo. This workshop focused on priority medicinal plant species and habitats selected from project sites in the Dominican Republic, in addition to several species endemic to the island flora of Hispañola or economically important species in the Western Antilles. On behalf of the IUCN-SSC Red List Programme and CBSG, this workshop was led by Michael Maunder, Director, Fairchild Botanic Garden, with co-facilitation by Danna Leaman, Chair, MPSG, Duane Kolterman, Professor of Botany, University of Puerto Rico, and Sonia Lagos-Witte, Director of the TRAMIL-GEF project and Regional Coordinator of the TRAMIL programme for Central America. Participants included the Director and staff of the National Botanic Garden, members of the TRAMIL-GEF/UNEP project, and a representative of the CIFLORPAN.

The second regional workshop was held in Panama City, Panama, 31 March-3 April 2004, hosted by CIFLORPAN. This workshop focused on priority species and habitats selected from project sites in Panama, Nicaragua, and Honduras, with the addition of endemic medicinal plant species, and emphasizing priorities shared between the participating countries and across the Central American region. This workshop was led by Danna Leaman, Duane Kolterman, and Sonia Lagos-Witte, with facilitation assistance from members of the staff of the National Botanic Garden, Dominican Republic and members of the project team in Panama, who had participated in the previous workshop in Santo Domingo.

These workshops had the following outputs:

- Specific applications of the Red List criteria to evaluating threats to the island native plant diversity of Hispañola
- Compilation of relevant information for Red List assessments, based on survey results, and on the knowledge and experience of the participants.
- Assignment of Red List categories to the priority species selected for assessment (12 species native to the island of Hispañola (including the Dominican Republic and Haiti); 16 species native to Central America (see Table 1).
- Identification of four priority conservation and resource management activities, including a time frame and key partnerships.

Next Steps / Follow-up

Project sites: The results of the conservation assessment and management recommendations will be discussed and elaborated with community leaders, focusing on incorporation of local management practise.

National resource management strategies: National workshops will be held in the four countries participating in this project, to share the results with national protected areas and natural resource managers, as well as national health authorities.

Regional and global: Summary results of the Red List

Table 1. IUCN Red List assessment results for selected medicinal plant species in Hispañola and Central America.

Scientific name	Common name	Proposed Red List category[1]	Red List criteria applied[2]	Level of assessment[3]	Local criteria for selection of species[4]
Hispañola[5]					
Agave antillarum Descourt (Agavaceae)	Maguey de Bestia (DO)	VU → EN Haitian Trade	A3cd; B1b(ii,iii,v)c(i,ii,iii,iv)	Regional (DO)	b, c (Hispañola), e, f, g, h (whole plant)
Argusia gnaphalodes (L.) Heine (Boraginaceae)	Nigua de Playa (DO)	EN	B1a(I,ii,iii,iv,v)c(iii)+2ab(I,ii,iii,iv, v)c(iii)	Regional (DO)	d, e, f, g, h (whole plant)
Caesalpinia brasiliensis L. (Fabaceae)	Palo de Brasil (DO)	EN	A3cd; A4acd; C1+2a(i)	Regional (DO)	b, c (Hispañola), d, f, g, h (wood), i
Caesalpinia coriaria (Jacq.) Willd. (Fabaceae)	Guatapaná (DO)	VU	A3cd; B1ab(i,ii,iii,v)+2ab(i,ii,iii,v)	Regional (DO)	d, e, f, g, h (fruit, wood)
Ekmanianthe longiflora (Griseb.) Urb. (Bignoniaceae)	Roblillo (DO)	CR	B2ab(i,ii,iii,iv,v);C2a(i)	Regional (DO)	b, d, f, h (root, wood and bark), i
Eugenia samanensis Alain (Myrtaceae)	Canelilla (DO)	CR	B1ab(i,ii,iii)+2ab(i,ii,iii); D	Global	b, c (DO), d, f, g, i
Eugenia yumana Alain (Myrtaceae)	Canelilla (DO)	CR	A3c; B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v); D	Global	b, c (DO), f, g, i
Guaiacum officinale L. (Zygophyllaceae)	Guayacán (DO)	VU	A4bcd; B1a(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)	Regional (DO)	a, b, d, e, f, g, h (whole plant)
Melocactus lemairei (Monv.) Miq. (Cactaceae)	Melón espinoso (DO)	CR	A3d	Regional (DO) → Global	a, b, c (Hispañola), d, e, f, g, h (whole plant)
Pimenta haitiensis (Urb.) Landrum (Myrtaceae)	Canelilla (DO)	EN	A2acd; B1b(i,ii,iii,iv,v)+2b(i,ii,iii,iv,iv)	Regional (DO)	b, c (Hispañola), d, f, g, i
Pimenta racemosa var. *grisea* (Kiaersk) Forst. (Myrtaceae)	Ozúa (DO)	EN	B1ab(i,ii,iii, v)+2ab(i,ii,iii,v)	Regional (DO)	d, e, f, g, h (wood)
Smilax domingensis Willd. (Smilacaceae)	Bejuco de Riñón (DO)	NT		Regional (DO)	d, e, f, g, h (root)

Scientific Name	Common Name	Proposed Red List category[1]	Red List criteria applied[2]	Level of assessment[3]	Local criteria for selection of species[4]
Central America[6]					
Bauhinia guianensis Aubl. (Fabaceae)	Escalera de mico (HN)	VU	A3cd	Regional (PA, HN, NI)	d, e, f, g, h (stem of liane)
Bursera graveolens Kunth. (Burseraceae)	Caraña, caraño, copal (NI)	VU	A3cd	Regional (NI) → NT Central Am.	d, e, f, g, h (bark and resin)
Calliandra rodocephala Donn Sw. (Mimosaceae)	Pankunbas (Mayanga/NI)	VU	A3c	Regional (NI)	d, e, f, i
Columnea nicaraguensis Berst. (Gesneriaceae)	Nana ko, risko (Teribe/PA)	EN	B2ab(iii)	Regional (PA)	c, h (whole plant), e, i
Columnea tulae Urb. (Gesneriaceae)	Wru dwroyo (Teribe/PA)	EN	B2ab(iii)	Regional (PA)	c, h (whole plant), e, i
Croton draco Schlecht. subsp. *panamensis* (Klotzsch) G.L. Webster (Euphorbiaceae)	Sangre de grado (NI)	VU	A3cd	Regional (NI)	d, e, f, g, h (resin/latex)
Crinum darienensis Woods (Liliaceae)	O'Ina (Kuna/PA)	EN	D	Global	c (PA), h (root), e, i
Heisteria macrophylla Oerst. (Olacaceae)	Africa (NI)	VU	A3c	Regional (NI)	d, e, f, i
Hoffmannia vesciculifera Standl. (Rubiaceae)		VU	A3c	Regional (PA)	c, h (root), e, i
Myrica cerifera (L.) Small (Myricaceae)	Encinillo, Cera vegetal (NI)	VU	A3cd	Regional (NI) → NT Central Am.	d, e, f, g, h (fruit, seeds)
Lycianthes nitida Bitter (Solanaceae)	Sutak bikis (Mayanga/NI)	VU	A3c	Regional (NI)	d, f, i
Myroxylon balsamum (L.) Harms (Fabaceae)	Balsamo (NI)	EN	A3cd	Regional (NI) → EN Global	d, e, f, g, h (bark)
Piper cenocladum C. Dc. (Piperaceae)	Kumpah, Pamkah putni (Mayanga/NI)	VU	A3c	Regional (NI)	d, e, f, i
Slonea picapica Standl. (Elaeocarpaceae)	Picapica (HN)	NT		Regional (HN)	c (Central America), e, f, g, i

continued...

Table 1. ...continued.

Scientific Name	Common Name	Proposed Red List category[1]	Red List criteria applied[2]	Level of assessment[3]	Local criteria for selection of species[4]
Sparattanthelium septentrionale Sandwith (Hernandiaceae)	Quina bejuco (HN)	EN	C1	Regional (HN)	e, f, g, i
Symplocos vernicosa L.O. Williams (Symplococaceae)	Quina roja (HN)	NT		Regional (HN)	c (Central America), h (bark), i

1 The IUCN Red List defines the following categories for evaluation of the degree to which taxa are threatened with extinction: EX = Extinct; EW = Extinct in the wild; CR = Critically endangered; EN = Endangered; VU = Vulnerable; NT = Near threatened; LC = Least concern; DD = Data deficient; and NE = Not evaluated.

2 Five criteria and numerous sub-criteria are used to evaluate the extent to which a taxon is threatened with extinction once it has been determined to qualify for one of the categories CR, EN, or VU:
A. Population reduction
B. Geographic range
C. Small population size and decline
D. Very small or restricted population
E. Quantitative analysis

3 Global assessments of endemic species were assigned according to the *IUCN Red List Categories and Criteria: Version 3.1* (IUCN 2001). Regional assessments of more widely distributed species were assigned according to *Guidelines for Application of IUCN Red List Criteria at Regional Levels: Version 3.0.* (IUCN 2003). Both of these documents are available at http://www.iucn.org/themes/ssc/red-lists.htm (viewed 19.7.2004).

4 Criteria assigned by the GEF-TRAMIL project for selection of species for Red List assessment:
a) Included in CITES Appendices
b) Included in an existing Red List (national, regional, global)
c) Endemic
d) Phenological vulnerability
e) Low or decreasing abundance
f) Local knowledge indicating diminishing or low abundance, importance to local use, or destructive harvest methods
g) Commercial / intensive use
h) Likelihood of destructive harvest based on part used (= root, bark, tuber, vine, whole plant)
i) Rarity

5 Dominican Republic (DO) and Haiti

6 Panama (PA), Nicaragua (NI), and Honduras (HN)

assessments will be completed and submitted to the IUCN-SSC Red List Programme for evaluation. Results will be posted on the global Red List website. National biodiversity focal points will be encouraged to report results and follow-up with national contributions to the Global Strategy for Plant Conservation. Development of a regional strategy and programme of work for the IUCN-SSC MPSG, together with other partners, will build on the results of these activities.

References

IUCN (Ed.) (2001): IUCN red list categories and criteria. Version 3.1. – 30 pp., IUCN Species Survival Commission, Gland & Cambridge.

IUCN (Ed.) (2003): Guidelines for application of IUCN Red list criteria at regional levels. Version 3.0. – 25 pp., IUCN Species Survival Commission, Gland & Cambridge.

For Danna Leaman's address see imprint.

For Sonia Lagos-Witte's address see list of members.

Conservation assessment and management prioritisation for wild medicinal plants of Maharashtra

D. K. Ved, G. Utkarsh & Anagha Ranade

Introduction

Conservation Assessment and Management Plan/Prioritisation (CAMP) workshops undertake rapid assessment of risk of extinction for prioritised taxa of conservation concern. CAMP process also documents & synthesises observations and assessments of the field biologists, using the red list criteria developed by the World Conservation Union (IUCN). CAMP process has been pioneered in India by the Conservation Breeding Specialist Group (CBSG) - India, based at Zoo Outreach Organisation (ZOO), Coimbatore, in collaboration with the Foundation for Revitalisation of Local Health Traditions (FRLHT), at Bangalore. Four such workshops were organised in southern India during 1995 to 1998 for the states of Karnataka, Kerala, and Tamil Nadu and resulted in the assessment of 112 species of rare, highly traded and endemic medicinal plants of the region (using the 1994 version of the RL criteria). Of these, 93 were found to be threatened belonging to the categories Critically Endangered - CR, Endangered - EN, and Vulnerable - VU.

During 7 to 9 February 2001, a CAMP workshop was facilitated by FRLHT at Pune to undertake a rapid assessment of the threat status for prioritised wild medicinal plants of Maharashtra. This was the first CAMP workshop in India where the latest version – version 3.1 – of Red List criteria (IUCN 2001) was applied. This was undertaken in the context of the medicinal plants conservation programme initiated in Maharashtra since 1997 with the support of Sir Dorabaji Tata Trust (SDTT) and later expanded in 1999 with financial support from United Nations Development Programme (UNDP). These efforts have, so far, supported establishment of 13 MPCAs (Medicinal Plant Conservation Areas) by the Maharashtra State Forest Department. Each of the sites measure about 250 ha. These MPCAs have been accorded added protection against fires, grazing and harvests with involvement of local communities.

CAMP preparations and conduct

Preparations for the CAMP workshop started with the enlistment of prioritised wild medicinal plants of Maharashtra, utilising the computerised database at FRLHT and based on a number of criteria like commercial trade, endemnism, parts harvested, rarity, reported decline, etc. 69 species were shortlisted at first. Based on oral and written consultations with selected expert invitees, 58 taxa, out of these, were short-listed for rapid assessment. Taxon Data Sheets (TDS) were circulated to the invitees to generate as much data as possible prior to the workshop. Around 20 respondents filled in and returned a dozen sheets each, covering about 47 species altogether. A core group of local expert invitees reviewed the information at a meeting held a fortnight prior to the CAMP and made important suggestions relating to the finalisation of the invitees.

First day of the workshop started with the introductory sessions, which included presentations of the latest

Table 1. Results of Pune CAMP, February 2001

Threat Status, Species, Family	Habit	Trade regulations
Critically Endangered (CR):		
Holostemma ada-kodien (Asclepiadaceae)	C	
Rauvolfia serpentina (Apocynaceae)	S	E, $
Endangered (EN):		
Chlorophytum arundinaceum (Liliaceae)	H	
Chlorophytum borivillianum (Liliaceae) (G)	H	
Dipcadi ursulae (Liliaceae) (G)	H	
Eulophia nuda (Orchidaceae)	H	E
Eulophia ramentacea (Orchidaceae)	H	E
Fumaria indica (Fumaricaceae)	H	
Iphigenia stellata (Liliaceae) (G)	H	
Nothopodytes nimmoniana (Icacinaceae)	T	
Operculina turpethum (Convolvulaceae)	C	
Oroxylum indicum (Bignoniaceae)	T	
Santalum album (Santalaceae)	T	
Saraca asoca (Caesalpiniaceae)	T	
Thalictrum dalzellii (Ranunculaceae)	H	
Vulnerable (VU):		
Aegle marmelos (Rutaceae)	T	
Embelia tsjeriam-cottam (Myrsinaceae)	T	
Fagonia cretica (Zygophyllaceae)	H	
Gloriosa superba (Liliaceae)	C	
Lamprachaenium microcephalum (Asteraceae) (G)	H	E
Moringa concanensis (Moringaceae)	T	
Mucuna monosperma (Fabaceae)	C	
Pterocarpus marsupium (Fabaceae)	T	
Pueraria tuberosa (Fabaceae)	C	
Rubia cordifolia (Rubiaceae)	C	E
Symplocos racemosa (Symplocaceae)	T	

continued...

Table 1. (...continued)

Threat Status, Species, Family	Habit	Trade regulations
Species assessed to be not threatened		
Near Threatened (NT):		
Cadaba fruticosa (Capparidaceae)	S	
Capparis moonii (Capparidaceae)	C	
Garcinia indica (Clusiaceae)	T	
Gardenia resinifera (Rubiaceae)	T	
Gymnema sylvestre (Asclepiadaceae)	C	
Nervilia aragoana (Orchidaceae)	H	
Nervilia prainiana (Orchidaceae)	H	
Terminalia arjuna (Combretaceae)	T	
Tinospora sinensis (Menispermaceae)	C	
Least concern (LC):		
Alangium salvifolium (Alangiaceae)	T	
Andrographis paniculata (Acanthaceae)	H	
Aristolochia bracteolata (Aristolochiaceae)	H	
Baliospermum montanum (Euphorbiaceae)	S	
Celastrus paniculatus (Celastraceae)	C	
Drimia indica (Liliaceae)	H	
Drosera indica (Droseraceae)	H	
Helicteris isora (Sterculiaceae)	S	
Holarrhena pubescens (Apocynaceae)	T	
Lobelia nicotianaefolia (Lobeliaceae)	H	
Pseudarthia viscida (Fabaceae)	C	
Symplocos cochinchinensis (Symplocaceae)	T	
Uraria picta (Fabaceae)	H	
Data Deficient (DD)		
Embelia ribes (Myrsinaceae)	C	
Salacia oblonga (Hippocrateaceae)	C	
Not Evaluated (NE)		
Kaempferia galanga (Zingiberaceae)	H	

Abbreviations:

Threat status, species, family:

(G) the species is almost endemic to Maharashtra and hence the assessment is global.

Habit: H (Herb), C (Climber), S (Shrub), T (Tree)

Trade regulations:

E the species export is regulated
$ species is included in CITES Appendix II

version of Red List criteria as well as the CAMP methodology. Thereafter the participants were invited to further reduce the targeted list of taxa so that the assessment could be accomplished within the three days exercise. The final list consisted of 51 species, representing 45 genera and 27 families; and having a habit-wise break-up of 15 trees, 4 shrubs, 19 herbs and 13 climbers. This workshop was innovative in documenting perceptions of some of the folk healers, also from villages, with the help of volunteer college students acting as translators. The 68 participants were organised into 5 working groups, for detailed discussions and recording of data and assessments for the allocated taxa. An exhibition of medicinal plant illustrations relating to the proposed taxa was also set up to help in confirming their identity to the folk healers. Each working group was provided with available published data, maps, geographical area tables etc. After the initial assessment of 1-2 taxa by each working group; a plenary session was organised to further explain the definitions etc. for facilitating accurate recording. Each working group spent 2-3 sessions of 2-3 hours each in assessing around 10 taxa each. This was followed by 1-2 sessions spent by each working group to review species assessments completed by other group/s. The concluding plenary session involved reaffirmation of the finalised assessments by all the participants, along with suggested modifications. The draft report was circulated to all the participants and a few other experts for affirmation and suggestion.

CAMP results and follow up

As the following table depicts, half of the species assessed, i.e. 26, belong to the group threatened (CR – 2, EN – 14, VU – 10). Most of these (20) are threatened due to population decline (Criterion A), owing to habitat loss or harvest. Five of these are nearly globally threatened as much of their global population is confined to Maharashtra: *Lamprachaenium microcephalum, Eulophia ramentacea*, *Dipcadi ursale*, *Iphigenia stellata,* and *Chlorophytum borivilanum.* Only a third of the threatened species (8) are recorded in trade.

A third of the threatened species (10) have been recorded in the MPCA network of thirteen sites across the state of Maharashtra. However, additional sites may have to be established for capturing some of these threatened species not recorded in the existing network. Export of five of these species assessed as threatened is regulated under the notifications issued by the Govt. of India. There is a need to review lists of plant species included in these notifications and assess their risk of extinction through rapid assessment processes like

CAMP for developing a focussed conservation action program and regulations for their harvest etc.

References

IUCN (Ed.) (2001): IUCN red list categories and criteria. Version 3.1. – 30 pp., IUCN Species Survival Commission, Gland & Cambridge.

VED, D.K., G. UTKARSH & ANAGHA RANADE (Ed.) (2001): Report of the CAMP (Conservation Assessment and Management Plan) workshop for medicinal plant species of Maharashtra. 7-9 February 2001, Pune. – 103 pp., Unpublished report, s.loc.

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Reviews and Notices of Publication

Uwe Schippmann (schp)

Boxed reviews refer to books which have been sent to us by the publisher.

ALMEIDA, C. DE F.C.B.R. DE & ALBUQUERQUE, U.P. DE (2002): Uso e conservacao de plantas e animais medicinais no estado de Pernambuco (Nordeste do Brasil). Um estudo de caso. – Interciencia 27 (6): 276-285.

ANDERSON, R.C., ANDERSON, M.R. & HOUSEMAN, G. (2002): Wild American ginseng. – Native Plants Journal 3 (2): 93-97.

ARNOLD, T.H., PRENTICE, C.A., HAWKER, L.C., SNYMAN, E.E., TOMALIN, M., CROUCH, N.R. & POTTAS-BIRCHER, C. (2002): Medicinal and magical plants of southern Africa. An annotated checklist. – Strelitzia 13: 1-203.

The work provides an annotated checklist based on information derived from the more important published ethnomedicinal works, as well as toxicological, ecological, floristic and specimen data sources. Included in the checklist is information for 215 families, 1 240 genera and 3 689 taxa of ethnomedicinal plants. This represents 15% of the region's flora and includes 159 taxa, included in a separate appendix, that are Red Data listed. Provided for each taxon are basic reference flags to its ethnomedicinal usage and harmful properties, a list of synonyms, its growth form(s), Red Data listings, and distribution within the region. A list of 109 references, scanned to compile the checklist, is included. (from summary, 06.10.2002).

ARYA, K.R. (2001): Recent observations on medicinal plant biodiversity and conservation of some hot spot areas of Kumaon Himalayas. – Journal of Medicinal and Aromatic Plant Sciences 23: 77-81.

AUMEERUDDY-THOMAS, Y. & PEI SHENGJI (Ed.) (2003): Applied ethnobotany. Case-studies from the Himalayan region. – 38 pp., UNESCO, Paris (People and Plants Working Paper 12).

BEN, G. (2002): Botswana perspectives on grapple plant (devil's claw). – In: CRIAA (Ed.): Proceedings of the Regional Devil's Claw Conference, 26-28 Feb 2002, Windhoek, Namibia. pp. 27-30, CRIAA, Windhoek.

The paper describes the legal and harvesting situation of *Harpagophytum* in Botswana. Most valuable are the two tables on harvesting volumes from 1978 to 2201 and the export volumes from 1997 to 2001 to several specified countries. A comparison shows that for 2001 the exports of 33 506.8 kg dried plant material is seven times larger than the amount harvested with 4 571.5 kg. This may either be explained by re-exports of previously imported material or by unrecorded harvesting in the country. (schp, 22.11.2002).

BERNDT, C. (2003): Lizenzvertrag mit Lendenschurz. Südafrikas Buschmänner erringen einen historischen Sieg. Künftig werden sie an einer Schlankheitspille mitverdienen. – Süddeutsche Zeitung 103: 17.

BHATTARAI, N. (2002): Conservation assessment and management planning (CAMP) workshop. Experience from Nepal. – Medplant Network News 2 (2): 8-9.

A CAMP workshop was held in Pokhara, Nepal, in January 2001. 48 participants from 10 countries (30 from Nepal) attended the meeting. During the 3 day workshop the participants assessed the threat status of 51 species, 6 of them endemic to Nepal and 29 endemic to the Himalayas. The latest version 3.1 of the IUCN threat categories was used. 3 species were assigned CR threat status (*Michelia champaca*, *Pterocarpus marsupium* and *Rauvolfia serpentina*), 14 EN and 23 VU. (schp, 12.09.2002).

BODEKER, G., BURFORD, G., CHAMBERLAIN, J. & BHAT, K.K.S. (2001): The underexploited medicinal potential of *Azadirachta indica* A. Juss. (Meliaceae) and *Acacia nilotica* (L.) Willd. ex Del. (Leguminosae) in sub-Saharan Africa: a case for a review of priorities. – International Forestry Review 3 (4): 4, 295-298, 332-335.

Medicinal tree cultivation can contribute to local health care, including the management of serious diseases, and stimulate small-scale local enterprise. Nevertheless, medicinal properties are often overlooked when the economic value of multipurpose tree species is evaluated. This paper examines the medicinal potential of two popular agroforestry species, *Azadirachta indica* and *Acacia nilotica*, both of which may be useful in treating priority diseases such as malaria and HIV/AIDS as well as a wide variety of non-communicable diseases. *Azadirachta indica* is popularly used in India for a variety of medicinal purposes, while in sub-Saharan Africa, although well known to local communities as a medicine, it has been more widely promoted as a source of natural pesticides. *Acacia nilotica* is generally cultivated only for timber and fuel wood. (from NWFP-Digest-L 8.2002, 06.12.2002).

BONDEV, I. (Ed.) (1995): Chorologichen atlas na lechebnite rastenija v Bulgaria [Chorological atlas of medicinal plants in Bulgaria; in Bulgarian]. – 272 pp., Prof. M. Drinov Acad. Publishing House, Sofia.

BRAMWELL, D. (2002): How many plant species are there ? – Plant Talk 28: 32-34.

To make a qualified estimate of the world's richness in flowering plants, Bramwell applies what he calls the "baseline + endemic" method. For each world region he takes the flora of the largest country as the baseline flora and adds to this the number of local endemics in each of the other countries of the region. Thirdly he allows for some adjustment in cases where species occur in more than one country of the region but not in the baseline flora. These figures are then added to give the world estimate of 421,968 species. This is remarkably close to the estimate of GOVAERTS (2001) (see page 78) who arrives at 422,127 species using a different method. It is >100,000 higher than earlier estimates which ranged from 230,000 to 320,000 species. Bramwell further concludes that the number of threatened flowering plant species world-wide ranges between 75,800 and 94,400 species. (schp, 15.09.2002).

CHAKRAVARTI, V. (2002): Vulnerable and threatened plants of economic value. *Hydnocarpus kurzii*. – MFP News 12 (2): 17-18.

The paper reports that the tree species is used in India for its so-called Chaulmoograe oil which is official in the Indian Pharmacopoea. Also *H. laurifolia* is used for this purpose. Trade is mainly local but the oil also exported to other countries, China and Argentina are mentioned. Cultivation does not take place, the collection is from wild stands only. Although it is the fruits and seeds that are used the author still believes that harvesting for medicinal purposes is the main cause for its population reduction. He states that *H. kurzii* is only left in 20 locations and has to be considered as endangered in India. (schp, 14.09.2002).

CHOJAR, A.K. (2002): Demand, supply and planning the market of selected herbals in India. – Journal of Tropical Medicinal Plants 3 (1): 141-145.

CECH, R. & CECH, S. (2002): Growing at-risk medicinal herbs. Cultivation, conservation and ecology. - vii+314 pp., Horizon Herbs, Williams, USA.

Despite many efforts from responsible harvesters, craftsmen and authorities alike, wild harvesting of medicinal plants is in many cases still far from being sustainable on a long-term basis. This book is full of examples were unregulated collection has at least locally extinguised populations of valuable plants which used to be thriving and plentiful. Powered by this background of continuing loss, the author has put together his comprehensive experience as a plant grower, focussing on the species which have to be regarded "at risk" in the United Plant Saver's terminology. 17 plant species and three genera are covered (in *Cypripedium* twelve species are differentiated, nine in *Echinacea*), each with an entry of 10-12 pages. Typically, the following headings are covered for each of them: range (i.e. distribution, mostly in the US; with a US state map with present/not present status; in the case of *Piper methysticum* a map of the Pacific islands); hardiness and adaptability; ecology; plant community; life cycle; cultivation from seed; cultivation from sections, cuttings or runners; general care (after establishment of plants; aspects of soils, water, fertilization); medicine (i.e. plant parts used); yield; harvest, processing and storage; seed collecting, cleaning, storage and longevity; conservation status; adulteration and nomenclature; information on other species; and literature references. In the conservation sections, the authors pull together data on domestic or international trade, if available, and assess the causes of threat for the species, over-harvest, land use changes or habitat loss. In *Dionaea muscipula*, e.g., the number of historic populations in North and South Carolina are compared to the numbers still existing. A quote on Venus fly trap: "In nature it lives in noble colonies, but it becomes a freak in the novelty trade: individuated, cupped in styrofoam, capped by a plastic bubble, overstimulated by prodding pencil-point and fed fatal bits of cheese". As an ultimate bonus all taxa are presented as b/w drawings carried out by SENA CECH, both portraying above-ground and underground plant parts (my favourite: *Trillium erectum*, p. 224). This book is a treasure chest for gardeners and non-gardeners. It is available at the authors' own publishing house, straight from Williams, Oregon, for an unbeatable US$ 14.95. (schp, 29.11.2002).

Trillium erectum. Illustration taken from the reviewed book.

BRANCO, C.D.C. & ALMEIDA, R. DE & ALBUQUERQUE, U.P. DE (2002): Use and conservation of medicinal plants and animals in Pernambuco State (northeast Brazil). A case study. – Interciencia 27 (6): 276.

CAMERON, G., PENDRY, S. & ALLAN, C. (2001): Traditional Asian medicine identification guide for law enforcers. – s.pag., Her Majesty's Custom and Excise and TRAFFIC International, London, Cambridge.

CHOMINOT, A. (2002): L'économie des plantes médicinales en Inde. – Ethnopharmacologia 29: 54-67.

COLE, D. (2002): Namibia's national devil's claw situation analysis. – In: CRIAA (Ed.): Proceedings of the Regional Devil's Claw Conference, 26-28 Feb 2002, Windhoek, Namibia. pp. 57-61, CRIAA, Windhoek.

In response to increasing trade volumes during the 1990s and to growing concern regarding the sustainability of the devil's claw harvest, Namibia held its first National Devil's Claw Stakeholder Workshop in November 1999. One of the main recommendations was that a nation wide situation analysis be carried out. The paper reports on the progress of this project which focusses on three aspects: (i) the population status of the species, (ii) the socio-economic aspects related to the resource management, and (iii) the nature of the local and export market. (schp, 29.11.2002).

CUNNINGHAM, A.B., AYUK, E., FRANZEL, S., DUGUMA, B. & ASANGA, C. (2002): An economic evaluation of medicinal tree cultivation. *Prunus africana* in Cameroon. – 35 pp., UNESCO, Paris (People and Plants Working Paper 10).

DAS PRAJAPARI, N., PUROHIT, S.S., SHARMA, A.K., KUMAR, T. (2002): A handbook of medicinal plants. A complete source book. – 1000 pp., Agrobios International, Jodhpur.

DENNIS, F. (2002): Conserving and cultivating medicinal plants in Ghana. – Botanic Gardens Conservation News 3 (8): 38-39.

DIEDERICHS, N., GELDENHUYS, C. & MITCHELL, D. (Nov 2002): The first legal harvesters of protected medicinal plants in South Africa. The Sizamimphilo Bark Harvesters Association leads the way for sustainable living and conservation of biodiversity. – Retrieved from www.scienceinafrica.co.za/2002/november/bark.htm, viewed: 03.12.2002.

There has been considerable growth in the medicinal plant industry in South Africa over the past few years. The shift from subsistence use to commercial trade of medicinal plants has led to an increased intensity and frequency of medicinal plant harvesting from wild habitats. The bark of many different forest and woodland tree species are used, a relatively small number are in high demand and intensively used. Intense and frequent harvesting of bark from species with a high market demand often results in ring-barking of trees. As a result, many of these have become protected under the laws governing the harvesting of medicinal and other plant material in KwaZulu-Natal. In order to address the growing need for natural forest areas to provide socio-economic benefits to surrounding communities, new national legislation (National Forest Act No. 84 of 1998) has directed the management of these areas towards a participatory approach. The "Commercial Products from the Wild Project" set the basis for a participatory forest management system in the uMzimkulu District by establishing a bark harvesters association (Sizamimphilo). The Association agreed on the following rules for sustainable resource use: (i) Sustainable resource harvesting practices to be implemented in the forests should contribute to the recovery and conservation of the forests. (ii) Bark harvesters should be able to continue with harvesting the bark resources with improved operating conditions, reduced effort and costs, minimized resource harvesting impacts. (iii) Rules for controlling resource harvesting must be simple, practical, and easy to manage. On 30 May 2002 the licence was issued to the Sizamimphilo Association for harvesting of bark under guidance of the management plan for natural forests in the uMzimkulu District. (from summary, 03.12.2002).

DRESSENDÖRFER, W. (2003): Blüten, Kräuter und Essenzen. Heilkunst alter Kräuterbücher. – 192 pp., Wissenschaftliche Buchgesellschaft, Darmstadt.

DÜRBECK, K. (2003): Promotion of controlled and sustainable wild collection of medicinal and aromatic plants for rural income generation. The role of GTZ in the support of medicinal plants in Bosnia and Herzegovina (BiH). – Drogenreport 15 (28): 66-67.

EMEA, Working Party on Herbal Medicinal Products (2.5.2002): Points to consider on Good Agricultural and Collection Practice for starting materials of herbal origin. Final document. EMEA/HMPWP/31/99 Rev. 3. – Retrieved from www.emea.eu.int/pdfs/human/hmpwp/003199en.pdf, viewed: 09.12.2002.

EUROPAM, GAP/GWP – Subcommittee (5.11.2001): Guidelines for Good Wild Crafting Practice (GWP) of medicinal and aromatic plants. EUROPAM working copy no. 3. – Retrieved from www.europam.net/GWP.htm, viewed: 10.12.2002.

EVSTATIEVA, L. & VITKOVA, A. (2000): Biodiversity of medicinal plants in Central Balkan National Park. – In: SAKALIAN, M. (Ed.): Biological Diversity of the Central Balkan National Park. pp. 58-105, USAID, Sofia.

The authors have prepared and present standardized medicinal plant inventories for various sites within the Central Balkan National Park and they give recommendations for improved management of the investigated areas. For each site the medicinal plants with economic importance have been assessed regarding the quantity of the resource in kg for the given area. (schp, 15.02.2003).

EVSTATIEVA, L., HARDALOVA, R. (2000): Diversity and resources of medicinal plants. – In: POPOV, A. & MESHINEV, T. (Ed.): High mountain treeless zone of the Central Balkan National Park. Biological diversity and problems of its conservation. pp. 437-465, BSBCP, Sofia.

The authors have investigated the tree-less, high-altitude regions of the Central Balkan National Park. Field work was carried out in 1996. 105 medicinal plant species were found, are assessed and grouped under six major categories which are, however, not clearly defined (Appendix 3). Unfortunately, in Appendix 2, a different grouping is given which appears to be more consistent but which is not reflected in the text. The main part of the text consists of very useful short species accounts. The major information given herein is an estimate of the plant biomass in kg found in the National Park of each species. The method used to arrive at these quantitative estimates is not described in the paper. (schp, 16.02.2003).

FAH (2003): Standard Operating Procedures for inspecting cultivated and wild crafted medicinal plants. – Journal of Herbs, Spices and Medicinal Plants 10 (3): 109-125.

FLEURENTIN, J. (2002): Les plantes médicinales de la pharmacopée francaise. – Ethnopharmacologia 28: 41-73.

GAEDCKE, F., STEINHOFF, B. & BLASIUS H. (2003): Herbal medicinal products. Scientific and regulatory basis for development, quality assurance and marketing authorisation. - xiii+177 pp., Medpharm Scientific Publishers, Stuttgart.

If you are a biologist interested in medicinal plants and have trouble to understand the legal framework that the pharmaceutical community has built up over the past decades: here is your remedy! The authors provide answers for all sorts of questions surrounding the regulatory basis for drug development, quality assurance and marketing authorisation. And they do it in a concise way: the book provides all this information on only 177 pages. The first chapter of some 30 pages is devoted to definitions of terms like "herbal drug" or the various states of extracts. Other chapters include "Quality assurance of herbal medicinal products" (of starting material, herbal extracts and the finished products), "The European marketing authorisation system" (describing the centralised, the decentralised and the national procedure and the increasingly important role of EMEA). Chapters 6 and 7 run through all the legal provisions especially on the EU level while the last chapter very briefly summarizes the work of WHO in this field. This very useful book also includes an Annex of almost 40pages with lists of all herbal monographs provided by the European Pharmacopoeia 2002, WHO, ESCOP and Commission E (for a comparison of monographs see also: FRANZ, G. (2001): Pflanzliche Drogen in den aktuellen Arzneibüchern. Deutsche Apotheker Zeitung 141: 794-802). (schp, 2.7.2004).

GAGNON, D. (10.5.1999): An analysis of the sustainability of American Ginseng harvesting from the wild. The problem and possible solutions. Final report to the Office of Scientific Authority of the US Fish and Wildlife Service. – Retrieved from http://www.nps.gov/plants/medicinal/pubs/ginseng.htm, viewed: 26.11.2002.

The major part of this report describes a two-tiered wild ginseng population monitoring program, and relevant field protocols, which should provide most of the answers needed to manage the ginseng resource for conservation, and perhaps continued harvesting. The monitoring program will yield population dynamics information from the high intensity monitoring of a smaller number of populations, and general population trends from the low intensity monitoring of a larger number of populations. (from summary, 29.11.2002).

GOESCHL, T. (2002): Stakes in the evolutionary race. The economic value of plants for medicinal applications. – Journal of Herbs, Spices and Medicinal Plants 9 (4): 373-388.

GOVAERTS, R. (2001): How many species of seed plants are there? – Taxon 50: 1085-1090.

The author quotes six earlier estimates for the total number of seed plants world-wide ranging from 231,413 to 320,000. None of these published figures give an exact description of how they were obtained. Govaerts therefore applies his own method which extrapolates reliable taxonomic data he has available for a number of plant groups from his “world checklist of seed plants” project. Basically it is a comparison of the number of accepted species in his database with the number of species cited in the Index Kewensis. This ratio is then applied to other plant groups using Index Kewensis species numbers as reference. The author can proove the reliability of his technique by applying it to otherwise well-known floras (Europe, South Africa and others). Using this method, the estimate for the world-wide number of seed plants is 422,127. (schp, 16.09.2002).

GUEDJE, N.M. & FANKAP, R. (2001): Utilisations traditionelles de *Garcinia lucida* et *Garcinia kola* (Clusiaceae) au Cameroon. – Syst. Geogr. Pl. 71: 747-758.

Traditional medicine and food are the main use categories. Seeds and bark are the most commonly used plant parts. The bark extraction almost always involves ringbarking the trees. The density of *G. lucida* varies from 17-314 stems/ha, the average number of *G. kola* trees is 0.4 stems per ha. The proportion of trees dying after debarking ranked between 5 and 43% according to the exploited stands of *G. lucida*. The proportion of debarked and logged trees of *G. kola* was estimated to be about 43%. The size-class distribution exhibited by both species shows a selective exploitation of the largest trees. The quantity of *G. lucida* fresh bark harvested was estimated at 15 kg per day and collector. These results indicate a high exploitation pressure using destructive harvesting techniques which could lead to the depletion of the resource in the future. (from summary, 07.06.2003).

HACHFELD, B. (2002): Occurrence and density of *Harpagophytum procumbens* in Namibia and South Africa. – In: CRIAA (Ed.): Proceedings of the Regional Devil’s Claw Conference, 26-28 Feb 2002, Windhoek, Namibia. pp. 157-163, CRIAA, Windhoek.

Since 1999 the German Bundesamt für Naturschutz has initiated several studies regarding the sustainability of the *Harpagophytum* harvesting in southern Africa. The author has been carrying out research in Namibia and South Africa focussing on the documentation and evaluation of the general distribution of *Harpagophytum*, its population status and the impact of harvesting. Preliminary results show a marked difference between commercial and communal farmlands with the latter harbouring the bulk of the resource but also the highest harvesting pressure. Investigations were carried out in quadrats of one square kilometer, each with 24 linear transect walks of 100 x 2 m and standardized counts of young and old plants, fruits and digging holes. While research is still on-going, results from the 92 investigated square kilometers investigated so far are presented regarding population structure and size and ecological requirements of the species. (schp, 29.11.2002).

HACHFELD, B. (2003): Ecology and utilisation of *Harpagophytum procumbens* (Devil’s Claw) in southern Africa. – 272 pp., Federal Agency for Nature Conservation, Bonn (Plant Species Conservation Monographs 2).

HAMUNYELA, E. (2002): Namibian perspective on devil’s claw. Resource status, current exports, permit system. – In: CRIAA (Ed.): Proceedings of the Regional Devil’s Claw Conference, 26-28 Feb 2002, Windhoek, Namibia. pp. 31-32, CRIAA, Windhoek.

The paper analyses the export situation of *Harpagophytum* in Namibia. The author presents a graph with export volumes

from 1997 to 2001 for the countries France, South Africa and Germany and another graph with total export volumes for 1991 to 2001. First large scale exports were observed in 1962, first concerns arose in 1975 when 180 tons were exported. Since 1991 a steady increase of exports is obvious. Todays concerns about over-exploitation in some areas and unsustainable harvesting techniques are expressed. (schp, 22.11.2002).

Jones, E.T., McLain, R.J. & Weigand, J. (Ed.) (2002): Nontimber forest products in the United States. - xxv+445 pp., University Press of Kansas, Lawrence.

In 28 papers the 33 contributors review the state of knowledge of NTFPs by offering a survey of products, uses and users, and discussions of sustainable management issues associated with ecology, cultural traditions, forest policy, and commerce. 6 papers are regional overviews ranging from the Pacific NW to the Carribean. Comprehensive reference lists are associated with each paper. Among other NTFPs (incl. honey, mushrooms) medicinals play a minor role (species list of MX-US-borderlands, p. 70; some medicinals also tabled on p. 59 listing monographs of important species). Tables and figures are few in the book (exception: paper on commerce by ALEXANDER et al., p. 115-150). Unfortunately, the index holds only few plant names, all of them common names. (schp, 26.05.2002).

HARDALOVA, R., EVSTATIEVA, L. & GUSSEV, C. (1998): Wild medicinal plant resources in Bulgaria and recommendations for their long-term development. – In: MEINE, C., SAKALIAN, M. (Ed.): Bulgarias's biological diversity. conservation status and needs assessment. pp. 528-561.

This paper is certainly among the the most important and valuable about medicinal plants in Bulgaria. The authors have summarized all relevant information about the level of MAP utilization and the threats to the species involved. 750 of its 3,567 species (21%) are used medicinally to some degree. With 6,000 tonnes of MAP gathered annually, Bulgaria is a major MAP exporter in Europe. In the major table of the paper (16 pages) all 248 species in trade are listed with information on life form, distribution, reproduction, and cultivation. The authors state that only 14 species are cultivated to some extent. In another important table the history and changes of protection and legal regulations since 1941 are presented. In the last part, the authors tried to estimate the existing resource volumes of all MAP species in Bulgaria. However, only few species have been covered by detailed studies *(Acorus calamus, Arctostaphylos uva-ursi, Ruta graveolens, Origanum vulgare subsp. hirtum)*. In the absence of population data, the authors present the average annual volumes gathered 1980-1990 and the extreme volumes found in the same period. These figures are presented for each species in a table of 5 pages. In the accompanying text the authors include some assessments of the over-utilization of some species and they conclude with several recommendations for a sustainable utilization, mainly calling for a thorough inventory of existing resources. (schp, 16.02.2003).

HSU, P.C. (2002): Commercial production of American ginseng (*Panax quinquefolius* L.). – Native Plants Journal 3 (2): 106-108.

KAMATENESI-MUGISHA, M. & BUKENYA-ZIRABA, R. (2002): Ethnobotanical survey methods to monitor and assess the sustainable harvesting of medicinal plants in Uganda. – In: MAUNDER, M., CLUBBE, C., HANKAMER, C. & GROVES, M. (Ed.): Plant conservation in the tropics. Perspectives and practice. pp. 467-482, Royal Botanic Gardens Kew, Kew.

KATHE, W., HONNEF, S. & HEYM, A. (2003): Medicinal and aromatic plants in Albania, Bosnia-Herzegovina, Bulgaria, Croatia and Romania. – 200 pp., Bundesamt für Naturschutz, Bonn (BfN-Skripten 91).

KRAFFT, M. (2002): Namibian export issues. – In: CRIAA (Ed.): Proceedings of the Regional Devil's Claw Conference, 26-28 Feb 2002, Windhoek, Namibia. pp. 122-124, CRIAA, Windhoek.

LAIRD, S. (Ed.) (2002): Biodiversity and traditional knowledge. Equitable partnerships in practice. – xxxix+504 pp., Earthscan, London (People and Plants Conservation Series).

This book offers practical guidance on how to arrive at equitable biodiversity research and prospecting partnerships. Drawing on experience and lessons learned from around the world, it provides case studies, analysis and recommendations in a range of areas that together form a framework for creating equity in these partnerships. They include researcher codes of ethics, institutional policies, community research agreements, the design of more effective commercial partnerships and biodiversity prospecting contracts, the drafting and implementation of national 'access and benefit-sharing' laws, and institutional tools for the distribution of financial benefits. (from summary, 11.11.2002).

LAIRD, S.A. & PIERCE, A.R. (2002): Promoting sustainable and ethical botanicals. Strategies to improve commercial raw material sourcing. Results from the sustainable botanicals pilot project. Industry surveys, case studies and standards collection. – 96 pp., Rainforest Alliance, New York. Retrieved from www.rainforest-alliance.org/news/archives/news/news44.html, viewed: 27.09.2002.

LANGE, D. (2003): Washingtoner Artenschutzübereinkommen. Erkennungshandbuch. Teil 8. Pflanzen. Heilpflanzen. – s.pag., Bundesminister für Umwelt, Naturschutz und Reaktorsicherheit, Bonn.

LANGE, D. & SCHIPPMANN, U. (2001): Identification manual flora. Section 4. Parts and derivatives. Medicinal and aromatic plants. – s.pag., CITES Secretariat, Geneva.

LEONTI, M., RAMIREZ R., F., STICHER, O. & HEINRICH, M. (2003): Medicinal flora of the Popoluca, Mexico. A botanical systematical perspective. – Economic Botany 57 (2): 218-230.

LIERSCH, R., SCHIPPMANN, U. & SEITZ, R. (2002): *Prunus africana*. Porträt einer Arzneipflanze. – Zeitschrift für Phytotherapie 23: 144-150.

LOMBARD, C. (2002): The Sustainably Harvested Devil's Claw Project, Namibia. Challenges and future work. – In: CRIAA (Ed.): Proceedings of the Regional Devil's Claw Conference, 26-28 Feb 2002, Windhoek, Namibia. pp. 120-121, CRIAA, Windhoek.

MANANDHAR, N.P. & MANANDHAR, S. (2002): Plants and people of Nepal. – 599 pp., Timber Press, Portland.

This encyclopedia summarizes Narayan P. Manandhar's in-depth knowledge of the Nepalese flora. 1517 taxa from 195 families are presented in a standard format which comprises scientific name, common names, description and uses. 834 taxa are illustrated by line drawings (all figures and counts taken from Taxon 52: 155-156, 2003). The introduction includes chapters on geography, climate, vegetation zones, ethnic communities, languages, religions, and a set of 48 colour photos of people in plant use situations (schp, 05.07.2004).

MANJKHOLA, S., & DHAR, U. (2002): Conservation and utilization of *Arnebia benthamii* (Wall. ex G. Don) Johnston, a high value Himalayan medicinal plant. – Current Science 83 (4): 484-488.

MATLHARE, T. (2002): Harvester and trade issues in Botswana. – In: CRIAA (Ed.): Proceedings of the Regional Devil's Claw Conference, 26-28 Feb 2002, Windhoek, Namibia. pp. 111-119, CRIAA, Windhoek.

The author is the General Manager of the Thusano Lefatsheng Trust (TL), a state-related organization which aims at marketing veld products to the benefit of local communities. Harvesting and trade in devil's claw started in Botswana in the late 1970s. TL is involved in it since 1986, acting as the only buyer and exporter. The raw material is exported to Europe, mainly Germany, through middlemen in Namibia and South Africa. Harvesting of the roots and exports are controlled through permits from government offices. Harvesters in Botswana are 95% women. TL's devil's claw program runs in only 3 districts and involves about 3 000 people from 50 settlements in rural areas. The author admits that under the current open access conditions of wild harvesting the sustainability of the resource use is questionable. Financial resources to carry out assessments and to determine harvesting quotas are lacking. The author is very reluctant towards commercial cultivation efforts assuming that it will exclude rural collectors from their income. (schp, 29.11.2002).

MBEWE, M (2002): Research plans for the *Harpagophytum* species at the University of Namibia. – In: CRIAA (Ed.): Proceedings of the Regional Devil's Claw Conference, 26-28 Feb 2002, Windhoek, Namibia. pp. 164-169, CRIAA, Windhoek.

MCCARTHY, S. (1.7.1999): Don't worry, darling, I have giant fennel. – Retrieved from www.salon.com/health/feature/1999/07/01/fennel/print.html, viewed: 23.10.2002.

This witty and fun-to-read paper in the "Health and Body" column of Salon.com outlines the history and mystery of the silphion plant, emphasizing its potential use as contraceptive. The taxonomic identity of silphion is unclear. Some people think it may have been *Ferula tingitana* which still grows in North Africa and the Middle East. However, this is hard to believe, since we know that the Cyrenians had a monopoly on Silphion. This would clearly not have been the case with a plant growing also in other areas outside Cyrene. With respect to the reasons for silphion becoming extinct she relates to overgrazing by sheep and to the more wide-spread view that existing long-term management was abandoned after Cyrene became a Roman senatorial province in 74 BC with one-year governors who then tried to maximize their profits not bothering about vanishing resources. (schp, 27.10.2002).

MIRANDA, E.M. DE, SOUSA, J.A. DE & PEREIRA, R. DE C.A. (2003): Caracterizacao e evaliacao de populacoes nativas de Unha-de-Gato [*Uncaria tomentosa* (Willd.) DC. e *U. guianensis* (Aubl.) Gmel.] no Vale do Rio Juruá-AC. – Revista Brasileira de Plantas Medicinais 5 (2): 41-46.

MOSSI, A.J., ZANATTA, R.S., LEONTIEV-ORLO, O., CANSIAN, R.L. & GERALD, L.T.S. (2002): On the distribution of *Maytenus* species in Rio Grande do Sul. – In: MING, L.C., CRAKER, L.E., SCHEFFER, M.C. & CAVES, F.C.M. (Ed.): Proceedings of the first Latin American symposium on the production of medicinal, aromatic and condiment plants. São Pedro, São Paulo, Brazil, 30.7. – 4.8.2000. pp. 29-32, International Society for Horticulture, Leuven (Acta Horticulturae 569).

NANAGULYAN, S.G., SIRUNYAN, A.L. & HOVHANNISYAN, E.K. (2002): Biodiversity and ecology of the medicinal mushrooms of Armenia. – International Journal of Medicinal Mushrooms 4 (1): 71-76.

NEGI, Y.S. & PANKAJ BHALLA (2002): Collection and marketing of important medicinal and aromatic plants in tribal areas of Himachal Pradesh. – Indian Forester 128 (6): 641-649.

NÉMETH, E. & BERNÁTH, J. (2001): Anbau und Markt von Arznei- und Gewürzpflanzen in Ungarn. – Zeitschrift für Arznei- und Gewürzpflanzen 6: 103-108.

ORÉNÉS, C. (2002): La plante-médicament dans la société malgache. – Ethnopharmacologia 28: 19-40.

PADULOSI, S., LEAMAN, D. & QUEK, P. (2002): Challenges and opportunities in enhancing the conservation and use of medicinal and aromatic plants. – Journal of Herbs, Spices and Medicinal Plants 9 (4): 243-267.

PAHLEN, M.C. VON DER & GRINSPOON, E. (2002): Promoting traditional uses of medicinal plants as efforts to achieve cultural and ecological sustainability. – Journal of Sustainable Forestry 15: 81-93.

PARROTTA, J.A. (2001): Healing plants of peninsular India. – CABI, Wallingford.

This book, of interest to researchers working in botany, ecology, medicine and pharmacology, naturalists within and outside India, and the general public, provides information on the healing plants of peninsular India. 545 species of trees, shrubs, climbers, herbs, grasses and ferns used in traditional Indian medicine are listed in alphabetical order of their respective

families, with botanical synonyms, common names, morphological descriptions, details of their geographical distribution and habitat, and their medicinal properties and uses. Colour plates are included for all the species. Indexes of scientific names, common names (in Bengali, English, Gujarati, Hindi, Kannada, Konkani, Malayalam, Marathi, Oriya, Punjabi, Sanskrit, Tamil, Telegu, and Urdu) and medicinal uses, two glossaries (medical and botanical terms), and a bibliography are provided. (from NWFP-Digest-L 9.2002, 04.12.2002).

PEITHNER, G. (2001): Silphion. Ein Nachruf. – ÖAZ Aktuell 23/2001. Retrieved from www.oeaz.at/zeitung/3aktuell/2001/23/haupt/haupt23_2001tier.html, viewed: 23.10.2002.

The paper summarizes the history of the ancient Silphion plant, a multi-purpose species once used as food, spice and medicinal (contraceptive?). Silphion was collected around Cyrene (now Lybia) and its export founded the wealth of this city for centuries from around 500 BC onwards. The paper illustrates some of the many coins that were emboosed in Cyrene depicting the Silphion plant. The identity of the species is uncertain. It belongs to the Apiaceae, probably in the genus Ferula. Since the species did not perform well in cultivation, all material was provided by wild collection which lead to the extinction of the plant. The author speculates about climatic changes as an additional cause for the decline. (schp, 27.10.2002).

PIERCE, A., LAIRD, S. & MALLESON, R. (2002): Annotated collection of guidelines, standards and regulations for trade in non-timber forest products (NTFPs) and botanicals. Version 1.0. – Retrieved from www.rainforest-alliance.org/news/archives/news/news44.html, viewed: 04.06.2002.

PINHEIRO, C.U.B. (2002): Extrativismo, cultivo e privatizacao do jaborandi (*Pilocarpus microphyllus* Stapf ex Holm, Rutaceae) no Maranhao, Brasil. – Acta Botanica Brasilica 16 (2): 141-150.

PORDIÉ, L. & BRISARD, V. (2002): Himalayan medical heritage facing its own success. Focus on intellectual property. – Ethnopharmacologia 29: 68-74.

POWELL, E. (2002): *Harpagophytum procumbens*. Northern Cape Province, South Africa. – In: CRIAA (Ed.): Proceedings of the Regional Devil's Claw Conference, 26-28 Feb 2002, Windhoek, Namibia. pp. 33-35, CRIAA, Windhoek.

The paper outlines a legislative framework for *Harpagophytum* harvest and export permits in the Northern cape province which is on the way of being implemented. (schp, 7.7.2004).

POSEY, DARRELL A., edited by KRISTINA PLENDERLEITH (2002): Kayapó ethnoecology and culture. – 304 pp., 33 line drawings and 31 tables. Routledge, New York.

As members of the MPSG are well aware, it is essential to take the cultural context of medicinal plant use into account. This book provides an admirable example of this context in the case of the Kayapó Indians of the Brazilian Amazon. The book consists of four main sections : (1) Kayapó history and culture; (2) Ethnobiology and the Kayapó project, (3) Kayapó land management, and (4) Continuing adaptation by the Kayapó. Three of the 21 chapters within these sections relate directly to medicinal plant use and their cultural context, two of which were co-authored by MPSG member Professor Elaine Elisabetsky. The first of these (Chapter 13) provides an analysis of Kayapó treatment of gastro-intestinal disorders and how their indigenous medicinal concepts are crucial guides to biomedical evaluation. The second (Chapter 14) deals with the use of contraceptive plants and plants used to manipulate sexual activities, such as the control of menstruation, fertility, in labour or in procuring abortion. The third (Chapter 6) describes the symbolism and process through which a person travels to become a shaman.

This book, carefully edited by Kristina Plenderleith, is a fitting tribute to Darrell Posey, who died in March 2001 in the middle of a distinguished and influential career. Like so much ethnobiological research, his papers were dispersed across a wide range of journals, some of them difficult to obtain. Of particular interest to me, as someone who like Darrell, originally trained as an entomologist, are the four chapters on Kayapó ethnoentomology, including his seminal work on Kayapó knowledge and classification of stingless bees. At a time when there is more interest than ever before in teaching ethnobotany, ethnobiology and ethnoecology, it is good to find Darrell's Kayapó papers available in a single bound volume. I would also recommend this book to university teachers in anthropology and pharmacology. My only criticism is the high price of the hardback version - which needs to be resolved through printing a paperback edition which is priced in reach of teachers and researchers in developing countries. (A.B. Cunningham)

PRASAD, R., KOTWAL, P.C., MISHRA, M., PRASAD, R. & MISHRA, M. (2002): Impact of harvesting of *Emblica officinalis* (Aonla) on its natural regeneration in central Indian forests. – Journal of Sustainable Forestry 14 (4): 1-12.

PURANIK, A. (1999): Opportunities and constraints for the production and development of medicinal plants in India. – In: KARKI, M. & JOHARI, RADHIKA (Ed.): The role of medicinal plants industry in fostering biodiversity conservation and rural development. pp. 27-32, International Development Research Centre, New Delhi.

Whereas other sources talk of some 20.000 plant species as native to India, the author estimates the "total number of plants known in India" to be as high as 45 000 species. Of these, 7 500 species are plants with a direct medicinal use. An analysis of the plant parts used in the Ayurvedic industry shows that 29.6% of the species are harvested for their roots, in 16.5% the whole plant is used. Other percentages are: bark 13.5%, fruits 10.3%, seeds 6.6%, leaves 5.8%, stems 5.5%, flowers 5.2%, rhizomes 4%, and wood 2.8%. (schp, 07.10.2002).

RAJASEKHARAN, P.E. & GANESHAN, S. (2002): Conservation of medicinal plant biodiversity. An Indian perspective. – Journal of Tropical Medicinal Plants 3 (1): 125-140.

RAMAKRISHNAPPA, K. (2003): Impact of cultivation and gathering of medicinal plants on biodiversity. Case studies from India. – In: ANON.: Biodiversity and the ecosytem approach in agriculture, forestry and fisheries. pp. 170-195, FAO, Rome.

ROBBINS, C. (2002): Medicine from U.S. wildlands. An assessment of native plant species harvested in the United States for medicinal use and trade and evaluation of the conservation and management implications. – Retrieved from www.nps.gov/plants/medicinal/pubs/traffic.htm, viewed: 26.11.2002.

ROBBINS, C. (2003): Ecolabelling as a conservation tool for American ginseng. – TRAFFIC Bulletin 19(3): 153-156.

ROTH, I. & LINDORF, H. (2002): South American medicinal plants. – x+492 pp., Springer, Berlin.

Risks of over-harvesting, threats, sustainability and conservation in general are not mentioned at all in this otherwise very useful book. It covers a selection of about 120 medicinal and other useful plant species which have been thoroughly investigated by the authors, more than 200 additional ones are only briefly covered. The bulk of the text for each species is dedicated to anatomical descriptions. The majority of illustrations are histological preparations showing leaf anatomy and other plant organs. (schp, 22.01.2003).

SAGUN BISTA (2003): Conservation of medicinal and aromatic plants for sustainable livelihood in Baitadi, Nepal. – Medplant Network News 3 (2): 8-10.

SCHIPPMANN, U. (2002): Medicinal plants. Just what the doctor ordered! – World Conservation 3 (2002).

SCHIPPMANN, U. (2002): Importing countries trade survey. Germany. – In: CRIAA (Ed.): Proceedings of the Regional Devil's Claw Conference, 26-28 Feb 2002, Windhoek, Namibia. pp. 104-106, CRIAA, Windhoek.

The paper reports the results of an interview survey carried out among German devil's claw importers in January 2002, covering the years 1999-2001. It was found that 8-10 importers are covering the total import market for *Harpagophytum*. Only two companies report imports from both Namibia and South Africa. All others only had imports from Namibia directly. It was found that figures reported by the importers are higher than the respective export trade figures monitored by the Namibian Ministry of Environment and Tourism (1999: 265 vs. 125 tonnes, 2000: 492 vs. 184 tonnes). Some assumptions are presented to explain these discrepancies. In 2001, figures match quite well. (schp, 29.11.2002).

SHANLEY, P., PIERCE, A.R., LAIRD, S.A. & GUILLEN, A. (2002): Tapping the green market. Certification and management of non-timber forest products. - xviii+456 pp., Earthscan, London.

This book explains the use and importance of market-based tools such as certification and ecolabelling for guaranteeing best management practices of non-timber forest products (NTFPs). Using extensive case studies and global profiles of NTFPs in the field, this book not only furthers comprehension of certification processes but also broadens understanding of NTFP management, harvesting and marketing. It includes guidelines on NTFP management assessment and species-specific certification. The volume is the collaborative work of 45 authors, contributors and editors and is divided into four sections: (i) The first section summarizes the current state of certification programmes and draws lessons from the evaluation of timber certification, and relates field-testing experiences in Mexico, Bolivia and Brazil. (ii) Section two incorporates a range of temperate and tropical NTFP species profiles which examine ecological, social, cultural and marketing elements as well as the likelihood that certification will promote environmental and social objectives in each case. With 14 case studies there is a dominance of Latin American experience, but also North America (3), the Mediterranean region (1), Africa (4) and Asia (3) are covered. (iii) The third section considers the 'core elements' of NTFP certification (ecological, social, marketing and technical issues) and also highlights the importance of NTFPs to subsistence livelihoods. (iv) The final section reviews the central lessons learned and summarises some of the opportunities and challenges afforded by NTFP certification. Appendices contain guidelines for assessing the management of NTFPs, a species-specific example for maple syrup and a resource directory. The book is highly recommendable for two reasons: It provides the broadest and most comprehensive overview possible on certification efforts undertaken to-date. Secondly it compiles a wealth of information on 45 utilized species from a total of 23 countries in a standardized and easy-to-read format, an information which would otherwise be scattered in numerous sources and niches. Congratulations to the authors and the publisher. (schp, 5.12.2003).

SCHIPPMANN, U., LEAMAN, D.J. & CUNNINGHAM, A.B. (2003): Impact of cultivation and gathering of medicinal plants on biodiversity. Global trends and issues. – In: ANON.: Biodiversity and the ecosytem approach in agriculture, forestry and fisheries. pp. 142-167, FAO, Rome (www.fao.org/DOCREP/005/AA010E/AA010e00.htm#TopOfPage, viewed: 22.01.2003).

SCHLUTER, C. & PUNJA, Z.K. (2002): Genetic diversity among natural and cultivated field populations and seed lots of American ginseng (*Panax quinquefolius* L.) in Canada. – International Journal of Plant Sciences 163 (3): 427-439.

SHANLEY, P. & LUZ, L. (2003): The impacts of forest degradation on medicinal plant use and implications for health care in eastern Amazonia. – BioScience 53 (6): 573-584.

SHINWARI, Z.K. & GILANI, S.S. (2003): Sustainable harvest of medicinal plants at Bullashbar Nullah, Astore (northern Pakistan). – Journal of Ethnopharmacology 84 (2/3): 289-298.

SINCLAIR, A. & CATLING, P.M. (2001): Cultivating the increasingly popular medicinal plant, goldenseal. Review and update. – American Journal of Alternative Agriculture 16 (3): 131-140.

SINCLAIR, A. & CATLING, P.M. (2002): Recent trends in stem numbers in goldenseal, *Hydrastis canadensis*, populations at the northern limit of its range. – The Canadian Field-Naturalist 116: 112-115.

SINCLAIR, A. & CATLING, P.M. (2003): Restoration of *Hydrastis canadensis* by transplanting with disturbance simulation. Results of one growing season. – Restoration Ecology 11 (2): 217-222.

SOEHARTONO, T. & NEWTON, A.C. (2002): The gaharu trade in Indonesia. Is it sustainable? – Economic Botany 56 (3): 271-284.

SOEJARTO, D.D. & al. (2002): An international collaborative program to discover new drugs from tropical biodiversity of Vietnam and Laos. – Natural Products Sciences 8: 1-15.

STEWART, K.M. (2003): The African cherry *(Prunus africana)*. From hoe-handles to the international herb market. – Economic Botany 57 (4): 559-569.

STROHBACH, M. (2002): Methods of sustainable utilization of the medicinal plant *Harpagophytum* in Namibia. Outline of research conducted in the Omaheke region, eastern Namibia. – In: CRIAA (Ed.): Proceedings of the Regional Devil's Claw Conference, 26-28 Feb 2002, Windhoek, Namibia. pp. 153-156, CRIAA, Windhoek.

Since 1999 the German Bundesamt für Naturschutz has initiated several studies regarding the sustainability of the *Harpagophytum* harvesting in southern Africa. The author has been carrying out research in Namibia in the Omaheke area with the following main objectives: (a) establishment of a sustainable harvesting method, based on investigations over four years on permanent plots situated near communities who regularly harvest the resource; (b) development of a simple yet reliable method, which can also be carried out by harvesting communities, to determine the annual sustainable harvesting quota for a potential harvesting area, and (c) investigating the influence of fluctuations in rainfall on the development of populations in comparison to the impact of harvesting. Research started in 2000 and will be completed by the end of 2004. (schp, 29.11.2002).

SUITS, S.A., CORBIT, R.M. & WOOD, A.J. (2003): American Ginseng (*Panax quinquefolium* L.), the 'other' ginseng. – Economic Botany 57 (1): 143-144.

SUMIT MANJKHOLA & UPPEANDRA DHAR (2002): Conservation and utilization of *Arnebia benthamii* (Wall. ex G.Don) Johnston. A high value Himalayan medicinal plant. – Current Science 83 (4): 484-488.

SUNEETHA, M.S. & CHANDRAKANTH, M.G. (2002): Trade in medicinal plants in Kerala. Issues, problems and prospects. – Journal of Medicinal and Aromatic Plant Sciences 24 (3): 756-761.

UMESH TRIPATHY, DILBAGH KAUR & RAMESHCHANDRA MAHESWARI (2003): Sustainable cultivation of medicinal plants. – Economic and Political Weekly 38 (10): 940-942.

VASISHT, K. & KUMAR, V. (2002): Trade and production of herbal medicines and natural health products. – iv+86 pp., ICS & UNIDO, Trieste.

This condensed report was prepared on behalf of UNIDO with the aim to "help developing countries to understand, penetrate and take benefit from the emerging demand of medicinal plants and their products" (from preface). In the first part (34 pp.) the global, European, North American and a few other markets are analysed with respect to phytopharmaceuticals, herbal medicines, traditional medicines, nutraceuticals, phyto-cosmetics and personal care products. The second part (26 pp.) covers the raw material supply, looking at dynamics and trends of trade in medicinal plants and its supply sources. The trade in liquorice *(Glycyrrhiza)* and ginseng *(Panax)* is briefly summarized as well as a number of source countries. The last part (14 pp.) of the report gives an overview of policies and regulations in medicinal plant trade, both on the international level as well as going into some regional details of 12 countries and regions. However, the description of CITES as a whole and its implementation in the European Union is full of mistakes and misunderstandings. This is hopefully not the case with other details and figures cited in the publication. (schp, 17.09.2002).

VENDER, C. (MAY 2000): ISAFA activities on medicinal and aromatic plants. – Retrieved from www.isafa.it/scientifica/officinali/offic-ing/officinalplants.htm, viewed: 18.10.2002.

The author describes the cultivation trials carried out by the Istituto Sperimentale per l'Assestamento Forestale e per l'Alpicoltura between 1981 and 1994. The trials were performed on typically alpine species with two aims: (1) to preserve vanishing wild populations from overharvesting, and (2) to create a market opportunity for niche crops in environments increasingly subject to abandonment. Two meetings in 1986 and 1994 discussed the outcomes of the projects. Proceedings were published by ISAFA. (schp, 20.10.2002).

VIEIRA, R.F. (2002): Conservacao de recursos genéticos de plantas medicinais e aromáticas Brasileiras. Um desafio para o futuro [Economic potential and conservation of medicinal and aromatic plants from Brazil]. – In: MING, L.C., CRAKER, L.E., SCHEFFER, M.C. & CAVES, F.C.M. (Ed.): Proceedings of the first Latin American symposium on the production of medicinal, aromatic and condiment plants. São Pedro, São Paulo, Brazil, 30.7.-4.8.2000. pp. 61-68, International Society for Horticulture, Leuven (Acta Horticulturae 569).

VINES, G. & BEHRENS, J. (2004): Herbal harvests with a future. Towards sustainable sources for medicinal plants. – 10 pp., Plantlife International, Salisbury.

VITKOVA, A. & EVSTATIEVA, L. (2000): Biodiversity of medicinal plants in Rila National Park. – In: SAKALIAN, M. (Ed.): Biological diversity of the Rila National Park. pp. 79-116, USAID, Sofia.

The authors have prepared and present standardized medicinal plant inventories for various sites within the Rila National Park and they give recommendations for improved manage-

ment of the investigated areas. For each site the medicinal plants with economic importance have been assessed regarding the quantity of the resource in kg for the given area. (schp, 15.02.2003).

VYVER, C. VAN DER (2002): Guidelines on sustainable harvesting of wild harvested devil's claw *(Harpagophytum procumbens)* in North West Province, South Africa. – In: CRIAA (Ed.): Proceedings of the Regional Devil's Claw Conference, 26-28 Feb 2002, Windhoek, Namibia. pp. 36-47, CRIAA, Windhoek.

The paper describes the recent policy of the North West Province to install a sustainable resource management for the harvesting and commerce of devil's claw in the region which started in 2001. (schp, 24.11.2002).

WHO (2003): WHO guidelines on Good Agricultural and Field Collection Practices (GACP) for medicinal plants. – vi+72 pp., WHO, Geneva.

WILLERT, D.J. VON (2002): Cultivation without irrigation. Trial and success. – In: CRIAA (Ed.): Proceedings of the Regional Devil's Claw Conference, 26-28 Feb 2002, Windhoek, Namibia. pp. 68-72, CRIAA, Windhoek.

The paper consists of the tables and overhead photos and figures presented at the workshop and has no text apart from the abstract. Based on experimental comparison of wild growing and cultivated plants, the author stresses that after three years the cultivated plants have a root mass eight times higher than in wild growing plants (of unknown age). (schp, 29.11.2002).

WILLIAMS, V.L. (2003): Hawkers of health. An investigation of the Faraday Street traditional medicine market in Johannesburg, Gauteng. – ix+128 pp., Draft report for Gauteng Directorate for Nature Conservation, Johannesburg (to be published: Plant Ecology and Conservation Series 15).

This is a very exciting piece of up-to-date ethnobotany: leaving the classical and often boring "Which species is used by what group for which desease?" behind and venturing into questions like: What is the education background of women who sell MAP in a huge city market? What is their perception of conservation? Vivienne Williams has examined the Johannesburg Faraday street market in any way possible and has summarized her findings in a report which will soon be published by the Gauteng Directorate for Nature Conservation in the series "Plant Ecology and Conservation Series". (schp, 08.06.2003).

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