

CHAPTER 8

REVISION OF THE 'GUIDELINES ON THE CONSERVATION OF MEDICINAL PLANTS' BY WHO, IUCN, WWF AND TRAFFIC

Process and scope

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Abstract. The 'Guidelines on the Conservation of Medicinal Plants' were published in 1993 by WHO, IUCN and WWF, following the historic 1988 Chiang Mai Declaration 'Saving Lives by Saving Plants'. In May 2003, representatives from WWF, IUCN, WHO and TRAFFIC recommended the revision of the 1993 Guidelines, as significant new developments had been made in the field of medicinal-plant conservation and use over the past decade. As an up-to-date global framework for medicinal-plant conservation and sustainable use it will help to develop management action at different levels of the supply chain, from harvesters and farmers to traders and the herbal-medicine industry. The commercial sector will be a key audience, in addition to governments, research institutes and NGOs.

The Guidelines are being revised through a global consultation process. An international expert consultation workshop was held in Kunming, China, in June 2004. Thirty medicinal-plant experts from 13 different countries participated in this meeting. Based on the results of the international workshop and two rounds of global e-mail consultation, a working draft was prepared and presented at the Third IUCN World Conservation Congress in November 2004 in Bangkok, Thailand. At this event, IUCN adopted a motion on the conservation of medicinal plants sponsored by the Government of India (Ministry of Environment and Forests), the Canadian Museum of Nature and WWF Germany, which has now become an IUCN resolution (IUCN 3.073). The final draft of the Guidelines was circulated for consultation to over 700 individuals/institutions from all sectors and regions between December 2004 and March 2005. Following the final consultation round and a final revision of the text, the revised Guidelines will enter the agreement process of the four coordinating agencies, which is hoped to be completed in early 2006. Subsequently, the revised WHO/IUCN/WWF/TRAFFIC Guidelines on the Conservation of Medicinal Plants will be translated into several languages and published.

Keywords: sustainable use; over-harvesting; herbal medicine; healing plants; Chiang Mai Declaration; Kunming; World Conservation Congress; IUCN resolution 3.073

BACKGROUND

Collection, use and trade of, as well as basic knowledge about medicinal and aromatic plants (MAP) are probably as old as mankind. For thousands of years, this knowledge was part of the oral traditions of peoples, often linked with the spiritual side of the cosmos and with feeding habits, and was passed on from one generation to the next. Holding knowledge about medicinal plants could be restricted to a specific (professional) group within the society (such as shamans, medicine women or men) or it was commonplace so that every family, within the wider framework of the group or tribe, could develop their own medical care system and perform their own rituals.

A lot of this knowledge has been lost through the years, because written documentation was rare or non-existent and cultures and traditions disappeared, taking their specific knowledge about medicinal plants with them. On the other hand, new cultural traditions and medicine systems, including the use of medicinal plants, were developed.

The first known documentation of the use of medicinal plants by humans traces back to about 7,000 years ago. Through the centuries, together with progressing human auto-domestication, documentation of knowledge, rules, procedures and other forms of social organization became prevalent. With increasing population numbers and densities, the demand for natural resources including medicinal plants increased. This development has gained amazing speed in recent decades and has led to concern over the long-term availability of regenerative natural resources such as medicinal plants.

The top 12 medicinal-plant export countries of the world export an annual 350,000 tonnes of medicinal plant material (average annual export 1991-2000), with a value of almost 900 million US dollars (Lange 2003). It is estimated that, today, between 40,000 and 50,000 plant species are used for medicinal and / or aromatic purposes worldwide, in both traditional and newly developed medicinal systems. The majority of the MAP species are still provided by collection from the wild (Schippmann in press; Lange and Schippmann 1997; Xiao 1991). In terms of volumes, however, over 50 % the medicinal plant material used worldwide may already be sourced from cultivation. Over-harvesting, habitat and ecosystem destruction and land conversion pose an increasing threat to MAP species and populations. For these reasons, common agreement has to be reached how MAPs, which provide the basis of most health-care systems worldwide, can be collected and / or cultivated sustainably in order to be able to continue providing natural healing power to humankind.

In March 1988, the World Health Organization (WHO), IUCN – The International Conservation Union and the World Wide Fund for Nature (WWF) convened an international consultation meeting on the conservation of medicinal plants in Chiang Mai, Thailand. One of the immediate results of this meeting was the Chiang Mai Declaration ‘Saving lives by saving plants’, (WHO 1993, p. 34) with a focus on primary health care, expressing concern over the loss of medicinal-

plant diversity and the need for international cooperation and conservation concepts. The WHO/IUCN/WWF Guidelines on the Conservation of Medicinal Plants (hereafter called 'Guidelines'), originally published in 1993, also trace back to the 1988 Chiang Mai meeting and aimed at providing a framework for the development of national strategies on the conservation and sustainable use of medicinal plants.

These Guidelines had, on the international level, considerable influence on the author organizations themselves, and played an important role during the development of WWF's 'People and Plants' initiative (1993-2004, continued through PPI), of IUCN's Medicinal Plant Specialist Group (founded in 1994) and influenced WHO's 'Traditional Medicine Strategy 2002-2005' (WHO 2002). Since the Guidelines' first edition, new concepts and policies in health care, conservation and sustainable use of natural resources were developed, such as the Convention on Biological Diversity (CBD), the Global Strategy for Plant Conservation (CBD 2002) and their implementation (Kathe and Pierce 2004).

In May 2003, representatives of WHO, IUCN, WWF, TRAFFIC and other medicinal-plant experts convened an informal meeting in Oxford, UK in order to discuss the challenges of medicinal-plant conservation and develop an action plan for the potential management of medicinal-plant resources. One of the most important, immediate results of this meeting was the agreement to react to the increasing political, economical and consumer demand for product quality and strive for creating a stronger awareness that product quality is not only determined by the pharmaceutical quality of a product, but also by the sustainability of the practices how the starting material is sourced. Agreement was achieved to revise, as a first step, the 1993 Guidelines so that they reflect modern conservation approaches and new developments and to improve their implementation. The revised Guidelines should provide the framework for international medicinal-plant conservation, which only works if widely known and accepted and if being translated into practice by a specific standard, practical performance criteria for the sustainable sourcing of medicinal plants (Leaman in press; Paetzold and Honnef 2005) and by locally adapted resource management plans. In the framework of relevant WHO Guidelines, the WHO/IUCN/WWF/TRAFFIC Guidelines on the Conservation of Medicinal Plants complement WHO's 'Guidelines on Good Agricultural and Collection Practices (GACP) for Medicinal Plants', which focus on pharmaceutical product quality, safety and best practices, was developed through an international consultation process and was published in 2003 (WHO 2003; Pierce and Kathe 2004).

MAIN SECTIONS

The revised 'WHO/IUCN/WWF/TRAFFIC Guidelines on the Conservation of Medicinal Plants' carry forth the spirit of the original 1993 Guidelines, the Chiang Mai Declaration, the Bangalore Declaration and the Convention on Biological Diversity (CBD). A number of new sections will be added to reflect up-to-date approaches to and requirements of medicinal-plant conservation and sustainable use.

The revised Guidelines will be more clearly structured as compared to the original document. The theoretical background and recommendations will be supplemented with text boxes illustrating the recommendations of each section by giving examples of specific experiences or practices from around the world or by providing more detailed definitions or amplifications.

Although the revision process has not been fully completed yet, the consultation has shown that there are a number of crucial issues, which will appear in the revised Guidelines in one form or the other, as a separate section or part of a larger unit. Sections newly developed for this revised draft document include 'equity', '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. Among the crucial issues are (in random order as the sequence will be decided upon during finalization):

A. Information and research

Although research into medicinal plants has been a continuous effort among healers, herbalists, botanists, companies and other plant specialists around the world, there are still considerable gaps in our knowledge of medicinal plants, their ecology and the effectiveness and interactions of their active principles. Besides promoting research, national and international coordination and information exchange is of particular importance to increase the effectiveness of research, avoid doubling and increase the availability of the results of research.

B. Policy and legislation

Governments and other players in the decision-making process on the political level are one of the Guidelines' key audiences. The Guidelines provide recommendations relating to the role of governments and others working on a political level on how to improve medicinal-plant resource management and conservation. This includes, among other aspects, institutional structures, trade regulation and stakeholder involvement and consultation.

C. Conservation strategies

Both *in situ* and *ex situ* conservation are recognized as valuable tools for medicinal-plant conservation. This includes inventorying and monitoring of medicinal-plant species and populations, medicinal-plant resource management and the role of gene banks and tissue cultures.

D. Sustainable production

Sustainable production of medicinal plants comprises collection from the wild, cultivation and all intermediate techniques such as enrichment planting. Advantages and disadvantages of cultivation and wild collection will be listed in a table. Adaptive production systems considering the sustainable sourcing and species conservation in the wild will be promoted.

E. Health care

The Guidelines will emphasize the importance of revitalizing local health-care traditions for the conservation of medicinal plants and their habitats in many parts of the world and of developing local herbal pharmacopoeias based on local traditions. The role of herbal home gardens and nurseries for native species for both medicinal-plant conservation and family health care will be mentioned.

F. Responsible business practices

Trade and producing industry are key groups in the medicinal-plants sector and have a high responsibility for the maintenance of healthy medicinal-plant populations and for the sustainable use of the resources. Therefore, a separate section on responsible business practices will be a core element of the revised Guidelines. This aspect was not covered in the original Guidelines.

G. Equity

Equity is a very general issue, which was not explicitly separated and dealt with in the original Guidelines. Equity mainly relates to two different areas: equity at the local and national levels and equity relating to intellectual property rights, access and benefit sharing (bio-prospecting, use of genetic resources) and traditional knowledge. Equity issues are influencing all levels of medicinal-plant sourcing and production, from collection and trade to the production of medicines.

H. Awareness, training and capacity building

The importance of including training on medicinal-plant sourcing and use more widely in curricula and training units for natural resource managers, outreach programmes and other relevant educational and capacity-building efforts will be stressed in the revised Guidelines.

REVISION PROCESS

When designing the process of revising the Guidelines, it soon became clear that, in

order to improve the uptake of the Guidelines, both the consultation and the target audience of the document needed to be broadened. Whereas the original Guidelines were mostly targeted at governments, IGOs and NGOs, the revised edition targets, in addition, the private sector, practitioner and herbalist groups, universities, botanical gardens and other research institutes.

The revised Guidelines were developed through a global consultation process. The consultation consisted of three rounds of e-mail consultation and an International Consultation Workshop (Table 1).

Table 1. Revision and consultation process of the WHO/IUCN/WWF/TRAFFIC Guidelines on the Conservation of Medicinal Plants during the period May 2003 – July 2005

Period	Revision / Consultation step
May 2003	Oxford Meeting: Decision to revise Guidelines
August 2003	Draft annotated outline produced and consulted within author organizations
September – November 2003	First international e-mail consultation (about 250 medicinal-plant experts)
December 2003 – April 2004	First full-text draft produced and consulted within author organizations
May – July 2004	Second international e-mail consultation (about 410 medicinal-plant experts + 230 WHO consultants)
June 2004	International Consultation Workshop in Kunming, China
August – November 2004	Second full-text draft produced and consulted within author organizations
November 2004	Presentation of final draft to the public at the Third IUCN World Conservation Congress in Bangkok, Thailand; IUCN Resolution 3.073
January – March 2005	Third and final international e-mail consultation (about 500 medicinal-plant experts + 230 WHO consultants)
April – July 2005	Final revised document produced and entering the approval process within the author organizations

WHO's procedure of developing / revising Guidelines slightly differs from that of the other three partner organizations. WHO did not consult by e-mail but through ordinary mail. In addition, WHO did not take part in the first consultation round, because only full-text versions could be circulated. For these reasons, the WHO consultation was carried out separate from the joint IUCN/WWF/TRAFFIC consultation process.

Between each consultation round, the draft document was revised. As many comments and ideas as possible were included in the revised drafts. In the case of contradicting comments a decision had to be made which suggestion to take on board. In addition, comments that would not reflect the principle goals and the spirit of the revised Guidelines could not be considered.

Care was taken to achieve a balanced geographical and stakeholder representation. For this reason, the number of experts consulted increased throughout the consultation process in order to close geographical or stakeholder 'gaps'. Besides including experts from all parts of the world, it was of particular importance to achieve a high and active involvement of medicinal-plant experts from all relevant interest groups in the world's largest source regions and consumer countries for medicinal plants, namely South Asia, China, North America and East and Central Europe. The e-mail consultation included representatives from government agencies, ministries, intergovernmental organizations, NGOs, the private sector (trade and pharmaceutical companies and associations), universities and other academic institutions, donors and foundations, and certification bodies (Table 2).

Table 2. Stakeholder representation of the international e-mail consultation process. As WHO's consultation process was carried out separately from the other three partner organizations, it is kept separate in this table. Most WHO consultants are government representatives of WHO member countries

Stakeholder group	No. consulted	No. of replies	Percentage of replies
IUCN / WWF / TRAFFIC Consultation			
Academic institutions / Universities	133	48	36.1
NGOs	94	29	30.9
Government agencies	72	25	34.7
IGOs and international organizations (incl. UN)	60	28	46.7
Herbal industry / Trade	51	19	37.3
Consultants	34	13	38.2
Associations	18	5	27.8
Donors and foundations	13	4	30.8
Certification bodies	7	0	0
Others	25	8	32.0
TOTAL (excl. WHO)	507	179	35.3
WHO consultation*	230	19*	8.3*
TOTAL (incl. WHO)	737	198	26.9

* WHO's consultation is based on member information. Comments received during the first full-text draft consultation were combined and the total number of comments received was not counted. Therefore this figure only reflects the number of comments received during the

final consultation round.

Most stakeholder groups active in the medicinal-plants sector seem to be adequately represented in the consultation process; the relatively low involvement of the private sector may reflect the fact that the network of experts of the author organizations only includes key representatives of the private sector. During the consultation process, however, the author organizations undertook considerable efforts to achieve a more widespread distribution of the draft to companies that are active in international medicinal-plant trade, as well as to pharmaceutical companies in the main source, trade and consumer countries. A closer look at the consultation statistics shows that the average response rate within almost all stakeholder groups is around 30 % (Table 2). Notable exceptions are IGOs and international organizations with a considerably higher response rate (46.7 %) and Certification Bodies with a 0 % response. Interestingly, the effort to approach representatives of certification bodies directly and ask them for input during the revision process remained without success, although certifiers of medicinal-plant-sourcing enterprises will be affected by the revised Guidelines.

It proved to be difficult to achieve adequate regional representation of the consultation process (Table 3). The current IUCN / WWF / TRAFFIC network of medicinal-plant experts is clearly reflected in the statistics: almost 50% of the experts consulted come from only 2 regions, West / Southwest Europe and South Asia. Some regions, such as West Africa, East and Southeast Europe, Middle East and Central Asia are underrepresented. This was partly compensated by WHO's consultation, because WHO's network, especially in the Middle East and Central Asia, is well developed. Unfortunately, however, the response rate of the WHO consultation was not very high. Language may in some cases have been a problem and disincentive for experts in some regions to reply to the call for comments, as English is not commonly understood or spoken in some parts of the world, such as Latin America and many West- and North-African countries. For Latin America and China, this could be partly compensated by translating the first full text draft into Spanish and Chinese, which triggered a number of additional comments. Due to time and funding constraints, however, it was not possible to translate the draft into other languages.

Table 3. *Geographic representation of the international e-mail consultation process. As WHO's consultation process was carried out separately from the other three partner organisations, it is kept separate in this table. It included representatives from almost all WHO member countries.*

Geographical region	No. consulted	No. of replies	Percentage of replies
IUCN / WWF / TRAFFIC Consultation			
West / Southwest Europe	155	58	37.4
South Asia	87	40	46.0
North America	70	25	35.7
South and Central America (incl. Caribbean)	60	21	35.0
East / Southeast Asia	49	13	26.5
Africa	45	14	31.1
Central / East / Southeast Europe	25	3	12.0
Australia / Oceania	10	3	30.0
Middle East / Central Asia (incl. Russia)	6	2	33.3
TOTAL (excl. WHO)	507	179	35.3
WHO consultation*	230	19*	8.3*
TOTAL (incl. WHO)	737	198	26.9

* WHO's consultation is based on member information. Comments received during the first full-text draft consultation were combined and the total number of comments received was not counted. Therefore this figure only reflects the number of comments received during the final consultation round

Again, the response rate from almost all regions was around 30 %. Notably, the response rate from South Asia is considerable higher, which shows the particularly keen interest in medicinal-plant conservation and sustainable sourcing in this region. On the other hand, the response rate from Central, East and Southeast Europe is remarkably low.

Parallel to the e-mail consultation, an international consultation workshop on the revision of the Guidelines was organized by the Kunming Institute of Botany, Chinese Academy of Sciences, in cooperation with WWF-UK. This workshop was held in Kunming, Province of Yunnan, China in late June 2004. Thirty medicinal-plant experts from Asia, Africa, Latin America, North America and Europe were invited to discuss all aspects of the revised draft Guidelines, from scope, structure, content and wording to target audience, translation and implementation (Kathe 2005).

The results of both the workshop and the e-mail consultation were integrated into

the final draft of the revised Guidelines presented at the Third IUCN World Conservation Congress in Bangkok in November 2004. For this congress, a motion on the 'Conservation of Medicinal Plants' (CGR3.RES059) was submitted to the IUCN Resolutions Committee by the Government of India, The Canadian Museum of Nature and WWF Germany and approved with amendments (IUCN Resolution 3.073 (see also IUCN 2005)) by the union's members assembly during the congress. In this resolution, IUCN explicitly welcomes and supports the revision of the Guidelines and urges all target groups of the revised Guidelines to endorse and implement them (IUCN 2005).

THE WAY FORWARD

With the work on the text of the Guidelines almost completed, new challenges are currently being faced in the revision process of the Guidelines. As this revision is the joint effort of four differently structured partner organizations, the internal sign-off and approval process of the Guidelines differs between the author organizations. These different processes and the ongoing fundraising efforts to finance the costly finalization of the document slow down the process considerably. Nevertheless, the Guidelines revision is hoped to be completed by mid 2006.

The finalization process consists of five main elements:

- A. Internal sign-off of all four partner organizations
- B. WHO finalization workshop
- C. Translation of final document into French, Spanish, Arabic, Chinese and Russian (translation into other languages is possible if required and if funds are made available)
- D. Printing of the Guidelines in all 6 languages
- E. Shipping and distribution

The finalization process will have to be followed by the implementation of the Guidelines. For this purpose, the Steering Committee, together with the coordinator of the Guidelines revision, are developing a distribution list and an implementation strategy. It is aimed at decentralizing implementation as much as possible to promote adaptive implementation and increase identification with the Guidelines worldwide.

The revision of the Guidelines has served as the starting point to initiate the development of a standard and applicable performance criteria for the sustainable collection of medicinal plants from the wild (ISSC-MAP), undertaken by the German Federal Agency for Nature Conservation (BfN), together with WWF, IUCN and other partners (Leaman in press; Leaman and Salvador 2005; Paetzold and Honnef 2005). The Guidelines may also influence company policies and company guidelines and standards, the development of codes of conduct, and management plans for sustainable resource management.

ACKNOWLEDGEMENTS

It is impossible to name all colleagues and experts who helped during the revision process of the Guidelines, as this would result in a list of over 200 persons. Therefore, I would like to thank all the many colleagues collectively and, in particular, both the former and current members of the Steering Committee of the revision process for their continuous help and support. These are (in alphabetic order, without academic titles): Alan Hamilton (formerly WWF-UK), Mandy Haywood (formerly IUCN-SSC), Susanne Honnef (WWF Germany), Danna Leaman (IUCN MPSG), Samuel Lee (TRAFFIC East Asia), Yukiko Maruyama (WHO), Teresa Mulliken (TRAFFIC International), Alison Rosser (IUCN-SSC) and Susanne Schmitt (WWF-UK). In addition, I would like to express my sincere thanks to Alan Pierce, who has, together with Danna Leaman and Alan Hamilton, written the various drafts during the revision process.

REFERENCES

- CBD, 2002. *Global strategy for plant conservation*. Convention on Biological Diversity, Montreal. [<http://www.biodiv.org/doc/publications/pc-brochure-en.pdf>]
- IUCN, 2005. *Resolutions and recommendations: World Conservation Congress, Bangkok, Thailand (17-25 November 2004)*. International Union for Conservation of Nature and Natural Resources, Gland. [http://www.iucn.org/congress/members/WCC_Res_Recs_ENGLISH.pdf]
- Kathe, W., 2005. The revision of the “WHO/IUCN/WWF guidelines on the conservation of medicinal plants”: a step forward in medicinal plant conservation and sustainable use. *HerbalGram*, 66, 60-61. [<http://herbalgram.org/naturemade/herbalgram/articleview.asp?a=2815&p=Y>]
- Kathe, W. and Pierce, A., 2004. Revision of the ‘WHO/IUCN/WWF guidelines on the conservation of medicinal plants’. *Medicinal Plant Conservation*, 9/10, 54-56.
- Lange, D., 2003. The role of East and Southeast Europe in the medicinal and aromatic plant trade: with special focus on Albania, Bosnia-Herzegovina, Bulgaria, Croatia and Romania. In: Kathe, W., Honnef, S. and Heym, A. eds. *Medicinal and aromatic plants in Albania, Bosnia-Herzegovina, Bulgaria, Croatia and Romania: a study of the collection of and trade in medicinal and aromatic plants (MAPs), relevant legislation and the potential of MAP use for financing nature conservation and protected areas*. Federal Agency for Nature Conservation, Bonn, 64-77. BfN-Skripten no. 91. [<http://www.bfn.de/fileadmin/MDb/documents/skript91.pdf>]
- Lange, D. and Schippmann, U., 1997. *Trade survey of medicinal plants in Germany: a contribution to international plant species conservation*. Bundesamt für Naturschutz, Bonn.
- Leaman, D.J., in press. Sustainable wild collection of medicinal and aromatic plants: development of an international standard. In: Bogers, R.J. ed. *Medicinal and aromatic plants*. Springer, Dordrecht. Wageningen UR Frontis Series no. 17. [http://library.wur.nl/frontis/medicinal_aromatic_plants/09_leaman.pdf]
- Leaman, D.J. and Salvador, S., 2005. *International standard for sustainable wild collection of medicinal and aromatic plants (ISSC-MAP), draft 2*. Steering Group for the Development of Practice Standards and Performance Criteria for the Sustainable Wild Collection of Medicinal and Aromatic Plants. [http://www.floraweb.de/proxy/floraweb/map-pro/draft_2.pdf]
- Medicinal Plant Specialist Group, *About the Medicinal Plant Specialist Group (MPSG)*. IUCN The World Conservation Union. [www.iucn.org/themes/ssc/sgs/mpsg]
- Paetzold, B. and Honnef, S., 2005. Sustainable wild collection of medicinal and aromatic plants. *TRAFFIC Dispatches*, 23, 3. [<http://www.traffic.org/dispatches/DispNo23.pdf>]
- Pierce, A. and Kathe, W., 2004. WHO releases Guidelines on Good Agricultural and Collection Practices (GACP) for medicinal plants. *Medicinal Plant Conservation*, 9/10, 56.

- PPI, *People and Plants International*. WWF, UNESCO and the Royal Botanic Gardens. [<http://www.peopleandplants.org/>]
- Schippmann, U., in press. Cultivation and wild collection of medicinal and aromatic plants under sustainability aspects. In: Bogers, R.J. ed. *Medicinal and aromatic plants*. Springer, Dordrecht. Wageningen UR Frontis Series no. 17. [http://library.wur.nl/frontis/medicinal_aromatic_plants/05_schippmann.pdf]
- WHO, 1993. *Guidelines on the conservation of medicinal plants*. World Health Organization, Geneva. [<http://www.wwf.org.uk/filelibrary/pdf/guidesonmedplants.pdf>]
- WHO, 2002. *WHO traditional medicine strategy 2002-2005*. World Health Organization, Geneva. [http://whqlibdoc.who.int/hq/2002/WHO_EDM_TRM_2002.1.pdf]
- WHO, 2003. *Guidelines on Good Agricultural and Collection Practices (GACP) for medicinal plants*. The World Health Organization, Geneva. [<http://whqlibdoc.who.int/publications/2003/9241546271.pdf>]
- Xiao, P.G., 1991. The Chinese approach to medicinal plants: their utilization and conservation. In: Akerele, O., Heywood, V. and Synge, H. eds. *The conservation of medicinal plants: proceedings of an International consultation 21-27 March 1988, Chiang Mai, Thailand*. Cambridge University Press, Cambridge, 305-313.