# AN OVERVIEW OF THE USE OF PLANTS AND ANIMALS IN TRADITIONAL MEDICINE SYSTEMS IN VIET NAM

Compiled by
Nguyen Dao Ngoc Van
and Nguyen Tap

A TRAFFIC SOUTHEAST ASIA REPORT

TRAFFIC
the wildlife trade monitoring network

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*Traditional Vietnamese and Chinese medicines on sale at market*

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# ACKNOWLEDGEMENTS

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The compiler of this report acknowledges the following people for their assistance: Mr. Ha Cong Tuan, Director of the Forest Protection Department of the Ministry of Agriculture and Rural Development, for his support and encouragement; Dr. Nguyen Xuan Dang, mammalogist at the Institute of Ecological and Biological Resources (IEBR) and his team for information and clarification on fauna used in traditional medicines in Viet Nam; Dr. Nguyen Tap, expert on medicinal plants of the National Institute for Materia Medica and his team, for valuable insight into, and clarification of, numerous aspects of the trade in traditional medicines; Dr. Luu Dam Cu, botanist at IEBR and Prof. Tran Cong Khanh of the Centre for Conservation of Medicinal Plants for their support and information sharing; and Peter Davidson for editing.

## Southern Viet Nam survey (conducted 2006)

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# GLOSSARY

An exchange rate of USD1: VND15 835 (as of 25 April 2005) is used throughout this report.

| | |
|---|---|
| TVM | Traditional Vietnamese Medicine refers to treatment processes created by Vietnamese peoples using materials native to Viet Nam, known as southern medicine (Thuoc Nam). |
| TCM | Traditional Chinese Medicine refers to treatment processes created by ethnic Chinese peoples using materials native to China, known as northern medicine (Thuoc Bac). Many of the plants used in TCM, although originally native to China, are now cultivated in Viet Nam. The medicinal products created from these plants are still referred to as TCM, even though the plants themselves are now cultivated in Viet Nam. |

| | |
|---|---|
| Traditional medicine | refers to both TVM and TCM; in Viet Nam, the government refers to traditional medicine while practitioners, pharmacists, traders and general public more frequently use the term oriental medicine "Thuoc Dong Duoc" to refers to TMs; technically, there is no difference. |
| Northern Viet Nam | In this report northern Viet Nam refers to areas north of Thua Thien Hue province. |
| Southern Viet Nam | In this report southern Viet Nam refers to Thua Thien Hue province and areas south. |
| Tael | refers to a measure used in markets throughout Viet Nam, approximately equivalent to 100g. |
| Part-processed | refers to any form of natural processing that does not involve chemicals or mechanized extraction (e.g. drying, steaming, steeping, grinding). |
| Parcelled medicine | refers to a packaged combination of dried, plant-based traditional medicine, usually comprising a mix of different plant species. |

*Viet Nam Red Data Book (Anon. 1996; Anon. 2000) definitions:*

| | |
|---|---|
| Endangered (E) | taxa threatened with imminent extinction; if current threats continue to operate these taxa will either have already undergone, or undergo a severe decline. |
| Vulnerable (V) | taxa threatened with extinction in the near future if current threats continue to operate. |
| Rare (R) | taxa that have restricted distributions and or small populations, which are not currently considered threatened, but their long term survival is uncertain. |
| Threatened (T) | taxa not included in other categories and for which insufficient information is available to be classified into any group. |
| Insufficiently Known (K) | taxa for which insufficient information is available to classify them in any of the above categories. |

## EXECUTIVE SUMMARY

Traditional medicine in Viet Nam comprises two forms - Traditional Vietnamese Medicine and Traditional Chinese Medicine. Both are thousands of years old. The use of these traditional medicine systems has seen a significant resurgence since Viet Nam's independence in 1945, promoted by government policies that have enabled the development of both traditional and western medicines. The trade in traditional medicine has also benefited from the relaxation of international trade barriers, particularly with China, and free market economies.

This study investigated the use of flora and fauna in traditional medicine in Viet Nam. The available literature was reviewed, and data made available by government institutions and pharmaceutical companies were analysed. Two market surveys were then implemented. The first, in 2005, was conducted in the north of Viet Nam, with a second survey following in 2006 in the southern part of the country. Both surveys utilised formal interviews complimented by informal interviews, casual observations and questionnaires, which were left with businesses and traders who were often too busy for formal face to face interviews.

The scale of traditional medicine use within Viet Nam is large: there are 48 hospitals and institutes devoted to the practice, over 240 traditional medicine departments in central and provincial hospitals, and over 9000 health centres reportedly licensed to practice traditional medicine. Many more unregistered herbalists and healers provide traditional medicine treatments to patients all over Viet Nam.

Previous studies have found over 3900 species of flora and 400 species of fauna have been recorded as used in traditional medicine remedies in Viet Nam. In this study, surveys of traditional medicine markets conducted in the North of Viet Nam found 180 plant and fungi species, and 30 animal species. In southern Viet Nam the numbers were higher - 288 species of plant and fungi, and 68 animal species were found.

While some medicinal species are used whole, in others particular parts are used for their different medicinal properties. The majority are traded and used in their raw and dried forms. Other remedies may be made from a combination of several medicinal species. Many animal parts are processed, while from some plant species substances such as oils are extracted for medicinal purposes, to create aromatic oils or for the food processing industry. These extracted substances are often exported in large quantities. The Ministry of Health currently has approximately 1500 traditional medicine remedies licensed for trade in Viet Nam, however many more unlicensed remedies are used by practitioners throughout the country. The vast majority of traditional remedies (over 95%) are plant-based. In fact, in southern Viet Nam, the investigation teams were told that many animals are hunted primarily for their meat, and are only secondarily used in traditional medicine.

Most plant and animal species utilised for traditional medicine in Viet Nam are sourced from the wild, a situation highlighted by the results of the surveys conducted for this study, where 58 out of 68 animals and 150 out of 288 plant and fungi species were collected from the wild in southern Viet Nam. Increasing demand for traditional medicine has important implications for the conservation of the many species of flora and fauna upon which traditional remedies are largely based. There is growing evidence to suggest that many of these have become more difficult to obtain from the wild, and a number of them are listed as species of conservation significance (on the IUCN Red List for threatened species, on the Red Data Book for Viet Nam, or on Viet Nam's own list of threatened species, Decree 32/2006/ND-CP). However, despite increasing rarity, surveys in both southern and northern Viet Nam found that many high profile animals of global conservation concern (such as Tiger, Bear or Rhinoceros) can still be bought on the market, provided prior notice is given and that the price negotiated is high enough.

Significant effort is currently being invested in developing cultivation techniques for medicinal plants and breeding programmes for animal species traded for medicinal purposes. This development is particularly relevant for those species which are of increasing conservation significance.

International trade forms a large proportion of the trade in traditional medicinal materials. High volumes of raw and part-processed plant materials are imported into Viet Nam or exported, chiefly to China, on an annual basis.

The legal framework for the trade in traditional medicines is complex, and is implemented by a number of different government ministries and departments. The Ministry of Health deals chiefly with pharmaceutical practices and standards, while the Forest Protection Department (under the Ministry of Agriculture and Rural Development) is responsible for both in situ conservation of traditional medicinal natural resources and for implementing Viet Nam's wildlife enforcement laws. The trade must also comply with the normal laws of commerce in Viet Nam. There is concern that the current legislation specific to traditional medicine in Viet Nam is inadequate to allow effective regulation of what is a complex network involving many different levels of society.

This study identified a series of problems with the current system of use of flora and fauna in traditional medicine. The most significant of these are:

- A lack of information on the distribution, conservation status and trade trends of medicinal flora and fauna;
- Out-of-date legislation which does not adequately address management responsibilities with respect to conservation of wild-sourced medicinal materials;
- A lack of awareness among regulatory and enforcement agencies of procedures that do exist, and how to recognize illegally traded medicinal species, especially plants;
- Weak implementation and enforcement of CITES obligations and national legislation;
- A lack of awareness or recognition among traditional medicine practitioners of the laws regulating or relevant to traditional medicine in Viet Nam;
- A lack of collaboration and information sharing between the key agencies with responsibilities in the field of traditional medicine, namely the Ministry of Health's Department of Traditional Medicine and National Institute of Materia Medica, and the Ministry of Agriculture and Rural Development's Forest Protection Department.

## Recommendations

The following recommendations are made as a series of steps towards improving understanding of the use of natural resources in traditional medicine, and improving the management and regulation of the traditional medicine network for conservation and sustainability:

### *Continued research and monitoring to fill current knowledge gaps, by:*

- Conducting field surveys to improve understanding of the distribution and status of medicinal plants and animals in the wild, using a collaborative team comprising staff from the National Institute of Materia Medica, the Institute of Ecology and Biological Resources, and the Forest Protection Department;
- Implementing regular, standardized surveys focusing on key species, markets and pharmaceutical companies to improve our understanding of long-term and seasonal trends in medicinal material supply and demand. These surveys should use technical support from the National Institute of Materia Medica, the Institute for Ecology and Biological Resources and the Forest Protection Department, with technical and financial support from relevant non-governmental organizations;

- Developing a database of wild plants and animals used in traditional medicines in order to collect and collate future monitoring and research/survey information. The database should be a collaborative venture between the National Institute for Materia Medica, the Forest Protection Department and the Institute for Ecology and Biological Resources;
- Continuing to collect information on the practice of traditional medicine, particularly by ethnic minority communities in Viet Nam.

***Publish and disseminate key documents relating to medicinal plants and animals, to inform government policy and communicate to international IUCN Red List and CITES authorities, by:***

- Obtaining government endorsement for updated lists of all medicinal plant and animal species, and a national Red List of species that are threatened or potentially at risk from over-harvesting for traditional medicine.

***Support conservation and development activities focusing on medicinal plant and animal species, by:***

- Encouraging collaboration between the National Institute for Materia Medica and the Forest Protection Department to enable protected area management teams to carry out in situ protection of medicinal plant populations;
- Developing standard, sustainable wild-harvest practices with communities of medicinal plant harvesters, and developing 'sustainable harvest quotas' for wild species;
- Investigating alternative livelihoods based on cultivation, artificial propagation, seeding and planting of medicinal plants for communities engaged in sourcing medicinal materials from the wild (for example, in the buffer zones of protected areas);
- Supporting development of medicinal plant research centres for the study of medicinal flora to improve cultivation techniques (to meet the requirements of Good Agricultural Practice (GAP) criteria), and to act as nurseries to supply larger scale medicinal plant cultivation operations;
- Research the feasibility of expanding a number of protected areas which are important sites for medicinal plants. These include the Ngoc Linh Nature Reserve in Kon Tum and Quang Nam Provinces, and the Hoang Lien National Park in Lao Cai Province;
- Upgrade the official listing (on Decree 32/2006/ND-CP) of a number of key medicinal plant taxa. These taxa are *Fallopia multiflora,* the entire genus *Dendrobium,* and three species of ginseng *Panax bipinnatifidus, P. stipuleanatus* and *P. vietnamensis.*

***Strengthening national legislation relevant to traditional medicine, by:***

- Reviewing and updating legislation pertaining to the management of wild populations of medicinal plants and animals and standard cultivation and captive-rearing practices for medicinal plants and animals;
- Improving the legal framework of the management of the pharmaceutical industry trade (both domestic and international trade);
- Improving monitoring of the trade and enforcement of Vietnamese and international law, particularly with respect to trade in threatened or endangered species;
- Developing a legal framework for international trade in medicinal materials, including developing a 'Certificate of origin and quality' for all medicinal materials from Viet Nam. This is particularly important to improve regulation and monitoring of regional trade between Viet Nam, China, Lao PDR and Cambodia.

***Ensure the roles of agencies responsible for traditional medicine management are complimentary and unambiguous, and strengthen their capacity to research, monitor and manage the trade in medicinal plants and animals, by:***

- Considering the development of an inter-sectoral action plan that lays out a regulatory framework for the trade of medicinal species, and which adheres to a set of conservation-based standards;
- Promoting information sharing and skills exchange between key state management agencies and scientific research institutes, particularly the Department of Traditional Medicine, the National Institute for Materia Medica and the Forest Protection Department;
- Developing simple training materials on identification, conservation and legal status of medicinal plants and animals (including derivatives) to improve effectiveness of law enforcement teams (forest rangers and protected area management teams, customs officers, market controllers, economic police, border army);
- Reviewing and developing the management capacity within key agencies responsible for monitoring the harvest, trade (including import and export) and use of medicinal wild plants.

***Conduct education and outreach work to raise awareness of national and international legislation and conservation issues relating to the use of plants and animals in traditional medicine, by:***

- Targeting key user groups, in particular traditional medicine businesses, practitioners and consumers;
- Targeting relevant government departments and ministries, in particular the Ministry of Health, the Forest Protection Department and the national fisheries authority;
- Promoting sustainable harvest practices through existing protected area management and environmental education projects.

# TÓM TẮT BÁO CÁO

Nền y học cổ truyền của Việt Nam là sự kết hợp của y học cổ truyền Việt Nam với y học cổ truyền Trung Hoa. Cả hai đều có lịch sử phát triển hàng nghìn năm. Từ khi Việt Nam hoàn toàn độc lập năm 1945, cả hai hệ thống y học cổ truyền này được hồi sinh trở lại cùng với các chính sách khuyến khích phát triển cả y học cổ truyền và y học hiện đại của nhà nước Việt Nam. Việc buôn bán dược liệu y học cổ truyền cũng được hưởng lợi nhờ sự nới lỏng các rào cản thương mại quốc tế, nhất là với Trung Quốc, và nền kinh tế thị trường tự do.

Nghiên cứu này tập trung vào điều tra việc sử dụng các loài động vật, thực vật làm thuốc trong y học cổ truyền ở Việt Nam. Các tài liệu và báo cáo có liên quan được nghiên cứu, và số liệu do các cơ quan của chính phủ và các công ty dược liệu cung cấp được phân tích. Hai cuộc khảo sát thị trường cũng đã được thực hiện. Cuộc khảo sát thứ nhất được tiến hành ở miền Bắc vào năm 2005 và cuộc khảo sát thứ hai được thực hiện vào năm 2006 ở các tỉnh miền Nam Việt Nam. Cả hai cuộc khảo sát đều sử dụng phương pháp phỏng vấn chính thức kết hợp với phỏng vấn không chính thức, quan sát ngẫu nhiên, và dùng bảng hỏi đối với các doanh nghiệp và doanh nhân – những người thường quá bận rộn không thu xếp được thời gian cho phỏng vấn trực tiếp.

Y học cổ truyền được sử dụng rộng rãi ở Việt Nam: cả nước có 48 bệnh viện và viện y học cổ truyền trực tiếp chữa bệnh, hơn 240 khoa y học cổ truyền tại các bệnh viện cấp trung ương và cấp tỉnh, và hơn 9000 trung tâm y tế được cấp phép hành nghề y học cổ truyền. Ngoài ra còn có rất nhiều các thầy lang và các bà hàng lá không đăng ký nhưng có hành nghề chữa bệnh bằng y học cổ truyền ở khắp nơi trong cả nước.

Những nghiên cứu trước đây đã tìm ra hơn 3900 loài thực vật và 400 loài động vật được ghi nhận sử dụng như các vị thuốc y học cổ truyền ở Việt Nam. Trong nghiên cứu này, kết quả khảo sát thị trường ở miền Bắc đã ghi nhận 180 loài thực vật và nấm, và 30 loài động vật đang được dùng làm thuốc. Ở miền Nam Việt Nam con số này còn cao hơn, với 288 loài thực vật và nấm, và 68 loài động vật.

Trong khi một số loài có thể dùng toàn bộ cơ thể để làm thuốc thì với một số khác chỉ những bộ phận nào đó với dược tính nhất định mới được sử dụng. Phần lớn các loài được buôn bán và sử dụng dưới dạng nguyên liệu thô và khô. Một số bài thuốc có thể được làm từ nhiều loài khác nhau. Rất nhiều bộ phận cơ thể động vật được chế biến, còn một số loài thực vật được chiết xuất dầu để làm thuốc, tạo dầu hương liệu hoặc chế biến thực phẩm. Các chất chiết xuất này thường được xuất khẩu với khối lượng lớn. Bộ Y tế hiện đã cấp phép lưu hành trên thị trường Việt Nam khoảng 1500 bài thuốc y học cổ truyền, ngoài ra trên khắp cả nước còn lưu hành rất nhiều bài thuốc khác chưa được đăng ký. Hầu hết các bài thuốc (95%) có nguồn gốc thực vật. Ở miền Nam, các nhóm điều tra thị trường nhận thấy, trong thực tế có rất nhiều loài động vật bị săn bắt với mục đích chủ yếu là để lấy thịt, còn dùng làm thuốc y học cổ truyền chỉ là mục đích thứ yếu.

Hầu hết các loài động vật, thực vật làm thuốc y học cổ truyền có nguồn gốc từ tự nhiên. Các kết quả khảo sát trong khuôn khổ của nghiên cứu này đã nêu bật một thực tế là, 58 trong số 68 loài động vật và 150 trong số 288 loài thực vật và nấm được săn bắt hoặc thu hái từ tự nhiên ở miền Nam Việt Nam. Nhu cầu thuốc y học cổ truyền ngày càng tăng lên có mối liên hệ quan trọng đến việc bảo tồn các loài động vật, thực vật được dùng nhiều trong y học cổ truyền. Ngày càng có nhiều bằng chứng cho thấy, nhiều trong số những loài này ngày càng trở nên khó kiếm trong tự nhiên, và nhiều loài đã được liệt kê vào danh sách những loài có ý nghĩa bảo tồn (trong Danh sách Đỏ những loài bị đe dọa của IUCN, trong Sách Đỏ của Việt Nam, hoặc trong danh mục những loài bị đe dọa của Việt Nam theo Nghị định 32/2006/NĐ-CP). Tuy nhiên, cho dù ngày càng trở nên khan hiếm, các khảo sát ở cả hai miền Bắc và Nam của Việt Nam vẫn cho thấy nhiều loài vốn được quan tâm bảo tồn một cách đặc biệt trên qui mô toàn cầu (như hổ, gấu và tê giác) vẫn có thể mua được trên thị trường, miễn sao có đặt trước và giá cả thỏa thuận đủ cao.

Nhiều nỗ lực đáng kể hiện đang được đầu tư vào việc phát triển kỹ thuật trồng thảo dược và thực hiện các chương trình nuôi sinh sản các loài động vật được buôn bán vì mục đích làm thuốc. Việc làm này đặc biệt thích hợp đối với những loài có ý nghĩa ngày càng quan trọng về mặt bảo tồn.

Buôn bán quốc tế dược liệu y học cổ truyền chiếm một tỷ trọng lớn trong toàn bộ hoạt động buôn bán mặt hàng này. Hàng năm, một khối lượng lớn thảo dược thô hoặc đã sơ chế được nhập khẩu vào Việt Nam hoặc xuất khẩu sang nước khác, chủ yếu là thị trường Trung Quốc.

Khung pháp lý điều chỉnh việc buôn bán thuốc y học cổ truyền rất phức tạp, và do nhiều bộ, ngành khác nhau thực hiện. Bộ Y tế chủ yếu chịu trách nhiệm về các hoạt động sản xuất dược liệu và các tiêu chuẩn về dược liệu, trong khi đó Cục Kiểm lâm (thuộc Bộ Nông nghiệp và Phát triển Nông thôn) chịu trách nhiệm bảo tồn tại chỗ tài nguyên cây và con làm thuốc cũng như thực thi pháp luật Việt Nam liên quan đến các loài hoang dã. Việc buôn bán động vật và thực vật làm thuốc cũng phải tuân thủ các qui định của pháp luật về thương mại của Việt nam. Điều đáng lo ngại là luật pháp hiện hành quy định cụ thể về y học cổ truyền ở Việt Nam chưa đủ để điều chỉnh một cách hiệu quả cả một mạng lưới phức tạp với nhiều tầng bậc xã hội khác nhau.

Nghiên cứu này đã nhận diện một loạt vấn đề liên quan đến hệ thống sử dụng động vật, thực vật làm thuốc y học cổ truyền. Những vấn đề chính yếu nhất bao gồm:

- Thiếu thông tin về tình trạng bảo tồn và khu vực phân bố cũng như thông tin về xu hướng buôn bán các loài động vật, thực vật làm thuốc;
- Các văn bản pháp luật đã lỗi thời, không còn phù hợp để điều chỉnh trách nhiệm quản lý đối với việc bảo tồn các nguyên vật liệu làm thuốc có nguồn gốc tự nhiên;
- Các cơ quan quản lý và thực thi pháp luật còn thiếu kiến thức về các thủ tục hiện hành và còn yếu trong việc phát hiện các loài làm thuốc bị buôn bán bất hợp pháp, nhất là các loài thảo dược;
- Việc thực hiện và thực thi các nghĩa vụ CITES cũng như pháp luật quốc gia còn yếu;
- Những người hành nghề y học cổ truyền còn thiếu nhận thức hoặc hiểu biết về luật pháp điều chỉnh hoặc có liên quan đến y học cổ truyền ở Việt Nam;
- Thiếu sự phối hợp và chia sẻ thông tin giữa các cơ quan chịu trách nhiệm chính về lĩnh vực y học cổ truyền, như Vụ Y học cổ truyền (Bộ Y tế), Viện Dược liệu (Bộ Y tế) và Cục Kiểm lâm (Bộ Nông nghiệp và Phát triển nông thôn).

## Các khuyến nghị

Những khuyến nghị sau đây được đưa ra như là một chuỗi các bước nhằm nâng cao sự hiểu biết về việc sử dụng tài nguyên thiên nhiên trong y học cổ truyền cũng như nhằm tăng cường việc quản lý và điều tiết mạng lưới y học cổ truyền vì mục tiêu bảo tồn và sử dụng bền vững:

***Tiếp tục nghiên cứu và giám sát để lấp đầy những lỗ hổng tri thức, bằng cách:***

- Tổ chức các cuộc điều tra ngoại nghiệp nhằm nâng cao hiểu biết về hiện trạng và vùng phân bố trong tự nhiên của các loài động vật, thực vật làm thuốc với việc hình thành một nhóm điều tra hỗn hợp bao gồm các cán bộ của Viện Dược liệu, Viện Sinh thái và Tài nguyên sinh vật và Cục Kiểm lâm;
- Thực hiện các cuộc khảo sát định kỳ, tiêu chuẩn đối với những loài quan trọng, những thị trường chính và những công ty dược chủ chốt nhằm nâng cao sự hiểu biết của chúng ta về các xu hướng cung cầu dược liệu theo mùa cũng như lâu dài. Những khảo sát này cần có sự hỗ trợ kỹ thuật của Viện Dược liệu, Viện Sinh thái và Tài nguyên sinh vật và Cục Kiểm lâm với sự hỗ trợ kỹ thuật và tài chính của các tổ chức phi chính phủ có liên quan;
- Xây dựng một cơ sở dữ liệu về các loài động vật, thực vật làm thuốc y học cổ truyền nhằm thu thập và tạo cơ sở để so sánh với các thông tin khảo sát/nghiên cứu và giám sát trong tương lai. Cơ sở dữ liệu phải là công trình hợp tác giữa Viện Dược liệu, Viện Sinh thái và Tài nguyên Sinh vật và Cục Kiểm lâm;
- Tiếp tục thu thập thông tin về hoạt động chữa bệnh bằng y học cổ truyền, đặc biệt là những bài thuốc của các cộng đồng dân tộc thiểu số ở Việt Nam.

***Xuất bản và phổ biến các tài liệu quan trọng có liên quan đến các loài động vật, thực vật làm thuốc, nhằm khuyến cáo cho các chính sách của Chính phủ và thông tin đến cơ quan quốc tế phụ trách về Danh sách Đỏ IUCN cũng như các cơ quan CITES, bằng cách:***

- Đề nghị Chính phủ phê duyệt danh mục cập nhật về các loài động vật, thực vật làm thuốc, và một Danh sách Đỏ quốc gia các loài bị đe dọa hoặc có nguy cơ bị đe dọa do sự khai thác quá mức để làm thuốc y học cổ truyền.

***Hỗ trợ các hoạt động bảo tồn và phát triển với trọng tâm hướng vào các loài động vật, thực vật làm thuốc, bằng cách:***

- Khuyến khích việc hợp tác giữa Viện Dược liệu và Cục Kiểm lâm nhằm tạo điều kiện cho ban quản lý các khu vực được bảo vệ thực hiện việc bảo tồn tại chỗ các quần thể cây thuốc;
- Xây dựng các qui định về các tiêu chuẩn khai thác bền vững cây thuốc từ tự nhiên áp dụng cho các đơn vị và cá nhân khai thác cây thuốc, và xây dựng hệ thống "hạn ngạch khai thác bền vững" đối với những loài cây thuốc khai thác trong tự nhiên;
- Nghiên cứu về các sinh kế thay thế dựa trên việc canh tác, trồng cấy nhân tạo, gieo trồng các loài cây làm thuốc cho các cộng đồng tham gia vào việc khai thác dược liệu từ tự nhiên (chẳng hạn ở vùng đệm của các khu bảo tồn thiên nhiên);
- Hỗ trợ xây dựng các trung tâm nghiên cứu cây thuốc để nghiên cứu về thực vật làm thuốc, giúp cải thiện các kỹ thuật canh tác (để đáp ứng được những yêu cầu về tiêu chuẩn Sản xuất Nông nghiệp Sạch (GAP)) và là những vườn ươm cung cấp cây giống cho các hoạt động trồng cây thuốc có qui mô lớn;

- Nghiên cứu tính khả thi của việc mở rộng một số khu vực được bảo vệ vốn là những địa bàn quan trọng của các loài cây làm thuốc, bao gồm Khu bảo tồn thiên nhiên Ngọc Linh ở tỉnh Kon Tum và tỉnh Quảng Nam, Vườn quốc gia Hoàng Liên ở tỉnh Lào Cai;
- Nâng cấp trong danh mục chính thức (trong Nghị định 32/2006/NĐ-CP) một số loài và nhóm loài thực vật làm thuốc quan trọng, bao gồm Hà thủ ô đỏ *Fallopia multiflora,* toàn bộ giống *Dendrobium* (Hoàng thảo và Thạch hộc), và ba loài thuộc họ Ngũ gia bì là Sâm vũ diệp *Panax bipinnatifidus,* Tam thất hoang *P. stipuleanatus* và Sâm Ngọc linh *P. vietnamensis.*

***Tăng cường luật pháp quốc gia có liên quan đến y học cổ truyền, bằng cách:***

- Xem xét và cập nhật luật pháp về quản lý các quần thể động vật, thực vật hoang dã làm thuốc, về các qui định đối với trồng và nuôi nhốt các cây và con làm thuốc;
- Cải thiện khung pháp lý về quản lý hoạt động buôn bán của ngành công nghiệp dược (cả buôn bán nội địa và quốc tế);
- Nâng cao việc giám sát buôn bán và thực thi pháp luật Việt Nam và pháp luật quốc tế, nhất là việc buôn bán các loài đang nguy cấp hoặc bị đe dọa;
- Xây dựng một khung pháp lý cho việc buôn bán quốc tế dược liệu, bao gồm cả việc xây dựng "Chứng chỉ nguồn gốc và chất lượng" cho tất cả các loại dược liệu từ Việt Nam. Cần tăng cường các quy định và nâng cao việc giám sát buôn bán trong khu vực giữa Việt Nam, Trung Quốc, Lào và Cam-pu-chia.

***Đảm bảo vai trò rõ ràng và bổ sung lẫn nhau của các cơ quan có trách nhiệm về quản lý y học cổ truyền, và tăng cường năng lực nghiên cứu, giám sát và quản lý buôn bán động vật, thực vật làm thuốc cho các cơ quan này, bằng cách:***

- Xem xét việc xây dựng một kế hoạch hành động liên ngành, vạch rõ khuôn khổ quy định về buôn bán các loài động vật, thực vật làm thuốc, và gắn liền với một bộ tiêu chuẩn dựa trên các tiêu chí bảo tồn;
- Đẩy mạnh việc chia sẻ thông tin và trao đổi kỹ năng giữa các cơ quan quản lý nhà nước chủ chốt và các cơ quan nghiên cứu khoa học, nhất là Vụ Y học cổ truyền, Viện Dược liệu và Cục Kiểm lâm;
- Xây dựng bộ giáo trình tập huấn đơn giản về nhận dạng loài, tình trạng bảo tồn và tình trạng pháp lý của các loài động, thực vật làm thuốc (kể cả dẫn xuất của chúng) nhằm tăng cường hiệu quả cho các đơn vị thực thi pháp luật (cán bộ Kiểm lâm, Ban quản lý của các khu bảo tồn, cán bộ Hải quan, cán bộ Quản lý thị trường, Cảnh sát kinh tế, Bộ đội biên phòng);

***Rà soát và xây dựng năng lực quản lý cho các cơ quan chịu trách nhiệm chính về giám sát việc khai thác và buôn bán (kể cả xuất, nhập khẩu) và sử dụng các loài thực vật hoang dã làm thuốc.***

***Thực hiện các chương trình giáo dục và truyền thông nhằm nâng cao nhận thức về luật pháp quốc gia và quốc tế cũng như về các vấn đề bảo tồn có liên quan đến sử dụng động vật, thực vật trong y học cổ truyền, bằng cách:***

- Tập trung vào các nhóm sử dụng chính, nhất là các doanh nghiệp đông dược, những người hành nghề y học cổ truyền và người tiêu dùng;
- Tập trung vào các bộ, ngành có liên quan, nhất là Bộ Y tế, Cục Kiểm lâm và ngành Thủy sản;
- Khuyến khích những hoạt động khai thác bền vững thông qua việc quản lý các khu bảo vệ hiện có và các dự án giáo dục môi trường.

# INTRODUCTION

Traditional medicine systems in Viet Nam have a history spanning over 2000 years. Since independence in 1945 there has been a resurgence in the use of traditional medicine. Today, the Government of Viet Nam is encouraging its use in community preventive and curative healthcare. Since launching the "Strategy for Development of Traditional Medicine in Viet Nam to 2010" in 2002, it is now state policy to equally support the use of traditional and western medicine. Over the past decade Viet Nam has opened its borders to international free trade policies and freer market economies. Increased national and international trade and a renewed demand for traditional medicines, in a country with a population of over 80 million people, has serious implications for the conservation of wild plant and animal species which are harvested for medicinal purposes.

This report is the culmination of a study of the use of flora and fauna in traditional medicine systems in Viet Nam. Two separate surveys were conducted - the first, in 2005, focused on northern Viet Nam, while the second survey, focussing on southern Viet Nam, took place in 2006. The surveys investigated the traditional medicine market at a domestic and international level, and considered the implications that this market system has for the sustainable use and conservation of the wild plant and animal species on which it is so dependent.

Both surveys set out with the following objectives:

- To develop a list of the plants and animals which are traded and consumed as traditional medicines in Viet Nam.
- To explore the consumption and trade in medicinal plants and animals in provinces in Viet Nam known to have high levels of such trade.
- To evaluate the impacts of the uncontrolled exploitation and illegal trade in medicinal plants and animals on Viet Nam's bio-diversity.
- To review/evaluate Viet Nam's policy towards the management of exploitation, consumption and trade of medicinal species.
- To provide recommendations for further research, effective management and the conservation of Viet Nam's medicinal fauna and flora.

Photographs © Nguyen Tap


Coptis chinensis*, protected Vietnamese medicinal plant*


Dipsacus asper*, a plant used for TAMs*


Asarum sp. *is often used in China for TAMs*

*Dried snakes from Mekong Delta sold in medicine shops on Lan Ong street*

# BACKGROUND

## What is traditional medicine in Viet Nam?

The two components of traditional medicine are common to all forms of healthcare. These components are (1) the materials used and (2) the treatment process. In traditional medicine, the raw materials (elements) are derived from wholly natural sources. Traditional medicine in Viet Nam is broadly differentiated into two types. The first treatment process was created by Vietnamese peoples using materials native to Viet Nam, and is known as southern medicine (*Thuốc Nam*) or Traditional Vietnamese Medicine (TVM). The second treatment process was created by ethnic Chinese peoples using materials native to China. This is known as northern medicine (*Thuốc Bắc*) or Traditional Chinese Medicine (TCM).

Both forms of traditional medicine are thousands of years old, and each has drawn extensively on the other over time in order to refine existing techniques, and to develop new treatment processes and medicinal remedies. Nevertheless, issues regarding 'ownership' of traditional medicine treatment processes can be politically and culturally sensitive. Many of the plants used in TCM, are now successfully cultivated in Viet Nam. However, the medicinal products created from these species are still referred to as 'Chinese Medicine', irrespective of the source of the plants.

In traditional medicine systems, the prevention of ailments and disease are considered to be as important as the cure; disease can be prevented by maintaining the body's natural balances, and through restoring energy levels in order to maintain a healthy life. In Viet Nam it is widely acknowledged that TVM is used primarily for curing ailments and diseases, and TCM is used chiefly for enhancing or strengthening health. Some practitioners use the two treatment processes in parallel to treat their patients.

Traditional medicines in Viet Nam are made from animal, plant and mineral products. Plants are used in numerically more remedies than animals. Most animal-based medicines also include plants to neutralize unpleasant odours and increase the overall effectiveness of the medicine. All parts of a plant can be utilised (e.g. roots, bark, woody stems, leaves, flowers, fruits, resin and seeds). For many species, different parts of the same plant are used to produce different remedies. For example, the components of the lotus *Nelumbo nucifera* sold for traditional medicines include dried leaves ("Lien diep" in Vietnamese), lotus endosperms ("Lien nhuc") and the gemma, or asexual reproductive structure, which is known as "Lien tam". Similarly, many different parts of animals are used, from whole bodies to specific organs (e.g. bones, glands, gall bladder, penis, skin, blood, claws, scales, hair and teeth).

Some remedies are made from derivatives of plants or animals requiring a chemical-based extraction process. However, the majority of medicine types comprise the plant and animal material in a raw or part-processed (non-chemical) form. In Viet Nam, traditional medicines can be found in almost all pharmacies as well as specific traditional medicine shops. The medicines are found in a variety of forms, including parcels of raw ingredients (fresh or dried), marinated spirits (alcohol, for drinking and massage), gels, ground powders, tablets and capsules. Animal parts are often made into gels, which are produced by a long process of boiling the raw materials in water, and reducing the product until a gel remains. Plants are frequently used in fresh or dried form. They are often combined according to prescription and added to a solution (usually water), cooked and reduced.

## History and cultural importance of Traditional Medicine in Viet Nam

Traditional medicine in Viet Nam dates back at least to the 2nd Century B.C. (Le Tran Duc, 1995). It has its foundations in the basis of the *yin-yang* principle and the interaction between human bodies and their surrounding environments. TVM remedies were documented for the first time in the ten-volume "*The Miracle of Southern Medicine*" written in the 14th Century by Tue Tinh, which listed approximately 500 naturally-sourced materials forming the basis for over 3,800 traditional remedies, which were used to cure 182 diseases and ailments (Le Tran Duc, 1995; Pham Xuan Sinh and Phung Hoa Binh, 2002).

During the French colonial period (19th and early 20th Centuries), French botanists continued the research into the taxonomy of Viet Nam's medicinal flora when they collected information for the book "*General Flora of Indochina*" (Flore Générale de L'Indochine) (Lecomte, H. 1912-1937). However, the French regime did not encourage the use of traditional medicine or include it in the formal healthcare system, so western medicine became dominant during this period (Pham Xuan Sinh and Phung Hoa Binh, 2002). Traditional medicine has, however, always remained very popular among Vietnamese people and today it is often used in parallel with, or in replacement of, western medicine.

Traditional medicine is typically perceived to produce few or no side effects and is believed to be able to cure certain health problems that western medicine cannot. It is also believed that while bacteria and viruses can develop resistance to western medicines, there has been no similar finding from studies on traditional medicines (Le Dien Duc, 1994; Pham Hung Cung, 2003). Traditional medicines are characterized by the use of crude herbs and prolonged usage. A single herb may contain a great many natural constituents and a combination of herbs even more. Since the constituents in the plants work better in conjunction with each other, it is believed that the patient is able to achieve significant long term benefits by using traditional medicine remedies (Zhang, 1998).

Today, an estimated 75% percent of Vietnamese people use traditional medicine as their primary source of treatment for common health problems (Ta Ngoc Dzung, Viet Nam Pharmaceutical Association, pers. comm. to Nguyen Dao Ngoc Van, May 2005). This statistic is in keeping with the WHO, which has estimated that approximately 80% of the population in developing countries still depend on traditional medicines, particularly those made from plants (Chen and Leon, 2006). The largest traditional medicine user groups are typically less well off communities living in rural or mountainous areas which are often distant from the nearest hospital or community health care centres. For these communities, the raw materials are often more readily available at no, or very low cost, in contrast to western medicines, which can be prohibitively expensive.

Viet Nam is also home to 54 different ethnicities. Each of these peoples have their own cultural traditions of using locally available animal and plant species to promote well being, treat ailments or cure diseases. While many traditional remedies are closely guarded cultural secrets, the use of traditional medicines by various ethnic minorities (including the Dao in Ba Vi and Ha Tay provinces, the H'Mong and Dao in Lao Cai province, the Ca Tu and Van Kieu in Nam Dong and Thua Thien Hue provinces) has been studied. A process of documentation of the remedies and techniques used is in progress (Nguyen Tap, National Institute for Materia Medica, pers. comm. to Nguyen Dao Ngoc Van, November 2004). In some of these localities, medicinal plant gardens have been set up for local people as a tool for communication and guidance for use of medicinal plants (Tran Khac Bao, 2003). Traditional medicine associations exist in several provinces (e.g. Bac Kan, Quang Ngai, Cao Bang, Lang Son), and in coordination with the National Institute for Materia Medica and the Central Hospital of Traditional Medicine, they are compiling inventories in order to conserve indigenous traditional medicine knowledge (Nguyen Tap, National Institute for Materia Medica, pers. comm. to Nguyen Dao Ngoc Van, March 2005).

## Governing legislation and the agencies responsible for traditional medicine in Viet Nam

The legal framework for the trade and use of plants and animals in traditional medicine is complex. The industry is governed by multiple laws, implemented by a complicated assortment of decrees, official letters, directives and circulars which have been set out by a number of different government ministries. The complete list can be found in Appendix 6. A feature of the legal system today is the lack of information sharing between key agencies. Given the complexity of the laws governing the trade and use of medicinal plants and animals, the number of ministries and departments charged with implementing these laws, and the lack of communication between these agencies, this legislation is in urgent need of review to assess its effectiveness.

### *Historical legislation*

The post-colonial resurgence of traditional medicine in Viet Nam began with a document promoting the development of traditional medicine alongside the development of western medicine (Prime Ministerial Directive 101/TTg, 1961). The National Institute for Materia Medica, under the Ministry of Health, was established in April of the same year (through Decision 324/QD), although it wasn't officially registered for scientific and technological operations until December 1993.

By 1966, the government recognised that detailed guidelines were required for the exploitation, market development and conservation of medicinal flora and fauna. These guidelines were outlined in Prime Ministerial Directive 210-TTg (1966).

© Nguyen Tap

*Rangers release confiscated animals back into the wild*

Two government ministries were given the task of implementing these guidelines. The Ministry of Health was assigned to guide the overall development of the legislation (which it achieved under circulars 37/BYT-TT, 1967, and 26/TT-LT, 1968) and to compile inventories and quantify amounts of plant species used in traditional medicines. The Ministry of Forestry (now the Department of Forestry under the Ministry of Agriculture and Rural Development) was appointed to manage the *in situ* exploitation and protection of medicinal wildlife in state-owned forests (now Special-use forests – a category of protected area).

In 1978 the Council of Ministers created Decision 200/CP as a general outline for the development of domestic pharmaceutical materials (including traditional medicines). Measures to be taken included a nationwide survey of medicinal flora and fauna, planning and zoning for cultivation of seedlings, continued support for technical facilities, development of a policy for sustainable use of medicinal wildlife, and clarification of the responsibilities of the ministries concerned with implementation of the Decision. The decision advocated inter-sectoral collaboration, and assigned the Ministry of Health as the ministry responsible for coordinating cooperation between the other government departments involved in its implementation.

In 2002, the Government launched the "Strategy for development of traditional medicines in Viet Nam to the year 2010" (Decision 108/2002/QD-TTg). This strategy aims to encourage the use of both western and traditional medicines in Viet Nam, emphasizing the historical importance, conservation and enhancement of traditional medicines. As part of this strategy, the Ministry of Health was assigned to prepare a set of national quality standards for the use of 186 medicinal plants and 88 processed substances derived from plants and animals. The strategy also includes the foundation of a National Academy of Traditional Medicine, development of institutional capacity to undertake further research on traditional medicines, setting of standards for the quality of traditional medicines in Viet Nam, ensuring the sustainable use of natural resources, and improving the cultivation and production of medicines from plants and animals.

### *Pharmacy law*

As an integral part of the nation's health system, traditional medicine comes under the jurisdiction of the Ministry of Health. Traditional medicine is governed by the same laws as those which control western medicines in Viet Nam, such as the Law on Protection of People's Health (1989), the Ordinance on Private Medicinal and Pharmaceutical Practice (1993, revised in 2003), and the Pharmacy Law (2005). These laws help to ensure that a high standard of quality is maintained in both traditional and western medicines.

The two major government players in the field of traditional medicine, the National Institute for Materia Medica and the Department for Traditional Medicine, both come under the Ministry of Health.

The Institute of Materia Medica's primary function is to take the lead in research into the pharmaceutical properties and value of plants and animals used in traditional medicines. Its work is strongly plant-focused, and its tasks include conducting research into the development of new plant-based medicines (with an emphasis on refining existing traditional remedies), including genetic research, establishing more efficient cultivation and processing techniques, providing technology transfer and technical advice on these areas, including international cooperation, supporting post-graduate studies into traditional medicine, and promoting awareness of the use and protection of medicinal species.

The Department of Traditional Medicine is responsible for the overall management of traditional medicine practices and its integration with western medicine. The Department's wide range of responsibilities include strategic planning and policy development (including promulgation of legal documents), conservation planning, coordinating activities with relevant government agencies and institutions, monitoring, managing and regulating traditional medicine practitioners (including licensing) and businesses (private and public) dealing in traditional medicines (including pharmaceutical companies), and developing training curricula.

Other departments within the Ministry of Health involved in the traditional medicine industry include the Pharmaceutical Testing Institute (established in 1961), which is responsible for research into, and evaluation of, the quality of pharmaceutical materials before they are introduced onto the market; and the Pharmaceutical Department of the Ministry of Health which issues permission for the production, circulation and import of pharmaceuticals approved by the Pharmaceutical Testing Institute, including traditional medicines.

### *Wildlife law*

Many traditional medicines utilise plant and animal resources which are sourced from the wild, and may be listed as threatened or endangered. As such, the industry must also comply with those laws concerned with environmental protection in Viet Nam. Many of these are general laws, which include clauses relevant to the *in situ* management and protection of wild animals and plants. They include the Law on Forest Protection and Development (1991, revised and supplemented 2004), the Land Law (1993, revised and added to in 1998 and 2003), the Law on Environmental Protection (1993, and revised in 2005) and the Law on Fisheries (1993). These laws are implemented by either the Ministry of Agriculture and Rural Development (for terrestrial species) or the Ministry of Fisheries (for marine species).

Viet Nam's management of threatened and endangered species is governed by Decree 32/2006/ND-CP (which replaced the earlier Decree 48/2002/ND-CP). This decree divides the species into two categories A – plant species and B – animal species. It also further classifies them according to those species for which trade and commercial exploitation are either forbidden (I) or restricted (II). So, List IA refers to plant species for which commercial exploitation and trade is forbidden, while a species on List IIB will be an animal species for which commercial exploitation and trade are allowed, but are restricted (requires ministerial approval). The complete list of medicinal plants and animals listed on Decree 32/2006/ND-CP can be found in Appendix 7. Many species on this list are medicinal plants and animals. Rare and endangered marine species are governed by Decree 59/2005/ND-CP and its instructive Circular 02/2006/TT-BTS.

As a signatory to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Viet Nam also has a responsibility to provide a legal framework for the management of importing and exporting wild animal and plant species, and to control the illegal trade in endangered species. These responsibilities are covered by Decree 11/2002/ND-CP (2002). Trade of forbidden and restricted commodities, some of which are those medicinal plants and animals listed as Category IA or IB, on the domestic market is dealt with by Prime Ministerial Decree 02/CP (1995).

In 1997, concerned by the level of exploitation of natural resources for traditional medicinal materials the Ministry of Health issued Decision 250/BYT-QD (1997) which led to the National Institute for Materia Medica compiling inventories of medicinal plants for nine protected areas.

## Other ministries and legislation

The Army Institute of Traditional Medicine, part of the Ministry of Defence, undertakes research, training and provides traditional medicine treatments and remedies primarily to military personnel and their relatives. It is considered one of the leading traditional medicine institutions in Viet Nam.

As a commercial industry, the traditional medicine market must also comply with Viet Nam's Commerce Law. Import and export of medicinal materials, customs requirements and tax payable are all controlled by the same set of directives which govern other commercial industries in Viet Nam.

## The scale of traditional medicine use within Viet Nam

Approximately 1500 types of traditional medicines are currently licensed by the Ministry of Health to be traded in Viet Nam's markets (Anon., 2003a; Trinh Van Lau, 2003). In 2003 there was reported to be (Anon., 2003a; Nguyen Thuong Dong, 2003):

- 48 hospitals and institutes devoted to the practice of traditional medicine
- 242 traditional medicine departments in central and provincial hospitals
- Over 9000 health centres apparently licensed to practice traditional medicine
- An estimated 30 000 traditional medicine practitioners and healers
- Approximately 25% of commune-level health stations providing traditional medicine practices

In addition to these registered practitioners, unregistered herbalists and healers use traditional medicines to provide treatments to patients almost all over Viet Nam (Trinh Van Lau, 2003; Vu Thi Thuan *et al*., 2003), and there are also significant numbers of unlicensed medicines in use by practitioners throughout the country.

A relatively small proportion of those medicines which are licensed are animal-based (only 47 medicines, which is approximately 3% of currently licensed medicines, Anon., 2003a).

## Conservation status of plants and animals traded and used for traditional medicine

Unsustainable use of natural resources and poor management of the trade in medicinal plants and animals has contributed to a significant depletion of a number of important plant and animal species in Viet Nam. In recognition of this situation, more recent research on traditional medicine in Viet Nam has focused on identifying those species of medicinal plants and animals which are listed as threatened or endangered.

Among the many species of animal previously found to be traded and used for medicinal purposes in Viet Nam, 71 are listed on the IUCN Red List (2000) (Nguyen Tap *et al.* 2004). The Viet Nam Red Data Book (Anon., 2000) lists 359 animals of conservation concern, many of which are used for medicinal purposes.

The impact of exploitation of wild medicinal plant species is less well documented, but may be similarly severe. The uncontrolled harvest of wild medicinal plants in Viet Nam, particularly on a commercial scale for processing and export by the pharmaceutical industry, along with habitat loss and degradation, are considered to be the primary causes for the decline of 136 medicinal plant species, 18 of which are classified as Critically Endangered by the IUCN (Anon., 2004c, Tran Cong Khanh and Tran Van On, 2002; Nguyen Tap, National Institute for Materia Medica pers. comm. to Nguyen Dao Ngoc Van, July 2004). A number of other species have declined so significantly in the wild in Viet Nam that they now have to be sourced via imports by the major pharmaceutical companies (Tran Cong Khanh and Tran Van On, 2002). The National Institute for Materia Medica has established a list of medicinal plant species considered rare and valuable, which has yet to receive official government endorsement (Nguyen Tap, 2005). Table 1, below, lists those wild plant species used in traditional medicines which are reportedly exploited in large quantities in Viet Nam.

**Table 1**

**Wild-sourced plant species used in traditional medicine, which are exploited in large quantities**

| Species | Family | Domestic use | Export | Estimated traded quantity (tonnes/yr) | Conservation notes |
|---|---|---|---|---|---|
| *Acorus* spp. | Araceae | + | + | 50 | |
| *Adenosma* spp. | Scrophulariaceae | + | | >100 | |
| *Amomum* spp. | Zingiberaceae | + | + | 600 | |
| *Ampelopsis cantoniensis*[3] | Vitaceae | + | ? | >100 | |
| *Cassia tora* | Caesalpiniaceae | + | + | 50-100 | |
| *Cibotium barometz* | Dicksoniaceae | + | + | 200-500 | CITES Appendix II; listed in Viet Nam Red Data Book |
| *Cyperus stoloniferus* | Cyperaceae | + | + | 50 | |
| *Coscinium fenestratum*[1] | Menispermaceae | + | + | 100-1000 | Listed in Viet Nam Red Data Book; listed in Decision 32/2006/ND-CP |
| *Docynia indica*[2] | Rosaceae | + | | 100 | |
| *Fallopia multiflora* | Polygonaceae | + | + | 50 | Listed in Viet Nam Red Data Book |
| *Fibraurea* spp.[1] | Menispermaceae | + | + | 50-100 | Some spp. listed in Viet Nam Red Data Book; some species listed in Decision 32/2006/ND-CP |
| *Homalomena* spp. | Araceae | + | + | >200 | |
| *Milletia* sp. | Fabaceae | + | | >200 | |
| *Spatholobus* sp. | Fabaceae | + | | | |
| *Schefflera* spp. | Araliaceae | + | | >100 | Some spp. listed in IUCN Red List 2004 |
| *Siegesbeckia orientalis* | Asteraceae | + | | 50 | |
| *Smilax* sp. | Smilacaceae | + | + | 100-200 | |
| *Stemona tuberosa* | Stemonaceae | + | + | 50 | |
| *Stephania* spp.[1] | Menispermaceae | + | + | >200 | Some spp. listed in Viet Nam Red Data Book; all species listed in Decision 32/2006/ND-CP |
| *Strychnos* spp. | Loganiaceae | + | + | >50 | |
| *Vitex* spp. | Verbenaceae | + | + | 50 | |

[1] = Key component must be extracted; [2] = used in medicinal spirits; [3] = used in medicinal tea, or extraction processed

*Source:* Nguyen Tap, 2004

There is also a history of cultivating medicinal plants in Viet Nam. By 2005 approximately 350 medicinal plant species, including 86 species considered rare and valuable, were reportedly being propagated or cultivated in the gardens of a network of bodies interested in the conservation of medicinal plant species in Viet Nam. This network comprises the National Institute for Materia Medica (with gardens in Hanoi and Sa Pa), the Centre for Ginseng and Medicinal Materials in Ho Chi Minh City, the Department of Medicinal Plant Resources, the Centre for Medicinal Plants in Da Lat (Lam Dong province), the Army Hospital of Traditional Medicines in Ha Dong town (Ha Tay province), the Institute of Ecology and Biological Resources and the University of Pharmacy, both in Ha Noi.

The mix of species cultivated includes a mixture of species endemic to Viet Nam and exotics. The latter are chiefly native to more northern latitudes, particularly China, and they were originally imported into Viet Nam specifically for cultivation. However, over the past ten years, low-cost imports of the medicinal materials extracted from these species have almost curtailed local cultivation of certain species used in TCM in Viet Nam, including *Angelica dahurica, Atractylodes macrocephala, Achyranthes bidentata, Scrophularia ningpoensis* and *Ligusticum wallichii.*

Key provinces for cultivating medicinal plants include Hung Yen, Nam Ha, Nam Dinh, Vinh Phuc and An Giang, Ha Noi's suburbs, the northern mountainous provinces, central coastline provinces and the Mekong Delta. The government has reserved 14 000ha for growing medicinal plants within the National Five Million Hectare Reforestation Programme (Anon., 2001c). Currently, a large number of medicinal plants are grown on a commercial scale. Of these, at least 20 species are harvested in quantities exceeding 50t per year. Some of these species, and the locations in which they are grown, are listed in Table 2 below.

**Table 2**

**Medicinal plants cultivated in quantities exceeding 50t per year in Viet Nam**

| Species | Growing locations, habitats and areas planted |
|---|---|
| *Cinnamomum cassia* | Mountainous areas of Yen Bai, Thanh Hoa, Quang Nam and Quang Ngai provinces; thousands of hectares |
| *Amomum aromaticum* | Forests above 1,500m in Lao Cai, Ha Giang and Lai Chau provinces; thousands of hectares |
| *Illicium verum* | Mountainous areas in Lang Son, Cao Bang, Quang Ninh, Ha Giang and Lai Chau provinces; thousands of hectares |
| *Artemisia annua* | Lowlands in Vinh Phuc, Tuyen Quang, Thanh Hoa, and Hanoi's suburbs; dozens of hectares, yielding 500-1,000 tonnes per annum |
| *Mentha arvensis* | Plains in northern provinces; dozens of hectares yielding 70-200 tonnes of essential oil for export per annum |
| *Cynara scolymus* (imported) | Montane areas of Lao Cai (north Viet Nam) and Lam Dong (south Viet Nam) provinces, with an annual output of 400-1000 tonnes |

*Source:* The National Institute for Materia Medica, 2003.

Some of the medicinal plant species of conservation significance currently under propagation in Viet Nam include, but are not limited to:

- *Panax vietnamensis* (Ngoc Linh Ginseng) is being cultivated in the Ngoc Linh mountains (in Quang Nam and Kon Tum provinces); approximately one million plants of different ages have been planted (See Case Study Two of this report for more details).
- *Panax bipinnatifidus* (Vu Diep Ginseng) and *P. stipuleanatus* are being grown under forest canopy in Sa Pa (Lao Cai province) as part of a ginseng conservation project led by the Ministry of Natural Resources and Environment and the National Institute for Materia Medica.
- *Acanthopanax trifoliatus* and *A. gracilistylus* have been planted out using cutting and seeding techniques in Sa Pa (Lao Cai province) and Pho Bang (Ha Giang province).
- *Valeriana jatamansi* has been planted over one hectare in Sa Pa, which is being used to supply raw materials to research production of a new tranquilliser by the National Institute for Materia Medica.
- *Morinda officinalis* has been planted over nearly four hectares in Doan Hung (Phu Tho province).
- *Aquilaria crassna* is being cultivated increasingly across central and southern Viet Nam.

Documentation of the distribution of medicinal plants has begun. Between 1986 and 2004, the National Institute for Materia Medica conducted comprehensive surveys of medicinal plants in nine protected areas, chiefly in northern and central Viet Nam. Total numbers of medicinal species found varied between 326 and 744, with Hoang Lien National Park, Lao Cai province supporting the highest number (Nguyen Tap, 2005). Comprehensive surveys of medicinal plant species are reportedly planned for all national parks and special-use forests, but will probably take some years to complete.

In 2005, as part of the implementation of the national action plan to improve the control of trade in wild plants and animals (Anon, 2004d) TRAFFIC Southeast Asia conducted a survey on the trade and utilisation of medicinal plants and animals in northern Viet Nam. This survey was closely followed by a similar survey, conducted in southern Viet Nam, in 2006.

This report presents the methods and results of both of these surveys, discusses the implications of these results, and makes recommendations for the conservation and sustainable development of the traditional medicine market in Viet Nam.

**Figure 1**

**Locations surveyed for traditional medicine in Viet Nam**


*Source:* Mai Ky Vinh, WWF

# METHODOLOGY OF SURVEYS IMPLEMENTED IN NORTHERN VIET NAM

## Market surveys and interviews

The field study was conducted in December 2004 and January 2005 by two teams (one focused on flora, the other on fauna) comprising four or five Vietnamese nationals. The flora team was composed of members of the National Institute for Materia Medica, the agency with the greatest expertise in the plants used in traditional medicine (their descriptions, distribution, conservation status and medicinal values) in Viet Nam; the fauna team comprised members of the Institute of Ecology and Biological Resources.

The two teams visited eight locations known or thought to support substantial traditional medicine markets (Table 3, Fig. 1), where they targeted owners of shops selling various forms of traditional medicine, from raw materials to processed medicine forms, and known traders of traditional medicine serving both domestic and international markets (the latter primarily to China). Interviews were also conducted with government agency staff. Informal and formal interviews were conducted; simple questionnaires asking for details of quantities of each species traded per year were given to individual shops and businesses to complete.

**Table 3**

**Locations, dates and numbers of shops/businesses surveyed for plants and animals used in traditional medicine in northern Viet Nam, 2004-2005.**

| Location | Province | Dates | No. of shops visited | | Est. total no. of businesses |
|---|---|---|---|---|---|
| | | | Fauna team | Flora team | |
| Ninh Hiep Market | Ha Noi | 03, 12, and 22-23/12/04 | 9 | 15 | 200 |
| Lan Ong Street | Ha Noi | 10/11, 04 and 13/12/04 | 13 | 30 | 67 |
| Dong Kinh and Tan Thanh markets | Lang Son | 27/12/04 and 03/01/05 | 3 | 6 | 40 |
| Dong Dang and Dong Kinh markets | Lang Son | 30-31/12/04 | ns | 10 | not known |
| Hai Phong city | Hai Phong | 17-18/01/05 | 28* | n.s. | 28* |
| Nghia Trai Market | Hung Yen | 15-16/11/04 | n.s. | 32 | 50 |
| Sa Pa | Lao Cai | 26-27/12/04 | n.s. | 10 | 28 |

Notes: n.s. = not surveyed; * = 2 markets visited but number of stalls/shops not recorded

*Source*: TRAFFIC research 2005

Telephone interviews were also conducted with the same interviewees questioned in the field, in an attempt to validate data gathered during direct interviews in the field, and to collect additional information about the illegal trade of medicinal products made from fauna and flora species of global conservation concern.

Field and telephone interviews included "role-play" methods (i.e., the interviewer poses as a patient suffering from a particular ailment or condition, or as a prospective buyer of substantial quantities of materials, etc). In Lan Ong Street (Ha Noi) in particular, interviews of this type were often difficult to maintain and complete because the interviewee was immediately wary of and alert to the motives of the interviewer (even in the case of National Institute for Materia Medica staff with a broad knowledge of traditional medicine). Telephone interviews tended to provide no more than an overview; the interviewee invariably wanted to meet in person to take the discussion further. Much trade business is conducted in a medicinal trade slang, which also hampered data gathering progress.

### Additional field visits

Visits were also made to snake farms in Vinh Son commune, Vinh Tuong District, Vinh Phuc Province, in order to interview farmers about the trade in, and breeding of, selected snake species that are used in traditional medicine.

### Pharmaceutical company surveys

The flora team surveyed two pharmaceutical companies trading traditional medicines in northern Viet Nam, from a list of 14 state-owned pharmaceutical companies and nine private traditional medicine companies provided by the Department of Traditional Medicine. Several other companies were asked for data on traditional medicines, but declined to provide information to the survey teams.

## RESULTS OF THE SURVEYS IMPLEMENTED IN NORTHERN VIET NAM

### Total number of species of flora and fauna traded for use in TM in northern Viet Nam

The information provided in this section is derived from face-to-face or telephone interviews with traders, and casual observations in the markets. The precise details of quantities of materials reported by traders and estimates made during casual observation by the survey teams could not be verified and should be interpreted with caution. They are nonetheless presented here, along with potentially important issues reported to the survey teams by traders, to provide as complete an overview of the scale and nature of the trade in traditional medicine materials in northern Viet Nam as possible.

Whole individuals, derivatives, raw and part-processed materials of more than 180 plant and 30 animal species were recorded in traditional medicine markets during surveys. Ninh Hiep in Ha Noi was the largest market for trade in medicinal plants surveyed, with Nghia Trai, Dong Dang and Dong Kinh markets also supporting substantial trade in some medicinal plant species. Lan Ong Street in Ha Noi has the largest market for animal-based traditional medicines, primarily acting as a retail market with wholesale outlets for some goods. Hai Phong is also an important centre for trade in wildlife for medicinal purposes, again at a retail level but there are also wholesale outlets in Hai Phong dealing in large quantities of plant-based traditional medicines.

### *Medicinal fauna*

Table 4 summarizes animal-based medicines and their price ranges in the different locations surveyed. Many species offered for sale are listed in the IUCN Red List (Anon., 2004c), the Viet Nam Red Data Book (Anon., 2000) and Decree 32/2006/ND-CP prohibiting or restricting their exploitation and use.

**Table 4**

**Animal-based traditional medicine products offered for sale in Ninh Hiep market and Lan Ong Street (Ha Noi), and Hai Phong town, December 2004 - January 2005.**

| Species/species group | Product | Unit (as sold) | Price (in ,000 VND) | | Price (USD)# | |
|---|---|---|---|---|---|---|
| | | | Ha Noi[1] | Hai Phong | Ha Noi[1] | Hai Phong |
| Primate spp. (Loridae, Cercopithecidae, Hylobatidae) | Primate gel | one tael | 100-120 | | 6.3-7.5 | |
| | Macaque gel | one tael | | 120 | | 7.5 |
| Bears *Ursus* sp. | Gel from bones | one tael | 450 | 70 | 28 | 4.4 |
| | Dried gall bladder (wild) | Whole | 11,000 | | 695 | |
| | Captive-bred bile | 1cc | 80 | 70 | 5 | 4.4 |
| | Wild caught bile | 1cc | 170-220 | | 11-14 | |
| | Teeth | One tooth | 200* | | 13 | |
| | Paws | Pair | 2,000 | | 126 | |
| | Paws steeped in alcohol | 20-litre jar | | 5,000 | | 316 |
| Tiger *Panthera tigris* | Gel (from bones) | one tael | 5-6,000 | 5,000 | 316-379 | 316 |
| | Whole body (frozen) | 1kg | 2,000 | | 126 | |
| | Liver (frozen) | Whole liver | 15,000** | | 947 | |
| | Penis (frozen) | Whole | 25,000** | | 1,578 | |
| | Tendon | one tael | | 80 | | 5 |
| Deer spp. (Cervidae) | Gel (from antlers) | one tael | 400* | | 25 | |
| | Juvenile antlers (soft) | one tael | 1,000 | | 63 | |
| Rhinoceros spp. (Rhinocerotidae) | Horn | one tael | 30,000 | | 1,895 | |
| | | one gram | | 400 | | 25 |
| Pangolin *Manis* sp. | Scales | one tael | 320 | | 20 | |
| Mixed mammal species | Mixed mammal bone gel | one tael | 120 | 160 | 7.6 | 10 |
| Domestic white horse | gell from bones | one tael | 250 | | 16 | |
| Coucal *Centropus* sp. | Whole bird steeped in alcohol and herbs | 5 litre jar | 250** | | 16 | |
| | | 20 litre jar | | 3,500 | | 221 |

**Table 4 (ctd.)**

**Animal-based traditional medicine products offered for sale in Ninh Hiep commune and Lan Ong Street (Ha Noi), and Hai Phong town, December 2004 - January 2005.**

| Species/species group | Product | Unit (as sold) | Price (in ,000 VND) | | Price (USD)# | |
|---|---|---|---|---|---|---|
| | | | Ha Noi[1] | Hai Phong | Ha Noi[1] | Hai Phong |
| Turtle spp. (Emydididae, | Gel (from plastron) | one tael | 300-350 | | 19-22 | |
| Python *Python* sp. | Gel | one tael | 80 – 100 | | 5-6.3 | |
| Moellendorff's rat snake *Elaphe moellendorffi* | Whole snake (c2kg) steeped in alcohol | one jar | 700* | | 44 | |
| King Cobra *Ophiophagus hannah* | King Cobra steeped in alcohol | 10-litre jar | 1,500 | 4,500 | 95 | 284 |
| Various snake sp. | Water snakes steeped in alcohol and Chinese herbs | 250ml bottle | 45** | | 2.8 | |
| | Water snake and oriental whip snake steeped in alcohol and herbs | 0.5 litre bottle | 45** | | 2.8 | |
| | Single Banded Krait, Ratsnake sp. and Cobra sp. steeped in alcohol | 10-litre jar | 800 | | | |
| | Five to seven unspecified snake species steeped in alcohol | 10-litre jar | 600-700* | 700 | 38-44 | 44 |
| | Dried snake | one tael | | 20 | | 1.3 |
| Monitor *Varanus* sp. | whole animal steeped in alcohol | 10-litre jar | | 5,000 | | 315 |
| *Gekko gekko* | c.25 individuals steeped in alcohol and Chinese herbs | 5 litre jar | 950 | 500 | 60 | 32 |
| | Single animal steeped in alcohol | 70ml bottle | | 60 | | 3.8 |
| | Gecko (dried) | Whole animal | 15-35 | 15 | 0.9-2.2 | 0.9 |
| *Gekko gekko* and seahorses | whole animals steeped in alcohol | 300ml bottle | 60** | | 3.8 | |
| Seahorse spp. | Large individuals (dried) | Pair | 450-550** | | 28-35 | |
| | Medium-sized individuals (dried) | Pair | 25-30 | 50 | 1.6-1.9 | 3.1 |
| | Small individuals (dried) | Pair | 15 | | 0.9 | |
| | Seahorses steeped in alcohol with Chinese herbs | 0.5-litre bottle<br>20 litre bottle | 45** | 3,000 | 3 | 189 |
| Star fish | Star fish (dried) | Whole | 1-2 | 5 | 0.1 | 0.3 |
| Scorpion sp. | Scorpion steeped in alcohol and Chinese herbs | 250ml bottle | 30 | 35 | 1.9 | 2.2 |
| Bees | Earth' bees steeped in alcohol | 5-litre jar | 400 | 450 | 25 | 28 |
| | Bumble bees steeped in alcohol | Liter | 120 | | 7.6 | |
| Silkworm | pupae steeped in alcohol | Liter | 100 | | 6.3 | |

[1] = Ninh Hiep commune and Lan Ong Street

* = only offered for sale in Ninh Hiep commune; ** = only offered for sale in Lan Ong Street

# = price in USD quoted at an exchange rate of 15.835VND : 1USD

*Source:* TRAFFIC research 2005

There are some notable discrepancies in price between Ha Noi and Hai Phong (e.g. bear gel in Ha Noi and Hai Phong). In some cases, these are thought to reflect the concentrations of the animal derivatives they contain, while some may include non-genuine components. In the case of others (e.g. King Cobra steeped in alcohol) the reasons for the difference are not so clear.

In addition, questionnaire surveys by the National Institute for Materia Medica revealed that a horse species, reported to be *Equus asinus* (African Wild Ass, apparently farmed in and imported from China), were traded in substantial quantities (500kg per household business per year) at Nghia Trai, and in smaller quantities in Ninh Hiep and Lan Ong. The skin of the ass is apparently used to make a gel. The earthworm *Pheretima asiatica* was also reportedly traded in substantial quantities (230kg per household business per year) for medicinal purposes in Ninh Hiep market.

### *Medicinal flora*

Approximately 180 plant species or genera were identified in medicinal use from questionnaire surveys in Lan Ong, Ninh Hiep, Nghia Trai, Dong Dang and Dong Kinh markets. These are listed individually in Appendix 1. A further 20-25 species were identified by their local Vietnamese name only. More species were traded at Ninh Hiep than the other markets, and for the vast majority of species, the largest quantities traded were at Ninh Hiep. Many different species were also found at Lan Ong Street, but in smaller quantities, reflecting the more retail-based nature of the market. Relatively few plant species were found in Sa Pa, but many of the wild-sourced species for sale there were of conservation concern. Two species of fungus, *Ganoderma lucidum* and *Poria cocos* were also reported in trade.

### *Pharmaceutical company survey results*

Three large pharmaceutical companies provided information on the species and quantities of medicinal materials sold. One company, located near the border with China, provided data on quantities of 112 species or genera traded in 2001-2002 (Appendix 2), as well as 17 materials for which only the Vietnamese names were known. In 2001, 2170t of materials was traded, while in 2002 this number increased slightly to 2286t. These materials were chiefly imports from China to be resold or processed and then sold on to domestic markets. There was relatively little difference in quantities traded for most species between 2001 and 2002, although one species, *Achyranthes asper*, was not traded at all in 2002 following a substantial quantity being used in 2001 (approximately 18t). Amounts of some species approximately doubled between years, for example, *Cimicifuga dahurica* and *Cuscuta sinensis* (Appendix 2). The company also imported two tonnes of Ass *Equus asinus* in each year.

A second company, based in Hanoi, is one of the largest State-owned pharmaceutical companies in Viet Nam. It reported on the 30 species traded in greatest amounts in 2002-2004 inclusive, which varied considerably between years, with over 1400 and 1600t imported in 2002 and 2004 respectively, while only 800t was imported in 2003. No reasons were given for this difference.

The third company imports materials on behalf of many smaller state-owned companies. In 2003, this company imported at least 95 species or genera, totalling over 9700t, and a further 82 species or genera for which only Vietnamese names are known, totalling 5090t.

# METHODOLOGY OF THE SURVEYS IMPLEMENTED IN SOUTHERN VIET NAM

## Market surveys and interviews

This study was conducted from 1st to the 10th of August, 2006. The surveys were conducted by two teams made up of Vietnamese nationals. Team members included pharmacists and ecologists. Pharmacists were employees of the Institute of Materia Medica, the Ginseng and Medicinal Materials Research Centre and a number of private and state-owned pharmaceutical companies based in either Ho Chi Minh City or Da Nang City. Ecologists were from the Da Nang Forest Protection Department, the Viet Nam-Russian Tropical Centre in Ho Chi Minh City, the National University of Ho Chi Minh City and the TRAFFIC Southeast Asia Programme.

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*Traditional medicine on sale in HCMC*

Surveys were conducted in Ho Chi Minh City and Da Nang City. These cities were chosen as the location for the surveys because they are believed to be major centres for the trade in traditional medicines in southern Viet Nam. Demand for traditional medicines (sourced from the wild, cultivated or imported) in both cities is very high. They also act as distribution centres from which medicinal materials are distributed to surrounding provinces. For this reason it was assumed for the purposes of this survey that results from the work done in these two centres could be seen as an overview of the trade and use of medicinal plants and animals in southern Viet Nam as a whole.

Over the survey period, the teams visited a total of 32 establishments known to be involved in traditional medicine (TM). Fifteen of these were focussed on the trade in medicinal plants, and included TM traders in open markets, small privately owned retail pharmacies and larger private or state-owned enterprises involved in wholesale of TM raw materials or processed remedies. Some traders sold only locally, while others served both domestic and international markets (with export mainly to China). The teams also visited a number of cultivation centres for medicinal plants.

For information on the trade and use in medicinal animals 17 establishments were visited. Like many of the medicinal plant traders, these included small market stall retailers, selling wildlife in open markets, small privately owned pharmacies selling a mix of TVM and TCM and larger pharmaceutical companies. The teams also visited a number of wildlife farms (particularly Snake Farms), restaurants and 'butchers' specialising in wild meat or dishes made from wildlife, as well as a public hospital focussed on providing TM to patients.

Introduction letters, which were required to introduce the survey to interviewees, were obtained through the Ho Chi Minh and Da Nang Departments of Health.

The survey involved formal and informal interviews with individual retailers or representatives of larger companies or organizations. Some government employers were also interviewed. Information gained in interviews was complemented by direct observation of the medicinal products for sale.

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*Packing medicinal materials at a shop in Thanh Phat*

The interviews aimed to determine the Vietnamese common name and scientific name of medicinal plant and animals, their origin (from the wild, cultivated or imported), the part of the plant or animal being used for medicinal purposes and why it is used, the volumes sold and the current prices.

The investigation teams found that the traders or company representatives were often busy, so the aims of the survey were explained, and simple survey questionnaires were left for collection at a later date.

The basic methods of investigation were the same for both medicinal plants and animals. However, the investigation teams felt that the very sensitive nature of the trade in medicinal animals meant that it was more difficult to collect accurate information. In these cases information collected during interviews was verified by direct observation of the medicinal animals and products for sale and transactions between traders and customers, and by informal discussions with traders.

### Additional field visit

An additional day field trip was made to a snake farm in Tien Giang Province to collect information on the use of snakes to produce medicinal products, and to investigate snake farming techniques.

## RESULTS OF THE SURVEYS IMPLEMENTED IN SOUTHERN VIET NAM

### Total number of species of flora and fauna traded and used in TM in southern Viet Nam

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Dioscorea persimilis*, en route to HCMC*

As with the survey conducted in northern Viet Nam, the information presented here is the result of a combination of formal and informal interviews, and casual observation.

In both Ho Chi Minh City and Da Nang the number of individuals and companies interviewed was relatively few compared to the total number of establishments involved in the trade or use of TM materials. While there are more than 500 companies involved in the trade in traditional medicinal plants in Ho Chi Minh City, only ten companies were surveyed for this report. Only 15 establishments involved in the trade in medicinal animals and their products were surveyed.

In Da Nang, approximately 100 companies, both private and state-owned, are involved in the processing, trade or use of traditional medicines (Dang Ngoc Phai, Quang Nam Department of Health, pers. comm. to Nguyen Tap, 2006). However, the survey team were able to interview only six establishments for the flora component of this survey while only two establishments - a restaurant and a small privately owned pharmacy - were interviewed for the fauna component.

In many cases, the figures relating to total amounts of each medicinal material sold given by traders cannot be verified, and should therefore be interpreted with caution. In addition, questionnaire responses received from different traders and companies were often inconsistent with regard to the types of information provided. For example, some traders were unable to provide precise information on the source of the materials (from the wild, cultivated in Viet Nam or imported), or on the total amount of medicinal material purchased by companies and then sold on to consumers. The information has therefore been collated and analysed to provide an overall impression of the trade and use of medicinal materials in southern Viet Nam.

### *Medicinal flora*

The survey teams found a total number of 288 species of plant and fungi traded and used for medicinal purposes in the southern Viet Nam survey. A complete list of the species found and their conservation status can be found in Appendix 3. In Da Nang, the survey found 213 medicinal plant species, from which 320 different traditional remedies were made. A greater number of species and remedies were found in Ho Chi Minh City. Approximately 383 medicinal plant products were derived from 274 different plant and fungi species.

Of the total number of species traded and used in southern Viet Nam, the vast majority of these species (277 out of 288 species) were flowering plants (Magnoliophyta/Angiospermae) from 103 different families.

Plant species also included one marine algae (Family Sargassaceae, *Sargassum* sp.), and three species of terrestrial fungi from two families (Family Ganodermataceae - *Ganoderma* sp., 'Co Linh chi' and *Ganoderma lucidum* 'Linh chi'; and Famliy Polyporaceae *Poria cocos* 'Phuc linh').

There was one species of Thong dat *Lycopodiophyta,* representing the Family Selaginellaceae, Quyen ba truong sinh *Selaginella tamariscima*; and three species of Fern (Polypodiophyta) representing two families (Family Polypodiaceae, Bo cot toai la to *Drynaria quercifolia* and Cot toai bo *Drynaria fortunei*; and Family Dicksoniaceae, Cau tich *Cibotium barometz*).

There were also four species of pine (Pinophyta/Gymnospermae), representing four families (Family Ginkgoaceae, Gingko (Ginkgoaceae Family), Family Gnetaceae, Gam *Gnetum montanum*, Family Pinaceae, Red Pine *Pinus merkusii* and Family Cupressaceae, Trac ba *Platycladus orientalis*).

### *Medicinal fauna*

Over the course of the investigation, the survey teams found that 58 different species of vertebrate animal (28 species of mammal, four species of bird, 23 species of reptile, two species of fish and one species of amphibian); and 10 species of invertebrate (one species each of earthworm, leech, cuttlefish, starfish, brown scorpion and forest centipede, silkworm, cicada, bee and wasp) were used for medicinal purposes. Many of the vertebrate species are of significant economic value, and are highly regarded for their medicinal properties. Of the 68 species of fauna traded, half of them are considered to be of conservation significance and are listed on either the IUCN Red List of Threatened Species (IUCN, 2006), Viet Nam's Red Book, Volume I (Anon, 2000), or as part of Decree 32/2006/ND-CP (Anon, 2006). More detail on the species found and their conservation status can be found in Appendix 4.

The investigation teams found 100 different medicinal products from 68 animal species traded in Ho Chi Minh City. They were mainly sold as a dried product (either the whole animal or parts), soaked in rice wine, or as the gel product which remains after boiling animal remains slowly in water.

Phootographs © Nguyen Tap

Gecko gecko *sold in medicine shops on Hai Thuong Lan Ong Street*

Hippocampus sp.*, also found on Hai Thuong Lan Ong Street*

*Starfish sold in shops*

Only two establishments involved in the trade in medicinal fauna were interviewed in Da Nang. In the first, a private pharmacy selling traditional medicine, five species were found. These were bird, sea horse, cuttlefish, starfish and gecko. The animals were sold either in dried form, or steeped in alchohol.

The second was a restaurant which specialised in serving dishes made from wild animals. Species found for sale included Wild boar (average consumption of 1 – 2 boar/day), weasel (different species, average consumption of 15 weasels per day) and Malayan Porcupine (average consumption of 10 animals per day, served as food, stomach used as medicine). Deer (species not specified) and muntjac were also sold, however these species are not always available, and their availability depends on the suppliers (who were not identified).

## Origins of medicinal flora and fauna traded and used in southern Viet Nam

### *Source of medicinal plants*

Of the 288 species recorded for use in TM in southern Viet Nam, 122 were exclusively wild-sourced from Viet Nam, 77 species were exclusively cultivated in Viet Nam, and 59 species were exclusively imported (mainly from China) (see appendix 3). In Da Nang, of the plant species used in TVM (154 species in total), 62 are cultivated in Viet Nam while 92 species were collected from the wild. A small percentage of the plant species traded and used in Da Nang (69 species) are used in TCM rather than TVM. Of these species some are cultivated in Viet Nam, but as they are originally from China and their remedies are traditionally Chinese they are still referred to as TCM. In Ho Chi Minh City, of the total number of species found, 119 were collected from the wild, 77 were cultivated in Viet Nam and 88 species were imported (mainly from China).

Of the 288 surveyed species, cultivated species include both native and exotic species. Imported species include both non-native species, and native species that are now rare and threatened in Viet Nam (such as, for example, *Coptis chinensis*).

### *Source of medicinal fauna*

Among the 68 species of vertebrate and invertebrate species found, the vast majority (58 species) are hunted from the wild. A small number, including tigers, snake and deer were also reported to have come from Cambodia, Lao PDR or Malaysia. One species of invertebrate, the Earthworm, is reportedly imported from China. While interviewees report that Viet Nam's wildlife farms appear to have had limited reproductive success to date, 20 species were reported to have been bred in captivity (not including domestic animals). Some animals traded and used in traditional medicine have multiple sources – they may be hunted from the wild, bred in captivity, or imported (legally or illegally) from neighbouring countries (mainly China, Cambodia, Lao PDR and Malaysia).

Some animals traditionally kept domestically in Viet Nam: the domestic dog *Canis familiaris*, Domestic pig *Sus domesticus*, Domestic cow *Bos indicus*, Domestic buffalo *Bubalis bubalis*, Domestic goose *Anser domestica*, Domestic chicken *Gallus gallus* and Silkworm *Bombyx mori,* are also sometimes used to produce materials for TM.

Wild animals reportedly bred in captivity for medicinal purposes include Macaque Monkeys *Macaca arctoides* and *M. mulatta*, Sika Deer *Cervus nippon* and Sambar *Cervus unicolor*, Malayan Porcupine *Hystrix brachyura*, Asiatic Brush-tailed Porcupine *Atherurus macrourus*, Monitor Lizard *Varanus* sp., Reticulated Python *Python reticulatus,* Chinese Ratsnake *Ptyas korros,* Cobra *Naja naja,* King Cobra *Ophiophagus hannah,* Plumbeous Water Snake *Enhydris plumbea,* Checkered Keelback *Xenochrophis piscator,* Pit Viper *Trimeresurus* sp.*,* Malayan Krait *Bungarus candidus,* Siamese Crocodile *Crocodylus siamensis,* Asiatic Softshell Turtle *Amyda cartilaginea,* Scorpion *Lychas mucronatus,* Centipede *Scolopendra morsitans,* Honeybee *Apis* sp.

Many other animals are hunted from the wild as juveniles and kept in captivity until they are big enough to be sold. This list includes (but is not restricted to) animals such as Binturong *Arctictis binturong*, Small Indian Civet *Viverricula indica*, Leopard Cat *Prionailurus bengalensis*, Pygmy Loris *Nycticebus pygmaeus* and many species of freshwater turtle.

## Conservation status of medicinal flora and fauna in southern Viet Nam

### *Medicinal flora*

The majority of plants used in TM in Viet Nam are sourced from the wild. Among these, 27 species are considered to be of conservation concern, and are listed on Decree No. 32/2006/ND-CP, The Red Data Book of Viet Nam Volume II (Anon, 1996) or the Viet Nam Medicinal Plant Red List (Nguyen Tap, 2006). Of those species traded in Da Nang City, 11 of the wild-sourced species are listed, while 14 of the species found in Ho Chi Minh City are listed. These species are listed in Table 5 below.

**Table 5**

**Conservation status of wild-sourced plant taxa utilised in TM in southern Viet Nam**

| Taxon name | Conservation Status | | | |
|---|---|---|---|---|
| | Decree 32/2006/ND-CP | | The Red Book of Viet Nam, Vol II (Anon, 1996) | Viet Nam's Red list of Medicinal Plants (Nguyen Tap, 2006) |
| | List IA | List IIA | | |
| *Anoectochilus setaceus*[2] | + | | + | Endangered |
| *Lilium brownii* var. *viridulum*[3] | | + | | Endangered |
| *Stephania pierrei/ cambodica* | | + | + | Vulnerable |
| *Codonopsis javanica* | | + | + | Endangered |
| *Fibraurea tinctoria*[2] | | + | | |
| *Coptis chinensis* [1,3] | | + | + | Critically Endangered |
| *Asarum* spp./*Asarum petelotii* [1,3] | | + | + | Endangered |
| *Panax vietnamensis* | | + | + | Critically Endangered |
| *Dendrobium nobile*[2] | | + | + | Vulnerable |
| *Thalictrum foliolosum*[1] | | + | + | Endangered |
| *Drynaria fortunei* | | | + | Endangered |
| *Coscinium fenestratum*[2] | | + | + | |
| *Tetrapanax papyriferus*[3] | | | + | Endangered |
| *Fallopia multiflora*[2] | | | + (as *Polygonum multiflorum*) | Endangered |
| *Hydnophytum formicarum* | | | + | Endangered |
| *Morinda officinalis*[3] | | | + | Endangered |
| *Cibotium barometz*[2] | | | + | |
| *Tribulus terrestris* | | | + | Vulnerable |
| *Aristolochia* spp. | | | + | Vulnerable |
| *Nepenthes mirabilis*[4] | | | + (as *Nepenthes anamensis*) | |
| *Smilax glabra* | | | + | |
| *Trichosanthes* spp. | | | | Endangered |
| *Dipsacus asper*[3] | | | | Endangered |
| *Homalomena cochinchinensis* | | | | Endangered |
| *Peucedanum decursivum* | | | | Endangered |
| *Rosa laevigata* | | | | Vulnerable |
| *Selaginella tamariscima* | | | | Vulnerable |

[1] Medicinal materials sold in southern Viet Nam are reportedly imported from China
[2] Species being sourced from the wild in Viet Nam and exported, mainly to China
[3] Species which are also successfully cultivated in China
[4] Both *Nepenthes mirabilis* and *N. anamensis* are also listed under the 2004 IUCN Red Species List; however, there is currrently some taxonomic confusion regarding synonomy between these species.

*Source:* Decree 32/2006/ND-CP; Anon, 1996; Nguyen Tap, 2006

### *Medicinal fauna*

Many of the species of medicinal fauna found for sale during the survey are of conservation concern. Half of the total number found (34 out of 68 species) are on either the IUCN Red List of Threatened Species, Viet Nam's Red Book, Volume I (Anon, 1996), or as part of Decree No.32/2006/ND-CP of the Vietnamese Government (Anon., 2006). The conservation status of the medicinal fauna found during this survey can be found in Appendix 4.

The teams found that most of the shop owners interviewed displayed a complete lack of understanding of Viet Nam's wildlife laws. Products from critically endangered animals, such as live tigers, tiger parts or rhinoceros horn were always claimed to be available, provided the price negotiated was high enough. However, there were also many reports that medicinal products derived from endangered species may not be genuine.

Among the 34 species of conservation significance, only 10 have been successfully bred in captivity in Viet Nam. These are Rhesus monkey, Tiger, Sika deer, Sambar, Malayan porcupine, Reticulated python, Cobra, King cobra, Siamese crocodile, and Asiatic Softshell Turtle. Even for these species, the number of animals bred in captivity does not currently meet market demand.

## Medicinal purpose and cost of medicinal fauna

Animals may be sold whole (with the viscera removed) or in specific parts, depending on the medicinal products required. For example, animal skin, bone, gall bladder, penis or shell (in the case of turtles) may be sold for different medicinal purposes.

Invertebrates may be sold fresh or dried (such as the Earthworm, *Pheretima asiatica,* which is normally dried). As with vertebrate species, for some invertebrates only certain parts are sold. For example, the exoskeleton of the Cicada *Cryptolympana japonica* is sold.

In some cases animal products are sold – for example the faeces of a number of species of bat *Hipposideros armiger*; *Pipistrellus javanicus,* Flying-Squirrel *Belomys pearsoni*, Chinese Ratsnake *Ptyas korros* or the honey from particular species of bee *Apis* spp.

The body parts used, the medicinal purpose and the costs of each species found during this survey are listed in the table below (Table 6).

**Table 6**

**Medicinal purpose, body parts used and cost of medicinal animal species traded and used in TM in southern Viet Nam**

| Common Name | Scientific Name | Parts used | Medicinal use | Cost | Source |
|---|---|---|---|---|---|
| Malayan Porcupine, Asiatic Brush-tailed Porcupine | *Hystrix brachyurus, Atherurus macrourus* | Whole body, stomach | Stomach used to cure gastric diseases | VND150 000 to 300 000 (USD9.47 – 18.95) for a complete stomach | Captive bred and wild caught |
| Asian Elephant | *Elephas maximus* | Skin, legs, teeth, bones | TM purpose Not specified | Not specified | Kept in captivity, and used for transport or tourism. Not specifically bred for TM, however, when a captive animal dies the body parts are used to produce TM remedies. |
| Asiatic Black Bear | *Ursus thibetanus* | Primarily for bile, paws, and whole body | TM purpose Not specified | VND60 000 approx. (USD3.79) per ml of bear bile, genuine bear 'gel' is sold for VND1-10 million (USD63.15 – 631.51) per 100g in Ho Chi Minh City. . | According to the Forest Protection Department approximately 4000 bears are kept in captivity in Viet Nam. To collect bile, bears are normally anaesthetized and scanned using ultrasound. Needles are inserted into the gall bladder and bile is removed with a syringe. Anywhere from 10 – 100ml of bile is removed each time, depending on the size of the bear. Bile extraction usually occurs two – four times per year. Given the high economic benefits, there are now many farms raising (keeping) bears in Viet Nam. Most animals are sourced from the wild, either in Viet Nam or in Lao PDR |
| Sika deer Sambar | *Cervus nippon Cervus unicolor* | Velvet antlers | TM purpose not specified | Not specified | Have long been raised successfully in northern Viet Nam (Nghe An and Ha Tinh province) and more recently in the south, particularly in the southern Highlands |
| Tiger | *Panthera tigris* | More detail found in Case Study 3, below | More detail found in Case Study 3, below | More detail found in Case Study 3, below | These are successfully bred in captivity by two farm owners in southern Viet Nam. There are apparently 40 animals in captivity on these farms (adults and babies born in captivity), and they are still developing their husbandry and breeding protocols (so no animals have yet been sold from these properties). The Tiger farms have recieved strong public support in Viet Nam. |
| Macaque, particularly the Rhesus Monkey. | *Macaca* spp. | Can be sold whole or in parts. Mainly sold in dried form, or as the gel which remains after boiling the animal's body or bones | Bred for vaccine production, food and medicinal pruproses. | Wide range of uses. The body (viscera removed) is a tonic for elderly people. Gel (produced by boiling bones) is used to treat bone diseases, such as back ache or arthritis. | Bred in large numbers in many locations in Viet Nam, including the islands of Quang Ninh and Khanh Hoa provinces. Hundreds of rhesus monkeys are sold in pharmacies in Hai Thuong Lan Ong Street (Quarter 5) |

**Table 6 (ctd.)**

**Medicinal purpose, body parts used and cost of medicinal animal species traded and used in TM in southern Viet Nam**

| Common Name | Scientific Name | Parts used | Medicinal use | Cost | Source |
|---|---|---|---|---|---|
| Asian Pangolin | *Manis* spp. | Whole body (restaurant trade) and scales (used inTM) | TM purpose not specified | Whole body VND1.5 – 1.7 million (USD94.73-107.36) per kg, scalesVND7-8 million (USD442.06 – 505.21)/kg | Sourced from the wild |
| Javan Rhinoceros | *Rhinoceros sondaicus* | Horn (normally in powdered form) | TM purpose Not specified | over VND1 Billion (USD6315.10) for one horn | Sourced from the wild. |
| Domestic dog | *Canis familiaris* | Whole body (restaurant trade), penis and bone used in TM | TM purpose Not specified | Not specified | Traditionally kept as a domestic animal in Viet Nam, bred in captivity and only secondarily used in TM. |
| Domestic pig | *Sus domesticus* | Whole body, the leg, hooves and bile. | The bile of the domestic pig can be used to cure cough. | Not specified | Traditionally kept as a domestic animal in Viet Nam, bred in captivity and only secondarily used in TM. In 2005, the one pharmaceutical company in Ho Chi Minh City consumed 242 kg of bile from domestic pigs. |
| Domestic cow Domestic buffalo | *Bos indicus Bubalus bubalis* | Parts used in TM include bile, horn and gall stones | Gall stones are used to cure neurological and cardiovascular deseases | Not specified | Traditionally kept as a domestic animal in Viet Nam, bred in captivity and only secondarily used in TM. While some of these products are now artificially synthised, most are imported from China. |
| Domestic goose Domestic chicken | *Anser domestica Gallus gallus* | Parts used include the crop membrane | The crop membrane is believed to cure intestinal diseases | Not specified | Traditionally kept as a domestic animal in Viet Nam, bred in captivity and only secondarily used in TM. The crop membranes are mainly imported from China. |
| Asiatic Softshell Turtle | *Amyda cartilaginea* | Whole body, shell | Mainly used for meat, secondarily used in TM (TM purpose not specified) | Not specified | Reportedly bred in many provinces. A small number are exported to China. |
| Siamese Crocodile | *Crocodylus siamensis* | Mainly raised for meat and leather, however secondarily used in TM | TM purpose not specified | Not specified | A number of farms in Ho Chi Minh City and surrounding provinces have imported Siamese crocodile from Thailand and now raise them in captivity in Viet Nam. |

**Table 6 (ctd.)**

**Medicinal purpose, body parts used and cost of medicinal animal species traded and used in TM in southern Viet Nam**

| Common Name | Scientific Name | Parts used | Medicinal use | Cost | Source |
|---|---|---|---|---|---|
| Chinese Ratsnake, Cobra, King Cobra, Plumbeous Water Snake, Checkered Keelback, Pit Viper, Krait | *Ptyas korros, Naja naja, Ophiophagus hannah, Enhydris plumbea, Xenochrophis piscator, Trimeresurus* sp., *Bungarus candidus* | Mainly used for meat, but also used in TM | TM purpose not specified | Cobra is valued at VND900 000 (USD56.84)/kg, while both Pit Viper and Krait sell for VND500 000 (USD31.58)/kg. | Kept in captivity in southern Viet Nam. These captive bred snakes supply markets in supply Ho Chi Minh city's market, other provinces and China. According to the results of this survey approximately 10 tons annually are sold annually in the south of Viet Nam. |
| Reticulated Python | *Python reticulatus* | Mainly used in the restaurant trade, or for their leather (used for producing fashion accessories). Secondarily used for TM | Once the viscera has been removed, the whole body may be eaten as a tonic. The python's bones boiled down to produce a gel is used to treat backache, while python fat is used to help heal burns. | Not specified | Successfully bred in a number of farms in southern Viet Nam. Many of these farms also breed other species or reptile, such as other snakes or turtles. One farm in the south of Viet Nam reportedly breeds 5 000 species of reptile annually. |
| Monitor Lizard | *Varanus nebulosus* | Whole body eaten, other parts (particularly gall bladder) used in TM. | Gall bladders are believed to cure neurological diseases | VND180 000 (USD11.37)/kg for the whole body. Freshly harvested gall bladders range from VND50 000 – 100 000 (USD3.16 – 6.32) | Allegedly bred in Cu Chi District in Viet Nam for the restaurant trade. |
| Gecko | *Gekko gecko* | Whole (dried or steeped in alcohol) | | VND20,000 (USD1.26)/gecko | Sourced from the wild |
| Toad | *Bufu melanostictus* | | Purulent material from the skin of the toad is used to cure diseases in children | | Sourced from the wild |
| Seahorse | *Hippocampus* spp. | Whole body (dried) | TM purpose Not specified | VND3-3.5 million (USD189.45 – 221.03) per kg. | Sourced from the wild |
| Honey Bee | *Apis* spp. | Honey | TM purpose Not specified | Not specified | Bees are kept all over Viet Nam. Though not stated in survey forms, according to other statistic sources, total output of raised honeybee can be more than 200 tons annually. 50% of which is for export. Honey exploited from the wild reduces. According to statistics of Department of Health of Gia Lai – Kontum province, about 20 tons of the wild honeys were exploited before 1990.[1] |

[1] pers. comm. Pham Gia Minh, Director of Pharmacy and Health Equipment Company, Kontum province to Nguyen Tap, 2006

**Table 6 (ctd.)**

**Medicinal purpose, body parts used and cost of medicinal animal species traded and used in TM in southern Viet Nam**

| Common Name | Scientific Name | Parts used | Medicinal use | Cost | Source |
|---|---|---|---|---|---|
| Centipede | *Scolopendra morsitans* | Whole body (dried), exoskeleton | TM purpose Not specified | Not specified | Centipede (*Scolopendra morsitans)*. According to the pharmacy owners interviewed for this survey all dried centipedes for sale are now domestically raised, although the location of these farms is unknown. |
| Scorpion | *Lychas mucronatus* | Whole body eaten, also used in TM | TM purpose Not specified | Not specified | Over the past five years this species has been kept successfully in both northern and southern Viet Nam. Although not verified, they have been reported to have been exported to China. |
| Silkworm | *Bombyx mori* | Whole body, faeces, and "bach cuong tam' | Bach Cuong Tam is used to cure sore throat, cough, fever, and haemorrhagic diseases (Do Tat Loi, 2004). | | Bach Cuong tam is normally imported from China. This is a dried product made from silkworms which have been parasitised by the fungi *Botrytis bassiana* or *Beauveria bassiana*. |

*Source:* TRAFFIC research 2006.

## CASE STUDIES

### Case Study One: The production of 'berberine' from *Coscinium fenestratum*




*Berberin tablets made from* Coscinium fenestratum

*Coscinium fenestratum* is a climbing plant which occurs naturally in Viet Nam, Lao PDR, Cambodia, Malaysia, India and Sri Lanka. In Viet Nam *C. fenestratum* was previously found in abundance in 14 mountainous provinces in southern Viet Nam from a latitude of 16°15'N (Anon, 2004d; Nguyen Tap *et al.,* 1981; Nguyen Tap 1985; Nguyen Tap *et al.,* 2004).

*C. fenestratum* has traditionally been harvested and used for medicinal purposes by the ethnic minorities of the southern Highlands of Viet Nam. It is known by many different common names, depending on the language of the minority group. For example, it is known as "Vang giang" in Khanh Hoa Province, while the Ba Na people refer to the plant as "Loong to ron" and to the Ede people it is known as "K'trong".

The stems, branches and roots of the plant have traditionally been cooked then diced and used to cure stomach ache, diarrhoea and dysentery (Nguyen Tap *et al.* 1981; Nguyen Tap, 1985, Liem *et al.* 1975; Loi, 1999).

In 1975, Vietnamese researcher Nguyen Liem discovered a number of different alkaloids, the most abundant of which was berberine, in the stems and roots of *C. fenestratum (*Liem *et al.* 1975). Since then, the plant has been the subject of many studies into its chemical and pharmaceutical properties.

Since 1977, *C. fenestratum* has been exploited to extract berberine for medicinal purposes. It has unfortunately become an example of how unplanned exploitation can lead to the exhaustion of a once abundant source.

**Botanical properties of *Coscinium fenestratum***

*C. fenestratum* is a light demanding species of climbing plant which is often found in large evergreen forest trees from 200-700m above sea level.

The flowers of the plant are dioecious, meaning that male and female flowers are found on different plants. Only plants with a stem diameter greater than 3cm can fruit. Within a population of *C. fenestratum* only around 30% of the plants will flower during the flowering season (from March to April). Fruits, which are spherical in shape and from 1.5-2cm diameter, ripen from August to September. Ripe fruits which have fallen from the plants are often swept away by floods during the rainy season, so plants growing from seeds are uncommon.

### *The history of exploitation of C. fenestratum in Viet Nam*

In the past, pharmaceutical companies normally established berberine processing plants in areas where natural supplies of *Coscinium fenestratum* were abundant. Local people were encouraged to harvest the plants, and then sell the the stems and roots to the company for processing. Berberine was normally extracted on-site, and the extracted raw product was then transferred to a different location for refinement and further processing to produce medicines.

By locating their extraction factories close to the original source, the pharmaceutical companies enjoyed low transportation costs and rapid turnover times. During the 1980's, the costs associated with the production of powdered Berberine were minimal, allowing the companies to sell one box of 100 tablets (10mg of Berberine per tablet) for VND1000 (USD 0.06)/box. The current price for a box of 100 Berberine tablets is around VND3000 (USD 0.19). (Nguyen Tap, pers.obs)

Between 1978 and 1996, 30 000t of *C. fenestratum* (equivalent to 300t of berberine powder) were harvested in southern Viet Nam. This production not only met the demands of Viet Nam's market but also supplied the markets of the former USSR and China (Anon, 2004d).

This rapid, uncontrolled exploitation has exhausted the abundant source of *Coscinium fenestratum* in Viet Nam.

The main reasons for the decline of C. fenestratum in Viet Nam are as follows:

- Unplanned exploitation – Processing factories (private and state owned) were established in all southern provinces where *C. fenestratum* naturally occured.
- Wastage during harvesting – *C. fenestratum* is lianoid plant and often climbs very large, tall trees. Local people often cut the plants from the ground, leaving many branches high up on the tree - an estimated 30 – 40% of branches were wasted (Anon, 2004d).
- Deforestation between 1975 – 1990 to grow crops such as coffee and rubber trees eliminated many of the forests where *C. fenestratum* naturally occured.

© Nguyen Tap

Coscinium fenestratum *in Khanh Hoa province*

Consequently, by the end of 1996, exploitation of *C. fenestratum* was forced to cease simply because stocks of *C. Fenestratum* were exhausted. Only small or regenerating plants were left in the wild, and *C. fenestratum* has now been listed in the 1996 Viet Nam Red Data Book of plants (Nguyen Tien Ban *et al*. 1996). Today, the Forest Protection Department of a number of provinces (Gia Lai, Kon Tum, Quang Nam, Binh Dinh and Binh Phuoc) have forbidden the exploitation of *C. fenestratum* in order to allow stocks to recover.

### *Exploitation of C. fenestratum in Lao PDR*

Amidst declining *C. fenestratum* resources and increasing demands for berberine to supply the traditional medicine market in both Viet Nam and China a number of pharmaceutical companies have begun harvesting the plant from within Lao PDR. Exploitation of this resource may also be occuring in Cambodia, however these reports are unconfirmed.

Given the lessons learned in Viet Nam, it is important to ensure that exploitation of *C. fenestratum* in Lao PDR occurs sustainably.

**Propagation of *Coscinium fenestratum* for sustainable exploitation of Berberine**

The parts of the plants harvested to extract berberine are the branches and stems. After harvesting, *C. fenestratum* is able to regenerate new buds from cut stems. These regenerated stems will reach a height of 10m in 12 years, with a diameter of 2.8 – 3.2cm.

It is therefore possible to sustainably harvest *C. fenestratum* to extract berberine. The roots should be left in the ground, along with 20-30cm of stem to allow for regeneration. Only plants with stems of more than 3cm diameter should be used and flowering plants should be avoided. Regenerated plants can be harvested again after 12 to 15 years (Nguyen Tap *et al.* 1985, 1995).

## Case Study Two: Vietnamese Ginseng *Panax vietnamensis*

Ngoc Linh Mountain, in Quang Nam Province, Central Viet Nam is home to an endemic, range restricted species of ginseng known as 'Ngoc Linh Ginseng' *Panax vietnamensis*. Ngoc Linh ginseng a long-lived herb. The ground stems die back every winter, and new growth buds emerge again in the Spring (starting in February). It is a moisture loving, shade-tolerant plant which grows in the wet evergreen forest found between 1,800m and 2,200m above sea level on Ngoc Linh Mountain (Anon, 2004). The ethnic Sedang people of Ngoc Linh Mountain have a long tradition of using ginseng for medicinal purposes. It is believed to enhance body strength, and is used to cure a number of diseases; more detailed information on its uses, however, is very difficult to obtain, as the Sedang people prefer to keep this traditional knowledge within their own culture.

Listed as E (Endangered) in Viet Nam's Red Data Book (Anon, 1996), CR (Critically Endangered) in Red list of Viet Nam's medicinal plants (Nguyen Tap, 2006) and also on List IA of Viet Nam's Decree 32/2006/ND-CP (Anon, 2006), it is an example of how uncontrolled exploitation, very poor management and sensational attention from the media have lead to the local extinction of an important endemic plant.



*Vietnamese Ginseng* (Panax vietnamensis)

Ngoc Linh Ginseng first came to the attention of Vietnamese pharmacists in 1973, when officers from the region's Department of Health (Pharmacists Dao Kim Long, Nguyen Chau Giang and Nguyen Thi Le) found the plant in the wild, and named it after the mountain it was found on. In 1974, samples of the plant were sent to Poland to investigate its chemical properties. However, it wasn't until 1985 that Ha Thi Dung and N. Grushvitzki described the plant and named it as a new species - *Panax vietnamensis* (Ha et Grushv., 1985; sp. nov.).

After the reunification of North and South Viet Nam in 1975, the National Ministry of Health set up the Ho Chi Minh City Ginseng and Medicinal Materials Research Centre. This centre worked with the provincial health departments in Gia Lai, Kon Tum, Quang Nam and Da Nang Provinces to carry out more comprehensive research on Ngoc Linh Ginseng. Research was aimed at improving the understanding of the natural distribution and abundance of the ginseng. Research on the medicinal characteristics of the plant was also carried out at the centre, and Ginseng Farms in Quang Nam and Kon Tum Provinces were established to improve propagation and hybridisation techniques. A small amount is still grown in Kon Tum Province's Ginseng Farm, while stricter management has resulted in 5ha of ginseng at the farm in Quang Nam Province (Son, 2006).

On October 2006, a media press release announced the discovery of a new reserve of Ngoc Linh Ginseng at around 1500m on Ngoc Lum Heo Mountain, close to Ngoc Linh Mountain in Quang Nam Province. While this information was supposed to remain confidential, the announcement was made on local television, in a magazine from Quang Nam Province, and over the internet, making these valuable reserves of ginseng more vulnerable to collection by local people. The reserves were exhausted a short time after the finding was made public (Nguyen Nhu Chinh, Quang Nam Department of Health, pers.comm.).

However, as a result of poor management and continued exploitation the plant has now become extremely rare and is very hard to find in the wild on Ngoc Linh Mountain. As Ngoc Linh Ginseng has become increasingly rare in the wild, the price per kilogram on the traditional medicine market has risen. One kilogram of dried ginseng currently sells for around 20 million VND (Nguyen Tap, pers.obs). With such high economic returns, collection of ginseng from wild reserves continues to occur, regardless of the law.

**Propagation of Ngoc Linh Ginseng**

Ginseng is a fastidious species, requiring a shade ratio of 70-90%. It is normally only found above 1,800m. Plants grown from seed in the nursery garden in Kon Tum Province are uprooted after one year, and replanted under natural forest cover on Ngoc Linh Mountain. After three years, the plants begin to produce fruit. Initially the number of flowers on each plant is quite small so the farms normally only begin to harvest from a plant after 5-7 years (Anon, 2004d; Son, 2006). The flowering season is from March to April, while fruits ripen from August to October.

The nursery garden produces seedlings which have been distributed for cultivation in the wild. Of these, 60 000 seedlings have been replanted on Ngoc Linh Mountain (Kon Tum province), while another 30 000 have been distributed to Sedang people for cultivation, and a further 10 000 seedlings have been replanted in Tay Giang commune and Ngoc Lum Heo Mountain (Son, 2006).

Better management is required if Ngoc Linh Ginseng is going to survive in the wild. The Government has recently declared the Ngoc Linh – Kon Tum Nature Reserve on the west side of Ngoc Linh Mountain. However, the east side of the mountain, where Ngoc Linh Ginseng still occurs naturally, lies outside the boundaries of the approved nature reserve. Quang Nam and Kon Tum Provinces will continue to invest in research and development of the cultivation of ginseng, with the hope that, in ten years time, they will be able to supply the traditional medicine market with ginseng from cultivation, rather than harvested from the wild. However, given the high economic value of ginseng in the traditional medicine market, and the poor living standards of local people (three communes in the district still do not have any roads for motor vehicles), the sustainable development of Ngoc Linh Ginseng will only be achieved if plans are implemented in accordance with other agriculture and forestry projects to improve livelihoods for local people.

## Case Study Three: Tiger *Panthera tigris*

The Tiger, inspiration behind many folklore legends, has long been revered in Viet Nam as the "the king of the forest". So, while known to be a potential danger to both humans and domestic animals, tigers are generally respected by the Vietnamese people.



*Caged tiger* Panthera tigris

In traditional medicine, many different parts of the tiger have been used to produce remedies for a wide range of complaints. A number of tiger parts are used for their reported ability to treat arthritis. Tiger bones are boiled in water to produce a 'bone gel', which is believed to enhance body strength and treat arthritis. Tiger paws are steeped in rice wine (ruou), to produce a medicinal alcohol which will also treat arthritis and generally improve health. Tiger claws are worn as jewellery to help the wearer ward off the common cold, while it is said that the Tiger's penis can improve a man's sexual prowess and treat impotence (Do Tat Loi, 2004, Anon, 2004d).

In addition to their medicinal qualities, tiger parts are also used for decoration - a tiger skin hung on a wall in a house can be used to express the power and prestige of the home owner.

The believed 'miracle' medicinal effects of tiger parts, and the prestige associated with purchasing tiger skins have meant that wealthy people are willing to buy tiger parts at very high prices. During this investigation the survey team were surprised to find that the trade in tiger parts generally occurs quite openly. Purchasing genuine tiger parts is not difficult once a suitable price has been negotiated between trader and buyer.

Nine different tiger products were found in markets in Ho Chi Minh City. However, many of these products may not be genuine. For example, claws and teeth sold as 'genuine' Tiger parts are commonly manufactured from plastics or buffalo horn. An estimated 5-10 complete Tiger skeletons are believed to be sold annually in Viet Nam (Nguyen Tap, pers obs). The prices of these parts, found during the survey in southern Viet Nam, are listed in Table 7 below.

### Table 7

### The price of tiger parts traded and used for traditional medicine

| Parts used | Price (VND) | Price (USD) |
|---|---|---|
| Live tiger cubs (~4kg bodyweight) | 30-40 million | 1894.54 – 2526.05 |
| Tiger skin – piece larger than 1.2m | 20-30 million | 1263.02 - 1894.54 |
| Tiger skin – smaller than 1.2m | 15 million | 947.27 |
| Tiger skull | Not for sale | Not for sale |
| Tiger teeth | 1.6 million one tooth | 101.04 |
| Dried tendons | 700 000 for one set of four leg tendons | 44.24 |
| Large claws | 1-1.5 million | 63.15 – 94.73 |
| Small claws | 700 000 – 800 000 | 44.21- 50.52 |
| Dried whole leg | 3 million | 189.45 |
| Complete skeleton | 200-300 million (depends on size) | 12630 - 18945 |
| Bone gel | 5 - 6 million/gm (can be up to 10 million /gram if higher bone content) | 315.76 – 378.91/gm (up to 631.51/gm) |

*Source:* TRAFFIC research 2006

### *Current status of Tigers in Viet Nam*

Multiple factors, including hunting pressure and habitat disturbance, have contributed to a significant decline in wild populations of Tiger in Southeast Asia. While reliable field data on the status of tigers in Viet Nam is scarce, it is believed that there are now very few individuals left in the wild. The IUCN Red List of Threatened Species currently lists the tiger as Endangered (IUCN 2006).

According to the author's (Nguyen Tap) unpublished information, in northern Viet Nam tigers were still believed to exist in Tuyen Quang, Yen Bai, Lai Chau, Son La, west Thanh Hoa and west Nghe An Province until 1980. In 2004 and 2005, tigers were seen by local people in Muong Nhe National Park (in Muong Te District) and in Pu Huong National Park (in Nghe An province) (author's unpublished information).

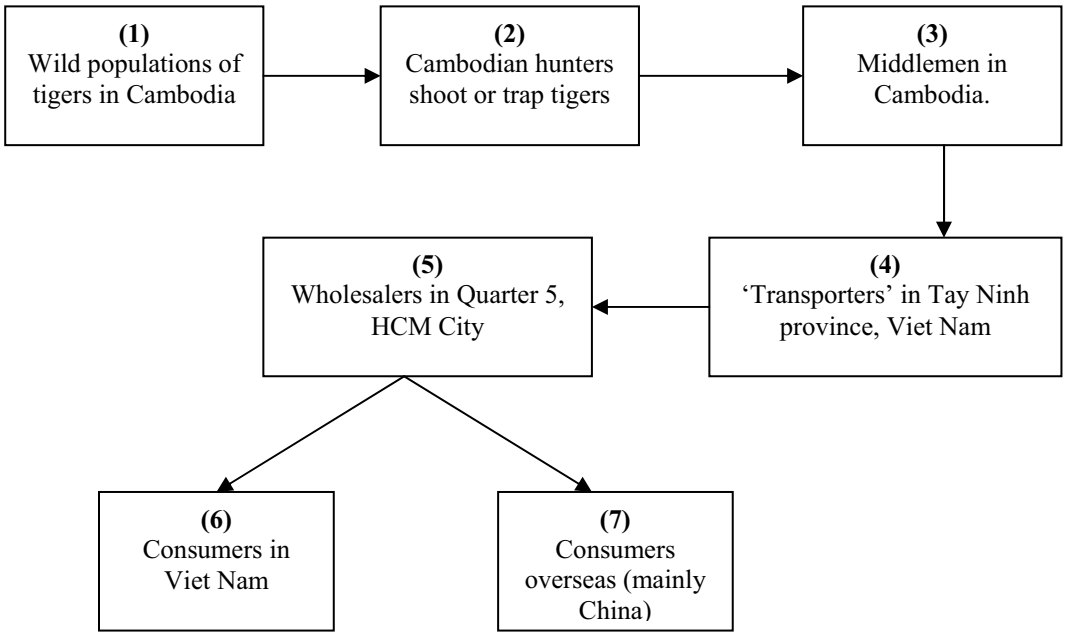
According to rangers from Viet Nam's Forest Protection Department, tigers still exist in a number of protected areas in southern Viet Nam. These are Chu Mom Ray National Park (in Kon Tum Province, along Viet Nam's border with Cambodia), Chu Yang Sin National Park (in Dak Lak Province), Cat Tien National Park (Lam Dong Province) and possibly in Bu Gia Map National Park (in Binh Phuoc Province) (Vu Xuan Khoi, pers comm. to Nguyen Tap , 2006).

### *Tiger trade routes*

Informants from this survey believe that live tiger cubs, tiger skeletons, raw materials and processed medicinal products are mainly hunted in Cambodia, and then transported to Ho Chi Minh City to supply the southern medicinal trade market. Some tigers may also enter the southern market from Malaysia. Lao PDR is believed to be the main source of wild tiger products into northern Viet Nam.

**Figure 2**

**Tiger trade route diagram**




1. Source – wild populations of tigers in the forests in Cambodia
2. Cambodian hunters shoot or trap wild tigers to sell to 'middlemen' in Cambodia.
3. The middlemen are often Cambodian, or are of Chinese decent but living in Cambodia with relatives in Quarter 5, Ho Chi Minh City, Viet Nam.
4. Cambodian middle men hand product over to Vietnamese 'Transporters' in Tay Ninh province (on the border with Cambodia).
5. 'Transporters' in Tay Ninh province transfer products to wholesalers in Ho Chi Minh city.
6. Wholesalers sell raw materials or processed products to consumers.
7. If the goods are destined for buyers overseas (Hong Kong, Taiwan or China) further processing often occurs to make transportation easier – for example, tiger bones are normally ground down to a fine powder.

*Source:* TAM Survey 2005

# DISCUSSION

## Scale of medicinal plant and animal trade and use in Viet Nam

There is abundant evidence to indicate that the trade in medicinal flora and fauna occurs on a very large scale in Viet Nam. By April 2002, Viet Nam reportedly had 189 licensed manufacturers of traditional medicines, producing an estimated 15 000 - 20 000t of medicinal products annually (Trinh Van Lau, 2003; Nguyen Tap, 2004). Quantities of licensed medicines reported in registered trade are also large. Some figures recently estimated the total quantity of raw materials used in traditional medicine by registered businesses alone to be around 50 000t annually, of which around 20-30 000t are used directly in packaged medicines (Nguyen Thuong Dong, 2003; Vu Thi Thuan et al., 2003; Nguyen Duy Thuan, 2003). However, it is generally unclear how the figures are derived, and the various assumptions made in arriving at these estimates do not accompany the figures themselves. Despite intrinsic inaccuracies, they are still likely to be an underestimation of the real extent of the trade – these figures do not include the significant proportion of unregistered trade in unlicensed and licensed traditional medicines that occurs within the private sector (for example by unregistered traditional medicine practitioners to their patients, or within communities in rural, mountainous areas).

Numerous authors have published widely varying figures for the total numbers of plant and animal species used in traditional medicine in Viet Nam (often due to taxonomic reasons), but the numbers are generally in the thousands, and one pattern is clear: many more plant than animal species are used (e.g. Lecomte, 1909-1939; Petelot and Crevast, 1928; Vo Van Chi, 1997-1998; Do Tat Loi, 2004). The most recent studies report medicinal uses for 3,926 plant species, of which approximately 90% are flowering plants (Magnoliophyta/Angiospermae), and 406 animal species (Anon., 2004b; Nguyen Tap, 2005). Twenty-two species of fungi have also been recorded in medicinal use (Nguyen Tap, 2005).

However, the number of species found during surveys conducted for this study was significantly lower. In the north of Viet Nam, whole individuals, derivatives, raw and part-processed materials of approximately 180 plant and 30 animal species were recorded in traditional medicine markets during surveys, while in the southern surveys 288 plant and fungi species and 68 animal (vertebrate and invertebrate) species were found.

These survey results may be an accurate representation of the quantities and species of medicinal flora and fauna at each location. In fact, the questionnaire survey results for plants from Ninh Hiep and Lan Ong Street (in the north of Viet Nam) broadly concord with similar questionnaire surveys conducted in the same markets in 2003 (Pham Thanh Huyen *et al*., 2003).

© Vu Phuong Manh

*Traditional medicine sold at a medicinal store*

However, the low numbers found during these surveys may also be a reflection of the potential difficulties in obtaining accurate and reliable data.

- Informants were often reluctant to divulge precise information to government institution survey teams, due to an inherent lack of trust that stems from both a fear of being taxed and other traders becoming aware of the precise nature of their businesses.
- At some locations sample sizes were relatively small (e.g. 10 out of 500 TM companies in Ho Chi Minh City in southern Viet Nam or 10 households out of 200 at Ninh Hiep in northern Viet Nam). Larger samples, and more regular observations or monitoring would provide more reliable datasets.
- A lack of knowledge of the identification of some raw and part-processed materials may have resulted in some species in use not being picked up, and a significant number of medicinal species and compounds are only known to the researchers by Vietnamese names and not scientific names. This is particularly the case with plants imported from China.
- Lower numbers may also be a reflection of the seasonality of the traditional medicine trade. Annual fluctuations in demand for certain species were also reported by market traders, and traders in each market reported seasonal variations in the availability of some medicinal materials; such trends could not be detected by the one-off surveys conducted in this study. One reason for this could be that demand for plants used in TVM (which focuses on cures) may be less stable because demand is partly linked to disease epidemics (e.g. influenza outbreaks). Another reason suggested was that China imports some materials that are wild-sourced in Viet Nam, and then re-exports them to a number of destinations e.g. Hong Kong, Republic of Korea, Taiwan, Singapore), either in part-processed or processed form. The Chinese export markets fluctuate and this has a knock-on effect on the demand for the products in Viet Nam.
- The survey teams from the study conducted in the south of Viet Nam also felt that the relatively small number of participants in Da Nang and Ho Chi Minh City was due in part to a lack of time and survey personnel.
- The survey in northern Viet Nam found large (up to ten-fold) discrepancies between quantities quoted on questionnaire forms and quantities inferred from direct observations and telephone conversations. This may have been due to traders trying to lure potential buyers with impressive statistics.

## Characterisation of the traditional medicine trade markets in Viet Nam

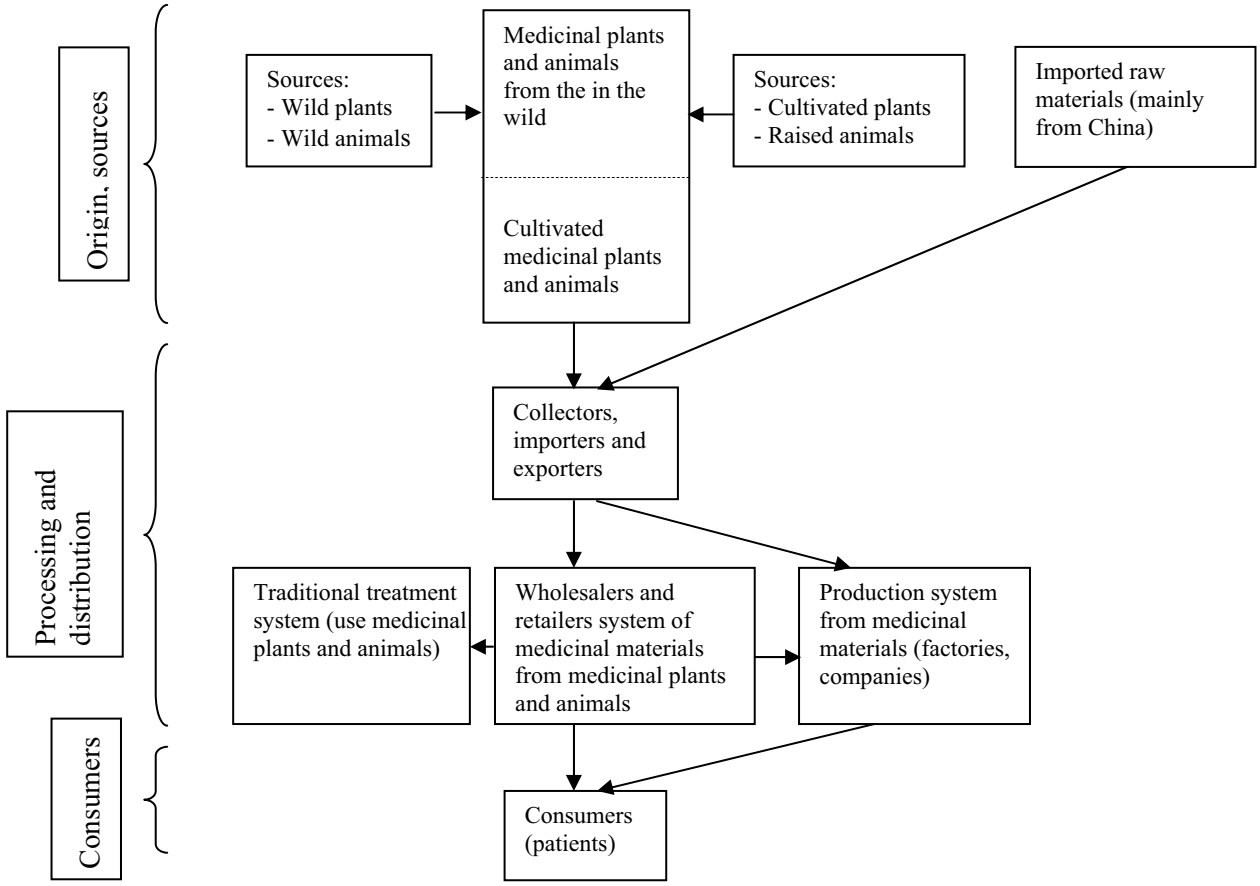
The establishments interviewed for the purposes of these surveys are representative of the wide range of businesses involved in the trade and use of traditional medicine in Viet Nam. Traders range from small stall-holders in open markets to large state or privately owned pharmaceutical companies (some of which deal in both traditional medicine and western medicine). Some businesses are retail operations, providing raw materials or simply processed traditional remedies directly to patients. These businesses tend to be smaller, and focussed solely on local markets. Others may be retail and wholesale. Some of the larger companies are involved in the processing of locally cultivated or imported raw materials to produce commercial pharmaceutical remedies. These larger organisations may be involved in both domestic and international trade markets.

For the medicinal fauna surveys, the teams also visited restaurants specialising in the sale of dishes based on wild animals, or farms where medicinal fauna (a range of domestic and wild species) are bred for sale.

Since shifting to a market economy in 1986, exploitation, cultivation, processing, trade and distribution have moved from solely state-owned enterprises to both state-owned and private companies and individuals. The supply/demand network of the traditional medicine trade can be summarized diagrammatically as follows:

**Figure 3**

**Diagrammatic representation of the supply and demand network for the trade in traditional medicine in Viet Nam**




*Source:* TAM Survey 2005

### *Northern Viet Nam - Ha Noi*

Two main centres support large-scale trading in traditional medicines and raw materials in Ha Noi: Ninh Hiep market in Gia Lam district, and Lan Ong street in Hoan Kiem district. Away from these main trade centres, traditional medicines are offered in many pharmacies and clinics throughout the city; however, time constraints precluded surveying a representative sample of these outlets.

#### *Ninh Hiep market*

Ninh Hiep market place is situated approximately 13 km north-east of Ha Noi in Gia Lam district, and has a tradition of processing and trading TCM and TVM that reportedly stretches back many centuries. Between 1979 and 1996, Ninh Hiep chiefly planted and traded in herbs used in TVM for domestic consumption, and only processed small amounts of TCM for export to some eastern European countries. Since the thawing of diplomatic and trade relations with China in 1996, Ninh Hiep's trade balance has shifted back towards large-scale processing of TCM using raw materials imported from China to supply the demand for TCM products across Viet Nam.



*Traditional Vietnamese and Chinese medicines on sale at market*

Within Ninh Hiep commune, which administratively was transferred from Bac Ninh province to Ha Noi in the early 1960s, TVM and TCM businesses chiefly operate out of one hamlet in the commune, comprising approximately 150 households. Smaller numbers of traditional medicine businesses exist in the other eight hamlets. Most, if not all, traders in the commune have no formal education in traditional medicines – their knowledge and experience in the use of wild plants and animals in traditional medicines has been passed down within the household-based business system in the commune.

Ninh Hiep is a major processing centre for Chinese-derived raw materials; TCM remedies are sent out to all provinces in Viet Nam from Ninh Hiep, and a small proportion are re-exported to China. Many Ninh Hiep households trading in traditional medicines have long-term, stable business partners (e.g. pharmaceutical agents) in southern provinces (e.g. Dong Nai, Bien Hoa and Sai Gon), as well as northern provinces (e.g. Ha Noi, Hai Phong and Quang Ninh). In the whole commune, between 15 and 20 households reportedly specialize in harvesting TVM plant materials, for domestic sale or export to China in raw or part-processed form.

This market is open daily from 0700-1000hrs, when medicinal materials are displayed outside around the road intersection in the hamlet. Trade continues into the afternoon, but primarily indoors. Sunday is the busiest day at the market. There is also a busy period around 2200hrs when deliveries of raw and part-processed materials from China are taken and the trucks then re-loaded with materials from Ninh Hiep for export to China.

Ten households surveyed by questionnaire in Ninh Hiep commune in December 2004 reported that they traded a total of 183 raw or part-processed plant materials, of which 46 were reportedly wild-harvested, 55 cultivated and 105 imported from China. Telephone interviews indicated that the balance between wild-sourced and cultivated was nearer 60:40% respectively. Some species have more than one source – for example, a number are collected both from the wild and cultivated in Viet Nam, while others are both cultivated and imported. The mean weight of raw plant materials reportedly traded per household per annum was approximately eight tonnes. Extrapolating to 200 households gives a mean annual amount of raw and part processed material traded in Ninh Hiep of approximately 1600t. Casual observations of the amount of materials delivered in large trucks on two days (one of which was Sunday, the day of greatest activity) in December 2004 indicated a minimum daily market turnover (quantities arriving and departing Ninh Hiep combined) of 7-8t of raw and part-processed materials. One of the largest traders in the main TM trading hamlet reported, during a telephone interview, that they imported 30t of TM materials from China per month, and reiterated that they have the supply network and capacity to gather hundreds of tonnes of TM materials in just one or two weeks.

Most of the materials traded in Ninh Hiep are used in parcelled medicines. Only a few are processed (e.g. to make balms and gels). These include *Stephania* spp., *Menispermaceae* spp., *Coscinium fenestratum*, star anise *Illicium verum* and Lemon grass *Cymbopogon citratus.* The following species were quoted as being in short supply in December 2004, although it was not made clear if this was normal for the season, or whether it indicated a long-term trend: *Smilax* spp., *Millettia* spp.; *Butea* sp.; *Spatholobus* sp. and *Nelumbo nucifera*. In previous years, species reported to have been in greater demand than supply could sustain included *Acorus gramineus*, *Dendrobium* spp., *Cibotium barometz*, *Nelumbo nucifera*, *Lactuca indica*, *Passiflora foetida*, *Desmodium styracifolium*, and *Eclipta prostrata*.

Although a Ninh Hiep community agreement (established in 1994) protects traders from competitors moving into the villages, there is no official system by which TM businesses in Ninh Hiep are licensed, and the trade in TM materials and medicines in Ninh Hiep is totally unregulated. Arrangements for transport of and payment for shipments are generally very flexible. Since the TM trade is unregulated no income tax can be collected from traders.

Trade in TCM materials between Ninh Hiep and China is generally conducted through the Tan Thanh border crossing (or small paths nearby), with some goods passing via Dong Kinh and Dong Dang market places in Lang Son province (see below).

The market for exporting TVM plant materials is reportedly less stable, and prone to wide price fluctuations. Traders reported that while their trading partners in China usually provided good deals on the first or second shipments, often they imposed a large reduction on the final shipment, or refused it entirely.

TM materials for use in TVM are supplied by traders from several northern provinces (including Lao Cai, Vinh Phuc, Lang Son, Lai Chau, Hoa Binh, Nghe An provinces) and internationally from the Lao PDR (goods are transported via the Cau Treo border crossing). Sa Pa and Tam Dao were reported to be important supply locations in Lao Cai and Vinh Phuc provinces respectively. Large orders must be placed two weeks to one month in advance, subject to seasonal availability of the TM material. Prices must be agreed upon before collection, and in the case of scarce or rare wild-sourced species with a high market demand, half of the contract value must be deposited before the transaction.

One household in the hamlet reported supplying hundreds of tonnes of materials to unnamed pharmaceutical companies in Ho Chi Minh City. These companies then extract the key components for use in processed oriental medicines.

Similar to the situation found in previous surveys, the questionnaire survey of ten households conducted by the flora research team in December 2004 resulted in only two traded medicinal goods being reported as having any animal content. However, face-to-face market stall surveys by the fauna research team revealed that at least three businesses specialize in the trading and processing of fauna for use in TM. These businesses offered over 30 types of animal-based traditional medicine (Table 4). These goods are not publicly displayed, but the three shop owners reported that they could supply any type of medicinal animal if ordered sufficiently in advance (e.g. two weeks to a month for dried tiger bone, a frozen whole tiger, rhino horn and wild bear whole gall bladder). The shop owners provided quality-testing assurances, and also offered services to cook tiger gel (*cao*) on request. The businesses are well organized, each claiming that they were shielded from investigations through protection by enforcement personnel.

### *Lan Ong Street*

Originally named Fujian Street, because it was settled by ethnic Chinese from Fujian, it was later renamed Lan Ong Street after a well respected TVM practitioner of the 18$^{th}$ Century. Both TCM and TVM materials have reportedly been traded here for centuries. The street currently supports at least 50 businesses comprising approximately 70 shops; in addition, there are several side streets that were not visited during this survey supporting further TM shops. Fifty percent of businesses reported being both retailers and wholesalers. This street market opens from 0930hrs.

Most of the household TM businesses in Lan Ong Street are registered, possessing either business licenses (in the case of traders) or practicing licenses (if practitioners), or both in some instances. These business licenses are issued by the Department of Trade in Ha Noi, and the practicing licenses are issued by the Department of Health in Ha Noi, both of which fall under the Ha Noi People's Committee. Licensing confers no legality to the businesses trading whatsoever, and TM trade is as unregulated in Lan Ong Street as it is in Ninh Hiep commune. There is no quality control, products were observed in trade without proper packaging and branding, and many species for which trade is banned were publicly displayed for sale and even used in advertising (for example on business cards).

Unlike Ninh Hiep, most businesses take goods deliveries at a different place to the shop where sales occur, usually storage areas in Ha Noi's suburbs. Flora and fauna research teams both observed that it much harder to observe or eavesdrop on transactions in Lan Ong Street compared to Ninh Hiep, with much business done over the phone and in slang.

A questionnaire survey conducted by the National Institute for Materia Medica as part of this study covered 30 businesses in December 2004. Approximately 200 types of TM raw and part-processed materials were reported in trade by the 30 businesses surveyed, with the total quantity traded per annum reported as approximately 375t (mean c.12.5t per business). Although this figure is considerably lower than the quantities reported/observed in trade at Ninh Hiep, the balance of material origins was very similar, with 51 (26%) reportedly wild-harvested, 39 (20%) cultivated and 105 (54%) imported (all from China). Thirteen plant species were reported to be both imported and cultivated within Viet Nam; these included *Angelica dahurica*, *Angelica sinensis*, *Achyranthes bidentata*, *Rehmania glutinosa*, and the fungus *Ganoderma lucidum*.

Animal-based TM products and materials were conspicuously displayed in some shops (Table 4). Thirty-seven types of remedies were noted on sale here, the most popular being snakes steeped in alcohol, mammal bone gels, geckos, seahorses and star fish. One store displayed over 300 bottles of animals (chiefly snakes) steeped in alcohol, various animal-based gels, dried bear gall bladders and paws, and thousands of dried star fish, seahorses and geckos. On a second visit, the shop owner showed the survey team what he claimed to be a complete frozen liver and gall bladder of an alleged Indochinese tiger priced at VND25 million (c.USD1580), a whole frozen penis of an alleged Indochinese tiger priced at VND16 million, (c.USD1010), and 100 frozen 1ml bottles of bear bile, half of which were said to be from wild bears (VND170 000/ml or c.USD11) and half said to be from captive-bred bears (VND70 000/ml or c.USD4.5).

The shop owner claimed to be able to differentiate between wild and farmed bear bile (based on colour and sediment content when kept in the same conditions), stating that he could supply thousands of mililitres of wild-caught bear bile at one week's notice. The shop owner also said that he can supply any animals that can be used for medicinal purposes such as rhino horns, frozen tiger, or complete sets of tiger bones. He was prepared to sign a hand-written commitment that the goods were authentic and customers would receive compensation if the goods were not genuine. When asked if he was concerned about law enforcement officers, he responded that he was only afraid of the local tax unit.

Both Lan Ong and Ninh Hiep markets have networks of traders extending across many provinces in Viet Nam, and when interviewed over the telephone, six different Lan Ong Street businesses stated that they could collect quantities of TCM and TVM weighing into the hundreds of tonnes within a period of two weeks to one month, subject to availability.

### *Dong Xuan market*

Dong Xuan market is located in Hoan Kiem district, Ha Noi. It is a wholesale market for a wide variety of goods, including wildlife used in traditional medicines. In January 2005, the survey found live geckos and freshwater turtles for sale in the market. These are species which are often used in traditional medicines.

Although observed quantities traded were small (generally <10 individuals of each species/species group), one stall owner reportedly ships in large quantities (several hundreds) of *Gecko gecko* from Lai Chau and Cao Bang provinces in north-west Viet Nam. These are sold freshly killed for VND35 000 (c.USD2.3) per animal. The tail tip of the gecko is the sought after ingredient. It is used to enhance male reproductive fitness. The same stall owner stated that with one month's notice she could prepare a large shipment of turtles from Lai Chau province, which she often does for export to China (requiring a further month to organize false documents to get the goods past customs and other relevant authorities). It was not known whether the freshwater turtles were ordered for the restaurant trade, the traditional medicine trade or both. Other products on sale in Dong Xuan (but not Ninh Hiep and Lan Ong markets) included bear bile, reported to originate from Republic of Korea and China (VND50 000/ml, or USD3.3), and dried shark fin (used in TCM for strengthening health).

### *Practitioner-based sale of traditional medicines in Ha Noi*

In addition to the major markets and shop/pharmacy-based traditional medicine retail/wholesale, there exists in Ha Noi a thriving business of traditional medicines without a fixed market place. This is run through traditional medicine practitioners, many of whom occupy positions of responsibility within government agencies dealing with traditional medicine. Traders in TM markets, and representatives from the major pharmaceutical companies interviewed both reported that this network of practitioners was often used to procure endangered wildlife used in TM, e.g. wild bear bile, Tiger bone gel, Rhino horns.

The contravention of various national and international laws by full time staff in government agencies and institutes is a serious issue that requires further investigation.

## ***Northern Viet Nam – Hai Phong, Lang Son, Lao Cai***

### *Hai Phong*

Hai Phong, situated on the southern bank of the Red River as it reaches the coast, is the third most populous city in Viet Nam. It is one of the main industrial centres of the North of Viet Nam, and is one of the country's most important seaports. Hai Phong is regarded as a major centre for the trade in wild animals in Viet Nam (Anon., 2004a). Animal-based TM products are publicly displayed for sale across the city. During the survey, 22 types of oriental medicine were openly on sale (Table 4). Various whole animals (e.g. seahorses, snakes, geckoes and coucals) and their parts (e.g. bear paws) were usually sold steeped in alcohol. There are five large oriental medicine shops and two shops offering wild animals steeped in alcohol. Traditional medicines are also available in chemists, liquor shops and restaurants in Hai Phong.

© Nguyen Tap

*Animal wine at specialty restaurant*

Hai Phong hosts the Nguyen Huu Hach Medical and Pharmaceutical Company, a relatively large business trading in traditional medicines, including wild sourced animals and their parts. The company has three large stores in Hai Phong specializing in traditional medicines, and the company's manager reported that he could supply any animal-based oriental medicine product on request.

In contrast, Hai Phong is not thought to be an important wholesale market for plants used in TM (Nguyen Tap unpublished data), and therefore the flora team did not survey this city.

### *Dong Dang and Dong Kinh markets, Lang Son province*

These are the two largest markets for Chinese goods in Lang Son, the main town in the province of the same name in north-east Viet Nam, bordering China (Fig 1). In the two markets combined, there are approximately 50 wholesalers and/or retailers of TM raw and part-processed materials, of which 65% are reportedly imported from China. A questionnaire survey of 10 shops (five in each market) resulted in a declared trade of approximately 14t per business per year. The species traded are listed in Appendix 1. In December 2004 the Pharmaceutical Management Division of Lang Son Department of Health reported that eight companies were registered to do business in traditional medicine.

The market place in Tan Thanh town, on the border with China, was also visited. No major trade of TM raw materials or products occurs in this market place, only small-scale sale of TM products at the local level. However, there reportedly exists a trading area in a valley outside the town, and it may be that the large-scale trading through Tan Thanh reported by traders in Ninh Hiep and elsewhere occurs away from the town to avoid enforcement of regulations.

*Sa Pa, Lao Cai province*

Sa Pa district, located within the Hoang Lien Son mountain range in Lao Cai province, north-western Viet Nam, spans an altitudinal range of almost 3,000m and experiences a mild climate relative to much of the rest of Viet Nam. Consequently, growing conditions for plant species imported from China and used in TCM are good. The boom in tourism over the past decade in Sa Pa has resulted in an expansion of the TM materials market there, and a network of c.30 household traditional medicine businesses now exists, using both wild-sourced and cultivated plants.

Ten of the 30 businesses surveyed in December 2004 used 36 different raw or part-processed materials, 23 (63%) of which were imported from China, including *Aconitum* sp., *Angelica* spp., *Atractylodes macrocephala*, *Eucommia ulmoides*, and *Phellodendron amurense*. The fungus *Ganoderma lucidum* is wild-harvested and sold in most shops in the market. Like this fungus, almost all species sold are harvested from wild sources. Many wild-sourced species are also of conservation concern (see Table 8).

**Table 8**

**Quantities of wild-harvested plant species used in traditional medicine in Sa Pa district markets, north-west Viet Nam: results of questionnaire surveys conducted in December 2004.**

| Species | Usable parts | Kg/ household/year | Of conservation concern[1] |
|---|---|---|---|
| *Acanthopanax trifoliatus* | Skin, branch, leaves | 10 | + |
| *Ampelopsis cantoniensis* | Branch, leaves | 56 | |
| *Angelica* spp. | Stem, roots | 15 | + |
| *Cibotium barometz* | Trunk, roots | 25 | + |
| *Codonopsis javanica* | Root bulb | 41 | + |
| *Coptis* spp. | Stem, roots | 2 | + |
| *Dipsacus asper* | Root bulb | 30 | + |
| *Disporopsis* sp. and *Polygonatum* sp. | Stem, roots | 7 | + (both) |
| *Drynaria* spp. | Stem, roots | 21 | + |
| *Fallopia multiflora* | Root bulb | 60 | + |
| *Ilex* sp. | Leaves | 51 | + |
| *Panax* spp. | Stem, roots | 1 | + |
| *Thalictrum foliolosum* | Stem, roots | 5 | + |

[1] Listed in the Viet Nam Red Data Book, or in Decree 32/2006/ND-CP, or considered to be under threat from over exploitation (Nguyen Tap, 2006).

*Source:* TRAFFIC research 2004

Since 2003, a number of species formerly traded in large quantities have not been observed in markets (Do Thi Thu Ha, Frontier Viet Nam Medicinal Plants Innovation Project *in litt*. to Nguyen Dao Noc Van, December 2004). These include *Coptis chinensis* and *C. quinquesecta, Panax bipinnatifidus* and *P. stipuleanatus*, *Lysimachia congestiflora* and *Paris polyphylla*; of these *Coptis* spp. are included in Decree 32/2006/ND-CP group IA (plant species for which any commercial exploitation and use is strictly prohibited) and the *Panax* spp. in group IIA (plant species for which commercial exploitation and use is limited).

### *Southern Viet Nam - Ho Chi Minh City and Da Nang*

#### *Ho Chi Minh City*

Ho Chi Minh City is the largest city of Viet Nam, with a total population of approximately 6 million people. The city also has the largest trading network for medicinal plants and animals in Viet Nam. This network is centred around Hai Thuong Lan Ong, Trieu Quang Phuc, Phung Hung and Luong Nhu streets in Quarter 5, an area of Ho Chi Minh City which has a large ethnic Chinese community. Medicinal materials from this centre are also distributed to neighbouring provinces in southern Viet Nam.

There is a relatively large trade in fauna for traditional medicines in Ho Chi Minh City, and live animals and medicinal animal products were found openly on display and readily available. In one area alone (Hai Thuong Lan Ong and the surrounding streets) there are more than 50 shops selling animals or animal products for medicinal purposes. Sale of TM products from this area was estimated to be between 3-5t annually. The survey team was told that snakes (no species specified) were the most commonly sold animal.

#### *Da Nang*

Da Nang, located on the central coast, on the western bank of the Han River, marks the northern limits of Viet Nam's tropical climate zone. It is also Viet Nam's fourth largest city. The medicinal trading centers in Da Nang city are found in the Con Market (Cho Con), and along Dien Bien Phu street. There are approximately 100 establishments involved in the trade in traditional medicine in Da Nang. Some of these traders are simply involved in selling raw or dried plant materials, others process these raw materials to produce pharmaceuticals for sale.

A rapid survey of the traditional medicine pharmacies in Da Nang suggested that while they may still sell medicines derived from animals or animal products, unlike in Ho Chi Minh City, these products are not on public display. The investigation teams also found around 20 local restaurants serving dishes made from wild caught animals, however these dishes do not appear on the menu.

The Da Nang Forest Protection Department (FPD) is responsible for the control of trade in wild fauna. From 2000-2006, large numbers of animals and animal products, from 39 different species of animal, were confiscated from illegal wildlife traders. Live confiscated animals were either destroyed (1.915kg of animals) or released into Ba Na Nature Reserve or Son Tra Hai Van Nature Reserve (3,323 animals released in total). More detail is provided in Appendix 5.

## Source of medicinal flora

It is widely recognised that the majority of plant and animal species used in traditional medicines are sourced from the wild. In 2004, Nguyen Tap suggested that more than 90% of the total number of plant species used in traditional medicine are harvested from the wild. The slant towards wild sourced species was also reflected in the surveys conducted for this study.

Some medicinal species may have more than one source – for example, a number of medicinal plants are both cultivated and imported. Some others may be are cultivated and sourced from the wild. Examples of these include *Morinda officinalis, Desmodium styracifolium, Artemisia vul garis, A denosma caerulea* and *Dipsacus asper.*

Viet Nam has a strong history of cultivating medicinal plants. By 2005 approximately 350 medicinal plant species, including 86 species considered rare and valuable, were reportedly being propagated or cultivated in the gardens of a network of bodies interested in the conservation of medicinal plant species in Viet Nam. Of the 288 medicinal plant species found during this survey in the south of Viet Nam, approximately one third of them (91 species) are successfully cultivated domestically. Some of these species were originally imported from China, but are now grown in Viet Nam. In the market for traditional medicines, however, these plants are still referred to as 'Traditional Chinese Medicines'.

Most of the plant species imported into Viet Nam for medicinal purposes originate in China. A key feature of the traditional medicine network is the apparently large scale of international trade in plants used in TVM and TCM across the China-Viet Nam border. The proportion of plants imported from China is reported to be in the range of 50-60% in terms of species of raw and part-processed materials in some markets, and 60-70% in terms of quantities. Some plants are exported to China for processing and the processed medicinal substance is re-imported back into Viet Nam. One of the largest processors of raw materials and producers of medicines in Viet Nam reported that from 2002 to 2004 it imported between 1,008 and 1,998t of 30 different raw or partially processed materials from China. The company also reported that, from 2000 to 2002, it acquired an annual average of 400t of *Artemisia annua* to extract artemisinin (for both domestic consumption and export), and exported 50-70t of *Mentha arvensis* and 200-300t of *Cymbopogon* spp. (Tran Binh Duyen, 2003).

Imported quantities of each species vary subject to the time of the year, local availability and market forces (competitive prices). Of 182 species that are imported, most are used in TCM (many of these are of Chinese origin), 27 species occur naturally in Viet Nam, and 35 species are cultivated in Viet Nam (Nguyen Tap, 2005). Despite being commercially cultivated, or naturally abundant in Viet Nam, they are still imported in large quantities each year, e.g. *Elsholtzia ciliata*, *Artemisia vulgaris*, *Lablab vulgaris*, *Areca catechu*, *Morus alba*, *Belamcanda chinensis* and *Coix lachryma-job* (Nguyen Tap, 2005).

A number of these (32 species) have not yet been successfully cultivated in Viet Nam. In order to supply the market demand they are imported in large quantities of up to 100t per annum. *Ziziphus sativa* and *Glycyrrhiza glabra* are examples of these plants.

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*Vietnamese ginseng in Quang Nam province*

Some of the imported species were previously cultivated in Viet Nam. Since 1990, medicinal materials imported from China are very cheap, reducing the competitiveness of the Vietnamese crop. Consequently, it has become very difficult to encourage continued cultivation of these species in Viet Nam, leading to a reduction in the total area of cultivation in Viet Nam. Some of these species include *Angelica dahurica*, *Atractylodes macrocephala*, *Angelica acutiloba*, *Angelica pubescens*, *Rehmannia glutinosa*, *Scrophularia ningpoensis*, *Achyranthes bidentata*, *Aucklandia lappa* and *Alisma plantago-aquatica*.

A consequence of this crop reduction is that cultivation techniques and knowledge are reportedly being neglected and even lost. This has several important ramifications for traders of medicinal plants and medicinal plant conservation in Viet Nam, including i) the instability of supplies from China; ii) increasing pressure on wild populations; iii) quality control issues (the quality of imported medicinal materials is not properly monitored, having potentially detrimental impacts on the domestic medicinal market and adverse effects on users). Moreover, the uncontrolled export of medicinal plants to China has exhausted some wild medicinal plant resources, rendering several species vulnerable to extinction.

It also appears that very large quantities are exported to China, both wild-sourced and cultivated plants. Lee (2000) reported that China imports six point four per cent of its total imported traditional medicine materials from Viet Nam. Exports of raw, part-processed and processed materials for use in both traditional and western medicine, as well as the food and cosmetic industries, form a significant proportion of the total amounts of medicines produced from plant sources in Viet Nam. Nguyen Tap (2003) reported an annual demand for exports of 37 medicinal materials totalling 10 740t, valued at USD35 million. Viet Nam's other major traditional medicine export markets include Taiwan, Japan, Singapore, Korea, Indonesia, Thailand, USA, Germany, Hungary, the Netherlands, Bulgaria, Poland and the UK. Commonly exported plants include

*Cinnamomum cassia*, *Illicium* spp., *Amomum aromaticum* and other *Amomum* spp., *Morinda officinalis*, *Sophora japonica*, *Homalomena* spp., *Kaempferia galangal*, *Chrysanthemum indicum*, *Cibotium barometz* (listed in CITES Appendix II), *Cyperus stoloniferus*, *Coix lachryma-jobi*, and *Melaleuca cajuputi.*

## Source of medicinal fauna

Animals are supplied to Viet Nam's traditional medicine (and also food) markets from three sources: 1) exploitation and hunting from the wild, 2) imports and 3) captive breeding. Exploitation from the wild and imports (most of which is illegal trade) comprise the most significant proportion. This ratio was also reflected in the current surveys. In the south of Viet Nam, the vast majority of medicinal fauna (58 out of 68 species) were hunted from the wild. During the first seven months of 2003 alone, about 20,000 animals weighing 33t were seized from the illegal trade in Viet Nam. Many of the animals seized were destined for the traditional medicine market (Anon., 2004a).

© Nguyen Tap

Arctictis binturong *ranched in HCMC*

As wild populations of animals used in traditional medicines decline in Viet Nam, imports from other Southeast Asian nations including Lao PDR, Cambodia, Myanmar and Indonesia have become an increasingly important source (Do Kim Chung *et al*., 2003). During this survey, one species of invertebrate, the Earthworm, was reportedly imported from China. As is the case with medicinal flora, some animals traded and used in traditional medicine have multiple sources – they may be hunted from the wild, bred in captivity, or imported (legally or illegally) from neighbouring countries.

Viet Nam acts as both a consumer and a transit route to China for wild animals from these countries (Anon., 2004a). Major imports of medicinal species include snakes, monitor lizards, pangolins and tortoises (Anon., 2005). Do Kim Chung *et al.* (2003) estimated quantities of approximately 600t (200 000 animals) were imported into Viet Nam each year, and that 60-65% of snakes and freshwater turtles in this category were re-exported to China. Some species are already on the verge of extinction in Viet Nam. It was a widespread belief among this study's interviewees that most if not all tiger products sold in traditional medicine in Viet Nam are sourced from imports (including from Russia), and that rhino horn is generally imported, mostly from Africa.

While Viet Nam's wildlife farms have had limited reproductive success to date, a number of animals used in traditional medicines are captive-bred on a large scale in Viet Nam. These include Sika *Cervus nippon* and Sambar Deer *Cervus unicolor* (for their velvet[2]), Rhesus *Macaca mulatta* and Long-tailed Macaques *M. fascicularis*, Indian Cobra *Naja atra* and Monocled Cobra *Naja kaouthia,* King Cobras *Ophiophagus hannah*, Burmese Python *Python molurus*, and Tockay Gecko *Gekko gecko*. However, traders interviewed in the south of Viet Nam for this survey suggested that the number of animals currently bred in captivity in Viet Nam does not meet the market demand for these species.

Some animals traditionally kept domestically in Viet Nam, such as the domestic dog *Canis familiaris*, Domestic pig *Sus domesticus,* Domestic cow *Bos indicus*, Domestic buffalo *Bubalis bubalis*, Domestic goose *Anser domestica*, Domestic chicken *Gallus gallus* and Silkworm *Bombyx mori* are also sometimes used to produce materials for TM.

[2] The velvet derives from the horns of the deer and is used in numerous applications including arthritis relief and boosting stamina.

Many other animals are hunted from the wild as juveniles and kept in captivity until they are big enough to be sold. This list includes (but is not restricted to) animals such as Binturong *Arctictis binturong*, Small Indian civet *Viverricula indica*, Leopard cat *Prionailurus bengalensis*, Pygmy loris *Nycticebus pygmaeus* and many species of turtle.

## Species trends and conservation issues

In most cases, there is insufficient trend data on quantities traded to know whether trade for traditional medicine use is having a major impact, but clearly some species have been heavily depleted, and others are reported as in greater demand than supply can keep up with. In Binh Chau Nature Reserve in southern Viet Nam, *Tinospora crispa* was extensively harvested between 1996 and 1998, and is now very rare. In Cat Tien National Park, a ca.50 hectare plot has been cleared of all vines, many of which are reportedly used in traditional medicine, to facilitate access and infrastructure construction for visitors (Le Buu Thach, 2002). In Bach Ma National Park, local herbalists frequently reported that several species had become rare, including *Coscinium fenestratu*m, *Fibraurea recis*a, and *Disporopsis longifolia* (Tran Thien An and Ziegler, 2001).

Further investigation is required into reports of various plant species being in short supply, some apparently as a direct result of over-harvesting, including *Anoectochilus setaceus*, *Nervilia fordii, Panax bipinnatifidus*, *P. stipuleanatus*, *P. vietnamensis*, *Coptis chinensis*, *C. quinquesecta*, *Lysimachia congestiflora* and *Paris polyphylla.* The conservation status of many medicinal plants remains poorly known, and causes for the scarcity of those already in short supply are difficult to prove (i.e. whether habitat loss/degradation is a more important issue than over exploitation). Monitoring of wild stocks and traditional medicine markets is an urgent research requirement for these species.

Many of the species of medicinal fauna found for sale during the southern survey are of conservation concern. Half of the total number found (34 out of 68 species) are on either the IUCN Red List of Threatened Species, Viet Nam's Red Book, Volume I (Anon, 1996), or as part of Decree No.32/2006/ND-CP of the Vietnamese Government (Anon., 2006). Decree 32/2006/ND-CP has two lists for threatened animals in Viet Nam – animals listed on List IB are completely protected and hunting and trade in these species is illegal. List IIB lists those species for which trade is legal, but restricted and only allowed under certain conditions. These numbers may be, to some extent, a reflection on the ineffectiveness of current control measures in Viet Nam. The conservation status of the medicinal fauna found during this survey can be found in Appendix 4.

Many of the animal species that were openly offered for medicinal sale in markets surveyed during this study (bear, rhinoceros, elephant and Tiger parts, for example) are globally threatened or of regional conservation concern, and are protected under national or international legislation. The National Action Plan to Strengthen the Control of Trade in Wild Fauna and Flora to 2010 (Anon., 2004a) deals with tackling these issues. One pharmaceutical company in the north of Viet Nam reported importing 50t of the faeces of *Rhinolophus* bats. This may have important conservation implications considering over 50 species of *Rhinolophus* worldwide are considered globally threatened (Anon., 2004c). Importation of this material is potentially a significant threat to the conservation of these species and requires further investigation.

Surveys in both the north and south of Viet Nam reported the use of large amounts of processed pangolin scales by hospitals. In Hanoi, large general hospitals maintain a TM Department, while in the south hospitals specialise in TM. Pangolins are listed in CITES Appendix II (with a zero quota annotation, which allows no trade) and on Group II of Decree No. 32/2006/ND-CP). It is not known if these animals were imported (illegally) or hunted from the wild in Viet Nam.

Of serious conservation concern was the repeated finding, by both the southern and northern survey teams, that many traders and representatives from pharmaceutical companies interviewed displayed a complete lack of understanding of Viet Nam's wildlife laws. Although most knew that there were laws relating to wildlife trade, the majority said that they had never read, or had access to, Decree 32/2006/ND-CP (or its predecessor Decree 48/2002/ND-CP).

In some cases even representatives of the government ministries responsible for control of the trade had incomplete knowledge of the legal framework. Perhaps due to a lack of awareness, many government agency/institution staff working in the traditional medicine field are reputed to be directly involved in trade in plants and animals for species whose trade is already prohibited or restricted through national or international legislation.

In Ho Chi Minh City in particular, medicinal products from wild animals were conspicuously available for sale. This was even the case for those species listed on Lists IA and IB of Decree No. 32/2006/ND-CP, for which trade is strictly forbidden. In most cases, products from critically endangered animals, such as live tigers, tiger parts or rhinoceros horn were always available, provided the price negotiated was high enough.

In a number of cases, price discrepancies were found for the same products in different markets. There are probably multiple factors affecting prices of medicinal goods, including seasonality, market demand and supply or raw materials. However, it may also reflect the amount of non-genuine or diluted products on the market, particularly animal-based medicines containing globally threatened species such as Tiger. For example, massaging gels stating to contain the bones of a certain species, such as tiger, may in fact not contain any part of that species. In products that contain a key ingredient derived from a threatened animal, processors will frequently add other materials, diluting the quantity of the key ingredient. The price varies accordingly. The additional materials are often derived from farmed animals or more common wild species. For example, one Tiger gel offered in Hai Phong claimed to comprise a maximum of 40% Tiger bone, the remaining 60% being made up from Southern Serow *Naemorrhedus sumatraensis* (IUCN Vulnerable), macaque *Macaca* spp. (IUCN Vulnerable and Near-threatened) and other animal bones. A gel can vary in price between VND9 million (c.USD570) and VND1.5 million (c.USD95) depending on its Tiger bone component. Other examples of diluted or non-genuine products include dried bear gall, which is often mixed with domestic pig or cow/buffalo gall bladder. Interviewees reported that authentic turtle gel is derived from only the plastron of freshwater turtles, but turtle gel is reportedly often derived from both upper and lower shells of all turtle species, including farmed soft-shell species. Teams in the South of Viet Nam also heard reports of non-genuine Rhinoceros horn in powdered form.

*Commercial snake breeding and rearing for use in traditional medicine*

© Nguyen Tap

*Captive bred* Python Reticulatus

© Nguyen Tap

Naja naja *at Dong Tam Snake Farm*

© Vu Phuong Manh

*Successfully bred* Pytas korros

Snakes are bred and reared commercially in Viet Nam for both food and use in traditional medicine. The commune of Vinh Son, Vinh Tuong district, Vinh Phuc province has been a dedicated snake-rearing enterprise since the middle of the last century, and is currently producing 70-100t of snakes for trade per annum. Chinese Cobra *Naja naja* is the most commonly bred species, but breeding of King Cobra *Ophiophagus hannah* is now being piloted.

Snakes are sold at various stages of development, with pricing based on their reproductive age/fitness. At the time of survey, a one-year old snake (not yet reproductively active) fetched VND20 000-30 000 per individual (USD1.3-2). Two-year old snakes for breeding stock fetched significantly more - VND150 000-250 000/kg (USD9-16), and a snake sold for food or medicine (minimum two years old) was sold for VND380 000/kg (USD24). The snakes are sold privately to traders who sell them to other provinces, or export them to China through unofficial routes.

Four main consumption products from snake in Vinh Son include (1) snake wine (6 to 12l bottles with 4 snakes each); (2) snake meat; (3) snake gel and (4) snake poison. Snake wine bottle and snake gel are consumed domestically. Cobra for meat and poison are often exported to China. The price for snake wine and snake meat depends on how big the snake is.

The snakes farmed in Vinh Son commune are apparently mainly fed wild-caught rodents and amphibians, supplemented with chickens, eggs and sometimes industrial animal feeds such as "Ravina", which is a high quality, expensive product only used when there is a scarcity of other food sources. This snake rearing operation reported various problems including a shortage of 'natural' foods, identification and treatment of health problems and environmental pollution from sewage discharge.

Snake farming businesses in Vinh Son commune have reportedly been officially registered with Vinh Phuc Forest Protection Department since 2000. The commune is keen to develop its snake-breeding business, and has submitted a plan to raise snakes in an area of 10 hectares with a total budget of VND2 billion (c.USD126 000) to Vinh Phuc Provincial People's Committee. In 2005, Vinh Son village was provided with VND700 million (c.USD44 100) from the Ministry of Natural Resources and Environment (MONRE) and VND600 million (c.USD 37 800) from Vinh Phuc province to carry out their snake-nursery project. The main objective of the project is to develop a facility to captive-breed cobra hatchlings to supply the demand of cobra farming in the village and to minimize the dependence on young cobras supplied by other villages or provinces.

## Management of the traditional medicine markets: an unregulated international network

The medicinal material trade is broadly under the management of two government ministries. According to the law of Viet Nam, the Ministry of Health is responsible for the management of all medicinal materials, while *in situ* management of medicinal flora and fauna, as well as monitoring of the trade in threatened species, comes under the jurisdiction of the Ministry of Agriculture and Rural Development (specifically, the Forest Protection Department). The Institute for Quality Control under the Ministry of Health is responsible for input and output quality of the pharmaceutical industries, while quality control of the medicinal materials traded in the free markets rests with the provincial health authorities.

A very large proportion of the trade in traditional medicine materials and products in Viet Nam is conducted within the private sector, involving traders operating at several different levels, from market places to small businesses and large companies, and practitioners, herbalists, cooperatives, and local traditional medical associations. The traditional medicine network is a complex web extending through every province of Viet Nam, with concentrations in and around large cities, provincial towns and border markets (particularly in Ho Chi Minh and Ha Noi, Da Nang, Lao Cai, Lang Son and Quang Ninh provinces). At no point in the chain is there any official regulation (either administration or enforcement) of activities (Pham Thanh Huyen *et al*., 2003), and with such a complex structure, some of which is underground, planning to regulate this private industry is a huge challenge.

All medicinal products traded and used in Viet Nam must be registered by the Ministry of Health. This system is designed to allow for more effective management of the industry, and stricter control of the quantity and quality of medicinal materials in Viet Nam. However, there is generally a lack of quality control in the traditional medicine trade. Medicinal products are casually displayed for sale in the marketplaces, without proper packaging, storage, or transportation to ensure hygienic conditions. At present, the Institute for Quality Control under the Ministry of Health has the authority to test the quality of TM materials and products. However, the institution can only cover traditional medicines produced by state-owned companies and manufacturers. This excludes large numbers of remedies that are traded solely in the private sector. Consequently, authentic medicines are likely traded alongside non-genuine products, particularly for medicines containing valuable products and their derivatives (typically from species whose commercial use is legally forbidden or restricted by Decree 32/2006/ND-CP, List IA or B).

Cultivated plant species are also currently not tested for residual heavy metals (from industrial pollution), pesticides, herbicides and other chemicals used in cultivation and processing. The traditional medicine market in Viet Nam must aim towards the international standards for traditional medicine quality control, which have been set out by the World Health Organisation (Anon. 2002, and references therein).

Many unlicensed materials, which have not been listed in the Vietnamese Pharmacopoeia, are still sold in large quantities. For many of these products the medicinal properties and chemical composition have not been evaluated. One example of these is a remedy known as 'Dragon's Blood' (Huyet rong) which is made from the stems of a climber *Milletia* sp. of the Fabaceae family and is sold as a tonic to enhance body strength and to cure arthritis.

It is also very difficult to control the quality of the medicinal materials which are imported from China. Insufficiently detailed product descriptions, or a lack of scientific name on the papers can lead to confusion. Some medicinal products can be made from different species of the same genus, for example, the Vietnamese medicine "Sa nhan" is made from different fruits of the *Amomum* genus (Zingiberaceae family). For most imported materials there is no record of scientific name or origin of the materials. This presents a particular problem with species which are currently not cultivated in Viet Nam, such *Fritillaria roylei*, *Tussilago farfara*, and *Astragalus membranaceus*. In addition, many medicinal materials are imported in a processed state so it is possible that some materials are not genuine. This is difficult to assess as no data on chemical composition or DNA is generally available. The inaccuracies surrounding traditional medicinal materials, particularly concerning accurate identification, contributes to the difficulties faced in attempts to regulate and manage the trade.

There are several key problems that need to be addressed to achieve effective regulation of the use of plants and animals in traditional medicine:

- Existing legislation is out-of-date, does not cover many species, and in particular does not address management responsibilities with respect to conservation of wild-sourced medicinal materials;
- There is a lack of awareness among regulatory and enforcement agencies of the legislation that does exist;
- Enforcement personnel cannot recognize illegally traded medicinal species;
- Health practitioners and staff of key institutes who can recognize species and medicines are not authorized to enforce laws;
- There is an almost total lack of inter-sectoral collaboration in addressing these issues; and
- There is a significant lack of awareness of both national and international laws relating to trade in threatened or endangered species by the traders themselves – this was found at all levels, from small market stalls to representatives from large pharmaceutical companies.

Although Decree 32/2006/ND-CP lists species for which commercial harvesting is prohibited, and for which exploitation is restricted, there has not been a single directive or circular issued by the health sector to guide the implementation of the above Decree in either the state or private pharmaceutical networks. The TM health sector has the expertise to recognize most of the wild plants traded for traditional medicine, but currently lacks any authority to enforce laws prohibiting or restricting harvesting of the listed species.

Market control, economic police, customs officers and forest rangers are authorised to control trade in wild plants and animals, and regularly seize large shipments of wild animals, many of which are listed as ingredients in traditional medicine pharmacoepia (ENV2002-2004, Anon., 2005). However, these enforcement personnel are not trained or equipped to identify medicinal plants listed in Decree 32/2006/ND-CP, or many part-processed or processed products and derivatives of plants and animals used in traditional medicine.

## RECOMMENDATIONS

At this stage, various actions are required, in particular further information gathering and much greater information sharing among the numerous agencies, institutions and organizations that have responsibility for the harvest, trade and use of traditional medicines. A number of the recommendations are rather general; more specific actions will be identifiable at a later stage. The order of listing these recommendations does not denote order of priority for action.

**Continued research and monitoring to fill current knowledge gaps, by:**

- Conducting field surveys to improve understanding of the distribution and status of medicinal plants and animals in the wild, using a collaborative team comprising staff from the National Institute of Materia Medica, the Institute of Ecology and Biological Resources, and the Forest Protection Department;
- Implementing regular, standardized surveys focusing on key species, markets and pharmaceutical companies to improve our understanding of long-term and seasonal trends in medicinal material supply and demand of plant and animal resources. These surveys should utilise technical and financial support from the National Institute of Materia Medica, the Institute for Ecology and Biological Resources and the Forest Protection Department, with technical support from relevant non-governmental organizations;
- Developing a database of wild plants and animals used in traditional medicines, into which monitoring and research/survey information can be input. The database should be a collaborative venture between the National Institute for Materia Medica, the Forest Protection Department and the Institute for Ecology and Biological Resources; and
- Continuing to collect information on the use of traditional medicine, particularly by ethnic minority communities.

**Publish and disseminate key documents relating to medicinal plants and animals, to inform government policy and communicate to IUCN Red List assessment and CITES Authorities, by:**

- *Medicinal species and Red Lists*: Obtain government endorsement for, publish, maintain and update a list of medicinal plant and animal species that are known to be threatened by, or potentially at risk from over-harvesting in Viet Nam. Such a list has already been developed for plants by the National Institute for Materia Medica. The lists should be used to afford species legal protection through updating legislation when necessary and communicated to the relevant IUCN Red List and CITES programmes.
- *Support and disseminate other key documents*: Pursue official government endorsement and publication of the following inventories in order to support research, management and rational use of medicinal plants and animals: (i) List of 3948 known Vietnamese medicinal plant species and (ii) List of 408 known Vietnamese medicinal animal species.

**Support conservation and development activities focusing on medicinal plant species, by:**

- Encouraging collaboration between the National Institute for Materia Medica and the Forest Protection Department to enable protected area management teams to carry out *in situ* protection of medicinal plant populations;
- Developing standard, sustainable wild-harvest practices with communities of medicinal plant harvesters (with reference to ISSC-MAP guidelines (Medicinal Plant Specialist Group, 2007) and WHO Guidelines for the Assessments of Herbal Medicines (WHO/TRM/91.4)) with the development of 'sustainable harvest quotas' for wild species;

- Investigating alternative livelihoods based on cultivation, artificial propagation, seeding and planting of medicinal plants, e.g. in protected area buffer zones;
- Supporting development of medicinal plant research centres for the study of medicinal flora, to improve cultivation techniques (to meet the requirements of Good Agricultural Practice (GAP) criteria); and to act as nurseries to supply larger scale medicinal plant cultivation operations;
- Research the feasibility of expanding a number of protected areas which are important sites for medicinal plants. These include:
  - In order to effectively protect the remaining wild source of Ngoc Linh Ginseng (*Panax vietnamensis)*, the current Ngoc Linh Nature Reserve in Kon Tum Province should be expanded to include the East side of the mountain (which lies within Quang Nam province).
  - Research the feasibility of expanding the current Hoang Lien National Park in Lao Cai Province to the North, to include Ban Khoang and Ta Giang Phin communes (Sapa District), Trung Leng Ho and Pa Cheo communes (Bat Xat District), Lao Cai province and all of the west side of Hoang Lien Son Mountain in Phong Tho and Than Uyen districts, Lai Chau province. This is necessary to effectively protect remaining natural reserves of ginseng (Panax spp.) in the area.
- Upgrade the official listing (on Decree 32/2006/ND-CP) of a number of key medicinal plant species as follows:
  - *Fallopia multiflora* (Thunb.) Haraldson should be added to List IIA (restricted exploitation for commercial purposes allowed). This is a plant which can be cultivated from offcuts from the stem, roots or from seed. It is listed as Vulnerable (V) in Viet Nam's Red book, Volume I (Nguyen Tien Ban *et al.*, 1996), it is on Viet Nam's Red list of medicinal plants (2006), and is listed as EN (Endangered) by the IUCN (Nguyen Tap, 1996)
  - The entire genus *Dendrobium*, Family Orchidaceae should be added to List IIA (restricted exploitation for commercial purposes allowed). Members of this genus are currently very commonly exported from Viet Nam, and are becoming increasingly rare in the wild in Viet Nam. Currently only one species within this genus, *Dendrobium nobile* is listed in Decree 32/2006/ND-CP (list IIA). *Dendrobium* spp. have already been listed as R (Rare) in Viet Nam's Red Book, Volume I (Nguyen Tien Ban *et al*. 1996).
  - Three species of ginseng - *Panax bipinnatifidus, Panax stipuleanatus* and *Panax vietnamensis* should be upgraded from List IIA to List IA on Decree 32/2006/ND-CP. All three species are listed as CR.A1c,d, (Critically Endangered) in the Red list of Viet Nam's Medicinal plants (population has been reduced by 90% and can rarely be seen in its natural range) (Nguyen Tap, 2006). All exploitation for commercial purposes should be strictly forbidden, and research into cultivation techniques is necessary for conservation of the species.

**Strengthening national legislation relevant to traditional medicine, by:**

- Reviewing and updating legislation pertaining to the management of wild populations of medicinal plants and animals, management of national traditional medicine policy mechanisms that account for conservation issues, management of pharmaceutical industry trade, monitoring and enforcement at trade points and standard cultivation and captive-rearing practices for medicinal plants and animals;
- Improving monitoring of the trade and enforcement of Vietnamese and international law, particularly with respect to trade in threatened or endangered species;
- Developing a legal framework for international trade in medicinal materials, including developing a 'Certificate of origin and quality' for all medicinal materials from Viet Nam. This is particularly important to improve regulation and monitoring of regional trade between Viet Nam, China, Lao PDR and Cambodia.

**Ensure the roles of agencies responsible for traditional medicine management are complimentary and unambiguous, and strengthen their capacity to research, monitor and manage the trade in medicinal plants and animals, by:**

- Considering the development of an inter-sectoral action plan that lays out a regulatory framework for the trade of medicinal species, and which adheres to a set of conservation-based standards;
- Promoting information sharing and skills exchange between key state management agencies and scientific research institutes, particularly the Department of Traditional Medicine, the National Institute for Materia Medica and the Forest Protection Department;
- *Training materials:* Developing simple training materials in Vietnamese language on identification of medicinal plants and animals (including derivatives) that are afforded legal protection should be considered in the immediate short-term, to train law enforcement staff (forest rangers and protected area management teams, customs officers, market controllers, economic police, border soldiers), to improve their effectiveness;
- *Management capacity:* Review and develop where necessary management capacity within the key agencies responsible for: monitoring the harvest, trade (including import and export) and use of medicinal wild plants; and the sustainable cultivation and harvesting of medicinal plants in general.

**Conduct education and outreach work to raise awareness of national and international legislation and conservation issues relating to the use of plants and animals in traditional medicine, by:**

- *Awareness raising among businesses, practitioners and consumers:* Raising awareness of pharmaceutical enterprises, traditional medicine practitioners of issues relating to the use of plants and animals in traditional medicine, including the sustainability of wild-harvesting, particularly those species currently being harvested at potentially unsustainable levels. Many practitioners are unaware of CITES legislation and issues.
- *Awareness raising within government:* Improve the knowledge and understanding of the need to conserve medicinal plants and animals in Viet Nam amongst government staff, particularly those working within the Ministry of Health, Ministry of Agriculture and Rural Development and Ministry of Fisheries.
- *Site specific activities:* Promote sustainable production and use of medicinal plant and animal species within existing protected area management and environmental education projects and programmes.

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## APPENDIX 1

Quantities of plant species (kg) reportedly traded per year in questionnaire surveys conducted in traditional medicine markets in northern Viet Nam 2004, and their sources (wild, cultivated or imported). Data presented are averages per household/business (no. of households surveyed is given in parentheses).

| Species | Lan Ong Street (*n*=30) | Ninh Hiep (*n*=10) | Nghia Trai (*n*=32) | Dong Dang Dong Kinh (*n*=10) | Sources | | |
|---|---|---|---|---|---|---|---|
| | | | | | wild | cult. | import |
| *Achyranthes asper* L. | 1 | 6 | 0 | 0 | * | | |
| *Achysanthes bidentata* Blume var. *bidentata* | 7 | 240 | 9 | 31 | | * | * |
| *Aconitum sinense* Paxt | 2 | 10 | | | | | * |
| *Acorus gramineus* Soland. | 1 | 25 | | | * | | |
| *Adenophora verticillata* (Pall.) Fisch. | 1 | 55 | | 17 | | | * |
| *Adenosma caerulea* R. Br. | 1 | 430 | 7 | 30 | * | * | |
| *Alisma plantago-aquatica* L. | 3 | 82 | 2 | | | | * |
| *Alpinia oxyphylla* Miq. | 1 | 17 | | | | | * |
| *Amomum* spp. | 1 | 35 | | | * | | |
| *Amomum tsao-ko* Crev. et Lem | 1 | 20 | | 1 | | * | |
| *Ampelopsis cantoniensis* (Hook. et Arn.) Planch. | 2 | | 4 | 30 | * | | |
| *Anemarrhena aspheloides* Bunge | 1 | 25 | | | | | * |
| *Angelica acutiloba* (Sieb. et Zucc.) Kitagawa | 20 | 358 | 1 | 29 | | | * |
| *Angelica dahurica* (Fisch. ex Hoffm.) Benth. et Hook. f. | 2 | 59 | 2 | 18 | | * | * |
| *Angelica pubescens* Maxim. | 3 | 33 | | | | | * |
| *Arctium lappa* L. | 1 | 10 | | | | | * |
| *Areca catechu* L. | 1 | 8 | | | | * | |
| *Aristolochia* spp. | 1 | 25 | | | * | | * |
| *Artemisia vulgaris* L. | 1 | 10 | | | | * | |
| *Asarum sp.* | 1 | 25 | | | | | * |
| *Asparagus cochinchinensis* (Lour.) Merr. | 2 | 25 | | | * | * | |
| *Aster ageratoides* Turcz. | 1 | 10 | | | | | * |
| *Astragalus membranaceus* (Fisch.) Bunge | 6 | 354 | | 46 | | | * |
| *Atractylodes lancea* (Thunb.) DC. | 3 | 70 | | 26 | | | * |
| *Atractylodes macrocephala* (Koidz.) Hand-Mazz | 7 | 376 | 3 | 19 | | | * |
| *Belamcanda chinensis* (L.) DC. | | 10 | | | | * | |
| *Boehmeria nivea* (L.) Gaud. | 1 | 43 | 2 | | * | * | |
| *Brassica alba* Boissier | 1 | 7 | | | | | * |
| *Brucea javanica* (L.) Merr. | 11 | 10 | | | * | | |
| *Bupleurum chinense* DC. | 1 | 10 | | | * | | * |
| *Caesalpinia sappan* L. | 1 | 20 | | | | * | |
| *Carthamus tinctorius* L. | 2 | 21 | | 4 | | | * |
| *Cassia tora* | 4 | 80 | 34 | | * | * | |
| *Chaenomeles lagenaria* (Lois.) Koiz | 3 | 30 | | | | | * |
| *Chrysanthemum indicum* L. | 2 | 42 | 9 | 10 | | * | |
| *Cibotium barometz* (L.) J. Sm. | 3 | 67 | 27 | 104 | * | | |
| *Cimicifuga dahurica* (Turcz.) Maxim | 2 | 35 | 5 | | | | * |
| *Cinchona* spp. | | | | | | * | |
| *Cinnamomum cassia* Blume | 2 | 32 | 20 | | | * | |
| *Cinnamomum* spp. | 2 | 33 | 20 | 15 | | * | |
| *Cistanche ambigua* G. Beck | | 25 | | 1 | | | * |
| *Citrus deliciosa* Tenore[2] | 3 | 80 | 1 | | | | |
| *Citrus hystrix* DC. | 2 | 30 | 3 | | | * | |
| *Citrus* sp. | 1 | 35 | 1 | | | * | |
| *Cleistocalyx operculatus* (Roxb.) Merr. et Perry | | | | | | * | |
| *Codonopsis javanica* (Blume) Hook. f. | 12 | 365 | | 56 | | | * |
| *Coix lachryma-jobi* L. | 7 | 170 | 2 | 77 | | * | |

| Species | Lan Ong Street (*n*=30) | Ninh Hiep (*n*=10) | Nghia Trai (*n*=32) | Dong Dang Dong Kinh (*n*=10) | Sources | | |
|---|---|---|---|---|---|---|---|
| | | | | | wild | cult. | import |
| *Coptis chinensis* Franch. | 2 | 22 | | 2 | | | * |
| *Cornus officinalis* Sieb. et Zuce | 2 | 35 | | | | | * |
| *Corydalis ambigua* Ch. et Schl. | 1 | 12 | | | | | * |
| *Crataegus pinnatifida* Bunge | 4 | 35 | 22 | 3 | * | | * |
| *Crinum latifolium* L. | | | | | | * | |
| *Croton tonkinensi* s Gagnep. | | | 5 | | | * | |
| *Cryptotympana japonica* Kate | | 15 | | | * | | * |
| *Curcuma longa* L. | 3 | 25 | | | | | |
| *Curcuma zedoaria* (Berger) Roscoe | | 35 | 10 | 3 | | | |
| *Cuscuta sinensis* Lam. | 4 | 45 | | | | | |
| *Cynara scolymus* L. | | | | | | * | |
| *Cyperus rotundus* L. | 3 | 46 | 7 | 10 | * | | |
| *Desmodium triangulare* (Retz.) Merr. | 1 | 212 | 47 | 2 | * | * | * |
| *Dioscorea persimilis* Prain et Burkill | 11 | 184 | 25 | 21 | | * | * |
| *Dioscorea alata* L. | | | 1 | | | * | |
| *Dioscorea tokoro* Makino | 2 | 70 | | | * | | * |
| *Diospyros kaki* L.f. | | 10 | | | | * | |
| *Dipsacus japonicus* Miq. | 3 | 81 | 20 | 20 | * | * | * |
| *Dracaena loureiri* Gagnep | 1 | 16 | | | * | | |
| *Drynaria* spp. | 3 | 43 | 23 | 10 | * | | |
| *Eclipta alba* L. | | 1 | | | * | | |
| *Eleutherine subaphylla* Gagnep. | 2 | 15 | | | | * | |
| *Elsholtzia ciliata* (Thunb.) Hyland. | 1 | 20 | 13 | | | * | |
| *Ephedra sinica* Stapf. | 2 | 21 | | | | | * |
| *Epimedium macranthum* Morr. et Decne. | 2 | 17 | 1 | | | | * |
| *Erythrina orientalis* (L.) Murr. | 1 | 10 | | | * | * | |
| *Eucommia ulmoides* Oliv. | 14 | 134 | 1 | 26 | | | * |
| *Euphoria longana* Lam. | 1 | 23 | 11 | 14 | | * | |
| *Euryale ferox* Salisb. | 1 | 17 | | | | | * |
| *Fallopia multiflora* (Thunb.) Hara. | 6 | 14 | | 9 | * | * | |
| *Foeniculum vulgare* Mill. | | 15 | | 50 | | | * |
| *Forsythia suspensa* Vahl | 5 | 41 | | | | | * |
| *Fritillaria thunbergii (*Mig.) Bak | 1 | 20 | | | | | * |
| *Gardenia angustifolia* (L.) Merr. | 1 | 37 | 1 | 3 | * | | |
| *Gentiana scabra* Bunge | 3 | 15 | | | | | * |
| *Gleditschia australis* Hemsl. | | 1 | 1 | | | * | |
| *Glycyrrhiza glabra* L. | 12 | 321 | 3 | 40 | | * | * |
| *Homalomena occulta* Lour. (Schott.) | | | 1 | | * | | |
| *Hordeum sativum* Jess. var. *vulgare* Hack | 3 | 143 | | | | * | * |
| *Houttuynia cordata* Thunb. | | | | | | * | * |
| *Illicium verum* Hook f. | 1 | 20 | | | | * | |
| *Imperata cylindrica* Beauv. | 1 | 15 | | | * | | |
| *Ixora coccinea* L. | | | | | | | * |
| *Jatropha multifida* L. | 1 | 13 | | | | | * |
| *Juncus effusus* L. var. *dicipiens* | 1 | 6 | | | | | * |
| *Justicia gendarussa* L. | 1 | 25 | | | | | * |
| *Kaempferia galanga* L. | 1 | 72 | 15 | | | * | * |

| Species | Lan Ong Street (*n*=30) | Ninh Hiep (*n*=10) | Nghia Trai (*n*=32) | Dong Dang Dong Kinh (*n*=10) | Sources | | |
|---|---|---|---|---|---|---|---|
| | | | | | wild | cult. | import |
| *Lablab purpureus* (L.) Sweet subsp. *purpureus* | 2 | 16 | | | | * | |
| *Lactuca indica* L. | 2 | 38 | 23 | | * | * | |
| *Leonurus heterophyllus* Sw. | 3 | 53 | 8 | | | * | |
| *Ligusticum wallichii* Franch. | 4 | 130 | 2 | 11 | | | * |
| *Lilium brownii* FE. Brown var. *colchesteri* Wilson | 1 | 16 | | | | | * |
| *Lindera myrrha* | 1 | 30 | | | * | | |
| *Lonicera japonica* Thunb. | 5 | 77 | 11 | 10 | * | | * |
| *Loranthus parasiticus* (L.) Merr. | 1 | 30 | | | | * | |
| *Lycium sinense* Mill. | 1 | | | | | | * |
| *Magnolia officinalis* Reidl. | 2 | 31 | | | | | * |
| *Mentha arvensis* L. | 1 | 26 | 8 | | * | * | |
| *Morinda officinalis* How. | 2 | 88 | 9 | 18 | | * | * |
| *Morus alba* L. | 1 | 25 | | | | * | |
| *Myristica fragrans* Houtt. | 2 | 15 | | | | | * |
| *Nelumbo nucifera* Gaertn. | 3 | 270 | | 38 | | * | |
| *Notopterygium incisium* Ting Mss | 1 | 34 | | | | | * |
| *Ophiopogon japonica* | 1 | 119 | 4 | 13 | | * | * |
| *Ostrea* spp. | 3 | 10 | | | * | | |
| *Paeonia lactiflora* Pall | 4 | 194 | | 68 | | | * |
| *Paeonia suffruticosa* Andr. | 1 | 43 | | | | | * |
| *Paeonia veitchii* Lynch var. *beresowskii* Schiff. | 1 | 30 | | | | | * |
| *Panax ginseng* | 3 | 30 | | 23 | | | * |
| *Panax notoginseng* (Burk.) FH Chen. | 4 | 30 | 20 | 36 | | | * |
| *Passiflora foetida* L. | 2 | 35 | | | * | | |
| *Perilla frutescens* (L.) Britt. | | | 33 | | | * | |
| *Perilla ocymoides* L. | 2 | 30 | 3 | | | * | |
| *Peucedanum decursivum* Maxim | | 15 | | | * | | * |
| *Phellodendron amurense* Rupr. | 3 | 32 | | 1 | | | * |
| *Phyllanthus urinaria* L. | 1 | | | | * | | |
| *Pistia stratoides* L. | | 10 | | | * | | |
| *Plantago major* L. | 2 | 434 | 8 | 3 | | * | |
| *Platycodon grandiflorum* (Jacq.) A. DC. | 2 | 66 | | 18 | | | * |
| *Pluchea pteropoda* Hemsl. | 1 | 40 | 1 | | * | | |
| *Pogostemon cablin* (Blanco) Benth. | 1 | 22 | 6 | | | * | |
| *Polygala tenuifolia* Willd. | 1 | 40 | | | | | * |
| *Polygonatum officinale* All. | 1 | 25 | | 4 | | | * |
| *Portulaca oleracea* L. | | | | | * | | |
| *Prunella vulgaris* L. | 2 | 204 | | | * | | |
| *Prunus armeniaca* L. | 1 | 15 | | | | | * |
| *Prunus persica* (L.) Stokes | 1 | 10 | | | | | * |
| *Psoralea corylifolia* L. | 2 | 35 | | 30 | | | * |
| *Pueraria lobata* (Willd.) Ohwi var. *thomsonii* (Benth.) | 2 | 77 | 4 | 5 | | * | |
| *Rehmannia glutinosa* (Gaertn.) Libosch. ex Fisch. et Mey. | 14 | 485 | 1 | 95 | | * | * |
| *Reynoutria japonica* Houtt. | | | 59 | | | * | |
| *Rheum officinale* Baill. | 1 | 14 | | 1 | | | * |
| *Rosa laevigata* Michx. | 1 | 16 | | | * | | * |
| *Salvia miltiorrhiza* Bunge | 3 | 52 | | 1 | | | * |

| Species | Lan Ong Street (*n*=30) | Ninh Hiep (*n*=10) | Nghia Trai (*n*=32) | Dong Dang Dong Kinh (*n*=10) | Sources | | |
|---|---|---|---|---|---|---|---|
| | | | | | wild | cult. | import |
| *Saposhnikovia divaricata* (Turcz) Schisch. | 2 | 100 | 12 | | | | * |
| *Sargentodoxa cuneata* (Oliv.) Rehd. et Wils. | 4 | 25 | | | * | | |
| *Schefflera* spp. | 2 | 40 | | 1 | * | | * |
| *Schizandra chinensis* (Turcz.) Baill. | 1 | 40 | | | | | * |
| *Scrophularia ningpoensis* Hemsl. | 6 | 73 | | 15 | | | * |
| *Scutellaria baicalensis* Georgi | 3 | 24 | | 30 | | | * |
| *Sepia esculenta* Hoyle | 2 | 30 | | | * | | |
| *Siegesbeckia orientalis* L. | 1 | 29 | 1 | | * | | |
| *Smilax glabra* Roxb. | 5 | 170 | 14 | 30 | * | | |
| *Sophora japonica* L. | 3 | 45 | 1 | 5 | | * | |
| *Stemona tuberosa* Lour. | 2 | 35 | 19 | | * | | |
| *Stevia rebaudiana* (Bert.) Hemsl. | 52 | | | | | * | |
| *Strychnos nux-vomica* L. | 3 | 13 | 1 | | * | | |
| *Strychnos wallichiana* Steud. ex DC | | 12 | | | * | | |
| *Syzygium aromaticum* (L.) Merr. et Perry | 1 | 19 | | | | | * |
| *Terminalia chebula* Retz | | 8 | | | | | * |
| *Tetradium rutaecarpa* (A. Juss.) Hartley | 1 | 10 | | | | | * |
| *Tetrapanax papyrifera* (Hook.) Kock | 1 | 15 | | | | | * |
| *Thalictrum foliolosum* DC. | 1 | 10 | | | * | | * |
| *Thuja orientalis* L. | 2 | 24 | | | | | * |
| *Thunbergia eberhardtir* Benoist | 1 | 25 | | | | | * |
| *Tinospora sinensis* Merr. | 3 | 24 | 2 | | * | | |
| *Tribulus terrestris* L. | 1 | 5 | | | | | * |
| *Trichosanthes kirilowii* Maxim. | 1 | 25 | | | | | * |
| *Trichosanthes* spp. | 1 | 10 | | | | | * |
| *Tussilago farfara* L. | | 10 | | | | | * |
| *Typhonium trilobatum* L. Schott. | 2 | 74 | 16 | 6 | | | * |
| *Uncaria* spp. | 1 | 35 | | 10 | * | * | * |
| *Vitex trifolia* | 3 | 31 | | | * | | |
| *Wedelia calendulacea* (L.) Less. | 3 | | 1 | | | * | |
| *Xanthium strumarium* L. | 1 | 20 | | | * | | |
| *Xylosma longifolium* Clos | 2 | 40 | | | | | * |
| *Zanthoxylum nitidum* (Roxb.) DC. | | 20 | | | * | | * |
| *Zea mays* | | | | | | * | |
| *Zingiber officinale* Roscoe | 1 | 33 | | 10 | | * | |
| *Ziziphus mauritiana* Lam. | 1 | 90 | 5 | 45 | | | * |
| *Ziziphus sativa* Mill. | 11 | 157 | | 73 | | | * |
| *Massa medicata fermentata* (combination of several spp) | 2 | 45 | | | | | * |
| | | | | | | | |
| **Fungi** | | | | | | | |
| *Ganoderma lucidum* L. | | | | 400 | | * | * |
| *Poria cocos* (Schw.) Wolf. | 3 | 210 | | 9 | | | * |

Identifications and nomenclature affiliations in this Annex were provided by the Institute of Materia Medica; further information on taxonomy and synonyms can be found at www.plantnames.unimelb.edu.au

## APPENDIX 2

Quantities of plant species (tonnes) reportedly traded by a major pharmaceutical company in Lang Son province, north-east Viet Nam, 2001-2002, and their sources (wild, cultivated or imported).

| Species | Quantity traded (tonnes) | | Source | | |
|---|---|---|---|---|---|
| | 2001 | 2002 | Wild | Cult. | Import |
| *Achyranthes asper* | 17.9 | 0.0 | * | | |
| *Achysanthes bidentata* Blume var. *bidentata* | 17.9 | 20.0 | | * | * |
| *Acorus gramineus* Soland. | 1.3 | 0.5 | * | | |
| *Adenophora verticillata* (Pall.) Fisch. | 91.0 | 75.0 | | | * |
| *Adenosma caerulea* R. Br. | 8.3 | 9.0 | * | * | |
| *Alisma plantago-aquatica* L. | 40.5 | 32.0 | | | * |
| *Alpinia oxyphylla* Miq. | 4.1 | 5.0 | | | * |
| *Anemarrhena aspheloides* Bunge | 6.7 | 8.0 | | | * |
| *Angelica dahurica* (Fisch. ex Hoffm.) Benth. et Hook. f. | 1.1 | 2.1 | | * | * |
| *Angelica acutiloba* (Sieb. et Zucc.) Kitagawa | 20.0 | 30.0 | | | * |
| *Angelica pubescens* Maxim. | 48.7 | 65.0 | | | * |
| *Arctium lappa* L. | 1.1 | 0.5 | | | * |
| *Aristolochia* spp. | 1.9 | 3.5 | | | * |
| Aristolochiaceae / Ranunculaceae spp. | 2.5 | 1.5 | | | * |
| *Artemisia vulgaris* L. | 1.3 | 3.0 | | * | |
| *Asarum balansae* Franch. | 5.3 | 9.0 | | | * |
| *Asparagus cochinchinensis* (Lour.) Merr. | 5.6 | 8.0 | | * | * |
| *Aster ageratoides* Turcz | 1.0 | 0.5 | | | * |
| *Astragalus membranaceus* (Fisch.) Bunge | 40.9 | 60.0 | | | * |
| *Atractylodes lancea* (Thunb.) DC. | 24.9 | 35.0 | | | * |
| *Atractylodes macrocephala* (Koidz.) Hand.-Mazz. | 24.0 | 31.0 | | | * |
| *Belamcanda chinense* (L.) DC. | 1.4 | 2.0 | | * | |
| *Brassica alba* Boissier | 1.9 | 1.6 | | | * |
| *Bupleurum chinense* DC. | 16.4 | 20.0 | | | * |
| *Carthamus tinctorius* L. | 21.1 | 15.0 | | | * |
| *Chaenomeles lagenaria* (Lois.) Koiz | 0.3 | 1.0 | | | * |
| *Chrysanthemum indicum* L. | 20.6 | 25.7 | | * | |
| *Cimicifuga dahurica* (Turcz.) Maxim | 15.0 | 35.0 | | | * |
| *Cistanche ambigua* G. Beck | 6.8 | 5.0 | | | * |
| *Citrus deliciosa* Tenore | 0.7 | 0.2 | | | * |
| *Codonopsis javanica* (Blume) Hook. f. | 62.9 | 70.0 | | | * |
| *Coix lachryma-jobi* L. | 51.0 | 60.0 | | * | |
| *Coptis chinensis* Franch. | 1.7 | 3.0 | | | * |
| *Cornus officinalis* Sieb. et Zuce | 1.1 | 0.5 | | | * |
| *Corydalis ambigua* Ch. et Schl. | 8.8 | 9.0 | | | * |
| *Crataegus pinnatifida* Bunge | 1.0 | 1.2 | * | | * |
| *Cryptotympana japonica* Kate | 2.1 | 1.0 | | | * |
| *Curcuma longa* L. | 1.0 | 0.4 | | | * |
| *Curcuma zedoaria* (Berger) Roscoe | 0.1 | 0.0 | * | | |
| *Cuscuta sinensis* Lam. | 7.9 | 15.0 | * | | * |
| *Desmodium triangulare* (Retz.) Merr. | 2.1 | 3.0 | * | | * |
| *Dioscorea persimilis* Prain et Burkill | 24.3 | 30.0 | | | * |
| *Dipsacus japonicus* Miq. | 62.0 | 70.0 | * | | * |
| *Drynarya* spp. | 0.5 | 1.1 | * | | |
| *Epimedium macranthum* Morr. et Decne. | 3.3 | 4.0 | | | * |
| *Eucommia ulmoides* Oliv. | 130.0 | 140.0 | | | * |
| *Euryale ferox* Salisb. | 8.1 | 7.0 | | | * |

| Species | Quantity traded (tonnes) | | Source | | |
|---|---|---|---|---|---|
| | 2001 | 2002 | Wild | Cult. | Import |
| *Fallopia multiflora* (Thunb.) Hara. | 12.8 | 8.0 | * | | |
| *Foeniculum vulgare* Mill. | 30.5 | 45.0 | | | * |
| *Forsythia suspensa* Vahl | 8.9 | 12.0 | | | * |
| *Fritillaria thunbergii (*Mig.) Bak | 2.3 | 3.0 | | | * |
| *Gardenia angustifolia* (L.) Merr. | 1.0 | 1.3 | * | | |
| *Gentiana scabra* Bunge | 1.4 | 1.0 | | | * |
| *Glycyrrhiza glabra* L. | 82.0 | 50.0 | | | * |
| *Imperata cylindrica* Beauv. | 5.0 | 4.5 | * | | |
| *Juncus effusus* L. var. *dicipiens* | 1.8 | 1.2 | | | * |
| *Justicia gendarussa* L. | 30.9 | 40.0 | | | * |
| *Lactuca indica* L. | 6.2 | 7.9 | * | | |
| *Ligusticum wallichii* Franch. | 51.1 | 60.0 | | | * |
| *Lilium brownii* F. E. Brown var. *colchesteri* Willson | 4.2 | 6.6 | | | * |
| *Lonicera japonica* Thunb. | 31.9 | 35.0 | * | | * |
| *Loranthus parasiticus* (L.) Merr. | 1.8 | 0.5 | | * | |
| *Magnolia officinalis* Reidl. | 0.1 | 0.2 | | | * |
| *Massa medicata fermentata* | 5.2 | 3.0 | | | * |
| *Mentha arvensis* L. | 0.0 | 0.1 | | * | |
| *Morinda officinalis* How. | 2.7 | 2.2 | | | * |
| *Myristica fragrans* Houtt. | 0.3 | 0.0 | | | * |
| *Notopterygium incisium* Ting Mss | 8.9 | 11.0 | | | * |
| *Ophiopogon japonica* | 52.0 | 50.0 | | * | |
| *Paeonia lactiflora* Pall. | 54.0 | 60.0 | | | * |
| *Paeonia veitchii* Lynch var. *beresowskii* Schiff. | 9.5 | 15.0 | | | * |
| *Panax notoginseng* | 11.0 | 5.0 | | | * |
| *Peucedanum decursivum* Maxim | 7.9 | 10.0 | | | * |
| *Phellodendron amurense* Rupr. | 14.2 | 20.0 | | | * |
| *Platycodon grandiflorum* (Jacq.) A. DC. | 77.3 | 65.0 | | | * |
| *Polygala tenuifolia* Willd. | 25.7 | 30.0 | | | * |
| *Polygonatum officinale* All. | 8.2 | 10.0 | | | * |
| *Poria cocos* (Schw.) Wolf | 42.0 | 51.0 | | | * |
| *Prunella vulgaris* L. | 9.8 | 7.0 | * | | * |
| *Prunus armeniaca* L. | 6.4 | 3.0 | | | * |
| *Prunus persica* (L.) Stokes | 8.0 | 5.0 | | | * |
| *Psoralea corylifolia* L. | 27.0 | 30.0 | | | * |
| *Pueraria lobata* (Willd.) Ohwi var. *thomsonii* (Benth.) Maesen | 2.0 | 2.5 | | * | * |
| *Rehmannia glutinosa* (Gaertn.) Libosch. ex Fisch. et Mey. | 109.0 | 150.0 | | * | * |
| *Rehmannia glutinosa* (Gaertn.) Libosch. Ex Fisch. et Mey. | 250.9 | 200.0 | | | * |
| *Rheum officinale* Baill. | 43.8 | 52.0 | | | * |
| *Rosa laevigata* Michx. | 11.9 | 7.0 | * | | * |
| *Salvia miltiorrhiza* Bunge | 50.0 | 53.0 | | | * |
| *Saposhnikovia divaricata* (Turcz) Schisch. | 9.0 | 1.0 | | | * |
| *Schefflera* spp. | 0.2 | 0.1 | | | * |
| *Schizandra chinensis* (Turcz.) Baill. | 11.3 | 15.0 | | | * |
| *Scrophularia ningpoensis* Hemsl. | 67.5 | 70.0 | | | * |
| *Scutellaria baicalensis* Georgi | 34.5 | 30.0 | | | * |
| *Smilax glabra* Roxb. | 3.5 | 6.0 | * | | |
| *Stemona tuberosa* Lour. | 0.2 | 0.5 | * | | |
| *Syzygium aromaticum* (L.) Merr. et Perry | 4.9 | 2.0 | | | * |

| Species | Quantity traded (tonnes) | | Source | | |
|---|---|---|---|---|---|
| | 2001 | 2002 | Wild | Cult. | Import |
| *Terminalia chebula* Retz | 1.0 | 0.5 | | | * |
| *Tetradium rutaecarpum* (A. Juss.) Hartley | 0.2 | 0.3 | | | * |
| *Tetrapanax papyrifera* (Hook.) Kock | 0.3 | 0.0 | | | * |
| *Thuja orientalis* L. | 4.0 | 3.2 | | | * |
| *Thunbergia eberhardt* Benoist | 8.0 | 10.0 | | | * |
| *Tribulus terrestris* L. | 0.0 | 0.5 | | | * |
| *Trichosanthes kirilowii* Maxim. | 5.1 | 4.0 | | | * |
| *Trichosanthes kirilowii* Maxim. | 4.5 | 2.0 | | | * |
| *Trichosanthes* spp. | 0.7 | 0.0 | | | * |
| *Tussilago farfara* L. | 1.2 | 0.7 | | | * |
| *Typhonium trilobatum* L. Schott | 0.6 | 0.4 | | | * |
| *Uncaria* spp. | 5.9 | 4.5 | * | | * |
| *Xanthium strumarium* L. | 7.0 | 10.0 | * | | |
| *Xylosma longifolium* Clos | 50.9 | 60.0 | | | * |
| *Zanthoxylum nitidum* | 1.7 | 3.5 | * | | * |
| *Ziziphus mauritiana* Lam. | 20.5 | 25.0 | | | * |

Identifications and nomenclature affiliations in this Annex were provided by the National Institute for Materia Medica; further information on taxonomy and synonyms can be found at www.plantnames.unimelb.edu.au

## APPENDIX 3

Complete list of the medicinal plant species found from the survey conducted in traditional medicine markets in southern Viet Nam in August 2006.

| No. | Vietnamese name | Scientific name | Family | Parts used | Source | | | Notes |
|---|---|---|---|---|---|---|---|---|
| | | | | | Viet Nam | | Imported | |
| | | | | | Wild harvested | Cultivated | | |
| 1. | ác ti sô | *Cynara scolymus* L. | Asteraceae | Leaf, stem, root, flower | | + | | MN |
| 2. | Ba kích | *Morinda officinalis* How | Rubuiaceae | Root | + | + | + | MB, TQ |
| 3. | Bạc hà | *Mentha arvensis* L. | Lamiaceae | Branch and leaf | | + | | MN |
| 4. | Bạc thau | *Argyreia acuta* Lour. | Convolvulaceae | Leaf | + | | | MN |
| 5. | Bách bộ | *Stemona tuberosa* Lour. | Stemonaceae | Root | + | | | MN, MB |
| 6. | Bách hợp | *Lilium brownii* Brown var. *viridulum* Baker | Liliaceae | Stem, bulb | + | | + | MB, TQ |
| 7. | Bạch cập | *Bletilla striata* (Thunb.) Reichb. f. | Orchidaceae | Root | | | + | TQ |
| 8. | Bạch chỉ | *Angelica dahurica* (Fisch. ex Hoffm.) Benth. et Hook. f. | Apiaceae | Root | | + | + | MB, TQ |
| 9. | Bạch chỉ nam | *Millettia penicillata* Gagnep. var. *penicillata* | Fabaceae | Root | + | | | MN |
| 10. | Bạch đậu khấu | *Amomum krervanh* Pierre | Zingiberaceae | Seed | + | | + | TQ |
| 11. | Bạch đồng nữ | *Clerodendron petasites* (Lour.) Moore | Verbenaceae | Branch and leaf, root | + | | | MN, MB |
| 12. | Bạch hạc | *Rhinacanthus nasutus* (L.) Kurz | Acanthaceae | Leaf, root | | + | | MN |
| 13. | Bạch hoa xà | *Plumbago zeylanica* L. | Plumbaginaceae | Leaf | | + | | MN |
| 14. | Bạch hoa xà thiệt thảo | *Hedyotis diffusa* Willd. | Rubiaceae | Whole plant | + | | | MN, MB |
| 15. | Bạch quả | *Ginkgo biloba* L. | Ginkgoaceae | Seed | | | + | TQ |
| 16. | Bạch thược | *Paeonia lactiflora* Pall. | Paeoniaceae | Root | | | + | TQ |
| 17. | Bạch truật | *Atractylodes macrocephala* (Koidz.) Hand.-Mazz. | Asteraceae | Root | | + | + | MB, TQ |
| 18. | Ban | *Hypericum japonicum* Thunb. ex Murray | Hypericaceae | Whole plant | + | | | MN |
| 19. | Bán biên liên | *Lobelia chinensis* Lour. | Lobeliaceae | Leaf | | | + | TQ |
| 20. | Bán chi liên | *Scutellaria barbata* D. Don | Lamiaceae | Whole plant (without root) | | | + | TQ |
| 21. | Bán hạ bắc | *Pinellia* spp. | Araceae | Root | | | + | TQ |
| 22. | Bán hạ nam | *Typhonium trilobatum* (L.) Schott | Araceae | Root | + | | | MN, MB |
| 23. | Bèo cái | *Pistia stratioides* L. | Araceae | Whole plant without root | + | | | MN |
| 24. | Bí kỳ nam | *Hydnophytum formicarum* Jacq. | Rubiaceae | Stem | + | | | MN |
| 25. | Biển súc | *Polygonum aviculare* L. | Polygonaceae | Whole plant | + | | | MB, MN |
| 26. | Bình vôi | *Stephania* spp. | Menispermaceae | Root | + | | | MN, MB |
| 27. | Bồ bồ | *Adenosma indiana* (Lour.) Merr. | Scrophulariaceae | Whole plant without root | + | | | MB, MN |

| No. | Vietnamese name | Scientific name | Family | Parts used | Source | | | Notes |
|---|---|---|---|---|---|---|---|---|
| | | | | | Viet Nam | | Imported | |
| | | | | | Wild harvested | Cultivated | | |
| 28. | Bồ công anh | *Lactuca indica* L. | Asteraceae | Leaf | + | | | MB, MN |
| 29. | Bồ đề | *Styrax tonkinensis* (Pierre) Craib ex Hart. | Styracaceae | Resin | + | + | | MB |
| 30. | Bồ kết | *Gleditsia fera* (Lour.) Merr. | Mimosaceae | Root | | + | | MN |
| 31. | Bổ cốt toái lá to | *Drynaria quercifolia (L.) J. Sm.* | Polypodiaceae | Root | + | | | MN |
| 32. | Bối mẫu | *Fritillaria cirrhosa* D.Don. | Liliaceae | Root | | | + | TQ |
| 33. | Bông ổi | *Lantana camara* L. | Verbenaceae | Twig, flower | + | | | MN |
| 34. | Bưởi | *Citrus grandis* L. | Rutaceae | Leaf | | + | | MN |
| 35. | Bướm bạc | *Mussaenda pubescens* Ait.f. | Rubiaceae | Whole plant | + | | | MN |
| 36. | Cà độc dược | *Datura metel* L. | Solanaceae | Petal | + | | | MN |
| 37. | Cải canh | *Brassica juncea* (L.) Czern. et Coss. | Brassicaceae | Seed | | | + | TQ |
| 38. | Cam thảo bắc | *Glycyrrhiza glabra* L. | Fabaceae | Root | | | + | TQ |
| 39. | Cam thảo dây | *Abrus precatorius* L. | Caesalpiniaceae | Leaf | + | | | MN |
| 40. | Cam thảo nam | *Scoparia dulcis* L. | Scrophulariaceae | Twig | + | | | MN |
| 41. | Cát cánh | *Platycodon grandiflorum* (Jacq.) A. DC. | Campanulaceae | Root | | | + | TQ |
| 42. | Cau | *Areca catechu* L. | Arecaceae | Root, fruit skin, seed | | + | | MN |
| 43. | Câu đằng | *Uncaria* spp. | Rubiaceae | Stem | + | | | MN, MB |
| 44. | Câu kỷ | *Lycium chinense* Mill. | Solanaceae | Fruit | | | + | TQ |
| 45. | Cẩu tích | *Cibotium barometz* (L.) J.Sm. | Dicksoniaceae | Root | + | | | MN |
| 46. | Cây cứt lợn | *Ageratum conyzoides* L. | Asteraceae | Twig | + | | | MN |
| 47. | Cây muối | *Rhus chinensis* Mill. | Anacardiaceae | Leaf gall | + | | + | MB, TQ |
| 48. | Cây nổ | *Flueggea virosa* (Roxb. ex Willd.) Woigt | Euphorbiaceae | Leaf | + | | | MN |
| 49. | Chân chim | *Schefflera* spp. | Araliaceae | Bark | + | | | MN, MB |
| 50. | Chè dây | *Ampelopsis cantoniensis* (Hook. et Arn.) Planch. | Vitaceae | Twig | + | | | MB |
| 51. | Chè đắng | *Ilex kaushue* S. Y. Hu | Aquifoliaceae | Leaf | + | + | | MB |
| 52. | Chè vằng | *Jasminum* spp. | Oleaceae | Twig | + | | | MN, MB |
| 53. | Chỉ thiên | *Elephantopus scaber* L. | Asteraceae | Whole plant without root | + | | | MN |
| 54. | Chó đẻ răng cưa | *Phyllanthus amarus* Schum. et Thonn | Euphorbiaceae | Whole plant | + | + | | MN |
| 55. | Chuối hột | *Musa balbisiana* Colla | Musaceae | Fruit, seed | | + | | MN |
| 56. | Chút chít | *Rumex chinensis* Campd. | Polygonaceae | Root | + | | | MB |
| 57. | Cỏ bấc đèn | *Juncus effusus* L. | Juncaceae | Inside stem | + | | | MB, MN |
| 58. | Cỏ dùi trống | *Eriocaulon sexangulare* L. | Eriocaulonaceae | Fruit | + | | | MN |
| 59. | Cỏ gừng | *Panicum repens* L. | Poaceae | Whole plant | + | | | MN |
| 60. | Cỏ mần trầu | *Eleusine indica* (L.) Gaertn. | Poaceae | Whole plant | + | | | MN |
| 61. | Cỏ nến | *Typha angustata* Bory et Chaub. | Typhaceae | Pollen | + | | | MB |

| No. | Vietnamese name | Scientific name | Family | Parts used | Source | | | Notes |
|---|---|---|---|---|---|---|---|---|
| | | | | | Viet Nam | | Imported | |
| | | | | | Wild harvested | Cultivated | | |
| 62. | Cỏ ngọt | *Stevia rebaudiana* (Bert.) Hemsl. | Asteraceae | Twig | | + | | MN, MB |
| 63. | Cỏ nhung | *Anoectochilus setaceus* Blume *(A. roxburghii* (Wall.) Wall. ex Lindl.) | Orchidaceae | Whole plant | + | | | MN, MB |
| 64. | Cỏ sữa lá nhỏ | *Euphorbia thymifolia* L. | Euphorbiaceae | Whole plant | + | | | MN |
| 65. | Cỏ tranh | *Imperata cylindrica* (L.) P. Beauv. var. *major* (Nees) Hubb. | Poaceae | Root | + | | | MN |
| 66. | Cỏ xước | *Achysanthes aspera* L. | Amaranthaceae | Root | + | | | MN |
| 67. | Cổ linh chi | *Ganoderma* sp. | Ganodermataceae | Fruiting body | + | | | MN |
| 68. | Cối xay | *Abutilon indicum* (L.) Sweet | Malvaceae | Twig and fruit | + | | | MN, MB |
| 69. | Cốt khí củ | *Reynoutria japonica* Houtt. | Polygonaceae | Root | | + | | MB |
| 70. | Cốt toái bổ | *Drynaria fortunei* (Kuntze) J. Sm. | Polypodiaceae | Root | + | | | MB |
| 71. | Cù đèn | *Croton sp.* | Euphorbiaceae | Branch, Leaf, root | + | | | MN |
| 72. | Củ gấu biển | *Cyperus stoloniferus* Retz. | Cyperaceae | Root | + | | | MN |
| 73. | Củ mài | *Dioscorea persimilis* Prain et Burk. | Dioscoreaceae | Root | | + | + | MB, TQ |
| 74. | Cúc áo hoa vàng | *Spilanthes acmella* (L.) Murr. | Asteraceae | Flower | + | | + | MB |
| 75. | Cúc hoa trắng | *Chrysanthemum morifolium* Ramat. | Asteraceae | Flower | | + | | MB, TQ |
| 76. | Cúc hoa vàng | *Chrysanthemum indicum* L. | Asteraceae | Flower | | + | | MB |
| 77. | Dành dành | *Gardenia* spp. | Rubiaceae | Seed | + | + | | MN, MB |
| 78. | Dâm dương hoắc | *Epimedium macranthum* Mor. | Berberidaceae | Whole plant | | | + | TQ |
| 79. | Dâu tằm | *Morus alba* L. | Moraceae | Branch, bark, Leaf and root | | + | | MB, MN |
| 80. | Dây đau xương | *Tinospora sinensis* (Lour.) Merr. | Menispermaceae | Stem | + | | | MN, MB |
| 81. | Dây khai | *Coptosapelta tomentosa* (Blume) Vahl. ex Heyne | Rubiaceae | Root | + | | | MN |
| 82. | Diếp cá | *Houttuynia cordata* Thunb. | Saururaceae | Leaf | + | | | MN |
| 83. | Dung (chè dung) | *Symplocos* sp. | Symplocaceae | Twig | + | | | MN |
| 84. | Dừa cạn | *Catharanthus roseus* (L.) G. Don | Apocynaceae | Whole plant | + | | | MN |
| 85. | Dứa dại | *Pandanus tonkinensis* Mart. ex Stone | Pandanaceae | Fruit, root | + | | | MN |
| 86. | Đại | *Plumeria rubra* L. var. *acutifolia* (Poir.) Baill. | Apocynaceae | Flower | | + | | MN |
| 87. | Đại bi | *Blumea balsamifera* (L.) DC. | Asteraceae | Leaf | + | | | MN, MB |
| 88. | Đại hoàng | *Rheum officinale* Baill. | Polygonaceae | Root | | | + | TQ |
| 89. | Đại táo | *Ziziphus sativa* Mill. | Rhamnaceae | Fruit | | | + | TQ |
| 90. | Đan sâm | *Salvia miltiorrhiza* Bunge | Lamiaceae | Root | | | + | TQ |
| 91. | Đảng sâm | *Codonopsis javanica* (Blume) Hook. f. | Campanulaceae | Root | + | | | MN, MB |
| 92. | Đào | *Prunus persica* (L.) Batsch | Rosaceae | Seed embryo, leaf | | | + | TQ |
| 93. | Đậu ván trắng | *Lablab purpureus* (L.) Sweet subsp. *Purpureus* | Fabaceae | Seed | | + | | MN |

| No. | Vietnamese name | Scientific name | Family | Parts used | Source | | | Notes |
|---|---|---|---|---|---|---|---|---|
| | | | | | Viet Nam | | Imported | |
| | | | | | Wild harvested | Cultivated | | |
| 94. | Địa hoàng | *Rehmannia glutinosa* (Gaertn.) Libosch.ex Fisch. et Mey. | Scrophulariaceae | Root | | + | + | TQ |
| 95. | Địa liền | *Kaempfera galanga* L. | Zingiberaceae | Root | + | + | | MN, MB |
| 96. | Đinh hương | *Syzygium aromaticum* (L.) Merr. et Berry | Myrtaceae | Flower | | | + | TQ |
| 97. | Đinh lăng | *Polyscias fruticosa* (L.) Harms | Araliaceae | Root, leaf | | + | | MN |
| 98. | Đỗ trọng bắc | *Eucommia ulmoides* Oliv. | Eucommiaceae | Bark | | + | + | TQ, MB |
| 99. | Đỗ trọng nam | *Euonymus* sp. | Celastraceae | Bark | + | | | MN |
| 100. | Độc hoạt | *Angelica pubescens* Maxim. | Apiaceae | Root | | + | + | TQ |
| 101. | Đu đủ | *Carica papaya* L. | Caricaceae | Leaf, flower | | + | | MN |
| 102. | Đương quy | *Angelica acutiloba* (Sieb. et Zucc.) Kitagawa | Apiaceae | Root | | + | + | MB, TQ |
| 103. | Gai | *Boehmeria nivera* (L.) Gaudich | Urticaceae | Root | | + | | MN |
| 104. | Gai chống (bạch tật lê) | *Tribulus terrestris* L. | Zygophyllaceae | Fruit and seed | + | | + | MN, TQ |
| 105. | Gắm | *Gnetum montanum* Mafkgr. | Gnetaceae | Stem | + | | | MN |
| 106. | Găng tía | *Gmelina asiatica* Roxb. | Verbenaceae | Branch, stem, root | + | | | MN |
| 107. | Gấc | *Momordica cochinchinensis* (Lour.) Spreng. | Cucurbitaceae | Seed, root | | + | | MB |
| 108. | Gừa | *Ficus microcarpa* L.f. | Moraceae | Root | + | | | MN |
| 109. | Gừng | *Zingiber officinale* Roscoe | Zingiberaceae | Root | | + | | MN |
| 110. | Hà thủ ô đỏ | *Fallopia multiflora* (Thunb.) Hara. | Polygonaceae | Root | + | | | MB |
| 111. | Hà thủ ô trắng | *Streptocaulon juventas* (Lour.) Merr. | Asclepiadaceae | Root | + | | | MN |
| 112. | Hạ khô thảo | *Prunella vulgaris* L. | Lamiaceae | Whole plant | + | | | MB |
| 113. | Hàn the | *Desmodium heterophyllum* (Willd.) DC. | Fabaceae | Whole plant | + | | | MN |
| 114. | Hạnh nhân | *Prunus armeniaca* L. var. *ansu* Maxim | Rosaceae | Seed | | | + | TQ |
| 115. | Hậu phác | *Cinnamomum iners* Reinw. ex Blume | Lauraceae | Bark | + | | | MN, MB |
| 116. | Hoa giẻ | *Desmos chinensis* Lour. | Annonaceae | Branch and leaf | + | | | MN |
| 117. | Hoàn ngọc | *Pseuderanthemum palatiferum* (Ness) Radlk | Acanthaceae | Leaf | | + | | MN |
| 118. | Hoàng bá | *Phellodendron amurense* Rupr. | Rutaceae | Bark | | + | + | TQ, MB |
| 119. | Hoàng cầm | *Scutellaria baicalensis* Georgi | Lamiaceae | Whole plant | | | + | TQ |
| 120. | Hoàng đằng | *Fibraurea tinctoria* Lour. | Menispermaceae | Root | + | | | MN |
| 121. | Hoàng kỳ | *Astragalus membranaceus* (Fisch.) Bunge | Fabaceae | Root | | | + | TQ |
| 122. | Hoàng liên | *Coptis chinensis* Franch. | Ranunculaceae | Root | | | + | TQ |
| 123. | Hoắc hương | *Pogostemon cablin* (Blanco) Benth. | Lamiaceae | Leaf | | + | | MB |
| 124. | Hòe | *Sophora japonica* L. | Fabaceae | Flower | | + | | MB, MN |
| 125. | Hồi | *Illicium verum* Hook.f. et Thoms. | Illiciaceae | Fruit | | + | | MB |

| No. | Vietnamese name | Scientific name | Family | Parts used | Source | | | Notes |
|---|---|---|---|---|---|---|---|---|
| | | | | | Viet Nam | | Imported | |
| | | | | | Wild harvested | Cultivated | | |
| 126. | Hồng hoa | *Carthamus tinctorius* L. | Asteraceae | Flower | | | + | TQ |
| 127. | Húng chanh | *Plectranthus amboinicus* (Lour.) Spreng. | Lamiaceae | Leaf | | + | | MN |
| 128. | Huyền hồ | *Corydris yanhusuo* W. T. Wang | Papaveraceae | Root | | | + | TQ |
| 129. | Huyền sâm | *Scrophularia ningpoensis* Hemsl. | Scrophulariaceae | Root | | + | + | TQ |
| 130. | Huyết dụ | *Cordyline fruticosa* (L.) Goepp. | Asteliaceae | Leaf | | + | | MN |
| 131. | Huyết giác | *Dracaena cambodiana* Pierre ex Gagnep. | Dracaenaceae | Red wood | + | | | MN |
| 132. | Huyết rồng | *Millettia* sp. | Fabaceae | Stem | + | | | MN |
| 133. | Hương nhu tía | *Ocimum tenuiflorum* L. | Lamiaceae | Branch and leaf | | + | | MN, MB |
| 134. | Hy thiêm | *Siegesbeckia orientalis* L. | Asteraceae | Branch and leaf | + | | | MB |
| 135. | ích mẫu | *Leonurus artemisia* (Lour.) S. Y. Hu | Lamiaceae | Branch and leaf | | + | | MB |
| 136. | ích trí nhân | *Alpinia oxyphylla* Miq. | Zingiberaceae | Fruit and seed | | | + | TQ |
| 137. | Ké đầu ngựa | *Xanthium strumarium* L. | Asteraceae | Fruit | + | | | MB, MN |
| 138. | Kê huyết đằng | *Spatholobus* sp.; *Butea* sp. | Fabaceae | Stem | + | | | MB, MN |
| 139. | Kha tử | *Terminalia chebula* Retz. | Combretaceae | Fruit | | | + | TQ |
| 140. | Khoản đông hoa | *Tussilago farfara* L. | Asteraceae | Bud, leaf | | | + | TQ |
| 141. | Khương hoạt | *Notopterygium insium* Ting | Apiaceae | Root | | | + | TQ |
| 142. | Kim anh | *Rosa laevigata* Michx. | Rosaceae | Fruit | + | | | MB |
| 143. | Kim ngân | *Lonicera japonica* Thunb. | Caprifoliaceae | Flower, branch, leaf | + | | + | MB, TQ |
| 144. | Kim tiền thảo | *Desmodium styracifolium* (Osb.) Merr. | Fabaceae | Branch and leaf | | + | | MB |
| 145. | Kinh giới | *Elsholtzia ciliata* (Thunb.) Hyland. | Lamiaceae | Flower, fruit | | + | | MB |
| 146. | La hán | *Momordica grosvenri* Swigle | Cucurbitaceae | Fruit | | | + | TQ |
| 147. | Lá lốt | *Piper lolot* L. | Piperaceae | Whole plant | + | | | MN |
| 148. | Lạc tiên | *Passiflora foetida* L. | Passifloraceae | Branch and leaf | + | | | MN |
| 149. | Liên kiều | *Forsythia suspensa* Vahl. | Oleaceae | Fruit | | | + | TQ |
| 150. | Linh chi | *Ganoderma lucidum* (Leyss. ex Fr.) Karst. | Ganodermataceae | Fruiting body | + | + | + | MN |
| 151. | Long đởm thảo | *Gentiana loureiri* (D.Don) Griseb. | Gentianaceae | Root | | | + | TQ |
| 152. | Lô hội | *Aloe vera* L. var. *chinensis* (Haw.) Berger | Asphodelaceae | Leaf | | + | | MN |
| 153. | Lúa | *Oryza sativa* L. | Poaceae | Seed | | + | | MN |
| 154. | Ma hoàng | *Ephedra sinica* Stapf. | Ephedraceae | Twig | | | + | TQ |
| 155. | Mã đề | *Plantago major* L. | Plantaginaceae | Leaf, seed, flower | | + | | MB |
| 156. | Mạch môn | *Ophiopogon japonicus* (L.f.) Ker.-Gawl. | Convallariaceae | Root | | + | | MB |
| 157. | Mạn kinh | *Vitex trifolia* L. ; *Vitex rotundifolia* L.f. | Verbenaceae | Fruit | + | | | MN |
| 158. | Mào gà trắng | *Celosia argentea* L. | Amaranthaceae | Seed | + | | + | MB, TQ |
| 159. | Mật bông hoa | *Buddleja officinalis* Maxim. | Buddleja ceae | Branch and leaf | + | | | MN |
| 160. | Mẫu đơn | *Paeonia suffruticosa* Andr. | Paeoniaceae | Bark, root | | | + | TQ |
| 161. | Mè đất | *Leucas aspera* (Wild.) Link. | Lamiaceae | Branch and leaf | + | | | MN |
| 162. | Mía dò | *Costus speciosus* (Smith) Koenig | Costaceae | Root | + | | | MN |

| No. | Vietnamese name | Scientific name | Family | Parts used | Source | | | Notes |
|---|---|---|---|---|---|---|---|---|
| | | | | | Viet Nam | | Imported | |
| | | | | | Wild harvested | Cultivated | | |
| 163. | Mò mâm xôi | *Clerodendrum philippinum* var. *symplex* Wu et Fang | Verbenaceae | Branch and leaf, root | + | | | MN |
| 164. | Mộc qua | *Chaenomeles lagenaria* (Lois.) Koidz | Rosaceae | Fruit | | | + | TQ |
| 165. | Mộc thông | *Iodes ovalis* Blume var. *vitiginea* (Hance) Gagnep. | Icacinaceae | Stem, branch, root | + | | | MN, MB |
| 166. | Một dược | *Commiphora* spp. | Burseraceae | Resin | | | + | TQ |
| 167. | Mơ tam thể | *Paederia foetida* L. | Rubiaceae | Leaf | | + | | MN |
| 168. | Mua | *Melastoma septennervium* (Lour.) Merr. | Melastomataceae | Leaf, root | + | | | MN |
| 169. | Muồng trâu | *Senna alata* (L.) Roxb. | Caesalpiniaceae | Leaf, stem | + | | | MN |
| 170. | Muống biển | *Ipomoea pes-caprae* L. | Convolvulaceae | Root | + | | | MN |
| 171. | Mướp đắng | *Momordica charantia* L. subsp. *charantia* (Ser.) Grebensc. | Cucurbitaceae | Fruit, stem and leaf | | + | | MN |
| 172. | Náng hoa trắng | *Crinum asiaticum* L. | Amaryllidaceae | Leaf | | + | | MN |
| 173. | Nắp ấm | *Nepenthes mirabilis* (Lour.) Druce | Nepenthaceae | Whole plant | + | | | MN |
| 174. | Nga truật | *Curcuma zedoaria* (Berger) Roscoe | Zingiberaceae | Root | + | | | MB, MN |
| 175. | Ngải cứu | *Artemisia vulgaris* L. | Asteraceae | Leaf | + | + | | MB |
| 176. | Nghệ | *Curcuma domestica* Valet. | Zingiberaceae | Root | | + | | MN |
| 177. | Ngọc trúc | *Polygonatum odoratum* (Mill.) Druce | Covallariaceae | Root | | | + | TQ |
| 178. | Ngô | *Zea mays* L. | Poaceae | Corn silk | | + | | MN |
| 179. | Ngô thù du | *Tetradium rutaecarpum* (Juss.) Benth. | Rutaceae | Fruit and seed | | | + | TQ |
| 180. | Ngũ gia bì | *Schefflera* spp. | Araliaceae | Bark | + | | | MB |
| 181. | Ngũ trảo | *Vitex negundo* L. | Verbenaceae | Leaf, seed | + | | | MB |
| 182. | Ngũ vị tử | *Schisandra chinensis* (Turcz.) Baill. | Schisandraceae | Fruit | | | + | TQ |
| 183. | Ngưu bàng | *Arctium lappa* L. | Asteraceae | Seed, root | | | + | TQ |
| 184. | Ngưu tất | *Achysanthes bidentata* Blume var. bidentata | Amaranthaceae | Root | | + | + | MB, TQ |
| 185. | Nhãn | *Euphoria longan* (Lour.) Steud. | Sapindaceae | Fruit, leaf | | + | | MB, MN |
| 186. | Nhàu | *Morinda citrifolia* L. | Rubiaceae | Fruit, root | | + | | MN |
| 187. | Nhàu rừng | *Morinda tomentosa* Heyne | Rubiaceae | Root | + | | | MN |
| 188. | Nhân trần | *Adenosma caerulea* R. Br. | Scrophulariaceae | Whole plant (without root) | + | + | | MB |
| 189. | Nhân trần bắc | *Artemisia capillaris* Thunb. | Asteraceae | Branch and leaf | | | + | TQ |
| 190. | Nhọ nồi | *Eclipta prostrata* (L.) L. | Asteraceae | Whole plant (without root) | + | | | MN |
| 191. | Nhục đậu khấu | *Myristica fragrans* Houtt. | Myristicaceae | Seed | | | + | TQ |
| 192. | Nhục thung dung | *Cistanche deserticola* Y. C. Ma | Orobanchaceae | Whole plant | | | + | TQ |
| 193. | Núc nác | *Oroxylum indicum* (L.) Vent. | Bignoniaceae | Bark | + | | | MB, MN |

| No. | Vietnamese name | Scientific name | Family | Parts used | Source | | | Notes |
|---|---|---|---|---|---|---|---|---|
| | | | | | Viet Nam | | Imported | |
| | | | | | Wild harvested | Cultivated | | |
| 194. | Ô dược | *Lindera aggregata* (Sims) Kosterm. | Lauraceae | Root | + | | + | MB, TQ |
| 195. | Ô đầu | *Aconitum pulchellum* Hand. - Mazz. | Ranunculaceae | Root | | + | + | TQ, MB |
| 196. | Ô rô | *Acanthus ilicifolius* L. | Acanthaceae | Leaf | + | | | MN |
| 197. | Phá cố chỉ | *Psoralea corylifolia* L. | Fabaceae | Seed | | | + | TQ |
| 198. | Phan tả diệp | *Cassia angustifolia* Vahl. | Caesalpiniaceae | Leaf, seed | | + | | MN |
| 199. | Phòng đảng sâm | *Codonopsis pilosula* (Franch.) Nannf. | Campanulaceae | Root | | | + | TQ |
| 200. | Phòng kỷ | *Aristolochia* spp. | Aristolochiaceae | Root | + | | + | MN, TQ |
| 201. | Phòng phong | *Saposhnikovia divaricata* (Turcz) Schisch. | Apiaceae | Root | | | + | TQ |
| 202. | Phục linh | *Poria cocos* (Schw.) Wolf | Polyporaceae | Fruiting body | | | + | TQ |
| 203. | Qua lâu | *Trichosanthes* spp. | Cucurbitaceae | Seed, root | + | | + | MB, TQ |
| 204. | Quao | *Sterospermum* spp. | Bignoniaceae | Root, stem | + | | | MN |
| 205. | Quế | *Cinnamomum cassia* Presl | Lauraceae | Bark and branch, small branch | | + | | MN |
| 206. | Quít | *Citrus reticulata* Blanco | Rutaceae | Fruit skin | | + | | MN |
| 207. | Quyển bá trường sinh | *Selaginella tamariscina* (Beauv) Spring | Selaginellaceae | Whole plant | + | | | MN |
| 208. | Rau dền gai | *Amaranthus spinosus* L. | Amaranthaceae | Root, seed | + | | | MN |
| 209. | Rau đắng đất | *Glinus lotoides* L. | Molluginaceae | Whole plant | + | | | MN |
| 210. | Rau má | *Centella asiatica* (L.) Urb. | Apiaceae | Whole plant | + | | | MN |
| 211. | Rau mùi | *Coriadrum sativum* L. | Apiaceae | Seed | | + | | MB |
| 212. | Ráy | *Alocasia macrrorhiza* (L.) Schott | Araceae | Root, leaf | + | | | MN |
| 213. | Ráy gai | *Lasia spinosa* (L.) Thw. | Araceae | Root | + | | | MN |
| 214. | Riềng | *Alpinia officinarum* Hance | Zingiberaceae | Root | | + | | MN |
| 215. | Rong mơ | *Sargassum* sp. | Sargassaceae | Whole plant | + | | | MN |
| 216. | Sa nhân | *Amomum* spp. | Zingiberaceae | Fruit and seed | + | | | MN |
| 217. | Sa sâm bắc | *Adenophora verticillata* (Pall.) Fisch. | Campanulaceae | Root | | | + | TQ |
| 218. | Sa sâm nam | *Launae pinnatifida* Cass. | Asteraceae | Root | + | | | MN |
| 219. | Sả | *Cymbopogon citratus* Stapf. | Poaceae | Whole plant | | + | | MN |
| 220. | Sài đất | *Wedelia calendulacea* Less. | Asteraceae | Whole plant | | + | | MN |
| 221. | Sài hồ bắc | *Bupleurum chinense* DC. | Apiaceae | Root | | | + | TQ |
| 222. | Sài hồ nam | *Polycarpaea arenaria* (Lour.) Gagnep. | Caryophyllaceae | Root | + | | | MN |
| 223. | Sắn dây | *Pueraria lobata* (Willd.) Ohwi var. *thomsonii* (Benth. ) Maesen. | Fabaceae | Root | | + | | MN |
| 224. | Sâm cát lâm | *Panax ginseng* C.A. Meyer | Araliaceae | Root | | + | | TQ |
| 225. | Sâm đại hành | *Eleuthrine bulbosa* (Mill.) Urban. | Iridaceae | Bulb | | + | | MN |
| 226. | Sâm ngọc linh | *Panax vietnamensis* Ha et Grushv. | Araliaceae | Root, leaf | + | + | | MN |

| No. | Vietnamese name | Scientific name | Family | Parts used | Source | | | Notes |
|---|---|---|---|---|---|---|---|---|
| | | | | | Viet Nam | | Imported | |
| | | | | | Wild harvested | Cultivated | | |
| 227. | Sen | *Nelumbo nucifera* Gaertn. | Nelumbonaceae | Leaf, pistil/stamen, fruit (seed), young leaf | | + | | MN |
| 228. | Si | *Ficus benjamina* L. | Moraceae | Root, leaf | + | + | | MN |
| 229. | Sim | *Rhodomyrtus tomentosa* Ait. | Myrtaceae | Root, bud | + | | | MN |
| 230. | Sơn tra | *Crataegus pinnatifida* Bunge | Rosaceae | Fruit | | | + | TQ |
| 231. | Sống rắn | *Acacia pinnata* (L.) Willd. | Mimosaceae | Bark | + | | | MN |
| 232. | Sứa hồng | *Anoectochilus* sp. | Orchidaceae | Whole plant | + | | | MN |
| 233. | Tam lăng | *Curculigo gracilis* (Kurz) Hook. f. | Hypoxidaceae | Root | + | | | MN |
| 234. | Tam thất | *Panax notoginseng* (Burk.) Chen | Araliaceae | Root | | | + | TQ |
| 235. | Tan quy (ngải chân vịt) | *Artemisia lactiflora* Wall. ex Bess. | Asteraceae | Branch and leaf | + | + | | MB, TQ |
| 236. | Tang ký sinh | *Taxillus gracilifolius* (Schult.) Ban | Loranthaceae | Branch and leaf | | + | | MB |
| 237. | Táo mèo | *Docynia indica* (Wall.) Decne. | Rosaceae | Fruit | + | | | MB |
| 238. | Táo ta | *Ziziphus mauritiana* Lam. | Rhamnaceae | Seed, leaf | | + | + | MN |
| 239. | Tần giao | *Gentiana tibetica* King | Gentianaceae | Root | + | | | TQ |
| 240. | Tế tân | *Asarum* spp. | Aristolochiaceae | Root | + | | + | TQ,MB |
| 241. | Thạch hộc | *Dendrobium nobile* Lindl. | Orchidaceae | Stem | + | | | MN, MB |
| 242. | Thạch xương bồ | *Acorus gramineus* Aiton ex Soland. | Acoraceae | Root | + | | | MB, MN |
| 243. | Thảo quả | *Amomum aromaticum* Roxb. | Zingiberaceae | Fruit | | + | | MB |
| 244. | Thảo quyết minh | *Cassia tora* L. | Caesalpiniaceae | Seed | + | | | MN |
| 245. | Thăng ma | *Cimicifuga dahurica* (Turcz.) Maxim | Ranunculaceae | Whole plant | + | | + | MB, TQ |
| 246. | Thị | *Diospyros decandra* Lour. | Ebenaceae | Bract | | + | | MB |
| 247. | Thiên hoa phấn | *Solena amplexicaulis* (Lam.) Dandhi | Cucurbitaceae | Root | | | + | TQ |
| 248. | Thiên ma | *Gastrodia elata* Blume | Orchidaceae | | | | + | TQ |
| 249. | Thiên môn | *Asparagus cochinchinensis* (Lour.) Merr. | Asparagaceae | Root | + | | | MN |
| 250. | Thiên niên kiện | *Homalomena* spp. | Araceae | Root | + | | | MN |
| 251. | Thổ bối mẫu | *Fritillaria cirrhosa* D. Don | Liliaceae | Root | | | + | TQ |
| 252. | Thổ hoàng liên | *Thalictrum foliolosum* DC. | Ranunculaceae | Root | + | | + | MB, TQ |
| 253. | Thổ phục linh | *Smilax glabra* Roxb. | Smilacaceae | Root | + | | | MN |
| 254. | Thông nhựa | *Pinus merkusii* Jungh. et de Vriese | Pinaceae | Resin | | + | | MN |
| 255. | Thông thảo | *Tetrapanax papyriferus* (Hook.) K. Koch | Araliaceae | Inside stem | + | | + | TQ, MB |
| 256. | Thốt nốt | *Borassus flabellifer* L. | Arecaceae | Flower, sap | | + | | MN |
| 257. | Thù lù | *Physalis* sp. | Solanaceae | Branch and leaf | + | | | MN |
| 258. | Thủy xương bồ | *Acorus calamus* L. | Acoraceae | Root | + | | | MB, MN |
| 259. | Thương truật | *Atractylodes lancea* (Thunb.) DC. | Asteraceae | Root | | | + | TQ |
| 260. | Tía tô | *Perilla frutescens* (L.) Britt. | Lamiaceae | Leaf, seed | | + | | MB |

| No. | Vietnamese name | Scientific name | Family | Parts used | Source | | | Notes |
|---|---|---|---|---|---|---|---|---|
| | | | | | Viet Nam | | Imported | |
| | | | | | Wild harvested | Cultivated | | |
| 261. | Tiền hồ | *Peucedanum decursivum* (Miq.) Maxim | Apiaceae | Root | + | | | MB |
| 262. | Tiểu hồi | *Foeniculum vulgare* Mill. | Apiaceae | Seed | | | + | TQ |
| 263. | Tơ hồng vàng | *Cuscuta chinensis* Lam. | Cuscutaceae | Whole plant | + | | | MN |
| 264. | Tơ xanh | *Cassytha filiformis* L. | Lauraceae | Seed and Whole plant | + | | | MN |
| 265. | Trạch tả | *Alisma plantago-aquatica* L. | Alismataceae | Root | | + | + | TQ |
| 266. | Trắc bá | *Platycladus orientalis* (L.) Franco | Cupressaceae | Leaf, seed | | + | + | MB, TQ |
| 267. | Trinh nữ hoàng cung | *Crinum latifolium* L. | Amaryllidaceae | Leaf | | + | | MN |
| 268. | Trương quân | *Ancistrocladus cochinchinensis* Gagnep. | Ancistrocladaceae | Branch and leaf | + | | | MN |
| 269. | Tục đoạn | *Dipsacus asper* Wall. | Dipsacaceae | Root | + | + | + | MB, MN, TQ |
| 270. | Tử uyển | *Aster ageratoides* Turcz. | Asteraceae | Flower | | | + | TQ |
| 271. | Tỳ giải | *Smilax synandra* Gagnep. | Smilacaceae | Root | + | | + | MB |
| 272. | Uy linh tiên | *Thunbergia eberhardtii* Benoist | Acanthaceae | Leaf, seed | | | + | TQ |
| 273. | Vàng đắng | *Coscinium fenestratum* (Gaertn.) Colebr. | Menispermaceae | Stem | | | + | Lμo |
| 274. | Vân mộc hương | *Aucklandia lappa* Decne. | Asteraceae | Root | | + | + | MB, TQ |
| 275. | Viễn chí | *Polygala japonica* Houtt. | Polygalaceae | Root | | | + | TQ |
| 276. | Vòi voi | *Heliotropium indicum* L. | Boraginaceae | Whole plant | + | | | MN |
| 277. | Vọng cách | *Premna* sp. | Verbenaceae | Branch, leaf | + | | | MN |
| 278. | Vông nem | *Erythrina variegata* L. | Fabaceae | Leaf, branch | + | | | MN |
| 279. | Xa kê | *Artocarpus communis* Forst. et Forst.f. | Moraceae | Leaf | | + | | MN |
| 280. | Xạ can | *Belamcanda chinense* (L.) DC. | Iridaceae | Root | | + | | MN |
| 281. | Xấu hổ | *Mimosa pudica* L. | Mimosaceae | Stem base and root | + | | | MN |
| 282. | Xích đồng nam | *Clerodendrum japonicum* (Thunb.) Sweet | Verbenaceae | Branch, leaf, flower, root | + | | | MN |
| 283. | Xích thược | *Paeonia veitchii* Lynch. var. *beresowskii* Schiff. | Paeoniaceae | Root | | | + | TQ |
| 284. | Xoan rừng | *Brucea javanica* Thunb. | Simaroubaceae | Seed | + | | | MN |
| 285. | Xuyên khung | *Ligusticum wallichii* Franch. | Apiaceae | Root | | + | + | TQ, MB |
| 286. | Xuyên tâm liên | *Andrographis paniculata* (Burm.f.) Ness | Acanthaceae | Twig | | + | | MN |
| 287. | Xuyên tiêu | *Zanthoxylum nitidum* (Roxb.) DC. | Rutaceae | Old fruit | + | | | MN |
| 288. | ý dĩ | *Coix lachryma-jobi* L. | Poaceae | Seed | | + | | MN |

**Notes:** MN = South Viet Nam sourced (wild harvested and/or cultivated)
MB = North Viet Nam sourced (wild harvested and/or cultivated)
TQ = imported from China

## APPENDIX 4

Complete list of the medicinal animal species found from the survey conducted in traditional medicine markets in southern Viet Nam in 2006.

| No. | Vietnamese name | Scientific name | Family | Parts used | Source | | Conservation status | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Wild | Bred | a | b | c |
| *(1)* | *(2)* | *(3)* | *(4)* | *(5)* | *(6)* | *(7)* | *(8)* | *(9)* | *(10)* |
| **Phylum Chordata<br>Sub-phylum Vertebrata<br>Class Mammalia (Mammals)** | | | | | | | | | |
| 1. | Dơi quạ | *Hipposideros armiger* Hodgson | Hipposideridae | Excrement | + | | | | |
| 2. | Dơi muỗi | *Pipistrellus javanicus* Gray | Vespertilionidae | Excrement | + | | | | |
| 3. | Cu li nhỏ | *Nycticebus pygmaeus* Bonhote | Loricidae | Skin | + | | VU | V | IB |
| 4. | Khỉ mặt đỏ | *Macaca arctoides* Geoffroy | Cercopithecidae | Whole body, bone | + | | VU | V | IIB |
| 5. | Khỉ vàng | *Macaca mulatta* Zimmermann | Cercopithecidae | Whole body, bone | + | | LR/nt | | IIB |
| 6. | Chó nhà | *Canis familliaris* Linnaeus | Canidae | Genital organ, bone | | + | | | |
| 7. | Gấu ngựa | *Ursus thibetanus* G. Cuvier | Ursidae | Whole body, gall, bone, leg | + | + | VU | E | IB |
| 8. | Rái cá | *Lutra lutra* Linnaeus | Mustelidae | Meat, bone, gall | + | | VU | T | IB |
| 9. | Chồn mực | *Arctictis binturong* Raffles | Viverridae | Musk gland | + | | | V | IB |
| 10. | Cầy hương | *Viverricula indica* Desmarest | Viverridae | Musk gland | + | | | | IIB |
| 11. | Mèo rừng | *Prionailurus bengalensis* Kerr | Felidae | Bone | + | | | | |
| 12. | Hổ | *Panthera tigris* Linnaeus | Felidae | Bone, genital organ, claw | + | | EN | E | IB |
| 13. | Voi | *Elephas maximus* Linnaeus | Elephantidae | Skin, tusk, bone | + | + | EN | V | IB |
| 14. | Lừa | *Equus asinus* Linnaeus | Equidae | Skin (imported) | | + | | | |
| 15. | Tê giác | *Dicerorhinus sumatrensis* Fischer or *Rhinoceros sondaicus* Desmarest | Rhinocerotidae | Horn (imported) | + | | CR | E | IB |
| 16. | Lợn rừng | *Sus scrofa* Linnaeus | Suidae | Meat, gall, claw | + | | | | |
| 17. | Lợn nhà | *Sus domesticus* Brisson | Suidae | Leg, gall, claw | | + | | | |
| 18. | Hươu cà tông | *Cervus eldi* M'Clelland | Cervidae | Horn, antler | + | | | E | IB |
| 19. | Hươu sao | *Cervus nippon* Temminck | Cervidae | Hornantler | + | + | CR | V | |
| 20. | Nai | *Cervus unicolor* Kerr | Cervidae | Hornantler | + | + | | | |
| 21. | Bò nhà | *Bos taurus* Linnaeus | Bovidae | Gall, gall-stone | | + | | | |
| 22. | Trâu nhà | *Bubalus bubalis* Linnaeus | Bovidae | Gall, gall-stone, horn | | + | | | |
| 23. | Sơn dương | *Naemorhedus sumtraensis* Bechstein | Bovidae | Horn, bone, meat | + | | VU | V | IB |
| 24. | Tê tê java | *Manis javanica* Desmarest | Manidae | Scale | + | | LR/nt | | IIB |
| 25. | Sóc bay | *Belomys pearsoni* Gray | Pteromyidae | Excrement | + | | LR/nt | R | IIB |
| 26. | Nhím | *Acanthion brachyurus* Linnaeus | Hystricidae | Stomach, gall | + | + | | | |
| 27. | Don | *Atherurus macrourus* Linnaeus | Hystricidae | Stomach, gall | + | | | | |
| 28. | Thỏ rừng | *Lepus nigricollis* Cuvier | Leporidae | Meat, blood | + | | | | |
| **Aves (Birds)** | | | | | | | | | |
| 29. | Ngỗng nhà | *Anser dometica* Geese | *Anatidae* | Gizzard membrane, feather | | + | | | |

| No. | Vietnamese name | Scientific name | Family | Parts used | Source | | Conservation status | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Wild | Bred | a | b | c |
| *(1)* | *(2)* | *(3)* | *(4)* | *(5)* | *(6)* | *(7)* | *(8)* | *(9)* | *(10)* |
| 30. | Gà nhà | *Gallus gallus domesticus* Brisso | Phasianidae | Gizzard membrane | | + | | | |
| 31. | Bìm bịp lớn | *Cetropus sinenes intermedius* Hume | Cuculidae | Whole body | + | | | | |
| 32. | Bìm bịp nhỏ | *Cetropus bengalensis bengalensis* Gmelin | Cuculidae | Whole body | + | | | | |
| **Reptilia (Reptiles)** | | | | | | | | | |
| 33. | Thạch sùng | *Hemidactylus frenatus* Schlegel | Gekkonidae | Whole body | + | | | | |
| 34. | Tắc kè | *Gekko gecko* Linnaeus | Gekkonidae | Whole body | + | | | T | |
| 35. | Kỳ đà vân | *Varanus nebulosus* Gray | Varanidae | Gall | + | + | | V | IIB |
| 36. | Rắn hai đầu | *Cylindrophis rufus* Schlegel | Anilidae | Whole body without gut | + | | | | |
| 37. | Trăn gấm | *Python reticulatus* Schneider | Boidae | Whole body, bone, fat... | + | + | | V | IIB |
| 38. | Rắn săn chuột | *Elapidae radiata* Schlegel | Colubridae | Whole body (without gut) | + | | | | IIB |
| 39. | Rắn ráo | *Ptyas korros* Schlegel | Colubridae | Whole body (without gut), shed skin | + | | | T | |
| 40. | Rắn roi | *Ahaetula prasina* Reinhardt | Colubridae | Whole body (without gut) | + | | | | |
| 41. | Rắn nước | *Xenochrophis piscator* Schneider | Colubridae | Whole body (without gut) | + | | | | |
| 42. | Rắn liu điu | *Enhydris plumbea* Boie | Colubridae | Whole body (without gut) | + | | | | |
| 43. | Rắn hổ mang | *Naja naja* Linnaeus | Elapidae | Whole body (without gut), gall | + | + | | T | IIB |
| 44. | Rắn cạp nia | *Bungarus candidus* Linnaeus | Elapidae | Whole body (without gut) | + | | | | IIB |
| 45. | Rắn cạp nong | *Bungarus fasciatus* Schneider | Elapidae | Whole body (without gut) | + | | | T | IIB |
| 46. | Rắn hổ chúa | *Ophiophagus hannah* Cantor | Elapidae | Whole body (without gut) | + | + | | E | IB |
| 47. | Rắn biển (Đẻn) | *Hydrophis* spp. | Elapidae | Whole body (without gut) | + | | | | |
| 48. | Rắn lục | *Trimeresurus* sp. | Viperidae | Whole body (without gut) | + | | | R | |
| 49. | Cá sấu | *Crocodylus siamensis* Schneider | Crocodylidae | Gall | + | | EN | E | |
| 50. | Rùa hộp | *Cuora* sp. | Emydidae | Meat, shell, breastplate | + | | VU | V | IB |
| 51. | Rùa đất sê pôn | *Cyclemys tcheponensis* Bourret | Emydidae | Meat, shell, breastplate | + | | LR/nt | | |
| 52. | Rùa ruộng | *Siebenrockiella crassicollis* Gray | Emydidae | Meat, shell, breastplate | + | | | | |
| 53. | Rùa núi vàng | *Indotestudo elongata* Blyth | Testudinidae | Meat, shell, breastplate | + | | EN | V | IB |
| 54. | Ba ba nam bộ | *Amyda cartilaginea* Boddaert | Trionychidae | Meat, breastplate | + | | | V | |
| 55. | Đồi mồi | *Eretmochelys imbricata* Linnaeus | Cheloniidae | Shell | + | | CR | E | IB |

| No. | Vietnamese name | Scientific name | Family | Parts used | Source | | Conservation status | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Wild | Bred | a | b | c |
| *(1)* | *(2)* | *(3)* | *(4)* | *(5)* | *(6)* | *(7)* | *(8)* | *(9)* | *(10)* |
| **Amphibia (Amphibians)** | | | | | | | | | |
| 56. | Cóc | *Bufo melanostictus* Schneider | Bufonidae | Meat, bone, exudate | + | | | | |
| **Pisces (Fish)** | | | | | | | | | |
| 57. | Cá ngựa | *Hippocampus* spp. | Syngnathidae | Whole body (without gut) | + | | | V | |
| 58. | Cá chìa vôi | *Syngnathus acus* Linnaeus | Syngnathidae | Whole body (without gut) | + | | | R | |
| **Sub-phylum invertebrate (Invertebrates)<br>Class Annelida (Annelids)** | | | | | | | | | |
| 59. | Giun đất (địa long) | *Pheretima asiatica* Michaelsen | Megascolecidae | Whole body | + | | | | |
| **Hirudinea (Leeches)** | | | | | | | | | |
| 60. | Đỉa | *Hirudo officinalis* Moquin | Hirudinidae | Whole body | + | | | | |
| **Mollusca (Molluscs)<br>Class Cephalopoda (Cephalopods)** | | | | | | | | | |
| 61. | Mực nang | *Sepia tigris* Sasaki | Sepiidae | shell | + | | | | |
| **Echinodemata (Echinoderms)<br>Class (Asteroidae) Star Fish** | | | | | | | | | |
| 62. | Sao biển | *Astropecten velitaris* Martens | Astropectinidae | Whole body | + | | | | |
| **Phylum Arthropoda (Arthropods)<br>Class (Arachnida)** | | | | | | | | | |
| 63. | Bọ cạp nâu | *Lychas mucronatus* Fabricius | Buthidae | Whole body | + | + | | | |
| **Miriopoda (Miriopods)** | | | | | | | | | |
| 64. | Rết rừng | *Scolopendra morsitans* Linnaeus | Scolopendridae | Whole body | + | + | | | |
| **Insecta (Insects)** | | | | | | | | | |
| 65. | Ve sầu | *Cryptolympana japonica* Kate | Cicadidae | Shed skin | + | | | | |
| 66. | Tằm | *Bombyx mori* Linnaeus | Bombycidae | Whole body | | + | | | |
| 67. | Ong mật | *Apis* spp. | Apidae | Honey, queen bee milk | + | + | | | |
| 68. | Ong đất | *Xylocopa* spp. | Apidae | Honey, whole body | + | | | | |

Notes:
- IUCN Red List of Threatened species (2000): **CR** (Critically Endangered); **EN** (Engangered); **VU** (Vulnerable); LR/nt (Lower risk / not threatened.
- Red Data Book of Viet Nam Vol. I - Animals (2000): **E** (Endangered); **R** (Rare); **T** (Threatened); **V** (Vulnerable).
- Decree 32/2006/ND-CP on Management of Endangered, Precious, and rare Species of Wild Plants and Animals (2006): IB & IIB.

## APPENDIX 5

Complete list of the wild animal species confiscated by the Da Nang Forest Protection Department from 2000 – 2006.

| No. | Species name | Amount (kg) | Number of individuals |
|---|---|---|---|
| 1. | Python | 330 | |
| 2. | Clouded monitor | 160 | 95 |
| 3. | Pangolin | 397 | 105 |
| 4. | Crab-eating macaque | 138 | 47 |
| 5. | Dried crab-eating macaque | 40 | |
| 6. | Rhesus macaque | | 1 |
| 7. | Porcupine sp. | | 20 |
| 8. | Asiatic black bear | | 5 |
| 9. | Himalayan Brown Bear | | 3 |
| 10. | Snakes | 671 | 7 |
| 11. | Marten or small Indian civet | | 36 |
| 12. | Large Indian civet | 9 | |
| 13. | Common hill myna | | 105 |
| 14. | Myna ('Green') | 10 | |
| 15. | softshell turtle | | 4 |
| 16. | Elongated tortoise | | 862 |
| 17. | Giant Asian pond turtle | | 263 |
| 18. | Tockay | 5 | |
| 19. | Golden cat | | 1 |
| 20. | Asiantic Brush-tailed Porcupine | | 20 |
| 21. | Red collared Dove | | 931 |
| 22. | Starling/Myna (chicks) | | 200 |
| 23. | Munia | | 300 |
| 24. | Parrot | | 154 |
| 25. | Red-shanked Douc Langur | | 2 |
| 26. | Hwamei | | 10 |
| 27. | Robin | | 19 |
| 28. | Robin | | 19 |
| 29. | Big-headed Turtle | | 3 |
| 30. | Python | | 2 |
| 31. | Sambar deer horn | 6 | |
| 32. | Sambar deer horn | 4 | |
| 33. | Malayan Snail-eating Turtle | | 8 |
| 34. | Malayan Box Turtle | | 31 |
| 35. | Yellow-headed Temple Turtle | | 3 |
| 36. | Lesser Whistling Duck | | 60 |
| 37. | Stump-tailed Macaque | | 5 |
| 38. | Yellow-cheeked Gibbon | | 2 |
| 39. | Wild Boar meat | 145 | |
| | **Total** | **1915 kg** | **3323 individuals** |

**APPENDIX 6** Legislation promulgated in Viet Nam with specific references to the exploitation, trade and use of plants and animals in traditional medicine.

| Type | Ref. No. | Date of issuance | Issuing authority | Summary of contents |
|---|---|---|---|---|
| Law | 34/2005/QH11 | 27/06/2005 | NA[i] | Pharmacy Law manipulating the registration, distribution, sales, supply, advertisement, testing, and quality control of all medicinal drugs, including traditional medicines |
| Decision | 765/2005/QĐ-BYT | 22/03/2005 | MoH[ii] | Approval of action plan to implement national policy on traditional medicine to 2010 |
| Decision | 30/2005/QĐ-TTg | 02/02/2005 | Govt[iii] | Foundation of Viet Nam's Academy of Traditional Medicine |
| Circular | 09/2004/TT-BYT | 14/9/2004 | MoH | Changes and supplementation to Circular 01/2004/TT-BYT dated 6 Jan 2004 of Ministry of Health on guidelines to private medicinal and pharmaceutical practice |
| Circular | 01/2004/TT-BYT | 06/01/2004 | MoH | Guide to private medicinal and pharmaceutical practice |
| Decision | 222/2003/QĐ-TTg | 03/11/2003 | PM[iv] | Approval of national policy on traditional medicine to 2010 |
| Decision | 5467/2003/QĐ-BYT | 21/10/2003 | MoH | Issuance of "Guidelines on application of electro-acupuncture in support to detoxify drug addiction" |
| Decree | 103/2003/NĐ-CP | 12/09/2003 | Govt | Specification of several articles in Ordinance on Private Medicinal and Pharmaceutical Practice |
| Ordinance | 07/2003/PL-UBTVQH11 | 25/02/2003 | NASC[v] | Ordinance on Private Medicinal and Pharmaceutical Practice |
| Official letter | 141/TCHQ-KTTT | 10/01/2003 | VNC[vi] | Import tax on traditional medicines |
| Decision | 108/2002/QĐ-TTg | 15/8/2002 | PM | Approval of Strategy for Development of Pharmacy Sector to 2010 |
| Circular | 08/2002/TT-BYT | 20/6/2002 | MoH | Guidelines on foreign investment and cooperation in Viet Nam in fields of medical examination and treatment using traditional medicine |
| Official letter | 1718/TCHQ-KTTT | 22/04/2002 | VNC | Import tax on traditional medicines |
| Circular | 20/2000/TT-BYT | 28/11/2000 | MoH | Guidelines on licensing traditional medicine practice in support of registration for medical examination and treatment services using traditional medicine, and of traditional medicines business |
| Directive | 25/1999/CT-TTg | 30/8/1999 | PM | Promotion of traditional medicine |
| Circular | 13/1999/TT-BYT | 06/07/1999 | MoH | Guidelines to implement Ordinance on Medicinal and Pharmaceutical Practice in field of traditional medicine |
| Directive | 09/BYT-CT | 02/11/1996 | MoH | Strengthening of management of private traditional medicine practitioners and traditional medicine quality control |
| Decision | 1203/BYT-QĐ | 11/7/1996 | MoH | Issuance of the regulation on medicine registration |
| Decree | 37/CP | 20/6/1996 | Govt | General health care and national policy on medicine uses |
| Decision | 371/BYT/QĐ | 13/3/1996 | MoH | Issuance of the regulation on evaluation of traditional medicine safety and efficiency |
| Directive | 03/BYT-CT | 01/3/1996 | MoH | Restoration of the traditional Vietnamese medicine garden and promotion of using traditional medicine's massage therapy in local community health care |
| Circular | 08/BYT-TT | 2/5/1994 | MoH | Guide to implement Ordinance on Private Medicinal and Pharmaceutical Practice in the field of private traditional medicine practice |
| Decree | 06/CP | 29/01/1994 | Govt | Specification of some articles in Ordinance on Private Medicinal and Pharmaceutical Practice |
| Ordinance | Not applicable | 13/10/1993 | NASC | Ordinance on Private Medicinal and Pharmaceutical Practice |
| Decision | 577/BYT/QĐ | 8/7/1993 | MoH | Issuance of provisional regulation on import of traditional medicines |
| Circular | 05/BYT-TT | 15/5/1993 | MoH | Granting certificates of qualification on traditional medicinal pharmaceutics |

| | | | | |
|---|---|---|---|---|
| Inter-sectoral Circular | 23/TTLN | 8/12/1990 | MoH and WU[vii] | Promotion of traditional Vietnamese medicine use and cultivation of medicinal plants in the interest of women's health care |
| Law | Not applicable | 11/7/1989 | NA | Law on Protection of People's Health |
| Inter-ministerial Circular | 34-TT/LB | 29/12/1979 | MoH and MoFo[viii] | Guidelines to implement Decision 200/CP with respect to harvest and protection of wild-sourced medicinal plants |
| Inter-ministerial Circular | 28/TT-LB | 27/9/1979 | MoH and MoA[ix] | Guidelines to implement Decision 200/CP in promoting medicinal plant cultivation |
| Resolution | 200/CP | 21/8/1978 | Govt | Development of national pharmaceutical work |
| Official letter | 4315/BYT-DC | 17/9/1977 | MoH | Guidelines on standardization of traditional Vietnamese medicine at district and commune levels |
| Inter-ministerial Circular | 21/TTLB | 08/8/1977 | MoH and MoE[x] | Study of traditional Vietnamese medicine plants in school |
| Decision | 1049/BYT-QĐ | 14/9/1976 | MoH | Issuance of provisional template charter for traditional medicine cooperatives |
| Directive | 23/BYT-CT | 17/7/1976 | MoH | Promotion of traditional Vietnamese medicine service and acupuncture at district and commune levels |
| Directive | 10/BYT-CT | 27/3/1976 | MoH | Promotion of research into drug production from national medicine materials |
| Decision | 63/BYT-QĐ | 19/02/1974 | MoH | Listing of essential traditional medicine remedies |
| Inter-ministerial Circular | 356-TT/LB | 15/8/1973 | MoH and PC[xi] | Decentralization of purchase pricing of medicinal materials |
| Directive | 27/BYT-CT | 07/11/1972 | MoH | Promotion of cultivation and use of traditional medicine plants to reduce pressure on wild-sourced rare medicinal materials |
| Directive | 27/BYT-CT | 07/9/1972 | MoH | Promotion of development and use of subsistent traditional Vietnamese medicines at commune level |
| Circular | 01/BYT-CT | 15/01/1969 | MoH | Promotion of cultivation of medicinal plants |
| Official letter | 3148/BYT-DC | 05/12/1968 | MoH | Cultivation of some medicinal plants at commune level |
| Inter-ministerial Circular | 26/TT-LB | 12/8/1968 | MoH and MoFo | Guidelines to implement Directive 210/TTg on exploitation of wild-sourced medicinal materials |
| Inter-ministerial Circular | 06/TT-LB | 12/02/1968 | MoH and MoA | Guidelines to implement Directive 210/TTg on medicinal plant cultivation in agro-cooperatives |
| Directive | 36/TD | 29/12/1967 | MoH | Promotion of traditional Vietnamese medicine use for children, within family and in school |
| Directive | 21/CP | 19/12/1967 | PM | Promotion of research into traditional medicine and integration of traditional and western medicines |
| Circular | 37/BYT-TT | 17/10/1967 | MoH | Guidelines to implement Directive 210-TTg/VG on exploiting and developing medicinal plants and animals |
| Circular | 20/BYT-TT | 08/8/1967 | MoH | Guidelines on establishment of research stations of medicinal materials |
| Official letter | 1081/BYT-DC | 06/5/1967 | MoH | Strengthening of collection of and trade in traditional Vietnamese medicine plants at commune level |
| Inter-ministerial Circular | 05/BYT-LĐ | 21/02/1967 | MoH and MoL[xii] | Establishment of research stations of medicinal materials at provincial level |
| Directive | 265/BYT-DC | 10/01/1967 | MoH | Mobilization of people's involvement in medicinal plant cultivation |
| Directive | 210-TTg/VG | 06/12/1966 | PM | Exploitation and cultivation/rearing of medicinal plants and animals |
| Official Letter | 5528/BYT | 31/8/1961 | MoH | Guidelines to use local traditional medicine remedies |
| Directive | 101/TTg | 15/3/1961 | PM | Promotion of use of traditional medicine (traditional Vietnamese medicine and traditional Chinese medicine) |

| | | | | |
|---|---|---|---|---|
| Official Letter | 682/ĐY | 22/9/1958 | MoH | Strengthening of self-reliance on traditional Vietnamese medicine |
| Decree | 397-NĐ/ĐY | 28/4/1958 | MoH | Foundation of Council for Traditional Medicine |
| Decree | 338/TTg | 07/6/1956 | PM | Foundation of Institute of Traditional Medicine Studies under Ministry of Health |
| Decree | 337/TTg | 07/6/1956 | PM | Foundation of ministerial Department of Traditional Medicine at Ministry of Health |
| Decree | 333-BYT/NĐ | 12/4/1956 | MoH | Foundation of an office of traditional medicine studies at Department of Health Treatment |

[i] National Assembly
[ii] Ministry of Health
[iii] Government
[iv] Prime Minister
[v] National Assembly Standing Committee
[vi] General Department of Viet Nam Customs
[vii] Viet Nam's Central Committee of Women's Union
[viii] Ministry of Forestry
[ix] Ministry of Agriculture
[x] Ministry of Education
[xi] Government's Price Committee
[xii] Ministry of Labour

# APPENDIX 7 Taxa listed in Decree 32/2006/ND-CP

**GROUP I: COMMERCIAL EXPLOITATION AND USE IS STRICTLY PROHIBITED**

**IA. Wild Plant Species**

| No. | Scientific Name | No. | Scientific Name |
|---|---|---|---|
| | **PINOPHYTA** | | **MAGNOLIOPHYTA** |
| 1 | *Cupressus torulosa* | | **Magnoliopsida** |
| 2 | *Taiwania cryptomerioides* | 8 | *Berberis julianae* |
| 3 | *Xanthocyparis vietnamensis* | 9 | *Berberis wallichiana* |
| 4 | *Abies delavayi fansipanensis* | 10 | *Diospyros salletii* |
| 5 | *Pinus kwangtungensis* | 11 | *Dalbergia tonkinensis* |
| 6 | *Taxus wallichiana* | 12 | *Coptis chinensis* |
| | (*T. baccata wallichiana*) | 13 | *Coptis quinquesecta* |
| 7 | *Glyptostrobus pensilis* | | **Liliopsida** |
| | | 14 | *Anoectochilus* spp. |
| | | 15 | *Paphiopedilum* spp. |

**I B. Wild Animal Species**

| No. | Scientific name | No. | Scientific name |
|---|---|---|---|
| | **MAMMALIA** | 33 | *Panthera tigris* |
| | **Dermoptera** | | **Proboscidea** |
| 1 | *Cynocephalus variegatus* | 34 | *Elephas maximus* |
| | **Primates** | | **Perissodactyla** |
| 2 | *Nycticebus bengalensis (N. coucang)* | 35 | *Rhinoceros sondaicus* |
| 3 | *Nycticebus pygmaeus* | | **Artiodactyla** |
| 4 | *Pygathrix cinerea* | 36 | *Axis (Cervus) porcinus* |
| 5 | *Pygathrix nemaeus* | 37 | *Cervus eldii* |
| 6 | *Pygathrix nigripes* | 38 | *Megamuntiacus vuquangensis* |
| 7 | *Rhinopithecus avunculus* | 39 | *Muntiacus truongsonensis* |
| 8 | *Trachypithecus barbei (T. phayrei)* | 40 | *Moschus berezovskii* |
| 9 | *Trachypithecus delacouri* | 41 | *Bos gaurus* |
| 10 | *Trachypithecus francoisi* | 42 | *Bos javanicus* |
| 11 | *Trachypithecus hatinhensis* | 43 | *Bos sauveli* |
| 12 | *Trachypithecus poliocephalus* | 44 | *Bubalus arnee* |
| 13 | *Trachypithecus villosus (T. cristatus)* | 45 | *Naemorrhedus (Capricornis) sumatraensis* |
| 14 | *Nomascus (Hylobates) concolor* | 46 | *Pseudoryx nghetinhensis* |
| 15 | *Nomascus (Hylobates) gabriellae* | | **Lagomorpha** |
| 16 | *Nomascus (Hylobates) leucogenys* | 47 | *Nesolagus timminsi* |
| 17 | *Nomascus (Hylobates) nasutus* | | **AVES** |
| | **Carnivora** | | **Pelecaniformes** |
| 18 | *Cuon alpinus* | 48 | *Leptoptilos javanicus* |
| 19 | *Ursus (Helarctos) malayanus* | 49 | *Pseudibis davisoni* |
| 20 | *Ursus (Selenarctos) thibetanus* | 50 | *Platalea minor* |
| 21 | *Lutra lutra* | | **Gruiformes** |
| 22 | *Lutra sumatrana* | 51 | *Grus antigone* |
| 23 | *Lutrogale (Lutra) perspicillata* | | **Galiformes** |
| 24 | *Amblonyx (Aonyx) cinereus (A. cinerea)* | 52 | *Polyplectron bicalcaratum* |
| 25 | *Arctictis binturong* | 53 | *Polyplectron germaini* |
| 26 | *Catopuma (Felis) temminckii* | 54 | *Rheinardia ocellata* |
| 27 | *Felis chaus* | 55 | *Pavo muticus* |
| 28 | *Pardofelis (Felis) marmorata* | 56 | *Lophura diardi* |
| 29 | *Prionailurus (Felis) bengalensis* | 57 | *Lophura edwardsi* |
| 30 | *Prionailurus (Felis) viverrina* | 58 | *Lophura hatinhensis* |
| 31 | *Neofelis nebulosa* | 59 | *Lophura imperialis* |
| 32 | *Panthera pardus* | 60 | *Lophura nycthemera* |
| | **Squamata** | | ***Testudinata*** |
| 61 | *Ophiophagus hannah* | 62 | *Cuora trifasciata* |

**GROUP II. RESTRICTING EXPLOITATION AND USE FOR COMMERCIAL PURPOSE**

**IIA. Wild Plant Species**

| No. | Scientific Name | No. | Scientific name |
|---|---|---|---|
| | **PINOPHYTA** | 18 | *Sindora siamensis* |
| 1 | *Cephalotaxus mannii* | 19 | *Sindora tonkinensis* |
| 2 | *Calocedrus macrolepis* | 20 | *Codonopsis javanica* |
| 3 | *Calocedrus rupestris* | 21 | *Garcinia fagraeoides* |
| 4 | *Fokienia hodginsii* | 22 | *Dalbergia cochinchinensis* |
| 5 | *Keteleeria evelyniana* | 23 | *Dalbergia oliveri (D. bariensis, D. mammosa)* |
| 6 | *Pinus dalatensis* | 24 | *Pterocarpus macrocarpus* |
| 7 | *Pinus krempfii* | 25 | *Cinnamomum balansae* |
| 8 | *Taxus chinensis* | 26 | *Cinnamomum glaucescens* |
| 9 | *Cunninghamia konishii* | 27 | *Cinnamomum parthenoxylon* |
| | **Cycadopsida** | 28 | *Coscinium fenestratum* |
| 10 | *Cycas* spp. | 29 | *Fibraurea tinctoria (F. chloroleuca)* |
| | **MAGNOLIOPHYTA** | 30 | *Stephania* spp. |
| | ***Magnoliopsida*** | 31 | *Thalictrum foliolosum* |
| 11 | *Panax bipinnatifidus* | 32 | *Excentrodendron tonkinensis (Burretiodendron tonkinensis)* |
| 12 | *Panax stipuleanatus* | | **Liliopsida** |
| 13 | *Panax vietnamensis* | 33 | *Disporopsis longifolia* |
| 14 | *Asarum* spp. | 34 | *Lilium brownii* |
| 15 | *Markhamia stipulata* | 35 | *Polygonatum kingianum* |
| 16 | *Afzelia xylocarpa* | 36 | *Dendrobium nobile* |
| 17 | *Erythrophloeum fordii* | 37 | *Nervilia* spp. |

**II B. Wild Animal Species**

| No. | Scientific name | No. | Scientific name |
|---|---|---|---|
| | **MAMMALIA** | | **Rodentia** |
| | **Chiroptera** | 19 | *Hylopetes alboniger* |
| 1 | *Pteropus vampyrus* | 20 | *Hylopetes lepidus* |
| | **Primates** | 21 | *Hylopetes phayrei* |
| 2 | *Macaca arctoides* | 22 | *Hylopetes spadiceus* |
| 3 | *Macaca assamensis* | 23 | *Petaurista elegans* |
| 4 | *Macaca fascicularis* | 24 | *Petaurista petaurista* |
| 5 | *Macaca leonina* (*M. nemestrina*) | | **Pholydota** |
| 6 | *Macaca mulatta* | 25 | *Manis javanica* |
| | **Carnivora** | 26 | *Manis pentadactyla* |
| 7 | *Vulpes vulpes* | | **AVES** |
| 8 | *Canis aureus* | | **Ciconiiformes** |
| 9 | *Mustela kathiah* | 27 | *Ciconia episcopus* |
| 10 | *Mustela nivalis* | 28 | *Thaumabitis (Pseudibis) gigantea* |
| 11 | *Mustela strigidorsa* | | **Anseriformes** |
| 12 | *Viverra megaspila* | 29 | *Cairina scutulata* |
| 13 | *Viverra zibetha* | | **Gruiformes** |
| 14 | *Viverricula indica* | 30 | *Houbaropsis bengalensis* |
| 15 | *Prionodon pardicolor* | | **Falconiformes** |
| 16 | *Chrotogale owstoni* | 31 | *Spilornis cheela* |
| | **Artiodactyla** | 32 | *Polihierax insignis* |
| 17 | *Tragulus javanicus* | | **Galiformes** |
| 18 | *Tragulus napu* | 33 | *Arborophila davidi* |

| No. | Scientific name | No. | Scientific name |
|---|---|---|---|
| 34 | *Arborophila charltonii* | 61 | *Python reticulatus* |
| | **Cuculiformes** | 62 | *Elaphe radiata* |
| 35 | *Carpococcyx renauldi* | 63 | *Ptyas mucosus* |
| | **Columbiformes** | 64 | *Bungarus candidus* |
| 36 | *Columba punicea* | 65 | *Bungarus flaviceps* |
| | **Apodiformes** | 66 | *Bungarus multicinctus* |
| 37 | *Collocalia germaini* | 67 | *Bungarus fasciatus* |
| | **Coraciiformes** | 68 | *Naja naja* |
| 38 | *Buceros bicornis* | | **Testudinata** |
| 39 | *Annorhinus tickelli* | 69 | *Platysternum megacephalum* |
| 40 | *Aceros nipalensis* | 70 | *Heosemys grandis* |
| 41 | *Aceros undulatus* | 71 | *Hieremys annandalii* |
| | **Psittaformes** | 72 | *Mauremys annamensis* |
| 42 | *Psittacula eupatria* | 73 | *Indotestudo elongata* |
| 43 | *Psittacula finschii* | 74 | *Manouria impressa* |
| 44 | *Psittacula roseata* | | **Crocodylia** |
| 45 | *Psittacula alexandri* | 75 | *Crocodylus porosus* |
| 46 | *Loriculus verlanis* | 76 | *Crocodylus siamensis* |
| | **Strigiformes** | | **AMPHIBIA** |
| 47 | *Tyto alba* | | **Caudata** |
| 48 | *Tyto capensis* | 77 | *Paramesotriton deloustali* |
| 49 | *Ketupa zeylonensis* | | **INSECTA** |
| | **Passeriformes** | | **Coleoptera** |
| 50 | *Copsychus malabaricus* | 78 | *Dorcus curvidens* |
| 51 | *Garrulax formosus* | 79 | *Dorcus grandis* |
| 52 | *Garrulax merulinus* | 80 | *Dorcus antaeus* |
| 53 | *Garrulax milleti* | 81 | *Eurytrachelteulus titanneus* |
| 54 | *Garrulax vassali* | 82 | *Cheriotonus battareli* |
| 55 | *Garrulax yersini* | 83 | *Cheriotonus iansoni* |
| 56 | *Gracula religiosa* | 84 | *Eupacrus gravilicornis* |
| | **REPTILIA** | | **Lepidoptera** |
| | **Squamata** | 85 | *Teinopalpus aureus* |
| 57 | *Varanus bengalensis (V. nebulosa)* | 86 | *Teinopalpus imperalis* |
| 58 | *Varanus salvator* | 87 | *Troides helena ceberus* |
| 59 | *Python curtus* | 88 | *Zeuxidia masoni* |
| 60 | *Python molurus* | 89 | *Phyllium succiforlium* |

TRAFFIC, the wildlife trade monitoring network, works to ensure that trade in wild plants and animals is not a threat to the conservation of nature. It has offices covering most of the world and works in close co-operation with the Secretariat of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

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