REPORT OF THE

CONSERVATION ASSESSMENT AND MANAGEMENT PLAN WORKSHOP (CAMP)

FOR

NON TIMBER FOREST PRODUCTS OF NILGIRI BIOSPHERE RESERVE

19 – 21 December 2000

Organised by
The Indian Institute of Forest Management, Bhopal

In collaboration with
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Facilitated by
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Conservation Assessment and Management Planning (CAMP) Workshop of NTFPs in Nilgiri Biosphere Reserve

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CONSERVATION ASSESSMENT AND MANAGEMENT PLAN WORKSHOP (CAMP) FOR NON-TIMBER FOREST PRODUCTS OF NILGIRI BIOSPHERE RESERVE

Executive Summary

The Nilgiri Biosphere Reserve (NBR) is a particularly rich area biologically of the Western Ghats. Non-Timber Forest Products (NTFPs) are a significant source of income for a large number of communities in the NBR, providing raw materials for many consumer products. In order to evolve a method of evaluating the impact of extraction of NTFPs in NBR, a Conservation Assessment and Management Plan Workshop was organized by IIFM from 19-21 December 2000) at IFGTB, Coimbatore for 40 selected species under heavy use as part of a larger project. The 1994 IUCN Red List Criteria were used as part of the CAMP process to assign a Category of threat to these species.

Seventeen of the 40 NTFP taxa assessed are threatened in NBR, mainly due to their restricted distribution and the threats affecting their population within NBR. It was felt that extraction of NTFP is having a significant impact, not only on the selected NTFPs evaluated but also on other species as a result of the act of extraction itself.

The status of species derived according to the IUCN 1994 Criteria indicated that 43% of the taxa are threatened in the Nilgiri Biosphere Reserve. Two taxa are Data Deficient. Table 1 and Figure 1 indicate the status of the selected NTFPs of NBR as assessed in the workshop.

Participants in small working groups, contributed information from field studies and literature/herbarium studies which was used to assess species according to the IUCN Red List Criteria, and derive a category. All species assessed are gathered from the wild and cultivation techniques are known for very few. More than 63% of the taxa assessed are in commercial and international trade. On the basis of information gathered, the workshop participants made various recommendations for management of the species

The primary threats to the species assessed were human interference, e.g., trade and harvest, habitat loss due to fragmentation. Harvest of plants and plant parts is one of the most important threats to NTFPs. For example, harvesting of roots is totally destructive to nearly half the species assessed. Harvesting of the various parts affects regeneration and is fatal to a large number of plants. Other effects are loss of vigour and maiming of individuals, which also impact the survival of species in the long term.

The most significant impact of harvest is reflected in the reports of decline in number of mature individuals of the selected NTFPs over time. This is consistent with the reports of harvest of mature plant parts. Among the plants analysed, 72.5% of the products were harvested from mature individuals. Also, 17.5% were obtained from both young and mature plants.

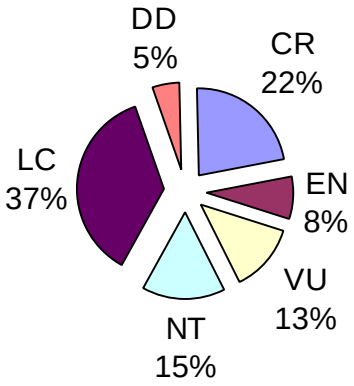
Recommendations for research and management were made by participants. Research recommendations were primarily for survey, taxonomic and genetic research. Management recommendations were for sustainable use, habitat management, and wild population management. The workshop also felt strongly that public awareness activities should be initiated.

The workshop participants agreed that the Nilgiri Biosphere Reserve requires enhanced protection to prevent human interference from posing a serious threat to the long term survival of taxa both inside and outside Protected Areas within the NBR. Plants under high usage, such as NTFPs, require intensive management for sustainable utilization on priority basis.

Table 1 : Species Assessed in the CAMP for NTFPs of NBR, 2000

NTFP taxa	Status in NBR	NTFP taxa	Status in NBR
Acacia sinuata (Lour.) Merrill	Vulnerable	*Hydnocarpus pentandra* (Buch.-Ham.) Oken	Vulnerable
Anamirta cocculus (L.) Wight & Arn.	Critically Endangered	*Myristica dactyloides* Gaertn.	Critically Endangered
Asparagus racemosus Willd., 1799	Least concern	*Nilgirianthus ciliatus* (Nees.) Bremek.	Critically Endangered
Baliospermum solanifolium (Burm. f.) Suresh in Nicols. *et al.*	Least concern	*Parmelia dilatata* Vainio	Data Deficient
Callicarpa tomentosa (L.) Murray	Least concern	*Persea macrantha* (Nees.) Kosterm.	Near Threatened
Canarium strictum Roxb.	Endangered	*Phyllanthus emblica* L.	Least Concern
Coscinium fenestratum (Gaertn.) Coelbr. 1822	Critically Endangered	*Piper longum* L.	Near Threatened
Costus speciosus (J. Koenig) Sm.	Least Concern	*Pseudarthria viscida* (L.) Wight & Arn.	Near Threatened
Curcuma aromatica Salisb.	Data Deficient	*Rauvolfia serpentina* (L.) Benth. ex Kurz.	Vulnerable
Curcuma zedoaria (Christm.) Rose.	Least Concern	*Rhaphidophora pertusa* (Roxb.) Schott	Least Concern
Cycas circinalis L. 1753	Critically Endangered	*Sapindus trifoliata* L.	Least Concern
Cyclea peltata (Poir.) Hook. f. & Thoms.	Near Threatened	*Sida rhombifolia* L. var. *retusa* (L.) Masters	Least Concern
Cymbopogon flexuosus (Nees ex Steud.) Wats.	Least Concern	*Solanum violaceum* Ortega	Least Concern
Desmodium velutinum (Wiild.) DC.	Least Concern	*Stereospermum colais* (Buch.-Ham. ex Dilliw.) Mabber.	Least Concern
Embelia ribes Burm. f.	Critically Endangered	*Symplocos cochinchinensis* (Lour.) Moore ssp. *laurina* Nooteb.	Vulnerable
Entada rheedei Spreng.	Endangered	*Terminalia bellirica* (Gaertn.) Roxb.	Near threatened
Garcinia gummi-gutta (L.) Robs.	Endangered	*Terminalia chebula* Retz.	Near Threatened
Helicteris isora L.	Least Concern	*Ventilago denticulata* Willd.	Vulnerable
Hemidesmus indicus (L.) R. Br.	Least Concern	*Zanthoxylum rhetsa* (Roxb.) DC.	Critically Endangered
Holostemma ada-kodien Schult.	Critically Endangered	*Zingiber zerumbet* (L.) Roscoe.	Critically Endangered

Figure 1 : Status of selected NTFPs of NBR according to CAMP Workshop (2000) using IUCN Red List Criteria



CONSERVATION ASSESSMENT AND MANAGEMENT PLAN WORKSHOP (CAMP) FOR NON-TIMBER FOREST PRODUCTS OF NILGIRI BIOSPHERE RESERVE

REPORT

The Nilgiri Biosphere Reserve

The Western Ghats is a vast area of biological richness covering much of six states in western Peninsular India. The Nilgiris, an offshoot of the Western Ghats, rich in biodiversity. In recognition of this fact, a 5,600 square kilometer area of this mountain range was declared Nilgiri Biosphere Reserve (NBR) in 1983. It is located in Southwest India, north of the Palghat Gap between 10^{o}45'-12^{o} 5'N lat and 76^{o} 10'-77^{o} 10'E long (Daniels, 1993). The altitude varies from coastal lowlands of less than 500 m MSL in the west to over 2,000 m in the east. The mountains drop abruptly and merge with the Deccan plateau in the east (Ashraf, pers comm).

Nilgiri Biosphere Reserve (NBR) is well known for its biodiversity. NBR contains tropical semi-evergreen forests, wet evergreen forests, grasslands, montane shola forests, grasslands, dry and moist deciduous forests and scrub jungles. A very high percentage of Western Ghats endemic vertebrates are found in this Biosphere Reserve. Among plants, the NBR has 82 species of angiosperms which are exclusive to this region. According to Subramanyam & Nayar (1974) about 1,500 species of dicots are endemic to the Western Ghats. Heywood states that these constitute 0.74% of the world's total species. Nair & Daniel, (1986) have enumerated 82 species of endemic angiosperms from NBR. According to Daniels (1993) the NBR may be India's only reserve where the biodiversity has been well documented.

Non-Timber Forest Products (NTFPs)

The term Non-Timber Forest Products (NTFPs) refer to biological resources of forests and jungles (with the exception timber) which are harvested from either natural or managed sites. Dyes, fruits, gums, latex, medicinal plants, nuts, oil seeds, ornamental plants, raw materials such as bamboo and rattan, resins, spices, and wildlife and wildlife products are some examples of NTFPs.

Literally thousands of villages and hamlets as well as individuals depend on NTFP sales for their livelihood throughout the world, particularly the tropics, and consumers also the world over depend on NTFPs for both luxury and necessary products. While it is generally accepted the widespread extraction of timber negatively impacts tropical forests, this view is not the popular opinion with respect to NTFPs.

Phillips (1994) in his "Primer" entitled Sustainable Harvest of Non-timber Plant Resources in Tropical Moist Forest states in the Introduction :

> *"One of the most basic and rarely questioned assumptions underlying much of the current interest in non-timber tropical forest resources is that the commercial harvesting of these commodities has little or no impact on a tropical forest. Unfortunately, this assumption is both untenable and potentially dangerous. If intensive resource extraction is the only activity planned within a tropical forest, there is a very high probability that these resources will be gradually depleted over time."*

Since Phillips wrote his Primer, the impact of extraction of NTFPs from forests is far more frequently questioned. Finding a means of assessing and monitoring the impact of NTFP

extractions and of preventing extinction of these and other species which suffer as a result of the extraction process, is the primary reason for conducting this CAMP Workshop for NTFP's of the NBR.

Conservation Assessment and Management Plan (CAMP) Workshop

The Conservation Assessment and Management Plan Workshop Process, conceived and developed by the Conservation Breeding Specialist Group, SSC, IUCN, was initially envisaged as a means of prioritizing species for captive breeding. A description of CBSG, SSC, IUCN is given in Appendix II. Over the 20 years of its development, however, the CAMP process has evolved more as a method of establishing priorities for research and management of species *in situ* including intensive management in context of broader conservation needs of threatened taxa.

A CAMP workshop brings together 10-40 experts (e.g., wildlife managers, Specialist Group members, scientists from the academic community and/or the private sector, and captive managers) to evaluate the threat status of all taxa in a broad group (e.g., an order or family), country, or geographic region to set conservation action and information-gathering priorities. Objective facilitators assist the group in selecting or confirming species for assessment, dividing up into rational and efficient Working Groups for information collection onto Taxon Data Sheets, assigning a status to the species, cleaning up and organizing a review of the Draft Report by all participants and coordinating the production of the final Report.

CAMP Reports have proven to be very effective in both bringing about and strengthening governmental action. The objective focus, internationally accepted process and techniques, use of indigenous knowledge, and participatory methodology are very satisfying to both governmental and non-governmental organizations.

During a CAMP workshop, the wild and captive status for each taxon under consideration are reviewed, on a taxon-by-taxon basis in an attempt to estimate the total population. CAMP worksheets include a "data quality" column so that "guesstimates" can be distinguished from population estimates based on solid documentation. Information about population fragmentation and trends, distribution, as well as habitat changes and environmental stochasticity also are considered. The CAMP process attempts to be as quantitative or numerate as possible because :

i) Action plans ultimately must establish numerical objectives for population sizes and distribution if they are to be viable.

ii) Numerical valuation promotes objectivity, comparability, less uncertainty, and, as a result better communication and cooperation between the various agencies and institutions concerned with the species.

After information has been gathered and the species thoroughly discussed the group then undertakes the following tasks:

1) assigning taxa to New IUCN Red List Category of Threat

2) making recommendations for research and management activities to contribute to the taxon's conservation.

3) making recommendations for cultivation programs if they can contribute to the conservation and sustainable use of the taxon.

Finally the results of the initial CAMP workshops are reviewed: 1) by distribution of a preliminary draft to workshop participants for comments, corrections of textual errors and additions and distribution of a final Report incorporating these contributions and an analysis of the workshop data as a whole. The Report is distributed to a broader audience which includes conservation specialists and managers worldwide as well as others with an interest in the workshop subject area. CAMP workshops, however, are not single or "final" events. Instead, the first CAMP can signal the beginning of a systematic process of assessment and review, which if carried out efficiently over several years can provide a scientific system of monitoring the conservation status of species. This continuing and evolving process should result in the development of more meaningful and precise conservation and recovery plans for the taxa involved.

The CAMP process is unique in its ability to prioritize intensive management action for species conservation, providing a framework for intensive management in the wild and in captivity. CAMP documents can be used as guidelines by national and regional wildlife agencies as well as regional captive breeding programs as they develop their own action plans. The long-term impact of the CAMP process on global priority setting has the potential to be profound. Within the near future, wildlife and zoo animal managers will have a set of comprehensive documents at their disposal, collaboratively and scientifically developed by the experts on the taxon or region, establishing priorities for global and regional species management and conservation. It is the intent that the CAMP process will ultimately contribute to the wise worldwide use of limited resources for species conservation.

The IUCN Red List Categories

The threatened species categories for Red Data Books were used relatively effectively for almost 30 years. In the early 1990's a process of revision and review was undertaken on the basis of the conservation sciences of small population dynamics and conservation biology which continue even today. The IUCN Red List Criteria (1994) and now (2000) provide an objective, numerate methodology of assessing species on the basis of scientific five criteria. Special methods for national and regional assessments of species which are not endemic to the targeted region have been developed and are being tested by CAMP Workshops as were all iterations of the new IUCN Red List Criteria and Categories since 1991.

A detailed explanation of the IUCN Red List Categories and Criteria was presented at the workshop. The categories and criteria are also given below (IUCN, 1994).

The 1994 IUCN Red List Categories are:

Extinct (EX)
A taxon is Extinct when there is no reasonable doubt that the last individual has died.

Extinct in the Wild (EW)

A taxon is Extinct in the wild when it is known only to survive in cultivation, in captivity or as a naturalised population (or populations) well outside the past range. A taxon is presumed extinct in the wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

Critically Endangered (CR)
A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future, as defined by any of the criteria (A to E) on subsequent pages.

Endangered (EN)
A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future, as defined by any of the criteria (A to E) on subsequent pages.

Vulnerable (VU)
A taxon is Vulnerable when it is not Cricically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future, as defined by any of the criteria (A to D) on subsequent pages.

Lower Risk (LR)
A taxon is Lower Risk when it has been evaluated, does not satisfy the criteria for any of the categories Critically Endangered, Endangered or Vulnerable. Taxa inculded in the Lower Risk category can be separated into three subcategories:

1. Conservation Dependent (cd). Taxa which are the focus of a continuing taxon-specific or habitat-specific conservation programme targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories above within a period of five years.

2. Near Threatened (nt). Taxa which do not quality for Conservation Dependent, but which are close to qualifying for Vulnerable.

3. Least Concern (lc). Taxa which do not qualify for Conservation Dependent or Near Threatened.

Data Deficient (DD)
A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/ or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution is lacking. Data Deficient is therefore not a category of threat or Lower Risk. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and threatened status. If the range of a taxon is suspected to be relatively circumscribed, if a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.

Not Evaluated (NE)
A taxon is Not Evaluated when it has not yet been assessed against the criteria.

The above Categories are for the 1994 version of the IUCN Red List Criteria (IUCN, 1994). Some modifications have been done which will be reflected in the 2000 IUCN Red List Criteria as yet unpublished.

IUCN Red List Criteria -- in brief

A – Population reduction – (1) observed, inferred, suspected or estimated reduction, or **(2)** projected or predicted reduction of at least 20% (VU), or 50% (EN), or 80% (CR) in 10 years or 3 generations whichever is longer based on **(a)** Direct observation; **(b)** index of abundance appropriate for the taxon; **(c)** decline in areas of occupancy, extent of occurrence and/or quality of habitat; **(d)** actual or potential levels of exploitation; **(e)** effects of introduced taxa, hybridisation, pathogens, pollutants, competitors, or parasites.

B – Restricted distribution -- Extent of occurrence estimated to be less than 20,000 sq km. (VU), or 5,000 sq km (EN) or 100 sq km (CR) and/or area of occupancy estimated to be less than 2000 sq.km. (VU), or 500 sq km (EN), or 10 sq km (CR), and qualifying for any two of the following: **(1)** severely fragmented, or known to exist in not more than 10 locations (VU), or 5 locations (EN), or single location (CR); **(2)** continuing decline, observed, inferred, projected in any **(a)** extent of occurrence, **(b)** area of occupancy; **(c)** area, extent and/or quality of habitat; **(d)** number of locations or subpopulations; **(e)** number of mature individuals; **(3)** extreme fluctuation in either **(a)** extent of occurrence, **(b)** area of occupancy, **(c)** number of populations or subpopulations, **(d)** number of mature individuals.

C – Population estimates – population estimated to number less than 10,000 (VU), or 2,500 (EN), or 250 (CR) mature individuals and either **(1)** estimated, continuing decline of at least 10% in 10 years or 3 generations or whichever is longer (VU), or 20% in 5 years or 2 generations, whichever is longer (EN), or 25% in 3 years or 1 generation whichever is longer (CR) OR in **(2)** continuing decline, observed, projected, inferred, number of mature individuals and population structure in the form of either **(a)** severely fragmented [no subpopulation estimated to contain more than 1000 (VU), or 250 (EN), or 50 (CR) mature individuals] ; **(b)** all individuals are in a single subpopulation.

D – Restricted populations – **(1)** population estimated to number less than 1000 (VU), or 250 (EN), or 50 (CR) mature individuals; **(2)** population restricted in area of occupancy of less than 100 sq km or less than 5 locations (VU).

E – Probability of extinction – quantitative analysis showing the probability of extinction in the wild is at least 10% in 100 years (VU), or 20% in 20 years or 5 generations, whichever is longer (EN), or 50% in 10 years or 3 generations, whichever is longer (CR).

Regional Guidelines of IUCN Red List Criteria
The Regional Guidelines developed by the Red List Review Committee were used for the first time in this exercise and species assessments were modified according to these Guidelines. (Appendix I).

CAMP for selected species of NBR
A Conservation Assessment and Management Plan (CAMP) Workshop for Non-Timber Forest Product plants of Nilgiris Biosphere Reserve has been conducted in order to determine the conservation status of a selection of NTFPs under high use, the assumption being that the persistence of NTFPs may be adversely influenced by human activities in the region. This workshop was part of a larger project on NTFPs.

Forty (40) selected taxa were proposed for assessment in the three-day workshop held at Coimbatore. The Workshop was conducted on the premises of the Institute for Forest Genetics and Tree Breeding (IFGTB). The workshop was organized by the Indian Institute for Forest Management (IIFM), Bhopal with the cooperation of IFGTB and Zoo Outreach Organisation (ZOO). The CAMP was facilitated by ZOO and CBSG, India, regional network of CBSG, SSC.

About 24 participants from various fields such as forestry, conservation, utilisation, management, non-governmental organisations, tribal welfare, botanists, ecologists etc., participated in the exercise and contributed information for the assessments.

Although the region for assessment was restricted to the Nilgiri Biosphere Reserve, it includes three southern Indian states of Karnataka, Kerala and Tamil Nadu. Small Working Groups were formed according to participants' knowledge and experience, representing Kerala, Karnataka, northern Tamil Nadu and southern Tamil Nadu. The assessments were made within these groups using the standard methods of the CAMP workshop process, e.g. 1) gathering of information on Taxon Data Sheets; 2) applying the IUCN Red List to this information and 3) deriving an IUCN Red List status and assigning a category of threat. The method developed by IUCN called the IUCN Red List Categories and Criteria was used rigourously throughout the exercise.

The area of NBR, though spread across three states is restricted in its extent and is not a centre of species uniqueness. A highly species-rich region of the Western Ghats, the NBR consists of five protected areas, viz. Nagarahole National Park, Bandipur Tiger Reserve (Karnataka), Mudumalai Wildlife Sanctuary, Mukurthi National Park (Tamil Nadu) and Wayanad Wildlife Sanctuary (Kerala). However, areas outside of these protected areas that fall within this Biosphere Reserve are prone to much human disturbance and the status of NTFPs depends much on their status outside of the Protected Areas.

Using the 1994 IUCN Categories of threat, the information gathered at the workshop was interpreted to derive the status of NBR NTFP taxa. Since the focus of the workshop was only on the status of NTFPs in the Biosphere Reserve and since none of the taxa are endemic to NBR, the regional IUCN guidelines were applied to derive the status. According to the assessments, 17 NTFP taxa are threatened in NBR, while 7 are near threatened and 14 are least concern. Two taxa are Data Deficient for want of more information. For an explanation of the regional guidelines, please consult Appendix I.

The seventeen (84.21%) NTFP taxa assessed as threatened in NBR were so mainly due to their restricted distribution and the threats affecting their population within NBR. In only six cases (31.59%), the taxa were assessed as threatened due to continuing or predicted population declines.

Using the principles of regional guidelines, the status of six taxa had to be upgraded to a higher level of threat in the region due to factors such as severe fragmentation, threats and non-possibility of re-colonization from the adjoining areas. Seven taxa were downgraded to a lower category due to the above reasons not being a limiting factor to the status of the taxa within NBR. As a result of this exercise, it is clear that regional guidelines, however appropriate, do not necessarily reflect the actual situation, since the degree of threats vary and the scale of interpretation is uncertain.

Table 2 lists the NTFP taxa assessed and their status in NBR as well as the Criteria upon which the taxa were categorized.

Table 2: Status and Criteria for Assessment of NTFP Taxa

NTFP taxa	Status in NBR	Criteria
Acacia sinuata	Vulnerable	B1+2abcde
Anamirta cocculus	Critically Endangered	A2bcd; B1+2ce
Asparagus racemosus	Least concern	
Baliospermum solanifolium	Least concern	
Callicarpa tomentosa	Least concern	
Canarium strictum Roxb.	Endangered	A2bd; B1+2bcde
Coscinium fenestratum	Critically Endangered	A2abcde; B1+2be
Costus speciosus	Least Concern	
Curcuma aromatica	Data Deficient	
Curcuma zedoaria	Least Concern	
Cycas circinalis	Critically Endangered	B1+2bcde
Cyclea peltata	Near Threatened	A1ad + 2d
Cymbopogon flexuosus	Least Concern	
Desmodium velutinum	Least Concern	
Embelia ribes	Critically Endangered	B1+2bcde
Entada rheedei	Endangered	B1+2bcde
Garcinia gummi-gutta	Endangered	B1+2bce
Helicteris isora	Least Concern	
Hemidesmus indicus	Least Concern	
Holostemma ada-kodien	Critically Endangered	B1+2e
Hydnocarpus pentandra	Vulnerable	B1+2bce
Myristica dactyloides	Critically Endangered	B1+2bcde
Nilgirianthus ciliatus	Critically Endangered	B1+2bc
Parmelia dilatata	Data Deficient	
Persea macrantha	Near Threatened	A2cd
Phyllanthus emblica	Least Concern	
Piper longum	Near Threatened	
Pseudarthria viscida	Near Threatened	
Rauvolfia serpentina	Vulnerable	B1+2bce
Rhaphidophora pertusa	Least Concern	
Sapindus trifoliata	Least Concern	
Sida rhombifolia var. *retusa*	Least Concern	
Solanum violaceum	Least Concern	
Stereospermum colais	Least Concern	

Symplocos cochinchinensis ssp. *laurina*	Vulnerable	A2cd
Terminalia bellirica	Near threatened	
Terminalia chebula	Near Threatened	
Ventilago denticulata	Vulnerable	B1+2bcde
Zanthoxylum rhetsa	Critically Endangered	B1+2e
Zingiber zerumbet	Critically Endangered	B1+2bce

Table 3: Status Totals of Selected NTFPs of NBR	
Critically Endangered	9
Endangered	3
Vulnerable	5
Near Threatened	6
Least Concern	15
Data Deficient	2
Total	40

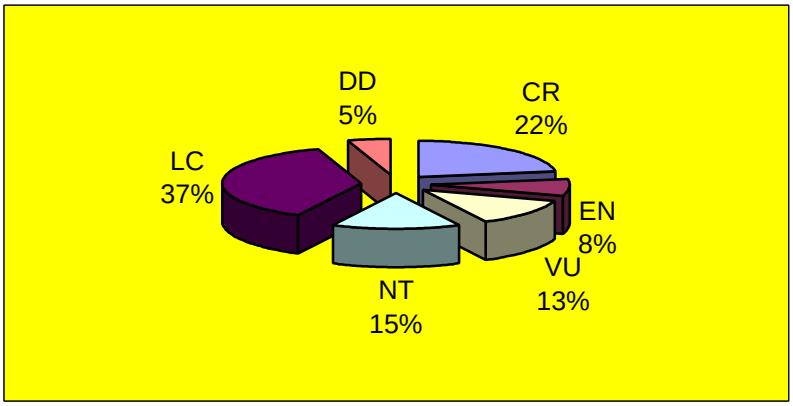


Fig. 2 : Status of selected NTFPs of NBR according to CAMP Workshop (2000) using IUCN Red List Criteria

Threats

The primary threats to the species assessed were human interference, e.g., trade and harvest, and habitat loss due to fragmentation.

Table 4: Threats & Trade

Scientific Name	Threats	Parts in Trade	Form of trade
Acacia sinuata	Human interference, harvest, harvest for cosmetics, over exploitation, trade of parts, trade for market or medicine and propagation difficulties	Fruits	Local, international
Anamirta cocculus	Human interference, harvest for medicine, habitat loss, fire and landslides	Leaves, fruit, stem and seeds	Local, domestic
Asparagus racemosus	Harvest, harvest for medicine, habitat loss due to exotic plants, trade for market or	Tuberous root	Domestic, commercial

Scientific Name	Threats	Parts in Trade	Form of trade
	medicine, over harvest of the species, insect pest problems, weedicides and collection of rhizomes		
Baliospermum solanifolium	Harvest for medicine	Root	Commercial
Callicarpa tomentosa	Human interference, harvest and habitat fragmentation	Flowers, stem, leaves, root and bark	Commercial
Canarium strictum Roxb.	Human interference, harvest for medicine [future], habitat loss, overexploitation, trade for market or medicine, edaphic changes, fire and harvest for resin collected from bark	Resin	Local, domestic, commercial, international
Coscinium fenestratum	Harvest for medicine, overexploitation, trade for market or medicine, natural/man induced threats and reproductive problems	Stem	Commercial, international
Costus speciosus	Habitat loss, harvest, habitat fragmentation, trade of parts, trade for market or medicine, edaphic changes and demographic instability	Root and rhizome	Local, domestic, commercial
Curcuma aromatica	(This species was categorized Data Deficient)	Root	Commercial
Curcuma zedoaria	Harvest for medicine, trade of parts, trade for market or medicine and weeds such as *Lantana* and Eucalyptus plantation	Root and rhizome	Local, domestic, commercial
Cycas circinalis	Habitat loss, harvest, trade of parts, harvest for medicine, harvest for food and reproductive problems	Whole plant	Domestic, commercial
Cyclea peltata	Human interference, harvest, habitat loss, overexploitation, trade of parts, trade for market or medicine, edaphic changes and landslides	Leaves and root	Domestic, commercial
Cymbopogon flexuosus	Fire and landslide [past]	Leaves and aerial parts	Local, domestic, commercial, international
Desmodium velutinum	Harvest for medicine, over exploitation, trade of parts, trade for market or medicine and fire	Root	Domestic, commercial, international
Embelia ribes	Habitat loss, harvest for medicine, over exploitation, trade of parts, trade for market or medicine, edaphic changes, fire and landslides	Fruit	Domestic, commercial
Entada rheedei	Habitat loss due to tree cover and propagation difficulties	Seeds	Local, commercial, international
Garcinia gummi-gutta	Harvest [past], harvest for medicine, harvest for food and trade for market or medicine [past]	Fruits	Local, domestic, commercial, international
Helicteris isora	Harvest for medicine, harvest for food [fodder], trade for market or medicine and edaphic changes	Fruits	Local, domestic
Hemidesmus indicus	Grazing, harvest, harvest for medicine, harvest for food, over exploitation, trampling and edaphic changes [future]	Root	Local, domestic, commercial, international

Scientific Name	Threats	Parts in Trade	Form of trade
Holostemma ada-kodien	Harvest for medicine, habitat fragmentation, over exploitation, pest and disease and trade for market or medicine	Root	Commercial
Hydnocarpus pentandra	Harvest, habitat loss, trade for market or medicine, harvest for medicine and oil extraction and habitat loss	Fruits	Local, domestic, commercial, international
Myristica dactyloides	Harvest, habitat loss, overexploitation, trade of parts, trade for market or medicine, harvest for medicine and food	Fruit, aril and seeds	Commercial
Nilgirianthus ciliatus	Harvest for medicine, habitat loss, overexploitation and fire	Root	Commercial
Parmelia dilatata	Harvest, harvest for medicine and food	Whole plant	Commercial
Persea macrantha	Harvest, harvest for medicine, bark and timber, habitat loss, overexploitation, trade of parts, trade for market or medicine, edaphic changes and fire	Bark	Commercial, international
Phyllanthus emblica	Harvest, grazing, harvest for food, harvest for medicine, habitat loss and demographic instability	Fruits	Local, domestic, commercial, international
Piper longum	Harvest, harvest for medicine, habitat loss, overexploitation, trade of parts, trade for market or medicine, edaphic changes, hybridisation and landslides	Fruits and root	Local, domestic, commercial, international
Pseudarthria viscida	Edaphic changes, harvest and harvest for medicine	Root	Commercial
Rauvolfia serpentina	Harvest, harvest for medicine, habitat loss, trade for market or medicine, trampling, fire and demographic instability	Root	Commercial, international
Rhaphidophora pertusa	Harvest for its ornamental value	Flowers and stem	Commercial
Sapindus trifoliata	Human interference, harvest, grazing, harvest for timber [past], habitat loss due to exotic plants [past], trade of parts, disease [past], fire, area taken over by Lantana and Eupetorium and demographic instability	Fruits	Commercial, international
Sida rhombifolia var. *retusa*	Harvest for medicine, overexploitation and grazing	Root and whole plant	Local, commercial
Solanum violaceum	Harvest and harvest for medicine and food	Fruits and root	Local, domestic, commercial
Stereospermum colais	Harvest, habitat loss, overexploitation, trade of parts, trade for market or medicine, edaphic changes and fire	Leaves, flower, fruit, bark	Local, domestic, commercial
Symplocos cochinchinensis ssp. *laurina*	Harvest for medicine and habitat loss	Bark and root	Commercial
Terminalia bellirica	Harvest, harvest for medicine, harvest for timber [past], habitat loss [past], overexploitation [past], trade of parts, trade for market or medicine and fire [past]	Fruits	Domestic, commercial, international
Terminalia chebula	Human interference [past], harvest for medicine, harvest, habitat loss [past], grazing [past], habitat loss due to exotic plants [past], trade of parts, trade for	Fruit and timber	Local (timber), Commercial (fruit)

Scientific Name	Threats	Parts in Trade	Form of trade
	market or medicine, fire [past] and demographic instability [past]		
Ventilago denticulata	Human interference, harvest, harvest for medicine, habitat loss, habitat fragmentation, trade of parts and trade for market or medicine	Bark and root	Domestic, Commercial
Zanthoxylum rhetsa	Harvest, harvest for medicine, overexploitation [past], trade for market or medicine, and fire	Seeds, fruit and root	Commercial
Zingiber zerumbet	Harvest, harvest for medicine, trade of parts and trade for market or medicine	Root	Commercial

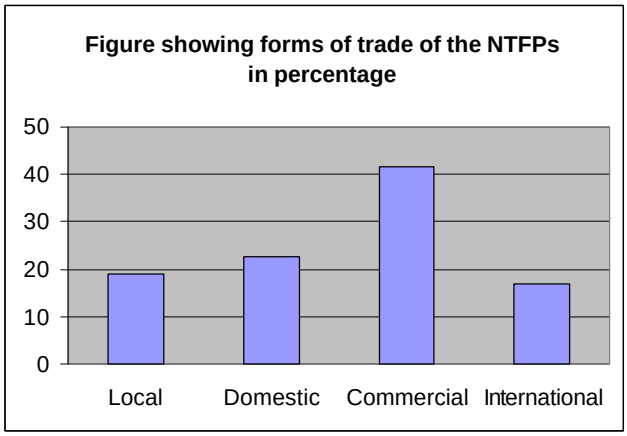
Table 5 : Threats to the selected NTFPs and percentage

Threats	Percentage
Human interference	4.8
Harvest (for food/fodder)	13.8
Harvest for cosmetics/ornamental	1.1
Harvest for medicine	13. 2
Over exploitation	9.0
Trade for market or medicine	13. 2
Trade of parts	8.0
Habitat loss/fragmentation	12.8
Fire and land slide	6.4
Insects/diseases/pest problem	1.6
Edaphic changes	5.3
Grazing	2.6
Demographic instability	5.8
Others (Weedicides, Hybridization, Reproductive problem)	2.1

Table 6: NTFPs in various forms of trade

Form of trade	Percentage
Local	19.1
Domestic	22.5
Commercial	41.6
International	16.7

Figure 3: Percentage of various forms of trade



Out of the 40 assessed species, five were proposed for the Negative List of Exports of the Government of India. The Ministry of Environment recommended that species of medicinal plants which had been assessed as Critically Endangered and Endangered under the IUCN Red List Criteria should be accorded special conservation measures. They notified the State Forest Departments to issue collection permits with due caution and to promote cultivation of those species through local people in order to ensure their long term sustainability. The Ministry also proposed that Critically Endangered and Endangered species be brought under the Wildlife (Protection) Act, 1972, Schedule VI (In Litt., 28 April 1997).

Yet it clear from the data collected in the workshop that the bulk of trade is domestic rather than international. Some regulation of domestic trade is urgently required including, perhaps, protection under the Wildlife Act.

Harvest

Harvest is one of the most important threats to NTFPs and the *raison d'etre* of the workshop. Harvest was mentioned as a threat for every species. The significance of harvest can be partially appreciated by comparing the parts in trade for each species with the negative impact on the plants. Harvesting of roots, for example, is totally destructive to nearly half the species assessed. Other examples of impact of harvest of parts on individual plants is not so dramatic, but the overall impact on species, including indirect effects, which are difficult to assess, may be significant. For example, harvesting of the various parts affects regeneration of 40% of the plants and is fatal to 55%. Other effects are loss of vigour (7.5%) and maiming of individuals (12.5%), which also impact the survival of species in the long term.

Table 7 : Impact of harvest of parts on NTFPs assessed in the workshop

	Roots	Fruits	Stem	Seeds	Leaves	Flowers	Bark	Resin
Totally destructive	42.5 %	2.4%	10%	10%	2.5%	2.5%	10%	2.5%
Partially destructive	2.5%	27.5%	--	--	--	--	5%	
Non-destructive	2.5%	10%	2.5%	2.5%	2.5%	2.5%	2%	

The most significant impact of harvest is reflected in the reports of decline in number of mature individuals of the selected NTFPs over time. This is consistent with the reports of harvest of mature plant parts. Among the plants analysed, 72.5% of the products were harvested from mature individuals. Also, 17.5% were obtained from both young and mature plants.

Moreover, harvesting of the products affected the regeneration of 40% of the plants and was fatal to 55%. The other effects were loss of vigour (7.5%) and maiming of individuals (12.5%)

Research and Management

Research and management recommendations were discussed for the taxa as illustrated in the Table below. Research recommendation were primarily for survey, taxonomic and genetic research. Management recommendations were for sustainable use, habitat management, wild

population management. The workshop also felt strongly that public awareness activities should be initiated.

Table 8. Research & Management Recommendations

Scientific Name	Research	Management
Acacia sinuata	Survey, genetic research and phenology and reproductive biology.	Habitat management, wild population management, sustainable utilisation, public awareness and cultivation.
Anamirta cocculus	Survey, genetic research, taxonomic research, reproductive biology and PHVA pending	Monitoring, habitat management, wild population management, sustainable utilisation, public awareness and genome resource banking
Asparagus racemosus	Genetic research and taxonomic research.	Sustainable utilisation, public awareness and cultivation.
Baliospermum solanifolium	Genetic research and population studies	Sustainable utilisation and cultivation and breeding
Callicarpa tomentosa	Survey, taxonomic research and life history studies.	Monitoring, habitat management, sustainable utilisation, public awareness and cultivation.
Canarium strictum Roxb.	Survey, genetic research, taxonomic research, life history studies, resin tapping technology and PHVA.	Monitoring, habitat management, wild population management, sustainable utilisation and public awareness
Coscinium fenestratum	Survey, life history studies and tissue culture.	wild population management, public awareness and cultivation.
Costus speciosus	Survey, taxonomic research and life history studies.	Habitat management, sustainable utilisation and cultivation.
Curcuma aromatica	Survey and taxonomic research.	Not recommended
Curcuma zedoaria	Not recommended	Sustainable utilisation.
Cycas circinalis	Survey, limiting factor research, life history studies and reproductive biology.	Wild population management, sustainable utilisation, public awareness, cultivation and *in situ* conservation of genetic material.
Cyclea peltata	Survey, taxonomic research and life history studies.	Habitat management, wild population management, monitoring, public awareness and cultivation.
Cymbopogon flexuosus	Not recommended	Not recommended
Desmodium velutinum	Survey, taxonomic research and life history studies.	Habitat management, sustainable utilisation and cultivation.
Embelia ribes	Survey, taxonomic research and life history studies.	Habitat management, wild population management, monitoring, sustainable utilisation, public awareness and cultivation.
Entada rheedei	Seed germination studies.	
Garcinia gummi-gutta	Survey, taxonomic research, genetic research and biochemical and cytogenetic studies.	Wild population management, sustainable utilisation, public awareness and cultivation.
Helicteris isora	Genetic research and life history studies.	Habitat management, monitoring, public awareness and sustainable utilisation.
Hemidesmus indicus	Survey and life history studies.	Sustainable utilisation, public awareness and cultivation.
Holostemma ada-kodien	Cytogenetic studies of different varieties and province.	Public awareness, semi processing, processing and storage.
Hydnocarpus pentandra	Survey, life history studies, population studies and agro technology	Habitat management, sustainable utilisation and cultivation.

Scientific Name	Research	Management
Myristica dactyloides	Survey, genetic research, life history studies and PHVA.	Wild population management, public awareness, sustainable utilisation and cultivation.
Nilgirianthus ciliatus	Taxonomic research and life history studies.	Habitat management and sustainable utilisation.
Parmelia dilatata	Taxonomic research.	Monitoring
Persea macrantha	Survey, genetic research and life history studies.	Habitat management, wild population management, monitoring, public awareness and sustainable utilisation.
Phyllanthus emblica	Survey, genetic research and fruit quality.	Habitat management, monitoring, public awareness, sustainable utilisation, cultivation and fire control.
Piper longum	Survey, genetic research, harvesting and PHVA.	Habitat management, wild population management and sustainable utilisation.
Pseudarthria viscida	Taxonomic research and improved harvesting techniques.	Public awareness regarding harvesting time and sustained utilisation.
Rauvolfia serpentina	Genetic research and life history studies.	Wild population management, cultivation and control harvesting.
Rhaphidophora pertusa	Clinical, biochemical and pharmacognostic studies and PHVA.	Public awareness, cultivation for ornamental and horticulture research.
Sapindus trifoliata	Survey and genetic research.	Habitat management, wild population management, monitoring, public awareness and sustainable utilisation.
Sida rhombifolia var. *retusa*	Survey and taxonomic research.	Sustainable utilisation, public awareness and cultivation.
Solanum violaceum	Not recommended.	Sustainable utilisation and harvesting techniques.
Stereospermum colais	Survey, genetic research, taxonomic research, life history studies and regeneration studies.	Habitat management, sustainable utilisation and cultivation.
Symplocos cochinchinensis ssp. *laurina*	Propagation techniques, genetic research, cytogenetic study and harvest method.	Sustainable utilisation and harvesting techniques.
Terminalia bellirica	Genetic research and harvesting techniques.	Habitat management and monitoring.
Terminalia chebula	Survey, taxonomic research, life history studies and harvesting, post harvest treatment and storage technology.	Habitat management, sustainable utilisation and cultivation.
Ventilago denticulata	Survey, taxonomic research and life history studies.	Habitat management, sustainable utilisation and public awareness.
Zanthoxylum rhetsa	Survey, taxonomic research and life history studies.	Wild population management, sustainable utilisation, cultivation and PHVA.
Zingiber zerumbet	Survey, taxonomic research and life history studies.	Genome resource banking, sustainable utilisation, biochemical analysis for flavours and cultivation.

Table 9. Cultivation recommendations

Detailed information was collected with regard to cultivation of the selected NTFPs including purpose of cultivation, availability of stocks and location of facility, level of cultivation, and the level of propagation techniques.

Scientific Name	Purpose of cultivation	Cultivated stocks & facility	Level of cultivation	Propagation technique
Acacia sinuata	Research, preservation of live genome and commercial/ sustainability	Cultivated stocks exist in kitchen gardens.	Initiate cultivation programme within 3 years	Propagation techniques not known at all.
Anamirta cocculus	Research	Cultivated stocks are not available	Initiate cultivation programme within 3 years	Propagation techniques not known at all.
Asparagus racemosus	Commercial/sustainability.	Number in cultivation is one	Initiate cultivation programme within 3 years	Propagation techniques are known for this taxa.
Baliospermum solanifolium	Commercial / sustainability.	Cultivated stocks are available at Kottakal Arya Vaidya Sala, Mallapuram, Kerala	Ongoing programme intensified or increased	Techniques known for similar taxa
Callicarpa tomentosa	Research.	Cultivated stocks are not available	Initiate cultivation programme within 3 years	Propagation techniques not known at all.
Canarium strictum Roxb.	Not recommended	Cultivated stocks are not available	Initiate cultivation programme within 3 years	Some propagation techniques known for similar taxa.
Coscinium fenestratum	Research, reintroduction and commercial/sustainability.	Cultivated stocks are not available	Initiate cultivation programme within 3 years	Some propagation techniques known for similar taxa.
Costus speciosus	Research, species recovery and preservation of live genome.	Cultivated stocks are not available	Initiate cultivation programme within 3 years	Propagation techniques not known at all.
Curcuma aromatica	Not recommended	-	-	-
Curcuma zedoaria	Not recommended	Cultivated stocks are not available	-	Propagation techniques known for similar taxa.
Cycas circinalis	Research, species recovery and commercial/ sustainability.	Cultivated stocks are not available	Initiate cultivation programme within 3 years	Propagation techniques not known at all.
Cyclea peltata	Research, species recovery and commercial/ sustainability	Cultivated stocks are not available	Initiate cultivation programme within 3 years	Propagation techniques not known at all.
Cymbopogon flexuosus	Not recommended	-	-	-
Desmodium velutinum	Commercial sustaiability	-	-	-
Embelia ribes	Reintroduction,	Cultivated stocks are	Ongoing programme	Some propagation

Scientific Name	Purpose of cultivation	Cultivated stocks & facility	Level of cultivation	Propagation technique
	education, species recovery and commercial/ sustainability	available at Kottakal. 10-15 individuals are found in cultivation.	intensified or increased	techniques known for taxon or similar taxa.
Entada rheedei	Not recommended	Cultivated stocks are not available		Some propagation techniques known for similar taxa.
Garcinia gummi-gutta	Commercial/sustainability	Cultivated stocks are available throughout Kerala	Ongoing programme intensified or increased	Propagation techniques known for the taxon.
Helicteris isora	Not recommended	Cultivated stocks are not available		
Hemidesmus indicus	Commercial/ sustainability	Cultivated stocks are available at AVS, Kottakal. Numbers in cultivation is >41000	Ongoing programme increased or intensified	Propagation techniques known for this taxon.
Holostemma ada-kodien	Not recommended	Cultivated stocks of about 10,000 are available in Kottakal AVG	Ongoing programme intensified or increased	Propagation techniques known for this taxon.
Hydnocarpus pentandra	Research	Cultivated stocks are not available		Propagation techniques known for this taxon or similar taxon.
Myristica dactyloides	Research and commercial/ sustainability		Initiate cultivation programme within 3 years	Propagation techniques known for this taxon or similar taxa.
Nilgirianthus ciliatus	Not recommended			Propagation techniques known for this taxon or similar taxon.
Parmelia dilatata	Not recommended			
Persea macrantha	Not recommended	Cultivated stocks are not available	Initiate cultivation programme after 3 years	Propagation techniques not known at all.
Phyllanthus emblica	Not recommended	Cultivated stocks are available at KAU		Propagation techniques known for this taxon or similar taxon
Piper longum	Not recommended	Cultivated stocks are available in spices board	Ongoing programme increased or intensified	Propagation techniques known for the taxon.
Pseudarthria viscida	Commercial/ sustainability	Cultivated stocks are not available	Initiate cultivation programme within 3 years	Propagation techniques not known at all.
Rauvolfia serpentina	Species recovery and preservation of live genome.	Cultivated stocks are available at KFRI, Jabalpur, Amarkantak Research Nursing, Madhya Pradesh, Bhopal to Orissa,	Initiate cultivation programme within 3 years	Propagation techniques known for this taxon or similar taxon.

Scientific Name	Purpose of cultivation	Cultivated stocks & facility	Level of cultivation	Propagation technique
		Salem tribals by farmers		
Rhaphidophora pertusa	Not recommended	Cultivated stocks are not available		
Sapindus trifoliata	Not recommended	-	-	-
Sida rhombifolia var. *retusa*	Not recommended	-	-	-
Solanum violaceum	Not recommended	Cultivated stocks are available in Kottakal	Ongoing cultivation programme within 3 years	Propagation techniques known for this taxon.
Stereospermum colais	Research and education	Cultivated stocks are not available	Initiate cultivation programme within 3 years	Propagation techniques not known at all.
Symplocos cochinchinensis ssp. *laurina*	Research and commercial/ sustainability	Cultivated stocks are available	Initiate cultivation programme within 3 years	Propagation techniques known for the taxon.
Terminalia bellirica				
Terminalia chebula	Research, species recovery, reintroduction and commercial/ sustainability	Cultivated stocks are not available	Initiate cultivation programme within 3 years	Some propagation techniques known for the species.
Ventilago denticulata	Research	Cultivated stocks are not available	Initiate cultivation programme within 3 years	Propagation techniques not known at all.
Zanthoxylum rhetsa	Research		Initiate cultivation programme within 3 years	Propagation techniques not known at all.
Zingiber zerumbet	Research and commercial/ sustainability	Cultivated stocks are not available		Propagation techniques not known at all.

All the Non-Timber Forest Products assessed in the workshop are collected from the wild. Only 30% of these species are in cultivation and even so, there is reason to doubt whether these are satisfying any significant proportion of the market demand. A staggering 70% of the NTFPs assessed in the workshop are not in cultivation at all. Propagation techniques are completely unknown for 30% of the assessed species. Of the remainder, cultivation techniques for many are only partially known or known only for similar taxa.

Collection

The data on collection of the NTFP in NBR shows that nearly all the NTFPs are collected. Also, there is periodic fluctuation in the collection of 40% of the species over years. This fluctuation is most likely a result of the stated impact of harvest on the regenerative capacity of the plants. In case of high demand it may be the case that young plants are also collected, thereby depleting the population for the next season.

Poor harvesting techniques and over-harvest also contribute to periodic fluctuation in collection. The collection of most of the species is for the preparation of Ayurvedic medicines.

Commercial (national and international) exploitation which involves the preparation of medicinal drugs requires enormous amounts of raw material. According to the data collected in the workshop, this accounts for 58.3% of trade (Table 6). Since cultivation techniques are not known for most of the species, commercial trade has a dramatic impact on population decline.

Table 10: Collection in NBR in the last 3 years

Scientific Name	Harvest by humans	Collection in NBR in last 3 years
Acacia sinuata	The plant is used locally for shampoo. The fruits are collected from mature plants.	There is no periodic fluctuation in the collection.
Anamirta cocculus	The plant is used locally for medicine and as fish poison by tribals. The fruits and seeds are collected from mature plants.	Unknown
Asparagus racemosus	Locally, the plant is collected to prepare medicine, food and soups.	There is periodic fluctuation in the collection of this species in NBR.
Baliospermum solanifolium	The plant is used locally for medicine. The roots are collected from mature plants.	There is periodic fluctuation in the collection of the NTFP from NBR over the years. Collection trends in Sholayar society 1992-'93 – 1500 bags; 1995-'96 – 3475 bags; 1997-'98 – 3725 bags; 1998-'99 – 1279 bags.
Callicarpa tomentosa	The plant is used locally for medicine and fuel wood. The harvest is carried out in mature plants.	Unknown
Canarium strictum Roxb.	The plant is used locally for medicine, to make wax, varnish, incense and turpentine. The resin is collected from mature plants.	There is periodic fluctuation in the collection of the NTFP in NBR over the years.
Coscinium fenestratum	The plant is used locally for medicine. The parts are collected from young and mature plants. It is used as a substitute for *Vateorhiza palmata* Miers.	There is periodic fluctuation in the collection of NTFP over the years. 1996-'97 – 45 kgs; 1998-'99 – 19 kgs.
Costus speciosus	The plant is used locally for medicine. The roots are collected from mature plants.	Unknown
Curcuma aromatica	The plant is used locally for medicine and cosmetics. The roots are collected from mature plants.	Unknown
Curcuma zedoaria	The plant is used locally for medicine. The roots are collected from mature plants.	There is periodic fluctuation in the collection of NTFP over the years. 1995-'96 – 425 kgs; 1999-2000 – 706 kgs
Cycas circinalis	The plant is used locally for medicine, food and decorative purpose. The parts are collected from mature plants. A sago is extracted from the trunk of about 7 years old plants.	There is periodic fluctuation in the collection of NTFP over the years. Since it is a slow growing plant no leaves are found for one or two years.
Cyclea peltata	The plant is used locally for medicine, food and shampoo. The roots are collected from young	There is periodic fluctuation in the collection in the last 1 year. Kalkulam Society – 1998-'99 – 49 Kgs; 1999-2000 –

Scientific Name	Harvest by humans	Collection in NBR in last 3 years
	and mature plants. The leaves are a delicacy in Java.	6 kgs. Green Cyclea Chindakki Kurumba SC/ST Society – 1995-'96 – 23.3 kgs; 1996-'97 – 534 kgs. Dry Cyclea
Cymbopogon flexuosus	The plant is used locally for medicine, insecticides and thatching. The parts are collected from young and mature plants.	There is no periodic fluctuation in the collection.
Desmodium velutinum	The plant is used locally for medicine. The roots are collected from mature plants.	-
Embelia ribes	The plant is used locally for medicine and as an adulterant of black pepper. The fruits are collected from mature plants.	There is periodic fluctuation in the collection in the last 3-4 years.
Entada rheedei	The plant is used locally for medicine. The fruits are collected from mature plants.	Depends on the demand. It is very less through legal channels.
Garcinia gummi-gutta	The plant is used locally for medicine and food. The fruits are collected from mature plants.	There is periodic fluctuation in the collection every alternate year.
Helicteris isora	The plant is used locally for medicine. The roots are collected from mature plants.	
Hemidesmus indicus	The plant is used locally for medicine and as flavoring agent. The roots are collected from mature plants.	The annual consumption by the drug industry in northern Kerala is 94471 kg of dried roots
Holostemma ada-kodien	The plant is used locally for medicine. The roots are collected from mature plants.	The consumption by the drug industry in northern Kerala is 33179 kg of dried root
Hydnocarpus pentandra	The plant is used locally for medicine and as fish poison. The parts are collected from mature plants.	
Myristica dactyloides	The plant is used locally for medicine and food. The roots are collected from mature plants.	
Nilgirianthus ciliatus	The plant is used locally for medicine. The roots are collected from mature plants.	There is no periodic fluctuation in the collection. In northern Kerala the annual consumption is 240697 kg
Parmelia dilatata	The plant is used locally for medicine and as flavoring agent in food. It is also used in mat, dyes and paint industries.	-
Persea macrantha	The plant is used locally for medicine and agarbathis. The roots are collected from mature plants.	-
Phyllanthus emblica	The plant is used locally for medicine and food. The roots are collected from mature plants.	There is periodic fluctuation in the collection every alternate year.
Piper longum	The plant is used locally for medicine. It is used as spice in food and is an ingredient of thrigodu. The roots are collected	

Scientific Name	Harvest by humans	Collection in NBR in last 3 years
	from mature plants.	
Pseudarthria viscida	The plant is used locally for medicine. The roots are collected from mature plants.	
Rauvolfia serpentina	The plant is used locally for medicine and for snake bites by local tribes. The roots are collected from young and mature plants.	
Rhaphidophora pertusa	The plant is used locally for medicine. The roots are collected from mature plants.	
Sapindus trifoliata	The plant is used locally for medicine and detergent as it contains saponin. The roots are collected from mature plants.	In the last 3 years 8-9 tons has been collected. There is periodic fluctuation in the collection every alternate year.
Sida rhombifolia var. *retusa*	The plant is used locally for medicine. The roots are collected from young and mature plants.	There is periodic fluctuation in the collection for every 2 years. The annual consumption of this taxon by drug industries in northern Kerala is 696941 kg dried roots.
Solanum violaceum	The plant is used locally for medicine in Ayurveda and Sidda. The roots are collected from young and mature plants.	It is one of the heavily consumed raw drug. The annual requirement for the drug industry in northern Kerala is 252712 kg of dried roots.
Stereospermum colais	The plant is used locally for medicine and fodder. The roots are collected from mature plants.	The annual requirement by the Ayurvedic drug industry in northern Kerala is 130714 kg dried roots
Symplocos cochinchinensis ssp. *laurina*	The plant is used locally for medicine. The roots are collected from young and mature plants.	There is no periodic fluctuation in the collection. The annual requirement of the dried bark of this taxon for the Ayurvedic medicine industry in north Keral is 66192 kg
Terminalia bellirica	The plant is used locally for medicine and tanning. The roots are collected from mature plants.	There is periodic fluctuation in the collection in every alternate year. The annual consumption of the fruits in northern Kerala is 130139 kg for drugs
Terminalia chebula	The plant is used locally for medicine and as dye. The roots are collected from mature plants.	In the last 3 years 5 tons were collected in Nilgiris area. There is periodic fluctuation in the collection every alternate year. The annual consumption of the dry fruits in northern Kerala is 373847 kg for drugs
Ventilago denticulata	The plant is used locally for medicine. The roots are collected from mature plants.	
Zanthoxylum rhetsa	The plant is used locally for medicine and incense. The roots are collected from mature plants.	There is no periodic fluctuation in the collection.
Zingiber zerumbet	The plant is used locally for medicine. The roots are collected from mature plants.	There is periodic fluctuation in the collection.

Information on use of plants by animals was recorded by the botanists. Worldwide, there are reports of reduction in population of pollinating animals. Animals also disperse seeds via defecation. Propagation of plants via pollination, and seed dispersal is, of course, dependent on

the stability of animal populations. Moreover, a heavy human presence such as occurs in conjunction with harvest, may impact the animal population and species distribution as well as it impacts the plants. Further research on plant/animal/human interaction/association may be useful for the survival of plant species.

Table 11: Use of NTFPs assessed in the workshop by animals

Scientific Name	**Uses to animals**
Acacia sinuata	Spotted deer and Sambar deer feed on the fruits.
Anamirta cocculus	This species is not used by animals.
Asparagus racemosus	Wild animals use the roots and shoots of this species.
Baliospermum solanifolium	Animals do not use the species.
Callicarpa tomentosa	Animals do not use the species.
Canarium strictum Roxb.	Birds use the fruits.
Coscinium fenestratum	Animals do not use the species.
Costus speciosus	Animals do not use the species.
Curcuma aromatica	Animals do not use the species.
Curcuma zedoaria	Not used by animals
Cycas circinalis	Bats feed on the seeds of this species.
Cyclea peltata	This species is used as fodder. Elephants eat this species.
Cymbopogon flexuosus	This species is used by livestock and wild animals. Elephants, Gaur and other herbivores eat this plant.
Desmodium velutinum	This species is graze by livestock and wild animals.
Embelia ribes	Animals do not use this species. Birds may use it.
Entada rheedei	Not used by animals
Garcinia gummi-gutta	Not used by animals
Helicteris isora	The leaves, bark and flowers are used by Elephants and cattle.
Hemidesmus indicus	Animals graze leaves of this species.
Holostemma ada-kodien	Leaves, stem and roots are fed by wild boars and other herbivores.
Hydnocarpus pentandra	Not used by animals
Myristica dactyloides	The fruits of the plant are used by birds and bats.
Nilgirianthus ciliatus	Bees feed on the nectar of this flower.
Parmelia dilatata	Not used by animals
Persea macrantha	Not used by animals
Phyllanthus emblica	Sambar and barking deer feed on this species.
Piper longum	Not used by animals
Pseudarthria viscida	This species is used by wildlife and livestock.
Rauvolfia serpentina	Not used by animals
Rhaphidophora pertusa	This species is fed by elephants.
Sapindus trifoliata	This species is fed by ungulates and insects use it for nectar.
Sida rhombifolia var. *retusa*	Goats feed on the leaves.
Solanum violaceum	This species is used by birds
Stereospermum colais	Fruits are used as fodder
Symplocos cochinchinensis ssp. *laurina*	Not used by animals
Terminalia bellirica	Primates, spotted deer and Sambar deer consume the unripe fruits of this species.
Terminalia chebula	Unripe fruits are fed by Sambar deer.
Ventilago denticulata	Not used by animals
Zanthoxylum rhetsa	Not used by animals
Zingiber zerumbet	Not used by animals

Conclusion

The group felt overwhelmingly that the area of Nilgiri Biosphere Reserve needed more protection than what was accorded and that human interference would pose a serious threat to taxa within and outside of Protected Areas if precautionary measures were not implemented soon. The workshop covered only 40 out of possibly hundreds of Non-Timber Forest Products of the NBR. Further investigation of more species is likely to strengthen the conclusions of this workshop and provide a fuller projection of NTFP survival in future. This workshop illustrates the crying need for immediate action to focus on making these clearly unsustainable activities sustainable.

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VULNERABLE [NBR]

Scientific name (author; date):	***Acacia sinuata* (Lour.) Merrill**
Synonym:	*Mimosa sinuata* Lour., *A. concinna* (Willd.) DC, *M. concinna* Willd., *A. rugata* Buch.-Ham. ex Benth, *A. concinna* var. *rugata* (Benth.) Baker
Family:	Mimosaceae
Common name:	Sigakai, Seekai, Shivakai [Tam.], Cherakai, Seenikia [Mal.]
Habit:	Prickly stout climbing shrub.
Habitat:	Wet and dry deciduous forests.
Niche/ elevation:	Forest edge, open spaces with moisture. Up to 800m in lower Ghats.

Distribution

Current Global Distribution:	Indo-Malay
Distribution from Literature:	Kunjapanai [S1]. Ayyapankoil, Mukkali [V1].
From Field Studies:	Nelamalai, Siruvani [V. Subramaniam, 2000]. Mudumalai [K.S. Devadass, 1999]. Kotagiri [D.S. Baburaj, 1989-90]. Kotagiri [S. Nath, 1999]. All over Kerala NBR [P. Sharma, N. Sasidharan, M.N.B. Nair, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan]
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	20-25/Many. Fragmented. There is a continuing decline but no extreme fluctuation in the number of locations or subpopulations.
Habitat status:	The decrease in habitat is <20% in the last 10 years and >20% decline is predicted in the next 10 years due to unscientific collections, over exploitation and poor regeneration. There is decrease in quality of the habitat due to biotic pressure.

Threats

Threats to taxon:	Human interference, harvest, harvest for cosmetics, over exploitation, trade of parts, trade for market or medicine, poor harvesting techniques, over harvest of species and propagation difficulties are resulting in and may result in future population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The fruits of the taxon are in local and international trade. Both forms of trade are resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. The number of mature individuals declined by >20% in the past and are likely to decline by >20% in the future. Generation time is 7-9 years.
Trends:	The population size/numbers are declining at the rate of 10-20% in the last 10 years and are likely to decline by >20% in the next 3 generations.

Recent Field Studies: A. Vatsyayan and P. Sharma in Nilambur, Attapadi, 2000, UNESCO project. N.A. Kumar in Wayanad, ongoing project. S.N. Prasad, P. Balasubramanian and A. Rajasekaran in Wayanad, 1994-98. Muralidharan in Wayanad, 1993-97. Keystone NTFP report in Nilgiris, 1998, Eco-development and availability of NTFP. P. Sharma in Nilambur and Attapadi. N. Sasidharan in Wayanad, 1994-97.

Data quality: Field studies and literature/herbarium studies. Population trends – indirect information

Uncertainty: 95% confidence, range of opinion, evidence and precaution.

The taxon in adjoining areas of NBR: The species also occurs in areas adjoining the NBR. In NBR the proportion of the population is approximately <20% and the population is contiguous with the adjoining population. The adjoining populations of the taxon outside NBR are equally threatened. If the taxon were to go extinct in NBR, it can recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**ENDANGERED – VULNERABLE**	Criteria:	**B1+2abcde**
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Survey, genetic research, phenology and reproductive biology.
Management:	Habitat management, wild population management, sustainable utilisation, public awareness and cultivation.
Cultivation:	Cultivation is recommended for research, preservation of live genome and commercial/ sustainability. Cultivated stocks exist in kitchen gardens. It is recommended to initiate cultivation programme within 3 years. Propagation techniques are not known at all.

Other comments: This species fruits in January - February when no other species fruits, therefore, it is eaten by Sambar deer. D.S. Baburaj saw 20-30 large bags of this species in Coimbatore railway station. It is exploited in Talamalai, Dimbam and Talawadi areas. It is used more in Tamil Nadu and Karnataka than in Kerala. Regeneration is difficult in Protected Areas as it is a slow growing species and fruits with the seed are collected. It is exploited outside NBR. This species is used in the preparation of soaps and shampoos. Every 3 years all the plants are replenished. Some Agricultural Department might have some technique to propagate a better variety.

Uses of NTFP in NBR

Parts used by wild animals: Spotted deer and Sambar deer feed on the fruits.

Harvest by humans: The harvest of fruits by humans is partially destructive to the plant. The plant is used locally for the preparation of shampoo. The impact of harvesting on the species affects its regeneration. The fruits are collected from mature plants.

NTFP in NBR: This NTFP is available only in certain parts of NBR.

Collection organised by: Collection organised by primary co-operative societies, private contractors and individuals from November to June depending on the altitude. The harvest techniques used are plucking and shaking branches. The collection is carried out for 2 months. The trade in the product is private. Collectors sell the harvested parts to private traders and primary cooperatives at the rate of Rs. 3-10 per kg. The NTFP goes within and outside the NBR states.

Data quality: Observation and indirect information from traderss, collectors, seniors, etc.

Sources: P1; S1: 51; V1: 186

Compilers: D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, B. Arthur K. Vivekananthan,

Reviewers: P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya, P. Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, M.N.B. Nair, V.S. Ramachandran, T.K. Sabu, A. Rajasekaran, A. Vatsyayan, B.A. Daniel

CRITIALLY ENDANGERED [NBR]

Scientific name (author; date):	***Anamirta cocculus* (L.) Wight & Arn.**
Synonym:	*Menispermum cocculus* L., *Anarmita puniculata* Colebr.
Family:	Menispermaceae
Common name:	Kaka Kolli vidai (Tam.), Fish berry (Eng.), Kagemari (Kan.), Kakamari (San.)
Habit:	Liane
Habitat:	Lower exposed slopes of mountains in the fringes of evergreen and semi evergreen forests.
Niche/elevation:	Exposed slopes of mid- and lower-elevations. 300-1000m.

Distribution

Current Global Distribution:	Indo-Malaysia
Distribution from Literature:	Kunakumadary, Nadugani [S1]. Anamudi slopes, Mukkali [V1].
From Field Studies:	Below Burliar and Keel Nadugani [D.S. Baburaj, 1995, 1999, 2000]. Nadugani [K. Vivekananthan, 1970]. Wayanad [N.A. Kumar]
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	2/2, 3. Fragmented. There is no continuing decline and no extreme fluctuation in the number of locations or subpopulations.
Habitat status:	The habitat is stable but < 20% decline is predicted in the next 5 years due to expansion of roads and developmental activities. There is decrease in the quality of habitat due to biotic interference.

Threats

Threats to taxon:	Human interference, harvest for medicine, habitat loss, fire, overharvest, poor harvest techniques and landslides are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The leaves, fruit, stem and seeds are in local and domestic trade for medicinal purpose.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are <2500. The number of mature individuals declined in the past by 10-20% and are likely to decline by >50% in the future. Generation time is 15-20 years.
Trends:	The population trend is not known. Predicted decline >50% in the next 50 years (3 generations) due to habitat loss and human interference.

Recent Field Studies: D.S. Baburaj below Burliar and Nadugani, 1992-93, herbarium. N.A. Kumar in Wayanad, 2000, ongoing project.

Data quality: Field studies, literature/herbarium studies, indirect information.

Uncertainty: 95% confidence, range of opinion and precaution.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR. In NBR the proportion of the population is approximately <10% and the population is contiguous with the adjoining population. The adjoining populations of the taxon outside NBR are equally threatened. If the taxon were to go extinct in NBR, it would be very difficult for the taxon to recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**ENDANGERED - CRITICALLY ENDANGERED**	Criteria:	**A2bcd; B1+2ce**
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Survey, genetic research, taxonomic research, reproductive biology and PHVA pending
Management:	Monitoring, habitat management, wild population management, sustainable utilisation, public awareness and genome resource banking
Cultivation:	Cultivation is recommended for research. Cultivated stocks are not available. There is no coordinated species management programme for this species and it is not recommended for India. It is recommended to initiate cultivation programme within 3 years. Propagation techniques are not known at all.

Other comments: This species is not common in Nilgiris but is common in Kerala. It is restricted to slopes at certain heights in Tamil Nadu. The population is static it may decline due to stochastic events. Habitat status is stable unless there is road construction. Destruction of habits for lianes is very high. Rehabilitation programme in Nadugani and Gudalur have been undertaken. Landslides between Kallar and Burliar is one of the threats. The seedlings do not establish themselves very well though regeneration is good. Specific technologies have to be worked out. This species is used as an adultrant for *Cosnium fenestratum* [Maramanjal]. Fruits are used in homeopathy. More study should be done on life history. Flowering and fruiting is during October – April. Habitat destruction by expansion of roads, landslides and fire can decimate the population. It is a slow growing and late flowering plant. Since it is a liane, occupying a limited niche, reproductive biology is incompletely known. It is rarely collected by tribals.

Uses of NTFP in NBR

Parts used by wild animals: Plants are not used by wild animals

Harvest by humans: The harvest of fruits and seeds by humans is non-destructive to the individual. The harvest of stem is destructive to the plant. It is locally used for medicine and as fish poison by tribals. The impact of harvesting affects regeneration and is also fatal to the species. The fruits and seeds are collected from mature plants.

NTFP in NBR: The NTFP is available only in certain parts of NBR.

Collection organised by: The collection of the species is organised by private contractors, primary co-operative societiesand is also collected by individuals, tribals and locals in the months of April and October. The harvest techniques used are plucking and hacking the liane. The trade in the product is private. Collectors sell the harvested parts to private tradersand primary co-operative society. The NTFP is traded within NBR states.

Data quality: Field study and indirect information from traderss, collectors, seniors, etc.

Sources: B1; B2; S1: 12; S2; V1: 50.

Compilers: D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, B. Arthur

Reviewers: P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya, P. Sharma, N. Sasidharan, M.N.B. Nair, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan, B.A. Daniel

Scientific name (author; date):	***Asparagus racemosus* Willd., 1799**
Family:	Liliaceae
Common name:	Shatavari [Mal.], Thanneervittan kizhangu, Ammaikodi, Kadumulla, Nilichodi [Tam.].
Habit:	Scandant shrub
Habitat:	Semievergreen, dry and moist deciduous and plantations.
Niche/ elevation:	300-2400m.

Distribution

Current Global Distribution:	Peninsular India, Southern Malaysia, South China [K.K. Nair]
Distribution from Literature:	Anaikatty, Bikkapattimund, Idukki, Bokkapuram Reserve Forest, Coonoor Ghat, Kotagiri, Kukal shola, Ootacamund, Vagapannai slopes [S1].
From Field Studies:	Wayanad, Nilambur, Attapadi, throughout Kerala [P**.** Sharma, N. Sasidharan, M.N.B. Nair, V.P.K. Nambiar, C.K. Antony, N. Anil Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan]. Udhagamandalam, Kukkal, Bokkapuram [D.S. Baburaj, 1996, 98]. Theppakkadu [K.S. Devadass, 1999]. Siruvani, Silent Valley [V. Subramaniam, 2000]. Foot hills towards Kotagiri [S.S.R. Bennet, 1997].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	>5 locations. Contiguous. There is a no continuing decline and no extreme fluctuation unknown in the number of locations or subpopulations.
Habitat status:	Increase in area of the habitat is < 20%.

Threats

Threats to taxon:	Harvest, harvest for medicine, habitat loss due to exotic plants, trade for market or medicine, over harvest of the species, insect pest problems, weedicides and collection of rhizomes are perceived threats. These threats, however, are not resulting in perceived or inferred population decline and they do not result in predicted decline also. The influence of threats on the population are well understood.
Trade:	The tuberous root of the taxon is in domestic and commercial trade. Commercial trade is resulting in a perceived or inferred population decline.

Population

Numbers/Generation time/Trend	Number of mature individuals in all populations are >2500. The number of mature individuals are likely to decline in the future by 10%. Generation time is 3 years.
Trends:	The population size or number of the taxon has declined at the rate of >10% in the last 3 generations. The predicted decline in the population is <10% in the next 10 years.

Recent Field Studies: Nambiar and T.K. Sabu in Wayanad, Nilambur and Attapadi, 1996-97, medicinal plants of India project. Muralidharan, 1995-97. Prasad *et al*. in Coimbatore, Wayanad and Mudumalai, 1994-98.

Data quality: Field studies, literature/herbarium studies, indirect information. Extent of occurance and Area of occupancy, number of locations and subpopulations and trade – estimated.

Uncertainty: 95% confidence and precaution.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR. In NBR the proportion of the population is approximately <20% and the population is contiguous with the adjoining population. The adjoining populations of the taxon outside the NBR, is equally threatened. If the taxon were to go extinct in NBR, it can recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**LOW RISK NEAR THREATENED**	Criteria:	-
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Genetic research and taxonomic research.
Management:	Sustainable utilisation, public awareness and cultivation.
Cultivation:	Cultivation is recommended for commercial/sustainability. Cultivated stocks are available in Kottakal Mallapuram, Kerala. Number in cultivation is one. There is no coordinated species management programme for this species and it is not recommended for India. It is recommended to initiate cultivation programme within 3 years. Propagation techniques are known for this taxa.

Other comments: *A. gonoclados* also yields shatavari. Wayanad in Oonchayal has a high concentration of the species [Nambiar]. It is commonly found in moist deciduous forests. Degradation of the habitat promotes regeneration. This species can regenerate from root and seed. There is no reduction in population. The use of weedicides in the plantation area within NBR is affecting the population. Wild population is now present in wasteland, 10 years back in 2 sq.km was required to harvest 1 kg. Today, 10 sq.km. is required for 1 kg. This species is used in Ayurveda, Siddha and Yunani medicines in which it is used a lot. It is used in pickle preparation. This is the much-used raw drug. It is also used widely by tribals. Population is declining in Wayanad. Sathavar gulam is becoming popular and is used in various treatments for women in Wayanad. Kottakal is meeting their part of their requirement from cultivation (25%). Their total requirement is 147 tons and 50% of which is obtained from NBR. Value of the product – 1kg is Rs.150/-. Collections from 1994,95-1996, 97 were about 14,402 kg [K.K. Nair]. Conservation measures should also be taken for *A. gonoclados* as it is being used as a substitute. The plants mature in a period of 3 years. The plants regenerate profusely from seeds as well as tuberous roots.

Uses of NTFP in NBR

Parts used by wild animals: Wild animals feed on roots and shoots of this species.

Harvest by humans: The harvest of roots and whole plant by humans is destructive to the plant. Locally, the plant is collected to prepare medicine, food and soups.

NTFP in NBR: The NTFP is available all over NBR.

Collection organised by: The collection of the species is organised by private contractors, primary co-operative societiesand carried out by individuals, tribals and locals in the months of June, October, November and December. The harvest techniques used are digging and uprooting. Men and women carry out the collection. The trade in the product is private. Collectors sell the harvested parts to private tradersand primary co-operative society. The price that the collectors receive for this species from private traders is Rs. 8-10/- per Kg. The NTFP goes within NBR states.

Collection in NBR in the last 3 years: There is periodic fluctuation in the collection of this species in NBR.

Data quality: The above estimates are based on field study, literature, collection trends and records and indirect information from traderss, collectors, seniors, etc.

Sources: B1; B2; S1: 147; S2;

Compilers: P**.** Sharma, N. Sasidharan, M.N.B. Nair, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan, B.A. Daniel

Reviewers: D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, B. Arthur, K. Vivekananthan, P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Nath, S. Raghavan, T. Surayya

LEAST CONCERN [NBR]

Scientific name (author; date):	***Baliospermum solanifolium* (Burm. f.) Suresh in Nicols. *et al.***
Synonym:	*Baliospermum montanum* (Willd.) Muell.-Arg., *Croton solanifolius* Burm.f., *Jatropha montana* Willd., *B. axillare* Bl.
Family:	Euphorbiaceae
Common name:	Nagadanti, Danti [Mal.]
Habit:	Shrub or under shrub
Habitat:	Moist deciduous teak plantation in Kerala along roads and wastelands
Niche/ elevation:	Heliophilic, it can grow in shade also. Up to 1000m.

Distribution

Current Global Distribution:	Indo-Malaysia
Distribution from Literature:	-
From Field Studies:	Nilambur [N. Sasidharan, 1995-97]. Attapadi, Wayanad areas [N.A. Kumar, Ramachandran, Nambiar (1993-97), T.K. Sabu, C.K. Antony, A. Vatsyayan, P. Sharma]. Upper Bhavani [M. Mohanan]
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	Not known/4 locations. Contiguous. There is a no continuing decline and extreme fluctuation is unknown in the number of locations or subpopulations.
Habitat status:	The habitat is stable. Change in quality of the habitat is not known.

Threats

Threats to taxon:	Harvest for medicine is resulting in and may result in population decline. The influence of threat on the population is well understood.
Trade:	The root of the taxon is in commercial trade for medicinal purposes. The present rate of extraction is not resulting in decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are >2500. The decline in the number of mature individuals is not known. Generation time is 2-3 years.
Trends:	The population size/numbers of the taxon is stable.

Recent Field Studies: Nilambur and	N. Sasidharan in Wayanad, 1995-97, biodiversity (1997). Nambiar and Sabu in Wayanad, Attapadi, 1993-97, Medicinal plants of India project sponsered by IDRC. Sivarajan in Nilambur, 1996, Flora. LSPSS in Palakkad, Herbarium.
Data quality:	Field studies, literature/herbarium studies, indirect information. Extent of occurence, Area of occupancy, Population trends – estimated. Number of locations and subpopulations and habitat status – inferred.
Uncertainty:	95% confidence, range of opinion.
The taxon in adjoining areas of NBR:	The taxon also occurs in areas adjoining the NBR and the population is contiguous with the adjoining population. If the taxon were to go extinct in NBR, it would be possible for it to recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**LOWER RISK LEAST CONCERN**	Criteria:	-
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Genetic research and population studies
Management:	Sustainable utilisation and cultivation and breeding
Cultivation:	It is recommended for commercial / sustainability. Cultivated stocks are available at Kottakal Arya Vaidya Sala, Mallapuram, Kerala. There is no coordinated species management programme for this species and it is not recommended for India. Ongoing programme should be intensified or increased. Techniques are known for similar taxa.

Other comments: It is *B. solanifolium* (Suresh and Manilal, 1988). It is distributed throughout NBR part of Kerala, especially in MD and teak plantation. It is not found in Nilgiri district. Due to good regeneration, there is no decline in the population even though, the species is highly harvested for its medicinal value. Regeneration is through roots and seeds. Even 75% of harvest is allowed for sustainable use. The population was not affected when moist deciduous forest was converted into teak plantation. This species colonised the area and did not allow any weed to come up [Nambiar and T.K. Sabu]. The habitat is declining but, this helps in regeneration. 500kg/year is used for oushadhi. The number of mature individuals cannot be estimated as these are subshrubs. D.S. Baburaj and V. Subramaniam have observed these plants only under cultivation in Coimbatore. If few drops of oil extract is added to the soil it attracts plenty of earthworms. The annual consumption of roots of this species by Ayurvedic drug industry in northern Kerala is 26,220 kg (Sasidharan, 2000).

Uses of NTFP in NBR

Plant used by wild animals: It is not used by wild animals

Harvest by humans: The harvest of roots by humans is destructive to the plant. The plant is used locally for medicine. The impact of harvesting is fatal to the individual. The roots collected from mature plants.

NTFP in NBR: The NTFP is available all over NBR.

Collection organised by: The collection organised by private contractors and primary co-operative societies throughout the year. The harvest techniques used are uprooting. The trade in the product is private. Collectors sell the harvested parts to private tradersand primary co-operative societies at the rate of Rs. 5 / kg in Palakkad [Anita] Rs. 13/kg [Nambiar and T.K. Sabu. The NTFP goes within NBR states. Jacobsons, Avis cooperation and Moitheen Haji are the names of traderss.

Collection in NBR in the last 3 years: Unknown. There is periodic fluctuation in the collection of the NTFP from NBR over the years. Collection trends in Sholayar Society: 1992-'93 – 1500 bags; 1995-'96 – 3475 bags; 1997-'98 – 3725 bags; 1998-'99 – 1279 bags. [Conservation and sustainable utilisation of NTFP in NBR, A. Vatsyayan and P. Sharma, Dec. 2000].

Data quality: Field study, collection trends, records and indirect information from traders, collectors, seniors, etc.

Sources: A. Vatsyayan and P. Sharma (2000) Conservation and sustainable utilisation including community based enterprise development of NTFPs, in Nilgiri Biosphere Reserve. P.K. Muralidharan, N. Sasidharan and Seethalakshmi (1997) Biodiversity in tropical moist forests: A study of sustainable use of non wood forest products in the Western Ghats of Kerala.

Compilers: P**.** Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, M.N.B. Nair, A. Vatsyayan, B.A. Daniel

Reviewers: B. Arthur, D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya.

LEAST CONCERN [NBR]

Scientific name (author; date):	***Callicarpa tomentosa* (L.) Murray**
Synonym:	*Tomex tomentosa* L., *Callicarpa arborea* Miq. ex Clarke, *C. lanata* L., *C. wallichiana* Walp., C. *lobata* Cl.
Family:	Verbenaceae
Common name:	Vettilaipattai, Seembakkulthu [Tam.], Nallapampil [Mal.].
Habit:	Small tree or large shrub. Heliophyte.
Habitat:	Shola margins, moist deciduous, semi evergreen forests and teak plantations.
Niche/ elevation:	Lower canopy, in exposed areas and gaps. 400-1500m.

Distribution

Current Global Distribution:	South India and Sri Lanka
Distribution from Literature:	Benne Reserve Forest,Gudalur Ghats, Karia shola, Nadugani, Devala, Needle Park [B1]. Mukkali, Silent Valley Reserve Forest [V1]. Attapadi [P1].
From Field Studies:	Keel Nadugani [D.S. Baburaj, 1996-98]. Lower altitudes of Siruvani, Silent Valley [V. Subramaniam, 2000]. Wayanad [K. Narendran, 1996]. Upper Bhavani and lower areas [M. Mohanan, May 1999]. Wayanad [P**.** Sharma, N. Sasidharan, M.N.B. Nair, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan]. Attapadi [A. Rajasekaran, 1994-98].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	>10/>10. Contiguous. There is a continuing decline but no extreme fluctuation in the number of locations or subpopulations.
Habitat status:	The habitat is stable but < 20% decline is predicted in the next 10 years due to expansion of roads. The quality of the habitat is stable.

Threats

Threats to taxon:	Human interference, harvest and habitat fragmentation are the threats to the taxon. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	Flowers, stem, leaves, root and bark of the taxon is in commercial trade for medicinal purposes.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are >2500. The number of mature individuals declined in the past by 10% and are likely to decline by by 10% in the future.
Trends:	The population size/number is stable. Predicted decline is <10% in the next 5-10 years.

Recent Field Studies: N.A. Kumar in Wayanad, 2000, ongoing project. S.N. Prasad, P. Balasubramanian and A. Rajasekaran in Attapadi, 1994-98.

Data quality: Field studies, literature/herbarium studies. Population numbers and population trends - indirect information, informal sighting.

Uncertainty: 95% confidence, range of opinion, evidence and precaution.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR. In NBR the proportion of the population is approximately <40% and the population is contiguous with the adjoining population. The adjoining populations of the taxon outside of the NBR are equally threatened. If the taxon were to go extinct in NBR, it can recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**LOWER RISK LEAST CONCERN**	Criteria:	-
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Survey, taxonomic research and life history studies.
Management:	Monitoring, habitat management, sustainable utilisation, public awareness and cultivation.
Cultivation:	Cultivation is recommended for research. Cultivated stocks are not available. There is no coordinated species management programme for this species and it is not recommended for

	India. It is recommended to initiate cultivation programme within 3 years. Propagation techniques not known at all.
Other comments:	This species is resistant to fires, it establishes rapidly and grows well. The roots and leaves are not in use. Only flowers are used by the name of Gnazhal poo [Nambiar]. It is used for charcoal and as firewood and to make camp/cot legs

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Uses of NTFP in NBR

Parts used by wild animals:	Not used.
Harvest by humans:	The harvest of roots, barks and flowers by humans are destructive to the plant whereas the harvest of stem is destructive. The plant is used locally for medicine and fuel wood. The impact of harvesting the NTFP on the species affects its regeneration. Mature plants are harvested.
NTFP in NBR:	The NTFP is available only in certain parts of NBR.
Collection organised by:	The collection is organised by private contractors, primary co-operative societies and is also collected by individuals throughout the year. The harvest techniques used are lopping, digging, debarking and uprooting. The trade in the product is private. Collectors sell the harvested parts to private traders and primary co-operative societies. The NTFP goes within and outside the NBR states.
Data quality:	Field study, literature and indirect information from traders, collectors, seniors, etc.
Comments:	It is rarely collected by tribals and locals.
Sources:	S1: 110; V1: 364; P1.
Compilers:	D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, B. Arthur
Reviewers:	P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya, P. Sharma, N. Sasidharan, M.N.B. Nair, C.K. Antony, N.A. Kumar, A. Rajasekaran, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan, B.A. Daniel, V.P.K. Nambiar

Scientific name (author; date):	***Canarium strictum* Roxb.**
Synonym:	*C. resiniferum* Brace *ex* King, *C. sikkimense* King
Family:	Burseraceae
Common name:	Black damar, Thelli, Kunthirikka payin and Pantham [Mal.], Mandadhup [Kan.], Karunkungiliam, Karuppukungilian [Tam.], Pantham, Kungilyam [Mal.]
Habit:	Large tree, 15-20m tall.
Habitat:	Moist evergreen forest and transition zones of deciduous forests.
Niche/ elevation:	It forms the top canopy in moist localities. 800-1800m.

Distribution

Current Global Distribution:	South East Asia
Distribution from Literature:	Carcoor ghats [S1]. Mukkali [V1].
From Field Studies:	Mudumalai, Silent Valley, Siruvani [Devadass, 1995]. Sairandhri, Siruvani [V. Subramaniam, 2000]. Manjeri- not in NBR [K. Narendran]. Burliar [S.S.R. Bennet, 1998]. All over Kerala [P**.** Sharma, N. Sasidharan, M.N.B. Nair, V.P.K. Nambiar, C.K. Antony, N. Anil Kumar, T.K. Sabu, V.S. Ramachandran, A. Vatsyayan].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	Locations many. Fragmented. There is a continuing decline but, no extreme fluctuation in the number of locations or subpopulations.
Habitat status:	The decrease in habitat is >20% in the last 20 years due to plantation, firewood collection and change in land use pattern. There is decrease in the quality of habitat due to changes in land use pattern.

Threats

Threats to taxon:	Human interference, harvest for medicine [future], habitat loss, overexploitation, trade for market or medicine, edaphic changes, fire and harvest for resin collected from bark are resulting in and may result in population decline. The influence of threats on the population are not well understood, are not reversible and have not ceased to be threats.
Trade:	The resin of the taxon is in local, domestic, commercial and international trade. Commercial and international trade are resulting in population decline.

Population

Numbers/Generation time/Trend:	Mature individuals in all populations are >2500. The number of mature individuals declined in the past by 10-20% and are likely to decline by 10-20% in the future. Generation time 30-35 years.
Trends:	The population size and numbers of the taxon are declining at the rate of <10% in the last 10 years and is predicted to decline by >50% in the next 3 generations.

Recent Field Studies: V. Subramaniam in Mudumalai, Silent Valley and Siruvani, 2000. L. Vijayan, S.N. Prasad and P. Balasubramanian in Silent Valley, 1994-96. V.S. Ramachandran in Nadugani. N.A. Kumar in Wayanad. Muralidharan in Wayanad. N.A. Kumar and P. Sharma and A. Vatsyayan in Nilambur and Attapady, Kerala.

Data quality: Census/monitoring, field studies, literature/herbarium studies.

Uncertainty: 95% confidence, range of opinion.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR. In NBR the proportion of the population is approximately <50% and the population is contiguous with the adjoining population. The adjoining populations of the taxon outside NBR are equally threatened. If the taxon were to go extinct in NBR, it may be difficult for it to recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**ENDANGERED**	Criteria:	**A2bd; B1+2bcde**
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Survey, genetic research, taxonomic research, life history studies, resin tapping technology and PHVA.
Management:	Monitoring, habitat management, wild population management, sustainable utilisation and public awareness
Cultivation:	Cultivated stocks are not available. There is no coordinated species management programme for this species and it is recommended for India. It is recommended to initiate cultivation programme within 3 years. Some propagation techniques are known for similar taxa.

Other comments: This species is present in all tropical moist evergreen forests in the NBR [Western Ghats]. Regeneration noticed not establishment of seedlings in wild. Only one seed is produced [K. Vivekananthan]. The resin used to make incense and varnish. Trade is organised and collected through LAMP societies in Wayanad [K. Narendran]. Regeneration is poor and resin collection which is crude, unscientific and brutal harms the tree. The population will decline at this rate. More study is required. Very few young trees remain – demographic instability. Mature trees tapped. Poor seed germination. Fire is kept at the base of the tree for the extraction of resin. The trees torched, and heated with sulphuric acid for increasing the extraction of the resin.

Uses of NTFP in NBR

Plant used by wild animals: Birds eat the fruits.

Harvest by humans: The harvest of bark and resin by humans is destructive to the plant. The plant is used locally for medicine, to make wax, varnsih, incense and turpentine. The impact of harvesting on the species maims the individual, causes loss of vigour and is fatal to the individual. The resin is collected from mature plants.

NTFP in NBR: The NTFP is available only in certain parts of NBR.

Collection organised by: The collection of the resin from the species is organised by private contractors, primary co-operative societies and is also collected by individuals throughout the year except rainy season. The harvest techniques used are making an incision on the trunk and debarking. Men and children collect the species. The trade in the product is private. Collectors sell the harvested parts to private traders and primary co-operative societies. The collectors receive Rs. 30-60 per kg for the NTFP. The NTFP goes within and outside the NBR states.

Collection in NBR in the last 3 years: There is periodic fluctuation in the collection of the NTFP in NBR over the years.

Data quality: Field study, collection trends and records, literature and indirect information from traders, collectors, seniors, etc.

Comments: Rarely collected by tribals and locals. The resin collected burnt to expel mosquitoes from dwelling in houses.

Sources: S1: 27; V1: 107; V3

Compilers: P. Sharma, N. Sasidharan, M.N.B. Nair V.P.K. Nambiar, C.K. Antony, N. A. Kumar, T.K. Sabu, V.S. Ramachandran, A. Vatsyayan, B.A. Daniel

Reviewers: B. Arthur, D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya

Scientific name (author; date):	***Coscinium fenestratum* (Gaertn.) Coelbr. 1822**
Synonym:	*Menispermum fenestratum* Gaertn.
Family:	Menispermaceae
Common name:	Maramanjal [Mal. & Tam.]
Habit:	Woody climber
Habitat:	Evergreen and semievergreen forests
Niche/ elevation:	300-1200m.

Distribution

Current Global Distribution:	Indo-Malayan
Distribution from Literature:	Nellialum [S1].
From Field Studies:	Wayanad, south Nilambur [C.K. Antony]. Muthikulam, Ombathuthoodu [Nambiar, A. Vatsyayan, T.K. Sabu]. Maeppadi [N.A. Kumar].
Ext. of occurrence (Sq. km.):	<100
Area of occupancy (Sq. km.):	<10
Number of Subpopulations/location:	5 Locations. Fragmented. There is continuing decline but no extreme fluctuation in the number of locations or subpopulations.
Habitat status:	The habitat in habitat is <20% in the last 25 years due to plantations. Change in the quality of the habitat is unknown.

Threats

Threats to taxon:	Harvest for medicine, overexploitation, trade for market or medicine, natural/man induced threats and reproductive problems are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The stem of the taxon is in commercial and international. Commercial trade is resulting in population decline.

Population

Numbers/Generation time/Trend:	Mature individuals in all populations are <2500. The number of mature individuals declined in the past by 50% and are likely to decline by by 80% in the future. Generation time 40 years.
Trends:	The population size/numbers are declining at the rate of >80% in the last 10 years. Predicted decline is 100% in the next 3-4 years.

Recent Field Studies: Nambiar and Sabu in Wayanad and Nilambur, 1993-97, medicinal plants of India project. N.A. Kumar in Wynaad, 2000, ongoing project. N. Sasidharan, 1993-97, Biodiversity. A. Vatsyayan and P. Sharma in Nilambur, 2000, Conservation and sustainable utilisation of NTFPs in NBR.

Data quality: Field studies, literature/herbarium studies, informal sightings, indirect information.

Uncertainty: 95% confidence.

The taxon in adjoining areas of NBR: The NBR popultaion is fragmented from the adjoining areas. If the taxon were to go extinct in NBR, it will not recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**CRITICALLY ENDANGERED**	Criteria:	**A2abcde; B1+2be**
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Endangered

Recommendations

Research:	Survey, life history studies and tissue culture.
Management:	Wild population management, public awareness and cultivation.
Cultivation:	Cultivation is recommended for research, reintroduction and commercial/sustainability. Cultivated stocks are not available. There is no coordinated species management programme for this species and it is recommended for India. It is recommended to initiate cultivation programme within 3 years. Some propagation techniques are known for similar taxa.

Other comments: This species should be saved from extinction. The area (habitat) could have been lost due to (Tantea) tea plantation in Nilgiris. It is a highly fragmented population. It is a habitat specific species. Nilambur has 95% of the population. Plantation activity was taken about 25 years back. The habitat is relatively stable [A. Vatsyayan & P. Sharma]. The plants are diaceous [N. Sasidharan] the male flowers earlier. Both male and female plants are required. Infertile seed production [Nambiar]. Germination percentage is very low [Nambiar & T.K. Sabu]. 10 tons of Maramanjal is required by Kottakal every year. Berberin hydrochloride crystals is extracted and exported. This is used in medicine. Reintroduction in the natural forest is required. It is very difficult to spot. Experimental cultivation is going on in KFRI, TBGRI, AVS, Kottakal. Seed germination is poor. Even immature plants are collected. The forest should not be disturbed for 20-25 years. This plant can be grown *ex situ*, it is in TBGRI [N.A. Kumar]. The chembra forest neart Thamburatikalli, Nilambur has to be protected. In Karulai range [Manjeri] it has been protected where ever available.

Uses of NTFP in NBR

Plant used by wild animals: Not used.

Harvest by humans: The harvest of roots, stem and whole plant by humans is destructive to the plant. The plant is used locally for medicine. The impact of harvesting affects regeneration and is fatal to the individual. The parts are collected from young and mature plants. It is used as a substitute for *Vateorhiza palmata* Miers.

NTFP in NBR: The NTFP is available only in certain parts of NBR.

Collection organised by: The collection of the species is organised by private contractors, primary co-operative societies and by individuals throughout he year. The harvest techniques used are uprooting and cutting. Generally men collect the species. The trade in the product is private. Collectors sell the harvested parts to private traders and primary co-operative societies at the rate of Rs.40-50 per kg. The NTFP goes within NBR states.

Collection in NBR in the last 3 years: There is periodic fluctuation in the collection of NTFP over the years. 1996-'97 – 45 kgs; 1998-'99 – 19 kgs. [Information from Kalkulam Society, Nilambur].

Data quality: Field study, collection trends, records and indirect information from traders, collectors, seniors, etc.

Sources: S1: 12; V2.

Compilers: P. Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, M.N.B. Nair, A. Vatsyayan, B.A. Daniel

Reviewers: B. Arthur, D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya

Scientific name (author; date):	***Costus speciosus* (J. Koenig) Sm.**
Synonym:	*Banksia speciosa* Koenig, *C. speciosus* var. *nepalensis* (Rose.) Baker
Family:	Costaceae (Zingiberaceae)
Common name:	Koshtum [Tam.], Channakaova [Mal.], Koogai
Habit:	Succulent herbs frequent among forest trees as undergrowth.
Habitat:	Moist deciduous and evergreen forests.
Niche/ elevation:	Moist areas and shade. Up to 900m.

Distribution

Current Global Distribution:	Indomalay and East Asia
Distribution from Literature:	Bennew Reserve Forest, Kulivayal Reserve Forest [S1]. Mukkali [V1].
From Field Studies:	Silent Valley, Siruvani, Nilambur [V. Subramaniam, 2000]. Nadugani, Keel Nadugani, Nilambur [D.S. Baburaj, 1998]. Wayanad, Attapadi, Nilambur [P.Sharma, N. Sasidharan, M.N.B. Nair, V.P.K. Nambiar, C.K. Antony, N. A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan]
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	10/Many. Contiguous. There is a continuing decline but no extreme fluctuation in the number of locations or subpopulations.
Habitat status:	There is decrease in habitat habitat is > 20% due to change in landuse pattern and habitat destruction. There is decrease in the quality of the habitat due to change in landuse pattern and habitat destruction.

Threats

Threats to taxon:	Habitat loss, harvest, habitat fragmentation, trade of parts, trade for market or medicine, edaphic changes and demographic instability are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The root and rhizome of the taxon is in local, domestic and commercial trade for medicinal purposes. Commercial trade is resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. The number of mature individuals declined in the past by 20% and are likely to decline by 20% in the future. Generation time 1 year.
Trends:	The population size/numbers are declining at the rate of >10% in the last 10 years.

Recent Field Studies: T.K. Sabu in Calicut University campus.

Data quality: Field studies, literature/herbarium studies. Habitat status, threats, trade, population numbers and population trends - indirect information.

Uncertainty: 95% confidence, range of opinion.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR. In NBR the proportion of the population is approximately <20% and the population is contiguous with the adjoining population. The adjoining populations of the taxon outside NBR are equally threatened. If the taxon were to go extinct in NBR, it would be possible for the taxon to recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**LOWER RISK LEAST CONCERN**	Criteria:	-
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Survey, taxonomic research and life history studies.
Management:	Habitat management, sustainable utilisation and cultivation.
Cultivation:	Cultivation is recommended for research, species recovery and preservation of live genome. Cultivated stocks are not available. There is no coordinated species management programme for this species and it is recommended for India. It is recommended to initiate cultivation programme within 3 years. Propagation techniques are not known at all.

Other comments:	Found in plenty in teak plantations. No subpopulations. Not many threats to the species. It grows well and is difficult to eradicate. Being annual or biannual herbs all are mature individuals.
Uses of NTFP in NBR **Plant used by:**	Not used.
Harvest by humans:	The harvest of roots by humans are destructive to the plant. The plant is used locally for medicine. The impact of harvesting on the species is fatal to the individual. The roots are collected from mature plants.
Collection organised by:	The species is collected by individuals in the months of September, October, November and December. The collection is carried out for 3-4 months in a year. The harvest techniques used are uprooting. The trade in the product is private. Collectors sell the harvested parts to private traderss. The NTFP goes within and outside NBR states.
Collection in NBR in the last 3 years:	Unknown
Data quality:	Literature and indirect information from traders, collectors, seniors, etc.
Sources:	S1: 144; V1: 498.
Compilers:	D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, B. Arthur
Reviewers:	P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya, P. Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, T.K. Sabu, V.S. Ramachandran, M.N.B. Nair, A. Vatsyayan and B.A. Daniel

DATA DEFICIENT [NBR]

Scientific name (author; date):	***Curcuma aromatica* Salisb.**
Synonym:	-
Family:	Zingiberaceae
Common name:	Kasthuri manjal [Mal. & Tam.], Kasturi-arishina [Kan.]
Habit:	Rhizomatous herb
Habitat:	Moist deciduous, semi evergreen forests, frequently cultivated
Niche/ elevation:	Up to 1000m.

Distribution

Current Global Distribution:	South Asia
Distribution from Literature:	Carcoorghat [S1]
From Field Studies:	Silent Valley [V. Subramaniam, 2000 and K. Narendran , 1996]. Wayanad [C.K. Antony]. Attapadi [A. Rajasekaran]
Ext. of occurrence (Sq. km.):	Not known
Area of occupancy (Sq. km.):	Not known
Number of Subpopulations/location:	Not known
Habitat status:	Not known

Threats

Threats to taxon:	Trade
Trade:	The root of the taxon is in commercial trade.

Population

Numbers/Generation time/Trend	Not known
Trends:	The population size/numbers are declining at the rate of >10%.

Recent Field Studies: None

Data quality: Indirect information, informal sighting.

Uncertainty Range of opinion

The taxon in adjoining areas of NBR:

Status in NBR:

IUCN (1994):	**DATA DEFICIENT**	Criteria:	-
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Survey and taxonomic research.
Management:	Not recommended
Cultivation:	Not recommended

Other comments: Taxonomic identity of this species is always confused with the closely allied species C. *zeodaria* by field botanists. Distribution of the *C. aromatica* may be different from *C. zeodaria*. Rhizome is used in homeopathy unofficially. This species is mostly cultivated for cosmetics. Wild populations are rare. Since the species is confused with *C. zeodaria* and since nobody has seen this species it is data deficient. LAMPS sell the powdered rhizomes in packets as cosmetics. It can be propagated through rhizomes.

Uses of NTFP in NBR

Plant used by wild animals: Not used.

Harvest by humans: The harvest of roots by humans are destructive to the plant. The plant is used locally for medicine and cosmetics. The impact of harvesting is fatal to the individual. The roots are collected from mature plants.

Collection organised by: The collection of the species is organised by NGO/Self help groups and primary co-operative societies.

Collection in NBR in the last 3 years:	Unknown
Sources:	S1: 144.
Compilers:	P**.** Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, A. Rajasekaran, T.K. Sabu, A. Vatsyayan, M.N.B. Nair, B.A. Daniel
Reviewers:	B. Arthur, D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya.

LEAST CONCERN [NBR]

Scientific name (author; date):	***Curcuma zedoaria* (Christm.) Rose.**
Synonym:	-
Family:	Zingiberaceae
Common name:	Manjakoora [Mal.], Sati [San.], Kichili-kizhangu, Kattu manjal [Tam.], Kachura [Kan.]
Habit:	Tuberous herb
Habitat:	Moist deciduous, evergreen forests and grassy patches.
Niche/ elevation:	100-1500m.

Distribution

Current Global Distribution:	Indo-Malaysia
Distribution from Literature:	-
From Field Studies:	Below Coonoor, Shola [S.S.R. Bennet]. Gudalur, Mudumalai [S. Nath, 1994]. Wayanad, Attapadi, Nilambur [N. Sasidhran and V.S. Ramachandran]
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	<10/10-500
Number of Subpopulations/location:	Unknown/Many. Contiguous. There is no continuing decline and extreme fluctuation in the number of locations or subpopulations.
Habitat status:	There is change in habitat due to plantations. Decrease in the quality of the habitat due to plantations.

Threats

Threats to taxon:	Harvest for medicine, trade of parts, trade for market or medicine and weeds such as *Lantana* and *Eucalyptus* plantation areas are threats to the taxon. They are not resulting in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The root and rhizome of the taxon is in local, domestic and commercial trade. Trade is not resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. The number of mature individuals have not declined in the past and are not likely to dsecline in the future. Generation time 1 year.
Trends:	The population size/numbers are increasing.

Recent Field Studies: N. Sasidharan in Wayanad, 1998. A. Vatsyayan and P.Sharma in Attapady and Nilambur, 2000.

Data quality: Census/monitoring, field studies, literature/herbarium studies. Habitat status, threats - informal sighting. Trade – indirect information.

Uncertainty: 95% confidence, minimum/maximum values.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining NBR and the population in NBR is contiguous with the adjoining population. The adjoining populations of the taxon outside of the NBR is equally threatened. If the taxon were to go extinct in NBR, it can recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**LOWER RISK LEAST CONCERN**	Criteria:	-
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Not recommended.
Management:	Sustainable utilisation.
Cultivation:	Cultivated stocks are not available. There is no coordinated species management programme for this species and it is not recommended for India. Propagation techniques are known for similar taxa.

Other comments:	This species is also used as kasthuri manjal. Even if 95% is harvested, regeneration is high. Though there is change in quality of the habitat, it does not affect the population. *Lantana* is a threat only in plantation areas. This species is used instead of *C. aromatica* for cosmetics commercially. In certain areas the population number is increasing. It is easy to cultivate. It is used as a substitute for arrow root. Being annual herbs they mature within one year.
Uses of NTFP in NBR	
Harvest by humans:	The harvest of whole plant is destructive to the individual. The plant is used locally for medicine. The impact of harvesting on the species is fatal to the individual. The roots are collected from mature plants.
Collection organised by:	The species is collected by individuals. Collection is organised by private contractors and primary co-operative societies in the months of November, December and January. The harvest techniques used are digging. The trade in the product is private. Collectors sell the harvested parts to private traders and primary co-operative societies at the cost of Rs. 4.5-5.00 per Kg [1996]. The NTFP goes within and outside NBR states.
Collection in NBR in the last 3 years:	There is periodic fluctuation in the collection of NTFP over the years. 1995-'96 – 425 kgs; 1999-2000 – 706 kgs [Information from Kalkulam SC/ST Society, Nilambur].
Data quality:	Field study, collection trends, records and indirect information from traders, collectors, seniors, etc.
Comments:	The collection trend varies according to demand.
Sources:	-
Compilers:	D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, B. Arthur
Reviewers:	P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya, P.Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N. A. Kumar, M.N.B. Nair, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan, B.A. Daniel.

Scientific name (author; date):	***Cycas circinalis* L. 1753**
Family:	Cycadaceae
Common name:	Madana kaman [Tam.], Inth, Kaan [Mal.], Mundicalu [Kan.]
Habit:	Palm-like tree
Habitat:	Dry or moist deciduous forests, also found by riverside.
Niche/ elevation:	100-850m.

Distribution

Current Global Distribution:	South India and Sri Lanka
Distribution from Literature:	-
From Field Studies:	Silent Valley, Nilambur [V. Subramaniam, 2000]. Wayanad, Nilambur [Nambiar]. Attapadi [N. A. Kumar and T.K. Sabu]. Siruvani [R. Gopalanan]. Pilloor in Coimbatore [P. Balasubramanian, 2000]. Athikadavu, Bhavani river [A. Rajasekaran].
Ext. of occurrence (Sq. km.):	<100
Area of occupancy (Sq. km.):	<100
Number of Subpopulations/location:	<10 locations. Fragmented. There is a continuing decline but no extreme fluctuation in the number of locations or subpopulations.
Habitat status:	In the past the decrease in habitat was < 20% and a decline of <20% is predicted in the future due to encroachment and alterations of the area. There is decrease in the quality of the habitat due to change in landuse pattern and habitat destruction.

Threats

Threats to taxon:	Habitat loss, harvest, trade of parts, harvest for medicine, harvest for food and reproductive problems are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The taxon is in domestic and commercial trade for its ornamental value.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are < 10,000. The number of mature individuals have declined in the past and are likely to decline by 10% in the future. Generation time 20-30 years.
Trends:	The population size/numbers are declining at the rate of >10% in the last 10 years and are likely to decline by > 50% in the next 3 generations.

Recent Field Studies:	Ritha Singh, all India project. SACON Project report. Father Matthew, University of Delhi, Gymnosperms of India.
Data quality:	Field studies, literature/herbarium studies.
Uncertainty:	Minimum/maximum values, range of opinion.
The taxon in adjoining areas of NBR:	The taxon also occurs in areas adjoining the NBR and the population in NBR is contiguous with the adjoining population. The adjoining population of the taxon outside the NBR is equally threatened. If the taxon were to go extinct in NBR, it cannot recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**CRITICALLY ENDANGERED**	Criteria:	**B1+2bcde**
CITES:	Appendix II	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Survey, limiting factor research, life history studies and reproductive biology.
Management:	Wild population management, sustainable utilisation, public awareness, cultivation and *in situ* conservation of genetic material.
Cultivation:	Cultivation is recommended for research, species recovery and commercial/sustainability. Cultivated stocks are not available. There is no coordinated species management programme for this species and it is recommended for India. It is recommended to initiate cultivation programme within 3 years. Propagation techniques are not known at all.

Other comments: This species is one of the Gymnosperms used in Ayurveda medicine. This is one of the living fossils [like *Ginkgo biloba*]. Endemic to the Indian sub continent. Sporadic and specific to moist deciduous forest. Not widespread, found in pockets [V. Subramaniam]. In Wayanad it is restricted to southern side. Being a protected area the habitat may not change. Fruits (female cone) are edible. Leavesare used in bouquets for ornamental purpose. The plant is dioecious, therefore sufficient population is necessary for seed production. Tender leaves are used as food by tribals. The plant is uprooted and planted in houses. Seed regeneration is good. Seeds are collected, hence, regeneration may be affected. Population number is not estimated in the Kerala part of NBR. Population is declining due to regeneration problems. In future overexploitation can lead to further decline. Even seedlings are collected by nurseries. Leaves are used for decorative purposes and are transported to Bangalore, Karnataka. Students also collect this plant for research. Though regeneration is good, the whole seedling is plucked, so the species is under threat. Sago is extracted from the trunk of about 7 years old plants (before fruiting) which is destructive.

Uses of NTFP in NBR

Plant used by wild animals: Bats feed on the seeds of this species.

Harvest by humans: The collection of seed is non-destructive to the plant. The harvest of leaves is partially destructive to the plant, whereas the harvest of whole plant is destructive. The plant is used locally for medicine, food and decorative purpose. The impact of harvesting on the species reduces the number of seeds for dispersal. The parts are collected from mature plants. Sago is extracted from the trunk of about 7 years old plants.

NTFP in NBR: The NTFP is available only in certain parts of NBR.

Collection organised by: The species is collected by individuals in the months of September and October. The leaves are collected throughout the year. The harvest techniques used are plucking and cutting. The trade in the product is private. The NTFP goes within and outside NBR states.

Collection in NBR in the last 3 years: There is periodic fluctuation in the collection of NTFP over the years. Since it is a slow growing plant, no leaves are found for one or two years.

Data quality: Indirect information from traders, collectors, seniors, etc.

Sources: Vajravelu (1990) Flora of Palghat; Saldhana (1976) Flora of Hassan.

Compilers: D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, B. Arthur

Reviewers: P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya, P.Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, A. Rajasekaran, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan, M.N.B. Nair, B.A. Daniel.

Scientific name (author; date):	***Cyclea peltata* (Poir.) Hook. f. & Thoms.**
Synonym:	*Menispermum peltatum* Poir. *C. barbata* Micrs, *C. burmenni* Hook.f. & Thoms, *C. arnotii* Miers.
Family:	Menispermaceae
Common name:	Para, Pache [Tam.], Padathali, Padavalli [Mal.].
Habit:	Climbing shrub, twiner
Habitat:	Wastelands, disturbed areas especially vertical slopes, in all marginal lands and plantations.
Niche/ elevation:	Among shrubs in shade near riversides. Up to 1900m.

Distribution

Current Global Distribution:	Indomalaya
Distribution from Literature:	Deepdale, Gudalur, Kalhatti [S1]
From Field Studies:	Silent Valley, Siruvani [V. Subramaniam, 2000]. Gudalur before Nadugani [D.S. Baburaj, 1998]. Attapadi [P. Balasubramanian]. Nilambur and Wayanad [Nambiar and A. Vatsyayan]. Bandipur [A. Rajasekaran].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	Many locations. Contiguous. There is no continuing decline in the number of locations or subpopulations.
Habitat status:	The increase in habitat is > 20% due to human interference (tea estates). There is no decrease in the quality of the habitat due to biotic interference and tea estates.

Threats

Threats to taxon:	Human interference, harvest, habitat loss, overexploitation, trade of parts, trade for market or medicine, edaphic changes and landslides are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The leaves and root of the taxon is in domestic and commercial trade for medicinal purposes. Commercial trade is resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. The number of mature individuals declined in the past by 20% and are likely to decline by 20% in the future. Generation time 2-3 years.
Trends:	The population size/numbers are declining at the rate of >20% in the last 10 years and are likely to decline by >20% in the next 10 years.

Recent Field Studies: D.S. Baburaj in Nadugani and Gudalur, 1998. V. Subramaniam in Silent Valley and Siruvani, 2000. SACON Project in Wayanad, Mudhumalai and Coimbatore, 1994-98. A. Vatsyayan and P. Sharma in Attapady and Nilambur, 2000, UNESCO Project.

Data quality: Field studies, literature/herbarium studies.

Uncertainty: 95% confidence, range of opinion.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR. In NBR the proportion of the population is approximately <10% and the population is contiguous with the adjoining population. The adjoining populations of the taxon outside NBR are equally threatened. If the taxon were to go extinct in NBR, it can recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**VULNERABLE ¯ LOWER RISK NEAR THREATENED**	Criteria:	**A1ad + 2d**
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Survey, taxonomic research and life history studies.
Management:	Habitat management, wild population management, monitoring, public awareness and cultivation.
Cultivation:	Cultivation is recommended for research, species recovery and commercial/ sustainability. Cultivated stocks are not available. There is no coordinated species management programme for this species and it is recommended for India. It is recommended to initiate cultivation programme within 3 years. Propagation techniques are not known at all.

Other comments: This species is used in the preparation of medicine for piles. There will be many threats in the future. The plant grows well in degraded land. It grows in poor conditions. The leaves are used as shampoo and the roots are used for piles. In 1998 D.S. Baburaj collected 8 kilograms of roots for drug standardisation. This plant is over exploited in Kerala. Production of flowers and fruits are very rare. This species may become extinct mainly due to over exploitation. The population has begun to decline very recently.

Uses of NTFP in NBR

Plant used by wild animals: This species is used as fodder. Elephants eat this species.

Harvest by humans: The harvest of roots by humans is destructive to the plant. The plant is used locally for medicine, food and shampoo. The impact of harvesting is fatal to the individual. The roots are collected from young and mature plants.

NTFP in NBR: The NTFP is available all over NBR.

Collection organised by: The collection is organised by primary co-operative societies, private contractors and individuals all throughout the year. The harvest technique used is uprooting. The collection is carried out for 3 months. The trade in the product is private. Collectors sell the harvested parts to private traders and primary cooperatives at the rate of Rs. 60 per kg of dry material. The NTFP goes within the NBR states.

Collection in NBR in the last 3 years: There is periodic fluctuation in the collection in the last 1 year. Kalkulam Society – 1998-'99 – 49 Kgs; 1999-2000 – 6 kgs. Green *Cyclea*: Chindakki Kurumba SC/ST Society – 1995-'96 – 23.3 kgs; 1996-'97 – 534 kgs. Dry *Cyclea*: 1995-'96 – 1574.3 kgs; 1996-'97 – 1022.5 kgs; 1997-'98 – 1161.1 kgs.

Data quality: Field study, collection trends and records, literature and indirect information from traders, collectors, seniors, etc.

Comments: The annual consumption of this taxon by the drug industry in northern Kerala is 36,468 kg of rhizome (dried root) [Sasidharan and Muraleedharan, 2000].

Sources: S1: 12

Compilers: D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, B. Arthur

Reviewers: P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya, P.Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, A. Rajasekaran, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan, M.N.B. Nair, B.A. Daniel

LEAST CONCERN [NBR]

Scientific name (author: date):	***Cymbopogon flexuosus* (Nees ex Steud.) Wats.**
Synonym:	*Andropogon flexuosus* Nees ex Steud., *A. nardus* var. *flexuosus (*Nees ex Steud.) Hack.
Family:	Poaceae
Common name:	Kodipul [Tam.], Ingi puli, Kodi puli [Mal.], Ginger grass, Lemon grass [Eng.]
Habit:	Perennial grass
Habitat:	Dry and moist deciduous forests, degraded lands.
Niche/ elevation:	750-2500m.

Distribution

Current Global Distribution:	Indo-Malaya
Distribution from Literature:	Burliar, Coonoor, Gudalur – Naduvattom, Mudumalai, Ootacamund, Pakasuramalai, Pykara [S1]
From Field Studies:	Kotagiri [S. Nath, 2000]. Gudalur [S. Nath and S.S.R. Bennet, 1998]. Barhai to Coonoor [S.S.R. Bennet]. Wayanad, Attapadi [Nambiar]. Throughout Nilgiris [D.S. Baburaj, K.S. Devadass, V. Subramaniam, K. Vivekananthan].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	500-2000
Number of Subpopulations/location:	Many locations. Contiguous. There is no continuing decline or extreme fluctuation in the number of locations or subpopulations.
Habitat status:	The decrease in habitat is < 20% in the past and < 20% decline is predicted in the future. There is decrease in quality of the habitat.

Threats

Threats to taxon:	Fire and landslide [past] are threats to the taxon.
Trade:	The leaves and aerial parts of the taxon are in local, domestic, commercial and international trade.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. Decline in the number of mature individuals unknown. Generation time is 1 years.
Trends:	Population trend increasing.

Recent Field Studies: -

Data quality: Field studies, informal sighting, literature/herbarium studies. Number of location and subpopulation – indirect information.

Uncertainty: 95% confidence.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining NBR. The population in NBR is contiguous with the adjoining population. The adjoining population of the taxon outside the NBR has the same status. If the taxon were to go extinct in NBR, it can recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**LOWER RISK LEAST CONCERN**	Criteria:	-
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Endangered

Recommendations

Research:	Not recommended
Management:	Not recommended
Cultivation:	Not recommended

Other comments: There is change in the habitat but it does not affect the population. It easily regenerates and grows well. In Kerala lemon grass is grown within rubber plantations for commercial use. Agricultural University, Odakali (KF) has conducted research on this species.

Uses of NTFP in NBR

Plant used by wild animals:	This species is used by livestock and wild animals like Elephants, Gaur and other herbivores.
Harvest by humans:	The harvest of leaves and stem by humans is non-destructive to the plant. The plant is used locally for medicine, insecticides and thatching. The parts are collected from young and mature plants.
NTFP in NBR:	The NTFP is available only in certain parts of NBR.
Collection organised by:	The collection is organised by private contractors and individuals throughout the year except summer. The harvest techniques used are cutting. The plant is harvested by women. The collection is carried out for 3 months. The trade in the product is private. Collectors sell the harvested parts to private traders. The NTFP goes within and outside the NBR states.
Collection in NBR in the last 3 years:	There is no periodic fluctuation in the collection.
Data quality:	Indirect information from traders, collectors, seniors, etc.
Comments:	Fischer (1936) has commented, Malabaar lemon grass oil is being extracted. Demand is less now.
Sources:	S1:162; W1.
Compilers:	P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath and T. Surayya.
Reviewers:	D.S. Baburaj, K.S. Devadas, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, P.Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, M.N.B. Nair, T.K. Sabu, A. Vatsyayan, B.A. Daniel, B. Arthur.

LEAST CONCERN [NBR]

Scientific name (author; date):	***Desmodium velutinum* (Wiild.) DC.**
Synonym:	*Desmodium latifolium* (Roxb. ex Ker.) DC., *Hedysarum velutinum* Willd., *D. lasiocarpum* DC., *Hedysarum latifolium* Roxb. ex Ker.
Family:	Fabaceae
Common name:	Kattu Orila [Tam. & Mal.]
Habit:	Under shrub
Habitat:	Under growth of dry and moist deciduous and semi evergreen forest
Niche/ elevation:	Undergrowth. 500-1000m.

Distribution

Current Global Distribution:	Africa and East and Southeast Asia
Distribution from Literature:	Adderley, Benne, Moyar bank, Mudumalai, Theppakkadu [S1]. Wayanad [P1]
From Field Studies:	Mudumalai [D.S. Baburaj, 1996]. Mudumalai [Devadass, 1999]. All over Kerala NBR [P. Sharma, N. Sasidharan, M.N.B. Nair, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	Many locations. Contiguous. There is a continuing decline but no extreme fluctuation in the number of locations or subpopulations.
Habitat status:	There is no change in the habitat or quality.

Threats

Threats to taxon:	Harvest for medicine, over exploitation, trade of parts, trade for market or medicine and fire are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The root of the taxon is in domestic, commercial and international trade.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. The number of mature individuals have not declined in the past and are not likely to decline in the future. Generation time is 5-10 years.
Trends:	The population size/numbers are declining at the rate of >10% in the last 5 years.

Recent Field Studies:	P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya in Palakkad. N.A. Kumar in Wayanad. A. Rajasekaran in Wayanad and Bandipur. Muralidharan in Wayanad, Nilambur and Attapadi. A. Vatsyayan and P. Sharma in Nilambur and Attapadi. S.N. Prasad, P. Balasubramanian and A. Rajasekaran in Wayanad.
Data quality:	Field studies, literature/herbarium studies, informal sighting and indirect information.
Uncertainty:	95% confidence, range of opinion.
The taxon in adjoining areas of NBR:	The taxon also occurs in areas adjoining the NBR. In NBR the proportion of the population is approximately <20% and the population is contiguous with the adjoining population. The adjoining populations of the taxon outside NBR are equally threatened. If the taxon were to go extinct in NBR, it can recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**LOWER RISK LEAST CONCERN**	Criteria:	-
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Survey, taxonomic research and life history studies.
Management:	Habitat management, sustainable utilisation and cultivation.
Cultivation:	Commercial sustainability

Other comments: This plant is an ingredient of dasamula in Ayurveda. *D. velutinum* is Kattu orilla, which is being used as Orilla by many of the manufacturers. The real Orilla is *D. gangeticum*. It is difficult to estimate habitat destruction. It is a substitute for green manure and Grihatpanchamula and Lagupanchamula. It is used as a good fodder. Dasamula is exported. There are 30 species of *Desmodium* (Bennet, 1987). As the roots are included in Dasamoola this species is being heavily harvested now-a-days.

Uses of NTFP in NBR

Plant used by: Livestock and wild animals feed on this species

Harvest by humans: The harvest of roots by humans is destructive to the plant. The plant is used locally for medicine. The impact of harvesting is fatal to the individual. The roots are collected from mature plants.

NTFP in NBR: The NTFP is available only in certain parts of NBR.

Collection organised by: The collection is organised by primary co-operative societies and in the months of November, December, January and February. The harvest techniques used are digging and uprooting. The trade in the product is private. Collectors sell the harvested parts to primary cooperatives at the rate of Rs. 6 per kg. The NTFP goes within and outside the NBR states. The annual consumption of this taxon by the Ayurvedic industry in northern Kerala is 164959 kg of dried roots. [Sasidharan and Muraleedharan].

Data quality: Indirect information from traders, collectors, seniors, etc.

Sources: S1: 41; P1.

Compilers: D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, B. Arthur

Reviewers: P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya, P.Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, M.N.B. Nair, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan, B.A. Daniel

Scientific name (author; date):	***Embelia ribes* Burm. f.**
Synonym:	-
Family:	Myrsinaceae
Common name:	Vivilingam, Vayvulingam, Katukodi [Tam.], Vizhal [Mal.], Vidangam [Sans.], Vayurilanga [Kan.]
Habit:	Climber, liane.
Habitat:	Evergreen moist forests. Common in wet evergreen to deciduous forests.
Niche/ elevation:	Exposed areas near road cuttings and forest edges. 800-2200m, >1200m.

Distribution

Current Global Distribution:	South and South East Asia
Distribution from Literature:	Coonoor, Devala, Nadugani, Kateri falls, Kottaicombai, Sispara, Sholurmattam [S1].
From Field Studies:	Below Kateri, Nadugani, Devala, Droog [D.S. Baburaj, 1987, 89, 94-96]. Silent Valley [V. Subramaniam, 2000]. Mettupalayam-Kotagiri [S.S.R. Bennet]. Nilambur, Wayanad [T.K. Sabu].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	9/9. Fragmented. There is a continuing decline but no extreme fluctuation in the number of locations or subpopulations.
Habitat status:	The decrease in habitat is < 20% due to biotic interference, change in land use pattern and frequent weeding. There is decrease in quality of the habitat due to biotic interfernce, change in land use pattern and frequent weeding.

Threats

Threats to taxon:	Habitat loss, harvest for medicine, over exploitation, trade of parts, trade for market or medicine, edaphic changes, fire and landslides are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The fruit of the taxon is in domestic and commercial trade for medicinal purposes. Commercial and domestic trade is resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are < 250. The number of mature individuals declined in the past by 20% and are likely to decline by 10% in the future. Generation time 10 years.
Trends:	The population size/numbers are declining at the rate of >20% in the last 10 years and are likely to decline by >20% in the next 3 generations due to habitat loss and trade.

Recent Field Studies: D.S. Baburaj in Udhagamandalam, 2000, M. Pharm, project work. V. Subramaniam in Silent Valley, 2000. Nambiar in Kerala, 1993-97, Medicinal plants of India, Kottakal.

Data quality: Census/monitoring, field studies, literature/herbarium studies.

Uncertainty: 95% confidence, range of opinion.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR. The adjoining population of the taxon outside of the NBR is fragmented and equally threatened. If the taxon were to go extinct in NBR, it cannot recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**ENDANGERED - CRITICALLY ENDANGERED**	Criteria:	**B1+2bcde**
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Survey, taxonomic research and life history studies.
Management:	Habitat management, wild population management, monitoring, sustainable utilisation, public awareness and cultivation.
Cultivation:	Cultivation is recommended for reintroduction, education, species recovery and commercial/ sustainability. Cultivated stocks are available at Kottakal. 10-15 individuals are found in cultivation. It is recommended to intensify or increase the ongoing programme. Some propagation techniques are known for taxon or similar taxa.

Other comments:	It is very difficult to establish under cultivation due to low seed viability. The cuttings of the plant do not establish well. Edges of tea plantations have been extended to destroy the habitat of this species. Habitat loss is due to tea plantations. This is a very rare plant. Dried fruits are used as adultrant for black pepper. It is also used as antibiotic.
Uses of NTFP in NBR	
Plant used by wild animals:	Birds may eat fruits, though unclear.
Harvest by humans:	The harvest of fruits and tender leaves by humans is partially destructive or destructive to the plant. The plant is used locally for medicine and as an adulterant of black pepper. The impact of harvesting on the species maims the individual, is fatal to the individual and also affects regeneration. The fruits are collected from mature plants.
NTFP in NBR:	The NTFP is available only in certain parts of NBR.
Collection organised by:	The collection is organised by primary co-operative societies, private contractors and individuals in March and April. The harvest techniques used are plucking and cutting. The collection is carried out for 2 months. The trade in the product is private. Collectors sell the harvested parts to private tradersand primary cooperatives at the rate of Rs. 20 for 50g in Coonoor [D.S. Baburaj], Rs. 45 per kg else where. The NTFP goes outside the NBR states.
Collection in NBR in the last 3 years:	There is periodic fluctuation in the collection in the last 3-4 years.
Data quality:	Field study, monitoring and indirect information from traders, collectors, seniors, etc.
Sources:	S1: 85
Compilers:	D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, B. Arthur
Reviewers:	P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya, P.Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, M.N.B. Nair, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan, B.A. Daniel

ENDANGERED [NBR]

Scientific name (author; date):	***Entada rheedei* Spreng.**
Synonym :	*Entada scandens* auct. non Benth., *E. schefferi* Ridl., *E. phaserloides* (L.) Merr., *Entada purseatha* DC.
Family:	Mimosaceae
Common name:	Kakkumkai [Mal.], Parandakai, Yannai puli [Tam.], Kakavalli, Doddakampi [Kan.]
Habit:	Gigantic woody climber
Habitat:	Evergreen and semievergreen forests.
Niche/ elevation:	200-1000m.

Distribution

Current Global Distribution:	Indomalaya
Distribution from Literature:	
From Field Studies:	Wayanad, Nilambur, Attapadi [P. Sharma, N. Sasidharan, M.N.B. Nair, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan]. Benne, Mudumalai [K.S. Devadass, 1999]. Mukkali [V. Subramaniam, 1996]. Mudumalai [K. Narendran, 1996, 97].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	3 locations. Fragmented. There is no continuing decline or extreme fluctuation in the number of locations or subpopulations.
Habitat status:	The decrease in habitat is < 20% in the last 50 years due to plantations. There is decrease in quality of the habitat due to plantations.

Threats

Threats to taxon:	Habitat loss due to tree cover and propagation difficulties are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The seeds of the taxon is in local, commercial and international trade for its ornamental value and scientific collections.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. The number of mature individuals have declined in the past by 10% and decline in the future unknown. Generation time is minimum of 10 years.
Trends:	The population size/numbers are declining and are likely to decline by <10% in the next 25 years due to lack of regeneration, slow growth and habitat degradation.

Recent Field Studies: None

Data quality: Field studies, literature/herbarium studies. Trade, population numbers and population trends – indirect information.

Uncertainty: 95% confidence, range of opinion, subjective opinion.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR and the population is not severely fragmented with the adjoining population. The adjoining populations of the taxon outside NBR are equally threatened. If the taxon were to go extinct in NBR, it would not be possible for the taxon to recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**ENDANGERED**	Criteria:	**B1+2bcde**
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Seed germination studies.
Management:	
Cultivation:	Cultivated stocks are not available. There is no coordinated species management programme for this species and it is not recommended for India. Some propagation techniques are known for similar taxa.

Other comments:	Earlier this species was considered a menace. In literature it is not found in Nilgiris. It is not a gregarious species. It occurs here and there. Fruits observed in Mukkali were found to differ morphologically from other populations in Wayanad, NBR (seed) [N. Sasidharan]. Due to conversion into plantation the habitat became condusive. Natural regeneration is poor. Seed germination tried by N. Sasidharan was successful. One plant is available in KFRI. Limited trade is in practise. The population is likely to come down due to low regeneration capacity. The species can deecline because of natural calamities or if cut down unwittingly. Not a heavily exploited species or used in medicine in a limited extent. Even common public is attracted by its size. Hence curio collections are made.
Uses of NTFP in NBR	
Harvest by humans:	The harvest of fruits by humans is non-destructive to the plant. The plant is used locally for medicine. The fruits are collected from mature plants.
NTFP in NBR:	The NTFP is available only in certain parts of NBR.
Collection organised by:	The collection is organised by primary co-operative societies and individuals in the months of March and April. The harvest technique used is hand picking. The trade in the product is private. Collectors sell the harvested parts to primary cooperatives at the rate of Rs. 3 per kg. The NTFP goes to local trade.
Collection in NBR in the last 3 years:	Depends on the demand. It is very less through legal channels.
Data quality:	Field study, collection trends, records and indirect information from traders, collectors, seniors, etc.
Comments:	Seeds are collected in plenty outside of NBR. Fruit pulp is used as fish poison, bark yields fibres, stem and bark is used as a substitute for soaps.
Sources:	-
Compilers:	P**.** Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N. Anilkumar, V.S. Ramachandran, T.K. Sabu, M.N.B. Nair, A. Vatsyayan, B.A. Daniel
Reviewers:	D.S. Baburaj, K.S. Devadas, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya, B. Arthur

ENDANGERED [NBR]

Scientific name (author; date):	***Garcinia gummi-gutta* (L.) Robs.**
Synonym:	*G. cambogia* (Gaertn.) Desv., *Cambogia gummi-gutta* L., *Mangostana cambogia* Gaertn., *G. cambogia* var. *conicarpa* (Wight) T.
Family:	Clusiaceae
Common name:	Kodampulli [Mal.], Kodakkapuli [Tam.], Upagi mara [Kan.].
Habit:	Evergreen tree, small to medium size tree [7-10m tall]
Habitat:	Evergreen forest, riparian
Niche/ elevation:	Upto 2000m.

Distribution

Current Global Distribution:	Westrn Ghats and Sri Lanka
Distribution from Literature:	
From Field Studies:	Wayanad, Nilambur, Attapadi [C.K. Antony and Anil]. Burliar, Coonoor, Lamb's Rock shola [K.S. Devadass, 1997 and D.S. Baburaj, 1996, 98]. Silent Valley [V. Subramaniam, 2000]. Sholurmattam slopes [S. Nath, 1994]. Siruvani [S.S.R. Bennet]. Gudalur [1999]. Nilgiris SE slopes [P. Balasubramanian]. Nilambur and Attapadi [P. Sharma and A. Vatsyayan, 2000].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	Many locations. Fragmented. There is no continuing decline or extreme fluctuation in the number of locations or subpopulations.
Habitat status:	The decrease in habitat is <20% due to plantations. There is decrease in quality of the habitat.

Threats

Threats to taxon:	Harvest [past], harvest for medicine, harvest for food and trade for market or medicine [past] are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The fruits of the taxon is in local, domestic, commercial and international trade for medicinal purposes. Commercial trade is resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. The number of mature individuals declined in the past by 10% and are likely to decline by 10-20% in the future. Generation time 40-50 years.
Trends:	The population size/numbers are declining at the rate of >10% in the last 10 years.

Recent Field Studies: A. Vatsyayan and P. Sharma in Nilambur and Attapadi, 2000, Conservation and sustainable utilisation including community based enterprise development of non- timber forest products in the NBR, UNESCO Project.

Data quality: Field studies, literature/herbarium studies, informal sighting. Population numbers – indirect information.

Uncertainty: 95% confidence, range of opinion.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR and the population is severely fragmented from the adjoining populations. The adjoining populations of the taxon outside NBR are equally threatened and cannot recolonize if extirpated from NBR. The proportion of population within NBR is very small.

Status in NBR:

IUCN (1994):	**ENDANGERED**	Criteria:	**B1+2bce**
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Survey, taxonomic research, genetic research and biochemical and cytogenetic studies.
Management:	Wild population management, sustainable utilisation, public awareness and cultivation.
Cultivation:	Cultivation is recommended for commercial/ sustainability. Cultivated stocks are available throughout Kerala. There is no coordinated species management programme for this species and it is recommended for India. It is recommended to intensify or increase ongoing programme intensified or increased. Propagation techniques are known for the taxon.

Other comments:	The MG University has received US patent for deciphering its elements. Normally it is common outside the forest. It is cultivated for medicine and food. The number of subpopulation need more research [A. Vatsyayan and P. Sharma]. Mode of collection is unscientific and crude, this will lead to depletion of population. This species is in high demand for the extraction of isocitric acid [D.S. Baburaj]. In the international trade the demand is in tons. Assessment of the population is deficient due to discontinuous distribution. This species is destructively harvested and extensively used. Regeneration is poor as fruits are collected. The species is in great demand even the cost is high. This species has great potential for income generation. Even other species of *Garcinia* are being collected. In Kerala it is cultivated in homesteads since the dried fruits are used in the preparation of fish curry including prawns.
Uses of NTFP in NBR	
Harvest by humans:	The harvest of fruits by humans is partially destructive to the plant. The plant is used locally for medicine and food. The impact of harvesting on the species affects regeneration and maims the individual. The fruits are collected from mature plants.
NTFP in NBR:	The NTFP is available all over NBR.
Collection organised by:	The collection is organised by primary co-operative societies, private contractors and individuals from July to September. The harvest techniques used are lopping, handpicking and wooden poole. Mostly men are involved in harvesting the fruits. The collection is carried out for approximately for 3 months. Collectors sell the harvested parts to private tradersand primary cooperatives at the rate of Rs. 80 per kg of dry material. In the open market, it is sold for up to Rs. 200 and in societies it is Rs. 75 per kg. The NTFP goes within the NBR states.
Collection in NBR in the last 3 years:	There is periodic fluctuation in the collection every alternate year.
Data quality:	Field study, collection trends and records, literature and indirect information from traders, collectors, seniors, etc.
Comments:	Wood is used for post. Tree yields a resin which, is purgative.
Sources:	-
Compilers:	P**.** Sharma, N. Sasidharan, N.N.B. V.P.K. Nambiar, C.K. Antony, N.A. Kumar, M.N.B. Nair V.S. Ramachandran, T.K. Sabu, A. Vatsyayan, B.A. Daniel,
Reviewers:	D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nair, T. Surayya, B. Arthur

Scientific name (author; date):	***Helicteris isora* L.**
Synonym:	-
Family:	Sterculiaceae
Common name:	Kaiva, Velamburi, Idamuri [Tam.], Karulimara [Kan.], Edampiri valampiri [Mal.].
Habit:	Shrub, small tree, heliophyte.
Habitat:	Moist deciduous forest.
Niche/ elevation:	Moist soil, lateritic, undergrowth at edges of moist deciduous forests. 500-1,100m.

Distribution

Current Global Distribution:	Indomalay, Australia
Distribution from Literature:	Edalur ghat [S1]. Wayanad [P1].
From Field Studies:	North Mudumalai, Siruvani, Keel Nadugani [D.S. Baburaj, 1999-2000]. Siruvani, Mudumalai [K.S. Devadass, 1999]. Siruvani, Silent Valley buffer zone [V. Subramaniam, 2000]. Siruvani, lower slopes of Nilgiris [K. Vivekananthan, 1994-95]. Mudumalai [K. Narendran, 1997-99]. All over Kerala [P.Sharma, N. Sasidharan, M.N.B. Nair, V.P.K. Nambiar, C.K. Antony, N. A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	15/ Many locations. Contiguous. There is no continuing decline or extreme fluctuation in the number of locations or subpopulations.
Habitat status:	There is no change in habitat but a decline of <20% is predicted in the future. There is decrease in the quality of habitat.

Threats

Threats to taxon:	Harvest for medicine, harvest for food [fodder], trade for market or medicine and edaphic changes are the threats to the taxon. These threats are not resulting in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The fruits of the taxon are in local and domestic trade.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. The number of mature individuals have not declined in the past and are not likely to decline in the future. Generation time 3 years.
Trends:	The population size/numbers are stable. Decline in future is not predicted.

Recent Field Studies:	A. Vatsyayan, P. Sharma in Attapadi and Nilambur. N. A. Kumar in Wayanad, ongoing project. S.N. Prasad, P. Balasubramanian and A. Rajasekaran in Wayanad, 1994-98. Muralidharan in Wayanad, 1993-97.
Data quality:	Field studies, literature/herbarium studies, informal sighting, indirect information.
Uncertainty:	95% confidence, range of opinion.
The taxon in adjoining areas of NBR:	The taxon also occurs in areas adjoining the NBR. In NBR the proportion of the population is approximately <20% and the population is contiguous with the adjoining population. The adjoining populations of the taxon outside NBR are not threatened. If the taxon were to go extinct in NBR, it can recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**LOWER RISK LEAST CONCERN**	Criteria:	-
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Genetic research and life history studies.
Management:	Habitat management, monitoring, public awareness and sustainable utilisation.
Cultivation:	Cultivated stocks are not available. There is no coordinated species management programme for this species and it is not recommended for India. Propagation techniques are not known at all.

Other comments:	Elephants and cattle feed on the leaves and bark of this species. Harvest for fiber to control elephants. It was used instead of jute before 1951. Since this species is present in moist deciduous forests, it resists fire. Therefore, the damage is minimum. It may be used, instead of nylon fibers as the fibers are biodegradable and are superior to coconut fibers. The fruit extract [oil] is used to treat ear pain in Vellingiri hills of Coimbatore.
Uses of NTFP in NBR	
Plant used by wild animals:	Leaves, bark and flowers are eaten by elephants and cattle.
Harvest by humans:	The harvest of fruits by humans is non-destructive to the plant. The plant is used locally for medicine. The impact of harvesting on the species affects regeneration. The roots are collected from mature plants.
NTFP in NBR:	The NTFP is available only in certain parts of NBR.
Collection organised by:	The collection is not organised. It is collected from February to May. The harvest technique used is plucking. The collection is carried out for 3 months. The trade in the product is private. Collectors sell the harvested parts to private traderss. The NTFP goes to local trade.
Collection in NBR in the last 3 years:	Not known
Data quality:	Indirect information from traders, collectors, seniors, etc.
Comments:	Grazing and forest fire if present might affect the population. Wood charcoal is used for gun powder. Collection time is 2 months only.
Sources:	S1: 21; P1.
Compilers:	D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, B. Arthur
Reviewers:	P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya, P. Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, A. Rajasekaran, V.S. Ramachandran, M.N.B. Nair, T.K. Sabu, A. Vatsyayan, B.A. Daniel

LEAST CONCERN [NBR]

Scientific name (author; date):	***Hemidesmus indicus* (L.) R. Br.**
Synonym :	*Periploca indica* L.
Family:	Asclepiadaceae
Common name:	Nannari [Mal.], Suganthipala [Tam.], Nannari, Narunandi [Mal.], Karibandha, Sogade [Kan.].
Habit:	Twining, wiry undershrub
Habitat:	Plains, open forest, edges of wastelands dry deciduous and scrub jungles.
Niche/ elevation:	Undergrowth along dry waterways. Up to 1000m.

Distribution

Current Global Distribution:	Peninsular India and Sri Lanka
Distribution from Literature:	Kallar, Burliar [S1]. Mudumalai, Attapadi, Coimbatore [P1]
From Field Studies:	Bandipur, Kallar, Mudumalai [D.S. Baburaj, 1998]. Wayanad Sanctuary [K. Narendran, 1996]. Segur [Devadass, 2000]. Coimbatore [P. Balasubramanian,1998]. Kotagiri [S. Nath, 2000]. Wayanad, Attapadi and Nilambur [P.Sharma, N. Sasidharan, M.N.B. Nair, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	Many locations. Contiguous. There is no continuing decline and no extreme fluctuation in the number of locations or subpopulations.
Habitat status:	There is increase in habitat as clearing of forests promote growth of this plant.

Threats

Threats to taxon:	Grazing, harvest, harvest for medicine, harvest for food, over exploitation, trampling and edaphic changes [future] are threats to the taxon. These threats are not resulting in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The root of the taxon is in local, domestic, commercial and international trade for medicinal purposes and as flavouring agent in sharbats. All forms of trade are resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. The number of mature individuals have not declined in the past and are not likely to decline in the future. Generation time 3 years.
Trends:	The population size/numbers are declining at a very slow rate and are not likely to decline in the future.

Recent Field Studies: Mudumalai, Attapadi, Coimbatore S.N. Prasad, P. Balasubramanian and A. Rajasekaran. Nambiar and T.K. Sabu all over Kerala, 1993-97. N.A. Kumar and A. Vatsyayan in Wayanad, ongoing project. Muralidharan in Wayanad, 1993-97.

Data quality: Field studies, literature/herbarium studies, informal sighting, indirect information.

Uncertainty: 95% confidence, range of opinion.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR. In NBR the proportion of the population is approximately <20% and the population is contiguous with the adjoining population. The adjoining populations of the taxon outside NBR are not threatened, but if the taxon were to go extinct in NBR, it can recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**LOWER RISK LEAST CONCERN**	Criteria:	-
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed:

Recommendations

Research:	Survey and life history studies.
Management:	Sustainable utilisation, public awareness and cultivation.
Cultivation:	Cultivation is recommended for commercial/ sustainability. Cultivated stocks are available at AVS, Kottakal. Numbers in cultivation is >41000. There is no coordinated species management programme for this species and it is not recommended for India. It is recommended to intensify or increase the ongoing programme. Propagation techniques are known for this taxon.

Other comments:	The Tamil Nadu Nannari which is in wide use in many establishments is the root of *Dacalepis hamiltoin*. The actual nannari which has to be used is the root of *H. indicus*. The root is used in sharbat commercially. The leaves when chewed seem to be refreshing. It is an astringent. At present the population is not affected because of the use of the substitute on a wider scale. Its demand is decreasing which is not true for Tamil Nadu. It is a good soil binder and can rejuvenate wastelands. The tubers establish within 3 months. The Government of India, Biotechnology division has given a project on feasibility of using this plant as a substitute.
Uses of NTFP in NBR	
Plant used by wild animals:	Animals graze leaves of this species.
Harvest by humans:	The harvest of roots by humans is destructive to the plant. The plant is used locally for medicine and as flavoring agent. The impact of harvesting is fatal to the individual. The roots are collected from mature plants.
NTFP in NBR:	The NTFP is available only in certain parts of NBR.
Collection organised by:	The collection is organised by primary co-operative societies, private contractors and individuals throughout the year except summer. The harvest techniques used are uprooting. The collection is carried out for 6 months. The trade in the product is private. Collectors sell the harvested parts to private traders and primary cooperatives at the rate of Rs. 30-35 per kg. The NTFP goes within and outside the NBR states.
Collection in NBR in the last 3 years:	The annual consumption by the drug industry in northern Kerala is 94471 kg of dried roots (Sasidharan and Muraleedharan, 2000)
Data quality:	Field study, collection trends, records and indirect information from traders, collectors, seniors, etc.
Sources:	S1: 90.
Compilers:	D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, B. Arthur
Reviewers:	P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya, P**.** Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N. A. Kumar, M.N.B. Nair V.S. Ramachandran, T.K. Sabu, A. Vatsyayan, , B.A. Daniel

Scientific name (author; date):	***Holostemma ada-kodien* Schult.**
Synonym:	*H. annulare* (Roxb.) K. Schum. *Sarcrostemma annulare* Roth., *H. rheedii* Spreng. ex Wall., *Sarcostemma annulare* Roth.
Family:	Asclepiadaceae
Common name:	Adapathian[Mal.], Thiruampale, Palay kirai [Tam.].
Habit:	Climber
Habitat:	Moist and dry deciduous.
Niche/ elevation:	Up to 1000m.

Distribution

Current Global Distribution:	Indo-Malaysia
Distribution from Literature:	Masinagudi, Segur, Theppakkadu [S1]
From Field Studies:	Wayanad, Nilambur [N.A. Kumar]. Attapadi,Thambirattukallu [Nambiar]. Siruvani belt [R. Gopalan].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location: locations	3 locations. Fragmented. There is a no continuing decline or extreme fluctuation in the number of or subpopulations.
Habitat status:	The decrease in habitat is <20% in the last 15 years due to plantation and encroachment. There is no change in quality of the habitat.

Threats

Threats to taxon:	Harvest for medicine, habitat fragmentation, over exploitation, pest and disease and trade for market or medicine are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The root of the taxon is in commercial trade for medicinal purposes. Commercial trade is resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. The number of mature individuals declined in the past by 20% and are likely to decline by 20% in the future. Generation time 2 years.
Trends:	The population size/numbers are declining at the rate of >20% in the last 10 years.

Recent Field Studies: Nambiar and T.K. Sabu in Wayanad, Nilambur and Attapadi, 1993-97, Medicinal plants of India project. A. Vatsyayan and P. Sharma in Nilambur and Attapadi, 2000.

Data quality: Field studies, literature/herbarium studies, informal sighting, indirect information.

Uncertainty: 95% confidence, range of opinion.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR and the population is not contiguous with the adjoining population. The adjoining populations of the taxon outside NBR are equally threatened. If the taxon were to go extinct in NBR, it cannot recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**ENDANGERED - CRITICALLY ENDANGERED**	Criteria:	**B1+2e**
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Cytogenetic studies of different varieties and provinces.
Management:	Public awareness, semi processing, processing and storage.
Cultivation:	Cultivated stocks of about 10,000 are available in Kottakal AVG. There is no coordinated species management programme for this species and it is recommended for India. It is recommended to increase or intensify ongoing programme . Propagation techniques are known for this taxon.

Other comments:	Dr. Swarupanandan's paper on S.I. Asclepiadaceae should be referred (KFRI), Journ. Linnaean Soc. Poor regeneration [Nambiar]. Gamble's collection (1886) alit is available in BSI [K. Vivekananthan]. Large quantities are traded as it is in great demand. Kottakal is cultivating 10-15% and requires about 1,000kg dried material. It is also obtained from market. Leaves and flowers are used as vegetable. As cultivation of this species is widely in practise, exploitation will be stopped [Nambiar]. It is one of the important species of Western Ghats [Nambiar].
Uses of NTFP in NBR	
Plant used by wild animals:	Wild boars and other herbivores eat leaves, stem and roots.
Harvest by humans:	The harvest of leaves and flowers are partially destructive to the plant whereas the harvest of roots by humans is destructivto the plant. The plant is used locally for medicine. The impact of harvesting is fatal to the individual. The roots are collected from mature plants.
NTFP in NBR:	The NTFP is available only in certain parts of NBR.
Collection organised by:	The collection is organised by primary co-operative societies, private contractors and individuals in the months of May and June. The harvest techniques used are uprooting. The trade in the product is private. Collectors sell the harvested parts to private traders and primary cooperatives at the rate of Rs. 95 per kg of dry material. In private it is sold for Rs. 70 per kg and in cooperatives fresh material is sold for Rs. 45 per kg. The NTFP goes within the NBR states.
Collection in NBR in the last 3 years:	The consumption by the drug industry in northern Kerala is 33179 kg of dried root (Sasidharan and Muraleedharan, 2000)
Data quality:	Field study, collection trends and records, literature and indirect information from traders, collectors, seniors, etc.
Comments:	Leaves, flowers and fruits used as vegetable.
Sources:	S1: 92; N1.
Compilers:	D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, B. Arthur
Reviewers:	P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya, P. Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, M.N.B. Nair, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan, B.A. Daniel

VULNERABLE [NBR]

Scientific name (author; date):	***Hydnocarpus pentandra* (Buch.-Ham.) Oken**
Synonym :	*H. wightiana* Blume, *Chilmora pentandra* Buch-Ham., *H. laurifolia* (Dennst.) Sleum.
Family:	Flacourtiaceae
Common name:	Maravettu [Tam.,Mal.], Marotti, Neerutti [Mal.], Toratti, Surti, Slewner [Kan.].
Habit:	Tree of 10-15m.
Habitat:	Often riparian, sometimes seen in cultivated areas also. Moist deciduous and semi evergreren forests.
Niche/ elevation:	Upto 1500m.

Distribution

Current Global Distribution:	-
Distribution from Literature:	-
From Field Studies:	Muthukulam [B. Joseph, 1999]. Kallar [M. Mohanan]. Wayanad, Attapadi, Nilambur [P.Sharma, N. Sasidharan, M.N.B. Nair, V.P.K. Nambiar, C.K. Antony, N. A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan]. Siruvani, Silent Valley [V. Subramaniam, 2000].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	3 locations. Contiguous. There is a no continuing decline or extreme fluctuation in the number of locations or subpopulations.
Habitat status:	The decrease in habitat is <20% in the last 10-15 years due to biotic pressure. There is decrease in quality of the habitat due to biotic pressure.

Threats

Threats to taxon:	Harvest, habitat loss, trade for market or medicine, harvest for medicine and oil extraction are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The fruits and seed of the taxon are in local, domestic, commercial and international trade. Commercial trade is resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. The number of mature individuals have declined in the past and are likely to decline by 10% in the future. Generation time is 30-40 years.
Trends:	The population size/numbers are declining at the rate of >10% in the last 10 years.

Recent Field Studies: A. Vatsyayan and P. Sharma in Nilambur, Attapadi, 2000, UNESCO project. N.A. Kumar in Wayanad, 2000, Ongoing project.

Data quality: Informal sighting, literature/herbarium. Distribution, trade – field studies, indirect information.

Uncertainty: 95% confidence.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR and the population is contiguous with the adjoining population. The adjoining populations of the taxon outside NBR are equally threatened. If the taxon were to go extinct in NBR, it can recolonise from the cultivated plants from the adjoining areas.

Status in NBR:

IUCN (1994):	**ENDANGERED – VULNERABLE**	Criteria:	**B1+2bce**
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Survey, life history studies, population studies and agro technology
Management:	Habitat management, sustainable utilisation and cultivation.
Cultivation:	Cultivation is recommended for research. Cultivated stocks are not available. There is no coordinated species management programme for this species and it is not recommended for India. Propagation techniques are known for this taxon or similar taxon.

Uses of NTFP in NBR

Harvest by humans:	The harvest of fruits and seeds by humans is partially destructive to the plant. The plant is used locally for medicine and as fish poison. The impact of harvesting affects regeneration of the species. It is a minimal threat. The parts are collected from mature plants.
NTFP in NBR:	The NTFP is available all over NBR.
Collection organised by:	The collection is organised by primary co-operative societies, private contractors and individuals from mid January tol mid April. The harvest techniques used are lopping, plucking and shaking branches. The collection is carried out for 3 months by men. The trade in the product is private. per kg. The NTFP goes within and outside the NBR states.
Data quality:	Collection trends, records, literature and indirect information from traders, collectors, seniors, etc.
Comments:	During Diwali the shell of the seed is used for lighting lamps. It is a common species in sacred groves [N. A. Kumar]. It is exported to France as a skin treatment oil [A. Vatsyayan and P. Sharma].
Sources:	-
Compilers:	D.S. Baburaj, K.S. Devadas, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, B. Arthur
Reviewers:	P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya, P.Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, M.N.B. Nair, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan, B.A. Daniel

Scientific name (author; date):	***Myristica dactyloides* Gaertn.**
Synonym :	*M. laurifolia* Hook. f. & Thoms., *M. beddomei* King, *M. contorta* Warb., *M. laurifolia* var. *lanceolata* Hook. f.
Family:	Myristiceae
Common name:	Kathjaathi kai [Tam.], Kattujathi [Mal.].
Habit:	Medium sized tree upto 30m.
Habitat:	Evergreen and semievergreen forests.
Niche/ elevation:	700-1500m.

Distribution

Current Global Distribution:	South India and Sri Lanka
Distribution from Literature:	Carcoor ghat, Gudalur, Naduvattom [S1]. Silent Valley Reserve Forest [V1].
From Field Studies:	Gudalur [S. Nath, 1998]. Silent Valley [P. Balasubramanian, 1995. Venkatasubtamanian, 2000]. Upper Siruvani [R. Gopalan]. Wayanad, Attapadi, Nilambur, Siruvani [P.Sharma, N. Sasidharan, M.N.B. Nair, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	4 locations. Fragmented. There is a continuing decline but no extreme fluctuation in the number of locations or subpopulations.
Habitat status:	The decrease in habitat is <20% in the last 10-15 years due to biotic pressure and alternate landuse. There is decrease in quality of the habitat due to biotic pressure and edaphic changes.

Threats

Threats to taxon:	Harvest, habitat loss, overexploitation, trade of parts, trade for market or medicine, harvest for medicine and food are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The fruit, aril and seeds of the taxon are in commercial trade. Commercial trade is resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. The number of mature individuals have declined in the past and are likely to decline in the future. Generation time 20 years.
Trends:	The population size/numbers are declining at the rate of >20% in the last 10 years and are likely to decline by >50% in the next 60 years.

Recent Field Studies: B. Joseph in Muthukulam, 1998, Conservation studies. N. A. Kumar in Wayanad, 2000, ongoing project. A. Vatsyayan and P. Sharma in Nilambur, Attapadi, 2000, UNESCO project. *Muralidharan et al.,* in Wayanad, 1993-97, Biodiversity. V. Subramaniam in Silent Valley, 2000, Quadrat study. LSPSS.

Data quality: Informal sighting, indirect information.

Uncertainty: 95% confidence.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR and the population in NBR is contiguous with the adjoining populations. The adjoining populations of the taxon outside NBR are equally threatened. If the taxon were to go extinct in NBR, it cannot recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**ENDANGERED - CRITICALLY ENDANGERED**	Criteria:	**B1+2bcde**
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Vulnerable

Recommendations

Research:	Survey, genetic research, life history studies and PHVA.
Management:	Wild population management, public awareness, sustainable utilisation and cultivation.
Cultivation:	Cultivation is recommended for research and commercial/ sustainability. There is no coordinated species management programme for this species and it is recommended for India. It is

recommended to initiate cultivation programme within 3 years. Propagation techniques are known for this taxon or similar taxa.

Other comments: In Gudalur, habitat could have been drastically reduced due to tea plantations. N. A. Kumar has used this plant as a dye. It is also used as an adulterant for nutmeg [*M. fragrans*]. Regeneration is poor. All fruits [nuts] are collected. There is no subsequent propagation. Some tribals say that finding this plant is a 'dream'. Since the fruits are dioecious setting is difficult. Demand in Kerala is met by Madhya pradesh and other Northern states [A. Vatsyayan and P. Sharma]. Selection and cultivation is recommended.

Uses of NTFP in NBR

Plant used by: The fruits of the plant are fed by birds and bats.

Harvest by humans: The harvest of fruits and seeds by humans are partially destructive to the plant. The plant is used locally for medicine and food. The impact of harvesting affects regeneration of the species. The roots are collected from mature plants.

NTFP in NBR: The NTFP is available only in certain parts of NBR.

Collection organised by: The collection is organised by private contractors and individuals in the months of March and April. The harvest techniques used are lopping and plucking. The collection is carried out for 2 months. The trade in the product is private. Collectors sell the harvested parts to private traders at the rate of Rs. 100 per kg of mace. The NTFP goes within and outside the NBR states.

Data quality: Indirect information from traders, collectors, seniors, etc.

Sources: S1: 122; V1: 400

Compilers: P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya

Reviewers: D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, P. Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N. A. Kumar, V.S. Ramachandran, M.N.B. Nair, T.K. Sabu, A. Vatsyayan, B. Arthur, B.A. Daniel

Scientific name (author; date):	***Nilgirianthus ciliatus* (Nees.) Bremek.**
Synonym:	*Strobilanthus ciliatus Nees*
Family:	Acanthaceae
Common name:	Kurinji, Chinna kurinji, Karimkurinji [Mal.]
Habit:	Shrub
Habitat:	Grassland, fringes of sholas at higher altitudes.
Niche/ elevation:	Fringes of sholas, shade loving. Above 1200m.

Distribution

Current Global Distribution:	Endemic to Western Ghats
Distribution from Literature:	Carcoor ghat [S1].
From Field Studies:	Mukurthi National Park, Upper Bhavani [M. Mohanan, 1999]. Naduvattom [R. Gopalan, 1998]. Attapadi, Nilambur, Wayanad [P. Sharma, N. Sasidharan, M.N.B. Nair, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan].
Ext. of occurrence (Sq. km.):	<100
Area of occupancy (Sq. km.):	<10
Number of Subpopulations/location:	1 location.
Habitat status:	The decrease in habitat is <20% in the last 10-15 years due to alteration of the habitat and alternate land use. There is decrease in quality of the habitat due to alternate land use and edaphic factors.

Threats

Threats to taxon:	Harvest for medicine, habitat loss, overexploitation and fire are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The root of the taxon is in commercial trade for medicinal purposes. Commercial trade is resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. Generation time not known.
Trends:	The population size/numbers are likely to decline by >10% in the next 20 years.

Recent Field Studies: R. Gopalan in Naduvattom, 1998, Survey. M. Mohanan in Mukurthi National Park and Upper Bhavani, 1999, Survey. A. Vatsyayan and P. Sharma in Nilambur, Attapadi, 2000, UNESCO project. N. Sasidharan in Wayanad, 1994-97.

Data quality: Field study, Informal sighting.

Uncertainty: 95% confidence.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR and the population in NBR is severely fragmented from the adjoining population. The adjoining populations of the taxon outside NBR are equally threatened. If the taxon were to go extinct in NBR, it cannot recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**CRITICALLY ENDANGERED**	Criteria:	**B1+2bc**
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Taxonomic research and life history studies.
Management:	Habitat management and sustainable utilisation.
Cultivation:	There is no coordinated species management programme for this species and it is not recommended for India. Propagation techniques are known for this taxon or similar taxon.

Other comments:	In MH there is only one collection. Therefore, this species in trade is doubtful. The species collected as *Strobilanthus* sp. possibly chinna kurinji could have been another *Strobilanthus* sp./ *Nilgirianthus* sp. more commonly available. The plant in analysis here is highly restricted in distribution and not commonly found. Hence more commercial/ market samples with flowers and fruits are necessary to fix the identity of the entity in question. Approximately the extent of occurrence is 1,400 sq. km. Roots are harvested in small numbers and regeneration is good therefore it is not a threat to the species. There is confusion in the identification of *Strobilanthus* sp.
Uses of NTFP in NBR	
Plant used by:	Bees feed on the nectar of this flower.
Harvest by humans:	The harvest of roots by humans is partially destructive to the plant. The plant is used locally for medicine. The impact of harvesting is fatal to the individual. The roots are collected from mature plants.
NTFP in NBR:	The NTFP is available all over NBR.
Collection organised by:	The collection is organised by private contractors and individuals all throughout the year. The harvest techniques used are uprooting. The collection is carried out for throughout the year by men. The trade in the product is private. Collectors sell the harvested parts to private tradersat the rate of Rs. 6-8 per kg of root and 1.5 kg for the whole plant. The NTFP goes within the NBR states.
Collection in NBR in the last 3 years:	There is no periodic fluctuation in the collection. In northern Kerala the annual consumption is 2,40,697 kgs (Sasidharan and Muraleedharan, 2000)
Data quality:	Monitoring, collection trends, records and indirect information from traders, collectors, seniors, etc.
Comments:	Regeneration is very fast.
Sources:	S1 – p.107.
Compilers:	P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya.
Reviewers:	D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, P.Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan, M.N.B. Nair, B. Arthur, B.A. Daniel

DATA DEFICIENT [NBR]

Scientific name (author; date):	***Parmelia dilatata* Vainio**
Synonym	-
Family:	Parmeliceae
Common name:	Kalpasi, Kalpasam, Kalpoovu [Mal.].
Habit:	Lithiphyte, lichen.
Habitat:	Semievergreen
Niche/ elevation:	Above 1000m.

Distribution

Current Global Distribution:	Not known
Distribution from Literature:	Coonoor, Devala – Nadugani, Kalhatti – Masunagudi, Karumpalam, Kinnatarai, Madanad Reserve Forest, Marappalam, Naduvattom, Gudalur and Segur ghat [S1].
From Field Studies:	Throughout NBR at higher altitudes
Ext. of occurrence (Sq. km.):	Not known
Area of occupancy (Sq. km.):	Not known
Number of Subpopulations/location:	Not known

Habitat status:

Threats

Threats to taxon:	Harvest, harvest for medicine and food are the threats to the species.
Trade:	Whole plant is in commercial trade.

Population

Numbers/Generation time/Trend	Not known
Trends:	Not known

Recent Field Studies: None

Data quality: -

Uncertainty High

The taxon in adjoining areas of NBR: Not known

Status in NBR:

IUCN (1994):	**DATA DEFICIENT**	Criteria:	-
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Survey, taxonomic research.
Management:	Monitoring
Cultivation:	

Other comments: For taxonomic identity Dr. G.N. Hariharan of M.S. Swaminathan Foundation may be contacted. It is used as a flavoring agent in the preparation of biriyani. Taxonomic identity has to be clarified. A more detailed study is needed. A number of lichen species are being collected from Nilgiris and are exported out of NBR states as a spice (condiment). More research in identification and distribution of the species in the area is required. It could be a mixture of species.

Uses of NTFP in NBR

Harvest by humans: The plant is used locally for medicine and as flavouring agent in food. It is also used in mat, dyes and paint industries.

NTFP in NBR: The NTFP is available all over NBR.

Collection organised by: The trade in the product is private. Collectors sell the harvested parts to private tradersand primary cooperatives. The NTFP goes within and outside the NBR states.

Sources: S: 123.

Compilers: P.Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N. A. Kumar, M.N.B. Nair, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan, B.A. Daniel

Reviewers: D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, B. Arthur, T. Surayya

Scientific name (author; date):	***Persea macrantha* (Nees.) Kosterm.**
Synonym:	*Machilus macrantha* Nees.
Family:	Lauraceae
Common name:	Gulamavo, Gurma [Kan.], Kollamavu [Tam.], Kulamavu [Mal.].
Habit:	-
Habitat:	Large evergreen tree of about 30m.
Niche/ elevation:	Evergreen forest. Top canopy in evergreen forest. Up to 2134m.

Distribution

Current Global Distribution:	South India and Sri Lanka
Distribution from Literature:	Bokkapuram Reserve Forest, Cherambadi, Gudalur ghat, Kariashola and Mamaram – Sundapatti [S1].
From Field Studies:	Kothagiri [M.M. Mohanan, 2000]. Lamb's Rock [RF] [D.S. Baburaj, 1992]. Silent Valley [V. Subramaniam, 2000]. Siruvani [K.S. Devadass, 1999]. All over Kerala [P.Sharma, N. Sasidharan, M.N.B. Nair, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	20/20. Contiguous. There is a continuing decline but no extreme fluctuation in the number of locations or subpopulations.
Habitat status:	The decrease in habitat is <20% in the last 10-20 years due to biotic interference and change in land use pattern. There is decrease in quality of the habitat due change in land use pattern.

Threats

Threats to taxon:	Harvest, harvest for medicine, bark and timber, habitat loss, overexploitation, trade of parts, trade for market or medicine, edaphic changes and fire are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The bark of the taxon is in commercial and international trade for medicinal purposes. Commercial trade is resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. The number of mature individuals declined in the past by 10- 20% and are likely to decline by 10-20% in the future. Generation time 20 years.
Trends:	The population size/numbers are declining at the rate of >10% in the last 10 years and are likely to decline by >20% in the next 60 years.

Recent Field Studies:	D.S. Baburaj in Lamb's Rock Reserve Forest, 1992., V. Subramaniam in Silent Valley, 2000. Devadass in Siruvani, 1999. N. A. Kumar in Wayanad, 2000, Ongoing project.
Data quality:	Field study. Population trends - Informal sighting, indirect information.
Uncertainty:	95% confidence, range of opinion.
The taxon in adjoining areas of NBR:	The taxon also occurs in areas adjoining the NBR. In NBR the proportion of the population is approximately <20% and the population is contiguous with the adjoining population. The adjoining populations of the taxon outside NBR are equally threatened. If the taxon were to go extinct in NBR, it can recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**VULNERABLE ¯ LOWER RISK NEAR THREATENED**	Criteria:	**A2cd**
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Survey, genetic research and life history studies.
Management:	Habitat management, wild population management, monitoring, public awareness and sustainable utilisation.
Cultivation:	Cultivated stocks are not available. There is no coordinated species management programme forthis species and it is recommended for India. It is recommended to initiate cultivation programme after 3 years. Propagation techniques are not known at all.

Other comments:	The resin/gum of this species is used as a binder for agarbathis. Over extraction for agarbathis and medicines. It is a secondary timber. Regeneration is good but establishment is poor. Bark and leaves are used as medicine for asthma and ulcer.
Uses of NTFP in NBR	
Harvest by humans:	The harvest of of leaves are partially destructive to the plant. The harvest of bark and whole plant by humans is destructive to the plant. The plant is used locally for medicine and agarbathis. The impact of harvesting is fatal to the individual. The roots are collected from mature plants.
NTFP in NBR:	The NTFP is available only in certain NBR.
Collection organised by:	The collection is organised by private contractors and individuals all through out the year. The harvest techniques used are incision and debarking. Men are involved in the harvest. The collection is carried out for 3 months. The trade in the product is private. The NTFP goes within and outside the NBR states.
Data quality:	Field study and indirect information from traders, collectors, seniors, etc.
Sources:	S1: 129
Compilers:	D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, B. Arthur
Reviewers:	P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya, P. Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, M.N.B. Nair, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan, B.A. Daniel

LEAST CONCERN [NBR]

Scientific name (author; date):	***Phyllanthus emblica*L.**
Synonym:	*Emblica officinalis* Gaertn.
Family:	Euphorbiaceae
Common name:	Nelli, Amla [Mal.], Nelli [Tam.], Amulaka [Kan.]
Habit:	Small [3-5m] to medium [7-9m] tree.
Habitat:	Dry and moist deciduous forests and secondary grasslands [predominant].
Niche/ elevation:	300-1000m.

Distribution

Current Global Distribution:	South and South East Asia
Distribution from Literature:	-
From Field Studies:	Eastern Bandipur [Suresh]. All through out Kerala and Tamil Nadu NBR [All participants]
Ext. of occurrence (Sq. km.):	5000-20000
Area of occupancy (Sq. km.):	500-2000
Number of Subpopulations/location:	Many locations. Contiguous.
Habitat status:	The decrease in habitat is <20% due to encroachment in Kerala and alternate land use. There is decrease in quality of the habitat due to weeds, erosion in Attapadi, trampling, fire and biotic interference.

Threats

Threats to taxon:	Harvest, grazing, harvest for food, harvest for medicine, habitat loss and demographic instability are resulting in and may result in population decline. The influence of threats on the population are well understood, some threats are not reversible and have not ceased to be threats.
Trade:	The fruits of the taxon are in local, domestic, commercial and international trade. Commercial trade is resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. The number of mature individuals have declined in the past and are likely to decline in the future. Generation time 20-25 years.
Trends:	The decline in population size/numbers not known.

Recent Field Studies: SACON Project report in Mudumalai, 1996-98. A. Vatsyayan and P. Sharma in Nilambur and Attapadi, 2000.

Data quality: Field study, literature/herbarium. Habitat status, trade - informal sighting. Population trends – indirect information, hearsay.

Uncertainty: 95% confidence, range of opinion.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR. The adjoining populations of the taxon outside NBR are equally threatened. If the taxon were to go extinct in NBR, it can recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**LOWER RISK LEAST CONCERN**	Criteria:	-
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Survey, genetic research and fruit quality.
Management:	Habitat management, monitoring, public awareness, sustainable utilisation, cultivation and fire control.
Cultivation:	Cultivated stocks are available at KAU. There is no coordinated species management programme for this species and it is not recommended for India. Propagation techniques are known for this taxon or similar taxon.

Other comments:	Optimum elevation is 300-500m. Field studies have been done in some locations. Varieties in Kotagiri has small pinkish fruits. >20% decline in population in Karnataka [Ram Shankar & Ganesh *et al*.] in BRT. Near Attapadi there is encroachment of forests [N. Sasidharan]. If SC order is followed strictly, exploitation is likely to decrease in future. The fruits are used to make pickles and is one of the ingredient in Chyawanprash. In BRT there is < 20%decline [Ganeshaiah *et al*.]. Demographic instability may affect the population in future. Genetic and taxonomic studies is recommended. *P. indofisturi* is collected and traded in this name. 400 kg/ha in BRT – extrapolate to NBR. Species management programme should be for NBR for harvesting, amount etc.
Uses of NTFP in NBR **Plant used by wild animals:**	Sambar and barking deer feed on this species.
Harvest by humans:	The harvest of fruits by humans is partially destructive to the plant whereas, the harvest of whole plant for fire wood is destructive to the plant. The plant is used locally for medicine and food. The impact of harvesting on the species affects regeneration and maims the individual. The roots are collected from mature plants.
NTFP in NBR:	The NTFP is available only in certain parts of NBR.
Collection organised by:	The collection is organised by NGOs/self help groups, forest department, primary co-operative societies, private contractors and individuals in the months of November, December and January. The harvest techniques used are lopping, plucking, shaking branches, hacking tree and cutting. The collection is carried out for about 3 months. The trade in the product is private. Collectors sell the harvested parts to private traders and primary cooperatives at the rate of Rs. 3-8 per kg depending on season. The NTFP goes to local trade, outside and within the NBR states. He names of the societies are LAMP societies, SC/ST federation and registered cooperative societies.
Collection in NBR in the last 3 years:	There is periodic fluctuation in the collection every alternate year.
Data quality:	Indirect information from traders, collectors, seniors, etc.
Comments:	Fruits, leaves and bark are rich in tannins (28, 22, 8-21% respectively).
Sources:	Prasad, S.N., P. Balasubramanian and A. Rajasekaran (1999) Ethnoecology and phytochemistry of medicinal plants in Nilgiri Biosp[here Reserve, Project Report – SACON, Coimbatore.
Compilers:	D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, B. Arthur, P**.** Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan, B.A. Daniel, P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, M.N.B. Nair, S. Raghavan, S. Nath, T. Surayya
Reviewers:	**-**

Scientific name (author; date):	***Piper longum* L.**
Family:	Piperaceae
Common name:	Thipli, Pipili, Kattu vethalai [Tam.], Thippali, Pippali, Magaohi [Mal.], Hippali tippali [Kan.].
Habit:	Creeping undershrub
Habitat:	Teak plantations, moist deciduous and evergreen forests
Niche/ elevation:	In shade. 300-1500m.

Distribution

Current Global Distribution:	Indo-Malaysia
Distribution from Literature:	
From Field Studies:	Attapadi [P. Balasubramanian, 1995]. Barliar/Kallar [R. Gopalan, 1997]. Siruvani [B. Joseph, 1998]. Kotagiri and Gudalur forests [S. Nath, 1998]. Wayanad [N.A. Kumar]. Attapadi, Nilambur [T.K. Sabu, D.S. Baburaj, 2000].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	Many locations. Contiguous.
Habitat status:	The decrease in habitat is <20% due to removal of large canopy trees and loss of canopy cover. There is decrease in quality of the habitat due to edaphic reasons.

Threats

Threats to taxon:	Harvest, harvest for medicine, habitat loss, overexploitation, trade of parts, trade for market or medicine, edaphic changes, hybridisation and landslides are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The fruits and root of the taxon are in local, domestic, commercial and international trade for medicinal purposes. Commercial trade is resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. The number of mature individuals declined in the past by 15- 20% and are likely to decline by 10% in the future. Generation time 3-4 years.
Trends:	The population size/numbers are declining at the rate of >10% in the last 10 years.

Recent Field Studies: D.S. Baburaj in Nilambur, 2000, collection of herbarium.

Data quality: Field study, literature/herbarium, informal sighting. Number of locations and subpopulations, habitat status, population trends - informal sighting, indirect information.

Uncertainty: 95% confidence, subjective opinion.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR and the population is contiguous with the adjoining populations. The adjoining populations of the taxon outside NBR are equally threatened. If the taxon were to go extinct in NBR, it can recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**LOWER RISK NEAR THREATENED**	Criteria:	-
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Survey, genetic research, harvesting and PHVA.
Management:	Habitat management, wild population management and sustainable utilisation.
Cultivation:	Cultivated stocks are available in spices board. There is no coordinated species management programme for this species and it is recommended for India. It is recommended to intensify or increase ongoing programme. Propagation techniques are known for the taxon.

Other comments: Extraction of roots from the wild will bring decline. In Ayurveda thipli moola is also used. This species is not found in Nilgiris district in wild.

Uses of NTFP in NBR

Harvest by humans:	The harvest of fruits are partially destructive to the plant. The harvest of roots by humans is destructive to the plant. The plant is used locally for medicine. It is used as spice in food and is an ingredient of thrigodu. The impact of harvesting on the species is fatal to the individual and also affectes regeneration. The roots are collected from mature plants.
NTFP in NBR:	The NTFP is available all over NBR.
Collection organised by:	The collection is organised by primary co-operative societies, private contractors and individuals in January. The harvest techniques used are plucking and uprooting. The collection is carried out for 1 month. The trade in the product is private. Collectors sell the harvested parts to private traders and primary cooperatives at the rate of Rs. 40-50 per kg of roots and Rs. 80-100 per kg for fruits [Nambiar], Rs. 20 per kg [A. Vatsyayan and P. Sharma]. The NTFP goes to local trade and within and outside the NBR states.
Data quality:	Field study, literature and indirect information from traders, collectors, seniors, etc.
Comments:	Illegal collection is the reason for low price to the collector. It is 5 times higher in the market.
Sources:	-
Compilers:	P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya.
Reviewers:	D.S. Baburaj, K.S. Devadas, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, B. Arthur, P.Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, M.N.B. Nair, T.K. Sabu, A. Vatsyayan, B.A. Daniel.

Scientific name (author; date):	***Pseudarthria viscida* (L.) Wight & Arn.**
Synonym:	*Hedysarum viscidum* L., *Desmodium viscidum* auct. non Dc
Family:	Fabaceae
Common name:	Neermali, Kodiottai [Tam.], Moovila [Mal.]
Habit:	Climbing undershrub upto 1.2m.
Habitat:	Deciduous to semievergreen forests.
Niche/ elevation:	Upto 1000m.

Distribution

Current Global Distribution:	Indomalay
Distribution from Literature:	Burliar, Kallar, Sirur, Adderley, Bokkapuram Reserve Forest [S1].
From Field Studies:	Mudumalai, Wayanad [P. Balasubramanian, 1997]. Nilambur, Attapadi, Siruvani [P.Sharma, N. Sasidharan, M.N.B. Nair, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan]. Mukkali [V. Subramaniam, 2000].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	Many locations. Contiguous. The decline in the number of locations or subpopulations unknown.
Habitat status:	The decrease in habitat is <20% in the last 10-15 years due to biotic pressure. There is decrease in quality of the habitat due to biotic pressure, edaphic and soil compaction.

Threats

Threats to taxon:	Edaphic changes harvest and harvest for medicine are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The root of the taxon is in commercial trade. Commercial trade is resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are >2500. The number of mature individuals declined in the past and are likely to decline in the future. Generation time 2 years.
Trends:	The population size/numbers are declining at the rate of <10% in the last 10-15 years.

Recent Field Studies:	SACON Project report, A. Vatsyayan and P. Sharma in Kerala NBR, 2000, Wayanad, Mudumalai, 1995-98, population study. V. Subramanian [2000]. K. Narendran [1996] in Silent Valley.
Data quality:	Field study, informal sighting. Locations or subpopulations – informal sighting, indirect information.
Uncertainty:	95% confidence, subjective opinion.
The taxon in adjoining areas of NBR:	The taxon also occurs in areas adjoining the NBR. The population in NBR is contiguous with the adjoining population. The adjoining populations of the taxon outside NBR are equally threatened. If the taxon were to go extinct in NBR, it can recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**LOWER RISK NEAR THREATENED**	Criteria:	-
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Taxonomic research and improved harvesting techniques.
Management:	Public awareness regarding harvesting time and sustained utilisation.
Cultivation:	Cultivation is recommended for commercial/ sustainability. Cultivated stocks are not available. There is no coordinated species management programme for this species and it is not recommended for India. It is recommended to initiate cultivation programme within 3 years. Propagation techniques are not known at all.
Other comments:	This plant is one of the constituents of Dasamoola and is in heavy demand. Kottakal requires 30,000kgs. per year.

Uses of NTFP in NBR

Plant used by:	This species is used by wildlife and livestock.
Harvest by humans:	The harvest of roots by humans is destructive to the plant. The plant is used locally for medicine. The impact of harvesting on the species is fatal to the individual. The roots are collected from mature plants.
NTFP in NBR:	The NTFP is available only in certain parts of NBR.
Collection organised by:	The collection is organised by private contractors and individuals. The harvest techniques used are uprooting and digging. The collection is carried out for throughout the year. The trade in the product is private. Collectors sell the harvested parts to private traders at the rate of Rs. 6 per kg and to primary collectors for Rs. 4 per kg. The NTFP goes within and outside the NBR states.
Data quality:	Collection trends and records, literature, indirect information from traders, collectors, seniors, etc.
Comments:	It is used as a substitute for Shalaparni roots (*Desmodium gangeticum*)
Sources:	S1: 45.
Compilers:	P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya
Reviewers:	D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, B. Arthur, P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, M.N.B. Nair, T. Surayya

VULNERABLE [NBR]

Scientific name (author; date):	***Rauvolfia serpentina* (L.) Benth. ex Kurz.**
Synonym :	*Ophioxylon serpentinum* L.
Family:	Apocynaceae
Common name:	Sarpgandha [San.], Amalpuri, Sarpagandhi [Tam. and Mal.], Chandra bhage [Hin.]
Habit:	Small shrub
Habitat:	Moist deciduous, peripheries of evergreen forests and teak plantations
Niche/ elevation:	Partial shade. Upto 1000m and above.

Distribution

Current Global Distribution:	Indomalaya
Distribution from Literature:	Avarihalla Reserve Forest, Benne Reserve Forest, Mudumalai [S1]. Coimbatore, Mudumalai, Wayanad [P1].
From Field Studies:	Mudumalai, Siruvani [P. Balasubramanian]. Kallar, Burliar [S.S.R. Bennet]. All over [P.Sharma, N. Sasidharan, M.N.B. Nair, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan]. Siruvani [D.S. Baburaj, 1989].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	Many locations. Fragmented.
Habitat status:	The decrease in habitat is <20% in the last 10 years due to biotic pressure. There is decrease in quality of the habitat due to biotic pressure.

Threats

Threats to taxon:	Harvest, harvest for medicine, habitat loss, trade for market or medicine, trampling, fire and demographic instability are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The root of the taxon is in commercial and international trade. Commercial trade is resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are >2500. The number of mature individuals declined in the past by 20-50% and are likely to decline by 20-50% in the future. Generation time is 5-7 years.
Trends:	The population size/numbers are declining at the rate of >20% in the last 10 years.

Recent Field Studies: S.N. Prasad, P. Balasubramanian and A. Rajasekaran in Coimbatore, Mudumalai, Wayanad, 1995-98, 99. Population studies. N.A. Kumar, A. Vatsyayan and P. Sharma in Nilambur and Attapadi, 2000. Muralidharan in Mudumalai, Wayanad and Coimbatore, 2000, Ongoing project.

Data quality: Field study, literature/herbarium, informal sighting. Habitat status – informal sighting.

Uncertainty: 95% confidence, subjective opinion.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR and the population in NBR is contiguous with the adjoining population. The adjoining populations of the taxon outside NBR are equally threatened. If the taxon were to go extinct in NBR, it can recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**ENDANGERED – VULNERABLE**	Criteria:	**B1+2bce**
CITES:	Appendix II	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Genetic research and life history studies.
Management:	Wild population management, cultivation and control harvesting.
Cultivation:	Cultivation is recommended for species recovery and preservation of live genome. Cultivated stocks are available at KFRI, Jabalpur, Amarkantak Research Nursing, Madhya Pradesh, Bhopal to Orissa, Salem trials by farmers. There is no coordinated species management programme for this species and it is recommended for India. It is recommended to initiate cultivation programme within 3 years. Propagation techniques are known for this taxon or similar taxon.

Other comments: There are three varieties based on the colour of the flower. This is a highly overexploited species in the world. Market has reduced as chemical equivalents are used. Mainly root is used so, the whole plant is harvested. Large scale cultivation will be good export value and revenue generation. The fruit is poisonous.

Uses of NTFP in NBR

Harvest by humans: The harvest of roots and whole plant by humans is destructive to the plant. The plant is used locally for medicine and for snake bites by local tribes. The impact of harvesting is fatal to the individual. The roots are collected from young and mature plants.

NTFP in NBR: The NTFP is available all over NBR.

Collection organised by: The collection is organised by primary co-operative societies, private contractors and individuals all throughout the year. The harvest techniques used are uprooting and digging. The collection is carried out for 2 months. The trade in the product is private. Collectors sell the harvested parts to private traders and primary cooperatives at the rate of Rs. 35 per kg [Rs. 95 per kg]. The NTFP goes within and outside the NBR states.

Data quality: Field study and indirect information from traders, collectors, seniors, etc.

Sources: S1: 90; P1.

Compilers: P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya

Reviewers: D.S. Baburaj, K.S. Devadas, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, B. Arthur, P. Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N. A. Kumar, V.S. Ramachandran, T.K. Sabu, M.N.B. Nair, A. Vatsyayan, B.A. Daniel

LEAST CONCERN [NBR]

Scientific name (author; date):	***Rhaphidophora pertusa* (Roxb.) Schott**
Synonym :	*Polypodium laciniatum* Burm. f., *Pothos pertusa* Roxb., *Rhaphidophora laciniata* (Burm. f.) Merr., *Scindapsus pertusus* (Roxb.) Schott & Endl., *Monstera pertusa* (Roxb.) Schott
Family:	Araceae
Common name:	Anaitippili [Tam.], Athitippili, Elithandian [Mal.]
Habit:	Large epiphytic climber.
Habitat:	Semievergreen and evergreen forest.
Niche/ elevation:	Shade loving plant. 300-900m.

Distribution

Current Global Distribution:	South West India and Sri Lanka
Distribution from Literature:	
From Field Studies:	All over Kerala [P**.** Sharma, N. Sasidharan, M.N.B. Nair, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan]. Mukkali, Anamooli [V. Subramanain, 2000]. Barliar and above [S.S.R. Bennet].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	3 locations. Fragmented. There is a no continuing decline or extreme fluctuation in the number of locations or subpopulations.
Habitat status:	There is no change in the habitat. No change in quality of habitat.

Threats

Threats to taxon:	Harvest for its ornamental value is a threat to the species.
Trade:	The flowers and stem of the taxon are in commercial trade for medicinal purposes. Commercial trade is resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are >2500. The number of mature individuals have not declined in the past and are not likely to decline in the future. Generation time 40 years.
Trends:	Population trends unknown.

Recent Field Studies: Nil

Data quality: Field study, literature/herbarium, informal sighting. Habitat status – informal sighting.

Uncertainty: 95% confidence, minimum/maximum values.

The taxon in adjoining areas of NBR:

Status in NBR:

IUCN (1994):	**LOWER RISK LEAST CONCERN**	Criteria:	-
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Clinical, biochemical and pharmacognostic studies and PHVA.
Management:	Public awareness, cultivation for ornamental and horticulture research.
Cultivation:	Cultivated stocks are not available. There is no coordinated species management programme for this species and it is not recommended for India. Propagation techniques are not known at all.

Other comments: *Balanophora indica* is used as a substitute in the market for *Rhaphidophora pertusa* [Nambiar]. At present the 'Athithippali' used by the manufacturers is obtained from *B. indica*. The inflorescence of this angiosperm parasite is sliced, dried and stored and is used as a 'Athithippali' according to Indian formula. The authentic publication by the Governmenrt of India as Athithippaili the inflorescence of *R. pertusa* has to be used. Whether *B. indica* could be used as a substitute for *R. pertusa* has to be evaluated by research studies. It is preferred by elephants. If we start to extract from inflorescence the population will decline. If the substitute is stopped there will not be a decline. *Balanophora fungosa* J.R& G. Forst is the preferred and widely used athithippali.

Uses of NTFP in NBR

Plant used by wild animals: This species is fed by elephants.

Harvest by humans: The harvest of whole by humans is destructive to the plant. The plant is used locally for medicine. The impact of harvesting on the species is loss of vigour. The roots are collected from mature plants.

NTFP in NBR: The NTFP is available all over NBR.

Collection organised by: The collection is organised by primary co-operative societies and individuals anytime depending upon the demand. The harvest techniques used are cutting at the bottom and pulling down the vine. The trade in the product is private. Collectors sell the harvested parts to private traders and primary cooperatives. The NTFP goes within the NBR states.

Data quality: Field study

Comments: The species is overexploited for ornamental purposes [V. Subramaniam].

Compilers: P.Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan, M.N.B. Nair, B.A. Daniel

Reviewers: D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, B. Arthur, T. Surayya

LEAST CONCERN [NBR]

Scientific name (author; date):	***Sapindus trifoliata* L.**
Synonym:	*Sapindus emarginatus* Vahl., *Sapindus laurifolius* Vahl.
Family:	Sapindaceae
Common name:	Puvamkottai, Poochikai, soap kai [Tam.], Ritha [Hindi], Oringikai [Mal.], Passa kottai, Urvanjikaya, Antawala, Kunkatekaya [Kan.].
Habit:	Medium sized tree 7-10m.
Habitat:	Scrub jungle, dry deciduous forest
Niche/ elevation:	Msl to 1000m.

Distribution

Current Global Distribution:	Southern India and Sri Lanka
Distribution from Literature:	Anaikatty, Kalhatti, Kunjapanai, Masinagudi, Segur Ghat [S1].
From Field Studies:	Mudumalai, Coimbatore, Bandipur, Attapadi, Sathyamangalam [P. Balasubramanian. Kotagiri [S. Nath]. Mettupalayam, Burliar [S.S.R. Bennet]. Wayanad [A. Vatsyayan]. Nilambu [N.A. Kumar, Ramachandra]. Siruvani [A. Rajasekaran]. Thangumarahada [D.S. Baburaj, 1998]. Mettupalayam [K. S. Devadass, 2000].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	Many locations. Contiguous. There is a continuing decline in the number of locations or subpopulations.
Habitat status:	The decrease in habitat is <20% in the last 10 years due to encroachment for other land use, development activities [power generation]. There is decrease in quality of the habitat due to grazing and human intervention.

Threats

Threats to taxon:	Human interference, harvest, grazing, harvest for timber [past], habitat loss due to exotic plants [past], trade of parts, disease [past], fire, area taken over by *Lantana* and *Eupatorium* and demographic instability are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The fruits of the taxon are in commercial and international trade for medicinal purposes. Commercial trade is resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. The number of mature individuals are likely to decline by up to 20% in the future. Generation time is 35-45 years.
Trends:	The population size/numbers are declining at the rate of <10% in the last 10 years.

Recent Field Studies: Narendra Prasad, P. Balasubramanian and A. Rajasekaran in Mudumalai, Coimbatore and Wayanad, 1995-98, population study, SACON project Report. S. Nath in Nilgiris, 1998, Keystone project report, economic dependence of tribals or trade. A. Vatsyayan and P. Sharma in Nilambur and Attapadi, 2000, UNESCO project

Data quality: Field study, literature/herbarium, informal sighting. Population numbers, trade - indirect information.

Uncertainty: 95% confidence, subjective opinion.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR and the population in NBR is contiguous with the adjoining population. The adjoining populations of the taxon outside NBR are equally threatened. If the taxon were to go extinct in NBR, it can recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**LOWER RISK LEAST CONCERN**	Criteria:	-
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Survey and genetic research.
Management:	Habitat management, wild population management, monitoring, public awareness and sustainable utilisation.
Cultivation:	There is no coordinated species management programme for this species and it is recommended for India.

Other comments: This species is used as shampoo [C.K. Antony]. Tribals use it as fish poison [A. Vatsyayan and P. Sharma]. Regeneration is good. Demand is low. More research is required to understand the threats. More systematic data collection on population is required. Leaf anatomical atudies of *S. emarginatus* and *S. laurifolius* establish them as different species [V. Subramaniam].

Uses of NTFP in NBR

Plant used by wild animals: This species is fed by ungulates and insects use it for nectar.

Harvest by humans: The harvest of fruits by humans is partially destructive to the plant. The plant is used locally for medicine and detergent as it contains saponin. The impact of harvesting on the species affects its regeneration. The roots are collected from mature plants.

NTFP in NBR: The NTFP is available only in certain parts of NBR.

Collection organised by: The collection is organised by primary co-operative societies, private contractors and individuals from February to April. The harvest techniques used are lopping, shaking branches and taken with a hooked stick. The collection is carried out for 3 months. The trade in the product is private. Collectors sell the harvested parts to individuals, private traders and primary cooperatives at the rate of Rs. 5-6 per kg. The NTFP goes within and outside the NBR states.

Collection in NBR in the last 3 years: In the last 3 years 8-9 tons has been collected. There is periodic fluctuation in the collection every alternate year.

Data quality: Field study and literature.

Comments: Collectors are paid low.

Sources: S1: 35.

Compilers: P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya

Reviewers: D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, A. Rajasekaran, P. Sharma, N. Sasidharan, V.P.K. Nambiar, M.N.B. Nair, C.K. Antony, N. A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan, B.A. Daniel, B. Arthur

LEAST CONCERN [NBR]

Scientific name (author; date):	***Sida rhombifolia* L. var. *retusa* (L.) Masters**
Synonym:	*Sida retusa* L.
Family:	Malvaceae
Common name:	Kurumthotti
Habit:	Under shrub
Habitat:	Wasteland, dry deciduous forest, all along the road inside the forest.
Niche/ elevation:	Up to 1000m and more.

Distribution

Current Global Distribution:	Pantropics
Distribution from Literature:	Silent Valley Reserve Forest [V1].
From Field Studies:	All over Kerala [P.Sharma, N. Sasidharan, M.N.B. Nair, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan]. Mudumalai, Nilambur, Gudalur [D.S. Baburaj, 1986, 97]. Silent Valley, Thalamalai, Dhimbur [V. Subramaniam, 2000]. Wayanad [K. Narendran, 2000]. Thepakkad-Mudumalai [K.S. Devadass, 1999]. Mudumalai, Theppakkad [K. Vivekananthan, 1982].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	500-2000
Number of Subpopulations/location:	2/Many. Contiguous. There is no continuing decline or extreme fluctuation in the number of locations or subpopulations.
Habitat status:	There is no change in habitat.

Threats

Threats to taxon:	Harvest for medicine, overexploitation and grazing are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The root and whole plant of the taxon are in local and commercial trade for medicinal purposes. Commercial trade is resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. The number of mature individuals have not declined in the past and are likely to decline by 20-30% in the future. Generation time is 1 year.
Trends:	The population size/numbers is stable and are likely to decline by >20% in the next 10 years due to unscientific harvest.

Recent Field Studies: Muralidharan *et al.,* 1993-97, Biodiversity. A. Rajasekharan in Wayanad and Bandipur, 1994-98, Ph.D. thesis- Ecology and utilisation of medicinal plants with special reference to select tribal groups in the NBR. K. Narendran in Wayanad, 1996, Socio-economic study of NTFP of Wayanad Wildlife Sanctuary. A. Vatsyayan and P. Sharma in Nilambur and Attapadi, 2000, UNESCO project.

Data quality: Field study, literature/herbarium, informal sighting.

Uncertainty: 95% confidence, range of opinion, minimum/maximum values

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR. In NBR the proportion of the population is approximately <10% and the population is contiguous with the adjoining population. The adjoining populations of the taxon outside NBR are equally threatened. If the taxon were to go extinct in NBR, it can recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**LOWER RISK LEAST CONCERN**	Criteria:	-
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Survey and taxonomic research.
Management:	Sustainable utilisation, public awareness and cultivation.
Cultivation:	There is no coordinated species management programme for this species and it is not recommended for India. Propagation techniques are not known at all.

Other comments: About 11 specoies are available which are used relatively for various ayurvedic preparartions. Collection is done during flowering time. The seeds are not dispersed. If this continues for 10 years, it will lead to population decline. In parts of Wayanad the population is declining. Regeneration is good. D.S. Baburaj in 1999 had observes large bundles of roots stacked with a vaidyar in Nilambur. The roots infected with fungus [deteriorating] were being sent for ayurvedic preparations. The genus has 11 species. This assessment is for *S. rhombifolia*. The threat to this species is diluted as other 10 species are also harvested as *rhombifolia*. The plant is plucked before flowering and fruiting, thereby hampering regeneration. Collection should be undertaken scientifically after seed setting and dispersal to facilitate regeneration of the species. It establishes well soon after rains.

Uses of NTFP in NBR

Plant used by: Goats feed on the leaves

Harvest by humans: The harvest of roots and whole plant by humans is destructive to the plant. The plant is used locally for medicine. The impact of harvesting is fatal to the individual. The roots are collected from young and mature plants.

NTFP in NBR: The NTFP is available all over NBR.

Collection organised by: The collection is organised by primary co-operative societies, private contractors and individuals from July to November. The harvest techniques used are uprooting. The collection is carried out for 3 months. The trade in the product is private. Collectors sell the harvested parts to private traders and primary cooperatives at the rate of Rs. 3.5-4.00 per kg of green material and Rs. 20 per kg of wet material. The NTFP goes within the NBR states.

Collection in NBR in the last 3 years: There is periodic fluctuation in the collection for every 2 years. The annual consumption of this taxon by drug industries in northern Kerala is 6,96,941 kg dried roots.

Data quality: Field study, collection trends and records, literature and indirect information from traders, collectors, seniors, etc.

Sources: V1: 84.

Compilers: P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, A. Rajasekaran, S. Raghavan, S. Nath, T. Surayya

Reviewers: D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, P. Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, M.N.B. Nair, T.K. Sabu, A. Vatsyayan, B. Arthur, B.A. Daniel

LEAST CONCERN [NBR]

Scientific name (author; date):	***Solanum violaceum* Ortega**
Synonym:	*S. indicum, Solanum anguivi* auct. non Lam., *S. solmeum* L.
Family:	Solanaceae
Common name:	Kandankatri, Cheruvazhuthina, Puthrichundu [Mal.].
Habit:	Erect armed shrub
Habitat:	Dry and moist deciduous forests, wastelands and scrub.
Niche/ elevation:	Up to 1500m (1000m only).

Distribution

Current Global Distribution:	Indomalaysia and East Asia
Distribution from Literature:	
From Field Studies:	Siruvani hills, Pillur slopes, Manjur [R. Gopalan]. Wayanad, Nilambur, Attapadi and Siruvani [P. Sharma, N. Sasidharan, M.N.B. Nair, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan]. Moss in private area [C.K. Antony]. Bokkapuram, Kunjapanai [D.S. Baburaj, 1995, 97].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	Many locations. Contiguous. There is no extreme fluctuation in the number of locations or subpopulations.
Habitat status:	The decrease in habitat is <20% due to biotic pressure. There is decrease in quality of the habitat due to biotic pressure.

Threats

Threats to taxon:	Harvest and harvest for medicine and food are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The fruits and root of the taxon are in local, domestic and commercial trade for medicinal purposes. Commercial trade is resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. Generation time 4-5 years.
Trends:	Population trends unknown.

Recent Field Studies: None

Data quality: Field study, literature/herbarium, informal sighting.

Uncertainty: 95% confidence, subjective opinion.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR and the population in NBR is contiguous with the adjoining population. The adjoining populations of the taxon outside NBR are of equal status. If the taxon were to go extinct in NBR, it can to recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**LOWER RISK LEAST CONCERN**	Criteria:	-
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Not recommended.
Management:	Sustainable utilisation and harvesting techniques.
Cultivation:	Cultivated stocks are available in Kottakal. There is no coordinated species management programme for this species and it is not recommended for India. It is recommended to initiate cultivation programme within 3 years. Propagation techniques are known for this taxon.

Other comments:	Two varieties present var. anguivi and multiflorum [higher altitudes]. Karimulli, Papparamulli [Tam.], Puthira – chunda [Mal.]. S. *xanthocarpam? S. jurattanx?.* The lower altitude variety is used. During general work it is used. There is negligible decline in the population. It is in dashamoolarishtam and is one of the lughudasamoolas. Easy to propagate and widely available NTFP. Reema Kumari, BSI, Research initiated on taxonomy, uses etc., more studies available as this is a popular species.
Uses of NTFP in NBR	
Plant used by wild animals:	This species is used by birds
Harvest by humans:	The harvest of fruits is non-destructive to the plant. The harvest of roots is destructive to the plant The plant is used locally for medicine in Ayurveda and Sidda. The impact of harvesting on the species is fatal to the individual [if roots are collected]. The roots are collected from young and mature plants.
NTFP in NBR:	The NTFP is available only in certain parts of NBR.
Collection organised by:	The collection is organised by primary co-operative societies, private contractors and individuals all through out the year. The harvest techniques used are plucking, digging and uprooting. The collection is carried out for through out the year. The trade in the product is private. Collectors sell the harvested parts to private traders and primary cooperatives at the rate of Rs. 18-20 per kg and Rs. 2 per kg of root. The NTFP goes to local trade and within and outside the NBR states.
Collection in NBR in the last 3 years:	It is one of the heavily consumed raw drug. The annual requirement for the drug industry in northern Kerala is 2,52,712 kg of dried roots.
Data quality:	Field study and indirect information from traders, collectors, seniors, etc.
Compilers:	P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya
Reviewers:	D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, P. Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan, M.N.B. Nair, B. Arthur, B.A. Daniel

Scientific name (author; date):	***Stereospermum colais* (Buch.-Ham. ex Dilliw.) Mabber.**
Synonym	*Bignonia colia* Buch-Ham ex Dilliw*, S. chelonoides* sensu Wight*, S. personatum* (Hassk)
Chatterjee,	*Dipterosperma personatum* Hassk., *S. tetrasgonum* DC.
Family:	Bignoniaceae
Common name:	Pompathiri [Mal.], Ambu, Velapadri [Tam.].
Habit:	Large tree of about 25m.
Habitat:	Moist deciduous, evergreen and semievergreen forests.
Niche/ elevation:	Open areas. 800-1000m.

Distribution

Current Global Distribution:	India, Burma and Sri Lanka
Distribution from Literature:	Thengumarada, Mudumalai, Sathyamangalam Reserve Forest [D.S. Baburaj, 1997-98]. Mudumalai [K.S. Devadass, 1999]. Moyar, Mudumalai [M. M. Mohanan]. Siruvani, Dhimbam [V. Subramaniam, 2000]. Attapadi, Wayanad, Silent Valley [P.Sharma, N. Sasidharan, M.N.B. Nair, V.P.K. Nambiar, C.K. Antony, N. A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan].
From Field Studies:	
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	Many locations. Contiguous. There is a continuing decline but no extreme fluctuation in the number of locations or subpopulations.
Habitat status:	There is no change in the habitat. There is decrease in quality of the habitat due to fire.

Threats

Threats to taxon:	Harvest, habitat loss, overexploitation, trade of parts, trade for market or medicine, edaphic changes and fire are resulting in and may result in population decline. The influence of threats on the population are not well understood, are not reversible and have not ceased to be threats.
Trade:	The leaves, flower, fruit, bark and root of the taxon is in local, domestic and commercial trade for medicinal purposes. Local trade is resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. The number of mature individuals declined in the past by 10% and are likely to decline by 10% in the future. Generation time 20-30 years.
Trends:	The population size/numbers are declining at the rate of <10.

Recent Field Studies: N.A. Kumar in Wayanad, Ongoing project. Muralidharan in Wayanad and Attapadi, 1993-97.

Data quality: Field study, literature/herbarium. Habitat status, threats, trade, population numbers, population trends – indirect information.

Uncertainty: 95% confidence, range of opinion.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR. In NBR the proportion of the population is approximately <30% and the population is contiguous with the adjoining population. The adjoining populations of the taxon outside NBR are equally threatened. If the taxon were to go extinct in NBR, it can recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**LOWER RISK LEAST CONCERN**	Criteria:	-
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Survey, genetic research, taxonomic research, life history studies and regeneration studies.
Management:	Habitat management, sustainable utilisation and cultivation.
Cultivation:	Cultivation is recommended for research and education. Cultivated stocks are not available. There is no coordinated species management programme for this species and it is recommended for India. It is recommended to initiate cultivation programme within 3 years. Propagation techniques are not known at all.

Other comments:	The demand for roots has reduced.
Uses of NTFP in NBR	
Plant used by wild animals:	Fruits are eaten by wild animals
Harvest by humans:	The harvest of leaves and bark by humans are partially destructive to the plant. The plant is used locally for medicine and fodder. The impact of harvesting on the species is fatal to the individual and also affects its regeneration. The roots are collected from mature plants.
NTFP in NBR:	The NTFP is available all over NBR.
Collection organised by:	The collection is organised individuals from March to November. The harvest techniques used are lopping, plucking, shaking branches and debarking. The collection is carried out for more than 3 months. The trade in the product is private. Collectors sell the harvested parts to private traders. The NTFP goes to local trade.
Collection in NBR in the last 3 years:	The annual requirement by the Ayurvedic drug industry in northern Kerala is 130714 kg dried roots (Sasidharan and Muraleedharan, 2000)
Data quality:	Literature and indirect information from traders, collectors, seniors, etc.
Compilers:	D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, B. Arthur
Reviewers:	P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya, P. Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, M.N.B. Nair, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan, B.A. Daniel

VULNERABLE [NBR]

Scientific name (author; date):	***Symplocos cochinchinensis* (Lour.) Moore ssp. *laurina* Nooteb.**
Synonym:	*S. laurina* (Retz.) Wall. ex G. Don, *S. ferruginea* Roxb. *S.f. var. polystachya* Cl., *Drupatris cochinchinensis* Lour., *S. spicata* Roxb., *S. spicata* var. *laurina* (Retz.) Clarke, *Myrtus laurinus* Retz.
Family:	Symplocaceae
Common name:	Kambli [Tam.], Pachooti [Mal.], Balalodhuginamara [Kan.].
Habit:	Medium sized tree of 6-9m.
Habitat:	Evergreen forests, sholas, riparian
Niche/ elevation:	Slopes and shola edges. 500-1500m.

Distribution

Current Global Distribution:	Indo-Malaysia, China and Japan
Distribution from Literature:	-
From Field Studies:	Upper Bhavani [P. Balasubramanian, 1995]. Wayanad [Nambiar]. Kalhatti [D.S. Baburaj, 1995]. Siruvani, Thalamalai [V. Subramaniam, 2000].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	500-2000
Number of Subpopulations/location:	Many locations. Contiguous. All individuals are in one population.
Habitat status:	The decrease in habitat is <20% in the last 10 years due to biotic pressure. There is decrease in quality of the habitat due to deforestation, change in land use pattern and monocultural change.

Threats

Threats to taxon:	Harvest for medicine and habitat loss are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The bark and root of the taxon is in commercial trade. Commercial trade is resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. The number of mature individuals declined in the past and are likely to decline in the future. Generation time 30 years.
Trends:	The population size/numbers are declining at the rate of <10% in the last 10 years and are likely to decline by >30% in the next 90 years/3 generations.

Recent Field Studies: R. Gopalan in Western Ghats, early 90's, Endemic plants of Western Ghats. V. Subramaniam in Silent Valley, 2000.

Data quality: Informal sighting, literature/herbarium. Threats, population numbers – indirect information. Trade – field study. Population trends – field study, indirect information, informal sighting.

Uncertainty: 95% confidence, subjective opinion.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR and the population in NBR is contiguous with the adjoining population. The adjoining populations of the taxon outside NBR are equally threatened. If the taxon were to go extinct in NBR, it can recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**VULNERABLE**	Criteria:	**A2cd**
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Propagation techniques, genetic research, cytogenetic study and harvest method.
Management:	Sustainable utilisation and harvesting techniques.
Cultivation:	Cultivation is recommended for research and commercial/ sustainability. Cultivated stocks are available. There is no coordinated species management programme for this species and it is not recommended for India. It is recommended to initiate cultivation programme within 3 years. Propagation techniques are known for the taxon.

Other comments:	1,36, 000 Kg of bark is used by Kottakal per year. A number of ayurvedic uses for bark are recorded from literature. All three species in the genera are used for medicinal purposes. Part of other field studies. It is a common evergreen forest element. Bark is mainly used in medicine. It is debarked. Very poor regeneration in NBR. It is a slow growing species. Overexploitation and poor harvest is resulting in population decline. These plants grow very well in Idukki district.
Uses of NTFP in NBR	
Harvest by humans:	The harvest of roots and bark by humans is destructive to the plant. The plant is used locally for medicine. The impact of harvesting on the species is fatal to the individual. The roots are collected from young and mature plants.
NTFP in NBR:	The NTFP is available only in certain parts of NBR.
Collection organised by:	The collection is organised by primary co-operative societies, private contractors and individuals all through out the year. The harvest techniques used are uprooting and debarking. Only men are involved in the collection. The collection is carried out throughout the year except during rainy season. The trade in the product is private. Collectors sell the harvested parts to private traders and primary cooperatives. The NTFP goes to local trade, within and outside the NBR states.
Collection in NBR in the last 3 years:	There is no periodic fluctuation in the collection. The annual requirement of the dried bark of this taxon for the Ayurvedic medicine industry in north Kerala is 66,192 kg (Sasidharan and Muraleedharan, 2000).
Compilers:	P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya
Reviewers:	D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, P. Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan, M.N.B. Nair, B. Arthur, B.A. Daniel

Scientific name (author; date):	***Terminalia bellirica* (Gaertn.) Roxb.**
Synonym:	*Myrobalanus bellirica* Gaertn., *Terminalia bellarica* var. *laurinoides* Cl.
Family:	Combretaceae
Common name:	Thani [Mal.], Thanri [Tam.]
Habit:	Large tree of about 40m.
Habitat:	Dry and moist deciduous forests.
Niche/ elevation:	Streamsides. Up to 1000m.

Distribution

Current Global Distribution:	Indo-Malaysia
Distribution from Literature:	Benne Reserve Forest, Gudalur, Naduvattom, Singara Reserve Forest [S1]. Mukkali [V1]. Mudumalai, Wayanad and Coimbatore [P1].
From Field Studies:	Mudumalai ,1995. Siruvani, Sathyamangalam , 1999 [P. Balasubramanian]. All over Kerala [P.Sharma, N. Sasidharan, M.N.B. Nair, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	Many locations. Contiguous.
Habitat status:	The decrease in habitat is <20% due to biotic pressure, grazing and fire. There is decrease in quality of the habitat due to biotic pressure, fire and compaction.

Threats

Threats to taxon:	Harvest, harvest for medicine, harvest for timber [past], habitat loss [past], overexploitation [past], trade of parts, trade for market or medicine and fire [past] are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The fruits of the taxon is in domestic, commercial and international trade for medicinal purposes and tanning. Commercial trade is resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. Generation time 50-70 years [fruiting], 150 years life span.
Trends:	The population size/numbers are declining at the rate of <10% in the last 5-10 years.

Recent Field Studies: Muralidharan *et al*. 1993-97. S.N. Prasad, P. Balasubramanian and A. Rajasekaran, in Mudumalai, Wayanad and Coimbatore, 1995-98, Population studies. N.Sasidharan in Wayanad, 1994-97.

Data quality: Informal sighting, literature/herbarium. Distribution, population trends - Field study. Threats, trade, population numbers – indirect information.

Uncertainty: 95% confidence, subjective opinion.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR and the population in NBR is contiguous with the adjoining population. The adjoining populations of the taxon outside NBR are equally threatened. If the taxon were to go extinct in NBR, it can recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**LOWER RISK NEAR THREATENED**	Criteria:	-
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Genetic research and harvesting techniques.
Management:	Habitat management and monitoring.
Cultivation:	There is no coordinated species management programme for this species and it is recommended for India.

Other comments: In Theppakkad, propagation of this species was tried but there was poor establishment [Devadass].

Uses of NTFP in NBR

Plant used by wild animals:	Primates, spotted deer and Sambar deer consume the unripe fruits of this species.
Harvest by humans:	The harvest of fruits by humans is partially destructive to the plant. The plant is used locally for medicine and tanning. The impact of harvesting on the species affects its regeneration. The roots are collected from mature plants.
NTFP in NBR:	The NTFP is available only in certain parts of NBR.
Collection organised by:	The collection is organised by primary co-operative societies, private contractors and individuals. The harvest techniques used are lopping, plucking and shaking branches. The trade in the product is private. Collectors sell the harvested parts to private traders and primary cooperatives at the rate of Rs. 6-8 per kg. The NTFP goes to local trade and within and outside the NBR states.
Collection in NBR in the last 3 years:	There is periodic fluctuation in the collection in every alternate year. The annual consumption of the fruits in northern Kerala is 1,30,139 kg for drugs (Sasidharan and Muraleedharan, 2000).
Data quality:	Indirect information from traders, collectors, seniors, etc.
Comments:	Regeneration is good but, establishment is poor. It is a hardy species.
Sources:	S1: 56; V1: 197; P1.
Compilers:	P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya
Reviewers:	D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, P. Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, M.N.B. Nair, A. Vatsyayan, B. Arthur, B.A. Daniel

Scientific name (author; date):	***Terminalia chebula* Retz.**
Synonym	-
Family:	Combretaceae
Common name:	Kadukkai [Tam.], Harra [Hindi], Kadukka [Mal.].
Habit:	Large tree of about 20m.
Habitat:	Dry decicuous forest.
Niche/ elevation:	Open area. Up to 800m.

Distribution

Current Global Distribution:	South and south east Asia
Distribution from Literature:	Nimaka shola, Bokkapuram Reserve Forest, Coonoor Ghat, Deepdale, Kalhatti – Masunagudi, Kaguchi, Madanad and Segur ghat [S1]. Mudumalai, Wayanad, Coimbatore [P1].
From Field Studies:	Siruvani hills [R. Gopalan]. Mudumalai, Sathyamangalam, Wayanad [P. Balasubramanian]. N.E. Slopes, Nilgiris [S. Nathalatha]. Wayanad, Attapadi [Rajendran, A. Vatsyayan]. Kalhatti, Masinagudi, Thirichigadi [D.S. Baburaj. 1994, 1998].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	Contiguous. All individuals are in one population.
Habitat status:	The decrease in habitat is <20% in the last 10 years. There is decrease in quality of the habitat due to biotic pressure.

Threats

Threats to taxon:	Human interference [past], harvest for medicine, harvest, habitat loss [past], grazing [past], habitat loss due to exotic plants [past], trade of parts, trade for market or medicine, fire [past] and demographic instability [past] are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The fruit of the taxon is in commercial trade for medicinal purposes. It is in local trade for timber. Commercial trade is resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. The number of mature individuals declined in the past by 10% and are likely to decline by 10% in the future. Generation time 50-75 years.
Trends:	The population size/numbers are declining at the rate of <10% in the last 10-15 years.

Recent Field Studies: Prasad, S.N., P. Balasubramanian and A. Rajasekaran in Mudumalai, Wayanad, Coimbatore, 1995-98, population studies. Keystone report, S. Nath in Nilgiris, 1998, Economic information and trade. A. Vatsyayan and P. Sharma, 2000 ongoing.

Data quality: Field study, informal sighting, literature/herbarium.

Uncertainty: 95% confidence, subjective opinion.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR and the population in NBR is contiguous with the adjoining population. The adjoining populations of the taxon outside NBR are of equal status. If the taxon were to go extinct in NBR, it can recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**LOWER RISK NEAR THREATENED**	Criteria:	-
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Survey, taxonomic research,life history studies and harvesting, post harvest treatment and storage technology.
Management:	Habitat management, sustainable utilisation and cultivation.
Cultivation:	Cultivation recommended for research, species recovery, reintroduction and commercial/ sustainability. Cultivated stocks are not available. There is no coordinated species management programme for this species. It is recommended to initiate cultivation programme within 3 years. Some propagation techniques are known for the species.

Other comments:	Fruits are used for tanning. Poor regeneration due to hard seed coat. It is used more in tanning industry. It is an ingredient of Triphala.
Uses of NTFP in NBR **Plant used by wild animals:**	Unripe fruits are fed by Sambar deer.
Harvest by humans:	The harvest of fruits and seeds by humans are partially destructive to the plant. The plant is used locally for medicine and as dye. The impact of harvesting on the species affects its regeneration. The roots are collected from mature plants.
NTFP in NBR:	The NTFP is available only in certain parts of NBR.
Collection organised by:	The collection is organised by primary co-operative societies, private contractors and individuals from February to April. The harvest techniques used are lopping, plucking and shaking branches. The collection is carried out for 3 months. The trade in the product is private. Collectors sell the harvested parts to private traders and primary cooperatives at the rate of Rs. 4-6 per kg of dry material. The NTFP goes to local trade, within and outside the NBR states.
Collection in NBR in the last 3 years:	In the last 3 years 5 tons were collected in Nilgiris area. There is periodic fluctuation in the collection every alternate year. The annual consumption of the dry fruits in northern Kerala is 373847 kg for drugs (Sasidharan and Muraleedharan, 2000).
Data quality:	Field study, literature and indirect information from traders, collectors, seniors, etc.
Sources:	S1: 56; P1.
Compilers:	P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya
Reviewers:	D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, P.Sharma, N. Sasidharan, V.P.K. Nambiar, A. Rajasekaran, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan, M.N.B.Nair, B. Arthur, B.A. Daniel

VULNERABLE [NBR]

Scientific name (author; date):	***Ventilago denticulata* Willd.**
Synonym:	*V. calyculata* Tulsane, *Ventilago madraspatana* Gaertn. var. *calyculata* (Tul.) King
Family:	Rhamnaceae
Common name:	Vempadam [Tam.], Popli [Kan.], Vembadam [Mal.]
Habit:	Slender climbing shrub.
Habitat:	Frequent on river side. Moist deciduous and semi evergreen forests.
Niche/ elevation:	Dry bed, in moist areas. 1000-1100m. Also found in lower areas.

Distribution

Current Global Distribution:	South and South East Asia.
Distribution from Literature:	Kalhatti [S1].
From Field Studies:	Siruvani [V. Subramaniam, 2000].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	4/4. Fragmented. There is a continuing decline but no extreme fluctuation in the number of locations or subpopulations.
Habitat status:	Predicted decline is <20% in the next 5 years due to biotic interference.

Threats

Threats to taxon:	Human interference, harvest, harvest for medicine, habitat loss, habitat fragmentation, trade of parts and trade for market or medicine are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The bark and root of the taxon is in domestic and commercial trade. Commercial trade is resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. The number of mature individuals declined in the past by 10% and are likely to decline by 10% in the future. Generation time 20 years.
Trends:	The population size/numbers are declining at the rate of >10% in the last 5 years.

Recent Field Studies: V. Subramaniam in Siruvani and eastern slopes of Nilgiris, 1994, 95.

Data quality: Field study, literature/herbarium. Habitat status, threats, trade, population trends – informal sighting, indirect information.

Uncertainty: 95% confidence, range of opinion.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR. In NBR the proportion of the population is approximately <20% and the population is contiguous with the adjoining population. The adjoining populations of the taxon outside NBR are equally threatened. If the taxon were to go extinct in NBR, it can recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**ENDANGERED – VULNERABLE**	Criteria:	**B1+2bcde**
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Survey, taxonomic research and life history studies.
Management:	Habitat management, sustainable utilisation and public awareness.
Cultivation:	Cultivation is recommended for research. Cultivated stocks are not available. There is no coordinated species management programme for this species and it is recommended for India. It is recommended to initiate cultivation programme within 3 years. Propagation techniques are not known at all.

Other comments: It is not frequently harvested.

Uses of NTFP in NBR

Harvest by humans:	The harvest of roots and bark by humans is destructive to the plant. The plant is used locally for medicine. The impact of harvesting is fatal to the individual. The roots are collected from mature plants.
NTFP in NBR:	The NTFP is available only in certain parts of NBR.
Collection organised by:	The collection is organised by individuals. The harvest techniques used are debarking and uprooting. The trade in the product is private. The NTFP goes within the NBR states.
Data quality:	Indirect information from traders, collectors, seniors, etc.
Comments:	Since this species is not commonly noticed, harvest is not frequent. The root bark yields a reddish dye, that is used for colouring wool, cotton and tassar silk.
Sources:	S1: 31.
Compilers:	D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, B. Arthur
Reviewers:	P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, T. Surayya.P.Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, M.N.B. Nair, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan, B.A. Daniel

CRITICALLY ENDANGERED [NBR]

Scientific name (author; date):	***Zanthoxylum rhetsa* (Roxb.) DC.**
Synonym:	*Z. budrunga* (Roxb.) DC., *Tipalia limonella* Dennst., *Fagara budrunga* Roxb., *F. rhetsa* Roxb., *Zanthoxylum limonella* (Dennst.) Alston., *Zanthoxylum budrunga (*Roxb.) DC. var. *rhetsa* (Roxb.)
Family:	Rutaceae
Common name:	Kattu murikku, Mutilam, Thumbunal [Mal. & Tam.]
Habit:	Medium-sized armed tree.
Habitat:	Moist deciduous
Niche/ elevation:	Open and rocky exposed areas. Up to 800m.

Distribution

Current Global Distribution:	Indomalay, South East Asia
Distribution from Literature:	Gudalurghat, Shubricks clearing [S1].
From Field Studies:	Nilambur [A. Vatsyayan and P. Sharma]. Attapadi [C.K. Antony].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	10-500
Number of Subpopulations/location:	3 locations. Fragmented.
Habitat status:	The habitat is stable.

Threats

Threats to taxon:	Harvest, harvest for medicine, overexploitation [past], trade for market or medicine, and fire are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The seeds, fruit and root of the taxon are in commercial trade for medicinal purposes. It is used for timber. Commercial trade is resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are <2500. The number of mature individuals declined in the past and are likely to decline in the future.
Trends:	The population size/numbers are declining at the rate of <10%.

Recent Field Studies: A. Vatsyayan and P. Sharma in Kerala NBR, Nov-Dec 2000.

Data quality: Informal sighting, literature/herbarium, indirect information. Population trends, threats, number of locations and subpopulations – field study

Uncertainty: 95% confidence, range of opinion, subjective opinion.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR and the population in NBR is not contiguous with the adjoining population. The adjoining populations of the taxon outside NBR are equally threatened. If the taxon were to go extinct in NBR, it can not recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**ENDANGERED - CRITICALLY ENDANGERED**	Criteria:	**B1+2e**
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Survey, taxonomic research and life history studies.
Management:	Wild population management, sustainable utilisation, cultivation and PHVA.
Cultivation:	Cultivation is recommended for research. It is recommended to initiate cultivation programme within 3 years. Propagation techniques are not known at all.

Other comments: Spines and seeds are used in ayurveda. Tribals say that the number of mature trees have decreased in wild [A. Vatsyayan and P. Sharma]. Padhinayakam and Cholanayakams.

Uses of NTFP in NBR

Harvest by humans: The harvest of fruits, seed and bark by humans is partially destructive to the plant. The plant is used locally for medicine and incense. The impact of harvesting on the species affects its regeneration and maims the individual. The roots are collected from mature plants.

NTFP in NBR:	The NTFP is available only in certain parts of NBR.
Collection organised by:	The collection is organised by primary co-operative societies and individuals during November and December. The harvest techniques used are lopping, shaking branches and cutting. The collection is carried out for 2 months by men. The trade in the product is private. Collectors sell the harvested parts to private traders and primary cooperatives at the rate of Rs. 7 per kg of fruit. The NTFP goes within and outside the NBR states.
Collection in NBR in the last 3 years:	There is no periodic fluctuation in the collection.
Data quality:	Field study and indirect information from traders, collectors, seniors, etc.
Sources:	S1: 145.
Compilers:	P.Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan, M.N.B. Nair, B.A. Daniel
Reviewers:	D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, B. Arthur, T. Surayya

Scientific name (author; date):	***Zingiber zerumbet* (L.) Roscoe.**
Synonym:	*Amomum zerumbet* L.
Family:	Zingberaceae
Common name:	Kattu inji, Malayinchi [Mal.], Koal inji [Tam.]
Habit:	Rhizomatous herb
Habitat:	Forest undergrowth in semi evergreen and moist decicduous forests.
Niche/ elevation:	Shade loving along water ways. 700m.

Distribution

Current Global Distribution:	Indomalay
Distribution from Literature:	-
From Field Studies:	Wayanad [N.A. Kumar]. Attapadi [C.K. Antony]. Attapadi Reserve Forest, Nilambur [A. Vatsyayan, P. Sharma]. Burliar, Coonoor [S.S.R. Bennet, S. Nath]. Siruvani [P. Balasubramanian, 1999].
Ext. of occurrence (Sq. km.):	100-5000
Area of occupancy (Sq. km.):	<10
Number of Subpopulations/location:	3 locations. Fragmented.
Habitat status:	The decrease in habitat is <20% due to encroachment and plantation. There is decrease in quality of the habitat due to biotic pressure and encroachment.

Threats

Threats to taxon:	Harvest, harvest for medicine, trade of parts and trade for market or medicine are resulting in and may result in population decline. The influence of threats on the population are well understood, are not reversible and have not ceased to be threats.
Trade:	The root of the taxon is in commercial trade for medicinal purposes. Commercial trade is resulting in population decline.

Population

Numbers/Generation time/Trend	Mature individuals in all populations are > 2500. The number of mature individuals declined in the past by <30% and are likely to decline by <20% in the future. Generation time is 2-3 years.
Trends:	The population size/numbers are declining at the rate of >20% in the last 10 years.

Recent Field Studies: Attapadi and Nilambur [A. Vatsyayan and P. Sharma]. N. Sasidharan in Palakkad.

Data quality: Field study, literature/herbarium. Trade, population numbers– indirect information.

Uncertainty: 95% confidence, range of opinion.

The taxon in adjoining areas of NBR: The taxon also occurs in areas adjoining the NBR and the population in NBR is contiguous with the adjoining population. The adjoining populations of the taxon outside NBR are equally threatened. If the taxon were to go extinct in NBR, it can recolonise from adjoining areas.

Status in NBR:

IUCN (1994):	**CRITICALLY ENDANGERED – ENDANGERED**	Criteria:	**B1+2bce**
CITES:	Not listed	Indian WL. (P) Act:	Not listed
Natl. RDB:	Not listed	Intl. RDB:	Not listed

Recommendations

Research:	Survey, taxonomic research and life history studies.
Management:	Genome resource banking, sustainable utilisation, biochemical analysis for flavours and cultivation.
Cultivation:	Cultivation is recommended for research and commercial/ sustainability. Cultivated stocks are not available. Propagation techniques are not known at all.

Other comments: The wild species (*Z. zerumbet*) fetches double the price per kg in the market in Wayanad [N. A. Kumar]. It gives a special flavour to the curry [Sabhu]. Tribals collect in off - season when they are not trading other NTFP [Sabhu]. Cultivation technique is same as for *Z. officinale*. The population is not declining rapidly because of the reproductive efficiency of the plants. May be there has been a 20 % decline in the past.

Uses of NTFP in NBR

Plant used by wild animals:	Not used by animals.
Harvest by humans:	The harvest of roots and stem by humans is destructive to the plant. The plant is used locally for medicine. The impact of harvesting on the species is loss of vigour. The roots are collected from mature plants.
NTFP in NBR:	The NTFP is available only in certain parts of NBR.
Collection organised by:	The collection is organised by primary co-operative societies, private contractors and individuals from August to January. The harvest techniques used are uprooting. The collection is carried out for 3 months by men. The trade in the product is private. Collectors sell the harvested parts to private traders and primary cooperatives at the rate of Rs. 20 per kg of dry material. The NTFP goes within the NBR states.
Collection in NBR in the last 3 years:	There is periodic fluctuation in the collection.
Data quality:	Field study and collection trends and records.
Compilers:	P.Sharma, N. Sasidharan, V.P.K. Nambiar, C.K. Antony, N.A. Kumar, V.S. Ramachandran, T.K. Sabu, A. Vatsyayan, M.N.B. Nair, B.A. Daniel
Reviewers:	D.S. Baburaj, K.S. Devadass, K. Narendran, S. Rajanna, R.S. Suresh, V. Subramaniam, K. Vivekananthan, P. Balasubramanian, B. Joseph, S.S.R. Bennet, R. Gopalan, P. Grard, S. Raghavan, S. Nath, B. Arthur, T. Surayya

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