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ENVIS Newsletter on Medicinal Plants



Editorial

Dear Friends,

ENVIS Team at FRLHT wishes all its readers a splendid New Year 2010.

This year is celebrated as International Year of Biodiversity 2010 as per Convention of Biological Diversity. We will be happy to share our experiences related to medicinal plants diversity and conservation across the country.

This issue includes articles pertaining to "Diversity of Herbal Raw Drugs and Plant Species in Trade" coupled with conservation efforts. The lead article providing insights in to the diversity of herbal drugs in trade, with latest findings from "Demand and Supply of Medicinal Plants in Trade, 2008". Write ups relate to prioritization of species for conservation management action, controversial drug – Daruharidra, what is species recovery program?, a peep into an unique medicinal plants herbarium-FRLH, Red Listed Medicinal Plants as per International Union for Conservation of Nature and Natural Resources and International Year of Biodiversity 2010 ,and much more..

We are receiving encouraging responses regarding our newsletter. We welcome each one of you to give us your feed back and help us improve it. While we regret for delay in the current issue of Med plant newsletter, we have combined four issues in this volume.

You can also freely download the newsletter from our website- <http://envis.frlht.org>

We welcome authors to contribute and share their experiences related to conservation efforts of medicinal plants across the country in the next issue. Your article has to be 1500 words with 300dpi images which you need to send to the Editor or email- envis.frlht.org. Qualifying articles will be published in the next volume.

Best Wishes

Suma T.S

Editor - Medplant

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Next Issue:

Medicinal Plants Conservation Efforts
across the country.

ENVIS Centre on Medicinal Plants

Foundation for Revitalisation of Local Health Tradition, Bangalore

FRLHT is a registered public trust, since 1991. Our vision is to "revitalise Indian Medical Heritage". Mission is to design and implement strategic programs in the three key thrust areas, that will have high social impact:

- Demonstrating the contemporary relevance of the traditional knowledge.
- Conservation of the natural and cultural resources used by Indian Medical Heritage.
- Large scale dissemination of traditional knowledge via informal, institutional and commercial transmission processes.

FRLHT is designated as "ENVIS Centre on Medicinal Plants" by MoEF, GoI. Here, we aim to bring awareness about the issues, concerns and experiences related to Indian Medicinal Plants conservation through the website: <http://envis.frlht.org.in> and quarterly newsletter: Medplant. By visiting our Centre at Bangalore, you can experience the beautifully landscaped medicinal plant garden with over 900 plant species. Amidst this paradise, you can meet 100 plus professionals, access exclusive Encyclopedia on Indian Medicinal Plants database; access exclusive FRLH- Herbarium and Raw Drug Repository with 35,000 accessions pertaining to 2,800 medicinal plant species, 602 plant raw drug samples pertaining to 452 species collected from authentic botanical sources; and 484 raw drugs pertaining to 395 species collected from various markets (Read more page No.12). It also has a full fledged laboratory: Centre for Pharmacology, Pharmacognosy and Pharmaceutics, Amruth Ayurveda Nursing Home and Yoga Centre and Institute for Ayurveda & Integrative Medicine.

Diversity of Herbal Raw Drugs and Plant Species in Trade

DK Ved¹ and GS Goraya

You may recall, in the earlier volumes of Medplant newsletter, you got a fair idea about sources of supply of botanical raw drugs and medicinal plants species in high volume trade/consumption. Based on the "Demand and Supply of medicinal plants in India"(Ved,D.K, and G.S, Goraya, 2008) a study supported by National Medicinal Plants Board, this volume shares research findings related to Diversity of Herbal Raw Drugs and Plant Species in Trade. Here is the gist of analysis of 960 species in trade with regard to species diversity:

1. 1289 botanicals (various parts sold) pertain to 960 plant taxa.
2. These 960 medicinal plant taxa in trade belong to 575 genera spread across 169 families. Amongst them 152 families belong to Angiosperm (dicot 130 and monocot 22), 5 gymnosperm, 9 pteridophytes and 3 Fungi and lichens group of plants.
3. Analysis of distribution pattern of traded medicinal plant taxa in 169 families brings out that about one third of these plant species belong to only ten families with 50 number of traded medicinal plants being from Fabaceae family.

Table 1. List of top ten families with corresponding number of species in trade

Sl. No.	Family	No. of Species
1.	Fabaceae	50
2.	Asteraceae	42
3.	Lamiaceae	33
4.	Euphorbiaceae	32
5.	Apiaceae	31
6.	Rubiaceae	27
7.	Cucurbitaceae	26
8.	Caesalpinaceae	25
9.	Rutaceae	22
10.	Zingiberaceae	22

All top ten families belongs to "Angiosperms" (dicotyledons 9; monocotyledons 1)

4. Further analyses shows that 47 angiosperm families are represented by only one species each in trade.
5. Life form analysis shows that 398 species comes under herbs (including grasses), 251 species are trees, 168 species are shrubs(including stragglers) and 143 species are climbers (including lianas), thus indicating that almost 2/3rd of the plant taxa are perennials and slow growers and hence requires attention for conservation efforts.
6. Usage in Indian System of Medicine shows that amongst 960 traded species, highest proportion is used under Ayurvedic System of Medicine (688), followed by Siddha(501), Unani (328), So-rig-pa /Tibetan system (197) and Homeopathy(146). Futher analyses shows that 54 species are commonly used across all the Indian Systems of Medicine.
7. Analysis of 1289 botanicals in trade revealed that more than half of the total raw drugs in trade are roots/rhizomes and the whole plants.

Table 2. Major category of parts traded

Major category of parts traded	Total count
Roots	338
Fruits	333
Whole plants	168
Stems	162
Leaves	140
Flowers	84
Exudates	37
Wood	20
Galls	4
Oil	3
Total number of traded botanicals	1289

For further reading, please refer to:

Ved, D.K. and G.S. Goraya (2008). Demand and Supply of Medicinal Plants in India. Bishen Singh Mahendra Pal Singh, Dehra Dun and FRLHT, Bangalore.

Tetuchaal, Arlu *Oroxylum indicum*

Stem and root bark
High volume traded medicinal plant.(>100MT/year)
Threat status in Karnataka:
Vulnerable
Photo courtesy: Ravikumar K, FRLHT



Flowering twig.



Wind-borne seed

Prioritizing Wild Medicinal Plant Species for Conservation Action

DK Ved and GS Goraya

The ever expanding domestic and global herbal market has subjected the native medicinal plant resources under considerable pressure. Wild populations of many medicinal plant species, i.e., those growing inside the forests as well as outside forests, have depleted to such an extent that their very survival has become a cause for concern. Whereas several of these species are facing threat of extinction, on account of their narrow distribution or endemism and degradation of their specific habitat, many of these have come to this pass on account of indiscriminate and unsustainable harvesting. It is a pity that most of these species have never been the focus of any dedicated management intervention. Whereas no management protocols are in existence for the species found outside forests, management focus in respect of the forest species also has been primarily on the timber species of high commercial value, with little or no priority accorded to the management of medicinal plants. This lack of management focus has been a prime cause, as well as a consequence, of inadequacy of data related to the diversity of medicinal plant species being harvested and the quantum of such harvests.

The Foundation for Revitalisation of Local Health Traditions (FRLHT), Bangalore, a Centre of Excellence of Medicinal Plants and Traditional Knowledge of Ministry of Environment and Forests (MoEF) of GOI, has undertaken two kinds of efforts to identify and prioritize wild medicinal plant species needing urgent management attention.

The first of these efforts relates to co-ordinating rapid threat assessment exercises for the wild medicinal plant species occurring in different States. These rapid threat assessments have involved conducting Conservation Assessment and Management Prioritisation (CAMP) workshops using **IUCN Red List Categories and Criteria**. This CAMP process has been utilized by FRLHT, over the past 13 years, to undertake rapid assessment of threat status of wild medicinal plant species of conservation concern, in different states of India. During this period FRLHT has facilitated 14 such CAMP workshops covering 17 states of India. These exercises have involved undertaking assessments for a total of 359 prioritized wild Medicinal plant taxa. Of the 359 taxa taken up for assessment, 335 have been assigned Red List status ranging from Critically Endangered (CR), Endangered (EN), Vulnerable (VU) to Near Threatened (NT).

The second effort relates to the NMPB sponsored nationwide study to assess the demand and supply of medicinal plants in the country undertaken by FRLHT during 2006-07. A total of 960 medicinal plant species, identified as sources of 1289 botanical raw drugs, have been recorded in-trade in this study. Further scrutiny and analysis of this list has resulted in short-listing of 178 species in high trade volumes i.e. exceeding 100 MT (dry wt) per year.

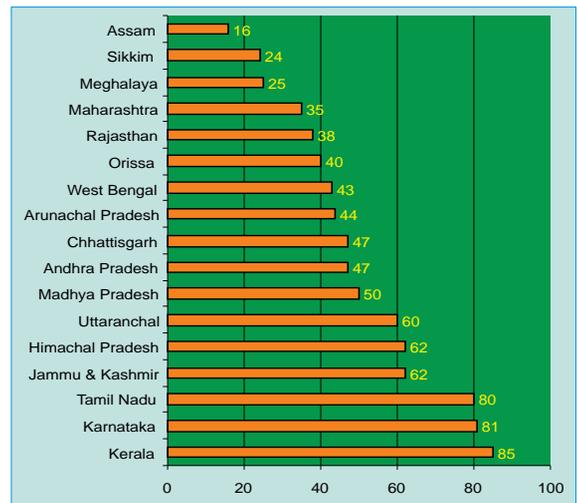
Out of the list of 335 Red Listed medicinal plant species resulting from the CAMP process, 197 have been recorded in trade in this study. It includes 84 species recorded in high volume trade i.e. exceeding 100 MT/year (dry wt). Informed and focused conservation action, along with appropriate

resource augmentation, has to be developed for these species, in the appropriate regions of the concerned state.

The following graph shows "State wise medicinal plant species assigned Red listed status (that includes near threatened and above) based on Rapid threat assessment exercises (CAMP process).

Total no. of species (NT and above) = 335

The rapid threat assessment exercises undertaken in respect of each of these 17 states, has resulted in the state-wise priority lists of wild medicinal plant species of conservation concern. These state wise lists can be utilized for initiating



conservation action and resource augmentation efforts in these states. The states not covered under any such rapid threat assessment exercise, so far, can also take a cue from the listing done for the adjoining states to initiate programmes.

The above graph on medicinal plant species of conservation concern, state wise, enlisted above shows that this number is of the order of 80 to 85 for each of the southern Indian states of Karnataka, Kerala and Tamilnadu. It needs to be realized that the higher number of medicinal plant species, of conservation concern, for a state is also on account of more than one rapid threat assessment exercises conducted for that state.

In the following page, we can see the listing of medicinal plant species of conservation concern, for Karnataka State, based on these rapid threat assessment exercises, including the identification of species which have been recorded in trade as plant raw drugs and also those recorded in high volume trade i.e. exceeding 100 MT (dry wt.) per year.

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(Next issue: Know more about conservation concern species for selected states.)

Medicinal Plants of Conservation Concern for Karnataka

CAMP workshops were held during 1995, '96, '97 and '99 at Bangalore to assess the threat status of prioritised Medicinal plants of Karnataka. During this process 81 medicinal plant species were assigned RL (Red List) status of Near Threatened (NT) and above. These 81 RL species are enlisted in the table below. This tabulation also identifies the species which have been recorded in trade in the NMPB supported National level Medicinal Plants trade study undertaken by FRLHT during 2008. It also identifies such species which have been recorded in high volumes i.e. in quantity exceeding 100 MT/year (dry wt.)

S.No	Botanical names	Habit	Status in KA	RL status (Global)	Recorded in Trade	Trade 100 MT/yr (dry wt.)
1	<i>Madhuca insignis</i> (Radlk.) H.J.Lam.	T	EX	EX(G)		
2	<i>Coscinium fenestratum</i> (Gaertn.) Coleb.	C	CR	-	T	H
3	<i>Cycas circinalis</i> L.	T	CR	-	T	
4	<i>Eulophia cullenii</i> (Wight) Blume	H	CR	CR(G)		
5	<i>Paphiopedilum druryi</i> (Bedd.) Pfitz.	H	CR	CR(G)		
6	<i>Pueraria tuberosa</i> (Roxb. ex Willd.) DC.	C	CR	-	T	
7	<i>Valeriana leschenaultii</i> DC.	H	CR	CR(G)		
8	<i>Ampelocissus indica</i> (L.) Planch.	C	EN	-		
9	<i>Chonemorpha fragrans</i> (Moon) Alston	C	EN	-	T	
10	<i>Cinnamomum wightii</i> Meisn.	T	EN	EN(G)	T	
11	<i>Decalepis hamiltonii</i> Wight & Arn.	C	EN	EN(G)	T	H
12	<i>Dipterocarpus indicus</i> Bedd.	T	EN	EN(G)		
13	<i>Drosera indica</i> L.	H	EN	-		
14	<i>Drosera peltata</i> J.E.Sm. ex Willd.	H	EN	-		
15	<i>Dysoxylum malabaricum</i> Bedd. ex Hiern	T	EN	EN(G)	T	
16	<i>Gymnema montanum</i> (Roxb.) Hook.f.	C	EN	EN(G)		
17	<i>Humboldtia vahliana</i> Wight	T	EN	EN(G)		
18	<i>Hydnocarpus macrocarpa</i> (Bedd.) Warb.	T	EN	EN(G)		
19	<i>Michelia champaca</i> L.	T	EN	-	T	
20	<i>Nilgiranthus ciliatus</i> (Nees) Bremek.	S	EN	EN(G)	T	H
21	<i>Nothapodytes nimmoniana</i> (Graham) Mabber.	T	EN	-	T	
22	<i>Persea macrantha</i> (Nees) Kosterm.	T	EN	-		
23	<i>Plectranthus nilgherricus</i> Benth.	H	EN	EN(G)		
24	<i>Rauwolfia serpentina</i> (L.) Benth. ex Kurz	H	EN	-	T	H
25	<i>Salacia reticulata</i> Wight	S	EN	-	T	
26	<i>Saraca asoca</i> (Roxb.) W.J. de Wilde	T	EN	-	T	H
27	<i>Strychnos aenea</i> A.W.Hill	C	EN	EN(G)		
28	<i>Swertia lawii</i> (Wight ex C.B.Clarke) Burkill	H	EN	EN(G)		
29	<i>Adenia hondala</i> (Gaertn.) W.J.de Wilde	C	VU	-	T	
30	<i>Aegle marmelos</i> (L.) Corr.	T	VU	-	T	H

S.No	Botanical names	Habit	Status in KA	RL status (Global)	Recorded in Trade	Trade 100 MT/yr (dry wt.)
31	<i>Amorphophallus commutatus</i> (Schott) Engl.	H	VU	VU(G)		
32	<i>Ampelocissus araneosa</i> (Dalz. & Gibson) Planch.	C	VU	VU(G)		
33	<i>Aphanamixis polystachya</i> (Wall.) Parker	T	VU	-	T	
34	<i>Aristolochia tagala</i> Cham	C	VU	-	T	
35	<i>Artocarpus hirsutus</i> Lam.	T	VU	VU(G)		
36	<i>Baliospermum montanum</i> (Willd.) Mull.Arg.	S	VU	-	T	H
37	<i>Calophyllum apetalum</i> Willd.	T	VU	VU(G)	T	
38	<i>Canarium strictum</i> Roxb.	T	VU	-	T	
39	<i>Cinnamomum macrocarpum</i> Hook.f.	T	VU	VU(G)	T	
40	<i>Cinnamomum sulphuratum</i> Nees	T	VU	VU(G)	T	H
41	<i>Curcuma pseudomontana</i> Graham	H	VU	VU(G)		
42	<i>Diospyros candolleana</i> Wight	T	VU	VU(G)		
43	<i>Diospyros paniculata</i> Dalz.	T	VU	VU(G)		
44	<i>Embelia ribes</i> Burm.f.	C	VU	-	T	H
45	<i>Embelia tsjeriam-cottam</i> (Roem. & Schult.) A. DC.	S	VU	-	T	H
46	<i>Garcinia indica</i> (Thouars) Choisy	T	VU	VU(G)	T	H
47	<i>Garcinia morella</i> (Gaertn.) Desr.	T	VU	-	T	
48	<i>Gardenia gummifera</i> L.f.	T	VU	VU(G)	T	
49	<i>Gloriosa superba</i> L.	C	VU	-	T	H
50	<i>Heracleum candolleianum</i> (Wight & Arn.) Gamble	H	VU	VU(G)	T	
51	<i>Holostemma ada-kodien</i> Schult.	C	VU	-	T	H
52	<i>Hydnocarpus alpina</i> Wight	T	VU	VU(G)		
53	<i>Hydnocarpus pentandra</i> (Buch.-Ham.) Oken	T	VU	VU(G)	T	
54	<i>Kingiodendron pinnatum</i> (Roxb. ex DC.) Harms	T	VU	VU(G)		
55	<i>Madhuca longifolia</i> (Koen.) Macbr.	T	VU	-	T	
56	<i>Madhuca neriifolia</i> (Moon) H.J.Lam	T	VU	-		
57	<i>Michelia nilagirica</i> Zenk.	T	VU	VU(G)		
58	<i>Myristica dactyloides</i> Gaertn.	T	VU	-	T	
59	<i>Myristica malabarica</i> Lam.	T	VU	VU(G)	T	
60	<i>Ochreinauclea missionis</i> (Wall. ex G. Don) Ridsdale	T	VU	VU(G)		
61	<i>Operculina turpethum</i> (L.) Silva Manso = <i>Merremia turpethum</i> (L.) Shah & Bhat	C	VU	-	T	H
62	<i>Oroxylum indicum</i> (L.) Vent.	T	VU	-	T	H
63	<i>Piper mullesua</i> Buch.-Ham. ex D.Don	C	VU	-		

S.No	Botanical names	Habit	Status in KA	RL status (Global)	Recorded in Trade	Trade 100 MT/yr (dry wt.)
64	<i>Pseudarthria viscida</i> (L.) Wight & Arn.	H	VU	-	T	H
65	<i>Rhaphidophora pertusa</i> (Roxb.) Schott	C	VU	-	T	
66	<i>Salacia oblonga</i> Wall. ex Wight & Arn.	C	VU	VU(G)	T	
67	<i>Santalum album</i> L.	T	VU	-	T	H
68	<i>Schrebera swietenioides</i> Roxb.	T	VU	-	T	H
69	<i>Swertia corymbosa</i> (Griseb.) Wight ex C.B.Clarke	H	VU	VU(G)	T	
70	<i>Symplocos racemosa</i> Roxb.	T	VU	-	T	H
71	<i>Tinospora sinensis</i> (Lour.) Merr.	C	VU	-	T	H
72	<i>Tragia bicolor</i> Miq.	C	VU	VU(G)		
73	<i>Vateria indica</i> L.	T	VU	VU(G)	T	H
74	<i>Celastrus paniculatus</i> Willd.	C	NT	-	T	H
75	<i>Garcinia gummi-gutta</i> (L.) Robson	T	NT	NT(G)	T	
76	<i>Hedychium coronarium</i> Koenig	H	NT	-	T	
77	<i>Knema attenuata</i> (Hook.f. & Thoms.) Warb.	T	NT	NT(G)		
78	<i>Nervilia aragoana</i> Gaud.	H	NT	-	T	
79	<i>Piper nigrum</i> L.	C	NT	-	T	
80	<i>Smilax zeylanica</i> L.	C	NT	-	T	
81	<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn.	T	NT	-	T	H

No of RL species (KA) recorded in trade = 52 No of RL species (KA) in high trade = 23

Refer: Ved, D.K and G.S. Goraya, 2008

Conservation Concern Medicinal Plants of Karnataka



Schrebera swietenioides (VU-Karnataka)



Vateria indica (VU-Global)

Species Recovery Plan to Restore Critically Endangered Plant Species of the Western Ghats

R. Vasudeva

The species recovery plan essentially entails creation of new populations of critically endangered species on sites where the species is likely to survive and become self-perpetuating. It also entails replenishing existing threatened populations which are in the brink of becoming locally extinct. The final aim of any species recovery plan is simply to pull an endangered species out of its danger using all possible strategies and methodologies. Ultimately a long term persistence of a newly created / introduced population is important to the success of a recovery programme.

Recovery plan has emerged recently as an effective tool to restore critically endangered plant species world over.

These programs have been undertaken in several countries such as Australia, Britain, Canada and the USA by invoking legislative provisions. However in these programmes, critically endangered animal species are emphasized in these countries. Some of the successful and celebrated examples species recovery include the recovery of American Bald Eagle, Condor, Grizzly bear, Black-footed Ferret *etc.* Only very few plant species have been focused world over. In India, species recovery programmes have been launched very recently. Although a number of plant species of the Western Ghats are critically endangered, a very few isolated attempts have been done earlier towards recovery of the endangered species. Reintroduction of Lady-Slipper Orchids to the Agasthyamalai hills is one such example. Majority of these attempts however, encompass only simple reintroduction of laboratory grown seedlings into habitats disregarding the genetic evaluation of the introduced populations. Long-term implications of such introductions to the demography and genetic structure of the populations are not understood.

Fundamental to effective restoration of a threatened species is to understand its autecological details (such as the basic biology, nursery requirement *etc.*), population genetic structure (allelic diversity, heterozygosity), demography (aspects of population size, sex ratio, population change *etc.*) and to construct spatially explicit distribution maps of these species. Further, it is essential to carefully select the genotypes for reintroduction based on robust molecular data. If the founding population is far too less genetically diverse, then the long term existence of populations cannot be expected.

Threatened plant species exhibit a myriad of life history traits and are susceptible to several pressures. For this reason there is no one single protocol that can be universally prescribed. However, only a general guideline could be suggested. Here we provide a generic methodology that



Salacia chinensis



Saraca asoca

could be considered while recovering an endangered species.

The following broad phases or issues need to be considered while attempting a reintroduction:

Step 1 Acquisition and build-up of the propagules

Step 2 Identification of suitable niches for reintroduction

Step 3 Creation of genetically robust populations

Step 4 Monitoring the fate of the introduced individuals

Step 5 Up-scaling

Step 1. Acquisition and building-up of the propagules

- Understand breeding system, seed biology and demographic

characteristics of the species to identify susceptible stages in the life-history of the species.

- One of the crucial steps of the reintroduction programme is to assess the genetic diversity of the existing populations adopting robust molecular techniques.
- It is essential to develop nursery techniques for the production of large scale reintroductions.
- A few species might require standardization of micro-propagation techniques if macro propagation is possible or if the population levels are too low to collect large number of propagules from the wild.

Step 2. Identification of suitable niches for re-introduction

- Identification and mapping of natural populations of the species in question needs to be undertaken through a suitable sampling technique.
- Locate suitable sites within the historical range of the species for reintroduction after considering ecological (such as climate, soil, slope, floristic composition, levels of disturbance, *etc.*) and logistic (such as land-use history, access, size, ownership, *etc.*) factors.
- Based on the experience of the field biologists, a subjective ecological profile of several candidate sites could be obtained. Initially a large number of `candidate sites` could be considered, from which a few sites could be short-listed based on logistic factors. In this stage, different landscapes such as Sacred groves, Temple forests and Natural forests, Protected areas could be considered as potential sites for reintroduction.
- Modern niche modeling theories such as DIVA GIS provide a much important image based decision criteria for the selection of sites hence they should be preferably be employed to select the target areas for reintroduction.

- It is essential that locations that are suitable for the domestication of the species in question also need to be selected.

Step 3. Creation of genetically robust populations

- This is also a crucial step in the recovery programme since much of the success of the recovery depends on the genetic nature of the founding populations and the initial silvicultural treatment that they receive. Several options are available at this stage to maximize the probability of the species recovery. One of the options is to create new founding populations on sites where the species in question is not present. Second option is to genetically enrich the existing populations through the introduction of propagules from different populations adopting Forest Gene Bank concept. Recovery of the species through habitat restoration using plant introduction as successional analogues is the third option.
- Although minimum viable population size is unknown for most plant species, a general range of 500 to 2000 individuals could be taken as a thumb rule.
- The exact nature of the re-establishment site (micro-site) needs to be determined from laboratory and pilot field studies.

3.1 Creating new founding populations on sites where the species is not present

- Since genetic variability in small population of threatened species is often low, it is important to maximize allelic diversity in new populations to ensure evolutionary persistence. A careful 'genetic composing' is necessary such that allelic diversity of the introduced plants is maximum.
- The offspring of unrelated individuals are often more viable than those of related individuals; matings between different geographic races may result in a decrease in offspring fitness, the process is known as 'out breeding depression'. Hence, for those species with large distributional ranges (say throughout a major part of the Western Ghats), it is suggested to create several founding populations in the regions of homogenous ranges (say one in northern, central and southern regions). This would minimize the out breeding depression while enhancing the diversity of the progeny.

3.2 Creation of Forest Gene Banks

- Forest gene bank concept as envisaged by Uma Shaanker and Ganeshiah (2000) includes genetic enrichment of sink populations (sites with relatively higher levels of gene diversity) through introduction of rare alleles from several source populations such that there would be a creation of progeny with higher levels of diversity.
- Augmenting natural regeneration of through silvicultural treatments in their natural populations.
- In order to reduce the out breeding depression, several satellite forest gene banks could be established through the distributional range of the species.

3.3 Reintroduction as successional analogues

- One may encounter a problem that the species in question cannot be reintroduced singly, rather a range of associated species need to be reintroduced. This is true for species that are of climax stage (or late succession stage) and whenever reintroduction has to be done for those areas with poor vegetation cover. The composition and sequence of planting of tree mixtures (*i.e* candidate species plus the associate) need to be understood and managed using a natural succession as an analogue. In the initial stages, nurse species that improve habitat quality might be reintroduced. This should facilitate the establishment, regeneration, growth and development of site-sensitive threatened species.

Step 4. Monitoring the populations

- Demographic monitoring of populations is necessary to identify those factors that could limit the establishment or growth of the new population. Run a pilot study to assess the introduced populations for this purpose.
- The monitoring parameters may include germination, mortality, phenology, reproductive survivorship, regeneration and the genetic structure of the progeny. However, for species with long reproductive cycles, it would be too difficult to assess the change in diversity over generations.

Step 5. Up-scaling the reintroductions

- Following the success of the pilot programme, the reintroduction could be undertaken at a higher level. For this, lessons learnt during the management at the plant level could be enhanced to the area management.
- Readjust the sites and populations through silvicultural management and/or additional introductions.

Adopting this new approach, we have established five new populations of a critically endangered species of fresh-water ecosystems viz., *Semecarpus kathalekanensis* under a DBT-funded project on species recovery. Before the project the species existed only in four isolated populations with less than 100 breeding individuals in the wild, making it a critically endangered one. All these populations were restricted to about 25 square kilometers around Jog falls in Uttara Kannada district. Through our efforts, today about 5000 individuals have been planted in locations as far as Kodagu and Kerala. Most of the out-planted individuals have adopted to the newer habitats and growing very well. Many of the conservation concern medicinally important species are subjected to Species Recovery Program. *Dysoxylum malabaricum*, *Saraca asoca*, *Mappia foetida*, *Myristica dactyloides*, *Myristica fatua*, *Embelia ribes*, *Celastrus paniculatus*, *Salacia chinensis* and many other associate plant species are being subjected to this species recovery program.

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Photographs courtesy: Dr. Vasudeva R.

Saving Plants that Save Lives and Livelihoods

International Standard for the Sustainable Wild Collection of Medicinal and Aromatic Plants (ISSC MAP)

The ISSC MAP standards have been developed at a crucial time of depletion of Medicinal and Aromatic Plant (MAP) resources in the wild. Over harvesting apart from habitat loss is the major cause for this decline. The standard contains a guideline of six principles and eighteen criteria which ensures sustainable management of the MAP resource in the wild. The standard is comprehensive and address all the dimension of the conservation issue- the biology of the species, ethical requirements, social justice, market pressures and business practices. The six principles which form the pivot of this standard are briefly described below:

1. **Maintaining wild MAP resources:** This elucidates how wild collection of MAP resources should be conducted so as to maintain the populations and species over the long term.
2. **Preventing Negative Environmental Impacts:** This principle ensures that negative impacts caused by MAP collection activities on other wild species, the collection area and neighboring areas are prevented
3. **Complying with Laws Regulations and Agreements:** This ensures that MAP collection and management activities shall be carried out under legitimate tenure agreements and comply with relevant laws, regulations and agreements
4. **Respecting Customary Rights:** This principle vouches that local communities' and indigenous people's customary rights to use and manage collection areas and rights over the wild collected MAP resources will be recognized and respected
5. **Applying responsible Management practices:** This ensures that wild collection of MAP species shall be based on adaptive, practical management processes and good collection practices.
6. **Applying responsible business practices:** This states that wild collection of MAP resources shall be undertaken to support quality, financial and labour requirements of the market without sacrificing sustainability of the resource.

These principles are developed in consultation with representatives from IUCN, WWF Germany, TRAFFIC Germany and Federal Agency for Nature Conservation (BfN), field partners, stake holders. This is financially supported by German Federal Ministry for Economic Cooperation and Development (BMZ).

Field implementations of these standards are being simultaneously conducted in seven countries of the world: *India, Nepal, Lesotho, Bosnia Herzegovania, Cambodia, Kazakhistan and Brazil*. In India, it is being implemented in two states- *Uttarakhand and Karnataka*.

In this write up, author wishes to share FRLHT's experience related to ISSC MAP implementation:

FRLHT has identified two sites- Agumbe Range of Shimoga Forest Division and the other in Katgal Range of Honnavar Forest Division. Four species are chosen for the study viz *Embelia tsjeriam-cottam* (*Vaividang*, fruits used to treat stomach disorders), *Salacia chinensis* (*Ekanayaka*, roots are used in anti-diabetic drugs), *Ailanthus triphysa* (*Halmaddi*,

resin used in Agarbatthi industry), and *Myristica dactyloides* (*Rampathre*), aril used as spice and to treat cough, bronchitis.

During the project tenure, a task team comprising of medicinal plants collectors, traders, Village Forest Committee members, state forest department officials, self help groups was constituted. Members did a thorough documentation of botanical information and traditional knowledge about the selected species. They also designed harvest schedule with method of harvesting through consultation with experts at FRLHT. The collectors who were interested in harvesting a species were given identity cards authorizing them to harvest in the stipulated fashion. Thus giving collector ownership responsibility. Over two years, methods of harvest have been refined based on the necessity and the experience.

One success story is the resin harvesting of *Ailanthus triphysa*. Experiments are being conducted to identify a method of harvest which causes minimum damage to the trees without compromising on the yield. A stark improvement in the quality of resin is seen, which has been classified as A Grade by the trader.

Various community workshops have been conducted to create awareness on this topic. The ISSC MAP experience has been shared in various forum, like the Save Western Ghats Campaign, BioFach 2009, to college student. Policy level meetings initiatives have been taken up.

It can be stated that the idea of this project has been embraced with eagerness among all concerned. It is hoped that with an incorporation of these standards into the working plan of the forest department, and applying these to a larger number of species, sustainability in resource collection can be achieved. Certification of compliance with these standards will help creating a brand value to the produce, thus providing a better market value to the benefit of the collector. Apart from conserving the resource base, this will also satisfy the health conscious customer.

For more information please refer:
<http://www.floraweb.de/map-pro>

Inputs from Arpana B, FRLHT, Bangalore
Email id: arpana.b@frlh.org

Conservation Concern Medicinal Plants of Karnataka



Aegle marmelos, VU



Celastrus paniculatus, NT



Baliospermum montanum, VU



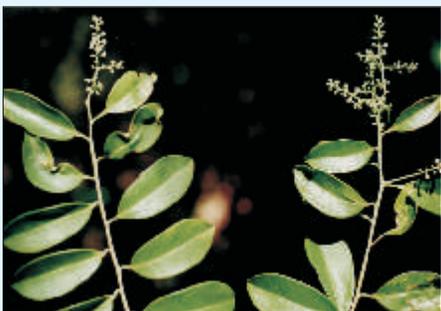
Cinnamomum sulphuratum, VU (Global)



Cosciniium fenestratum, CR



Decalepis hamiltonii, EN (Global)



Embelia ribes, VU



Embelia tsjeriam-cottam, VU



Garcinia indica, VU (Global)



Gloriosa superba, VU



Holostemma ada-kodien, VU



Myristica dactyloides, VU



Nilgirianthus ciliatus, EN (Global)



Operculina turpethum, VU



Oroxyllum indicum, VU



Pseudarthria viscida, VU



Rauwolfia serpentina EN



Santalum album, VU



Symplocos racemosus, VU



Saraca asca, EN

Unique Bio-Cultural Herbarium and Repository of Raw Drugs

FRLH - accredited acronym for a specialized repository related to medicinal plants used in Indian Systems of Medicine (ISM) - includes a herbarium, a repository of raw drugs and an image library of plants and parts thereof used as medicine. This repository is well supported by an encyclopedic data-bank and relevant literature on the subject.

FRLH is an outcome of dedicated efforts in the field of medicinal plant conservation by the Foundation for Revitalisation of Local Health Traditions (FRLHT) and financial support extended by the DANIDA and the Ministry of Environment & Forests, Govt. of India.

Aims of FRLH are

1. Provide one-stop information related to plants used in ISM.
2. House herbarium specimens of the diversity of plants used in ISM collected from across their range of locations, representing the diversity.
3. Provide facilities for authentication of medicinal plant samples with the help of voucher specimens.
4. Act as a research and educational centre for furthering the cause of medicinal plant conservation.
5. Serve as a centre for capacity building in the field of taxonomy, field floristic surveys and herbarium techniques.

A unique feature of this herbarium is its easy accessibility both to the scientific community and the laypersons. This has been achieved through linking the cultural information pertaining to vernacular names, local uses and classical uses of plants to the herbarium database, thus making the retrieval and referral relatively easy even for a non-technical person. A thematic design for arrangement of herbarium specimens is being worked out to further enhance the educational value of this biocultural herbarium!

This is one of exclusive herbarium dedicated wholly to medicinal plants. It currently holds about 40,000 accessions pertaining to more than 2,800 medicinal plant taxa collected



Herbarium Block

from across various biogeographic regions of the country. In respect of important medicinal plant species, however the accessions reflect their range of distribution as also the morphological variations within.

A variety of raw drugs including roots, rhizomes, barks, stems, leaves, fruits, seeds, gums, etc are derived from about 960 medicinal plant species are currently known to be in trade. At FRLH, efforts are underway to collect such officinale parts of these species directly from the authentic botanical sources as well as from the market.



Herbarium Specimen

Currently, the repository holds market samples in relation to 400 species as collected from major raw drug markets in the country. It also has a collection of botanicals pertaining to 440 species that have been sourced directly from the confirmed plant species. The duly labeled raw drugs have been thematically displayed. While the process to add on to the plant-based accessions is ongoing, FRLH is also making efforts to enrich the repository with specimen samples of metals and minerals used in ISM.

The herbarium and raw drug repository is supported with an Image Library that currently possesses over 20,000 images of live plants and their habitats, scanned herbarium sheets and raw drugs. This image library is oriented to help facilitate the identification of specimens, especially for the user groups such as ISM practitioners, students, researchers, resource managers, etc.

This image library is under the process of upgradation to a 'Virtual Herbarium' so that the researchers, academicians, lay persons, resource users, resource managers and the industries could access it through Internet. Sample images have already been uploaded in the web site: <http://envis.frlht.org> Various services offered at FRLH

1. Authentication of plant samples
2. Floristic inventories/surveys
3. Assist in establishing herbaria
4. Design and publish educational materials like pictorial field guides
5. Directory of medicinal plants used by industry
6. Training in herbarium methods and plant identification
7. Free reference service for students

Information provided by Herbarium Team.

Continued in page 14

Contestants for Daaru-Haridra

SN Venugopal

The word meaning of Daaru-haridra is the wood (daaru) having yellow color like that of turmeric (haridra).

तिक्ता दारुहरिद्रा स्याद्द्रक्षोष्णा व्रणमेहजित् ।
कर्ण-नेत्र मुखोद्भूतां रुजं कण्डूञ्च नाशयेत् ॥

Daaruharidra is tikta in rasa, ruksa in guna, usna in veerya.
cures vrana, meha, kama netra mukhodbhuta ruja, kandu

According to *Dhanwantri Nighantu*, this drug is being effectively used in treating ulcers, diabetic disorders, pain and itching in the ear, eyes and mouth. Some of the important formulations in which *daaru-haridra* is an ingredient is *Manjishtidi kasaya* which is used for diabetic disorders, *Jyoti taila* for wounds and ulcers, and *khadira arista (Bhaisajya ratnavali)* for skin diseases. There are various anjana preparations prepared using *daaru-haridra* which is recommended for eye disorders.

In Ayurveda texts, there are nearly 22 references for 'daaru haridra', 7 references for 'daaru nisa' and around 200 references for 'daarvi'.

In the community of Ayurveda physicians, the botanical identification of the plant *Daaru-haridra* varies in different parts of India. The three species of *Berberis* viz *B. lyceum*, *B. aristata*, *B. asiatica* are regarded as *Daaru-haridra* according to experts of Ayurveda in North India. In South India, *Coscinium fenestratum*, a woody creeper having yellow colored stems is used as *Daaru-haridra*. In the last hundred years, nine authors have attempted to correlate *Daaru-haridra* to various botanical candidates, namely; 1). *Berberis aristata* DC. 2). *Berberis asiatica* Roxb. 3). *Berberis lycium* Royle, 4). *Morinda umbellata* L., 5). *Coscinium fenestratum* (Gaertn.) Coleb

One of the reasons relating to the controversy in

identification of *daaru-haridra* is based on similarity in appearance of yellowish stem of correlated species as mentioned earlier.



Morinda umbellata is being used as an adulterant because of deep yellow colouration of its stem. In South India, *Maramanjil*, *Coscinium fenestratum*, is being used clinically as *Daaru-haridra*. However, this cannot be considered as the original *Daaru-haridra* because the features mentioned in Ayurvedic texts does not support the morphological features of this species.

Considering the efficacy of the species, one may consider *Coscinium fenestratum* as a better alternative considering its history of clinical usage. This has led to rapid decline of the population due to unsustainable harvest, slow reproductive propagation due to inherent dioecious nature. Another species, *Berberis aristata* is also threatened due to unscientific method of harvest and over-exploitation thus leading to rapid decline in its population.

It is high time to find a better mechanism to propagate and grow these species adequately instead of depending on few wild populations.

Author is Senior Ayurveda Physician at FRLHT. Email id: venu.gopal@frlht.org. Further reading: *Medplant*, Volume 1, issue 2&3 <http://envis.frlht.org>

Simple remedies from Ashtanga Hridayam, Chiktsastana 19:37:

(Daaru haridra - Roots)

- For skin disorders like itching, allergic rashes, scabies.
Take 20g each of the following bark- *Daaru haridra*, *khadira (Acacia catechu)* and *Nimba (Neem)*. Add 1 litre of water. Reduce to ¼ by heating. Then again reduce to 120 ml.
- Duration: 14 days course. Take this decoction twice daily. (1-0-1); Empty stomach in the early morning and in the evening before dinner.

Decoction of *Daaru-haridra* mixed with honey should be taken followed by intake of rice water, in case of leucorrhoea.

Cooled decoction mixed with honey can be taken to cure jaundice. This is taken in the morning. Decoction is used in case of fever.

Inputs: Shilpa Naveen, Research Officer, FRLHT

Inventories on Medicinal Plants used in Indian Systems of Medicine

(Encyclopedia on Indian Medicinal Plants series)

Tabassum I.F. Shariff

1. CD on *Dravya Guna Shastra*:

Dravya Guna Shastra or *Ayurvedic Materia Medica* CD contains comprehensive information about 370 plants recommended for B.A.M.S syllabus. 2300 *sanskrit slokas* with their translation in English, 800 plant images, botanical correlation of Sanskrit names. It also includes classical method of understanding medicinal plants, plant nomenclature, identification, properties and usages.



This CD contains three major sections about *Namagyan*, *Rupa-gyana* & *Guna-gyana* i.e. plant identification, properties and usages. It has complete information of 620 plants derived from 12,870 references of *Charaka*. 1700 formulations and 600 plant images. It includes detailed information on plant classification, botanical information, distribution, morphology and propagation information on selected plants. Another important feature of this CD are bilingual display, a very user-friendly search facility, a detailed glossary of around 3000 Sanskrit words.

6. Comprehensive Inventory of Plants in Ayurveda

A database that gives user a comprehensive inventory of bibliographic references of classical texts of Ayurveda, including the specific chapter/s and verse, for the Sanskrit names of plant entities included in the inventory. This is based on a thorough review and analysis of 23 publications, based on the interpretations of eminent botanists and Ayurvedic scholars, over the last century.

In addition to the nomenclature correlations between the botanical and Sanskrit names of plant entities obtained from these 23 publications, a rigorous review of 20 primary reference texts of Ayurveda, ranging from *Caraka samhita* (1500 BC-400 AD) to *Saligrama nighantu* of (1896), has also been undertaken in order to establish authenticity of the Sanskrit names of plants having references in these classical texts.

About the author: Research Officer, FRLHT

2. CD on Medicinal plants of Siddha

This CD contains 500 plants recommended for B.S.M.S. syllabus. It is a repository of 33,350 Tamil names correlated to 1600 plants with 1000 formulations and 1000 plants images. This includes Tamil reference *slokas/padas* explaining the properties and usages of plants, simple remedies and formulation information.

3. CD on Medicinal plants in Unani

This CD contains information on 307 plants (including the 275 plants recommended for B.U.M.S. curriculum) in Unani system of medicine, with related information compiled from various literatures, 720 plant images and 650 unani formulations including botanical information and pharmaceutical data.



4. CD on Medicinal plants in Homoeopathy

This CD contains information related to 320 medicinal plants used in Homoeopathy. It also has 375 plant images and 250 plants species with proven clinical information from popular homoeopathy scientists. It also covers more than 300 clinical symptoms and also 100 popular Primary Health Care medications.

5. Plants of Caraka Samhita

Caraka samhita (1500 BC-400 AD) is the oldest available classical text of Ayurveda and even today it forms the foundation for the medical practice by thousands of physicians and scientists of Indian system of medicine.



(Cont. from Page - 12)

Herbarium Technique Training Programme

The goal of FRLH is to make significant contribution towards creating awareness about the diversity of medicinal plants and their conservation status. Thus act as a vehicle to promote

medicinal plant conservation and go a long way to help revive our health care traditions. Several training programs and workshop have been conducted for high school students, teachers, lecturers, students of pre-university, graduation and post graduation, ISM practitioners on need basis. Usually a 15 member team is given training and interested institutions or groups may write to:

Assistant Director

FRLH (Bio-Cultural Herbarium & Repository of Raw Drugs)

Foundation for Revitalisation of Local Health Traditions No.

74/2, Jarakbande Kaval, Post Attur, Via Yelahanka Bangalore.

560 106, Karnataka, INDIA. Phone: + 91 80 2856

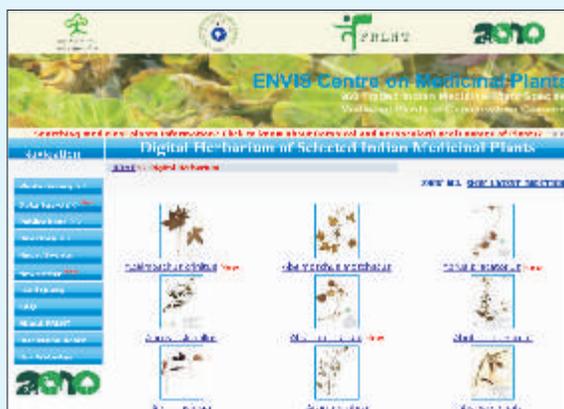
8005/8000/8001 Fax: + 91 802856 5873

email: herbarium@frlht.org, k.ravikumar@frlht.org

http://www.frlht.org/dept_herb.php

Just double click: www.envis.frlht.org

Explore a well referenced, unique one-stop-information house on medicinal plants of India. This exclusively website gives information on conservation concern species, traded species, latest reports/publications/ directories. User friendly search, enables us to access range of information related to botanical and local names correlations, view digital atlas and digital herbarium! Down load free Medplant e-version newsletter. Browse for more.....



What's in News?

- 28th May - 2nd June, 2009: Reorientation Training Programme on "Knowledge Base of Medicinal Plants" - a contemporary approach to understand species recommended for B.A.M.S. syllabus was designed and conducted by FRLHT and program supported by Dept of AYUSH, Government of India.

- 17th and 18th August 2009: Teachers Training workshop- A –Day–out with Neighbourhood Medicinal Plants was held at FRLHT and KV –CRPF, Bangalore. 50 biology teachers from Kendriya Vidyalaya Sangathan, Bangalore region took part in the workshop. This was supported by Kendriya Vidyalaya Sangathan, Bangalore Region.

- October –November 2009: Capacity Building Training for the Front-line Staff of SFD, on Identification and Management of Wild Medicinal Plant Resources. Course designed and conducted by: FRLHT, Bangalore; Program supported by: National Medicinal Plants Board, New Delhi. Four trainings were conducted viz Oct 2009, Venue: Forest Training School, Jaipur; Organized by: Rajasthan State Forest Department and Nov 2009, Venue: Organized by: Gujarat State Forest Department.

- 8th December 2009: A one day workshop on Neighbourhood Medicinal Plants of Bangalore city was designed and conducted by FRLHT for 60 underprivileged middle to high school students from Azim Premji Foundation, Bangalore.

- 29th December 2009: A one day workshop on Medicinal Plants and Traditional Knowledge for 45 Post Graduate Teachers (Biology), All India In-service Course, Kendriya Vidyalaya Sangathan was designed and conducted at FRLHT, Bangalore. This was supported by Kendriya Vidyalaya Sangathan, Bangalore Region.

- 12th January 2010: One day workshop on Neighbourhood Medicinal Plants of Bangalore City was designed and conducted by FRLHT for Bharatiya Vidyapet Bhavan's Nagarjuna Pre-University College, Bangalore. Nearly 50 second year pre-university students along with teaching faculties were sensitized on medicinal plants conservation and Traditional Knowledge.

- Initiated, "Green Ambassador Competition 2010" for Kendriya Vidyalaya Sangathan, Bangalore Region. Trained teachers and green club students have taken part actively. Results will be announced on the occasion of World Environment Day, June 5th 2010.



2010 International Year of Biodiversity

Biodiversity is Life Biodiversity is Our Life

Perhaps it would not be too much of an exaggeration to say that you are an integral part of nature; and your fate is inextricably bound with biodiversity, the huge variety of a range of other animals and plants-, the places they live and their surrounding environments, all over the world.

You constantly rely on this diversity of life to provide you with the food, fuel, medicine and many other essentials you simply cannot live without. Yet this rich diversity is being lost at a greatly accelerated rate because of various human activities. This impoverishes us all and weakens the ability of the living systems, on which we so completely depend, to resist growing threats such as climate change.

The United Nations proclaimed 2010 to be the International Year of Biodiversity, and people all over the world are working hard to safeguard and preserve this irreplaceable natural wealth and reduce biodiversity loss. This is vital for current and future human wellbeing. We need to do more. And now is the time to act.

The International Year of Biodiversity is a unique opportunity to increase understanding of the vital role that biodiversity plays in sustaining life on Earth.

We welcome our readers to contribute material in the website <http://www.cbd.int/2010/about/> related to these aspects:



Guide for Plant Lovers

"Photo guide to selected medicinal plants of Karnataka" published by FRLHT, Bangalore. Sponsored by: MoEF, GoI.

FRLH team has brought out illustrated field guide on 100 common medicinal plants of

Karnataka. It is for students, users of medicinal plants and any plant lovers. This book has more than 200 pictures with description.

Interested individuals may contact email id: medplan@frlht.org



Awards and Recognitions

- Citizen Extra Ordinaire - 2007, by Rotary Club of Bangalore for traditional medicine and environment consciousness.
- Anchor Better Interiors Excellence Award - 2007, for gardening and landscaping.
- Cultural Stewardship - 2003, the Rosenthal Centre for Complementary & Alternative Medicine, of the Medical School in Columbia University, New York.
- Equator Initiative Prize, United Nations - 2002, Medicinal Plants Program for linking conservation to livelihood needs.
- Norman Borlaug Award - 1998, contributions to the conservation of medicinal plants.

Neighbourhood Medicinal Plants of Bangalore CDROM for High School Students



Now, Bangalore city students can use the new CDROM, to explore your fascinating plant world.

Experience the richness of plant diversity in your traditions, life style and environ. Share with us your interesting and enriching learnings in a creative way (such as poems, essays, paintings etc. Best expressions will be published in our website www.envis.frlht.org.

E-mail: envis@frlht.org or send your entries by post.

We invite readers to send their responses/views/features of interest etc. through e-mail: envis@frlht.org (Please note: Articles for subsequent issues should not exceed more than 1000 words. It can be accompanied with images in .jpg format)

For more information contact:
The Co-ordinator,
ENVIS Centre on Medicinal Plants

Foundation for Revitalisation of Local Health Traditions
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www.frlht.org



2010 International Year of Biodiversity

Biodiversity is Life

Biodiversity is Our Life