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Approaches and policy's for medicinal plants conservation

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Abstract
Medicinal plant conservation is challenging, since the taxa occur during a wide selection of habitats and geographic regions. Their conservation threats and supreme use are diverse and users aren't only local rural communities but also distant urban citizens. *Ex situ* conservation remains the most remit and area of experience of botanic gardens. *In situ* conservation is the preferable methodology, since *ex situ* conservation tends to take place outside the range state of the target species. The preservation of species in place offers all the benefits of allowing survival to act, which can't be recreated *ex situ*. A policy trend positively linking biodiversity conservation by CBD, WTO,TRIPS, UNCTAD Bio Trade Initiative, MEA, Doha Declaration, GSPC,WHO, CITES with human development is gaining momentum and people's access rights to natural resources necessary for his or her survival have improved with policy provisions.. In India a unique and pioneering program for conservation of wild medicinal plants has been initiated and it has involved establishment of a network of MPCA focused on conservation of prioritized wild medicinal plants. Seed banking was a vital backup to other conservation methodologies, and one that should be supported and expanded for medicinal plants.

Keywords: medicinal plants, conservation, approaches, policies, India, status

Introduction
Interest and support for the conservation and development of medicinal plants is increasing altogether parts of the planet. This is often due, in part, to a growing recognition given to the role of medicinal plants within the provision of culturally relevant and affordable health care in creating sustainable livelihoods and within the vital conservation of biodiversity. This has also drawn the eye of the planet community towards the necessity for creating mechanisms to make sure sustained development of the world and to permit sharing of data between countries, organizations and agencies. Medicinal plant conservation is challenging, since the taxa occur during a wide selection of habitats and geographic regions. Their conservation threats and ultimate use are diverse and users are not only local rural communities but also far away urban citizens. However, it is widely agreed that the conservation of medicinal plants can be achieved through an integrated approach balancing *in situ* and *ex situ* conservation strategies. Medicinal plant conservation must therefore operate within several spheres; drawing together disparate groups and mutually acknowledging different take holder interests in order to succeed.

As recognised by the CBD, *in situ* conservation is the preferable methodology, since *ex situ* conservation tends to take place outside the range state of the target species. The preservation of species in place offers all the benefits of allowing survival to act, which can't be recreated *ex situ*. Unless plants can be conserved in their natural habitats, in variable breeding populations, they run the risk of extinction.

Ex situ conservation remains the main remit and area of expertise of botanic gardens. It provides an important 'insurance' against the loss of plant genetic resources, with a key role to play in terms of preservation and species re-introduction programmes, education and research.

The policy context
A policy trend positively linking biodiversity conservation with human development is gaining momentum and people's access rights to natural resources necessary for their survival have improved with policy provisions.

The Convention on Biological Diversity (CBD) was ratified in 1992 at the Rio Earth Summit. The 190 Parties have agreed to plan to protect biodiversity, develop sustainably and engage within the equitable sharing of benefits from the utilization of genetic resources.

The conservation of biodiversity is acknowledged because the cornerstone of sustainable development. The World Trade Organisation's (WTO) agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), 1994, sets out how to deal with the commercial use of traditional knowledge and genetic material bythose other than the communities or countries where these originate, especially when these are the subject of patent applications. The UNCTAD Bio Trade Initiative (launched in 1996) promotes the sustainable use of goods and services derived from biodiversity, in support of the objectives of the CBD. The Millennium Ecosystem Assessment (MEA) assessed the consequences of ecosystem change on human well-being, gathering data from2001 to 2005 and providing a scientific appraisal of the condition and trends in the world's ecosystems and the services they provide, as well as the scientific basis for action to conserve and use them sustainably. The Doha Declaration of 2001 aimed to make sure that the TRIPS agreement and the CBD support each other "allowing for the optimal use of the world's resources in accordance with the objective of sustainable development, seeking both to protect and preserve the environment and to enhance the means for doing so in a manner consistent with their respective needs and concerns at different levels of economic development".

In 2002 the CBD adopted the Global Strategy for Plant Conservation (GSPC), which specifies 16 outcome orientated targets for delivery by 2010. The 2002 World Summit on Sustainable Development aimed to promote a global commitment to sustainable development, improving the lives of the world's poorest people as well as reversing the continued degradation of the global environment. The WHO launched their Traditional Medicine Strategy in 2002, discussing the role of traditional medicine in healthcare systems. In 2004, the Addis Ababa Principles and Guidelines to the CBD detailed 14 interdependent practical principles and operational guidelines that govern the uses of components of biodiversity to ensure the sustainability of such use. Also in 2004, a new paragraph was added to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Resolution Conf.8.3 stating that the Conference of the Parties recognizes that implementation of CITES listing decisions should take into account potential impacts on the livelihoods of the poor.

Access and benefit sharing (ABS) one of the three fundamental objectives of the CBD is to promote the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources. One way of doing this is by confirming the sovereign rights of the State over its biological resources. The bio prospecting of plants for potential new drugs raises issues about the protection of traditional knowledge and the mechanisms to ensure that indigenous peoples benefit from uses of their resources.

Cultivation versus wild harvest

Cultivation has long been suggested as a possible mitigation to the unsustainable wild harvest of medicinal plants, simultaneously taking the pressure off wild stock whilst boosting commerce. Along an agronomic model, modern methods of plant breeding, propagation and post-harvest processing techniques allow medicinal plant products to be engineered to a consistent and high standard, infinitely more appropriate for standardized pharmaceutical use. The cultivation, management and enrichment planting of high value plants is therefore an important strategy to meet consumer demands and reduce the impacts of markets on biodiversity. However, cultivation often requires major inputs for a far-off return during a fluctuating market characterized by 'fads'. Though several medicinal plants are cultivated on a large scale (*Arnica montana, Hamamelis virginiana, Panaxquinque folius* and *Catharanthus roseus etc.*) it is not economically feasible to commercially cultivate all of the medicinal plants that are threatened in the wild. (It should be noted that, despite cultivation, several of these species were also considered as priorities for further conservation attention in the wild). There is little incentive to bring into cultivation species that are required in relatively small volumes, are slow growing, are believed to be more potent in their wild form or donot command sufficiently high prices. Moreover, there are social, economic and ecological benefits to wild harvest. As mentioned, since wild collection is mostly carried call at low-wage countries and by low-income, underprivileged groups. It's a chance for the poorest of individuals to urge at least some income, despite having no land. Wild harvest also gives an economic value to ecosystems and habitats and thus provides an incentive for the protection of something much larger than simply the medicinal plant. Though the consequences of collecting activity are still very little understood, the involvement of local people in sustainable management practices increases both their desire and ability to guard wild populations from over-exploitation. Of course, the assumption here is that stocks are sufficient, demand will remain constant and the structures and dynamics within local communities will remain stable. It should be noted that both large-scale cultivation and unsustainable wild harvest lead to genetic erosion. When cultivated, artificial changes (to intensify the concentration of certain compounds) often occur very quickly, unlike in nature. In the short term the specified results are achieved but, in terms of genetic diversity, there could also be future negative consequences. It's a various gene pools that contribute to the power of species or populations to take care of resistance to diseases and to adapt to a changing climate. Environmental conditions at every level are constantly changing, and only diversity can make sure that some individuals are going to be ready to adapt to these changes.

CITES and medicinal plants

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) provides varying degrees of protection to more than 33,000 plant species. Of these, about 240 are medicinal (Schippmann, 2001) even though only approximately 30 have been listed specifically because of concern over their trade as medicine. The intention of CITES is to promote a sustainable trade in listed species. CITES regulates international trade between signatory countries. It is not applicable to domestic or non-signatory traffic. Monitoring of the trade under the terms and conditions of the Convention is complex and only partially successful. It is thought that an enormous amount of trade in medicinal plants goes unrecorded and unregulated, for example that within China or between Nepal and India. Even trade movements covered by CITES are poorly understood, hampered by identification problems, under-resourced enforcement and in consistent national interpretations of the international statute. Most medicinal plant species are not traded under their scientific name, and come in a variety of parts and derivatives. *Aquilaria malaccensis*, for example, has atleast 50 trade names (Lange and Schippmann, 1999) [8]; an

import of woodchips can be listed as 'bark' with no species name. However, CITES is an important mechanism for trade regulation and to highlight critical issues. Botanic gardens can be involved in the success of CITES in a number of ways.

The IUCN Red List of Threatened Species

Policy frameworks and legislation are informed by essential data like the endangerment assessments made by the Species Survival Commission (SSC) of the IUCN, which produces a Red List of Threatened Species. Employing a network of thousands of scientists the Red List provides taxonomic, conservation status and distribution information on globally evaluated species consistent with specific categories and criteria. It is essentially a framework for classifying species according to their extinction risk. So far, almost 40,000 species are assessed, of which some 12,000 are plants. It's difficult to specify what proportion of threatened medicinal plant species have been evaluated using the IUCN Red List categories and criteria but it is generally recognised to be a low proportion.

Status of medicinal plant conservation in India

Recognizing medicinal plants importance, the Government of India established the Department of Indian System of Medicine and Homoeopathy, and more recently the Medicinal Plants Board to develop, promote and regulate the world for maximizing the advantages to the people also on ensure sustainable growth. Medicinal plants are identified together of the thrust areas by the Ministry and different programmes are initiated for conservation of medicinal plants found within the forests and protected areas also as cultivation of those plants within the degraded forest areas.

In India a unique and pioneering program for conservation of untamed medicinal plants has been initiated since 1993. It has involved establishment of a network of Medicinal Plant Conservation Areas (MPCAs) focused on conservation of prioritized wild medicinal plants occurring in several regions of the country. The Foundation for Revitalisation of Local Health Traditions (FRLHT) which has been supported as a Centre of Excellence on Medicinal Plants and Traditional Knowledgeby Ministry of Environment & Forests, since 2002, has been coordinating the establishment of this network of conservation areas together with the concerned state forest departments. Thus far a complete of 108 such MPCAs are established across 12 states (Anon, 2012) [1] for *in situ* conservation.

Table 1: Red Listed (Near threatened and above) medicinal plants list (Based on IUCN Red List Categories and Criteria)

S. No	Botanical names	Status
1	*Abelmoschus moschatus* Medik.	NT
2	*Abies densa* W.Griff . ex Parker	NT
3	*Abrus precatorius* L.	NT
4	*Aconitum balfourii* Stapf	VU
5	*Aconitum bisma* (Buch.-Ham.) Rapaics	EN
6	*Aconitum chasmanthum* Stapf ex Holmes	CR
7	*Aconitum deinorrhizum* Stapf	EN
8	*Aconitum ferox* Wall. ex Seringe	EN
9	*Aconitum heterophyllum* Wall. Ex Royle	CR
10	*Aconitum spicatum* (Bruhl) Stapf	EN
11	*Aconitum violaceum* Jacq. ex Stapf	VU
12	*Acorus calamus* L.	EN
13	*Adenia hondala* (Gaertn.) W.J.deWilde	VU
14	*Adhatoda beddomei* C. B. Clarke	CR
15	*Aegle marmelos* (L.) Corr.	VU
16	*Alectra chitrakutensis* (Rau) Prasad & Dixit	CR
17	*Allium stracheyi* Baker	VU
18	*Alpinia calcarata* Roscoe	EN
19	*Amentotaxus assamica* D.K.Ferguson	CR
20	*Amorphophallus commutatus* (Schott) Engl.	VU
21	*Amorphophallus paeoniifolius* (Dennst.) Nicolson	VU
22	*Amorphophallus sylvaticus* (Roxb.) Kunth	VU
23	*Ampelocissus araneosa* (Dalz. & Gibson) Planch.	VU
24	*Ampelocissus barbata* (Wall.) Planch.	EN
25	*Ampelocissus indica* (L.) Planch.	EN
26	*Andrographis paniculata* (Burm.f.)Wall. ex Nees	VU
27	*Angelica glauca* Edgew.	EN
28	*Angiopteris evecta (*Forst.) Hoff m.	EN
29	*Anodendron paniculatum* A.DC.	EN
30	*Aphanamixis polystachya* (Wall.)Parker	VU
31	*Aquilaria malaccensis* Lam.	CR
32	*Arisaema tortuosum* Schott	VU
33	*Aristolochia indica* L.	NT
34	*Aristolochia tagala* Cham	VU
35	*Arnebia benthami* (Wall. ex G.Don) Johns	CR
36	*Arnebia euchroma* (Royle) John.	CR
37	*Artemisia maritima* L.	VU
38	*Artocarpus hirsutus* Lam.	VU
39	*Asparagus racemosus* Willd.	EN
40	*Asparagus rottleri* Baker	EX

41	*Atropa acuminata* Royle ex Lindl.	CR
42	*Balanophora involucrata* Hook.f.	EN
43	*Baliospermum montanum* (Willd.) Mull.Arg.	VU
44	*Barleria acanthoides*	VU
45	*Berberis aristata* DC.	VU
46	*Bergenia ciliata* (Haw.) Sternb.	VU
47	*Bergenia stracheyi* (Hook.f. & Thoms.) Engl.	VU
48	*Betula utilis* D.Don	CR
49	*Blepharis sindica* Stocks ex T.Anders	VU
50	*Blepharispermum subsessile* DC.	EN
51	*Boswellia ovalifoliolata* Bal. & Henry	EN
52	*Boswellia serrata* Roxb. ex Colebr.	EN
53	*Brucea mollis* Wall. ex Kurz	EN
54	*Buchanania lanzan* Spreng.	VU
55	*Bunium persicum* (Boiss.) Fedts.	EN
56	*Butea monosperma* var. *lutea* (Witt.) Maheshwari	EN
57	*Cadaba fruticosa* (L.) Druce	NT
58	*Caesalpinia digyna* Rottler	VU
59	*Calligonum polygonoides* L.	EN
60	*Calophyllum apetalum* Willd.	VU
61	*Canarium strictum* Roxb.	VU
62	*Capparis moonii* Wight	NT
63	*Cayratia pedata* (Lam.) Juss. ex *Gagnep. var. glabra* Gamble	EN
64	*Celastrus paniculatus* Willd.	EN
65	*Cephalotaxus griffi thii* Hook.f.	EN
66	*Cerbera odollam* Gaertn.	VU
67	*Ceropegia bulbosa* Roxb.	VU
68	*Chlorophytum arundinaceum* Baker	EN
69	*Chlorophytum borivillianum* Sant. & Fernandes	CR
70	*Chlorophytum tuberosum* Baker	VU
71	*Chonemorpha fragrans* (Moon) Alston	EN
72	*Cibotium barometz* Link.	EN
73	*Cinnamomum bejolghota* (Buch.-Ham.) Sweet	VU
74	*Cinnamomum cecidodaphne* Meissn.	EN
75	*Cinnamomum Macrocarpum* Hook.f.	VU
76	*Cinnamomum sulphuratum* Nees	VU
77	*Cinnamomum tamala* (Buch.-Ham.) Nees	VU
78	*Cinnamomum wightii* Meisn.	EN
79	*Citrullus colocynthis* (L.) Kuntze	VU
80	*Citrus macroptera* Montr. *var.annamensis* Tanaka	EN
81	*Clerodendrum serratum* (L.) Moon	EN
82	*Cochlospermum religiosum* DC.	CR
83	*Colchicum luteum* Baker	VU
84	*Commiphora wightii* (Arn.) Bhandari	CR
85	*Coptis teeta* Wall.	EN
86	*Cordia macleodii* (Griff .) Hook.f. & Thoms.	EN
87	*Corollacarpus epigaeus* (Rottler &Willd.) Clarke	EN
88	*Coscinium fenestratum* (Gaertn.)Coleb.	CR
89	*Costus speciosus* (J.Koenig ex Retz.)Sm.	VU
90	*Crateva magna* (Lour.) DC.	VU
91	*Curcuma angustifolia* Roxb.	VU
92	*Curcuma pseudomontana* Graham	VU
93	*Curcuma zedoaria (*Christ.) Roscoe	VU
94	*Cycas beddomei* Dyer	CR
95	*Cycas circinalis* L.	CR
96	*Dactylorhiza hatagirea* (D.Don)Soo	CR
97	*Datisca cannabina* L.	EN
98	*Decalepis hamiltonii* Wight & Arn.	EN
99	*Dendrobium nobile* Lindl.	EN
100	*Desmodium motorium* (Houtt.) Merr.	VU
101	*Didymocarpus pedicillata* R. Br.	EN
102	*Dioscorea bulbifera* L.	VU
103	*Dioscorea deltoidea* Wall. Ex Griseli	EN
104	*Dioscorea hispida* Dennst.	VU
105	*Dioscorea prazeri* Prain & Burkill	EN
106	*Diospyros candolleana* Wight	VU
107	*Diospyros paniculata* Dalz.	VU
108	*Dipcadi ursulae* Blatter	EN

109	*Dipterocarpus indicus* Bedd.	EN
110	*Drosera burmannii* Vahl	EN
111	*Drosera indica* L.	EN
112	*Drosera peltata* J.E.Sm. ex Willd.	EN
113	*Dysoxylum malabaricum* Bedd. ex Hiern	EN
114	*Elaeocarpus sphaericus (*Gaertn.)K.Schum.	VU
115	*Embelia ribes* Burm.f.	CR
116	*Embelia tsjeriam-cottam* (Roem. & Schult.) A. DC.	VU
117	*Entada pursaetha* DC.	EN
118	*Ephedra foliata*	EN
119	*Ephedra gerardiana* Wall. ex Stapf.	EN
120	*Eremostachys superba* Royle ex Benth.	VU
121	*Eulophia cullenii (*Wight) Blume	CR
122	*Eulophia herbacea* Lindl.	EN
123	*Eulophia nuda* Lindl.	EN
124	*Eulophia ochreata*	CR
125	*Eulophia ramentacea* Wight	EN
126	*Euphorbia fusiformis* Buch.-Ham.	VU
127	*Fagonia cretia* L.	VU
128	*Ferula jaeschkeana* Vatke	VU
129	*Flickingeria fugax* (Rchb.f.)Seodemf.	EN
130	*Fritillaria cirrhosa* D.Don	EN
131	*Fritillaria roylei* Hook.	EN
132	*Fumaria indica* Pugsley	EN
133	*Garcinia gummi-gutta* (L.) Robson	NT
134	*Garcinia indica* (Thouars) Choisy	VU
135	*Garcinia morella* (Gaertn.) Desr.	VU
136	*Garcinia pedunculata* Roxb.	EN
137	*Garcinia travancorica* Bedd.	EN
138	*Garcinia xanthochymus* Hook.f.	VU
139	*Gardenia gummifera* L.f.	VU
140	*Gardenia resinifera* Roth	NT
141	*Gentiana kurroo* Royle	CR
142	*Gentiana quadrifaria* Bl.	VU
143	*Gloriosa superba* L.	EN
144	*Glycosmis macrocarpa* Wight	VU
145	*Gnetum ula* Brongn.	VU
146	*Gymnadenia orchides* Lindl.	VU
147	*Gymnema khandalense* Santapau	EN
148	*Gymnema montanum* (Roxb.)Hook.f.	EN
149	*Gymnema sylvestre* R.Br.	EN
150	*Gymnocladus assamicus* Kanjilal	CR
151	*Gynocardia odorata* R.Br.	EN
152	*Habenaria intermedia* D.Don	EN
153	*Hedychium coronarium* Koenig	VU
154	*Heliotropium keralense* Sivar. &Manilal	CR
155	*Helminthostachys zeylanica* (L.)*Hook.*	CR
156	*Heracleum candolleanum (*Wight& Arn.) Gamble	VU
157	*Heracleum lanatum* Michx.	VU
158	*Hildegardia populifolia* (Roxb.)Schott & Endl.	VU
159	*Hippophae rhamnoides* L.	VU
160	*Hippophae salicifolia* D.Don	NT
161	*Holostemma ada-kodien* Schult.	CR
162	*Homalomena aromatica* (Roxb.)Schott	EN
163	*Humboldtia vahliana* Wight	EN
164	*Hydnocarpus alpina* Wight	VU
165	*Hydnocarpus kurzii* (King.) Warb.	VU
166	*Hydnocarpus macrocarpa (*Bedd.)Warb.	EN
167	*Hydnocarpus pentandra* (Buch.-Ham.) Oken	VU
168	*Hyoscyamus niger* L.	EN
169	*Hypericum perforatum* L.	VU
170	*Hyssopus offi cinalis* L.	VU
171	*Illicium griffi thii* Hook.f. & Thoms.	CR
172	*Iphigenia stellata* Blatter	EN
173	*Ipomoea mauritiana* Jacq.	NT
174	*Janakia arayalpathra* J.Joseph & V.Chandras.	CR
175	*Juniperus polycarpos* C. Koch.	EN
176	*Jurinea dolomiaea* Boiss.	EN

177	*Kingiodendron pinnatum* (Roxb. Ex DC.) Harms	VU
178	*Knema attenuata* (Hook.f. & Thoms.) Warb.	NT
179	*Lamprachaenium microcephalum* Benth.	EN
180	*Lasia spinosa* (L.) Thw.	EN
181	*Leptadenia reticulata* Wt. & Arn.	EN
182	*Lilium polyphyllum* D.Don ex Royle	CR
183	*Limonia acidissima* L.	VU
184	*Litsea glutinosa* (Lour.) Robinson	CR
185	*Luffa echinata* Roxb.	EN
186	*Lumnitzera racemosa* Willd.	VU
187	*Lycopodiella cernua* (L.) Pichi-Sermolli	EN
188	*Madhuca insignis* (Radlk.) H.J.Lam.	EX
189	*Madhuca longifolia* (Koen.) Macbr.	VU
190	*Madhuca neriifolia* (Moon) H.J.Lam	VU
191	*Mahonia napaulensis* DC.	VU
192	*Malaxis muscifera* (Lindl.) Kuntze	CR
193	*Manilkara hexandra* (Roxb.)Dubard	EN
194	*Meconopis aculeata* Royle	EN
195	*Mesua ferrea* L.	EN
196	*Michelia champaca* L.	EN
197	*Michelia nilagirica* Zenk.	VU
198	*Morinda citrifolia L.*	VU
199	*Moringa concanensis* Nimmo ex Dalz. & Gibson	VU
200	*Mucuna monosperma* DC.	VU
201	*Mucuna pruriens* (L.) DC.	EN
202	*Mucuna gigantea* (Willd.) DC.	EN
203	*Myristica dactyloides* Gaertn.	VU
204	*Myristica malabarica* Lam.	VU
205	*Nardostachys grandifl ora* DC.	CR
206	*Naringi crenulata* (Roxb.) Nicolson	VU
207	*Nepenthes khasiana* Hook.f.	EN
208	*Nervilia aragoana* Gaud.	EN
209	*Nervilia prainiana* (King & Prantl) Scidenf.	NT
210	*Neurada procumbens* L.	EN
211	*Nilgirianthus ciliatus* (Nees)Bremek.	EN
212	*Nothapodytes nimmoniana* (Graham) Mabber.	EN
213	*Nypa fruticans* (Thunb.) Wurmb.	VU
214	*Ochreinauclea missionis* (Wall. Ex G. Don) Ridsdale	VU
215	*Ocimum gratissimum* L.	VU
216	*Olax nana* Wall.	VU
217	*Operculina turpethum* (L.) Silva *Manso =Merremia turpethum* (L.) Shah & Bhat	EN
218	*Ophioglossum reticulatum* L.	EN
219	*Oroxylum indicum* (L.) Vent.	EN
220	*Ougeinia oojeinensis* (Roxb.)Hochr.	EN
221	*Paederia foetida* L.	VU
222	*Panax* pseudoginseng Wall.	CR
223	*Panax wangianus* Sun	EN
224	*Paphiopedilum druryi* (Bedd.)Pfi tz.	CR
225	*Paris polyphylla* Sm.	EN
226	*Peganum harmalaL.*	VU
227	*Pericampylus glaucus* (Lam.) Merr.	VU
228	*Persea glaucescens* (Nees) Long	CR
229	*Persea macrantha* (Nees) Kosterm.	EN
230	*Peucedanum nagpurense* (C.B.Clarke) Prain	VU
231	*Phyllanthus emblica* L.	VU
232	*Phyllanthus indofi scheri* Benn.	VU
233	*Physochlaena praealta* (Walp.)Miers.	VU
234	*Picrorhiza kurrooa* Royle ex Benth.	CR
235	*Pimpinella tirupatiensis* Bal. & Subr.	EN
236	*Piper barberi G*amble	CR
237	*Piper betleoides* C.DC.	NT
238	*Piper boehmeriaefolium* Wall. ex C.DC.	VU
239	*Piper longum* L.	EN
240	*Piper mullesua* Buch.-Ham. Ex D.Don	VU
241	*Piper nigrum* L.	EN
242	*Piper pedicellatum C.DC.*	VU
243	*Piper peepuloides* Roxb.	VU

244	*Plectranthus barbatus* Andr.	EN
245	*Plectranthus nilgherricus* Benth.	EN
246	*Pleione maculata* (Lindl.) Lindl. &Paxton	EN
247	*Pluchea lanceolata* Oliver & Hiern.	NT
248	*Plumbago indica* L.	EN
249	*Plumbago zeylanica* L.	VU
250	*Podophyllum hexandrum* Royle	CR
251	*Polyalthia simiarum* (Buch.-Ham.)Hook.f & Thoms.	VU
252	*Polygonatum cirrhifolium* (Wall.)Royle	EN
253	*Polygonatum multifl orum* (L.) All.	VU
254	*Polygonatum verticillatum* (L.) All.	VU
255	*Pseudarthria viscida* (L.) Wight &Arn.	VU
256	*Psilotum nudum* (L.) P.Beauv.	CR
257	*Pterocarpus marsupium* Roxb.	CR
258	*Pterocarpus santalinus* L.f.	CR
259	*Pueraria tuberosa* (Roxb. ex Willd.)DC.	CR
260	*Rauvolfi a serpentina* (L.) Benth. exKurz	CR
261	*Rhaphidophora decursiva* (Roxb.)Sch.	EN
262	*Rhaphidophora pertusa* (Roxb.) Schott	VU
263	*Rheum emodi* Wall. ex Meissn.	EN
264	*Rheum moorcroftianum* Royle	EN
265	*Rheum nobile* Hook.f. & Thoms.	VU
266	*Rheum spiciforme* Royle	VU
267	*Rheum webbianum* Royle	VU
268	*Rhodiola heterodonta* (Hook.f. &Thoms.) Boriss	VU
269	*Rhododendron anthopogon* D.Don	EN
270	*Rhododendron campanulatum* D.Don	VU
271	*Rhodondendron lepidotum* Wall. ex D.Don	VU
272	*Roylea cinerea* (D. Don) Baillon	VU
273	*Rubia cordifolia* L.	VU
274	*Salacia oblonga* Wall. ex Wight &Arn.	VU
275	*Salacia reticulata* Wight	EN
276	*Salvadora oleoides* Decne	VU
277	*Salvadora persica* L.	VU
278	*Santalum album* L.	EN
279	*Saraca asoca* (Roxb.) W.J. de Wilde	CR
280	*Sarcostemma viminale* (L.) R.Br.	VU
281	*Saussurea costus* (Falc.) Lipsch.	CR
282	*Saussurea gossypiphora* D.Don	CR
283	*Saussurea obvallata* (DC.) Edgew.	CR
284	*Schrebera swietenioides* Roxb.	VU
285	*Scindapsus offi cinalis* (Roxb.) Schott	VU
286	*Semecarpus travancorica* Bedd.	EN
287	*Shorea robusta* Roxb. ex Gaertn.f.	NT
288	*Shorea tumbaggaia* Roxb.	CR
289	*Smilax zeylanica* L.	VU
290	*Smilax glabra* Roxb.	CR
291	*Sonneratia caseolaris* (L.) Engl.	EN
292	*Stemona tuberosa* Lour.	VU
293	*Sterculia urens* Roxb.	EN
294	*Stereospermum chelonoides* (L.f.)DC.	NT
295	*Stereospermum colais* (Dillwyn)Mabb.	EN
296	*Strychnos aenea* A.W.Hill	EN
297	*Strychnos colubrina* L.	EN
298	*Strychnos nux-vomica* L.	VU
299	*Strychnos potatorum* L.f.	VU
300	*Swertia chirayita* (Roxb. ex Flem.)Karst.	CR
301	*Swertia corymbosa* (Griseb.) Wight ex C.B.Clarke	VU
302	*Swertia lawii* (Wight ex C.B.Clarke)Burkill	EN
303	*Symplocos paniculata (*Thunb.)Miq.	VU
304	*Symplocos racemosa* Roxb.	CR
305	*Syzygium alternifolium* (Wight)Walp.	EN
306	*Syzygium travancoricum* Gamble	EN
307	*Tacca integrifolia* Ker-Gawl.	EN
308	*Tacca leontopetaloides* (L.) Kuntze	NT
309	*Taxus wallichiana* Zucc.	CR
310	*Tecomella undulata (*Sm.) Seem.	EN
311	*Terminalia arjuna* (Roxb. ex DC.)Wight & Arn.	VU

312	*Terminalia chebula* Retz.	VU
313	*Terminalia pallida* Brandis	EN
314	*Thalictrum dalzellii* Hook.	EN
315	*Thalictrum foliolosum* DC.	VU
316	*Tinospora sinensis* (Lour.) Merr.	VU
317	*Toona ciliata* M.J.Roem.	VU
318	*Tragia bicolor* Miq.	VU
319	*Tribulus rajasthanensis* Bhandari & Sharma	CR
320	*Trichopus zeylanicus Gaertn.subsp. travancoricus* (Bedd.) Burkill	EN
321	*Trichosanthes cucumerina* L.	NT
322	*Tropidia curculigoides* Lindl.	EN
323	*Tylophora indica* (Burm.*f.) Merr.*	VU
324	*Uraria picta (Jacq.) Desv. ex DC.*	VU
325	*Urginea indica* (Roxb.) Kunth	VU
326	*Urginea nagarjunae* Hemadri & Swahari	EN
327	*Utleria salicifolia* Bedd.	CR
328	*Valeriana hardwickii* Wall.	VU
329	*Valeriana jatamansi* Jones	VU
330	*Valeriana leschenaultii* DC.	CR
331	*Vateria indica* L.	VU
332	*Vateria macrocarpa* B.L. Gupta	CR
333	*Xylocarpus granatum* Koenig	EN
334	*Zanthoxylum armatum* DC.	EN
335	*Zanthoxylum rhetsa* (Roxb.) DC.	EN

Conclusion

Seed banking was an important backup to other conservation methodologies, and one that ought to be supported and expanded for medicinal plants specifically, since most efforts are directed to crops so far. Further, climate change science is popping its attention to thepredicted effects of temperature rise onindividual plant species. The alteration ofa species' environmental niche will in turnaffect whole ecosystems; habitats willshift and their composition change. The transfer of cultivation methodologies to farmers via training initiatives should be encouraged, as should the development of harvester and best practice horticultural knowledge shared between these.

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