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Impact of Indira Sagar Dam in the Eastern Ghats of Andhra Pradesh on the Floristic Wealth

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ABSTRACT

The aim of the study was to assess the impact of Indira Sagar dam on floral resources in Eastern Ghats region of India, using a primary data base on floristic diversity. During the floristic surveys, 245 species belonging to 204 genera under 81 families were recorded. The dominant family was Euphorbiaceae with 15 species and *Cassia* was the largest genus. Several species may face more pressure from exploitation as they provide a number of useful products of the project area. To compensate for the loss of various goods and services provided by the forests falling in the submergence area and to decrease pressure of the affected families on the forests, a biodiversity management plan is suggested in the light of prevailing socio-economic conditions.

Introduction:

Large dams are known to impact river systems by altering several key parameters including flow regimes and physical habitats, channel shape, sediment transport, water temperature, chemistry, and riparian vegetation (1). A dam is a barrier built across a river or stream to confine and utilize the flow of water for human purposes such as irrigation and generation of hydroelectricity. While dam construction is done with positive intentions in mind, their adverse impacts on elements of biodiversity are threatening to outweigh the positive objectives for which they are built (2). Globally, there are more than 45,000 large dams in over 150 countries (3) and it is estimated that another 1,500 or so are currently under construction, nearly 400 of which are over 60 meter high. Large dams have caused considerable environmental damages and a major cause for the decline biodiversity in recent decades (4). The submergence of forests due to hydroelectric projects can be a serious threat to the biodiversity of the region (5, 6). Besides this, these studies suggested several protection and conservation measures attributing benefits of the biodiversity. Moreover, the studies also highlighted for development and conservation of the medical plants existing in various regions particularly in and around project area.

Study area:

Indira Sagar project is located at 17° 25' 00" N 81° 63' 33" E on river Godavari near Ramayyapet village of Polavaram Mandal of West Godavari district in Andhra Pradesh. The project is multipurpose major terminal reservoir project on river Godavari for development of Irrigation, Hydropower and drinking water facilities to East Godavari, Vishakhapatnam, West Godavari and Krishna districts of Andhra Pradesh. The submergence area is one of the richest biodiversity regions with dense vegetation on hilly terrain with beautiful scenic environments. The topography of the hilly region is broad and flat at the summit. The hilly region is covered with dense forest along the slopes and it has characteristic barren tops which favor the growth of grasses, stunted trees and herbs with thick root stock growth. The study area has unique physiographic characteristics and natural resources support a range of vegetation with moist-deciduous forest, dry-deciduous forest (7), shrub land and forest plantations. The vegetation types in general are determined by climatic conditions, altitudinal variations, edaphic and biotic factors. The southern moist deciduous riverine forest is a climatic-climax type of vegetation stratified into three layers consisting of herbaceous, shrubby, tree growth. This is confined to an altitude of 500 – 1000 m above

mean sea level on well developed soil and abundant rainfall. Degraded forests are represented by thorny scrub resultant of the degradation of the natural forest because of biotic interference. Some of the areas identified under this category include the bald hill tops in reserved forest area. Forest blanks also appear amidst forest areas, mostly used for podu cultivation (Shifting cultivation) by the local tribal communities. Generally paddy, chillies, tobacco and corn crops are raised along the foot hills and flood plains, in this study area.

Materials and methods:

The intensive field surveys carried out in the submerged area of Indira Sagar dam during 2010-2012, covering premonsoon, monsoon and postmonsoon seasons. Specimens of flowering and non flowering vascular plants in quadruplicates were collected along with necessary field data. Collected specimens were made into herbarium as per the methods suggested by Jain and Rao (8). Species were critically examined and identified with the help of different floras like Flora of the Presidency of the Madras (9) and Flora of West Godavari district (10). The voucher specimens are deposited at the Botany Department Herbarium, Andhra University, Visakhapatnam.

Results and discussion:

Based on the floral survey conducted in the submergence area of the project, a total of 245 species belonging to 204 genera under 81 families (Table-1) were reported. Turkmen et al (11) enumerated 464 species from Karkamis dam reservoir in Turkey and 535 plant species found in hydroelectric project from Western Himalayan region (6). About 98.3% of the total vascular plants in the Indira Sagar dam submergnce area are angiosperms, followed by 1.7% pteridophytes. Genera and species ratio of the study area is 1:1.2. Out of 245 species, 4 species (1.7 %), 3 genera (1.5%) and 3 families (3.7%) are pteridophytes; 241 species, 201 genera and 78 families belong to angiosperms. Among the angiosperms, there were 199 species of dicotyledons representing 81.2 % and 42 species of monocotyledons comprising 17.1 %. The ratio of monocots to dicots among species is 1:4.73. Therefore, it is necessary to understand the distribution pattern and the conservation status of the species of submergence area in the adjoining area. That the dicot group of plants is the most dominant in the Western Himalayan region (6).

Habitat wise analysis of flora shows comparatively higher percentage of herbs (44.4%) followed by trees (25.7%), climbers (14.2%) and shrubs (13.8%), epiphytes and parasites (0.8% each). The dominant family is Euphorbiaceae represented by 15 species, followed by Poaceae (13), Fabaceae (12), Acanthaceae and Rubiaceae (11 species each), Asteraceae (9), Caesalpiniaceae (8), Lamiaceae (7), Amaranthaceae, Apocynaceae and Malvaceae (6 species each), 4 families have 5 species, 6 families have 4 species and 9 families have 3 species each while 16 families have 2 species and 37 families are represented by only single species. In Karkamis dam reservoir, Asteraceae, Fabaceae, Poaceae, Lamiaceae and Apiaceae are the dominant families (11). *Cassia* is the dominant genus with 5 species followed by *Phyllanthus* 4 species; *Dioscorea*, *Ficus*, *Sida*, *Solanum* and *Terminalia* 3 species each. The study area is one of the richest places for Rice and edible legumes genetic resources and medicinal plants (12).

The mode of livelihood of the local people affected by the project is predominately forest based agriculture and animal husbandry. The survey found that the people of this area derive a range of medicinal plants (Table 1) for various purposes. These are prepared with roots, barks, leaves and stems and used for fevers, stomachache, body pains, cuts, wounds, skin diseases and control of blood pressure etc. These species should be promoted for plantations considering their preferred microclimatic requirement, habitat protection in adjoining areas and their cultivation in nurseries, agricultural fields, arboretum and other vacant areas. Published information on the propagation techniques (both *in situ* and *ex situ*) and habitat preferences of these species is fairly readily available in the region (13).

The last two decades, degradation of the Eastern Ghats forests and its adverse impacts on the environment has attracted considerable attention (14, 15, 16) and developmental interventions such as construction of dams and mining have also been responsible for the loss of the forest resources. This study shows that impacts on the floral diversity in the project area can be primarily classified in terms of direct loss due to the submergence and indirect losses due to shift in anthropogenic pressure for the forest resources to the adjoining forests of the project area. The important floristic changes will take place in the irrigation canals and dam banks due to the changing environmental conditions when dam construction is complete and when the water levels rises.

Strategies for the improvement of floral resources:

The study identified the loss of plant species in the study area. Keeping the above aspects under consideration, the improvement of the status of vegetation cover in and around the project area. Social forestry programs particularly to develop natural plants species which come under rare and very rare category. Under regeneration of natural forest ecosystem, the species which are suitable to locate in the climatic conditions such as *Tectona grandis*, *Dalbergia sissoo* and *Terminalia arjuna* can be planted. Programs should be prepared for active involvement of tribal people in the re-growth and management of forests in the degraded forest areas and waste lands and in-turn to increase the productivity of the forests. Further, these programs significantly have contributed to the benefit

Table: 1. List of plant species in Indira Sagar dam.

S.No.	Name of the plant	Habit	Family	Vernacular Name
1	*Abrus precatorius* L.*	Climber	Fabaceae	Gurivinda
2	*Abutilon indicum* (L.) Sweet	Shrub	Malvaceae	Thuthura Benda
3	*Acacia leucophloea* (Roxb.) Willd.	Tree	Mimosaceae	Tella Thumma
4	*Acalypha alinifolia* Willd.	Herb	Euphorbiaceae	Kuppinta
5	*Acalypha indica* L.	Herb	Euphorbiaceae	Muripindi
6	*Achyranthes aspera* L.	Herb	Amaranthaceae	Dutchena
7	*Achyranthes bidentata* Bl.	Herb	Amaranthaceae	
8	*Adiantum incisum* Forsk.	Herb	Adiantaceae	Raja-Hamsa
9	*Adiantum lunulatum* Burm.f.	Herb	Adiantaceae	Raja-Hamsa
10	*Aerva lanata* (L.) Juss.ex Schult.	Herb	Amaranthaceae	Kondapindi
11	*Aerva sanguinolenta* (L.) Bl.	Herb	Amaranthaceae	Telaga Pindi
12	*Aganosma dichotoma* (Roth) K. Schum.	Climber	Apocynaceae	Pala Malle
13	*Ailanthes excels* Roxb.	Tree	Simaroubaceae	Pedamanu
14	*Alangium salvifoium* (L.f.) Wangerin	Tree	Alangiaceae	Udugu
15	*Albizia odoratissima* (L.f.) Benth.	Tree	Mimosaceae	Ganara
16	*Allophyllus cobbe* (L.) Raeusch.	Shrub	Sapindaceae	Guvva Gutti
17	*Alocasia decipiens* Schott	Herb	Araceae	Mankanda
18	*Alstonia venenata* R. Br.	Tree	Apocynaceae	Yedakulapala
19	*Ampelocissus latifolia* (Roxb.) Planch.*	Climber	Vitaceae	Bedasa Tivva
20	*Andrographis paniculata* (Burm.f.) Nees	Herb	Acanthaceae	Nelavemu
21	*Anisochilus carnosu s*(L.f.) Benth.	Herb	Lamiaceae	Karpuravalli
22	*Anogeissus latifolia* (DC.) Guill. & Perr.	Tree	Combretaceae	Sirimanu
23	*Antidesma ghaesembilla* Gaertn.	Tree	Euphorbiaceae	Pollai
24	*Apluda mutica* L.	Herb	Poaceae	
25	*Aponogeton natans* (L.) Engl.	Herb	Aponogetonaceae	Nava Dumpa
26	*Ardisia solanacea* Roxb.	Shrub	Myrsinaceae	Konda Mayur
27	*Argyreia nervosa* (Burm.f.) Boj.	Climber	Convolvulaceae	Samudrapala
28	*Aristida funiculata* (Trin. & Rupr.)	Herb	Poaceae	Parakagaddi
29	*Aristolochia indica* L.	Climber	Aristolochiaceae	Nalla Easwari
30	*Arundinella ciliata* (Roxb.) Miq.	Herb	Poaceae	Peepalu
31	*Arundanella setosa* Trin.	Herb	Poaceae	
32	*Asparagus racemosus* Willd.	Climber	Liliaceae	Pilliteegalu
33	*Bacopa monnieri* Wettst.	Herb	Scrophulariaceae	Jalabrahmi
34	*Baliospermum montanum* (Willd.) Muell.-Arg.	Herb	Euphorbiaceae	Nelajidi
35	*Bambusa arundinacea* (Retz.) Roxb.	Shrub	Poaceae	Veduru
36	*Barleria strigosa* Willd.	Shrub	Acanthaceae	Nilambaramu
37	*Bauhinia racemosa* Lam.*	Tree	Caesalpiniaceae	Are
38	*Bauhinia vahlii* Wt.& Arn.	Climber	Caesalpiniaceae	Adda
39	*Bidens pilosa* L.	Herb	Asteraceae	
40	*Blepharis maderaspatensis* (L.) Roth	Herb	Acanthaceae	

41	*Blepharis repens* (Vahl) Roth	Herb	Acanthaceae	
42	*Blumea mollis* (D. Don) Merr.	Herb	Asteraceae	
43	*Boerhavia diffusa* L.*	Herb	Nyctaginaceae	Atikamamidi
44	*Bombax ceiba* L.	Tree	Bombacaceae	Buruga
45	*Breynia vitis- idaea* (Burm.f.) Fischer	Shrub	Euphorbiaceae	Erra Balli
46	*Bridelia retusa* (L.) Spreng.	Tree	Euphorbiaceae	Anemu
47	*Buchanania lanzan* Spreng.*	Tree	Anacardiaceae	Jarumamidi
48	*Bulbostylis barbata* (Rottb.) Cl.	Herb	Cyperaceae	
49	*Byttneria herbacea* Roxb.	Herb	Sterculiaceae	
50	*Calotropis gigantean* (L.) R. Br.	Shrub	Asclepiadaceae	Jilledu
51	*Calycopteris floribunda* Lam.	Climber	Combretaceae	Bontha
52	*Canthium dicoccum* (Gaertn.) Teijsm. & Binn.	Tree	Rubiaceae	Alli
53	*Capparis zeylanica* L.*	Climber	Capparaceae	Atonda
54	*Cardiospermum halicacabum* L.	Climber	Sapindaceae	Budda Kakara
55	*Careya arborea* Roxb.	Tree	Barringtoniaceae	Kanapa
56	*Caryota urens* L.	Tree	Arecaceae	Jilugu
57	*Casearia elliptica* Roxb.	Tree	Flacourtiaceae	Giduguru
58	*Cassia absus* L.	Herb	Caesalpiniaceae	Chanupala Vittulu
59	*Cassia auriculata* L.	Shrub	Caesalpiniaceae	Tangedu
60	*Cassia fistula* L.	Tree	Caesalpiniaceae	Rela
61	*Cassia hirsute* L.	Shrub	Caesalpiniaceae	
62	*Cassia occidentalis* L.	Herb	Caesalpiniaceae	kasinta
63	*Chloris barbata* Sw.	Herb	Poaceae	Uppu Gaddi
64	*Chlorophytum tuberosum* (Roxb.) Baker	Herb	Liliaceae	
65	*Cissampelos pareira* L.	Climber	Menispermaceae	Shedsugndi
66	*Cleistanthus collinus* (Roxb.) Muell.- Arg.*	Tree	Euphorbiaceae	Vadisa
67	*Clematis gouriana* DC	Climber	Rananculaceae	Pedutivva
68	*Clematis smilacifolia* Wall.	Climber	Rananculaceae	Garrapu Teega
69	*Cleome viscosa* L.*	Herb	Capparaceae	Kukka-Vaminta
70	*Cocculus hirsutus* (L.) Diels	Climber	Menispermaceae	Dusara Tiga
71	*Colebrookea oppositifolia* J.E. Sm.	Shrub	Lamiaceae	Ritchu Rodda
72	*Colocasia esculenta* (L.) Schott. & Endl.	Herb	Araceae	Sari Kanda
73	*Commelina benghalensis* L.	Herb	Commolinaceae	Kodukalu
74	*Commelina erecta* L.	Herb	Commelinaceae	
75	*Cordia dichotoma* Forst.f.	Tree	Boraginaceae	Nakiri
76	*Costus speciosus* (Koen.) Sm.	Herb	Costaceae	Bogachika
77	*Crotalaria medicaginea* Lam.	Herb	Fabaceae	
78	*Crotalaria verrucosa* Wt. & Arn.	Herb	Fabaceae	Gili Gicha
79	*Croton banplandianum* Bail.	Herb	Euphorbiaceae	Galivana Mokka
80	*Cryptolepis buchanani* Roem. & Schult.	Climber	Periplocaceae	Adavi Palateega
81	*Curculigo orchiolides* Gaertn.	Herb	Hypoxidaceae	Nakku Dumpa
82	*Cuscuta reflexa* Roxb.	Herb	Cuscutaceae	Shitamma Pogunulu

83	*Cyanotis cristata* (L.) Don	Herb	Commelinaceae	Gollagundi
84	*Cymbidium aloifolium* (L.) Sw.	Epiphyte	Orchidaceae	
85	*Cyperus iria* L.	Herb	Cyperaceae	
86	*Cyperus rotundus* L.	Herb	Cyperaceae	Thunga
87	*Dactyloctenium aegyptium* (L.) Beauv.	Herb	Poaceae	
88	*Dalbergia paniculata* Roxb.*	Tree	Fabaceae	Pachari
89	*Dendrophthoe falcate* (L.f.) Ettingsh.	Parasite	Loranthaceae	Badanika
90	*Desmodium pulchellum* (L.) Benth.	Shrub	Fabaceae	Sarivi
91	*Dioscorea bulbifera* L.	Climber	Dioscoreaceae	Siragadi
92	*Dioscorea oppositifolia* L.	Climber	Dioscoreaceae	Yella Gadda
93	*Dioscorea pentaphylla* L.	Climber	Dioscoreaceae	Pendi muka tiga
94	*Diospyros melanoxylon* Roxb.*	Tree	Ebenaceae	Tuniki
95	*Diospyros sylvatica* Roxb.	Tree	Ebenaceae	Ghata
96	*Ecbolium viride* (Forsk.) Alston	Herb	Acanthaceae	Nakkatoka
97	*Echinochloa colona* (L.) Link	Herb	Poaceae	Kaproda Gaddi
98	*Elephantopus scaber* L.	Herb	Asteraceae	
99	*Elytraria acaulis* (L.f.) Lindau	Herb	Acanthaceae	Yedddadugu
100	*Emilia sonchifolia* (L.) DC.	Herb	Asteraceae	
101	*Eragrostis ciliata* (Roxb.) Nees	Herb	Poaceae	
102	*Eranthemum purpurascens* Nees	Shrub	Acanthaceae	Vadambaramu
103	*Erythroxylum monogynum* Roxb.	Shrub	Erythroxylaceae	Devadaru
104	*Chromolaena odorata* (L.) King & Robinson	Shrub	Asteraceae	Kampurodda
105	*Euphorbia hirta* L.	Herb	Euphorbiaceae	Pachabotlu
106	*Evolvulus alsinoides* (L.) L.	Herb	Convolvulaceae	Vishnukrantham
107	*Evolvulus nummularius* (L.) L.f.	Herb	Convolvulaceae	
108	*Ficus hispida* L.f.	Tree	Moraceae	Bodda
109	*Ficus mollis* Vahl	Tree	Moraceae	
110	*Ficus religiosa* L.	Tree	Moraceae	Ravi
111	*Flacourtia indica* (Burm.f.) Merr.	Tree	Flacourtiaceae	Kanaregu
112	*Flemingia stricta* Roxb.*	Shrub	Fabaceae	Nemali Padamu
113	*Gardenia latifolia* Ait.	Tree	Rubiaceae	Pedda Bikki
114	*Garuga pinnata* Roxb.	Tree	Burseraceae	Garugu
115	*Globba marantina* L.	Herb	Zingiberaceae	Konda Pasupu
116	*Gmelina arborea* Roxb.	Tree	Verbenaceae	Gummadi Teku
117	*Gomphrena serrata* L.	Herb	Amaranthaceae	Neerubogada
118	*Grewia rothii* DC.	Shrub	Tiliaceae	Pedda Chipuru
119	*Grewia tiliaefolia* Vahl	Tree	Tiliaceae	Tada Chettu
120	*Haldinia cordifolia* (Roxb.) Ridsd.	Tree	Rubiaceae	Bandari
121	*Hedyotis corymbosa* (L.) Lam.	Herb	Rubiaceae	
122	*Helicteres isora* L.	Shrub	Sterculiaceae	Shamala
123	*Heliotropium curassavicum* L.	Herb	Boraginaceae	Nela Golivida
124	*Heliotropium indicum* L.	Herb	Boraginaceae	Naga Danti

125	*Hemidesmus indicus* (L.) R. Br.	Climber	Periplocaceae	Sugndhipala
126	*Hiptage benghalensis*(L.) Kurz.	Climber	Malpighiaceae	Bandi Guruginja
127	*Holarrhena pubescens* (Bunch.-Ham.) Wall.	Tree	Apocynaceae	Tedlapala
128	*Holoptelea integrifolia* (Roxb.) Planch.	Tree	Ulmaceae	Nemali
129	*Hugonia mystax* L.	Shrub	Linaceae	Pisangi
130	*Hybanthus enneaspermus* (L.) F.V. Muell.	Herb	Violaceae	Ratna Purusa
131	*Hyptis sauveolens* (L.) Poit.	Shrub	Lamiaceae	Sima Tulasi
132	*Ichnocarpus frutescens* (L.) Ait.	Climber	Apocynaceae	Nalla Teega
133	*Imperata cylindrica* (L.) Raeusch.	Herb	Poaceae	Darbha Gaddi
134	*Indigofera cassioides* DC.	Shrub	Fabaceae	
135	*Ipomoea hederifolia* L.	Climber	Convolvulaceae	Elakachevulu
136	*Jatropha gossypifilia* L.	Shrub	Euphorbiaceae	Nepalum
137	*Justicia glauca* Rottl.	Herb	Acanthaceae	Kondapindi
138	*Rostellularia procumbens* (L.) Nees	Herb	Acanthaceae	
139	*Knoxia mollis* Wt.	Herb	Rubiaceae	Kampu Rodda
140	*Kyllinga nemoralis* (Forst. & Forst.f.) Hutchins.	Herb	Cyperaceae	
141	*Lagerstroemia parviflora* Roxb.	Tree	Lythraceae	Chennangi
142	*Lannea coromandelica* (Houtl.) Merr.	Tree	Anacardiaceae	Gumpena
143	*Lantana camara* L.	Shrub	Verbenaceae	Gaju Kampa
144	*Leucas cephalotes* (Roth) Spreng.	Herb	Lamiaceae	Tummi
145	*Lindernia ciliata* (Colsm.) Pennell	Herb	Scrophulariaceae	
146	*Lindernia crustacea* (L.) F. Muell.	Herb	Scrophulariaceae	
147	*Lindernia oppositifolia* (Retz.) Mukherjee	Herb	Scrophulariaceae	
148	*Litsea deccanensis* Gamble	Tree	Lauraceae	Naramamidi
149	*Lygodium flexuosum* L.	Climber	Schizaeaceae	
150	*Madhuca longifolia* (Koen.) Macbr.	Tree	Sapotaceae	Ippa
151	*Mallotus philippensis* (Lam.) Muell.-Arg.	Tree	Euphorbiaceae	Sindhuram
152	*Mangifera indica* L.	Tree	Anacardiaceae	Mamidi
153	*Manilkara zapota* (L.) P. Royen	Tree	Sapotaceae	Pala Chettu
154	*Melastoma malabathricum* L.	Shrub	Melastomaceae	Pathudu
155	*Meliosma simplicifolia* (Roxb.) Walp.	Tree	Sabiaceae	
156	*Memecylon umbellatum* Burm.f.	Tree	Melastomaceae	Alli
157	*Micrococca mercurialis* (L.) Benth.	Herb	Euphorbiaceae	
158	*Mimosa pudica* L.	Herb	Mimosaceae	Atti Patti
159	*Mimosa intsia* L.	Shrub	Mimosaceae	Korintha
160	*Mitragyna parviflora* (Roxb.) Korth.	Tree	Rubiaceae	Pacha Pasari
161	*Mollugo nudicaulis* Lam.	Herb	Aizoaceae	Parpatakamu
162	*Mollugo pentaphylla* L.	Herb	Aizoaceae	Verrichatarasi
163	*Morinda pubescens* J.E. Sm.	Tree	Rubiaceae	Togaru
164	*Mucuna pruriens* (L.) DC.	Climber	Fabaceae	Duradagondi
165	*Naravalia zeylanica* (L.) DC.*	Climber	Ranunculaceae	Pulla Bachala
166	*Nyctanthes arbor-tristis* L.	Tree	Oleaceae	Parijatham

167	*Ocimum americanum* L.	Herb	Lamiaceae	Kukka Tulasi
168	*Oplismenus burmannii* (Retz.) Beauv.	Herb	Poaceae	Kodijuttu Gaddi
169	*Orthosiphon rubicundus* (D. Don) Benth.	Herb	Lamiaceae	Nela Tappidi
170	*Passiflora foetida* L.	Climber	Passifloraceae	Tella Jumiki
171	*Pavetta indica* L.	Shrub	Rubiaceae	Papidi
172	*Pavetta tomentosa* Sm.	Shrub	Rubiaceae	Tella Papidi
173	*Pavonia zeylanica* (L.) Cav.	Shrub	Malvaceae	Karu Benda
174	*Pedalium murex* L.	Herb	Pedaliaceae	Yenugu Palleru
175	*Perotis indica* (L.) O. Ktze.	Herb	Poaceae	Nakka Toka
176	*Vigna trilobata* (L.) Verdc.	Climber	Fabaceae	Pilli Pesara
177	*Phoenix loureirii* Kunth.	Shrub	Arecaceae	Chitti Eetha
178	*Phrynium placentarium* (Lour.) Merr.	Herb	Marantaceae	
179	*Phyla nodiflora* (L.) Greene	Herb	Verbenaceae	Bokkena
180	*Phyllanthus amarus* Schum. & Thonn.	Herb	Euphorbiaceae	Nela Usiri
181	*Phyllanthus debllis* Klen ex Willd.	Herb	Euphorbiaceae	
182	*Phyllanthus emblica* L.	Tree	Euphorbiaceae	Usiri
183	*Phyllanthus virgatus* Forst.f.	Herb	Euphorbiaceae	
184	*Plumbago zeylanica* L.	Herb	Plumbaginaceae	Chitramulamu
185	*Pogostemon benghalensis* (Burm.f.) O. Ktze.	Shrub	Lamiaceae	Pedda Tulasi
186	*Polyalthia cerasoides* (Roxb.) Bedd.	Tree	Annonaceae	Dudduga
187	*Polycarpaea corymbosa* (L.) Lam.	Herb	Caryophyllaceae	Rajuma
188	*Polygala arvensis* Willd.	Herb	Polygalaceae	
189	*Potamogeton octandrus* Poir.	Herb	Potamogetonaceae	
190	*Pouzolzia zeylanica* (L.) Benn.	Herb	Urticaceae	
191	*Premna tomentosa* Willd.	Tree	Verbenaceae	Kokkiti
192	*Protium serratum* (Colebr.) Engl.	Tree	Burseraceae	Peda Busi
193	*Pteris vittata* L.	Herb	Pteridaceae	
194	*Pupalia lappacea* (L.) Juss.	Herb	Amaranthaceae	Anthreetha
195	*Ruellia tuberose* L.	Herb	Acanthaceae	
196	*Schleichera oleosa* (Lour.) Oken	Tree	Sapindaceae	Erra Busi
197	*Scleria lithosperma* (L.) Sw.	Herb	Cyperaceae	
198	*Scoparia dulcis* L.	Herb	Scrophulariaceae	
199	*Semecarpus anacardium* L.f.*	Tree	Anacardiaceae	Nalla Jidi
200	*Sida acuta* Burm.f.	Herb	Malvaceae	Chittemu
201	*Sida cordifolia* L.	Herb	Malvaceae	Chiru Benda
202	*Sida rhombifolia* L.	Herb	Malvaceae	Guba Tada
203	*Smilax perfoliata* Lour.	Climber	Smilaxaceae	Kushtapu Thamara
204	*Solanum anguivi* Lam.	Shrub	Solanaceae	Vankudu
205	*Solanum nigrum* L.*	Herb	Solanaceae	Kamanchi
206	*Solanum torvum* Sw.	Shrub	Solanaceae	Konda Vusti
207	*Sparmacoce articularis* L.f.	Herb	Rubiaceae	
208	*Spilanthes paniculata* DC.	Herb	Asteraceae	

209	*Stemona tuberose* Lour.	Climber	Stemonaceae	Kanupu Tiga
210	*Sterblus asper* Lour.	Tree	Moraceae	Baranika
211	*Sterculia urens* Roxb.	Tree	Sterculiaceae	Konda Thamara
212	*Strychnos nux-vomica* L.	Tree	Loganiaceae	Mushini
213	*Strychnos potatorum* L.f.	Tree	Loganiaceae	Indupa
214	*Synedrella nodiflora* (L.) Gaertn.	Herb	Asteraceae	
215	*Syzygium cumini* (L.) Skeels	Tree	Myrtaceae	Neredu
216	*Tamarindus indica* L.	Tree	Caesalpiniaceae	Chinta
217	*Chomelia asiatica* (L.) O. Ktze.	Shrub	Rubiaceae	Papidi
218	*Tephrosia purpurea* (L.) Pers.	Herb	Fabaceae	Vempali
219	*Tephrosia villosa* (L.) Pers.	Herb	Fabaceae	Nugu Vempali
220	*Teramnus labialis* (L.f.) Spreng.	Herb	Fabaceae	Masha Parni
221	*Terminalia alata* Roth	Tree	Combretaceae	Nalla Maddi
222	*Terminalia bellerica* (Gaertn.) Roxb.	Tree	Combretaceae	Thani
223	*Terminalia chebula* Retz.	Tree	Combretaceae	Karaka
224	*Themeda laxa* (Anderss.) Camus	Herb	Poaceae	Kalla Kasavu
225	*Thunbergia fragrans* Roxb.	Climber	Acanthaceae	Indratiga
226	*Tiliacora acuminata* (Lam.) Miers.	Climber	Menispermaceae	Tivva Mushini
227	*Tinospora cordifolia* (Willd.) Hook.f. & Thoms.*	Climber	Menispermaceae	Tippa Teega
228	*Trema orientalis* (L.) Bl.	Tree	Ulmaceae	Morali
229	*Trianthema portulacastrum* L.	Herb	Aizoaceae	Galijeru
230	*Tridax procumbens* L.	Herb	Asteraceae	Gaddi Chamanthi
231	*Triumfetta pentandra* A. Rich.	Herb	Tiliaceae	Chirusitrika
232	*Tylophora indica* (Burm.f.) Merr.	Climber	Asclepiadaceae	Verripaala
233	*Typha angustata* Bory & Chaub.	Herb	Typhaceae	Dabbu Jambu
234	*Urena lobata* L.	Shrub	Malvaceae	Nalla Benda
235	*Drimia indica* (Roxb.) Jessop	Herb	Liliaceae	
236	*Vanda tessellata* (Roxb.) Don	Epiphyte	Orchidaceae	Vadanika
237	*Ventilago denticulata* Willd.	Climber	Rhamnaceae	Surati Chekka
238	*Vernonia cinerea* (L.) Less.	Herb	Asteraceae	Garita Kammi
239	*Viscum articulatum* Burm.f.*	Parasite	Viscaceae	katta badanika
240	*Waltheria indica* L.	Herb	Sterculiaceae	Nalla Benda
241	*Woodfordia fruticosa* (L.) Kurz.	Shrub	Lythraceae	Seringi
242	*Wrightia arborea* (Dennst.) Mabb.	Tree	Apocynaceae	Tella Pala
243	*Wrightia tinctoria* R. Br.	Tree	Apocynaceae	Ankudu
244	*Xylia xylocarpa* (Roxb.) Taub.	Tree	Mimosaceae	Tangini
245	*Ziziphus oenoplia* (L.) Mill.	Climber	Rhamnaceae	Parimi

*Medicinal plants

for scheduled tribe population and also improve the environmental quality. A permanent body to monitor and the management of floral resources particularly for rare endangered and extent categories is to be constituted. The main function of the body is to protect and develop habitat condition for the above mentioned categories. Moreover, the body is accountable for the

development of social forestry and participatory forest management programs.

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