CEPF SMALL GRANT FINAL PROJECT COMPLETION REPORT

Organization Legal Name:	Palni Hills Conservation Council
Project Title:	Grassland and Shola Research and Restoration of the Palni Hills
Date of Report:	-
Report Author and Contact Information	Kannan Raveendran Amarville , Lower Shola Road P.O.Box No 34,Kodaikanal Tamil Nadu,India

CEPF Region: **Western Ghats & Sri Lanka Hotspot (Anamalai corridor- Palni Hills)**
Strategic Direction: **S.D. 1, Building cooperation between local communities to promote biodiversity conservation and enhance connectivity**

Grant Amount: **$ 19,465 (Nineteen Thousand Four Hundred Sixty Five)**

Project Dates: **1st September 2009 – 31st January 2011**

Implementation Partners for this Project (please explain the level of involvement for each partner):

NIL

Conservation Impacts

Please explain/describe how your project has contributed to the implementation of the CEPF ecosystem profile.

1. Survey of present status of shola native forest and grasslands is useful in assessment and analyzing future conservation efforts
2. Survey of possible Native Habitat of Nilgiri Tahr (*Hylocrius hemitragus*), Grizzled Giant Squirrel (*Ratufa macroura indica*) shows establishment of small conservation reserve to protect the habitats.
3. Possible native tree restoration sites in between invaded exotic plantations are located for immediate planting.
4. The interactions with farmers and their involvement in different phases of the project, improved local awareness of the need for long term biodiversity planning in their landscape
5. The project also improved awareness of the urgent need to promote native trees rather than exotics in coffee plantations. Farmers who attended the consultative meetings articulated their interest in planting native trees if saplings were made available through government or private institutions
6. Awareness of the role of policy in conserving native species on private lands was enhanced among Forest Department officers
7. Awareness on conservation of native plantations have been created for sustainable natural resource utilization and management

Please summarize the overall results/impact of your project against the expected results detailed in the approved proposal.

1. Suitable and pioneer grassland species are recorded and a model nursery established. Those species will replace the invasive wattle after conducting the required field trials on pilot scale.

2. Elephant corridors and Gaur migration in Upper Palnis are recorded by field study. 3 .Discussion and meetings with stakeholders show future conservation projects as community participated.

4. Community area and abandoned private lands identified for establishing conservation plots for select genetic diversity of grasses and associated native plants.

5. Extension of habitat located for endangered mammals (Nilgiri langur and Indian Giant squirrel) in the middle altitudes, in shola patches.

6. Strategy formed for multiplying high altitude ecotype of *Apis cerana indica* with pollinator potential for forest plant species and study of rock bee migration vis a vis flowering of grasses and shola plants.

Outputs achieved:
A manuscript on pioneer grasses and native trees are prepared for future restoration

Outputs in progress:
Survey all possible restoration sites in denuded forest lands, exotic plantations and community lands are conducted for future conservation efforts.

Please provide the following information where relevant:

Hectares Protected:

NIL

Species Conserved:

NIL

Corridors Created:

NIL

Describe the success or challenges of the project toward achieving its short-term and long-term impact objectives.

Successes: The monitoring of tree growth in private coffee plantations revealed that at least one native species had the potential to grow as fast as the popular exotic silver oak. This species thus can be promoted among farmers while also pursuing options to increase its remunerative value by recommending appropriate policy modifications. A published scientific paper is likely to result from this finding. In addition, four consultative meetings were conducted to publicise interim results and solicit inputs from farmers and others. Farmers cooperated and participated in all phases of the project, by permitting the monitoring of trees and acquisition of wood samples from their estates, by participating in interviews and by attending meetings held at central locations of the district.

Challenges: Getting the Forest Department on board and involved seriously in the project has been a challenge. It was difficult to obtain interviews in the early months of the project, as many officers were transferred out of the district and had to be replaced by new officers. The short duration of my project thus did not permit us to identify officers with a long-term commitment to this issue, nor to develop relevant linkages between the FD and farmers.

Habitat of Nilgiri Tahr are located in Marian shola and associated places by field visits. Habitats are remote from stakeholders place and inaccessible. It needs more efforts and time to assessing animal movement and habitat study.

Were there any unexpected impacts (positive or negative)?

No

Lessons Learned

Describe any lessons learned during the design and implementation of the project, as well as any related to organizational development and capacity building. Consider lessons that would inform projects designed or implemented by your organization or others, as well as lessons that might be considered by the global conservation community.

Project Design Process: (aspects of the project design that contributed to its success/shortcomings)

This project further developed the results of an earlier project, and utilised connections with farmers that had been established previously. These features probably helped produce results in a short time period

Project Implementation: (aspects of the project execution that contributed to its success/shortcomings)

Associations with scientists at the French Institute of Pondicherry and elsewhere was important during project development and manuscript writing.

A possible reason for lack of success with involving the Forest Department was the absence of prior contacts with relevant officers. Building a relationship to enable their participation might require a longer engagement than 1 year.

Conflict issues are crucial to handle. Cooperative efforts of community and Forest departments can be a tactic solution.

Other lessons learned relevant to conservation community:

Inherit conservation knowledge found among the forest associated communities. They really need financial support and assistance in implementation.

ADDITIONAL FUNDING

Provide details of any additional donors who supported this project and any funding secured for the project as a result of the CEPF grant or success of the project.

Donor	Type of Funding*	Amount	Notes

****Additional funding should be reported using the following categories:***

A *Project co-financing (Other donors contribute to the direct costs of this CEPF project)*

B *Grantee and Partner leveraging (Other donors contribute to your organization or a partner organization as a direct result of successes with this CEPF project.)*

C *Regional/Portfolio leveraging (Other donors make large investments in a region because of CEPF investment or successes related to this project.)*

Sustainability/Replicability

Summarize the success or challenge in achieving planned sustainability or replicability of project components or results.

Challenges: Sustainability will depend on continued support from researchers and the conservation community with respect to information sharing on native species value and availability. Local capacity building also is important to develop resilient systems for supply of native seedlings at nominal rates. Finally, farmers will require incentives such as reduced restrictions on the sale of native timber.

Summarize any unplanned sustainability or replicability achieved.

Safeguard Policy Assessment

Provide a summary of the implementation of any required action toward the environmental and social safeguard policies within the project.

Implemented

Performance Tracking Report Addendum

CEPF Global Targets

(Enter Grant Term)

Provide a numerical amount and brief description of the results achieved by your grant.
Please respond to only those questions that are relevant to your project.

Project Results	Is this question relevant?	If yes, provide your numerical response for results achieved during the annual period.	Provide your numerical response for project from inception of CEPF support to date.	Describe the principal results achieved from July 1, 2009 to June 30, 2011. (Attach annexes if necessary)
1. Did your project strengthen management of a protected area guided by a sustainable management plan? Please indicate number of hectares improved.	No			Please also include name of the protected area(s). If more than one, please include the number of hectares strengthened for each one.
2. How many hectares of new and/or expanded protected areas did your project help establish through a legal declaration or community agreement?	No			Please also include name of the protected area. If more than one, please include the number of hectares strengthened for each one.
3. Did your project strengthen biodiversity conservation and/or natural resources management inside a key biodiversity area identified in the CEPF ecosystem profile? If so, please indicate how many hectares.	No			
4. Did your project effectively introduce or strengthen biodiversity conservation in management practices outside protected areas? If so, please indicate how many hectares.	Yes	At least 50 - 100 farmers are likely to plant more native trees in the future, potentially affecting @ 500 - 1000 ha	(Same)	Results achieved during October 2009 to August 2010: 1. A native species with relatively fast growth was identified and a scientific manuscript was submitted for publication 2. Farmers were sensitized to the need for planting more native trees and have stated their interest in doing so 3. Four consultative meetings were conducted, in which farmers and others participated and provided practical suggestions for increasing the availability and promotion of native saplings in the future
5. If your project promotes the sustainable use of natural resources, how many local communities accrued tangible socioeconomic benefits? Please complete Table 1below.	No			

If you answered yes to question 5, please complete the following table.

Table 1. Socioeconomic Benefits to Target Communities

Please complete this table if your project provided concrete socioeconomic benefits to local communities. List the name of each community in column one. In the subsequent columns under Community Characteristics and Nature of Socioeconomic Benefit, place an X in all relevant boxes. In the bottom row, provide the totals of the Xs for each column.

Name of Community	Community Characteristics								Nature of Socioeconomic Benefit												
									Increased Income due to:												
	Small landowners	Subsistence economy	Indigenous/ ethnic peoples	Pastoralists/nomadic peoples	Recent migrants	Urban communities	Communities falling below the poverty rate	Other	Adoption of sustainable natural resources management practices	Ecotourism revenues	Park management activities	Payment for environmental services	Increased food security due to the adoption of sustainable fishing, hunting, or agricultural practices	More secure access to water resources	Improved tenure in land or other natural resource due to titling, reduction of colonization, etc.	Reduced risk of natural disasters (fires, landslides, flooding, etc)	More secure sources of energy	Increased access to public services, such as education, health, or credit	Improved use of traditional knowledge for environmental management	More participatory decision-making due to strengthened civil society and governance.	Other
Total																					

If you marked "Other", please provide detail on the nature of the Community Characteristic and Socioeconomic Benefit:

Additional Comments/Recommendations

Long term projects can bring tangible results in restoration of native species and wildlife habitat and corridor conservation efforts in Palni hills.

Information Sharing and CEPF Policy

CEPF is committed to transparent operations and to helping civil society groups share experiences, lessons learned, and results. Final project completion reports are made available on our Web site, www.cepf.net, and publicized in our newsletter and other communications.

Please include your full contact details below:

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List of appendices:

1. Checklist of Indigenous & Exotic plants of Upper Palni hills
2. Checklist of trees and shrubs list in Bombay Shola
3. Pictorial Checklist of Grasses in Palni Hills
4. Pictorial Checklist of Associate Plants of Grasslands in Palni Hills
5. Map: Location of Stakeholders villages in Palni Hills
6. Report on Survey of present status of shola native forest Palni Hills.
7. Report on Survey of present status of grasslands of Palni Hills
8. Report on Survey of possible Native Habitat of Nilgiri Tahr (*Hylocrius hemitragus*), Malabar Grizzled Giant Squirrel (*Ratufa macroura indica*).

8. List of Possible native tree restoration sites in between invaded exotic plantations (with GPS locations).
9. Meetings report
10. List of Suitable and pioneer grassland species for planting.
11. Maps of Elephant corridors and Gaur migration routes in Upper Palnis.
12. Maps of Community area and abandoned private lands identified for establishing conservation plots for select genetic diversity of grasses and associated native plants.
13. Map of Extension of habitat located for endangered mammals (Nilgiri langur and Indian Giant squirrel) in the middle altitudes, in shola patches.
14. Strategy Document for multiplying high altitude ecotype of *Apis cerana indica* with pollinator potential for forest plant species
15. Study Report of rock bee migration vis a vis flowering of grasses and shola plants.
16. A manuscript on pioneer grasses and native trees for future restoration

Appendix-1

Checklist of Indigenous and Exotic Plants of Upper Palni Hills

INDIGENOUS PLANTS

SNO	BOTANICAL NAME	COMMON NAME	FAMILY	USES
1.	*Achyranthus aspera*	Hill nayuruvi	Amaranthaceae	colds, infertility
2.	*Acorus calamus*	Sweet flag	Araceae	Stomach-ache
3.	*Arisaema leschnaultii*	Snake plant	Araceae	Piles, elephantiasis
4.	*Artimesia parviflora*		Compositeae	Antiviral, vomiting,
5.	*Alstonia venenata*		Apocynaceae	Insanity,epilepsy
6.	*Berberis tinctoria*	Berberis	Berberidaceae	Joundice
7.	*Biophytum intermedium*		Oxalidaceae	Diabetes, asthma
8.	*Centella asiatica*	Indian pennywort	Apiaceae	Memory,dysentery,skin disorders.
9.	*Celastrus paniculatus*		Celastraceae	Stimulant.
10.	*Fagopyrum esculentum*	Buck wheet	Polygonaceae	Pest control
11.	*Gaultheria fragrantissima*	Winter green	Ericaceae	Hook worm, rheumatism, neuralagia.
12.	*Jasminum bignonaceum*	-	Oleaceae	Ring worm.
13.	*Laportea ternimalis*	Herbaceouis nettle	Urticaceae	Pesticide control
14.	*Lobelia leschnaultiana*	-	Companulaceae	Relives asthma,antiseptic.
15.	*Micromaria biflora*	Indian wild thyme	-	-
16.	*Maesa indica*	-	Myrsinaceae	Anti-inflammatory analgesig,tranguilliser
17.	*Mallotus repandus*	-	Euphorbiaceae	Against worms
18.	*Oxolis purporea*	-	Oxalidaceae	Biliousness, wounds
19.	*Plantago ovata*	-	Plantaginaceae	Wounds
20.	*Passiflora mollissima*	Passion fruit	Passifloraceae	Tonic
21.	*Polygala grillata*	-	Polygonaceae	purgative,febrifuge
22.	*Rhamnus wightii*	-	Rahamnaceae	Tonic
23.	*Rubus ellipticus*	Rosberry	Rosaceae	Pregnancy
24.	*Sida rhombifolia*	-	Malvaceae	Rheumatsm T.B.
25.	*Smilex aspera*	-	Liliaceae	Sores,boils,absesses
26.	*Strobilanthus kunthiana*	Kurinji	Acanthaceae	Scorpionbit
27	*Toddalia asiatica*	-	Rutaceae	Against fever,tonic, Malaria
28.	*Vanasushava pedata*	-	Apiaceae	-

INDIGENOUS TREES

S.no	*BOTANICAL NAME*	COMMON NAME	FAMILY	USES
29.	*Cinnamomum wightii*	Cinnamom	Lauraceae	Viral infection
30.	*Datura metal*	Oomathai	Solanaceae	Scopolomine
31.	*Elaeocarpus glandulosus*		Elaeocarpaceae	Rheumatism,pneumonia
32.	*Elaeocarpus tuberculatus*		Elaeocarpaceae	Biliousness,indigestion typhoid rheumatism
33.	*Hypericum mysurense*		Guttiferae	
34.	*Hydnocarpus pentandra*		Flacourtiaceae	Snakebite,oil for leprosy cure
35.	*Michelia nilagirica*	-	Magnoliaceae	Febrifuge
36.	*Nothapodytes nimoniana*	Mappia	Icacinaceae	Cancer
37.	*Prunus ceylanica*		Rosaceae	Stomach ache
38.	*Rhododendron nilagiricum*	Rhododendron	Ericaceae	Diathoea
39.	*Rhodomyrtus tomentosa*	Hill goose berry	Myrtaceae	Diarrhoea
40.	*Symplocos cochinchinensis*		Symplocaceae	Uterine,disorders anti-inflammatory, gumproblems.
41.	*Syzygium caryophyllatum*	Naval	Myrtaceae	Hypoglycaemic, Male contraception?
42.	*Syzygium cumini*	Naval	Myrtaceae	Diabetes
43.	*Viburnum coriaceum*		Caprifoliaceae	Amoebicide

EXOTIC TREES:

Sl.No.	Botanical Name	Common Name	Family	Uses
44	*Cupressus arizonica*	Cypress	Cupressaceae	Varicoses
45	*Cupressus sempervirens*	Italian cypress	Cupressaceae	Antifungal circulation
46	*Citrus aurantium*	Bitter orange	Rutaceae	Narvous condition
47	*Eucalyptus citriodora*	lemon scented gum	Myrtaceae	Antiseptic antifungal
48	*Morus nigra*	Mulberry	Moraceae	Tonic
49	*Michelia ~~Champaca~~champaca*	Champaca	Magnoliaceae	Skin,bowels, opthalmia
50	*Prunus domestica*	Plum	Rosaceae	Laxative
51	*Prunus sativa*	Pear	Rosaceae	Catarith,colitis
52	*Thuja orientalis*	Oriental thuja	Cupressceae	Homeopathic, cleansing

EXOTIC PLANTS

53	*Achillea millefolium*	Yarrow	Compositae	Wounds,B.P.
54	*Artemesia paviflora*		Compositae	Antiviral,vomiting
55	*Adhatoda vasika*	Adhatoda	Scrophularceae	Cough, malaria
56	*Agave Americana*	Agava	Cactaceae	Rh. Arthritis
57	*Chrysanthemum Cinerarifolium*	Pyrethrum	Compositae	Insect protection
58	*Cymbopogon citradus*	Lemon grass	Gramineae	Oil headache, struss A
59	*Cymbopogon winteriants*	Javacitronella	Gramineae	Mosquito repellent
60	*Digitalis purporea*	Fox glove	Scrophularceae	Wounds,heart stimulant
61	*Eupatorium glandulosum*	Eupatorium	Compositae	Iodine, homeopathic
62	*Fever few*			
63	*Foeniculam vulgare*	Fennel	Umbeliferae	Digestive
64	*Fragaria vesca*	Nilagiri strawberry	Rosaceae	Asringent
65	*Hibiscus rosasinensis*	Rose of chine	Malvaceae	Fever U.T.
66	*Hydrangea macrophylla*	Hydrangea	Hydrangeaceae	Cystitis
67	*Lavendula angustifolia*	Lavender	Labiateae	Burns, tension
68	*Mentha citrata*	Eaude colognemart	Labiateae	Burns, tension
69	*Mentha spicata*	Spear mint	Labiateae	Gas, fever
70	*Mentha sativa*	Mint	Labiateae	Diarrhoea, gas
71	*Mentha piperita*	Pepper mint	Labiateae	Cough
72	*Ocimum bassillicum*		Liabiateae	Respiratory
73	*Ocimum gratissimum*	Cloocimum	Liabiateae	
74	*Oenothera biennis*	Evening primrose	Onagraceae	Hormone imbalance,PMS
75	*Oreganum marjorum*			Fever
76	*Pelargonium graveolens*	Rose gernanium	Geraniaceae	Bleetinggums,tension
77	*Petroselinum crispum*	Parsley	Umbelliferae	Digestive
78	*Pogostemon patchouli*	Patchouli	Labiateae	Antifungal, antiseptic
79	*Rosmarinus officinaalis*	Rosemary	Labiateae	Headache, tonic
80	*Ruta graveolens*	Rue-	Rutaceae	Menses, nervine
81	*Selinum Variegatum*			
82	*Santolina chaemecyparissus*	Lavender cotton	Compositae	Antifungal,antiseptic oil
83	*Salvia Officinalis*	Sage	Labiateae	Gargle
84	*Solanum Officinalis*		Solanaceae	Worms control,digestive
85	*Solanum Xanthcarpum*		Solanaceae	Fever malaria
86	*Solanum nigrum*		Solanaceae	Cancer,scourge
87	*Taraxacum officinalis*	Dandelion	Compositae	Diuretic
88	*Thymus vulgaris*	Thyme	Labiateae	Bactericide U.T. immune System
89	*Vetiveria zizanoides*	Vetiver	Gramineae	Oil : Relaxant,antiseptic
90	*Velariana arnottiana*	-	Valarianaceae	Nervous disorders

- ✓ Reference: List of Medicinal Plants of Nilgiris, Workshop on Cultivation & Marketing of Medicinal, Aromatic & CulinaryHerbs 1999 -
- ✓ BALCAR T. AND STEWART R. Medicinal plants of the upper Palni Hills list 1999
- ✓ Plants in the upper Palnis identified and checklist prepared by PHCC

Appendix-2

CHECKLIST OF TREES AND SHRUBS LIST IN BOMBAY SHOLA

S.No	*Botanical Name*	*Family*
1	Michelia nilagirica	Magnoliaceae
2	Michelia chambaca *	Magnoliaceae
3	Mahonia Leschenaultii	Berberidaceae
4	Eurya nitida	Thaceae
5.	Polygala arillata	Polycalaceae
6.	Elaeocarpus glandulosus	Elaeocarpaceae
7.	Elaeocarpus recurvatus	Elaeocarpaceae
8.	Euodia fraxinifolia	Rutaceae
9.	Toddalia asiatica var. floribunda	Rutaceae
10	Gomphandra coriacea	Icacinaceae
11	Ilex wightiana	Aquifoliaceae
12	Euonymus crenulatus	Celastraceae
13	Meliosma simplicifolia ssp pungens	Sabiaceae
14	Turpinia nepalensis	Staphyleaceae
15	Erythrina sykesii	Papilionoideae
16	Acacia mearnsii	Mimosoideae
17	Acacia melanoxylon	Mimosoideae
18.	Photinia integrifolia var sublanceolata	Rosaceae
19	Prunus ceylanica	Rosaceae
20	Prunus cerasoides	Rosaceae
21	Eucalyptus globules	Myrtaceae
22	Syzygium caryophyllatum	Myrtaceae
23	Syzygium densiflorum	Myrtaceae
24	Memecylon randerianum	Melastomataceae
25	Tibouchina urvilleana	Melastomataceae
26	Schefflera racemosa	Araliaceae

27	Viburnum cylindricum	Caprifoliaceae
28	Lasianthus acuminatus	Rubiaceae
29	Pavetta breviflora	Rubiaceae
30	Psychotia nilgiriensis var nilgiriensis	Rubiaceae
31	Tarenna flava	Rubiaceae
32	Gaultheria fragrantissima	Ericaceae
33	Rhododendron arboreum ssp.lagiricum	Ericaeae
34	Vaccinium leschenaultii	Ericaeae
35	Isonadra perrottetiana	Sapotaceae
36	Symplocos cochinchinesis ssp laurinia	Symplocaceae
37	Symplocas foliosa	Symplocaceae
38	Chionanthus ramiflorus	Oleaceae
39	Olea paniculata	Oleaceae

Appendix-3

Checklist of Grasses in Palni Hills

Acorus calamus
Local Name: Vasambu(Tamil), Gorbach(Hindi)
Family: Araceae
Habit: Aromatic marsh herb
Habitat & Distribution: Commonly seen near water ways & swamps of Palnis. Probably introduced grass. Plains from the coast to 1200m. North temperate hemisphere and Tropical Asia
Uses: Rhizome used as medicine

Juncus effusus
Family: Juncaceae
Local Name: Korai (Ta)
Habit: Grass
Habitat & Distribution: Common in swamps & marshes of upper Palnis. Elevation from 1800-2400m. Europe, Africa, Asia, Australia, America.
Uses: Used for making mats & baskets; Decoction of pith as antilithic, pectoral, discutient; also as diuretic & depurative

Juncus inflexus
Common Name: Korai (Ta)
Family: Juncaceae
Habit: Grass
Habitat & Distribution: Common Grass in swamps (Berijam lake).N.Africa, Europe, W.Asia, Himalaya, Srilanka
Uses: Making mats & baskets; fodder

Juncus bufonius
Common Name:
Family: Juncaceae
Habit: Grass
Habitat & Distribution: Common grass in swamps of Upper Palnis. Plateau slopes 2100-2400m. Temperate regions of Europe, Asia & America
Uses: Fodder for wild cattle

Juncus leschenaultii
Common Name:
Family: Juncaceae
Habit: Grass
Habitat & Distribution: Common grass in swamps. Elevation from 1500-2400mm. India, Himalaya to East China, Japan
Uses: Fodder for wild cattle

Carex baccans
Family: Cyperaceae
Habit: Grass
Habitat & Distribution: Common grass in hedges, home garden. Above 2000msl. E.Himalaya, India, Srilanka, Indo-China, Malaysia, S.China, Taiwan
Uses: Fodder for cattle

Carex capillacea
Family: Cyperaceae
Habit: Grass
Habitat: Common grass in marsh, rocky places above 2200msl. Himalayas, Korea, Japan, Malaysia, Australia.
Uses: Fodder for cattle

Bromus catharticus
Common Name: Fescue grass
Family: Graminae
Habit: Grass
Habitat & Distribution: Introduced, Water courses & Habitations. S.America; widely introduced in Temperate regions of the World.
Uses: Fodder, Ornamental

Briza maxima
Common Name: Large Quaking grass

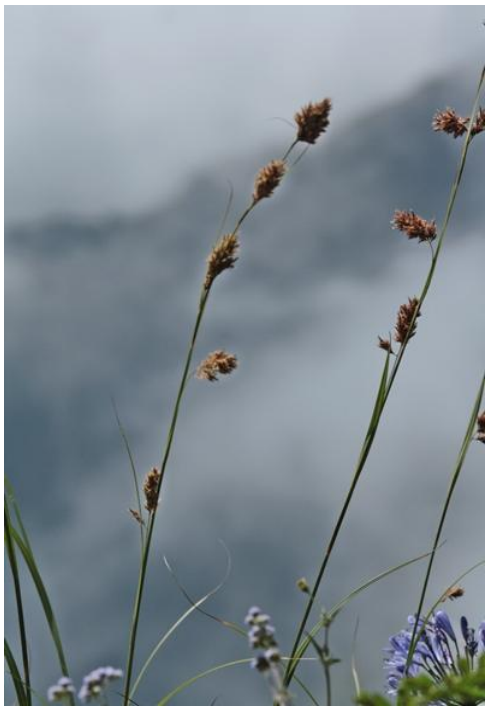
Family: Graminae
Habit: Grass
Habitat & Distribution: Roadside drainage & Habitations. Native of the Mediterranean; introduced in higher altitudes of India as ornamental.
Uses: Ornamental

Briza minor
Common Name: Small Quaking grass
Family: Graminae
Habit: Grass
Habitat & Distribution: Near habitations. Native of the Mediterranean; introduced in higher altitudes of India as ornamental.
Uses: Ornamental

Kyllinga odorata
Common Name:
Family: Cyperaceae
Habit: Grass
Habitat & Distribution: Common in rocky patches above 800msl.
Uses:

Mariscus sumatrensis
Common Name:
Family: Cyperaceae
Habit: Grass
Habitat & Distribution: Common in rocky patches, slopes above 1200msl. Tropical Africa, Tropical & subtropical Asia, Malaysia, N.Australia.
Uses:

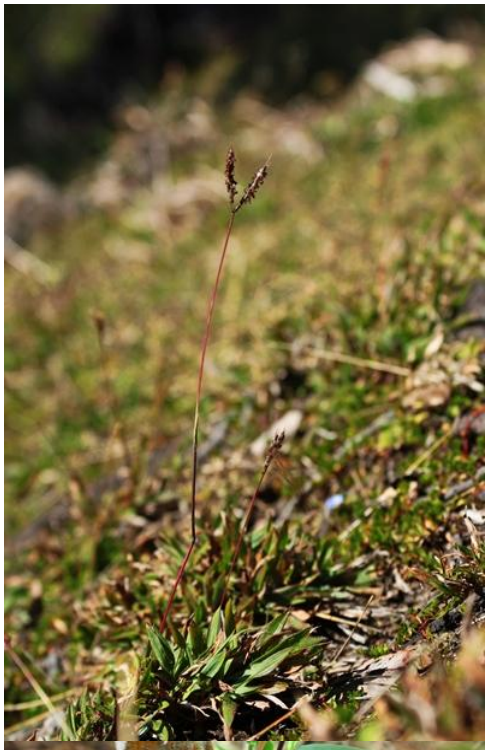
Carex lindleyana var mercarensis
Common Name:
Family: Cyperaceae
Habit: Grass
Habitat & Distribution: Common in moist rocky patches, shola floor, stream banks. Above 1800msl. Indian Peninsula & Srilanka
Uses:



Carex lindleyana var major
Common Name:
Family: Cyperaceae
Habit: Grass
Habitat & Distribution: Common in rocky patches, open grasslands above 1900msl. Indian Peninsula & Srilanka
Uses:

Themeda cymbaria
Common Name: Pothai pul
Family: Graminae
Habit: Grass
Habitat & Distribution: Rocky slopes of 700-2100msl. Western Peninsular India, Srilanka
Uses: Good fodder

Carex maculata
Common Name:
Family: Cyperaceae
Habit: Grass
Habitat: moist rocky patches, stream banks above 2100msl.
Uses:



Paspalum paspalodes
Common Name: Knot grass
Family: Graminae
Habit: Grass
Habitat & Distribution: Marshy banks of river. Tropics & subtropics through out the world.
Uses: fodder

Sinarundinaria wightiana

Common Name: Eetha
Family: Gramineae
Habit: Straight growing Grass
Habitat & Distribution: Water courses above 1700msl. W.Ghats & South of Nilgris

Uses:

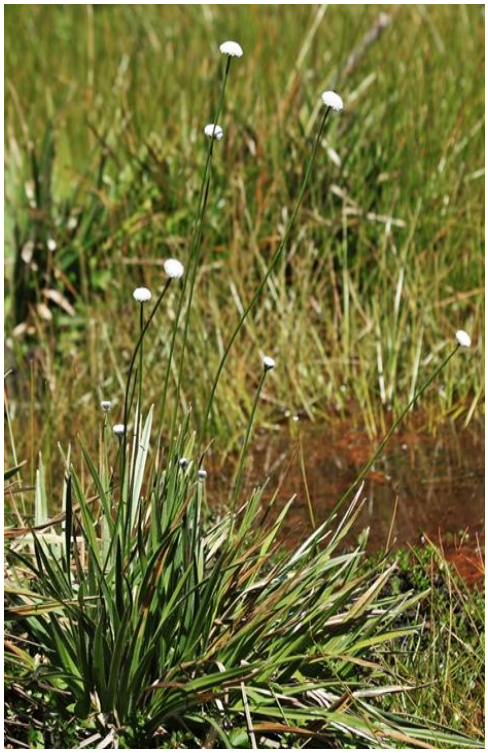
Zenkeria stapfii
Common Name: Pothai pul
Family: Gramineae
Habit: Grass
Habitat & Distribution: Rocky slopes. Indian Peninsula & Srilanka.
Uses:

Chrysopogon zeylanicus
Common Name:
Family: Gramineae
Habit: Grass

Habitat & Distribution: Abundant in rocky slopes above 2100msl. Hills of Tamilnadu & Srilanka.
Uses:

Cymbopogon nardus
Common Name: Kamachi pul, Citronella grass, Ganjni(Hin)
Family: Gramineae
Habit: Grass
Habitat & Distribution: Abundant in Rocky slopes 1300-1800msl. Endemic to hills of Peninsula. Introduced to Srilanka & Malaysia.
Uses: Aromatic oil in cosmetics, fodder, bagasse in paper making

Isachne bourneorum
Common Name:
Family: Gramineae
Habit: Grass
Habitat & Distribution: Shola floor, rock crevices, bare slopes of upper Palnis 1800-2100msl. Endemic to Peninsula.
Uses: Good fodder



Eriocaulon quinquangulare
Common Name:
Family: Eriocaulaceae
Habit: Grass
Habitat: Perennially marsh & exposed places
Uses:

Eriocaulon collinum
Common Name:
Family: Eriocaulaceae
Habit: Dwarf Grass
Habitat: Perennially marsh & exposed places above 1800msl.
Uses:

Eriocaulon pectinatum
Common Name:
Family: Eriocaulaceae
Habit: Dwarf Grass
Habitat & Distribution: Perennially marsh & exposed places. Western Ghats
Uses:

Microstegium ciliatum
Common Name:
Family: Gramineae
Habit: Grass
Habitat & Distribution: Common in moist rocky patches of Middle Palnis 1300-1800msl, stream banks. India to Burma, China & Philippines.
Uses:

Fimbristylis dichotoma
Common Name:
Family: Cyperaceae
Habit: Grass
Habitat & Distribution: Common in river banks of Mid-Palnis 900msl.
Uses: Mat & basket making

Fimbristylis quinquangularis
Common Name:
Family: Cyperaceae
Habit: Grass
Habitat & Distribution: Common in marshy ground, less in bare slopes 1600-1900msl. Western Ghats.
Uses:

Eragrostis cilianensis

Common Name:
Family: Gramineae
Habit: Grass
Habitat & Distribution: Slopes & exposed river beds. Tropical & warm temperate regions.
Uses: Good fodder

Eragrostis kiwuensis
Common Name:
Family: Gramineae
Habit: Grass
Habitat & Distribution: Slopes(2400msl). Zaire, Ethiopia, Yemen & India
Uses:

Vulpia myuros
Common Name: Mouse tail Fescue grass
Family: Gramineae
Habit: Grass
Habitat & Distribution: Common roadside grass in Upper Palnis 2100-2400msl. C & S Europe & Mediterranean, East through

middle east to Peninsular India, Southern USSR. Widely introduced.
Uses: Ornamental

Appendix-4

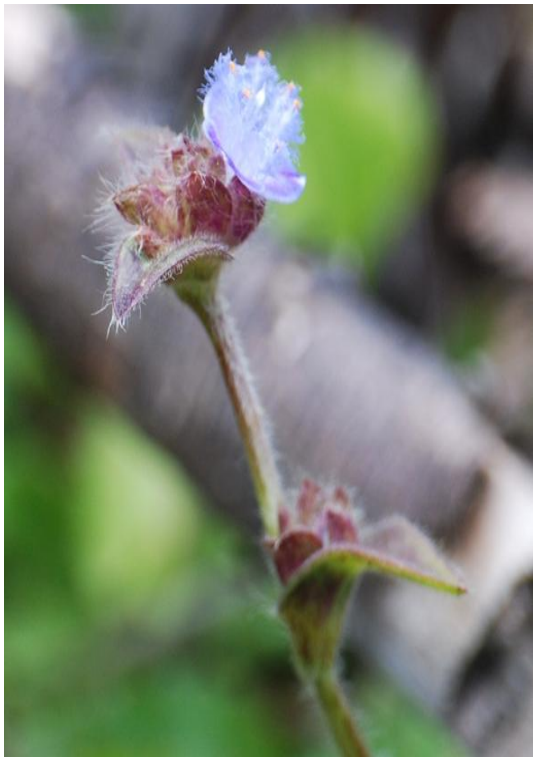
Checklist of Associate Plants of Grasslands in Palni Hills

Anaphalis beddomei
Common Name:
Family: Compositae
Habit: Sub shrub

Habitat & Distribution: Common in grasslands, stream banks of Upper Palnis 1800-2400msl. W Ghats
Uses: Medicinal

Anaphalis travancorica
Common Name:
Family: Compositae
Habit: Sub shrub
Habitat & Distribution: Common in moist rocky patches of Upper Palnis 1900-2400msl. W Ghats
Uses:

Cirsium wallichii
Common Name:
Family: Compositae
Habit: Sub-shrubby
Habitat & Distribution: Low-lying marsh, degraded slopes above 2000msl. Lower Himalayas to W Ghats.
Uses: Medicinal



Cyanotis arachnoidea
Common Name: Nirupalli
Family: Commelinaceae
Habit: Herb
Habitat: Exposed slopes, rock edges 1300-2400msl.
Uses: Fodder

Fragaria vesca
Common Name: Garden Strawberry
Family: Rosaceae
Habit: Herb
Habitat: Moist slopes & grasslands
Uses: Fruits edible; used in medicinal purposes, leaves astringent & diuretic

Hypericum mysurense
Common Name: Avaran(Ta)
Family: Guttiferae
Habit: Shrub
Habitat: degraded slopes
Uses: Medicinal

Osbeckia leschenaultiana
Common Name:
Family: Melastomataceae
Habit: Shrub
Habitat: degraded slopes
Uses: Flowers & roots used as Medicine

Oxalis spp
Common Name:
Family: Oxalidaceae
Habit: Herb
Habitat: degraded slopes
Uses:

Hypericum patulum
Common Name:
Family: Guttiferae
Habit: Shrub
Habitat: degraded slopes
Uses: Seeds aromatic, stimulant

Hedyotis swertioides
Common Name:
Family: Rubiaceae
Habit: Shrub

Habitat: degraded slopes
Uses: Medicinal

Hedyotis articularis
Common Name: Kudal-churiki(Ta)
Family: Rubiaceae
Habit: Shrub
Habitat: degraded slopes
Uses: Used as medicine for diarrhea, cholera

Hedyotis leschenaultiana
Common Name:
Family: Rubiaceae
Habit: Shrub
Habitat: Shola borders, stream banks

Uses: Medicinal

Lycopodium spp
Common Name:
Family:
Habit: Herb
Habitat: Shola floor
Uses:

Malus baccata
Common Name: Siberian Crab apple, Ban mehal(Hi)
Family: Rosaceae
Habit: Shrub
Habitat: degraded slopes
Uses: Edible fruits

Persicaria peduncularis
Common Name:
Family: Polygonaceae
Habit: Rugose herb
Habitat: Marshes 2000-2300msl.
Uses:

Plectranthus malabaricus
Common Name: Kurali(Ta)
Family: Labiatae
Habit: Leafy herb
Habitat & Distribution: Shola floor, marshy ground, stream banks 1400-2400msl. Peninsula
Uses: Medicinal purposes

Smilax aspera
Common Name:
Family: Liliaceae
Habit: Armed vine
Habitat & Distribution: Shola border, wayside 1300-2200msl. Widespread from Mediterranean, E Africa to India & Srilanka
Uses: Roots yield tannin, Medicinal purposes

Veronica javanica
Common Name:
Family: Scrophulariaceae
Habit: Herb
Habitat: Near cultivation field 1800-2100msl.
Uses: Medicinal

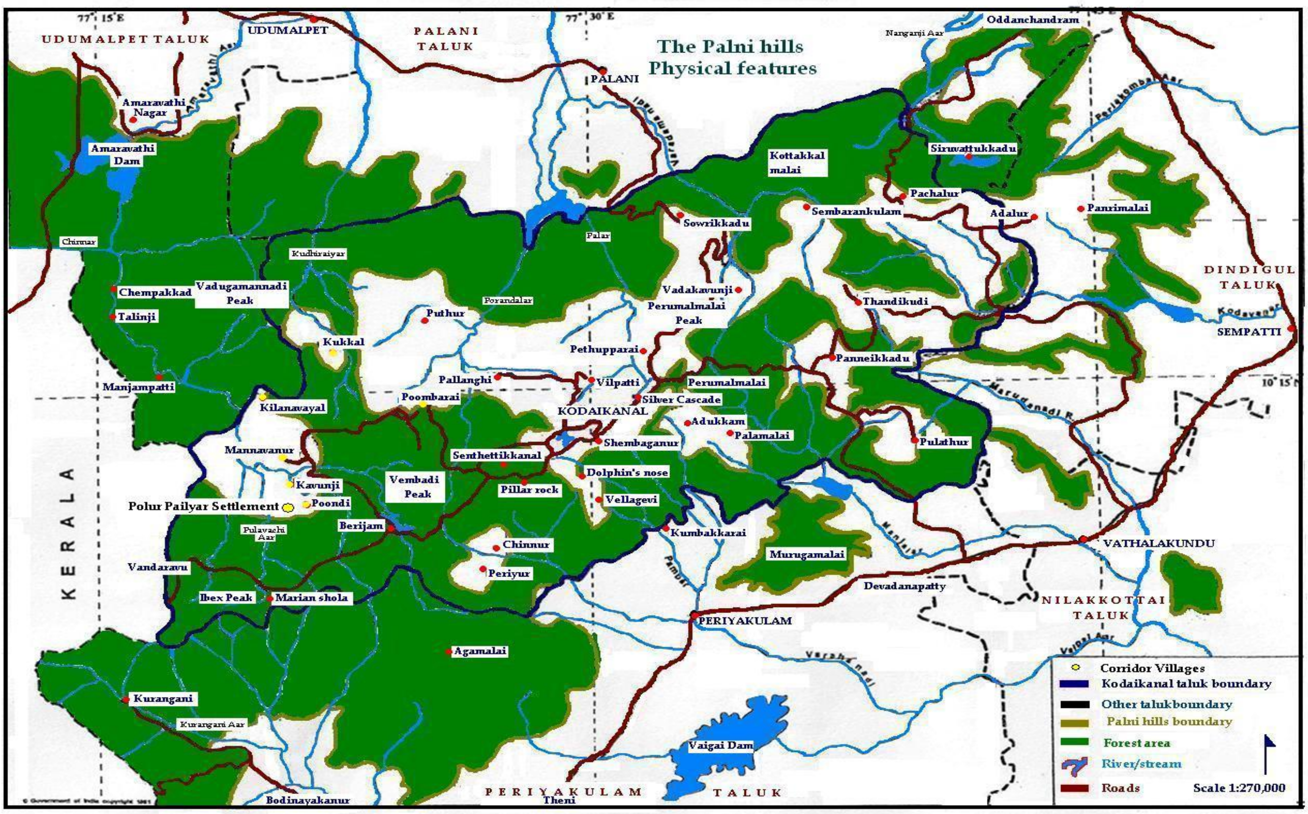
Solanum pubescens
Common Name:
Family: Solanaceae
Habit: Shrub
Habitat: Common in wayside, Shola border
Uses: Edible fruits, Medicinal

Leucas spp
Common Name:
Family: Labiatae
Habit: Herb
Habitat: Slopes & Rock edges
Uses: Medicinal plant, Nectar source for bees

Tephrosia spp
Common Name:
Family: Fabaceae
Habit: Shrub
Habitat: Slopes
Uses: Medicinal

Appendix-5

Map: Location of Stakeholders villages in Palni Hills



The Palni hills
Physical features
UDUMALPET TALUK
UDUMALPET
PALANI TALUK
PALANI
77° 15' E
77° 30' E
Amaravathi Nagar
Amaravathi Dam
Chinnar
Kudhiraiyar
Palar
Porandalar
Nanganji Aar
Oddanchandram
Kottakkal malai
Siruvattukkadu
Pachalur
Sembarankulam
Adalur
Panrimalai
Sowrikkadu
Vadakavunji
Thandikudi
DINDIGUL TALUK
SEMPATTI
Chempakkad
Vadugamannadi Peak
Talinji
Puthur
Perumalmalai Peak
Kukkal
Pethupparai
Panneikkadu
Pallanghi
Vilpatti
Perumalmalai
Manjampatti
Kilanavayal
Poombarai
Silver Cascade
KODAIKANAL
Adukkam
Palamalai
Shembaganur
Pulathur
Mannavanur
Senthettikkanal
Dolphin's nose
Kavunji
Vembadi Peak
Pillar rock
Vellagevi
Polur Pailyar Settlement
Poondi
Berijam
Pulavachi Aar
Kumbakkarai
Chinnur
VATHALAKUNDU
Murugamalai
KERALA
Vandaravu
Periyur
Devadanapatty
Ibex Peak
Marian shola
NILAKKOTTAI TALUK
PERIYAKULAM
Agamalai
Kurangani
Kurangani Aar
Vaigai Dam
PERIYAKULAM TALUK
Theni
Bodinayakanur
Corridor Villages
Kodaikanal taluk boundary
Other talukboundary
Palni hills boundary
Forest area
River/stream
Roads
Scale 1:270,000

Appendix-4

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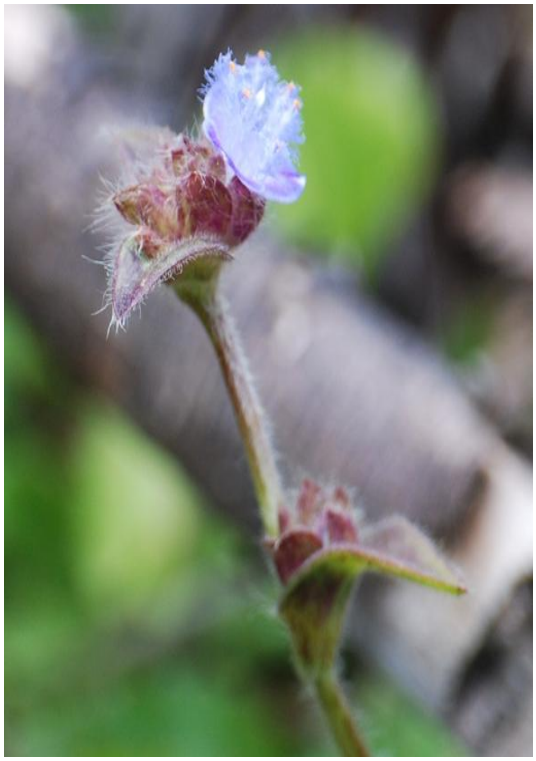

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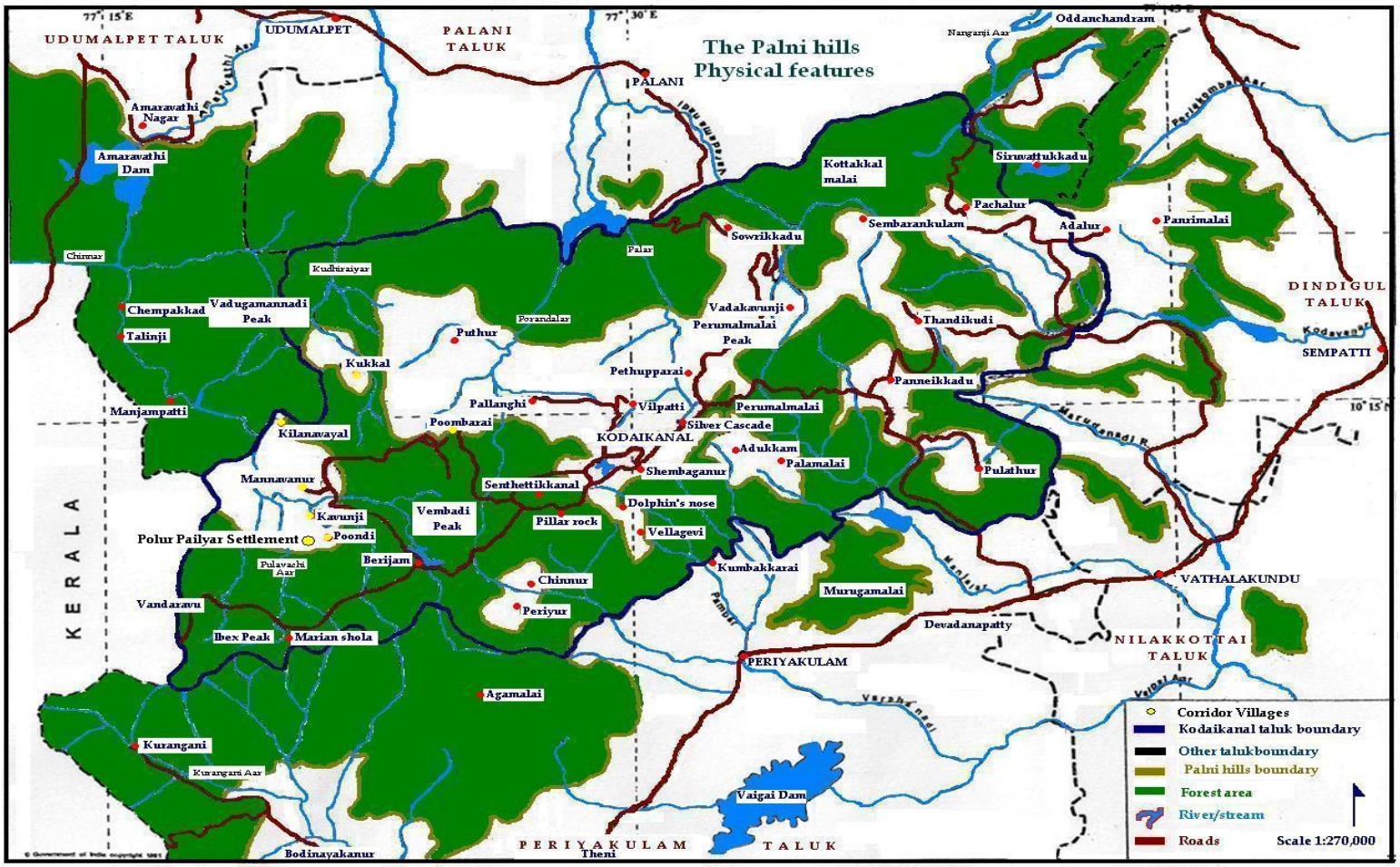
Appendix-5

Map: Location of Stakeholders villages in Palni Hills



Glimpses of Present Status of sholas in Upper Palnis

There are so many shola patches located at Upper Palni region. Most of them in degraded and denuded status due to severe invasion of exotics and anthropogenic pressure. Remote sholas such Marian shola, Mathikettan shola are in good condition. But small shola patches are fragile and almost complete denudation.

I.Wildlife composition:

Fauna: Gaur, Wild pig, Malabar Giant squirrel, Dusky squirrel.

Avifauna:

These forest support many of birds such as Red whiskered bulbul, black bird, black, orange flycatcher etc

Butterfly:

These forest support many of insects and butterflies such as Nilgiri tiger, Stripped tiger, Red disc brown, Painted lady, Indian Red admiral, blue admiral etc.

II. Tree species composition:

There are many kinds of medicinal plants and pioneer tree species present in Upper Palnis sholas. Large shola patches of Upper Palnis comprise below listed wet evergreen tree species and small patches comprise few of them because of severe invasion of exotics and anthropogenic pressure.

S.No	Tree species	Family
1	Michelia nilagirica	Magnoliaceae
2	Michelia Chambaca *	Magnoliaceae
3	Mahonia Leschenaultii	Berberidaceae
4	Eurya nitida	Thaceae
5.	Polygala arillata	Polycalaceae
6.	Elaeocarpus glandulosus	Elaeocarpaceae
7.	Elaeocarpus recurvatus	Elaeocarpaceae
8.	Euodia fraxinifolia	Rutaceae
9.	Todalia asiatica var. floribunda	Rutaceae
10	Gomphandra coriacea	Icacinaceae
11	Ilex wightiana	Aquifoliaceae
12	Euonymus crenulatus	Celastraceae

13	Meliosma simplicifolia ssp pungens	Sabiaceae
14	Turpinia nepalensis	Staphyleaceae
15	Erythrina sykesii	Papilionoideae
16	Acacia mearnsii	Mimosoideae
17	Acacia melanoxylon	Mimosoideae
18.	Photinia integrifolia var sublanceolata	Rosaceae
19	Prunus ceylanica	Rosaceae
20	Prunus cerasoides	Rosaceae
21	Eucalyptus globules	Myrtaceae
22	Syzygium caryophyllatum	Myrtaceae
23	Syzygium densiflorum	Myrtaceae
24	Memecylon randerianum	Melastomataceae
25	Tibouchina urvilleana	Melastomataceae
26	Schefflera racemosa	Araliaceae
27	Viburnum cylindricum	Caprifoliaceae
28	Lasianthus acuminatus	Rubiaceae
29	Pavetta breviflora	Rubiaceae
30	Psychotia nilgiriensis var nilgiriensis	Rubiaceae
31	Tarenna flava	Rubiaceae
32	Gaultheria fragrantissima	Ericaceae
33	Rhododendron arboreum ssp.lagiricum	Ericaeae
34	Vaccinium leschenaultii	Ericaeae
35	Isonadra perrottetiana	Sapotaceae
36	Symplocos cochinchinesis ssp laurinia	Symplocaceae
37	Symplocas foliosa	Symplocaceae
38	Chionanthus ramiflorus	Oleaceae
39	Olea paniculata	Oleaceae

1.Tiger shola

Tiger shola is medium size shola patch of Upper Palnis located close to silver cascade waterfalls which the entrance of Kodaikanal and some extent of flowing stream.

Major threats:

Invasion of exotics i.e, Eucalyptus, Pine, anthropogenic pressure by tourists, water pollution by cultivation fields, tree felling for firewood, illegal encroachment.

2. Bombay shola

Bombay shola is one of largest shola patch of upper Palnis and located above Briant park and ends Kilpoomi closeto upper lake view.

Major threats:

Solid waste deposition by nearby bungalows, water pollution by domestic sewage, noise pollution by tourist vehicles, tree felling for firewood.

3. Bear shola

Bear shola is one of smallest shola patch of Upper Palnis located close to human habitations and hotels.

Major threats:

Invasion of exotics i.e, Eucalyptus, Pine, wattle, anthropogenic pressure by tourists, water pollution by cultivation fields, tree felling for firewood, illegal encroachment.

4. Pambar shola

Pambar shola one of largest shola patches and started close Saleth Matha church and extended along the Pambar river, Vattakanal and Dolphin nose.

Invasion of exotics i.e, Eucalyptus, Pine, wattle, anthropogenic pressure by tourists, water pollution by cultivation fields, tree felling for firewood, illegal encroachment and noise pollution.

5. Kundan shola

Kundan shola is one of smallest shola patch of Upper Palnis which is located on the way to Poomparai.

Major threats:

Invasion of exotics i.e, Eucalyptus, Pine, wattle, anthropogenic pressure by tourists, tree felling for firewood, illegal encroachment and noise pollution.

6. Kundar shola

Kundar shola is one of smallest shola patch which is located on Kundar valley and extended along Kundar stream.

Major threats:

Invasion of exotics i.e, Eucalyptus, Pine, wattle, tree felling for firewood, illegal encroachment and noise pollution.

7.Mathikettan shola

Mathikettan shola is one of largest shola of Upper Palnis with minimum threat and located on way to Berijam lake.

Major threats:

Invasion of exotics

8. Marian shola

Marian shola is one of largest shola forest of Upper Palnis located remote region from human habitation and tourism places. One of good habitat of Nilgiri Tahr and endangered wild mammals.

Major threats:

Invasion of exotics

9.Vattakanal shola

A small shola patch located below Pillar rocks.

Major threats:

Invasion of exotics i.e, Eucalyptus, Pine, wattle, tree felling for firewood

10. Moyar point shola

A small shola patch located below Moyar point.

Major threats:

Invasion of exotics i.e, Eucalyptus, Pine, wattle, tree felling for firewood

11. Picnic shola

A small shola patch located close Naidupuram of Kodaikanal town.

Major threats:

Invasion of exotics i.e, Eucalyptus, Pine, wattle, tree felling for firewood, illegal encroachment, and solid waste deposition.

Glimpses of Present status of Grassland in Palni hills

Grasslands

The high altitude grasslands and sholas are the main habitats for many endangered flora and fauna. The east flowing rivers of the Palni Hills are the lifeline of the plains population of over three million people that live in the smaller towns. The river Vaigai, feeding temple town of Madurai, and river Shanmuga, feeding the pilgrim centre of Palani, are dependent upon the rainfall from the Upper Palnis. The grasslands sponge-like character in regulating water cannot be matched by the monocultures of eucalyptus and wattle. The former species was brought to the Palni Hills to drain the swamps or marshes.

There are three types of grassland ecosystem present in Palni hills

I.Open grasslands in high lands

These type of large grasslands located high lands in upper Palnis. These grasslands occupy vast area with devoid of trees or with minimum trees and shrubs.

These grasslands comprise some of below listed grass species as common.

Carex baccans

Carex capillacea

Carex lindleyana var mercarensis

Carex lindleyana var major

Isachne bourneorum

Major high land grasslands of Palni hills are listed below. These grasslands are shrinking due to Invasion of exotics, over grazing, illegal encroachment.

a. Mannavanur grasslands

One of large high land grassland devoid of trees and associated with shrubs. It ends in Mannavanur swamp. It is associated with Mannavanur village. So the anthropogenic and cattle grazing pressure are high.

b. Kilavarai grasslands

One of large highland grasslands of Upper Palnis. It distributed from Kilavarai hill top to slope patches. The anthropogenic pressure is comparatively lower than Mannavanur.

c. Kookal top grasslands

Kookal top grassland is one of large high land grasslands of Upper Palnis. It is associated with richest Kookal shola forest. The anthropogenic pressure is low due to its remoteness.

d. Ibex peak grasslands

One of remote high land grassland with no anthropogenic pressure. Cliffs are major habitat of Nilgiri Tahr.

e. Vembedi peak grasslands

One of remote high land grassland with no anthropogenic pressure.

II.Marshes and Swamps

Marshes and Swamps are mostly associated with high land grassland ecosystem, valleys, waterways such as rivers and streams. Some of common grass species are listed below.

Acorus calamus

Juncus effuses

Juncus inflexus

Juncus bufonius

a. Konalar swamp

One of largest swamp in Upper Palnis; located close to Berijam lake.

b. Berijam swamp

One of largest swamps of in Upper Palnis; but comparatively smaller than Konalar swamp.

c. Mannavanur swamp

One of largest swamp of Upper Palnis associated with Mannavanur high land grasslands and Mannavanur lake.

d.Pulavachiyar swamp

One of largest swamp of Upper Palnis and it is a major part of Pulavachiyar watercatchment.

e. Vattaparai swamp

It is one of smallest swamp associated with Vattaparai rocky grassland patches.

f.Observatory swamp

It is one of smallest swamp close to exotic plantations and human habitations.

Major threats

Invasion of exotics, low rainfall, illegal encroachment, modification in topography

III.Grassland patches of rocky slopes

These grasslands are located on hill slopes and rocky cliffs; found mostly in middle Palnis and lower slopes of high land grasslands.

The common grass species of these grasslands are listed below.

Carex baccans

Briza minor

Mariscus sumatrensis

Themeda cymbaria

Zenkeria stapfii

Chrysopogon zeylanicus

Cymbopogon nardus

a.Kundar grasslands

A small patch of grassland found in Kundar valley and associated with Kundar streams and wattle plantations.

b.Kilkundar grasslands

A small patch of grassland found below Kundar valley and associated with Kundar streams and wattle plantations.

c. Vattaparai grasslands

Medium size grassland found close to rocky patches of Pillar rocks.

d. Perumal malai peak grasslands

One of largest rocky grasslands found close to Perumal malai peak.

e. Adukkam grasslands

One of scattered distributed grasslands in Middle Palnis.

Major threats

Forest fire, Invasion of exotics, over grazing, poor rainfall, drought, illegal encroachment, land slide, and rock mining.

Community Meeting Report

Date: 15/09/2009 Place: Mannavanur

No of Participants: 36 Time: 11am

A community meeting was conducted by PHCC at Mannavanur village on 15th September 2009. There were 11 persons from Poondi & Polur; 18 persons from Mannavanur village participated from community side. Forest Ranger Mr Nagaiah, Forester Mr.Thirumal pandian and Forest Guard Mr.Palanisamy participated from Kodaikanal forest division, Tamilnadu State forest department. Three researchers Mr.Karthikraja, Mr. Kamalkanth, Mr.Parthipan and nursery manager, Mr. Antony samy from PHCC organized and participated in the meeting.

Minutes of the meeting:

Project researcher Mr. Karthikraja welcomed and explained about the purpose and objectives of the meeting. He also explained significances of shola forest and grasslands, present status of shola and grasslands of Upper Palnis and objectives of ''CEPF Grassland and Shola Research and Restoration of the Palni Hills''. He also answered few queries from community during his speech.

Forest Ranger Mr.Nagaiah also explained about significances of forests, grasslands, wildlife, developmental and preservation works done by State forest department, legal rights of people dwelling close to reserve forest and destructive and illegal activities of forest intruders and poachers.

Mr. Selvaraj from Poondi expressed his views on forest conservation, cultivation and farming practices of olden days, present cropping pattern, irrigation problems and crop damage by wild animals Gaur and Porcupine.

Mr. Mathialagan from Mannavanur expressed his views on man animal conflict, crop damage by wild animals, insufficient measures and remedies from Government side. He also expresses his fear about recent movements of Elephants at Mannavanur.

Then open discussion went on mainly about man animal conflict. Forest Ranger Mr Nagaiah explained state government's remedy schemes on crop damage by wild animals; provided money to farmers in 2007-08, planned future protection measures and present steps to control crop damage. He also answered many queries from community side.

Mr.Karthikraja explained how this project going to be implemented and output of the projects. He also mentioned impacts of this project on livelihood of community. He insisted the need of join hand cooperative work of Community, NGO and Government in conservation efforts. He also clarified doubts and queries about the projects.

The community participants expressed their consent and support to this project and upcoming conservation activities. Also they expect remedies their grief and fulfillment needs from Government. PHCC and Forest officials agreed to represent their grief to Government and rectify the problems soon.

Mr Antony samy, Nursery manager of PHCC thanked all participants from stake holding villages, Forest department officials, CEPF donors, ATREE and meeting organizers.

The tea and snacks had been provided to all participants in between the meeting. Then the meeting ended with lunch.

Pioneer Grassland species and associated plant species for Future Planting

The following pioneer grass species were identified and recorded all over Upper Palnis and some from middle Palnis as suitable for planting at marshy lands, shola patches, restoration sites and rocky slopes. All of these grasses and grassland associated plant species were transplanted to PHCC model nursery; some of them by seed origin and some of them through vegetative parts.

Grassland species

Acorus calamus

Juncus effuses

Juncus inflexus

Juncus bufonius

Juncus leschenaultia

Carex baccans

Carex capillacea

Kyllinga odorata

Carex lindleyana var mercarensis

Carex lindleyana var major

Themeda cymbaria

Carex maculate

Paspalum paspalodes

Sinarundinaria wightiana

Zenkeria stapfii

Chrysopogon zeylanicus

Cymbopogon nardus

Isachne bourneorum

Eriocaulon quinquangulare

Eriocaulon collinum

Eriocaulon pectinatum

Microstegium ciliatum

Fimbristylis dichotoma

Fimbristylis quinquangularis

Eragrostis cilianensis

Eragrostis kiwuensis

Vulpia myuros

Associate species

Anaphalis beddomei

Anaphalis travancorica

Cirsium wallichii

Cyanotis arachnoidea

Fragaria vesca

Hypericum mysurense

Osbeckia leschenaultiana

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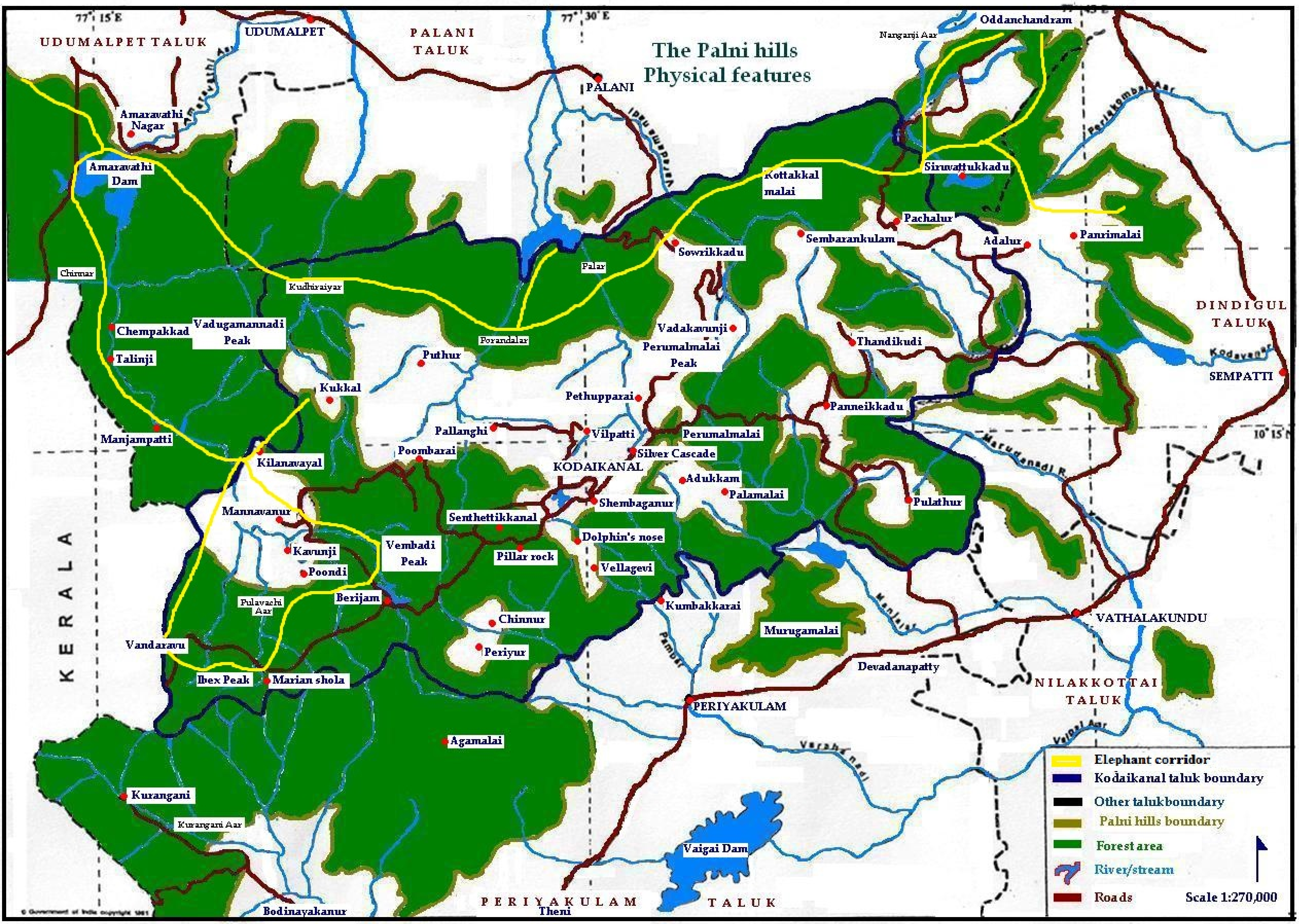
Leucas spp

Tephrosia spp


The Palni hills
Physical features
77° 15'E
77° 30'E
10° 15'N
UDUMALPET TALUK
UDUMALPET
PALANI TALUK
PALANI
Oddanchandram
Nanganji Aar
Amaravathi Nagar
Amaravathi Dam
Amaravathi Aar
Varadhamanadi
Perigombai Aar
Kottakkal malai
Siruvattukkadu
Pachalur
Panrimalai
Adalur
Sembarankulam
Sowrikkadu
Palar
Chinnar
Kudhiraiyar
Porandalar
Chempakkad
Vadugamannadi Peak
Talinji
Puthur
Vadakavunji
Perumalmalai Peak
Thandikudi
DINDIGUL TALUK
Kodavanar
SEMPATTI
Kukkal
Pethupparai
Panneikkadu
Manjampatti
Pallanghi
Vilpatti
Perumalmalai
Poombarai
Silver Cascade
Kilanavayal
KODAIKANAL
Adukkam
Palamalai
Shembaganur
Pulathur
Marudanadi R.
Mannavanur
Senthettikkanal
Dolphin's nose
Vembadi Peak
Kavunji
Pillar rock
Poondi
Vellagevi
KERALA
Pulavachi Aar
Berijam
Kumbakkarai
Chinnur
VATHALAKUNDU
Manjalar
Pamuar
Murugamalai
Vandaravu
Periyur
Devadanapatty
Ibex Peak
Marian shola
NILAKKOTTAI TALUK
PERIYAKULAM
Vaigai Aar
Agamalai
Varaha nadi
Kurangani
Kurangani Aar
Vaigai Dam
PERIYAKULAM TALUK
Theni
Bodinayakanur
Elephant corridor
Kodaikanal taluk boundary
Other taluk boundary
Palni hills boundary
Forest area
River/stream
Roads
Scale 1:270,000

The Palni hills
Physical features

77° 15' E
77° 30' E
10° 15' N

UDUMALPET TALUK
UDUMALPET
PALANI TALUK
PALANI
Oddanchandram
Nanganji Aar
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Amaravathi Nagar
Amaravathi Dam
Varadamanadi
Periakombai Aar
Kottakkal malai
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KERALA
Vandaravu
Periyur
Murugamalai
Manjalar
Pambar
Devadanapatty
Ibex Peak
Marian shola
NILAKKOTTAI TALUK
PERIYAKULAM
Agamalai
Vaigai Dam
Varahanadi
Vaigai Aar
Kurangani
Kurangani Aar
PERIYAKULAM TALUK
Theni
Bodinayakanur

Gaur movement hill villages
Kodaikanal taluk boundary
Other talukboundary
Palni hills boundary
Forest area
River/stream
Roads

Scale 1:270,000

The Palni hills
Physical features

77° 15' E
77° 30' E
10° 15' N

UDUMALPET TALUK
UDUMALPET
PALANI TALUK
PALANI
Oddanchandram
Nanganji Aar
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Amaravathi Nagar
Amaravathi Dam
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KERALA
Vandaravu
Periyur
Pambar
Devadanapatty
Ibex Peak
Marian shola
NILAKKOTTAI TALUK
PERIYAKULAM
Agamalai
Vaigai Dam
Varahanadi
Vaigai Aar
Kurangani
Kurangani Aar
PERIYAKULAM TALUK
Theni
Bodinayakanur

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Possible wasteland villages for Planting
Kodaikanal taluk boundary
Other talukboundary
Palni hills boundary
Forest area
River/stream
Roads
Scale 1:270,000

The Palni hills
Physical features

77° 15' E
77° 30' E
10° 15' N

UDUMALPET TALUK
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PALANI TALUK
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Nanganji Aar
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SEMPATTI
Kukkal
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Chinnur
Murugamalai
KERALA
Vandaravu
Periyur
Pambar
Devadanapatty
Ibex Peak
Marian shola
NILAKKOTTAI TALUK
PERIYAKULAM
Agamalai
Vaigai Aar
Varahar nadi
Kurangani
Kurangani Aar
Vaigai Dam
PERIYAKULAM TALUK
Bodinayakanur
Theni

Possible Extented habitats
Kodaikanal taluk boundary
Other talukboundary
Palni hills boundary
Forest area
River/stream
Roads

Scale 1:270,000

Strategy Document for multiplying high altitude ecotype of *Apis cerana indica* with pollinator potential for forest plant species

Background: The Indian or Asian Hive bee exists/ resides in different eco climatic zones at the Western ghats. There is an ecotype which habits the Foothills Plains of WG and extends its range up to an altitude of 750 meters, these colonies are populated by workers and queen that show a golden yellow abdomen Their cell size is 4.5mm (average of 10 colonies). Above this elevation, one can see the black race or Black ECO Type, which is larger and also builds colonies to strengths that match the European Bee (Apis melliferae) in volumes, there are reports of a single colony found in a termite mound at Palnis, where the Rev Fr.Newton who invented the Newton hive estimated that the colony had approximately 80 000 bees. The cell size is larger at 4.7 mm and the Comb Center distance is 27mm as opposed to 25 mm in the foothill plains variety.

Special attributes of the Upper Hills Black Ecotype of Apis cerana indica

1. Apart from cavity nesting in the wild, this eco-type is often found in ground level inside termite mounds and cavities
2. Presence of multiple queens in colonies at termite mounds

3. Growing to about 35 litres in volume when housed in suitable hives

4. Nesting also on side walls of manmade contour terraces where vegetable cultivation takes place

Pollinator Potential

The Black Ecotype Apis cerana holds much potential for pollinator services of cultivated as well as wild / forest species of trees shrubs and creeper, as large colony volumes, mean many workers attending to a single species of flower in any given flowering period.

Reasons for Declining population of* Apis cerana I *at Upper Palnis

1. Increased use or ground application of FURADON (generic name Phorate) for control of nematodes and aphids by farmers, in potatoes and bananas

2. Use of Glyphosate and Paraquat as weed killers that eliminate all short term flowering plants in the Upper Hill vegetable fields.

3. Replacement of Upper Grasslands with wattle and further spread of wattle as an invasive , that has little or no undergrowth , thereby reducing forage for wild and hived colonies of Apis cerana
(though flowering frequently both Black and Silver Wattle (*Acacia mearnsii* and *A dealbata*) are pollen flowers with little or no nectar hence are not favoured by honey bees of all Apis genus

The past work of PHCC
The PHCC has been working with Burnt Clay Top Bar Hives at the foothills with the yellow race of the Hive bee Apis cerana I, where farmers or beekeepers keep bee colonies in Burnt Clay Top bar Hives that provide cool and dry conditions for the colony at the hot and arid plains.

The Strategy for Multiplication of Dark or Black Ecotype of Apis cerana indica at Upper Palnis

1. Place Burnt Clay Top Bar Hives in farms close to an existing SHOLA patch at Upper Hills village of Poomparai and Kavunji, where traditionally Mannadiar communities kept hive on the side walls of terraced vegetable fields.

2. The hives are buried under mud in the terrace walls with only one 25mm PVC pipe coming out as entrance,

3. The hives are buried with an active colony inside and there is no further hive or colony management

4. The colonies thus buried were observed to issue new swarms at regular intervals.

5. The new swarms will either be hived or make home in tree cavities in the shola forest nearby

6. It was observed that FIVE such buried colonies could issue six to seven swarms during the prime swarming season of February March and a minimum of three swarms during second swarming season of September in each calendar year

7. Hence each such Buried Top Bar Clay Hive with single entrance had potential to multiply colony numbers by a factor of 10 , thus increasing the number of worker bees and colonies in the vicinity of SHOLA forests and paving way for better pollination services from the Dark Race of A c I

Discussion

With increasing use of Pesticides and chemicals dangerous to bee colonies there is acute decline of Apis genus of bees at Upper Palni Hills. Measures to counter these are a priority so as to ensure pollination of field crops as well as forest species, as the SHOLA forest is shrinking in area each year and seed availability of some of the 40 -50 shola tree species depends upon good pollination service and consequent fruit and seed set.

Hence a strategy to help improve colony numbers was formulated during the grasslands project with assistance from beekeepers of the PHCC working at Middle Altitudes as well as foothills plains.

The Burnt Clay Top Bar Hives are fabricated at the plains tree growing centre of Viruveedu and sent to various forest areas to be colonized and buried underground in suitable places.

Conclusion

With increasing mortality of bee colonies all over the world due to disease, environmental degradation and pesticide use, it is important for organizations like PHCC to place colonies in suitable hives, where the emphasis will be on pollination services instead of honey production.

Report on Migratory pattern of the Giant Honey Bee or Rock bee *Apis dorsata* vis a vis flowering of grasses and shola plants.

In cooperation with Moopar and Paliyar Tribes persons residing at Villages of Oothu at Middle Hills – 1100 mts elevation and Kombaipatti in the foothills plains

Background:
PHCC and honey hunters have been interacting for almost two decades, starting with
Honey Hunters tribes persons of Mooppar Community at the foothills and Paliyars at Oothu settlement at Middle Hills. The tribes persons bring honey along with intact combs to the PHCC tree growing centre of Viriveedu where the honey is passively processed using solar heaters and pollen is removed using butter paper by one or two women, depending upon the volume of honey combs.

Data collection at Viruveedu tree nursery:
When a honey hunter brings in combs, he is querried as to the source of the honey and also the site of collection; this information is stored in hand written notebooks.
Apart from taking data from these hand written notes, the grasslands team visited the Viruveedu centre and also the two tribal settlements at Oothu and Kombaipatty to interact with the honey hunters to gather information on movements of the Rock bee colonies.

Observed and inferences on migration of *Apis dorsata*

The Rock bee colonies are showing a clear migratory pattern between the Middle Hills and the Foothills Plains at Palni Hills. The migration takes place twice each year, once in February-March and again during September. These periods correspond to flowering of forest species and major and minor nectar flows respectively.

The colonies select tall trees or rock overhangs in the mountains as well as foothills plains. The rockbee has also become urbanized and the preferred nesting space are tall buildings and underneath water tanks.

It was observed that during the Winter Monsoon of North East the rains are falling in the mountains through the months of October, November and even till Middle of December, corresponding to the Tamil calendar months of Iippasi and Karthigai. The rock bee colonies migrate from the Hills to the plains during this period of heavy rains at the Hills and reside at coconut plantations, foraging on cultivated crops like Drum stick (*Moringa oleifera*), Rainfed sesame and Banana.

After the rains are over and mild cold temperatures set in the flowering of *Euphorbias* ; *Calotropis* and *Pterolobium* species of shrubs which are plenty at the outer slopes of Palni Hills , that are also severely degraded forests due to grazing and fire wood gathering , The colonies are settled in foothills coconut gardens and forage at the outer slopes. The nectar flow lasts for about two months staring from Middle December till Middle of February.

With the onset of summer in the plains, the rock bee colonies migrate to the Middle Hills where coffee is grown extensively. They stay at the mountains during the months of March April and May

when the mixed forests coffee eco system has many trees and shrubs apart from coffee flower and provide nectar for the colonies.

The tribes person harvest honey from the colonies that are nesting on rock crevices or on tall tress of *Albizzia stippularis* (popularly known as arappu usil). The colonies stay at the mountains till the start of the South West Monsoon rains, which are intermittent at Palni Hills, but the nectar flow starts to recede during Middle of July and the colonies again migrate towards the plains where cultivated crops are their forage source.

It is reported by tribes persons that when South West Monsoon rains are good and pulses are sown in the foothill farm lands , the Rock bee forages on the Red Gram (*Cajanus cajan*) but since early 1990's the SW monsoon rains have completely failed under the rain shadow areas of foothills of Palni Hills range. The rock bee forages on neem (*Azadirachta indica*) which there are plenty of trees in farmlands as shelterbelts and as avenue trees in many small towns and villages.

The colonies are seen at farmlands, coconut groves and urban water tanks till the end of the windy season, which is till Middle of August, after wards they migrate to the mountains again to exploit the minor nectar flow season of September and reside at the hills till the onset of the North East Monsoon which is till middle or even till the end of October,

The colonies have little nectar during the September flow period and the tribes persons report that they do not harvest the honey during this period as this may lead to extinction of colonies. For the two month period November, December and till the end of January (roughly corresponding to the harvest festival of Pongal) the colonies reside at the foothills garden lands. Here they feed on cultivated crops like Drumstick, Tuberose and Coriander.

A manuscript on pioneer grasses and native trees for future restoration

I Shola restoration

Shola of Upper Palnis are pristine and age old forests. The artificial regeneration and planting can support some extent. PHCC is doing its planting operations and conservation activities in shola patches for two decades. Below plants and trees are raised in our nursery and planted in Shola patches. The survival and growth is vary depends upon the individual species.

Botanical Name	**Family**
Michelia nilagirica	*Magnoliaceae*
Michelia Chambaca	*Magnoliaceae*
Mahonia Leschenaultii	*Berberidaceae*
Elaeocarpus glandulosus	*Elaeocarpaceae*
Elaeocarpus recurvatus	*Elaeocarpaceae*
Euodia fraxinifolia	*Rutaceae*
Todalia asiatica var. floribunda	*Rutaceae*
Gomphandra coriacea	*Icacinaceae*
Ilex wightiana	*Aquifoliaceae*
Euonymus crenulatus	*Celastraceae*
Meliosma simplicifolia ssp pungens	*Sabiaceae*
Turpinia nepalensis	*Staphyleaceae*
Erythrina sykesii	*Papilionoideae*
Photinia integrifolia var sublanceolata	*Rosaceae*
Syzygium caryophyllatum	*Myrtaceae*
Syzygium densiflorum	*Myrtaceae*
Memecylon randerianum	*Melastomataceae*
Tibouchina urvilleana	*Melastomataceae*
Schefflera racemosa	*Araliaceae*

Viburnum cylindricum	*Caprifoliaceae*
Lasianthus acuminatus	*Rubiaceae*
Pavetta breviflora	*Rubiaceae*
Psychotia nilgiriensis var nilgiriensis	*Rubiaceae*
Tarenna flava	*Rubiaceae*
Gaultheria fragrantissima	*Ericaceae*
Rhododendron arboreum ssp.lagiricum	*Ericaeae*
Vaccinium leschenaultii	*Ericaeae*
Isonadra perrottetiana	*Sapotaceae*
Symplocos cochinchinesis ssp laurinia	*Symplocaceae*
Symplocas foliosa	*Symplocaceae*
Chionanthus ramiflorus	*Oleaceae*
Olea paniculata	*Oleaceae*

II. Grassland restoration

Grassland restoration practices are new to PHCC, though we tried tree planting in watercatchments of Upper Palnis. We have tried in our nursery with all of checklisted grass species. Some of them regenerated well in nursery. Bare root transplanting is better option in case of most grass species. Suitable grass species and associate plants for suitable biotype are listed below.

I. Open grasslands in high lands

Carex baccans

Carex capillacea

Carex lindleyana var mercarensis

Carex lindleyana var major

Isachne bourneorum

Anaphalis beddomei

Anaphalis travancorica

II. Marshes and Swamps

Acorus calamus

Juncus effuses

Juncus inflexus

Juncus bufonius

Cirsium wallichii

Cyanotis arachnoidea

Fragaria vesca

Oxalis spp

Persicaria peduncularis

Plectranthus malabaricus

Smilax aspera

III. Grassland patches of rocky slopes

Carex baccans

Briza minor

Mariscus sumatrensis

Themeda cymbaria

Zenkeria stapfii

Chrysopogon zeylanicus

Cymbopogon nardus

Cirsium wallichii

Cyanotis arachnoidea

Hypericum mysurense

Osbeckia leschenaultiana

Hypericum patulum

Hedyotis swertioides

Hedyotis articularis

Hedyotis leschenaultiana

Solanum pubescens

Malus baccata

Leucas spp