

**BOTANICAL OBSERVATIONS ON THE PURULIA PUMPED STORAGE
HYDROPOWER PROJECT AREA, BAGMUNDI HILLS,
PURULIA DISTRICT, WEST BENGAL**

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A B S T R A C T

The paper presents a vegetation and floristic account of the proposed Purulia pumped storage hydropower project at Bagmundi hills, Purulia district, West Bengal. The primary impact of the project would be submerging of c. 4 sq. km. area of forest for construction of two rock filled dams. A total number of 246 species under 192 genera belonging to 78 families have been identified from the area, of which 54 species are ethnobotanically significant.

INTRODUCTION

Dams are largely recognized in the capacity to generate hydroelectric power and augment agricultural production. A major conflict occurs between development and biodiversity conservation when projects are located in the wilderness areas. Forests and wildlife have been directly and indirectly impacted by the hydroelectric and irrigation projects. The inundation of forests by the hydroelectric projects can cause a major threat to biodiversity of that region. India is a major dam builder among the developing countries. A total number 246 major and 1,059 medium river valley projects, 65 major and 625 medium projects were completed between 1951-1985.

With a view to develop an adequate energy storing system in the eastern region for augmenting the peak demand, a pumped storage hydropower project has been contemplated

in the district of Purulia, West Bengal having an installed capacity of 900 MW with the financial assistance of Japan. On completion of this project four square kilometer of forest would be submerged for construction of 2 dams, one upper dam and another lower dam. This would be one of the major primary impacts on wildlife and their habitat in this area.

AREA OF STUDY

The project area lies in the Bagmundi hill range of Purulia district (22°43'N and 23°42'N, 85°49'E and 86°54'E). The tropic of cancer passes through the north of this district. The average altitude is of 400 m and at certain places this rises to 600 m.

Soil : The soil is of laterite type but at many places there are thick deposits of clay, which sometimes attain a thickness of 18 m on the northern base of Bagmundi plateau.

Climate : The area is dry like other parts of the district, from early March till the end of May or beginning of June, hot west winds prevail and the temperature in shade rises to 34°C and sometimes several degrees higher, the night temperature falls considerably. The rains set in about the middle of June and last till the middle of September. The air is comparatively dry in the intervals between showers. In October cooler currents of air from the north and west set in and by the end of the month the cold weather is ordinarily well established.

Rainfall : The normal annual rainfall of the study area varies from 124.33 to 139.57 cm. The average rainfall from June to September constitutes nearly 78 per cent of the annual precipitation.

Vegetation : The area from the point of view of vegetation is an extension of the floristically rich hilly plateau of Bihar, Orissa and represents a distinct type of flora related to the adjoining drier areas of the two states. The area is considerably dry and hot except a few heavy showers during the monsoon and has allowed in the growth of only one kind of forest under Tropical sub-humid Deciduous type dominated by natural forest of *Shorea robusta* (Sal). But continuous biotic influences have changed its typical character and now the forest density becomes thinner and continuous stretch has been broken. The study area is also traversed by several narrow streams and those almost remain dry except the rainy season.

Shorea has been observed to be associated with the tree species like *Terminalia crenulata*, *Terminalia bellirica*, *Terminalia arjuna*, *Anogeissus latifolia*, *Mangifera indica*, *Dalbergia lanceolaria*, *Bridelia retusa*, *Diospyros exculpta*, *Diospyros cordifolia*, *Madhuca indica*, *Litsea glutinosa*, *Butea monosperma*, *Dillenia pentagyna*, *Kydia calycina*, *Garuga pinnata*, etc. The hill tops are lined up with *Cochlospermum religiosum*. The average height of the tree species varies from 10-20 m. The other associates of the study area composed of shrubs, woody climbers or small trees like *Ziziphus mauritiana*, *Ziziphus oxyphylla*, *Croton oblongifolius*, *Morinda tomentosa*, *Pavetta indica*, *Canthium dicoccum*, *Gardenia latifolia*, *Derris scandens*, *Holarrhena antidysenterica*, *Combretum decandrum*, *Celastrus paniculatus*, *Alangium salvifolium*, *Flacourtia indica*, *Woodfordia fruticosa*, etc.

Common herbs and undershrubs are : *Argemone mexicana*, *Cleome viscosa*, *Sida cordifolia*, *Sida acuta*, *Oxalis corniculata*, *Tephrosia purpurea*, *Mimosa pudica*, *Tridax procumbens*, *Eclipta alba*, *Heliotropium indicum*, *Evolvulus nummularius*, *Scoparia dulcis*, *Lindernia parviflora*, *Rungia pectinata*, *Hygrophila auriculata*, *Clerodendrum viscosum*, *Leucas cephalotus*, *Boerhavia diffusa*, *Alternanthera sessilis*, *Amaranthus spinosa*, *Achyranthes aspera*, *Croton bonplandianum*, *Cyanotis tuberosa*, *Arisaema tortuosum*, etc.

Common climbers and twiners are *Tinospora cordifolia*, *Cocculus hirsutus*, *Ampelocissus latifolia*, *Ampelocissus tomentosa*, *Abrus precatorius*, *Bauhinia vahlii*, *Passiflora foetida*, *Momordica dioica*, *Pergularia daemia*, *Cuscuta reflexa*, etc.

Common aquatic and marsh plants are *Ludwigia adscendens*, *Ludwigia octovalvis* ssp. *sessiliflora*, *Ludwigia perennis*, *Polygonum barbatum*, *Polygonum hydropiper*, *Polygonum plebejum*, *Cyperus cyperoides*, etc. *Salix tetraphylla* occurs by the side of the stream. *Equisetum debile* is also found to grow in the dry streams in sandy soil. Common ferns are *Cheilanthes farinosa*, *Polypodium simplex*, *Pteris pellucida*.

All the specimens collected on various excursions have been properly preserved and deposited in the Central National Herbarium (CAL), Botanical Survey of India, Howrah.

Floristic analysis : The annotated list of species is appended. The list also includes the distribution status of each species in the study area largely based on the field observations. The list comprises of a total of 246 species of 192 genera from 78 families.

	Families	Genera	Species
Monocotyledons	11	28	35
Dicotyledons	65	160	207
Pteridophytes	2	4	4
Total	78	192	246

Trees were represented by 56 species followed by herbs (91), shrubs (48), climbers/lianas (34) and grass/sedge (17). None of the species from this area falls under the category of threatened plants and none of the species were found to be endemic to this region.

Table I. Plant species recorded from PPSP area :

Family/Species	Habit*	Distribution status**
Dicotyledons :		
Dilleniaceae		
<i>Dillenia pentagyna</i> Roxb.	T	F
Annonaceae		
<i>Miliusa tomentosa</i> (Roxb.) Sinclair	T	F

*(Habit of species are represented by the following symbols : H = Herb, S = Shrub, U = Undershrub, T = Tree, ST = Small tree, C = Climber/liana and PR = Parasite.

**Distribution status is represented by the symbols : R = Rare, O = Occasional, F = Frequent, A = Abundant).

Family/Species	Habit	Distribution status
Menispermaceae		
<i>Cissampelos pareira</i> L.	C	F
<i>Tinospora cordifolia</i> (Willd.) Miers.	C	F
Papaveraceae		
<i>Argemone maxicana</i> L.	H	F
Capparidaceae		
<i>Capparis zeylanica</i> L.	C	F
<i>Cleome monophylla</i> L.	H	F
Cochlospermaceae		
<i>Cochlospermum religiosum</i> (L.) Alston	T	A
Polygalaceae		
<i>Polygala erioptera</i> DC.	C	O
Caryophyllaceae		
<i>Polycarpon prostratum</i> (Forsk.) Aschers. & Schweinf.	H	F
Portulacaceae		
<i>Portulaca oleracea</i> L.	H	F
Elatinaceae		
<i>Bergia ammannioides</i> Heyne ex Roth	H	O
Dipterocarpaceae		
<i>Shorea robusta</i> Gaertn.f.	T	A
Malvaceae		
<i>Kydia calycina</i> Roxb.	T	O
<i>Sida acuta</i> Burm.f.	H	F
<i>S. cordifolia</i> L.	H	F
<i>Thespesia lampas</i> Dalz. & Gibs.	S	O

Family/Species	Habit	Distribution status
Bombacaceae		
<i>Bombax ceiba</i> L.	T	F
Sterculiaceae		
<i>Byttneria herbacea</i> Roxb.	H	O
<i>Helicteris isora</i> L.	S	O
<i>Sterculia urens</i> Roxb.	T	F
Tiliaceae		
<i>Grewia asiatica</i> L.	T	O
<i>Triumfetta rhomboidea</i> Jacq.	H	A
Oxalidaceae		
<i>Oxalis corniculata</i> L.	H	A
Rutaceae		
<i>Murraya paniculata</i> (L.) Jacq.	S	O
<i>Naringi crenulata</i> (Roxb.) Nicolson	T	O
Burseraceae		
<i>Garuga pinnata</i> Roxb.	T	O
Celastraceae		
<i>Celastrus paniculatus</i> Willd.	S	A
Rhamnaceae		
<i>Ventilago denticulata</i> Willd.	C	C
<i>Zizyphus mauritiana</i> Lamk.	ST	A
<i>Z. oxyphylla</i> Edgew.	S	O
<i>Z. oenophila</i> (L.) Mill.	S	A
<i>Z. rugosa</i> Lamk.	ST	O
Vitaceae		
<i>Ampelocissus latifolia</i> (Roxb.) Planch.	C	A
<i>A. tomentosa</i> (Roth) Planch.	C	A

Family/Species	Habit	Distribution status
<i>Leea edgeworthii</i> Santapau	C	O
Sapindaceae		
<i>Cardiospermum halicacabum</i> L.	H	A
Anacardiaceae		
<i>Buchanania lanzan</i> Spreng.	T	O
<i>Mangifera indica</i> L.	T	O
Papilionaceae		
<i>Abrus precatorius</i> L.	C	A
<i>Alysicarpus bupleurifolius</i> (L.) DC.	H	A
<i>Atylosia scarabaeoides</i> (L.) Benth.	H	F
<i>Butea monosperma</i> (Lamk.) Taub.	T	F
<i>B. parviflora</i> Roxb.	C	A
<i>B. superba</i> Roxb.	C	A
<i>Crotalaria albida</i> Heyne ex Roth	U	A
<i>C. calycina</i> Schrank.	H	O
<i>C. prostrata</i> Roxb.	H	A
<i>Dalbergia volubilis</i> Roxb.	S	O
<i>Derris indica</i> (Lamk.) Bennet	T	O
<i>Desmodium diffusum</i> DC.	H	F
<i>D. gangeticum</i> (L.) DC.	H	F
<i>D. pulchellum</i> (L.) Benth.	S	O
<i>D. triflorum</i> (L.) DC.	H	A
<i>D. velutinum</i> (Willd.) DC.	U	O
<i>Indigofera cassioides</i> Rottl. ex DC.	S	A
<i>I. linifolia</i> (L.f.) Retz.	H	F
<i>I. tinctoria</i> L.	U	F
<i>Maughania bracteata</i> (Roxb.) H.L. Li	S	R
<i>Millettia auriculata</i> Baker	C	F
<i>Pseudathria viscida</i> (L.) Wt. & Arn.	H	A

Family/Species	Habit	Distribution status
<i>Tephrosia purpurea</i> (L.) Pers.	H	A
<i>Uraria alopecuroides</i> (Roxb.) Wt.	U	A
<i>Zornia gibbosa</i> Span.	H	F
Caesalpiniaceae		
<i>Bauhinia variegata</i> L.	T	A
<i>B. vahlii</i> Wt. & Arn.	C	F
<i>Cassia absus</i> L.	H	O
<i>C. fistula</i> L.	T	F
<i>C. mimosoides</i> L.	H	F
<i>C. occidentalis</i> L.	U	A
Mimosaceae		
<i>Mimosa pudica</i> L.	U	A
<i>M. rubicaulis</i> Lamk.	S	A
Combretaceae		
<i>Anogeissus latifolia</i> (DC.) Wall. ex Bedd.	T	O
<i>Combretum decandrum</i> Roxb.	T	O
<i>C. roxburghii</i> Spreng.	T	O
<i>Terminalia arjuna</i> (Roxb.) Wt. & Arn.	T	F
<i>T. bellirica</i> (Gaertn.) Roxb.	T	F
<i>T. chebula</i> (Gaertn.) Retz.	T	F
<i>T. tomentosa</i> (Roxb.) Wt. & Arn.	T	O
Myrtaceae		
<i>Syzygium cumini</i> (L.) Skeels	T	A
Lecythidaceae		
<i>Careya arborea</i> Roxb.	T	O
Lythraceae		
<i>Ammania baccifera</i> L.	H	A
<i>Woodfordia fruticosa</i> (L.) Kurz	S	A

Family/Species	Habit	Distribution status
Onagraceae		
<i>Ludwigia adscendens</i> (L.) Hara	H	A
<i>L. octovalvis</i> (Jacq.) Raven	H	O
ssp. <i>sessiliflora</i> (Mich.) Raven		
<i>L. perennis</i> L.	H	F
Passifloraceae		
<i>Passiflora foetida</i> L.	C	A
Cucurbitaceae		
<i>Cephalandra indica</i> Naud.	C	F
<i>Coccinia grandis</i> (L.) Voigt	C	F
<i>Momordica dioica</i> Roxb. ex Willd.	C	A
<i>Trichosanthes bracteata</i> (Lam.) Voigt	C	F
<i>T. cucumerina</i> L.	C	A
Molluginaceae		
<i>Mollugo stricta</i> L.	H	A
Apiaceae		
<i>Centella asiatica</i> (L.) Urban.	C	A
Araliaceae		
<i>Heptapleurum venulosum</i> Seem	C	O
Alangiaceae		
<i>Alangium salvifolium</i> (L.f.) Wangerim	T	A
Rubiaceae		
<i>Adina cordifolia</i> (Roxb.) Hook.f.	T	A
<i>Borreria articularis</i> (L.f.) F.N. Williams	H	A
<i>Canthium dicoccum</i> (Gaertn.) Teys. & Binn.	T	A
<i>Dentella repens</i> (L.) J.R. & G. Forst.	H	A
<i>Gardenia gummifera</i> L.f.	S	R
<i>G. latifolia</i> Ait.	T	O

Family/Species	Habit	Distribution status
<i>G. turgida</i> Roxb.	T	O
<i>Hedyotis nitida</i> Wt. & Arn.	H	O
<i>Ixora arborea</i> Roxb.	T	F
<i>Knoxia diandra</i> Roth	H	O
<i>K. sumatrensis</i> (Retz.) DC.	H	A
<i>Meyna laxiflora</i> Robyns.	S	O
<i>Mitragyna parvifolia</i> (Roxb.) Korth.	T	O
<i>Pavetta indica</i> L.	S	F
<i>Thecagonum ovalifolium</i> (Cav.) Babu	H	O
<i>Wendlandia exserta</i> (Roxb.) DC.	T	O
<i>W. tinctoria</i> DC.	T	R
<i>Xeromphis spinosa</i> (Thunb.) Keay	S	R
Asteraceae		
<i>Ageratum conyzoides</i> L.	H	A
<i>Caesulia axillaris</i> Roxb.	H	O
<i>Cyathocline purpurea</i> (Buch.-Ham. ex D.Don.) H O. Kuntze	H	O
<i>Eclipta alba</i> (L.) Hassk.	H	A
<i>Elephantopus scaber</i> L.	H	O
<i>Emilia sonchifolia</i> (L.) DC. ex Wt.	H	F
<i>Tridax procumbens</i> L.	H	A
<i>Vernonia cinerea</i> (L.) Less.	H	A
Myrsinaceae		
<i>Ardisia humilis</i> Vahl	ST	O
<i>Embelia tsjeriam-cottam</i> A.DC.	T	O
Sapotaceae		
<i>Madhuca indica</i> Gmel.	T	O
Ebenaceae		
<i>Diospyros exsculpta</i> Buch.-Ham.	ST	A

Family/Species	Habit	Distribution status
<i>D. melanoxylon</i> Roxb.	ST	A
<i>D. montana</i> Roxb.	ST	O
Symplocaceae		
<i>Symplocos racemosa</i> Roxb.	T	R
Oleaceae		
<i>Linociera ramiflora</i> (Roxb.) Wall. ex G.Don	S	O
<i>Nyctanthes arbor-tristis</i> L.	S	A
Apocynaceae		
<i>Carissa paucinervis</i> A. DC.	S	O
<i>C. spinarum</i> L.	S	A
<i>Holarrhena antidysenterica</i> (L.) Wall.	S or ST	A
<i>Ichnocarpus frutescens</i> (L.) R. Br.	S	A
Asclepiadaceae		
<i>Ceropegia hirsuta</i> Wt. & Arn.	C	O
<i>Cryptolepis buchanani</i> Roem. ex Schult.	C	O
<i>Gymnema sylvestre</i> (Retz.) R. Br. ex Schult.	C	F
<i>Hemidesmus indicus</i> (L.) R. Br.	C	A
<i>Holostemma annulare</i> (Roxb.) Schum.	C	O
<i>Pergularia daemia</i> (Forsk.) Choiv.	C	A
Gentianaceae		
<i>Canscora decussata</i> (Roxb.) Schult.	H	F
<i>C. diffusa</i> (Vahl) R. Br.	H	F
Ehretiaceae		
<i>Cordia dichotoma</i> Forst.f.	T	O
Boraginaceae		
<i>Heliotropium indicum</i> L.	H	O

Family/Species	Habit	Distribution status
Convolvulaceae		
<i>Cuscuta reflexa</i> Roxb.	C	A
<i>Erycibe paniculata</i> Roxb.	S or T	O
<i>Evolvulus alsinoides</i> (L.) L.	H	A
<i>E. nummularius</i> (L.) L.	C	A
<i>Ipomea eriocarpa</i> R. Br.	H	A
<i>Jacquemontia paniculata</i> Hallier	H	O
Solanaceae		
<i>Datura metel</i> L.	H	O
Scrophulariaceae		
<i>Bacopa monnieri</i> (L.) Wettstein	H	A
<i>Lindernia parviflora</i> (Roxb.) Haines	H	F
<i>Scoparia dulcis</i> L.	H	A
Acanthaceae		
<i>Andrographis paniculata</i> (Burm.f.) Wall. ex Nees	H	F
<i>Barleria cristata</i> L.	U	F
<i>B. strigosa</i> Willd.	S	R
<i>Cardenthera difformis</i> L.f.	H	O
<i>Eranthemum purpurascens</i> Nees	U	A
<i>Hemigraphis latebrosa</i> (Roth) Nees	H	O
<i>Justicia diffusa</i> Willd.	H	A
<i>Ruellia tuberosa</i> L.	U	O
Verbenaceae		
<i>Clerodendrum viscosum</i> Vent	S	O
<i>Holmskioldia sanguinea</i> Retz.	C	O
<i>Lantana camara</i> L.	S	A
<i>Lippia javanica</i> (Burm.f.) Spreng.	S	O

Family/Species	Habit	Distribution status
<i>Premna flavescens</i> Hamilton ex Clarke	T	R
<i>Vitex negundo</i> L.	S	F
Lamiaceae		
<i>Anisomeles indica</i> (L.) O. Kuntze	H	F
<i>Leucas mollissima</i> Wall. ex Benth.	H	A
<i>Orthosiphon rubicundus</i> Benth.	H	R
<i>Pogostemon benghalensis</i> (Burm.f.) O. Kuntze	U	O
Nyctaginaceae		
<i>Boerhavia diffusa</i> L.	H	F
Amaranthaceae		
<i>Achyranthes aspera</i> L.	H	F
<i>Aerva lanata</i> (L.) Juss.	H	O
<i>Alternanthera sessilis</i> (L.) R. Br.	H	O
<i>Amaranthus spinosus</i> L.	H	A
<i>Celosia argentea</i> L.	H	F
Chenopodiaceae		
<i>Chenopodium ambrosioides</i> L.	H	O
Polygonaceae		
<i>Polygonum barbatum</i> L.	H	A
<i>P. hydropier</i> L.	H	A
<i>P. plebejum</i> R. Br.	H	F
Lauraceae		
<i>Cassytha filiformis</i> L.	C, PR	A
<i>Litsea glutinosa</i> (Lour.) Roxb.	T	O
Loranthaceae		
<i>Viscum articulatum</i> Burm.f.	S, PR	F

Family/Species	Habit	Distribution status
<i>V. orientale</i> Willd.	S, PR	F
Euphorbiaceae		
<i>Acalypha indica</i> L.	H	F
<i>Antidesma diandrum</i> (Roxb.) Roth	S	O
<i>Bridelia retusa</i> Spreng.	T	A
<i>B. stipularis</i> Bl.	S	O
<i>Croton bonplandianum</i> Baill.	H	A
<i>C. oblongifolius</i> Roxb.	S	A
<i>Euphorbia hirta</i> L.	H	A
<i>E. hypericifolia</i> L.	H	O
<i>Jatropha curcas</i> L.	S	F
<i>Mallotus philippensis</i> (Lam.) Muell.-Arg.	S	O
<i>M. repandus</i> (Willd.) Muell.-Arg.	S	O
<i>Phyllanthus emblica</i> L.	T	A
<i>P. virgatus</i> Forst.f.	H	A
Ulmaceae		
<i>Holoptelea integrifolia</i> (Roxb.) Planch.	T	F
<i>Trema orientalis</i> (L.) Bl.	T	O
Moraceae		
<i>Ficus heterophyllus</i> Roxb.	ST	A
<i>F. hispida</i> L.f.	S	F
<i>F. racemosa</i> L.	ST	A
<i>Streblus asper</i> Lour.	T	A
Salicaceae		
<i>Salix tetraphylla</i> Roxb.	T	F
Monocotyledons :		
Orchidaceae		

Family/Species	Habit	Distribution status
<i>Luisia teratifolia</i> Gaud.	H	F
<i>Vanda tessellata</i> (Roxb.) Hook. ex G. Don	H	A
Zingiberaceae		
<i>Costus speciosus</i> (Koenig ex Retz.) J. E. Smith	H	R
<i>Curcuma aromatica</i> Salisb.	H	O
<i>Globba bulbifera</i> Roxb.	H	F
Hypoxidaceae		
<i>Curculigo orchiodes</i> Gaertn.	H	O
Amaryllidaceae		
<i>Pancratium biflorum</i> Roxb.	S	O
Dioscoreaceae		
<i>Dioscorea bulbifera</i> L.	C	A
<i>D. glabra</i> Roxb.	C	F
<i>D. hispida</i> Dennst.	C	F
<i>D. pentaphylla</i> L.	C	F
Liliaceae		
<i>Chlorophytum arundinaceum</i> Baker	H	O
<i>Gloriosa superba</i> L.	H	R
<i>Asparagus racemosus</i> Willd.	U	A
Smilacaceae		
<i>Smilax zeylanica</i> L.	S	A
Commelinaceae		
<i>Murdannia scapiflora</i> (Roxb.) Royle	H	F
<i>Cyanotis tuberosa</i> (Roxb.) Schult.f.	H	O
Araceae		
<i>Arisaema tortuosum</i> Schot.	H	O

Family/Species	Habit	Distribution status
Cyperaceae		
<i>Bulbostylis barbata</i> (Rottb.) Cl.	H	F
<i>Cyperus cyperoides</i> (L.) O. Ktze.	H	O
<i>C. nutans</i> Vahl	H	A
<i>C. rotundus</i> L.	H	A
<i>C. triceps</i> (Rottb.) Enol.	H	A
<i>Fimbristylis dichotoma</i> (L.) Vahl	H	A
Poaceae		
<i>Bambusa tulda</i> Roxb.	H	O
<i>Brachiaria ramosa</i> (L.) Stapf	H	O
<i>Digitaria sanguinalis</i> (L.) Scop.	H	O
<i>Eragrostis brachyphylla</i> (Stapf) Br.	H	A
<i>E. coarctata</i> Stapf	H	A
<i>Heteropogon contortus</i> (L.) Beauv. ex Roem. & Schult.	H	A
<i>Panicum psilopodium</i> Trin.	H	O
<i>Perotis indica</i> (L.) O. Ktze.	H	A
<i>Polypogon monspeliensis</i> (L.) Desf.	H	F
<i>Sporobolus indicus</i> (L.) R. Br.	H	F
<i>Thysanolaena maxima</i> (Roxb.) O. Ktze.	H	F
Pteridophytes :		
Polypodiaceae		
<i>Cheilanthes farinosa</i> (Forsk.) Kaulf.	H	F
<i>Polypodium simplex</i> Sw.	H	F
<i>Pteris pellucida</i> Presl.	H	F
Equisetaceae		
<i>Equisetum debile</i> Roxb.	H	O

Table II. Ethnobotanically important species from PPSP area

Botanical names	Local names	Uses
<i>Abrus precatorius</i> L.	Kunch	Root decoction is used for fever and also white eye disease of cattle.
<i>Achyranthes aspera</i> L.	Apang	Root paste is used externally to cure the wounds.
<i>Adina cordifolia</i> (Roxb.) Hook.f.	Karam	Stem bark is used internally for acute fever.
<i>Alternanthera sessilis</i> (L.) R. Br. ex DC.	Sincheshak	Leaf is used as vegetable.
<i>Amaranthus spinosus</i> L.	Kanta note	Leaves and young stem are used as vegetables. Whole plant is also given to cow for more milk. Root paste is given internally to cure blood dysentery.
<i>Ampelocissus tomentosa</i> (Roth) Planch.	—	Root paste is used to cure venereal diseases, boils and pain.
<i>Andrographis paniculata</i> (Burm.f.) Wall. ex Nees	Kalmegh	Dried plant parts put in water overnight, next morning the yellowish colour water is given internally for small worms of children.
<i>Anogeissus latifolia</i> (DC.) Wall. ex Bedd.	Dhaw	Wood is used for making axels of cart.
<i>Ardisia solanacea</i> (Poir.) Roxb.	Cardagulanj	Bark paste is smeared on forehead to cure headache.

Botanical names	Local names	Uses
<i>Argemone maxicana</i> L.	Sial-Kanta	Seed oil is used externally for sores.
<i>Asparagus racemosus</i> Willd.	Satamul	Root decoction is used internally for stomach trouble. Pounded seed is used internally for Ascaris. Leaves are used for making plates. Colour extracted from petals is used for colouring clothes.
<i>Atylosia scarabaeoides</i> (L.) Benth.	—	Leaf juice is used internally to cure dysentery.
<i>Boerhavia diffusa</i> L.	Punarnaba	Root decoction is used internally for stomach trouble.
<i>Butea superba</i> Roxb.	Palas	Decoction of stem bark is used for curing wounds.
<i>Careya arborea</i> Roxb.	Klembher	Root is used as fish poison.
<i>Centella asiatica</i> (L.) Urban	Thankuni	Leaf-juice is used internally for stomach trouble.
<i>Cissampelos pareira</i> L.	—	Root decoction is used internally for stomach pain and fever.
<i>Cochlospermum religiosum</i> (L.) Alston	—	Flower is used in preparation of rice cake.
<i>Cordia dichotoma</i> Forst.f.	Bonch	Stem bark is used internally for venereal and urinary diseases.

Botanical names	Local names	Uses
<i>Costus speciosus</i> (Koenig ex Retz.) J. E. Smith	Kewa	Root is used internally for body pain, fever and urinary diseases.
<i>Cryptolepis buchanani</i> Roem. ex Schult.	Madhablata	Decoction of plant is used internally for venereal disease.
<i>Curculigo orchiioides</i> Gaertn.	Talamuli	Root decoction is used internally for fever of children, filaria and venereal disease.
<i>Cuscuta reflexa</i> Roxb.	Sarnalata	Stem juice is used externally for wounds.
<i>Datura metel</i> L.	Dhutro	Pounded seed is used externally for leprosy.
<i>Dentella repens</i> (L.) J.R. & G. Forst.	Helencha	Leaves are used as vegetable.
<i>Dillenia pentagyna</i> Roxb.	Ban-chalta	Fruit is used for preparing pickles.
<i>Diospyros melanoxylon</i> Roxb.	Gab	Fruit juice is used for tanning the fishing net.
<i>Erycibe paniculata</i> Roxb.	—	Bark decoction is used internally for venereal diseases.
<i>Evolvulus alsinoides</i> (L.) L.	—	Decoction of plant is used externally for scorpion bites.
<i>Ficus hispida</i> L.f.	Dumur	Unripe fruits are used as vegetables.
<i>Gardenia latifolia</i> Ait.	Barabhuru	Juice of young stem is used

Botanical names	Local names	Uses
		externally on sores of hand and foot.
<i>Garuga pinnata</i> Roxb.	—	Fruits are edible.
<i>Gloriosa superba</i> L.	—	Root decoction is given internally for small pox of cattle.
<i>Helicteres isora</i> L.	Mochra	Seeds boiled in mustard oil is massaged in children's body to cure body pain. Stem bark is used as cordage.
<i>Hemidesmus indicus</i> (L.) R.Br.	Anantamul	Root decoction is used internally for snakebite and venereal diseases.
<i>Holarrhena antidysenterica</i> (L.) Wall.	Kurchi	Decoction of bark is used internally for dysentery.
<i>Holostemma annulare</i> (Roxb.) Schum.	Charkidudhi	Flower is used internally for venereal disease.
<i>Kydia calycina</i> Roxb.	—	Stem is used for making walking stick.
<i>Madhuca indica</i> Gmel.	Maul	Dried flowers are used for preparation of liquor; raw flowers are edible.
<i>Mimosa rubicaulis</i> Lamk.	—	Stem bark is used as fish-poison.
<i>Momordica dioica</i> Roxb. ex Willd.	—	Fruits are used as vegetables.
<i>Nyctanthes arbor-tristis</i> L.	—	Leaf juice is used internally for fever.
<i>Polygonum plebejum</i> R.Br.	Chikni sag	Whole plant is used as vegetables.

Botanical names	Local names	Uses
<i>Shorea robusta</i> Gaertn.f.	Sal	Leaves are used to make plates.
<i>Smilax zeylanica</i> L.	Ramdantan	Root decoction is used internally for fever, rheumatism and venereal diseases.
<i>Terminalia arjuna</i> (Roxb.) Wt.& Arn.	Arjun	Dried bark is chewed for acidity.
<i>T. chebula</i> (Gaertn.) Retz.	Hartuki	Fruit juice is given internally for stomach disorder.
<i>Trema orientalis</i> (L.) Bl.	—	Leaf is used as sand paper.
<i>Tridax procumbens</i> L.	—	Leaf decoction is given externally for scorpion-sting.
<i>Vitex negundo</i> L.	Begna	Leaf juice is given orally for cough and cold.
<i>Woodfordia fruticosa</i> (L.) Kurz	Dhadki	Root decoction is given internally for rheumatism.
<i>Xeromphis spinosa</i> (Thunb.) Keay.	Gurman	Fruit is used as fish poison.
<i>Zyzyphus mauritiana</i> Lamk.	Kul	Fruits are used as pickles.

Conclusion : The primary impact for the proposed project would be the submergence of c. 4 sq. km area of forest cover. The complete wiping out of the forest in core zone will definitely have some adverse effect on the climate of this district. So intensive plantation should be done in and around the project area to compensate the loss of green cover. Utmost care should be taken to avoid felling of large trees during civil constructions around the project area. The following species may be cultivated in and around project area : *Butea monosperma*, *Alstonia scholaris*, *Madhuca indica*, *Shorea robusta*, *Terminalia arjuna*,

Terminalia chebula, *Anthocephalus cadamba*, *Careya arborea*, *Bauhinia variegata*, *Dalbergia sisoo*, *Cochlospermum religiosum*, *Polyalthia longifolia*, *Tectona grandis*, *Azadirachta indica*, *Lagerstroemia parviflora*, *Bombax ceiba*, *Syzygium cumini*, *Gmelina arborea*, *Michelia champaca* and *Adansonia digitata*. 37 species of medicinal plants have been recorded from the study area of which most of them are of common occurrence. Project authority may be asked to cultivate the following medicinal plants in a nearby area. The species are : *Asparagus racemosus*, *Costus speciosus*, *Butea superba*, *Cryptolepis buechanani*, *Curculigo orchioides*, *Datura metel*, *Gloriosa superba*, *Helicteres isora*, *Hemidesmus indicus*, *Holarrhena antidysenterica*, *Smilax zeylanica*, *Phyllanthus embelica*, *Erycibe paniculata*, *Terminalia chebula*, *Vitex negundo*, *Woodfordia fruticosa*, etc. None of the species from the study area falls under the category of threatened plants as per IUCN categories and none of the species are found to be endemic. Coordination is needed between developmental agencies and plant resource managers to save the threatened biodiversity of this type.

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