

## Conservation plan

### 1. BIOLOGICAL ENVIRONMENT:

Study of biological environment is one of the important aspects for the Environmental Impact Assessment, in view of the need for conservation of Environmental quality and biodiversity of particular geographical area. Ecological systems show complex interrelationship between biotic and Abiotic components including dependence, competition and mutualism. Biotic components comprises of plant and animal communities which interact not only within and between themselves but also with the Abiotic components viz. Physical and Chemical; components of the environment.

Generally, biological communities are the good indicators of climatic and edaphic factors. Studies on biological aspects of ecosystems are important in Environmental Impact Assessment for safety of natural flora and fauna. Information on the impact of environmental stress on the community structure serves as an inexpensive and efficient early warning system to check the damage to a particular ecosystem. The biological environment includes mainly terrestrial and aquatic ecosystems.

The animal and plant communities exist in their natural habitats in well organized manner. Their natural settings can be disturbed by any externally induced anthropological activities or by naturally induced calamities or disaster. So, once this setting is disturbed, it becomes practically impossible or takes a longer time to come to its original state. Plants and animals are more susceptible to environmental stress. A change in the composition of biotic communities reflected by a change in the distribution pattern of natural species of flora and fauna exist in the ecosystem. The sensitivity of animal and plant species to the changes occurring in their proposed ecosystem can therefore, be used for monitoring Environmental Impact Assessment studies of any project.

#### 1.1 Objectives of Biological Study:

The main objectives of biological study were:

- To collect the baseline data for the study along with a description of the existing terrestrial, wetland and aquatic biodiversity.
- To assess the scheduled species in the proposed site (rare, endangered, critically endangered, endemic and vulnerable).
- To identify the locations and features of ecological significance.
- To identify the Impacts of proposed project before, after and during development phase.

**Table: 1. Mode of data collection and parameters considered during the Survey**

Sr. No.	Aspect	Data	Mode of Data collection	Parameters monitored	Remarks
1.	Terrestrial Biodiversity	Primary data collection	By field survey	Floral and Faunal diversity	<p><b>For Floral Diversity:</b> Random survey, sapling survey/forest inventory, walking transect, collection and identification with the help of relevant literature.</p> <p><b>For Faunal Diversity:</b> direct and indirect sampling, walking transect, point sampling and nest sampling etc.</p>
2.		Secondary data collection	From authentic sources like Forests department of Haryana and available published literatures from ZSI, BSI etc.	Floral and Faunal diversity and study of vegetation, forest type, importance etc.	Data collected from the working plan of the region, forest types from the authentic literature of Champion & Seth.
3.	Aquatic Biodiversity	Primary data	By field survey	Floral and Faunal diversity	<p><b>For Plankton Study-</b> Lackey's drops method and light microscope</p> <p><b>For other aquatic-</b> Random survey, opportunistic observations</p>
4.		Secondary data collection	From authentic sources like Forests department of Haryana.	Floral and Faunal diversity and study of vegetation, forest type, importance etc.	Desktop literature review to identify the representative spectrum of threatened species, population and ecological communities.

**2. FOREST TYPES:**

This proposed pipeline project will supply gas to major industries in energy starved region of southern India, particularly in Tamil Nadu and some parts of Karnataka and Andhra Pradesh. The project is expected to aid further industrial growth in the region. The Pipeline passes through Thiruvallur and Vellore districts of Tamil Nadu, Chittoor district of Andhra Pradesh and Kolar and Bengaluru rural districts of Karnataka.

Based on Champion and Seth's classification, the forest types of Thiruvallur and Vellore districts of Tamil Nadu, Chittoor district of Andhra Pradesh and Kolar and Bengaluru rural districts of Karnataka were categorized as follows:

**A. Forest Types of Thiruvallur and Vellore Districts of Tamil Nadu:**

Tamil Nadu is located in the southern part of Indian peninsula. It has a geographical area of 130,058 km<sup>2</sup>. The forest cover of the state is 23,044 km<sup>2</sup>, which is 17.72% of its geographical area. The forest types of Thiruvallur and Vellore districts of Tamil Nadu are as follows:

- **Mangrove Scrub (4B/TS1):** this type of forest is present in the coastal areas in the river deltas, along the edges of tidal waterways and on shelter muddy coasts of the Thiruvallur district. The species are *Avicennia officinalis*, *Excoecaria*, with halophytes like *Sudae monica*, *Salicornia* spp. etc.
- **Dry Red Sanders Bearing Forest (5A/C2):** It is a tropical dry deciduous forest with *Pterocarpus santalinus* in the top storey. Other species present in the type are *Pterocarpus marsupium*, *Chloroxylon swietenia*, *Albizia amara*, *Acacia leucopholea*, *Hardwickia binata* and dry grasses. This forest type is found in Thiruvallur and Vellore districts.
- **Southern Dry Mixed Deciduous Forest (5A/C3):** This forest type occurs in both districts. It is formed by a mixture of tree species, all of which are deciduous. The important species are *Dalbergia latifolia*, *Terminalia tomentosa*, *T. chebula*, *T. paniculata*, *Pterocarpus marsupium*, *Anogeissus latifolia*, *Santalum album*, *Chloroxylon swietenia*, *Acacia chundra*, *Dendrocalamus strictus* and good deal of grasses.
- **Dry Deciduous Scrub (5/DS1):** A low broken soil cover of shrubby growth 3-6m high including some tree species reduced to similar conditions, usually many stemming from the base. This forest type occurs in both districts. The important species are *Pterocarpus marsupium*, *Anogeissus latifolia*, *Bridelia retusa*, *Terminalia chebula*, *Emblica officinalis*, *Annona squamosa* and *Phoenix humilis* with grass cover.

- **Dry Savannah Forest (5/DS2):** Small groups or scattered trees of *Emblica officinalis*, *Pterocarpus marsupium*, *Diospyros melanoxylon* and *Butea monosperma* in the heavy grassland, which are fire resistant, are characteristics of this type of forest. This forest type occurs in both districts.
- **Dry Grassland (5/DS4):** It is highly degraded stage of dry deciduous forest due to repeated fire and heavy biotic pressure. The dominant grass species are *Cymbopogon flexuosus*, *Heteropogon contortus*, *Cynodon dactylon* with some annual species of grasses. This forest type occurs in both districts.
- **Dry Bamboo Brakes (5/E9):** Only one species i.e. *Dendrocalamus strictus* occurs and forms relatively low but often dense brakes and found in District Vellore.
- **Dry Tropical Riverain Forest (5/1S1):** The dominant species of this type are *Terminalia arjuna*, *Pongamia pinnata*, *Mitragyna parvifolia*, *Mangifera indica*, *Alangium salvifolium*, *Syzygium cuminii*, *Ficus* spp., *Strychnos nuxvomica* etc. This forest type occurs in Vellore district.
- **Secondary Dry Deciduous Forest (5/2S1):** This type is marked by the absence of old trees. Important species are *Aegle marmelos*, *Gyrocarpus jacquini*, *Feronia limonia*, *Lannea coromandelica*, *Carissa spinarum* with *Lantana* breaks. This forest type occurs in both districts.
- **Southern Thorn Forest (6A/C1):** This type occurs in relatively drier areas of Andhra Pradesh and Tamil Nadu including both districts. Important species are *Albizia amara*, *Acacia ferruginea*, *Azardirecta indica*, *Zizyphus mauritiana*, *Z. xylopyrus*, *Dichrostachys cinerea*, *Chloroxylon swietenia*, *Celistanthus colinus* etc.
- **Karnatak Umbrella Thorn Forest (6A/C2):** This forest type is an open thorn forest with *Acacia planiformis* with its umbrella shaped crown with thickets of other species of *Acacia*, *Albizia amara*, *Acacia latronum*, *Dichrostachys cinerea*. This forest type is found in both districts.
- **Tropical Dry Evergreen Forest (7/C1):** The important species of this forest type are *Memecylon umbellatum*, *Atlantia monophylla*, *Glycosmis pentaphylla*, *Maba buxifolia*, *Carissa carandus*, *Randia dumetorium*, *Dodonea viscosa*, *Zizyphus glaberrima* etc. This forest type is found in both districts.

## **B. Forest Types of Chittoor District of Andhra Pradesh:**

Andhra Pradesh is situated on the south eastern coast of India and spreads over an area of 275,069 km<sup>2</sup>. The area under forest cover is 44,372 km<sup>2</sup> (16.13% of the geographical area). The forest types of Chittoor district of Andhra Pradesh are as follows:

- **Dry Red Sanders Bearing Forest (5A/C2):** It is a tropical dry deciduous forest with *Pterocarpus santalinus* in the top storey. Other species present in the type are *Pterocarpus marsupium*, *Chloroxylon swietenia*, *Albizia amara*, *Acacia leucophloea*, *Hardwickia binata* and dry grasses.
- **Southern Dry Mixed Deciduous Forest (5A/C3):** This forest type occurs in all over Andhra Pradesh. It is formed by a mixture of tree species, all of which are deciduous. The important species are *Dalbergia latifolia*, *Terminalia tomentosa*, *T. chebula*, *T. paniculata*, *Pterocarpus marsupium*, *Anogeissus latifolia*, *Santalum album*, *Chloroxylon swietenia*, *Acacia chundra*, *Dendrocalamus strictus* and good deal of grasses.
- **Dry Deciduous Scrub (5/DS1):** A low broken soil cover of shrubby growth 3-6m high including some tree species reduced to similar conditions, usually many stemming from the base. This forest type occurs in all over Andhra Pradesh. The important species are *Pterocarpus marsupium*, *Anogeissus latifolia*, *Bridelia retusa*, *Terminalia chebula*, *Embllica officinalis*, *Annona squamosa* and *Phoenix humilis* with grass cover.

### C. Forest Types of Kolar and Bengaluru rural districts of Karnataka:

The forest types of Kolar and Bengaluru rural districts of Karnataka are as follows:

- **Southern Dry Mixed Deciduous Forest (5A/C3):** This forest type occurs in both districts. It is formed by a mixture of tree species, all of which are deciduous. The important species are *Terminalia alata* (Mathi), *Pterocarpus marsupium*, *Anogeissus latifolia* (Dindiga), *Santalum album*, *Chloroxylon swietenia*, *Hardwickia binata* (Kamar), *Cassia fistula* (Kakke), *Diospyros Montana* (Jagalaganti), *D. melanoxylon* (Tupra), *Dendrocalamus strictus*, *Santalum album* (Srigandha), *Acacia catechu* (Katha) and good deal of grasses.
- **Dry Deciduous Scrub (5/DS1):** A low broken soil cover of shrubby growth 3-6m high including some tree species reduced to similar conditions, usually many stemming from the base. This forest type occurs in both districts. Floristic composition is *Albizia amara*, *Acacia leucophloea*, *Butea monosperma*, *Bauhinia racemosa*, *Carissa carandus*,

*Dalbergia paniculata*, *Diospyros* spp., *Embllica officinalis*, *Erythroxylon monogynum*, *Feronia elephantum*, *Santalum album* etc.

- **Southern Thorn Forest (6A/C1):** This forest type occurs in both districts. Important species are *Anogeissus latifolia* (Dindiga), *Santalum album*, *Chloroxylon swietenia*, *Hardwickia binata* (Kamar), *Cassia fistula* (Kakke), *Diospyros Montana* (Jagalaganti), *D. melanoxylon* (Tupra), *Dendrocalamus strictus*, *Santalum album* (Srigandha), *Acacia catechu* (Katha) and good deal of grasses.

### **3. BIODIVERSITY ASSESSMENT:**

The Biodiversity conservation and habitat fragmentation are terms that are often used together because of the burgeoning human population and rapidly declining biodiversity all over the world. A logical consequence of an increasing human population and subsequent use of land for development projects is less space for flora and fauna and greater pressure on remaining habitat fragments.

### **4. METHODOLOGY FOR FLORAL DIVERSITY:**

The present study on the floral assessment for the project activity is based on field survey of the area. Inventory Methodology was adapted to the baseline data of floral diversity in a corridor of 5km width on either side along the entire stretch of the proposed pipeline using the relevant toposheets of scale 1:50000.

A forest inventory is “**an attempt to describe the quantity and quality of forest trees and many of the characteristics of the land area upon which the trees are grown.**” The objective this floral inventory of the study area, is to provide complete checklist of floristic structure along the entire stretch of the proposed pipeline for formulating effective management and conservation measures. The tree species, shrubs, herbs and climbers observed in the study area are represented in the **Table 2**.

**Quadrat Methodology** was adapted for the baseline data from the Kaundinya Wildlife Sanctuary. The study was aimed at enumeration of the available plant resources and obtaining a broad representation of the existing floristic variations in the protected areas. Enumeration of the plant wealth was done by surveying the area through walking followed by collection and identification of plant specimens. Sample plots were selected in such a way to get maximum representation of different types of vegetation and plots were laid out in different parts of the

buffer area along the entire stretch of the proposed pipeline. The tree species, shrubs, herbs and climbers observed in the buffer area are represented in the **Table 2**.

#### **4.1 Floristic Composition along the proposed Pipeline:**

A total of 108 plant species comprising 27 tree species, 25 shrubs and 53 herbs and three climbers were recorded along the proposed pipeline. No endemic or threatened plant species were recorded during the survey. The proposed pipeline passes mainly through agriculture areas. Hence, almost 90% of the inventory area fell under cultivated or fallow lands. Important cultivated recorded along the proposed pipeline and its environs are listed under **Table 3**.

#### **4.2 Floristic Composition of buffer zone along the proposed Pipeline:**

The vegetation and the floristic composition of buffer zone along the proposed pipeline and along the road side and water bodies were observed and studied during the field study period. 191 species were observed, details of which are given separately.

The common trees that are found among the herbaceous and shrubby undergrowth are *Cocos nucifera* which is one of the characteristic member of the riverine vegetation: *Acacia nilotica*, *Pithecellobium dulce*, *Azadirachta indica*, *Ficus Religiosa* and *Ficus benghalensis*. *Prosopis glandulosa*, *Pterocarpus marsupium*, *Santalum album* etc. is most dominant, occurring among the above species.

The shrubby layer consists of such common plants as *Jatropha glanduifera*, *Crotalaria verrucosa*, *Martynia annua*, *Cassia auriculata*, *Vitex negundo* etc. *Ipomoea carnea* is a fast spreading shrub found growing luxuriously among the above species along the river banks. The dry mixed deciduous forests have stunted and immature varieties of bamboo type *Dendrocalamus strictus* and *Anoyeissus latifolia*. Sparsely seen are fuel trees as *Albizia lebbek*, *Acacia sundra*, *Premna tomentosa*, *Anogeissus latifolia*, *Tectona grandis*, *Lagerstroemia parviflora*, *Terminalia tomentosa* and *Cleistanthus collinus*.

Among the common aquatic plants found in the shallow water mention may be made of *Eichhornia crassipes*, *Vallisneria spiralis*, *Hydrilla verticillata*, *Potamogeton nodosus*, *Ottelia alismoide*, *Ceratophyllum demersum*, *Aponogeton natans* etc. *Typha angustata* grows in large populations at several points.

Few of the marshy herbs which are subject to flooding during monsoon are several species of *Cyperus* sp., *Scirpus mucronatus*, *Eleocharis congesta*, *Eleocharis geniculata*, *Fimbristylis*

*schoenoides*. Other notable plants of the above category are *Heliotropium paniculatum*, *Ammannia baccifera*, *Ammannia octandra*, *Dentella repens*, *Bacopa monnieri* etc.

**Table 2: Floristic composition along the proposed pipeline and its Buffer zone**

Scientific Name	Family	Along Pipeline	Buffer zone
<b>TREES</b>			
<i>Acacia auriculiformis</i>	Mimosaceae	+	+
<i>Anogeissus latifolia</i>	<i>Combretaceae</i>	-	
<i>Acacia latronum</i>	Mimosaceae	-	
<i>Acacia leucophloea</i>	Mimosaceae	+	+
<i>Acacia ferruginea</i>	Mimosaceae	-	
<i>Acacia catechu</i>	Mimosaceae	+	+
<i>Acacia chundra</i>	Mimosaceae	-	
<i>Aegle marmelos</i>	Rutaceae	-	
<i>Alangium salvifolium</i>	Cornaceae	-	
<i>Albizia lebbek</i>	Mimosaceae	+	+
<i>Albizia amara</i>	Mimosaceae	+	+
<i>Annona squamosa</i>	Annonaceae	+	+
<i>Atalantia monophylla</i>	Rutaceae	-	
<i>Azadirachta indica</i>	Meliaceae	+	+
<i>Bauhinia racemosa</i>	Caesalpiniaceae	+	+
<i>Bridelia retusa</i>	Phyllanthaceae	-	
<i>Butea monosperma</i>	Fabaceae	+	+
<i>Carissa carandas</i>	Apocynaceae	-	
<i>Carissa spinarum</i>	Apocynaceae	-	
<i>Cassia fistula</i>	Caesalpiniaceae	+	+
<i>Chloroxylon swietenia</i>	Rutaceae	-	
<i>Celistanthus colinus</i>	Phyllanthaceae	-	
<i>Cocos nucifera</i>	Arecaceae	+	+
<i>Dalbergia latifolia</i>	Fabaceae	+	+
<i>Dalbergia paniculata</i>	Fabaceae	-	
<i>Dendrocalamus strictus</i>	Poaceae	-	
<i>Dichrostachys cinerea</i>	Mimosaceae	+	+
<i>Diospyros melanoxylon</i>	Ebenaceae	-	
<i>Diospyros montana</i>	Ebenaceae	-	
<i>Dodonaea viscosa</i>	Sapindaceae	-	
<i>Emblica officinalis</i>	Phyllanthaceae	-	
<i>Enterolobium saman</i>	Mimosaceae	+	+
<i>Erythroxylon monogynum</i>	Erythroxylaceae	-	
<i>Eucalyptus globulus</i>	Myrtaceae	+	+
<i>Feronia elephantum</i>	Rutaceae	-	
<i>Ficus benghalensis</i>	Moraceae	+	+
<i>Ficus religiosa</i>	Moraceae	-	+



Scientific Name	Family	Along Pipeline	Buffer zone
<i>Feronia limonia</i>	Rutaceae	-	
<i>Glycosmis pentaphylla</i>	Rutaceae	-	
<i>Gyrocarpus jacquini</i>	Hernandiaceae	-	
<i>Hardwickia binata</i>	Fabaceae	-	
<i>Lannea coromandelica</i>	Anacardiaceae	-	
<i>Leucaena leucocephala</i>	Mimosaceae	+	+
<i>Maba buxifolia</i>	Ebenaceae	-	
<i>Mangifera indica</i>	Anacardiaceae	+	+
<i>Memecylon umbellatum</i>	Melastomataceae	-	
<i>Mitragyna parvifolia</i>	Rubiaceae	-	
<i>Phoenix humilis</i>	Arecaceae	+	+
<i>Phyllanthus emblica</i>	Phyllanthaceae	+	+
<i>Pithecellobium dulce</i>	Mimosaceae	+	+
<i>Pongamia pinnata</i>	Fabaceae	+	+
<i>Prosopis cineraria</i>	Mimosaceae	+	+
<i>Prosopis glandulosa</i>	Mimosaceae	-	+
<i>Pterocarpus marsupium</i>	Fabaceae	-	
<i>Pterocarpus santalinus</i>	Fabaceae	-	
<i>Randia dumetorum</i>	Rubiaceae	-	
<i>Santalum album</i>	Santalaceae	-	
<i>Strychnos nuxvomica</i>	Loganiaceae	-	
<i>Syzygium cumini</i>	Myrtaceae	-	+
<i>Tamarindus indica</i>	Caesalpinaceae	+	+
<i>Tamarix gallica</i>	Tamariscaceae	-	+
<i>Tecoma stans</i>	Bignoniaceae	-	+
<i>Terminalia arjuna</i>	Combretaceae	-	
<i>Terminalia alata</i>	Combretaceae	-	
<i>Terminalia tomentosa</i>	Combretaceae	-	
<i>Terminalia chebula</i>	Combretaceae	-	
<i>Terminalia paniculata</i>	Combretaceae	-	
<i>Vitex negundo</i>	Verbenaceae	+	+
<i>Wrightia tinctoria</i>	Apocynaceae	+	+
<i>Zizyphus glaberrima</i>	Rhamnaceae	-	
<i>Zizyphus xylopyrus</i>	Rhamnaceae	-	+
<i>Zizyphus mauritiana</i>	Rhamnaceae	-	
<b>SHRUBS</b>			
<i>Abutilon indicum</i>	Malvaceae	+	+
<i>Aerva lanata</i>	Amaranthaceae	+	+
<i>Agave americana</i>	Agavaceae	+	+
<i>Anisomeles malabarica</i>	Lamiaceae	+	+
<i>Azima tetraantha</i>	Salvadoraceae	+	+
<i>Calotropis gigantea</i>	Asclepiadaceae	+	+
<i>Canthium parviflorum</i>	Rubiaceae	+	+
<i>Capparis sepiaria</i>	Capparaceae	+	+

Scientific Name	Family	Along Pipeline	Buffer zone
<i>Carissa carandas</i>	Apocynaceae	+	+
<i>Cassia auriculata</i>	Caesalpiniaceae	+	+
<i>Chromolaena odorata</i>	Asteraceae	+	+
<i>Euphorbia caducifolia</i>	Euphorbiaceae	+	+
<i>Gossypium hirsutum</i>	Malvaceae	+	+
<i>Hibiscus ovalifolius</i>	Malvaceae	+	+
<i>Ipomoea carnea</i>	Convolvulaceae	+	+
<i>Jatropha glandulifera</i>	Euphorbiaceae	+	+
<i>Kirganelia reticulata</i>	Euphorbiaceae	+	+
<i>Lantana camara</i>	Verbenaceae	+	+
<i>Opuntia dillenii</i>	Cactaceae	+	+
<i>Themeda triandra</i>	Poaceae	+	+
<i>Triumfetta rotundifolia</i>	Malvaceae	+	+
<i>Typha angustata</i>	Typhaceae	+	+
<i>Xanthium strumarium</i>	Asteraceae	+	+
<i>Zizyphus nummularia</i>	Rhamnaceae	+	+
<b>HERBS</b>			
<i>Abutilon indicum</i>	Malvaceae	-	+
<i>Acalypha indica</i>	Euphorbiaceae	-	+
<i>Achyranthes aspera</i>	Amaranthaceae	+	+
<i>Aerva lanata</i>	Amaranthaceae	-	+
<i>Alloteropsis cimicina</i>	Poaceae	-	+
<i>Alternanthera sessilis</i>	Amaranthaceae	-	+
<i>Amaranthus viridis</i>	Amaranthaceae	+	+
<i>Ammania baccifera</i>	Lythraceae	+	+
<i>Argemone Mexicana</i>	Papaveraceae	-	+
<i>Aristida adscensionis</i>	Poaceae	+	+
<i>Aristolochia grandiflora</i>	Aristolochiaceae	+	+
<i>Bacopa monnieri</i>	Scrophulariaceae	-	+
<i>Blumea mollis</i>	Asteraceae	+	+
<i>Boerhavia diffusa</i>	Nyctaginaceae	+	+
<i>Boerhavia erecta</i>	Nyctaginaceae	+	+
<i>Borreria ocymoides</i>	Rubiaceae	+	+
<i>Caralluma adscendens</i>	Apocynaceae	+	+
<i>Cassia auriculata</i>	Fabaceae	-	+
<i>Cassia obtus</i>	Fabaceae	-	+
<i>Centella asiatica</i>	Apiaceae	+	+
<i>Chloris barbata</i>	Poaceae	+	+
<i>Cleome viscosa</i>	Marsiliaceae	-	+
<i>Coldenia procumbens</i>	Boraginaceae	+	+
<i>Corchorus tridens</i>	Malvaceae	+	+
<i>Crassocephalum crepidioides</i>	Asteraceae	+	+
<i>Croton bonplandianus</i>	Euphorbiaceae	+	+
<i>Croton sparsiflorus</i>	Euphorbiaceae	-	+

Scientific Name	Family	Along Pipeline	Buffer zone
<i>Cynodon dactylon</i>	Poaceae	+	+
<i>Cyperus articulatus</i>	Cyperaceae	-	+
<i>Cyperus difformis</i>	Cyperaceae	-	+
<i>Cyperus pangorei</i>	Cyperaceae	-	+
<i>Cyperus rotundus</i>	Cyperaceae	+	+
<i>Dactyloctenium aegyptium</i>	Poaceae	+	+
<i>Dentella repens</i>	Rubiaceae	-	+
<i>Digitaria bicornis</i>	Poaceae	+	+
<i>Dipteracanthus patulus</i>	Acanthaceae	-	+
<i>Dodonaea viscosa</i>	Sapindaceae	+	+
<i>Eclipta alba</i>	Asteraceae	+	+
<i>Eragrostis viscosa</i>	Poaceae	+	+
<i>Echinops echinatus</i>	Asteraceae	+	+
<i>Eleocharis acutangula</i>	Cyperaceae	-	+
<i>Eleocharis geniculata</i>	Cyperaceae	-	+
<i>Eriochloa procera</i>	Poaceae	-	+
<i>Euphorbia caducifolia</i>	Euphorbiaceae	+	+
<i>Euphorbia hirta</i>	Euphorbiaceae	+	+
<i>Euphorbia prostrata</i>	Euphorbiaceae	+	+
<i>Evolvulus alsinoides</i>	Convolvulaceae	-	+
<i>Fimbristylis bisumbellata</i>	Cyperaceae	-	+
<i>Fimbristylis schoenoides</i>	Cyperaceae	-	+
<i>Gomphrena celosioides</i>	Amaranthaceae	+	+
<i>Grangea maderaspatana</i>	Asteraceae	-	+
<i>Heliotropium paniculatum</i>	Boraginaceae	-	+
<i>Heliotropium indicum</i>	Boraginaceae	-	+
<i>Hydrilla verticillata</i>	Hydrocharitaceae	-	+
<i>Hygrophila auriculata</i>	Acanthaceae	+	+
<i>Hyptis suaveolens</i>	Lamiaceae	+	+
<i>Justicia prostrate</i>	Acanthaceae	-	+
<i>Justicia tranquebariensis</i>	Acanthaceae	+	+
<i>Kyllinga nemoralis</i>	Cyperaceae	+	+
<i>Lagascea mollis</i>	Asteraceae	+	+
<i>Lindernia ocymoides</i>	Linderniaceae	+	+
<i>Ludwigia hyssopifolia</i>	Ongraceae	+	+
<i>Marsilea quadrifolia</i>	Marsileaceae	+	+
<i>Merremia tridentata</i>	Convolvulaceae	+	+
<i>Mimosa pudica</i>	Fabaceae	+	+
<i>Nymphaea nouchali</i>	Nymphaeaceae	-	+
<i>Ocimum basilicum</i>	Lamiaceae	-	+
<i>Oxalis corniculata</i>	Oxalidaceae	+	+
<i>Panicum brevifolium</i>	Poaceae	+	+
<i>Parthenium hysterophorus</i>	Asteraceae	+	+
<i>Pennisetum americanum</i>	Poaceae	-	+

Scientific Name	Family	Along Pipeline	Buffer zone
<i>Phyla nodiflora</i>	Verbenaceae	+	+
<i>Phyllanthus maderaspatensis</i>	Euphorbiaceae	+	+
<i>Phyllanthus amarus</i>	Euphorbiaceae	+	+
<i>Physalis peruviana</i>	Solanaceae	+	+
<i>Polygonum barbatum</i>	Polygonaceae	+	+
<i>Polygonum glabrum</i>	Polygonaceae	-	+
<i>Setaria intermedia</i>	Poaceae	-	+
<i>Setaria verticillata</i>	Poaceae	-	+
<i>Sida cordata</i>	Malvaceae	+	+
<i>Sida acuta</i>	Malvaceae	+	+
<i>Solanum surattense</i>	Solanaceae	+	+
<i>Sphaeranthus indicus</i>	Asteraceae	+	+
<i>Tephrosia purpurea</i>	Fabaceae	+	+
<i>Trianthema decandra</i>	Aizoaceae	+	+
<i>Tribulus terrestris</i>	Zygophyllaceae	+	+
<i>Tridax procumbens</i>	Asteraceae	+	+
<i>Typha angustata</i>	Typhaceae	-	+
<i>Vallisneria spiralis</i>	Hydrocharitaceae	-	+
<i>Vicoa indica</i>	Asteraceae	+	+
<b>CLIMBERS</b>			
<i>Abrus precatorius</i>	Fabaceae	+	+
<i>Citrullus colocynthis</i>	Cucurbitaceae	-	+
<i>Coccinia grandis</i>	Cucurbitaceae	+	+
<i>Passiflora edulis</i>	Passifloraceae	+	+
<i>Pergularia extensa</i>	Asclepiadaceae	-	+

**Table 3: Important Cultivated Plants recorded along the proposed pipeline and its environs**

No.	Scientific Name	English Name	No.	Scientific Name	English Name
1.	<i>Oryza sativa</i>	Paddy	2.	<i>Capsicum annum</i>	Cilli
3.	<i>Gossypium hirsutum</i>	Cotton	4.	<i>Mangifera indica</i>	Mango
5.	<i>Sorghum bicolor</i>	Jowar	6.	<i>Lycopersicon lycopersicum</i>	Tomato
7.	<i>Celosia argentea</i>	Greens	8.	<i>Zea mays</i>	Maize
9.	<i>Manihot esculenta</i>	Tapioca	10.	<i>Sesamum indicum</i>	Sesame
11.	<i>Cocos nucifera</i>	Coconut	12.	<i>Phyllanthus emblica</i>	Gooseberry
13.	<i>Moringa oleifera</i>	Drumstick	14.	<i>Anona squamosa</i>	Custard apple
15.	<i>Borassus flabellifer</i>	Palmyra Palm	16.	<i>Solanum melongena</i>	Brinjal

### 5. Fauna Diversity:

To prepare a detailed report on the status of wildlife biodiversity within 5 km radial area along the proposed pipeline to assess the impacts due to the project activity and evolve suitable

mitigation measures to protect and conserve wildlife biodiversity following components were studied:

- a) Wildlife Survey (Diversity)
- b) Habitat Study (Feeding, Breeding and Roosting areas)
- c) Distribution/Status of Birds
- d) Rare & Endangered species of Fauna
- e) Specific local characteristics of biodiversity in the study area.

### **5.1 Methodology for Faunal Diversity:**

A linear transect of 1.0 km each was chosen for sampling at each site. Each transect was trekked for 1.5 hr for the sampling of faunal diversity through following methods for different categories. For the sampling of butterflies, the standard ‘Pollard Walk’ method was employed and all the species recorded daily. Voucher specimens of the species that could not be identified in the field were collected using a butterfly net besides photographing them.

For bird’s sampling, ‘Point Sampling’ along the fixed transect (Foot trails) was carried out. All the species of birds were observed through a binocular and identified with the help of field guide book and photographs.

For the sampling of mammals, direct count on open width (20m) transect was used. In addition, information on recent sightings/records of mammals by the villagers/locals was also collected. For carnivores, indirect sampling was carried out and the mammals were identified by foot marks, faeces and other marks/sign created by them. In case of reptiles mainly lizards were sampled by direct count on open width transects.

The study of fauna takes substantial amount of time to understand the specific faunal characteristic of area. The assessment of fauna has been done by extensive field survey of the area. During survey, the presence of wildlife was also inhabitants depending on animal sightings and the frequency of their visits in the project area which was later confirmed from forest department, Wildlife Department etc.

**Table 4: Faunal Diversity observed along pipeline and its buffer zone**

<b>Sr. No.</b>	<b>Scientific Name</b>	<b>Common Name</b>	<b>Schedule</b>
1.	<i>Axis axis</i>	Chital	Schedule-III
2.	<i>Bendicota bengalensis</i>	Field Rat	Schedule-IV

Sr. No.	Scientific Name	Common Name	Schedule
3.	<i>Boselaphus tragocamelus</i>	Nilgai	Schedule-III
4.	<i>Canis aureus</i>	Jackal	Schedule-II
5.	<i>Elephas maximus indicus</i>	Elephant	Schedule-I
6.	<i>Felis chaus</i>	Jungle Cat	Schedule-I
7.	<i>Funambulus pennanii</i>	Five Striped Palm Squirrel	Schedule-IV
8.	<i>Herpestes edwardsii</i>	Common Mongoose	Schedule-II
9.	<i>Hystrix indica</i>	Indian Porcupine	Schedule-II
10.	<i>Lepus nigricollis</i>	Indian Hare	Schedule-IV
11.	<i>Maccaca mulata</i>	Monkey	Schedule-II
12.	<i>Melursus ursinus</i>	Sloth bear	Schedule-I
13.	<i>Muntiacus muntjak</i>	Barking Deer	Schedule-III
14.	<i>Mus booduga</i>	Indian field mouse	Schedule-V
15.	<i>Presbytis entellus</i>	Hanuman Langoor	Schedule-II
16.	<i>Rattus rattus</i>	Black Rat	Schedule-V
17.	<i>Rousettus leschenaultia</i>	Bat	Schedule-V
18.	<i>Suncus murinus</i>	Chachundar	Schedule-IV
19.	<i>Sus scrofa</i>	Wild Boar	Schedule-III
20.	<i>Viverricula indica</i>	Indian Civet	Schedule-II
21.	<i>Vulpus bengalensis</i>	Fox	Schedule-II
22.	<i>Manis crassicaudata</i>	Pangolin	Schedule-I
23.	<i>Hyaena hyaena</i>	Hyaena	Schedule-III
24.	<i>Panthera pardus</i>	Leopard	Schedule-I
25.	<i>Muntiacus muntjak</i>	Barking deer	Schedule-III
26.	<i>Canis lupus pallipes</i>	Indian Wolf	Schedule-I
27.	<i>Axix axis</i>	Chital	Schedule-III
28.	<i>Cuon alpinus alpinus</i>	Wild Dog/Dhole	Schedule-II
<b>AMPHIBIANS</b>			
29.	<i>Duttaphrynus melanostictus</i>	Common Indian Toad	Least Concern
30.	<i>Bufo stomaticus</i>	Marbled Toad	Least Concern
31.	<i>Microhyla ornate</i>	Ornate Narrow-Mouthed Frog	Least Concern
32.	<i>Uperodon systema</i>	Narrow-Mouthed Frog	Least Concern
33.	<i>Euphlyctis cyanophlyctis</i>	Indian Skipper Frog	Least Concern
34.	<i>Zakerana keralensis</i>	Kerala Warty Frog	Least Concern
35.	<i>Rana tigrina</i>	Indian Bull Frog	Schedule-IV
36.	<i>Sphaerotheca breviceps</i>	Indian Burrowing Frog	Least Concern
37.	<i>Euphlyctis hexadactylus</i>	Indian Green Frog	Least Concern
38.	<i>Polypedates maculatus</i>	Indian Tree Frog	Least Concern
<b>REPTILES</b>			
39.	<i>Lissemys punctata</i>	Indian Flap Shell Turtle	Schedule-I
40.	<i>Melanochelys trijuga</i>	Indian Black Turtle	Least Concern
41.	<i>Hemidactylus brooki</i>	Brook's House Gecko	Least Concern
42.	<i>Hemidactylus leschenaulti</i>	Bark Gecko	Least Concern
43.	<i>Hemidactylus triedrus</i>	Indian Termite Hill Gecko	Least Concern
44.	<i>Hemidactylus frenatus</i>	Asian House Gecko	Least Concern

Sr. No.	Scientific Name	Common Name	Schedule
45.	<i>Sitana ponticeriana</i>	Fan Throated Lizard	Least Concern
46.	<i>Calotes versicolor</i>	Indian Garden Lizard	Least Concern
47.	<i>Mabuya carinata</i>	Keeled Grass Skink	Least Concern
48.	<i>Mabuya trivittata</i>	Three-lined Grass Skink	Least Concern
49.	<i>Eryx conica</i>	Common Sand Boa	Least Concern
50.	<i>Ptyas mucosus</i>	Indian Rat Snake	Least Concern
51.	<i>Boiga trigonatus</i>	Common Indian Cat Snake	Least Concern
52.	<i>Lycodon aulicus</i>	Common Wolf Snake	Least Concern
53.	<i>Ahaetulla nasutus</i>	Green Vine Snake	Least Concern
54.	<i>Amphiesma stolata</i>	Buff-striped Keelback	Least Concern
55.	<i>Xenochropis piscator</i>	Keelback Water Snake	Least Concern
56.	<i>Naja naja</i>	Spectacled Cobra	Schedule-II
57.	<i>Bungarus caeruleus</i>	Common Indian Krait	Least Concern
58.	<i>Daboia russelli</i>	Russell's Viper	Least Concern
59.	<i>Echis carinata</i>	Saw Scaled Viper	Least Concern
<b>BUTTERFLIES</b>			
60.	<i>Ixias marianne</i>	White orange tip	Common
61.	<i>Papilio demoleus</i>	Lime butterfly	Common
62.	<i>Euploea core</i>	Common crow	Common
63.	<i>Cyrestis thyodamas</i>	Common map	Common
64.	<i>Papilio polytes</i>	Common mormon	Common
65.	<i>Eurema hecabe</i>	Common Grass Yellow	Fairly Common
66.	<i>Danaus genutia</i>	Striped Tiger	Common
67.	<i>Hypolimanas misippus</i>	Danaid Egg Fly	Common
68.	<i>Mycalesis perseus</i>	Common Bush Brown	Common
<b>AVES</b>			
69.	<i>Corvus splendens</i>	House Crow	Schedule-V
70.	<i>Columba livia</i>	Rock Pigeon	Common
71.	<i>Francolinus pondicerianus</i>	Gery francolin	Least Concern
72.	<i>Turoides striatus</i>	Jungle babbler	Schedule-IV
73.	<i>Acridotheres tristis</i>	Common Myna	Schedule-IV
74.	<i>Merops orientalis</i>	Green bee-eater	Least Concern
75.	<i>Coracias benshalensis</i>	Indian roller	Schedule-IV
76.	<i>Dicrurus macrocercus</i>	Black Drongo	Schedule-IV
77.	<i>Microcarbo niger</i>	Little cormorant	Schedule-IV
78.	<i>Apus apus</i>	Common swift	Schedule-IV
79.	<i>Apus affinis</i>	House swift	Schedule-IV
80.	<i>Accipiter badius</i>	Shikra	Schedule-IV
81.	<i>Bubulcus ibis</i>	Cattle Egret	Schedule-IV
82.	<i>Egretta garzetta</i>	Little Egret	Schedule-IV
83.	<i>Ardeola grayii</i>	Pond heron	Schedule-IV
84.	<i>Vanellus indicus</i>	Red wattled lapwing	Schedule-IV
85.	<i>Pseudibis papillosa</i>	Black Ibis	Schedule-IV

Sr. No.	Scientific Name	Common Name	Schedule
86.	<i>Streptopelia decaocto</i>	Ring dove	Schedule-IV
87.	<i>Streptopelia chinensis</i>	Spotted Dove	Schedule-IV
88.	<i>Halcyon smyrnensis</i>	White Breasted Kingfisher	Schedule-IV
89.	<i>Merops persicus</i>	Blue Cheeked Bee Eater	Schedule-IV
90.	<i>Eudynamys scolopacea</i>	Asian Koel	Schedule-IV
91.	<i>Srniculus lugubris</i>	Drongo Cuckoo	Schedule-IV
92.	<i>Pavo cristatus</i>	Indian peafowl	Schedule-I
93.	<i>Gallus sallas</i>	Red Jungle Fowl	Schedule-IV
94.	<i>Amaurornis phoenicurus</i>	White breasted water hen	Schedule-IV
95.	<i>Gallinule chloropus</i>	Common Moorhen	Schedule-IV
96.	<i>Ocyceros birostris</i>	Great Indian Hornbill	Schedule-I
97.	<i>Corvus corax</i>	Raven	Schedule-IV
98.	<i>Dendrocitta vagabunda</i>	Tree Pie	Schedule-IV
99.	<i>Saxicoloides fulicata</i>	Indian Robin	Schedule-IV
100.	<i>Saxicola caprata</i>	Pied Bush Chat	Schedule-IV
101.	<i>Nectarinia asiatica</i>	Purple Sun Bird	Schedule-IV
102.	<i>Nectarinia minima</i>	Small Sun Bird	Schedule-IV
103.	<i>Passer domesticus</i>	House Sparrow	Schedule-IV
104.	<i>Parus major</i>	Grey Tit	Schedule-IV
105.	<i>Pycnonotus cafer</i>	Red Vented Bulbul	Schedule-IV
106.	<i>Acridotheres ginginianus</i>	Bank Myna	Schedule-IV
107.	<i>Turdoides caudatus</i>	Common Babbler	Schedule-IV
108.	<i>Orthotomus sutorius</i>	Tailor Bird	Schedule-IV
109.	<i>Psittacula krameri</i>	Rose Ringed Parakeet	Schedule-IV
110.	<i>Ploceus philippinus</i>	Baya	Schedule-IV
111.	<i>Bubo bubo</i>	Owl	Schedule-IV
<b>PISCES</b>			
112.	<i>Ilisha kampeni</i>	Kampen's ilisha	Not Evaluated
113.	<i>Tenualosa ilisha</i>	Hilsa Shad	Not Evaluated
114.	<i>Gudusia chapra</i>	Indian River Shad	
115.	<i>Nematalosa nasus</i>	Gizzard Shad	Least Concern
116.	<i>Stolephorus commersonii</i>	Long Jawed Anchovy	Not Evaluated
117.	<i>Stolephorus indicus</i>	Indian Anchovy	Not Evaluated
118.	<i>Thryssa mystax</i>	Gangetic Anchovy	Least Concern
119.	<i>Elops machnata</i>	Tenpounder	Not Evaluated
120.	<i>Anguilla benghalensis</i>	Indian Longfin Eel	Near Threatened
121.	<i>Notopterus notopterus</i>	Bronze Feather Back	Least Concern
122.	<i>Chanos chanos</i>	Milk Fish	Not Evaluated
123.	<i>Chela cachius</i>	Silver Hatchet Chela	Least Concern
124.	<i>Laubuka laubuca</i>	Indian Glass Barb	Least Concern
125.	<i>Salmostoma boopsis</i>	Boopis Razorbelly Minnow	Least concern
126.	<i>Salmostoma horal</i>	Hora Razorbelly Minnow	Vulnerable
127.	<i>Esomus barbatus</i>	South Indian Flying Barb	Least Concern
128.	<i>Danio devario</i>	Bengal Danio	Least Concern



Sr. No.	Scientific Name	Common Name	Schedule
129.	<i>Rasbora rasbora</i>	Gangetic Scissortail Rasbora	Least Concern
130.	<i>Barilius barila</i>	Barred Baril	Least Concern
131.	<i>Barilius barna</i>	Barna Baril	Least Concern
132.	<i>Puntius amphibious</i>	Scarlet Banded Barb	Data Deficient
133.	<i>Puntius chola</i>	Swamp Barb	Least Concern
134.	<i>Rohtee ogilbii</i>	Vatani Rohtee	Least Concern
135.	<i>Labeo boga</i>	Boga	Least Concern
136.	<i>Labeo calbasu</i>	Orange Fin Labeo	Least Concern
137.	<i>Labeo fimbriatus</i>	Fringed Lipped Peninsula Carp	Least Concern
138.	<i>Labeo rohita</i>	Rohu	Least Concern
139.	<i>Labeo potail</i>	Deccan Labeo	Critically Endangered
140.	<i>Catla catla</i>	Catla	Least Concern
141.	<i>Garra bicornuta</i>	Tunga Garra	Near Threatened
142.	<i>Garra gotyla</i>	Gotyla	Least Concern
143.	<i>Garra mullya</i>	Mullaya Garra	Least Concern
144.	<i>Tor khudree</i>	Deccan Mahseer	Endangered
145.	<i>Clarias batrachus</i>	Walking Catfish	Least Concern
<b>CRABS</b>			
146.	<i>Scylla serrata</i>	Mud Crab	Least Concern
<b>PRAWNS</b>			
147.	<i>Macrobrachium dobsoni</i>	Not Available	Not Available
148.	<i>Macrobrachium lamarii</i>	Not Available	Not Available
149.	<i>Macrobrachium malcolmsonii</i>	Not Available	Not Available
150.	<i>Macrobrachium scabriculum</i>	Not Available	Not Available
151.	<i>Penaeus monodon</i>	Not Available	Not Available
152.	<i>Metapenaeus monoceros</i>	Not Available	Not Available

## 5.2 Endangered Species:

132 species of vertebrates could be seen in the vicinity of the proposed project. Endangered species among the observed species likely to be present along the proposed pipeline route are listed in Table 4. It was observed that out of 132 species only 7 are listed in the Schedule I under Wildlife Protection Act, 1972 and Near Threatened, Vulnerable, Endangered & Critically Endangered categories of IUCN 3.1.

**Table 5: Endangered Species along pipeline and its buffer zone**

Species	Schedule	IUCN Status
<b>REPTILE</b>		
1. <i>Lissemys punctata</i>	Schedule-I	Least Concern

<b>BIRDS</b>			
1.	<i>Pavo cristatus</i>	Schedule-I	Least Concern
2.	<i>Ocyrceros birostris</i>	Schedule-I	Least Concern
<b>PISCES</b>			
1.	<i>Anguilla benghalensis</i>	Not Mentioned	Near Threatened
2.	<i>Salmostoma horal</i>	Not Mentioned	Vulnerable
3.	<i>Labeo potail</i>	Not Mentioned	Critically Endangered
4.	<i>Garra bicornuta</i>	Not Mentioned	Near Threatened
5.	<i>Tor khudree</i>	Not Mentioned	Endangered
<b>MAMMALS</b>			
1.	<i>Elephas maximus indicus</i>	Schedule-I	Endangered
2.	<i>Felis chaus</i>	Schedule-I	Least Concern
3.	<i>Melursus ursinus</i>	Schedule-I	Vulnerable
4.	<i>Panthera pardus</i>	Schedule-I	Vulnerable
5.	<i>Canis lupas pallipes</i>	Schedule-I	Least Concern

### **5.3 Status of National Park/Wildlife Sanctuary/Biosphere Reserve:**

The length of pipeline envisaged is 311 kms pipeline (281 km-mainline and 30 kms- spurline) from Thiruvallur (Tamil Nadu) to Bengaluru (Karnataka) along with associated facilities. The pipeline will traverse through states of Tamil Nadu, Andhra Pradesh and Karnataka.

The proposed R-LNG pipeline passes through Palamner reserved forest and Kaundinya wildlife sanctuary. The proposed pipeline will pass from number of roads, state highway, rivers/canals, Agricultural land etc. There are no rehabilitation and resettlement (R&R) issues.

#### **5.3.1. Kaundinya Wildlife sanctuary:**

Kaundinya Wildlife Sanctuary (12°39'–13°10' N and 78°29–78°52' E), Chittoor District, Andhra Pradesh falls in the hill ranges of the Eastern Ghats, a broken and discontinuous line of mountains in peninsular India. Koundinya Wildlife Sanctuary in Andhra Pradesh is the perfect retreat for wildlife enthusiasts. **A combination of wildlife sanctuary and an elephant reserve.**

Kaundinya Wildlife Sanctuary (357 km<sup>2</sup>) is linear in shape, running ca. 70 km north to south; the breath varies from 1 to 15 km (Fig.). It has a periphery of about 224 km with 53 fringe and 8 enclosure villages, and is bordered by reserve forests of Andhra Pradesh or Tamil Nadu. The Sanctuary comes under two ranges: Palamaner in the north and Kuppam in the south. Palamaner Range has four blocks: Tekumanda, Musalimadugu, Mordana and Nellipatla. The Kuppam Range has six blocks: Naikaneri, Peddanaikdurg, Charagallu, Peddur Extension, Peddur and Kangundi.

The water sources in the Sanctuary consists of the River Palar, its tributaries the Malattar (or Kaigal) and Koundinya, from which the Sanctuary gets its name. The other water sources in the Sanctuary comprise of natural or manmade ponds or lakes, most of which are situated at the outskirts of villages. Rainfall is from the SW monsoon (June-August: 380 mm) and NE monsoon (October-December: 410 mm). The cold weather is from November to February with temperatures sometimes dropping to 10°C. Summer (March-May) is mild with maximum temperature of about 33°C.

Andhra Pradesh did not have elephants for the past 200 years (Syam Prasad & Reddy 2002). However, during the early 1980s, a small herd of elephants moved into the Kuppam and Palamaner forest divisions of Chittoor district in Andhra Pradesh from the Hosur-Dharmapuri forests of Tamil Nadu, ca. 60 km to its northwest.

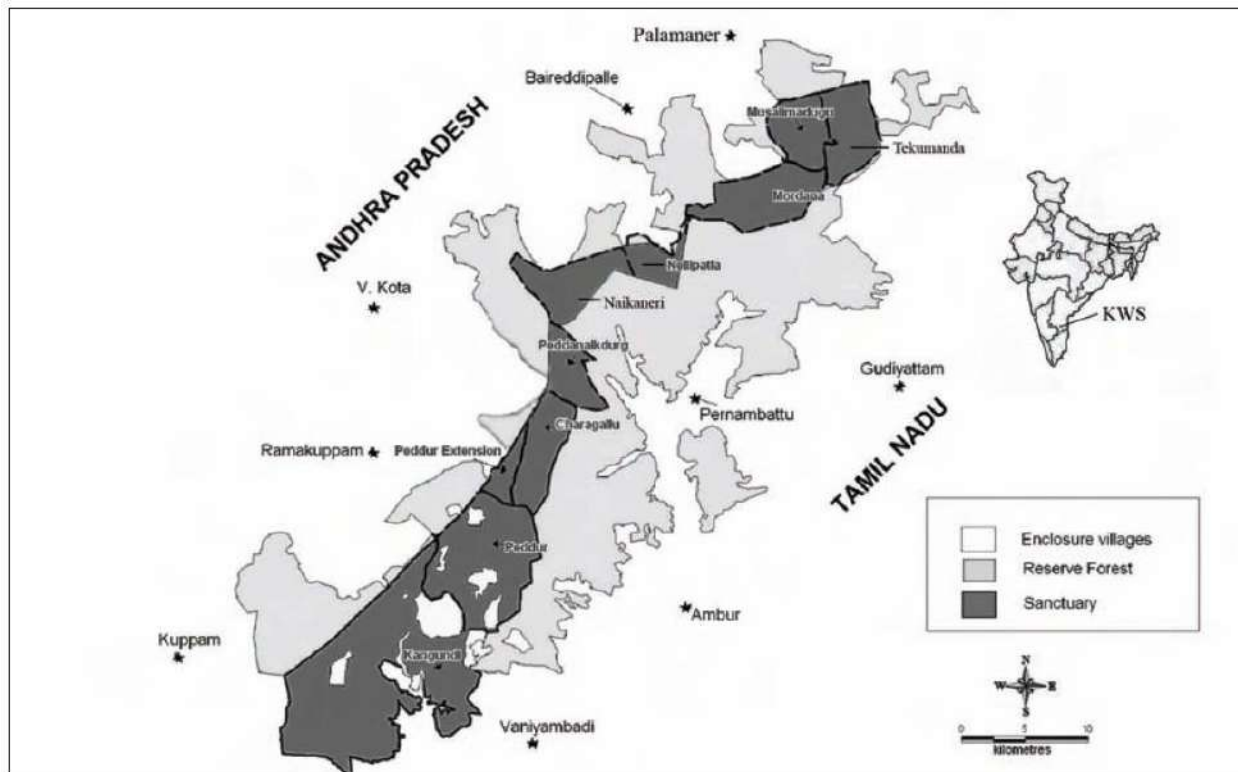


Figure: Map of the study area: Kaundinya Wildlife Sanctuary



Figure: Kaundinya River

The vegetation comprises predominantly of Southern Tropical Dry Mixed Deciduous (Champion & Seth 1968) with trees of *Hardwickia binata*, *Chloroxylon swietenia*, *Albizia amara*, *Boswellia serrata*, *Anogeissus latifolia*, *Pterocarpus santalinus*, *Shorea* spp., *Diospyros* spp. and *Ficus* spp. The water courses are dominated by *Terminalia arjuna*, *Pongamia pinnata*, *Tamarindus indica*, *Mangifera indica* and *Syzigium cumini*. The vegetation varies widely in different areas as a result of terrain, soil, impacts of grazing, fires, woodcutting, and history of exploitation. Due to the past exploitation for timber and fuel, most of the trees in the Sanctuary are results of coppice growths or got established in the last 2-3 decades, hence their overall small stature. The exotic *Lantana camara* bush has invaded most areas of the Sanctuary.

The sanctuary is primarily an elephant reserve and is home to about 78 Indian elephants. The vulnerable yellow-throated bulbul is present in the sanctuary. Apart from Indian elephant, some of the animals found in the sanctuary are: sloth bear, panther, cheetal, chowsingha, sambar, porcupine, wild boar, jungle cat, jackal, jungle fowl, starred tortoise and slender loris.

According to “**Right of Passage**” an isolated herd of about 30 elephants inhabits the Kaundinya Wildlife Sanctuary in the Chittoor district of Andhra Pradesh and has originally migrated from the Hosur and Anekal Forest Divisions of Tamil Nadu. A small group of about six elephants is also reported from an isolated area in the Tirupattur Forest Division of Tamil Nadu. No elephant corridor is found in this landscape.



Surveys along the reported migration route of elephants into KWS from the Hosur-Dharmapuri-Bannerghatta forests revealed that the elephants after crossing the Krishnagiri-Bangalore highway near Rayakotta, moved in an eastward direction along the Eastern Ghats, passing by the villages Maharajakadai, Veppanapalli, Pungirithi, Kurivinayanapalli, Yakalnatham and Kallikovil near Kuppam. From there, the animals moved southwards crossing the Krishnagiri-Kuppam road to take a curvilinear route northwards to enter the Kangundi block of the Sanctuary near Mallanur.



Fig: Construction of Elephant Corridor on Bengaluru-Tirupati Highway (NH-206)



Fig: Sign board of Elephant territory on Bengaluru-Tirupati Highway (NH-206)

## 6. Aquatic Diversity:

### 6.1 Methodology for Inland Water Sampling:

The samples for qualitative and quantitative analysis of planktons were collected from the sub surface layer at knee depth. Water samples were filtered through plankton net of 20 $\mu$  mesh size (APHA, 1971). The filtered samples were concentrated by using the centrifuge. By using Lackey's drops method and light microscope (Lackey, 1938), the qualitative analysis was carried out for phytoplankton and zooplankton (**Table 6**). The standard flora and other literature were followed for the qualitative evaluation of Plankton.

**Table 6: Phytoplankton and Zooplanktons Recorded in the Study Area**

NAME OF THE GENUS	CLASS	CORE AREA	BUFFER AREA
<b>(A)PHYTOPLANKTON</b>			
AMPHORA	BACILLARIOPHYCEAE	-	+
CYMBELLA	BACILLARIOPHYCEAE	-	+
FRAGILLARIA	BACILLARIOPHYCEAE	-	+
GOMPHONEMA	BACILLARIOPHYCEAE	-	+
GYROSIGMA	BACILLARIOPHYCEAE	-	+
NAVICULA	BACILLARIOPHYCEAE	-	+
ANKISTRODESMUS	CHLOROPHYCEAE	-	+
MICROSPORA	CHLOROPHYCEAE	-	+
<b>(B)ZOOPLANKTON</b>			
ALONA	BRANCHIOPODA	-	+
NAUPLINS	CRUSTACEAN	-	+
EUGLYPHA	IMBRICATEA	-	+
CENTROPYXIS	LOBOSEA	-	+
TICHOCERA	MONOGONONTA	-	+
EPIPHANES	ROTIFERA	-	+
EUGLYPHA	IMBRICATEA	-	+

**Table-7 Budget for Conservation/Management Plan**

<b>S. No.</b>	<b>Component</b>	<b>Budget in Rs (Lakh)</b>
<b>1</b>	Planting of trees groves in surrounding area and Promotion of agro forest in villages planting fruits trees	<b>20.00</b>
<b>2</b>	Artificial nests, feeding and watering arrangement for animals	<b>5.00</b>
<b>4</b>	Workshops, Training and awareness programs	<b>5.00</b>
<b>5</b>	Water supply	<b>5.00</b>
<b>6</b>	Salt Licks	<b>5.00</b>
<b>7</b>	Contingency	<b>5.00</b>
<b>Total</b>		<b>45.00</b>