

# Ecological Status near thermal power plant and jetty in Abdasa Taluka, Dist– Kutch Gujarat India

## Abstract

The thermal power plant has major impact of hot water discharge in to nearby creek or into sea on its ecosystem. The baseline for avian biodiversity, marine ecosystem and terrestrial ecosystem has to be assessed before discharging the hot water into sea. We have assessed the terrestrial as well as marine ecosystem for baseline scenario near the thermal power plant in Abdasa taluka, Kutch Gujarat. In the present study, we have focused on terrestrial baseline status of ecological system of surrounding. The findings state that area is not rich in biodiversity but mangrove biodiversity and density may be affected due to the thermal power plant activities.

**Keywords:** Avian biodiversity, mangrove, hot water discharge, impact, endangered species, thermal power plant

Volume 3 Issue 5 - 2018

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**Received:** August 26, 2018 | **Published:** October 02, 2018

## Introduction

The area in question has one thermal power plant running by Sanghi Industries Limited and one Jetty (walkway accessing the centre of an enclosed water body or structure that projects from the land out into water) structure built in 1994–1995 which is mainly used to Cement and other solid cargo handling by Sanghi Industries Limited. Sanghi Industries Limited is among leading cement manufacturers from Western India.

Water bodies should have the biological and chemical characteristics expected under sustainable conditions. The degree of departure of current vegetation from the potential natural vegetation, or potential natural community has detrimental impact on ecological system of the area. Before detailing the study area, a cursory understanding of the state scenario is important. Biodiversity of this region is largely related to the Thar Desert. Fossiliferous Limestone was found (Nummulites) which were mainly Marine deposits (coin-shaped) in

this area. Due to unfavourable meteorological conditions and diverse habitat, a rapid snapshot survey for biological reconnaissance was conducted in this case. Secondly, the activity rhythms of different species differ on a diurnal scale. For instance the rodents dwelling in the sandy tracts of the buffer zone were seen despite being ubiquitous, but leave unmistakable sole imprints of the hind paws on the sand. Such indirect species specific evidences of the animals' occupancy of the habitat have been considered. With desertic conditions, coastal vicinity, open scrub forest and slight undulating terrain in this region provides a unique ecosystem. The adverse climate and edaphic conditions intermixed with saline open plains and mangrove forests along the coast have turned this desert into an ideal dwelling place for wildlife and birds. Though forest areas are open, scrubby and along the coast they are of saline nature, some of the most endangered and threatened species of animals and birds survive in this area. As the district lies in poor rainfall area it lacks the richer mammalian life, but has the two form of wildlife are terrestrial and avifauna (Figure 1&2).



**Figure 1** Jetty Structure.



**Figure 2** Thermal power plant.

## Methodology

An ecological survey of the study area was conducted particularly with reference to listing of species and assessment of the existing

baseline ecological conditions in the study area. Total 8 hotspots/villages has been identified in the study area are listed in Table 1. The methodology adopted for the survey is depicted in Table 2.

**Table 1** List of villages/spots of survey

SNo	Name of Village/Spots	Remarks
1	Akari	A small village nearest to project site, about 22 families residing in the village, very few agriculture fields are there to grow the crops which are rain dependent.
2	Moti Ber	The locals in these village practicing agriculture and milk. The Moti Ber village is the biggest in the area having more than 600 families.
3	Nani Ber	
4	Navavas	
5	Thumdi	Village having 40 families practicing the agriculture.
6	Golay RF	Small village practicing agriculture and milk
7	Walawadi	Open jungle of Prosopis juliflora and Acacia nilotica on SW with scattered agriculture fields.
8	West Mangrove Forest	A very small village of 22 families, some agriculture fields
		Mangrove Forest in coastal area on SE direction.

**Table 2** Mode of data collection and parameters considered during the survey+

#	Aspect	Data	Mode of Data Collection	Parameters Monitored	Remarks
1.	Terrestrial Ecology	Primary data collection	By Field Survey <sup>1-6</sup>	<p>For Floral diversity, Vegetation measurements:</p> <p>Tree, Shrub, Herbs, Grasses, Climbers, Cultivated plants in the study area, Floristic composition of the study area, Medicinal plants of the study area, Status of the forest, their category in the study area, Rare and endangered flora in the study area. Endemic plants in the study area.</p> <p>For Fauna in the study area:</p> <p>-Reptiles, -Amphibians, -Birds, -Fresh water fishes -Mammals, -Butterflies. Rare and Endangered fauna in the study area, Endemic fauna in the study area, Wild life and their conservation importance in the study area.</p>	Random survey, opportunistic observations, diurnal bird observation, active search for reptiles, faunal habitat assessment, active search for microhabitat, scats, foot prints, animal call, pug marks, debarking sign, Nesting, Claws, Dung, etc. and information from local villagers.
2.		Secondary data collection	Kutchh SF Division under SF Circle Bhuj. Data of Fisheries department. Literature like research papers, books published by research/academic Institutions. Reports (Research reports, previous EIA reports etc.)	Interpretation of secondary data for Ecological Sensitive Areas such as national forests, wild life sanctuaries, lakes, ravines, hills, hillocks and reserve forest, vegetation, type, importance etc.	The literature was collected from various authentic sources. <sup>7-33</sup>

Table Continued.....

#	Aspect	Data	Mode of Data Collection	Parameters Monitored	Remarks
3.	Evaluation of Ecological sensitivity	Secondary	Review and Discussion	Wild life importance, Floral Endemicity, Faunal Endemicity, State of Terrestrial vegetation, State of wet land vegetation, Mangrove vegetation, Conservation importance, Legal status (National park, Wild life sanctuary, Reserve forest, Wetlands, Agricultural lands) Lakes /reservoirs/dam, Natural lakes and Swamps, Breeding ground of Migratory and Residential birds.	-

## Results and discussion

Kutch bhuj district is forefront in agriculture field. The crops like groundnut, till, bajri etc. are taken in monsoon. The agriculture is rain dependent. No means of major surface water available for crop irrigation. The area falls under agro-climatic zone XIII as per IASRI

[http://www.iasri.res.in/agridata/12data/chapter1/db2012tb1\\_2.pdf](http://www.iasri.res.in/agridata/12data/chapter1/db2012tb1_2.pdf).

### Floral diversity of the study area

The climatic, edaphic and biotic variations with their complex interrelationship and composition of species, which are adapted to these variations, have resulted in different vegetation cover, characteristic of each region.<sup>20</sup> The tree species, herbs, shrubs, climbers and major crops, were documented during this base line study.<sup>21–24</sup>

**Trees:** The dominant trees in the study area are *Mangifera indica* L (Mango trees) *Azadirachta indica* (Neem), *Plumeria rubra* L. (Champa), Babool (*Acacia nilotica*), *Casuarina equisetifolia* L. (Casuarina), *Dalbergia sisoo* L. (Shisham), etc. Total 34 species of trees belong to 17 families are enumerated from the study area (Table 3).

Table 3 List of trees in the study area

S.No.	Family and Scientific name	Vernacular name
<b>1</b>	<b>Anacardiaceae</b>	
1/1	<i>Mangifera indica</i> L.	Keri
<b>2</b>	<b>Annonaceae</b>	
2/1	<i>Polyalthia longifolia</i> L.	Asopalav
<b>4</b>	<b>Apocynaceae</b>	
3/1	<i>Plumeria rubra</i> L.	Champa
4/2	<i>Tamarindus indica</i> L.	Imli
<b>5</b>	<b>Burseraceae</b>	
5/1	<i>Commiphora wightii</i> L.	Guggal
<b>6</b>	<b>Casuarinaceae</b>	
6/1	<i>Casuarina equisetifolia</i> L.	Sharu
<b>7</b>	<b>Caricaceae</b>	
7/1	<i>Carica papaya</i> L.	Papaya

Table Continued.....

S.No.	Family and Scientific name	Vernacular name
<b>8</b>	<b>Euphorbiaceae</b>	
8/1	<i>Emblica officinalis</i> L.	Anola
<b>7</b>	<b>Fabaceae</b>	
9/1	<i>Dalbergia sisoo</i> L.	Sisso
10/2	<i>Delonix regia</i> (Boj)	Gulmohar
11/3	<i>Parkinsonia aculeata</i> L.	Rambaval
12/4	<i>Peltophorum pterocarpum</i> (DC.)	Tamrafal
13/5	<i>Albizia lebeck</i> L.	Siris
14/6	<i>Albizia procera</i> L.	Safed Siris
<b>8</b>	<b>Leguminosae</b>	
15/1	<i>Derris indica</i> (Lam.)	Karanj
16/2	<i>Parkinsonia aculeata</i> L.	Vilayati Kikar
<b>9</b>	<b>Lythraceae</b>	
17/1	<i>Sonneratia apetala</i> L.	Blume Mangrove
18/2	<i>Sonneratia alba</i> L.	Mangrove Apple
<b>10</b>	<b>Meliaceae</b>	
19/1	<i>Azadirachta indica</i> A.Juss	Limdo
<b>11</b>	<b>Mimosaceae</b>	
20/1	<i>Acacia nilotica</i> L.	Desi Baval
21/2	<i>Leucaena leucocephala</i> (Lam.) De	Pardesi Baval
22/3	<i>Pithecellobium dulce</i> (Roxb.) Bth.	Jungle jalebi
23/4	<i>Prosopis cineraria</i> (L.)	Khejari
24/5	<i>Acacia senegal</i> (L.) Willd,	Baval
<b>12</b>	<b>Moraceae</b>	
25/1	<i>Ficus benghalensis</i> L.	Bargad
26/2	<i>Ficus religiosa</i> L.	Pipal
<b>13</b>	<b>Moringaceae</b>	
27/1	<i>Moringa oleifera</i> Lam	Sargavo
<b>14</b>	<b>Myrtaceae</b>	
28/1	<i>Eucalyptus citriodora</i> Hk.	Nilgari

Table Continued.....

S.No.	Family and Scientific name	Vernacular name
29/2	<i>Syzygium cumini</i> L.	Jambu
<b>15</b>	<b>Rhamnaceae</b>	
30/1	<i>Zizyphus mauritiana</i>	Bor
31/2	<i>Zizyphus xylopyrus</i> L.	Jungli Bor
<b>16</b>	<b>Salvadoraceae</b>	
32/1	<i>Salvadora persica</i> L.	Piludo
33/2	<i>Salvadora oleoides</i> Decne.	Toothbrush Tree
<b>17</b>	<b>Sapotaceae</b>	
34/1	<i>Manilkara zapota</i> L. van Royen	Chikoo

**Shrubs and Herbs:** Total 20 shrub species belong to 15 families are enumerated from the study area. The dominant shrub community in this area was represented by *Prosopis juliflora*, *Calotropis procera*, *Cereus peruvianus*, *Xanthium strumarium* L., *Abelmoschus manihot* L., *Hibiscus rosa sinensis* L., etc. The shrubs observed in the study area are given in the Table 4 and herbs encountered in the study area are listed in Table 5.

Table 4 List of shrubs in the study area

S.No.	Family and Scientific name	Vernacular name
<b>1</b>	<b>Apocynaceae</b>	
1/1	<i>Thevetia peruviana</i>	Pili Kaner
<b>2</b>	<b>Asclepiadaceae</b>	
2/1	<i>Calotropis procera</i>	Akoda
<b>3</b>	<b>Bignoniaceae</b>	
3/1	<i>Tecoma stans</i> (L.) H.B. & K.	Peilafol
<b>4</b>	<b>Cactaceae</b>	
4/1	<i>Cereus peruvianus</i>	Cactus
5/2	<i>Opuntia elatior</i> Mill.	Fafdo thor
<b>5</b>	<b>Capparaceae</b>	
6/1	<i>Capparis decidua</i> (Forsk) Edgew	Kerdo
<b>6</b>	<b>Compositae</b>	
7/1	<i>Xanthium strumarium</i> L.	Gokhru
<b>7</b>	<b>Lythraceae</b>	
8/1	<i>Lawsonia inermis</i>	Mehandi
<b>8</b>	<b>Euphorbiaceae</b>	
9/1	<i>Ricinus communis</i> L.	Divel
10/2	<i>Euphorbia nivulia</i> Buch.-Ham	Thor
11/3	<i>Jatropha curcus</i> L.	Ratanjot
<b>9</b>	<b>Malvaceae</b>	
12/1	<i>Abelmoschus manihot</i> L.	Jungli Bindi
13/2	<i>Hibiscus rosa sinensis</i> L.	Jasund
<b>10</b>	<b>Musaceae</b>	
14/1	<i>Musa paradisiaca</i> L.	Kela

Table Continued.....

S.No.	Family and Scientific name	Vernacular name
<b>11</b>	<b>Mimosaceae</b>	
15/1	<i>Prosopis juliflora</i>	Gando baval
<b>12</b>	<b>Nyctaginaceae</b>	
16/1	<i>Bougainvillea spectabilis</i> Willd.	Bougainvelia
<b>13</b>	<b>Rhamnaceae</b>	
17/1	<i>Zizyphus nummularia</i>	Jharbera
18/2	<i>Zizyphus nummularia</i> (Burm.f.) W.	Chanibor
<b>14</b>	<b>Punicaceae</b>	
19/1	<i>Punica granatum</i>	Anar
<b>15</b>	<b>Rutaceae</b>	
20/1	<i>Citrus limon</i>	Neebu

Table 5 List of herbs in the study area

S.No.	Family and Scientific name	Vernacular name
<b>1</b>	<b>Asphodelaceae</b>	
1/1	<i>Aloe barbensis</i> Mill.	Kunvarapato
2/2	<i>Aloe vera</i>	Kuwar Pathu
<b>2</b>	<b>Asteraceae</b>	
3/1	<i>Tridax procumbens</i> L.	Bhangro
4/2	<i>Eclipta prostrata</i>	Bhangro
5/3	<i>Echinops echinatus</i> Roxb	Shulio
6/4	<i>Lacunae procumbens</i> (Roxb)	Moti Bhonpatri
<b>3</b>	<b>Convolvulaceae</b>	
7/1	<i>Cressa cretica</i> L.	Palio, Rudanti
8/2	<i>Ipomoea pes-caprae</i> (L)	Dariani vel
9/3	<i>Ipomoea aquatica</i> Forsk.	Nalini Bhaji
10/4	<i>Ipomoea obscura</i> Ker	Vad fudradi
<b>4</b>	<b>Lamiaceae ( Labiatae)</b>	
11/1	<i>Ocimum sanctum</i> L.	Tulsi
<b>5</b>	<b>Malvaceae</b>	
12/1	<i>Abutilon indicum</i> L.	Khapat, Dabaliar
<b>6</b>	<b>Menyanthaceae</b>	
13/1	<i>Nyphoides indicum</i> (Roxb.)	Kumudini
<b>7</b>	<b>Nyctaginaceae</b>	
14/1	<i>Boerhavia diffusa</i> L.	Satodi
<b>8</b>	<b>Papilionaceae</b>	
15/1	<i>Cortalaria medicaginea</i> Lam	Ran methi
<b>9</b>	<b>Solanaceae</b>	
16/1	<i>Datura metel</i>	Dhatura
17/2	<i>Solanum nigrum</i> L.	Piludi
<b>10</b>	<b>Zygophyllaceae</b>	
18/1	<i>Tribulus terrestris</i> L.	Gokhru

**Mangrove:** Some part of the study area falls coastal area which is declared as mangrove forest (10.68%), there is *Avecenia marina* was observed during the study. Four species of mangrove were encountered from the study area were terrestrial mangrove (Table 6).

**Table 6** List of mangrove/s encountered in the study area

S.No.	Scientific name	Common name	Family
<b>Marine</b>			
1.	<i>Avecenia marina</i>	Grey Mangrove	Verbenaceae
<b>Terrestrial</b>			
2.	<i>Salvadora persica</i>	Toothbrush Tree	Salvadoraceae
3.	<i>Salvadora oleoides</i> Decne.	Toothbrush Tree-Big	Salvadoraceae
4.	<i>Sonneratia apetala</i>	Blume Mangrove	Lythraceae

### Cultivated plants in the study area

It is observed that, the different parts of the study area were practicing different crop pattern based on the season and availability of irrigation facility. The rain is the major source of irrigation in this area. The general crop patterns practiced in the study area were Juwar (*Sorghum vulgare*), Ground nut (*Arachis hypogaea*) and during monsoon, Wheat (*Triticum aestivum*) during winter and during summer only Ground nut (*Mumphi*) were practiced in this region.

**Major horticultural crops:** Plantation of Chikku (*Manilkara zapota*), Kela (*Musa sp.*) Papaya (*Carica papaya*), Amla (*Phyllanthus emblica*), Mango trees (*Mangifera indica*) and Dadam (*Punica granatum*) were observed at some localities. Mango trees (*Mangifera indica*) and Tamarindus trees (*Tamarindus indica*) were observed adjacent to the residential area and also along the road side at almost all villages. Chikku, Aam, Amla, Limboo and Papaiyo were developed by client in the premises.

**Major vegetable corps:** The major vegetables grown in the study area were:

- Bhindi (*Abelmoschus esculentus*),
- Brinjal, (*Ringana Solanum melongena*),
- Cabbage (*Brassica oeraceae*),
- Tomato (*Lycopersicon lycopersicum*),
- Gubar (*Cyamopsis tetragonoloba*),
- Val (*Lablab purpureus*),
- Turia (*Luffa acutangula*),
- Karela (*Momordica charantia*),
- Drum stick (*Sargva*) (*Moringa oleifera*),
- Amla (*Tamarindus indica*)
- Chloi (*Vigna unguilata*)

**e. Pulses:** The pulses cultivated in this region were Mag (*Vigna acontifolia*), Tuver (*Cajanus cajan*).

### Reet Species in the study area

Among the enumerated flora in the study area, none of them were

assigned any threat category by Red data book of Indian Plants.<sup>15–19,21–24</sup>

### Faunal biodiversity of the study area

For the documentation of the faunal biodiversity of the study area with respect to birds, reptiles, amphibians, and butterfly species, a baseline survey had been conducted. The common birds observed in the study area are *Accipiter badius*, *Halcyon coromanda*, *Anhinga melanogaster*, *Apus apus*, *Egretta garzetta*, *Columba livia*, *Streptopelia orientalis*, *Anthus campestris*, *Motacilla cinerea*, *Motacilla flava*, *Nectarinia asiatica*, *Phalacrocorax fuscicollis*, *Pycnonotus cafer*, *Limosa limosa*, *Platalea ajaja*, etc. listed in Table 7. The Indian Peafowl was observed which is listed as schedule –I as per IWPA, 1972 and others listed as schedule IV as per IWPA, 1972.

**Butterflies from the study area:** Butterflies from three families observed during the present study are documented in the table below (Table 8).

**Herpetofauna:** In amphibian group, the toads were sighted during the study period. The reptile, Common Garden Lizard, House Gecko and Fan-Throated Lizard, Common rat Snake and were observed in the region is given in the table below (Table 9).

### Mammals

Common Mongoose (*Herpestes edwardsii*), Jungle cat were observed which are protected under schedule II and Nilgai (*Boselaphus tragocamelus*) is Schedule–III animal as per Wildlife Protection Act 1972. The Squirrel, Indian Porcupine, Hare etc. are protected under schedule IV. The Common House Rat (*Rattus rattus*) is protected under schedule V (Table 10).

### Insect

There is no significant faunal assemblage here except for some insects like Honey Bees (*Apis sp.*) and Gum leaf Grasshopper (*Goniaea australasiae*).

### Fisheries

Gujarat is the second largest fish producing States in the country only next to West Bengal. Among all the maritime States, Gujarat accounts for a significant share insofar as marine fish production in the country is concerned and stands as the largest marine fish producer. Although, the study area have no major river or any lake, a very few fishes were observed. Some part of study area fall coastal zone, hence marine fishes reported, no fisher man or fishing activity found in the study area (Table 11), (Figure 3–5).

### REET faunal species

Some of the sighted fauna was given protection by the Indian Wild Life (Protection) Act, 1972 by including them in different schedules. Among the birds in the study area, Pea fowl (*Pavo cristatus*) is included in schedule I of Wild life Protection Act (1972), while many other birds are included in schedule IV. Among the reptiles, Indian Cobra (*Naja naja*), Indian chameleon, Rat snake, Indian Krait and Indian Monitor are provided protection as per Schedule–II of Wild life Protection Act, (1972). Among mammals; Common Mongoose (*Herpestes edwardsi*), Indian Monitor, Jungle cat are a schedule–II animals. Nilgai (*Boselaphus tragocamelus*) is protected as Schedule–III animal and hares and 5 striped squirrels are included in schedule IV of Wild Life Protection act 1972.



**Table 7** Systematic lists of birds in the study area with status

#	Family	Scientific Name	Vernacular Name	Common Name	Status
1.	Accipitridae	<i>Accipiter badius</i> (Gmelin, 1788)	Shakro	Shikra	R
2.		<i>Elanus caeruleus</i> (Desfontaines, 1789)	Kapasi/Laudharo	Black-winged Kite	R
3.	Alcedinidae	<i>Halcyon coromanda</i> (Latham, 1790)	Kalkalio	Ruddy Kingfisher	R
4.		<i>Halcyon smyrnensis</i> (Linnaeus, 1758)	Moto Kalkalio	White-throated Kingfisher	R
5.	Anhingidae	<i>Anhinga melanogaster</i> (Pennant, 1769)	Jalbhi	Darter	R
6.	Apodidae	<i>Apus apus</i> (Linnaeus, 1758)	Ababil	Common Swift	R
7.		<i>Apus affinis</i> (JE Gray, 1830)	Moto Ababil	Little Swift	R
8.	Ardeidae	<i>Bubulcus ibis</i> (Linnaeus, 1758)	Dhorbaglo	Cattle Egret	R
9.		<i>Egretta garzetta</i> (Linnaeus, 1766)	Baglo	Little Egret	R
10.		<i>Mesophoyx intermedia</i> (Wagler, 1827)	Vachetdholo baqlo	Intermediate Egret	R
11.	Caprimulgidae	<i>Caprimulgus asiaticus</i> (Latham, 1790)	Sonara	Nightjar	R
12.	Charadriidae	<i>Vanellus indicus</i> (Boddaert, 1783)	Titodi	Lapwing	R
13.	Ciconiidae	<i>Ciconia ciconia</i> (Linnaeus, 1758)	Badho	White Stork	V
14.		<i>Ephippiorhynchus asiaticus</i> (Latham, 1790)	Dhonk	Black necked Stork	R
15.		<i>Mycteria leucocephala</i> (Pennant, 1769)	Dhonk	Painted Stork	R
16.	Columbidae	<i>Columba livia</i> (Gmelin, 1789)	Kabutar	Rock Pigeon	R
17.		<i>Streptopelia decaocto</i> (Frivaldszky, 1838)	Holdi	Eurasian Collared-Dove	R
18.		<i>Streptopelia orientalis</i> (Latham, 1790)	Holdi	Rufous Turtle Dove	R
19.	Coraciidae	<i>Coracias benghalensis</i> (Linnaeus, 1758)	Deshi Neelkanth	Indian Roller	R
20.	Corvidae	<i>Corvus splendens</i> (Vieillot, 1817)	Kagdo	Crow	R
21.	Cuculidae	<i>Centropus sinensis</i> (Stephens, 1815)	Hoco	Coucal	R
22.		<i>Surniculus lugubris</i> (Horsfield, 1821)	Kaliyakoshi	Drongo Cuckoo	R
23.	Dicruridae	<i>Dicrurus macrocercus</i> (Vieillot, 1816)	Kado kosi	Black drongo	R
24.	Fringillidae	<i>Carduelis carduelis</i> (Linnaeus, 1758)	Tapusiyu	Goldfinch	R
25.	Glareolidae	<i>Cursorius coromandelicus</i> (Gmelin, 1789)	Rangodhlo	Courser	R
26.	Gruidae	<i>Antigone antigone</i> (Linnaeus, 1758)	Kunj	Crane	R
27.	Laridae	<i>Larus brunnicephalus</i> (Jerdon, 1840)	Gull	Gull brown headed	R
28.		<i>Sterna albifrons</i> (Pallas, 1764)	Nana vabagli	Little Tern	R
29.	Leiothrichidae	<i>Turdoides caudate</i> (Dumont, 1823)	Babbler	Common Babbler	R
30.	Megalaimidae	<i>Megalaima haemacephala</i> (Statius Muller, 1776)	Kansaro	Coppersmith barbet	R
31.	Meropidae	<i>Merops leschenaultia</i> (Vieillot, 1817)	Tarklo	Chestnut-headed Bee-eater	R
32.	Motacillidae	<i>Anthus campestris</i> (Linnaeus, 1758)	Pidi dhanchidi	Tawny Pipit	R
33.		<i>Anthus spinoletta</i> (Linnaeus, 1758)	Panini Dhanchidi	Water Pipit	W
34.		<i>Motacilla cinerea</i> (Tunstall, 1771)	Diwaliyo	Grey Wagtail	W
35.		<i>Motacilla flava</i> (Linnaeus, 1758)	Pilo Divaliyo	Yellow Wagtail	S
36.	Muscicapidae	<i>Ficedula parva</i> (Bechstein, 1792)	Chatki ma khimar	Red breasted Flycatcher	R
37.		<i>Muscicapa striata</i> (Pallas, 1764)	Nanu Chikyu	Spotted Flycatcher	S
38.	Nectariniidae	<i>Nectarinia asiatica</i> (Latham, 1790)	Jāmbālī Sunbird	Purple Sunbird	R
39.		<i>Nectarinia minima</i> (Sykes, 1832)	Motu Duriyu	Crimson-backed Sunbird	R
40.	Paridae	<i>Cyanistes caeruleus</i> (Linnaeus, 1758)	Chikyu	Blue Tit	R
41.		<i>Parus major</i> (Linnaeus, 1758)	Tikdi	Great Tit	R

Table Continued.....

#	Family	Scientific Name	Vernacular Name	Common Name	Status
42.	Passeridae	<i>Passer domesticus</i> (Rafinesque, 1815)	Chakli	Sparrow	R
43.	Phalacrocoracidae	<i>Phalacrocorax fuscicollis</i> (Stephens, 1826)	Pani Kagdo	Cormorant	R
44.	Phasianidae	<i>Francolinus pondicerianus</i> (Gmelin, 1789)	Titar	Gery Francolin	R
45.		<i>Pavo cristatus</i> (Linnaeus, 1758)	Mor	Indian Peafowl	R
46.	Phoenicopteridae	<i>Phoenicopterus minor</i> (Geoffroy Saint-Hilaire, 1798)	Nano Surkabh	Lesser Flamingo	R
47.	Picidae	<i>Picus viridis</i> (Linnaeus, 1758)	Lakkadkhod	Green Woodpecker	R
48.	Ploceidae	<i>Ploceus philippinus</i> (Linnaeus, 1766)	Sugari	Baya weaver	R
49.	Podicipedidae	<i>Tachybaptus ruficollis</i> (Pallas, 1764)	Dubki	Little Grebe	R
50.	Psittaculidae	<i>Psittacula krameri</i> (Cuvier, 1800)	Popat	Rose-ringed Parakeet	V
51.	Pteroclididae	<i>Pterocles exustus</i> (Temminck, 1825)	Batumdi	Sandgrouse	V
52.	Pycnonotidae	<i>Pycnonotus cafer</i> (Linnaeus, 1766)	Bulbul	Bulbul	R
53.	Rallidae	<i>Amaurornis phoenicurus</i> (Pennant, 1769)	Safed chatari	White-breasted Water hen	R
54.		<i>Fulica atra</i> (Linnaeus, 1758)	Dasadi	Common Coot	R
55.	Rallidae	<i>Gallinula chloropus</i> (Brisson, 1760)	Jalmurgi	Moorhen	R
56.	Scolopacidae	<i>Actitis hypoleucos</i> (Linnaeus, 1758)	Nani tutwari	Sandpiper	W
57.		<i>Limosa limosa</i> (Linnaeus, 1758)	Motagadero	Black Tailed Godwit	R
58.		<i>Philomachus pugnax</i> (Linnaeus, 1758)	Tilio	Ruff	R
59.	Striidae	<i>Athene noctua</i> (Scopoli, 1769)	Nani ghuwad	Little Owl	R
60.	Sturnidae	<i>Acridotheres ginginianus</i> (Latham, 1790)	Ghoda kabar	Bank Myna	R
61.	Threskiornithidae	<i>Platalea leucorodia</i> (Linnaeus, 1758)	Chamchichanch	Eurasian Spoonbill	OP
62.		<i>Platalea ajaja</i> (Linnaeus, 1758)	Gulabi chamchichanch	Spoonbill	O
63.		<i>Threskiornis melanocephalus</i> (Latham, 1790)	Dhorikankansar	Black headed ibis	R

R= Resident; O= occurs most of the year; P= Spring or autumn passage; W= Winter only; V= Vagrant; S= Summer only.

Table 8 Butterflies in the study area

Scientific Name and Family	Common Name	Relative Abundance
<b>Family Asclepiadaceae</b>		
<i>Danaus genutia</i> Cramer	Striped Tiger	Common
<b>Family Papilionidae</b>		
<i>Papilio polytes</i>	Common Mormon	Common
<b>Family Pieridae</b>		
<i>Eurema hecabe</i>	Common Grass yellow	Very Common
<i>Ixias Marianne</i>	White orange tip	Common
<b>Family: Nymphalidae</b>		
<i>Danaus chrysippus</i>	Plain Tiger	Common
<i>Phalantha phalantha</i>	Common Leopard	Fairy Common
<i>Hypolimanas misippus</i>	Danaid egg fly	Common
<i>Mycalesis perseus</i>	Common bush brown	Uncommon
<i>Cynthia cardui</i> Linnaeus	Painted Lady	Uncommon
<i>Junonia hierta</i> Fabricius	Yellow pansy	Common
<i>Junonia orithya</i> Linnaeus	Blue pansy	Fairy Common

**Table 9** Reptiles and amphibian in the study area

S.No.	Family	Common Name	Scientific name	Schedule as IWPA, 1972
	Agamidae	Common Garden Lizard	<i>Calotes versicolor</i> (Cuvier, 1817)	Not listed
		Fan-Throated Lizard	<i>Sitana ponticeriana</i> (Cuvier, 1817)	Not listed
	Bufo	Toad	<i>Bufo bufo</i> (Gray 1825)	Not listed
	Chamaeleonidae	Indian chameleon	<i>Chameleon calcaratus</i> (Rafinesque, 1815)	Schedule II
	Colubridae	Common Rat Snake	<i>Ptyas mucosus</i> (Linnaeus, 1758)	Schedule II
		Common Indian Krait*	<i>Bungarus caeruleus</i> (Schneider, 1801)	Schedule II
	Elapidae	Indian Cobra*	<i>Naja naja</i> (Linnaeus, 1758)	Schedule II
	Gekkonidae	House Gecko	<i>Hemidactylus flaviviridis</i> (Ruppell, 1835)	Not listed
	Scincidae	Brahminy Skink	<i>Mabuya carinata</i> (Schneider, 1801)	Not listed
	Varanidae	Indian Monitor	<i>Varanus bengalensis</i> (Daudin, 1802)	Schedule II

\*Not sighted but included as per the secondary information from the villagers.

**Table 10** Mammals in study area

S.No.	Family	Common Name	Scientific name	Status as per IWPA 1972
	Antilopinae	Nilgai (Blue Bull)	<i>Boselaphus tragocamelus</i> (Pallas, 1766)	Schedule-III
	Felidae	Common Jungle Cat	<i>Felis chaus</i> (Schreber, 1777)	Schedule II
	Herpestidae	Common Mongoose	<i>Herpestes edwardsii</i> (É. Geoffroy Saint-Hilaire, 1818)	Schedule II
	Hystriidae	Indian Porcupine	<i>Hystrix indica</i> (Kerr, 1792)	Schedule IV
	Leporidae	Hare	<i>Lepus nigricollis</i> (F. Cuvier, 1823)	Schedule IV
	Muridae	Common House Rat	<i>Rattus rattus</i> (Linnaeus 1758)	Schedule V
		5 striped Palm Squirrel	<i>Funambulus pennanti</i> (Wroughton, 1905)	Schedule IV
	Sciuridae	Grey Musk Shrew	<i>Suncus murinus</i> (Linnaeus 1766)	-

**Table 11** List of fishes reported from the study area

S.No.	Family	Common name	Scientific name
1.	Carangidae	Seer Fish	<i>Caranx atropus</i>
2.	Clupeidae	Hilsa	<i>Tenualosa ilisha</i>
3.	Oxudercidae	Mud Skipper	<i>Gobius boddarti</i>
4.		Thread Fin	<i>Polynemus indicus</i>
5.	Polynemidae	Indian Salmon*	<i>Eleutheronema tetradactylum</i>
6.	Sapridae	Long Spine Sea-bream*	<i>Argyrops spinifer</i>

\*not seen directly.





**Figure 3** Spotting during primary survey.



**Figure 4** Mangrove in the study area.



**Figure 5** Marine survey.

## Conclusion

The area in question has one thermal power plant running by Sanghi Industries Limited and one Jetty (walkway accessing the centre of an enclosed water body or structure that projects from the land out into water) structure built in 1994–1995 which is mainly used to Cement and other solid cargo handling by Sanghi Industries Limited. Sanghi Industries Limited is among leading cement manufacturers from Western India. Total 34 species of trees belong to 17 families are enumerated from the study area. The dominant trees in the study area are *Mangifera indica* L (Mango trees) *Azadirachta indica* (Neem), *Plumeria rubra* L. (Champa), Babool (*Acacia nilotica*), *Casuarina equisetifolia* L. (Casuarina), *Dalbergia sisoo* L. (Shisham), etc. Total 21 shrub species belong to 15 families are enumerated from the study area. The dominant shrub community in this area was represented by *Prosopis juliflora*, *Calotropis procera*, *Cereus peruvianus*, *Xanthium strumarium* L., *Abelmoschus manihot* L., *Hibiscus rosa sinensis* L., etc. Some part of the study area falls coastal area which is declared as mangrove forest (10.68%), there is *Avecenia marina* was observed during the study. Four species of mangrove were encountered from the study area were terrestrial mangrove. The common birds observed in the study area are *Accipiter badius*, *Halcyon coromanda*, *Anhinga melanogaster*, *Apus apus*, *Egretta garzetta*, *Columba livia*, *Streptopelia orientalis*, *Anthus campestris*, *Motacilla cinerea*, *Motacilla flava*, *Nectarinia asiatica*, *Phalacrocorax fuscicollis*, *Pycnonotus cafer*, *Limosa limosa*, *Platalea ajaja*, etc. Common Mongoose (*Herpestes edwardsii*), Jungle cat were observed which are protected under schedule II and Nilgai (*Boselaphus tragocamelus*) is Schedule–III animal as per Wildlife Protection Act 1972. The Squirrel, Indian Porcupine, Hare etc. are protected under schedule IV. There is no

significant faunal assemblage here except for some insects like Honey Bees (*Apis* sp.) and Gum leaf Grasshopper (*Goniada australasiae*). The study represent that the area in question is not rich in biodiversity, although the marine ecosystem needs to be affected by hot water discharge into sea. Therefore, an urgent need for marine ecosystem management plans to be implemented during operation phase.

## Acknowledgements

None.

## Conflict of interest

Author declares that there is no conflict of interest.

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