

CHAPTER 3

DESCRIPTION OF THE ENVIRONMENT

3.1 Site and Impact Zone

The power plant site is located adjacent to an existing road connecting Khurda, Chandaka, Barang, Gobindapur and Naraj villages. The site can be approached by road from Cuttack at a distance of about 12 km. The proposed site boundary is at a distance of more than 500 m from Naraj Marthapur Railway station on Talcher-Khurda Road railway line of Eastern railway. The proposed site is located between latitude 20°26' 02''N to 20°27' 43'' N and longitude 85° 45' 28'' E to 85° 47' 07'' E with an altitude of 30 m above mean sea level.

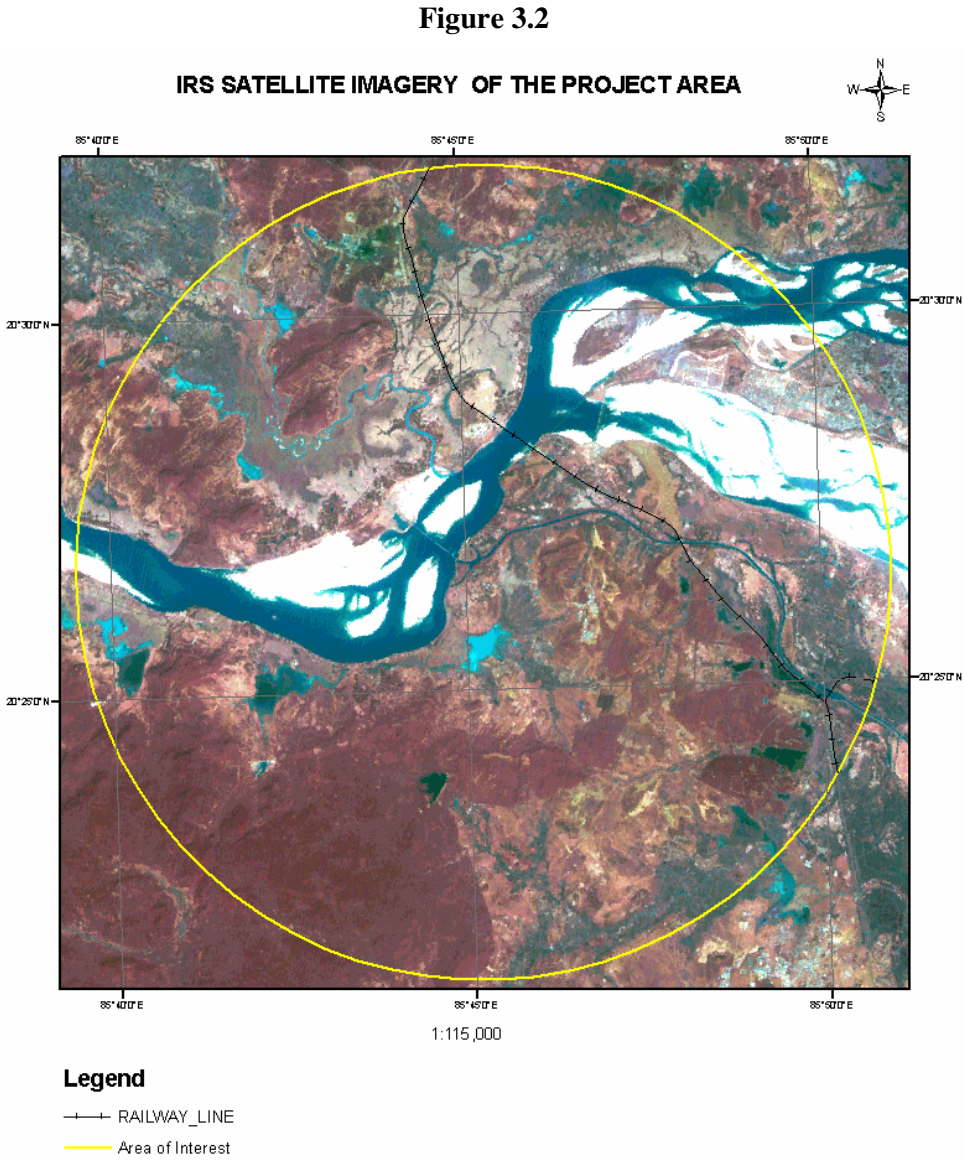
*A 10 kilometre radius zone has been considered as study zone as suggested by TOR Pt. No. 5. A physical map for the area in 1: 50000 scale of Survey of India is given in **Figure 3.1**. The study period for field measurements was March – May 2007.*

3.2 Physiography

The region is a part of Upper Gondwana system and alluvium plain. The impact zone is therefore partly in Mahanadi delta and partly in the eastern ghat region with hills and forests. The Eastern ghat hills pass through the coastal districts of Orissa. The hills are not continuous ranges but are irregularly scattered series of steep ridges separated by deep precipitous valleys cut out by the denuding action of running water. Mahanadi, the major river of the state enters the plain stage at Naraj, near the site. From this point the bifurcation of the main trunk stream starts and the delta stage begins. At Naraj, many river islands are formed and the first bifurcation gave birth to the river Kathjodi passing south of Cuttack. At this anicuts have been made on the river and delta irrigation canals like Puri canal starts from these anicuts. The northern part of impact zone is a watershed between Mahanadi and Brahmani. Soil is mostly new alluvium and old alluvium with some

tracts of low laterite. The hills after a prolonged period of rock-weathering have been responsible for creating the laterite belt.

Figure 3.2 shows the recent satellite image of the impact zone.



3.3 Climate

The climate of the study region is tropical monsoonic type. The year may be divided into four major seasons – summer, monsoon, post-monsoon and winter. Nearest meteorological station is at Cuttack. The met station was established in 1867.

The area experiences a hot and humid climate during summer months of March to May characterized by temperature going up as high as above 39°C. The highest temperature recorded has been 47°C. The south-west monsoon generally sets in around 5th to 10th June and by first week of July the area is under full sway of south-west monsoon. Monsoon rains lash the area during June to end of September. Annual average rainfall is about 1560 mm.

Winter season, between December and beginning of February is characterized by wind chill from north and long nights. The temperature goes down around 15°C, with some days below 10°C. **Table 3.1** shows the major meteorological parameters of the region.

Table 3.1
Meteorological Observations from IMD Data
Predominant Wind Direction

Season	Direction
Winter	Mostly calm, North East
Post Monsoon	West, North East
Summer	South West, South
Monsoon	South West, West

Temperature

	Temperature
Maximum Recorded	47.7 °C
Maximum Mean	35.8 °C
Minimum Recorded	7.6 °C
Minimum Mean	15.5 °C

Rainfall

Annual Average	Maximum recorded in a Month	Maximum recorded in a day
1560 mm	901	292 mm

Monitoring of Micro-meteorological Data

A meteorological monitoring station was set up at the site during the study period of March – May 2007. The parameters monitored were temperature, humidity, atmospheric pressure, wind speed and wind direction.

Table 3.2 presents the highlights of meteorological data during study period. Detailed data are given in **Annexure I**.

Table 3.2
Highlights of Meteorological Data during Study Period

	Maximum	Minimum
Temperature, °C	41.5	17
Avg. Wind Speed, km/hr	30.6	0
Relative Humidity, %	96	24

Windrose

Distribution of wind speed and direction during the study period is represented by the Windrose diagram as shown in **Figure 3.3**.

It shows that predominant wind direction during this period was from west and south west. Wind speed was generally low.

3.4 Landuse in Impact Zone

Satellite data of the study area was procured from National Remote sensing Agency based on the IRS-P6, LISS-III sensor and the same has been used for Land use/ Land cover studies. Cloud free and the best quality at the same time recently acquired data is the main criteria in choosing this particular data. Survey of India toposheet covering the project area also used as a reference for this study.

Visual and digital interpretation methods were used to prepare interpreted map. The satellite data is interpreted based on photo elements like tone, texture, size, shape, pattern, aspect, association etc. These interpreted maps and digitally enhanced satellite data are used on the ground to identify different elements of various features and themes. Suitable field sampling designs in terms of line transects/ quadrants are used to assess the interpreted elements and relate with satellite data. The field data collections are aided by GPS in order to locate the ground verification points on the image and for further incorporation of details.

Based on the visual interpretation, ground truth verification and available secondary information, final maps were prepared in 1:50000 scale. The results were analyzed based on the distribution of various land use / land cover classification and the results are presented both in tabular as well as chart form.

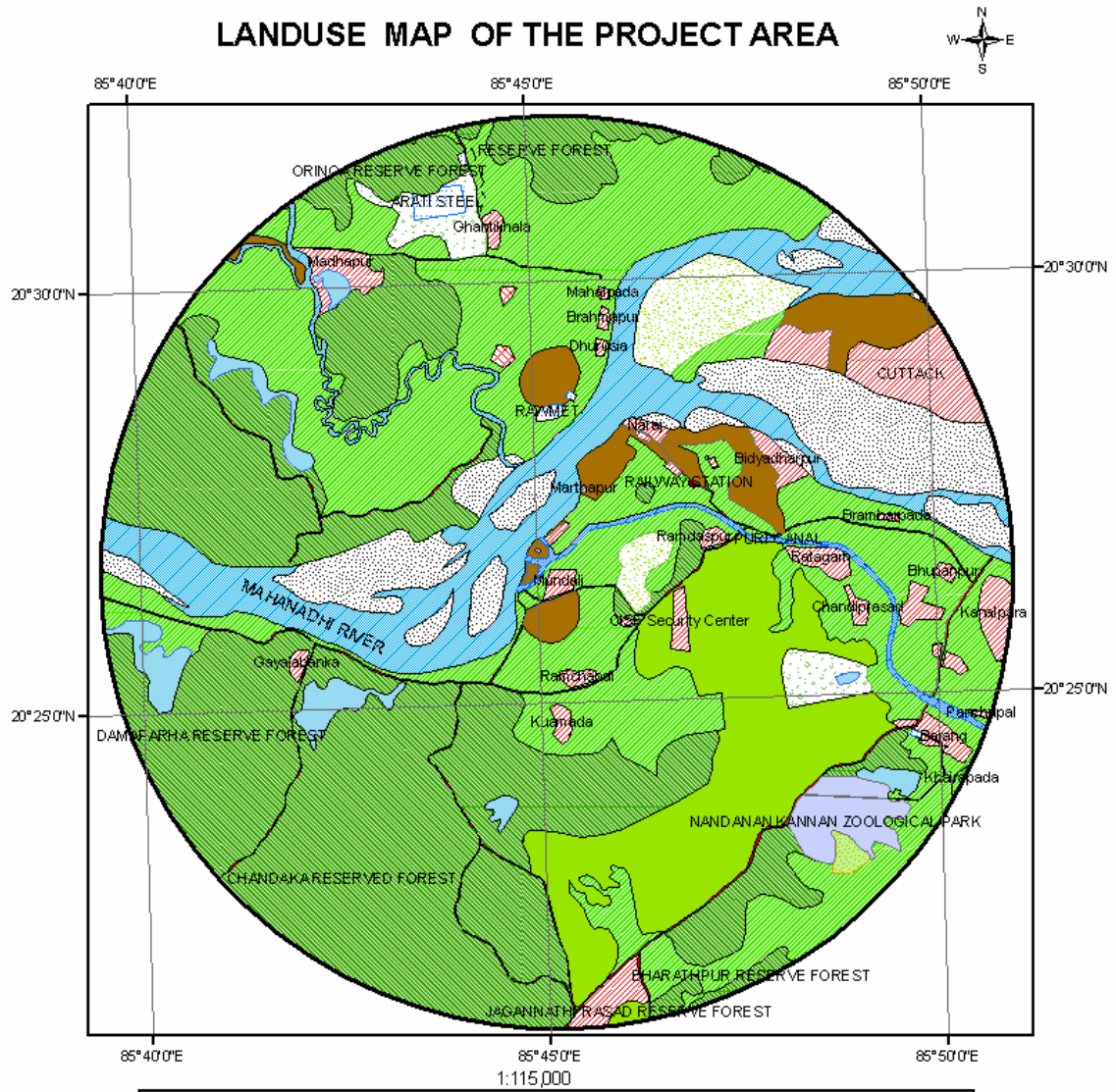
The various land use and land cover classes delineated include settlements, agriculture, forest area, river, river sand, tank, canal, industrial land, road, barren/scrub land, marshy land, etc. Coverage of the each land use / land cover classification shall be visualized as shown in the map. The area of each identified classes is shown in the following table.

Table 3.3 presents the landuse scenario in impact zone. From the statistics prepared for the various land use land cover, it shall be noted that the predominant land use is dense forest land which is about 32 % of the total impact zone, followed by agricultural land with crop, river sand, settlements and so on. More than 40% of the impact zone comes under forest cover. **Figure 3.4** presents the Landuse Map of Impact Zone.

Table 3.3
Landuse Scenario

Landuse	Area (Sq. km)	Percentage (%)
Agri Plantation	3.79	1.20%
Barren Land	9.85	3.13%
Canal	1.55	0.49%
Crop Land With Crop	87.69	27.83%
Dense Forest Land	100.74	31.97%
Industrial Land	0.89	0.28%
Moderate Dense Forest	27.9	8.85%
River / Stream	26.98	8.56%
River Sand	22.71	7.21%
Road	3.14	1.00%
Settlements	14.04	4.46%
Settlement With Mixed Vegetation	0.27	0.09%
Tank	5.08	1.61%
Marsh	0.5	0.16%
Scrub Land	6.75	2.14%
Zoological Park	3.26	1.03%
Total	315.14	100.00%

Figure 3.4
LANDUSE MAP OF THE PROJECT AREA



3.5 Ambient Air Quality

Selection of Air Quality Monitoring Stations

To assess the present air quality of the area, eight (8) ambient air quality monitoring stations (A) were setup. The locations of the monitoring stations for air quality study were selected on the basis of meteorological data, topography, sensitive locations, stack height etc. Predominant wind direction during the season is from south and south west.

A 1 - Station no. 1 is situated at the central location of the proposed site at the village Mundali. The station also has a Met logger. The village has a central school Nabodaya Vidyalaya and a health centre. **A 2** - Station no. 2 is situated about 2 km apart from the central location at the North direction. The village name is Naraj. **A 3** - Station no. 3 is situated at the village, named Ramdaspur. It is about 2 km. towards South East direction. **A 4** - Station no. 4 is at village Bidyadharpur which is about 3 km.towards East direction. **A 5** - Station no. 5 is situated at the North East direction about 8 km from the site, at the housing complex at Cuttack Development Authority. **A 6** - is about 8 km. to the South East direction at Barang. **A 7** - Station no. 7 situated at the village Dhurukuria within the boundary of Atghara notified forest, about 4 km. at West direction. **A 8** - Station no. 8 is situated at Goyalbank village at about 8 km towards southwest. Within the boundary of Bhagipur notified forest. An elephant reserve and a wildlife sanctuary named Chandraka Abhayaranya is situated within 1 km. from the location.

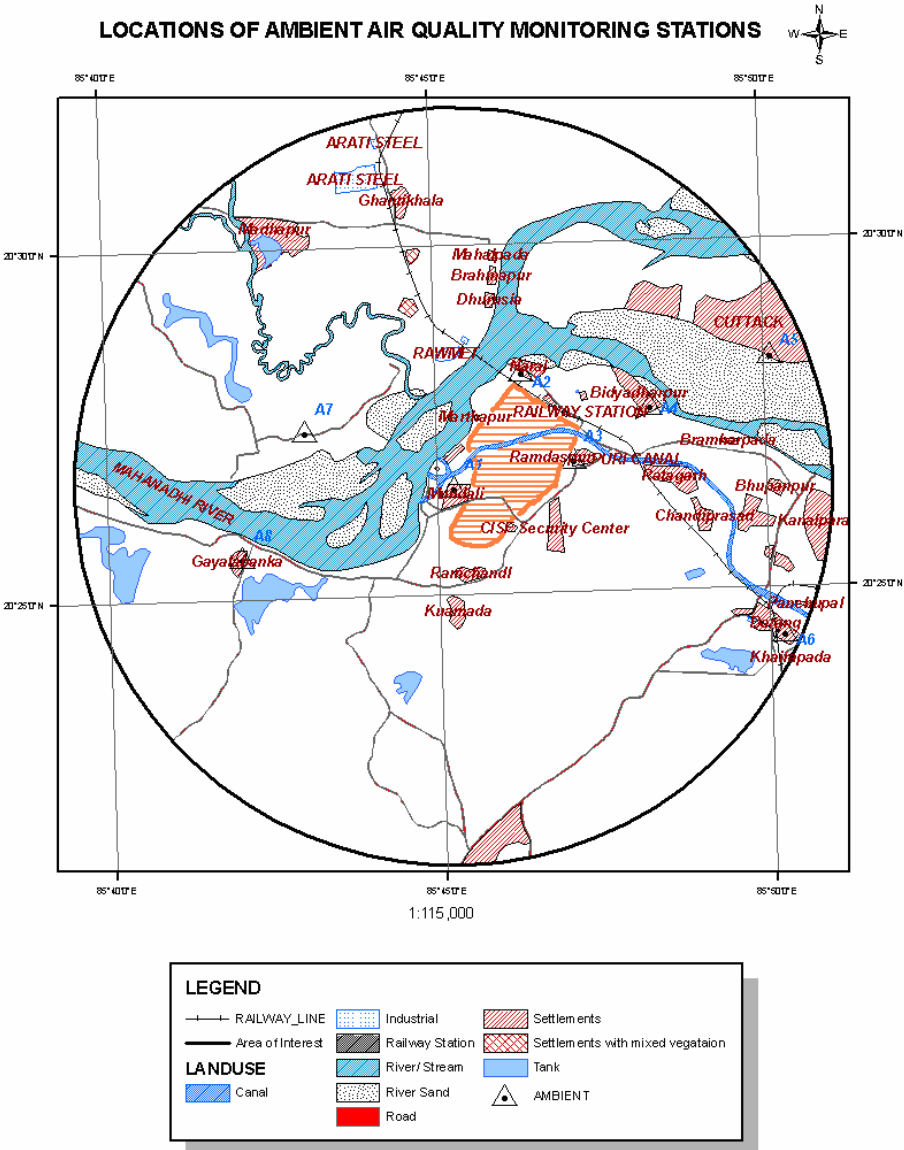
Figure 3.5 shows the locations and **Table 3.4** presents the direction and distance of the monitoring stations from project site.

Table 3.4

Locations of Ambient Air Quality Monitoring Stations

AAQ Station No	Location	Approx Distance from Project Site	Direction	Site Characteristics
1	Mundali (Project Site) near Navoday School	Within 0.5 km from proposed plant boundary	W	Village and a modern school with hostel
2	Naraj	1.5 km	North	Downwind direction, Residential and Market Area
3	Ramdaspur	2 km	South East	Residential Area
4	Bidyadharpur	4 km	East	Downwind direction, Residential Area
5	Cuttack	8	NE	Downwind direction and City Air Quality
6	Barang	7 km	SSE	Residential Area near to Nandan Kanan Biological Park
7	Dhurukuria	4 km	W	Near Atagarh Forest area and crosswind
8.	Goyal bank	6 KM	SW	Near Elephant reserve and forest area

Figure 3.5



Parameters, Frequency and Monitoring Methodology

Monitoring was conducted in respect of the following parameters:

- Suspended Particulate Matter (SPM)
- Respirable Particulate Matter (RPM)
- Sulphur Dioxide (SO₂)
- Nitrogen Dioxide (NO₂)

The equipment were placed at a height of 3 to 7 meters above ground level at the monitoring stations, thus negating the effects of wind blown ground dust and free from vertical obstructions within a cone of 120° from the actual position of the sampler, to avoid any impedance to the pollutants. The equipment was placed at open space free from trees and vegetation which otherwise act as a sink of pollutants resulting in lower levels in monitoring results.

With a view to collecting the samples for SPM, RPM, SO₂ and NO₂, Envirotech High Volume Samplers (HVS) along with Gaseous attachment APM 411 were used for round the clock collection of the samples. The samples for SPM, RPM, SO₂ and NO₂ were collected on 8 hourly basis, twice a day to find the 24-hour average. The instruments were well capable of drawing air at a flow rate of 1 to 1.3 m³/min with very little pressure drop. A cyclone is used to separate non-Respirable particulates. Glass micro-fibre filter papers (GF, Whatman) were used for the collection of RPM. SO₂ was collected by drawing air at a flow-rate of 0.5 litres per minute (lpm) through an absorbing solution i.e., Sodium tetrachloromercurate (West and Gaek Method). NO₂ was collected by drawing air at a similar flow rate through the mixture of absorbing solutions i.e. sodium hydroxide and sodium arsenite. The measurement for both SO₂ and NO₂ were done colorimetrically.

Monitoring was conducted in the summer season March – May 2007 at a frequency of twice a week at each station for 24 hours.

The sampling and analysis of air pollutants were done as per the norms suggested by Central Pollution Control Board (Emission Regulations Part-III) and also the Bureau of Indian Standards IS-5182.

Results and Discussions:

National Ambient Air Quality Standards for different pollutants for different areas is presented in **Table 3.5**.

Table 3.6 presents the summary of concentration of pollutants at all the stations. Detailed results for the respective locations have been given in **Annexure I**.

SPM and RPM

Suspended Particulate Matter (SPM) and Respirable Particulate Matters (RPM) at the study area during the study period were moderate. In the village areas, e.g Mundali, Nara, Bidyadharpur and Ramdaspur the SPM and RPM levels were within the limit of residential zone (200 $\mu\text{g}/\text{m}^3$ and 100 $\mu\text{g}/\text{m}^3$ respectively). The maximum and minimum values for SPM were 188 $\mu\text{g}/\text{m}^3$ and 145 $\mu\text{g}/\text{m}^3$ respectively and those for RPM were 88 $\mu\text{g}/\text{m}^3$ and 52 $\mu\text{g}/\text{m}^3$ respectively. The levels were lower in the regions close to forest areas e.g. Dhurukuria and Goyal Bank. SPM and RPM levels were relatively higher in Cuttack, the maximum values of SPM and RPM values crossing the desirable limits. The levels of SPM and RPM are graphically presented in **Figure 3.6**.

Sulphur Dioxide

Sulphur dioxide concentrations during the monitoring period in the study area were found to be generally very low and much within the residential limit. The 24-hour limit of SO_2 for residential area is 80 $\mu\text{g}/\text{m}^3$ and for sensitive area is 30 $\mu\text{g}/\text{m}^3$. SO_2 level remained within 6.5 $\mu\text{g}/\text{m}^3$ to BDL only. The levels of SO_2 are graphically presented in **Figure 3.7**.

Nitrogen Di-Oxide

Nitrogen dioxide concentrations during the monitoring period were moderate and within residential limit. The 24-hour limit of NO₂ for residential area is 80 µg/m³. Highest value monitored was 46.3 µg/m³ at Cuttack. Average values varied around 30 µg/m³. The levels of NO₂ are graphically presented in **Figure 3.7**.

**Table 3.5
National Ambient Air Quality Standard**

Pollutant	Time Weighted average	Concentration in ambient air		
		Industrial Area	Residential, Rural & other areas	Sensitive area
Sulphur Dioxide (SO ₂)	Annual Average *	80 µg/m ³	60 µg/m ³	15 µg/m ³
	24 hours**	120 µg/m ³	80 µg/m ³	30 µg/m ³
Oxides of Nitrogen as NO ₂	Annual Average *	80 µg/m ³	60 µg/m ³	15 µg/m ³
	24 hours**	120 µg/m ³	80 µg/m ³	30 µg/m ³
Suspended Particulate Matter (SPM)	Annual Average *	360 µg/m ³	140 µg/m ³	70 µg/m ³
	24 hours**	500 µg/m ³	200 µg/m ³	100 µg/m ³
Respirable Particulate matter (size less than 10 µm) (RPM)	Annual Average *	120 µg/m ³	60 µg/m ³	50 µg/m ³
	24 hours**	150 µg/m ³	100 µg/m ³	75 µg/m ³
	24 hours**	1.5 µg/m ³	1.00 µg/m ³	0.75 µg/m ³
Carbon Monoxide (CO)	8 hours**	5.0 mg/m ³	2.0 mg/m ³	1.0 mg/m ³
	1 hour	10 mg/m ³	4.0 mg/m ³	2.0 mg/m ³

* Annual Arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval.

** 24 hourly/8 hourly values should be met 98% of the time in a year. However, 2% of the time, it may exceed but not on two consecutive days.

**Table 3.6
Summary of Ambient Air Quality Monitoring Results**

All values in microgram/cu.m

Station A 1 – Mundali (Project Site)

	SPM	RPM	SO₂	NO₂
Max.	188	87	5.4	35.3
2nd Max	184	84	4.9	34.9
Min	108	52	3.8	24.5
Average	154.8	70.8	4.5	30.4
Std dev	21.4	8.4	0.3	3.1

Station A 2 - Naraj

	SPM	RPM	SO₂	NO₂
Max.	184	88	6.4	42.4
2nd Max	182	79	5.4	40.5
Min	149	59	4	30.8
Average	168.3	70.1	5.0	35.7
Std dev	9.4	7.0	0.4	2.8

Station A 3 - Ramdaspur

	SPM	RPM	SO₂	NO₂
Max.	184	80	5.7	39.5
2nd Max	180	79	5.5	36.7
Min	154	56	0	26.2
Average	168.9	70.4	4.7	32.8
Std dev	8.0	6.8	1.0	2.7

Station A 4 – Bidyadharpur

	SPM	RPM	SO₂	NO₂
Max.	187	78	6.1	39.9
2nd Max	182	77	5.8	38.5
Min	145	63	3.8	28.6
Average	170.0	70.4	5.1	34.3
Stdev	9.7	4.2	0.5	2.7

Station A 5 – Cuttack

	SPM	RPM	SO₂	NO₂
Max.	278	134	6.5	46.3
2nd Max	256	125	6	44.5
Min	148	64	4.9	31.2
Average	194	97	5.5	38.6
Stdev	25.9	15.2	0.4	4.7

Station A 6 – Barang

	SPM	RPM	SO₂	NO₂
Max.	188	87	4.8	35.5
2nd Max	126	42	4.7	35.3
Min	75	22	3.5	26.4
Average	122	36	4.4	30.9
Stdev	16.5	11.6	0.3	2.5

Station A 7 – Dhurukuria

	SPM	RPM	SO₂	NO₂
Max.	148	70	5.9	38.8
2nd Max	134	56	5.8	36.4
Min	66	32	4.4	28.8
Average	112	44	5.4	32.6
Stdev	18.7	6.9	0.3	2.4

Station A 8– Goyal bank

	SPM	RPM	SO₂	NO₂
Max.	178	82	5.4	35.7
2nd Max	167	78	5	34.7
Min	42	29	4.1	26.9
Average	102	51.7	4.5	30.9
Stdev	31.8	16.5	0.3	2.3

Figure 3.6

Ambient SPM & RPM concentrations

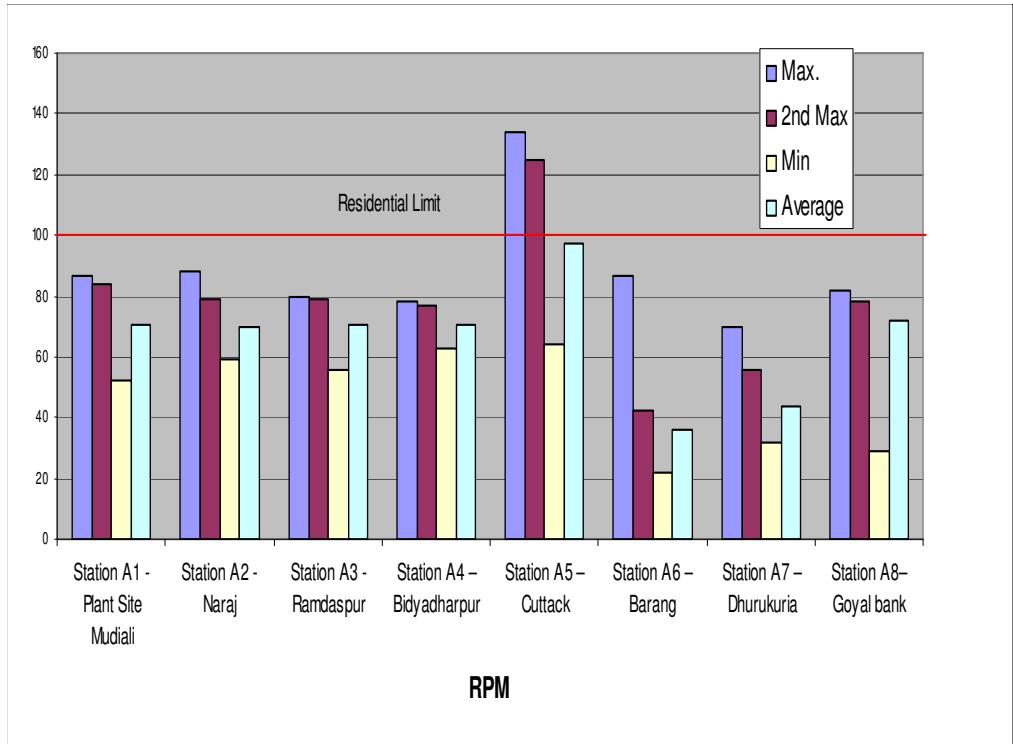
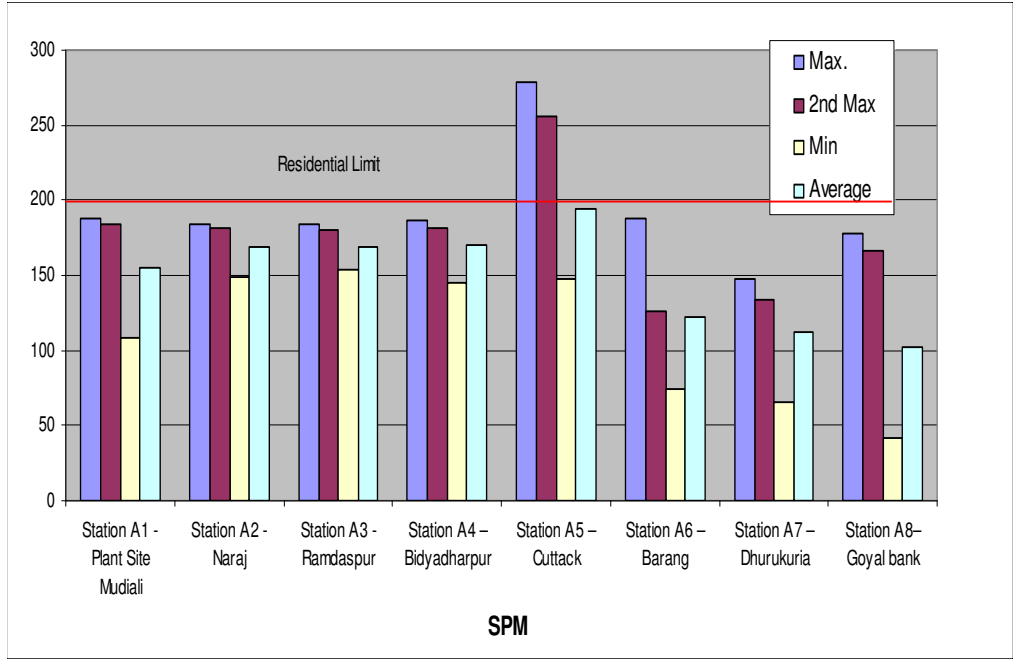
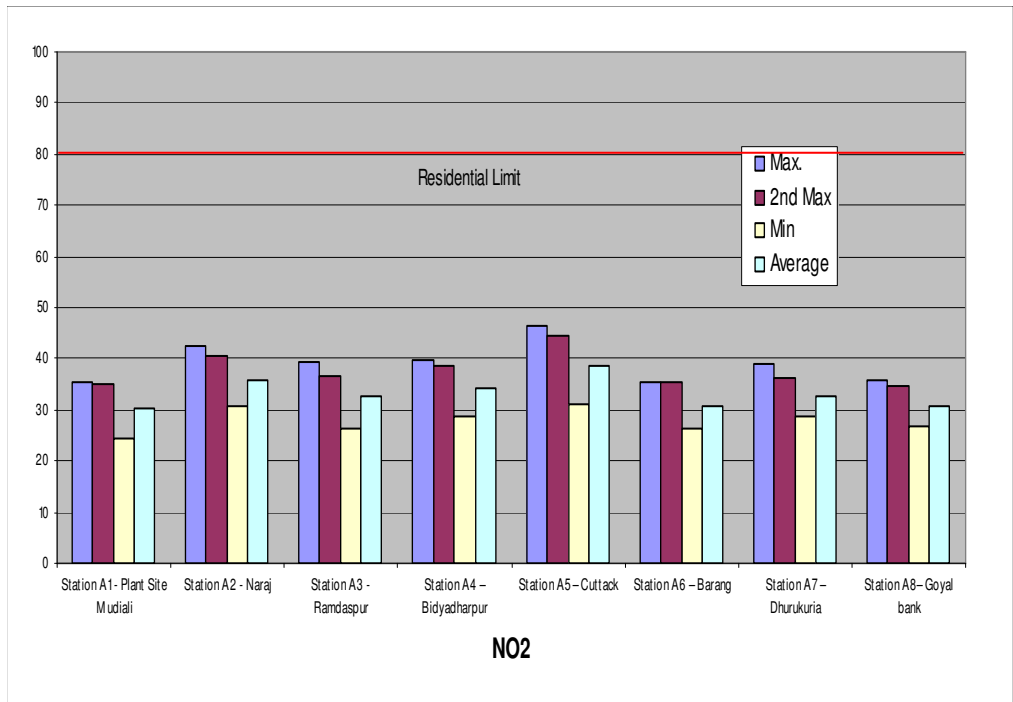
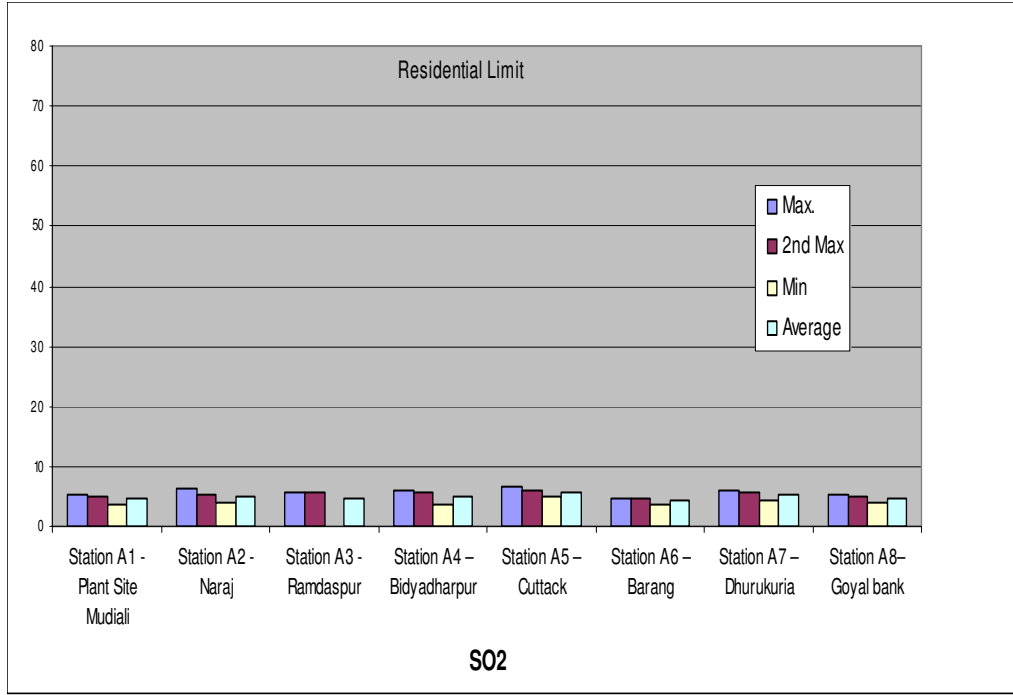


Figure 3.7
Ambient SO₂ & NO₂ concentrations



3.6 Hydrology and Water Quality

Hydrology

The Mahanadi River passes from Southwest to Northeast on the western side of the site and then takes a right turn towards east bifurcating the river near Naraj. At Naraj, many river islands are formed and the first bifurcation gave birth to the river Kathjodi passing south of Cuttack. Mahanadi is the biggest river in Orissa and originates from the mountains of Raipur and Bastar in Chhatisgarh state towards west. The river has a total length of 852.8 km from the source to the delta and 107 km from upper point of delta to the the delta mouth. Puri Canal, a major irrigation canal originates from the barrage at Naraj and flows towards east. Other rivers which join the Mahanadi with in 10 km radius of the study area is Sapua river.

There are a number of various sizes of ponds in the adjoining villages. These ponds are used by a large number of people for different domestic purposes. These are also used for pisciculture and irrigation.

Groundwater occurs in confined aquifers moderate yield prospects of 15-40 lps. Ground water is available at a depth of 10-20m.

Water Quality

Water samples were collected and analysed from six (6) locations for the month of March, April and May 2007 to assess the baseline status of surface water and from four (4) locations to assess the ground water quality of the site. The sampling and analysis methodologies of the water samples adopted were as per IS-2488, IS-3025, APHA 20th Ed etc.

The proposed power plant will draw water from the Mahanadi River and also will discharge treated wastewater in the river. Therefore two samples of river water have been collected from upstream and downstream of Mundali weir on the Mahanadi River. Though neither Puri canal water will be used nor any wastewater will be discharged there, water quality of the canal near the site and that at the

downstream near Ramdaspur have been collected for analysis. For other surface water quality in the locality, water from two ponds have been monitored.

Therefore six surface water sources monitored were:

- 1) SW 1 - Mahanadi - Up Stream To Mundali Weir
- 2) SW 2 - Mahanadi - Down Stream To Mundali Weir Near Naraj
- 3) SW 3 - Puri Canal - Near To Site (Mundali)
- 4) SW 4 - Pond Water Near Naraz
- 5) SW 5 - Pond Water Near Ramdaspur
- 6) SW 6 - Puri Canal - Near Ramdaspur

No groundwater will be used for plant purposes. However ash pond water may influence ground water quality. Groundwater sources were measured therefore from dugwell and hand pump near the proposed ash pond and from a dugwell and hand pump near the site.

Therefore four ground water sources monitored were:

- 1) GW 1 - Dugwell Near To The Proposed Ash Pond Area
- 2) GW 2 - Hand Pump Near To The Proposed Ash Pond Area
- 3) GW 3 - Dugwell Near To The Proposed Site
- 4) GW 4 - Hand Pump Near To The Proposed site

Figure 3.8 & 3.9 shows the locations of water quality monitoring stations.

Table 3.7

Locations of Surface Water Quality Monitoring Stations

Surface Water (SW) Quality Monitoring Station No.	Location	Approx Distance from Project Site	Direction	Site Characteristics
1	Mahanadi – Upstream to Mundali Weire	2 km	SW	River Water Usage: Irrigation, Bathing Cleanning etc.
2	Mahanadi – Downstream to Mundali Weire near Naraj	1.5 km	W	River Water near railway bridge. Usage: Irrigation, Bathing Cleanning etc.
3	Puri Canal - Near To Site (Mundali)	0.5 km	W	Puri Canal before the project boundary. Usage: Bathing Cleanning etc.
4	Pond Water Near Naraz	2 km	N	Pond Water Usage: Bathing Cleanning etc.
5	Pond Water Near Ramdaspur	1 km	SE	Pond Water Usage: Bathing Cleanning etc.
6	Puri Canal - Near Ramdaspur	2 km	E	Puri Canal after the project boundary. Usage: Bathing Cleanning etc.

Table 3.8

Locations of Ground Water Quality Monitoring Stations

Ground Water (GW) Quality Monitoring Station No.	Location	Approx Distance from Project Site	Direction	Site Characteristics
1	Dugwell Near To The Proposed Ash Pond Area	2 km	S	Village - Kumada Usage: Bathing Cleanning etc.
2	Hand Pump Near To The Proposed Ash Pond Area	2 km	S	Village - Kumada Usage: Bathing Cleanning etc.
3	Dugwell Near To The Proposed Site	1.5 km	E	Village - Ramdaspur Usage: Bathing Cleanning etc.
4	Hand Pump Near To The Proposed site	0.5 km	W	Village - Mundali Usage: Bathing Cleanning etc.

Figure 3.8

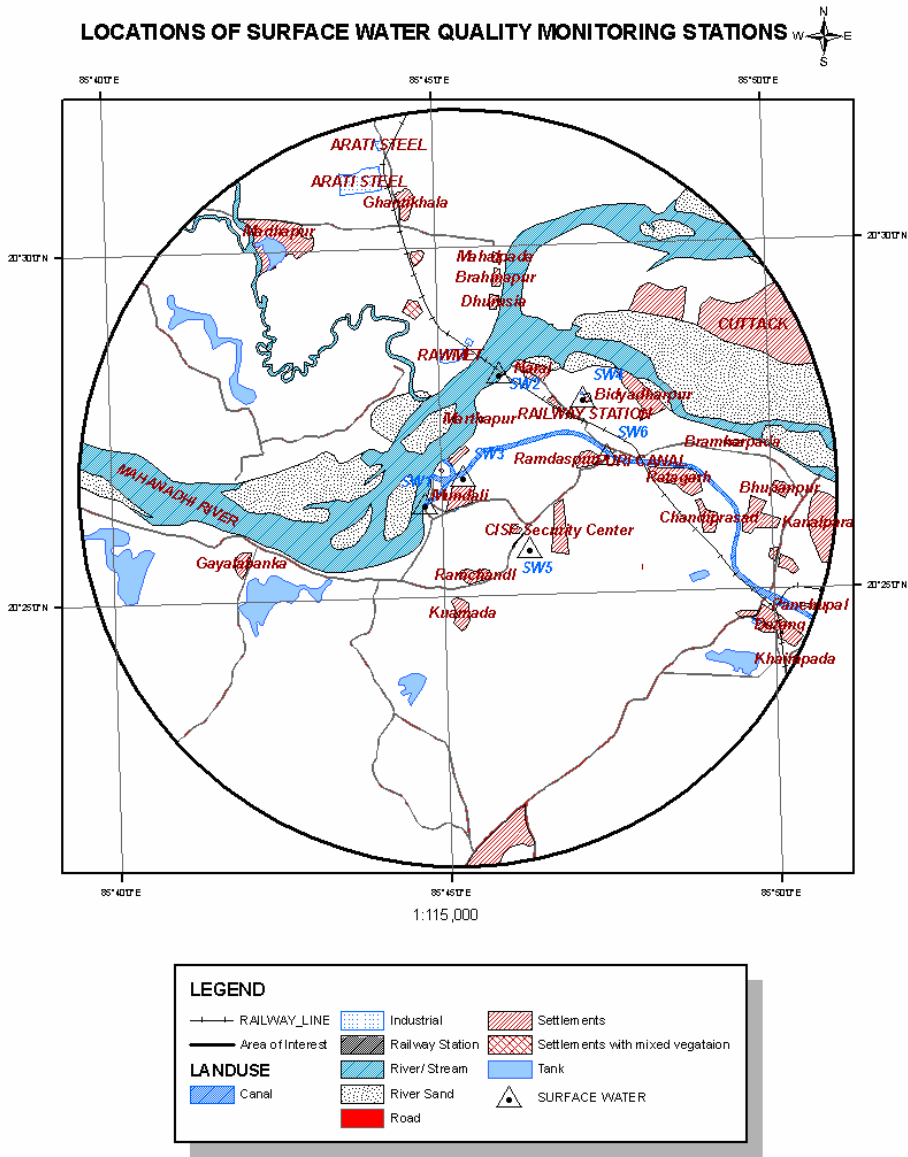
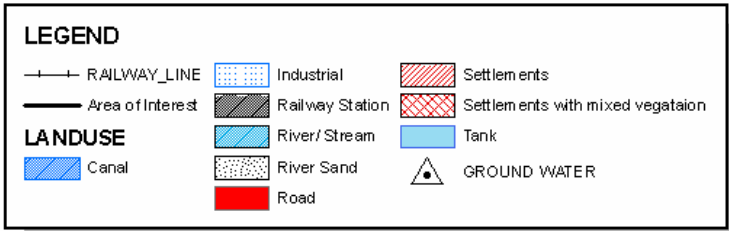
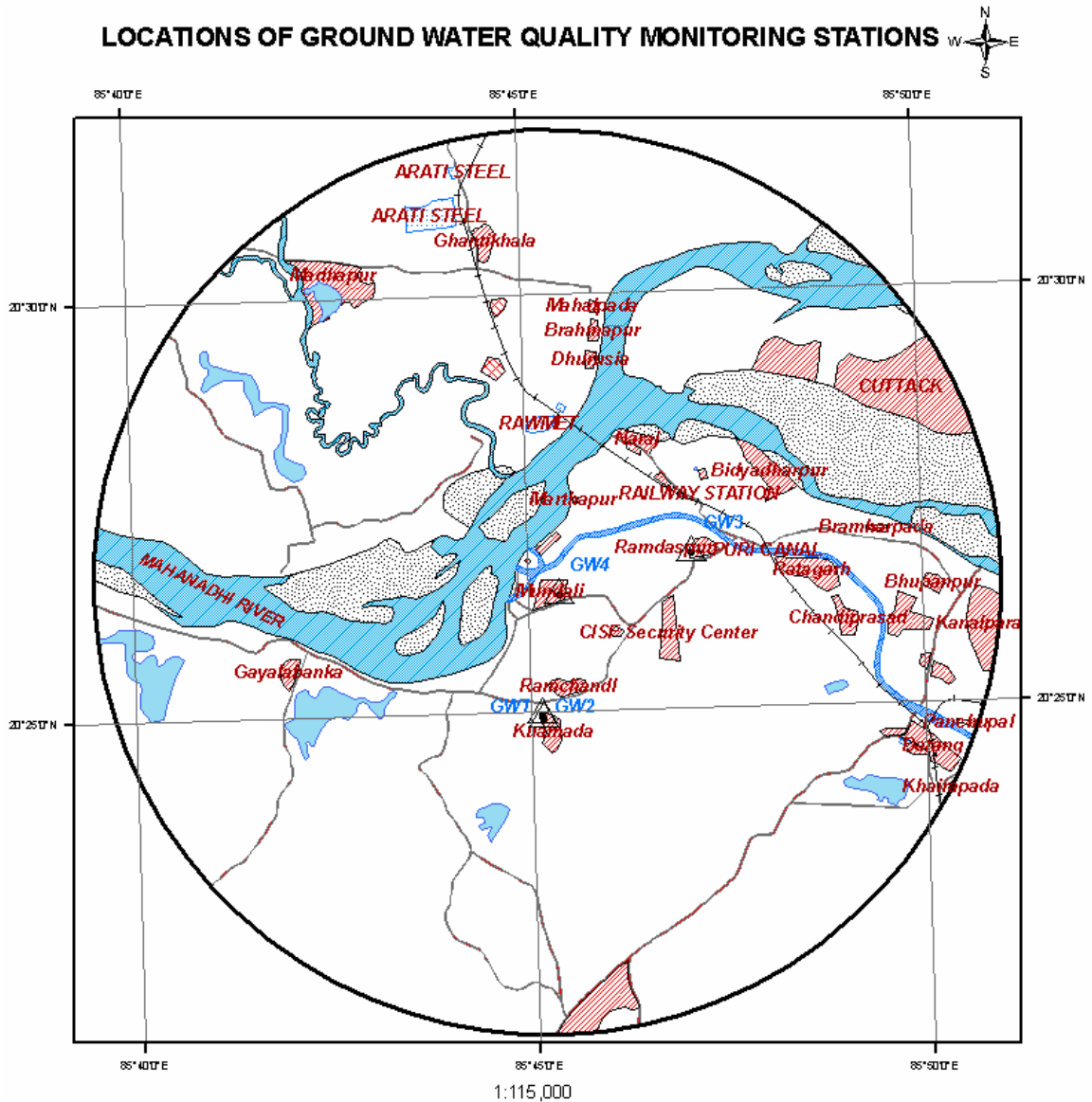


Figure 3.9

LOCATIONS OF GROUND WATER QUALITY MONITORING STATIONS



Observation

The results show that water quality from all the river and canal water sources meets the Class C- of the Indian Standards for Inland Surface Water subject to pollution which means that the water is suitable for use as drinking water source with conventional treatment followed by disinfection, except pH which was found to be on higher side and mostly above 8.5. Water is moderately hard and has moderate dissolved solids content. Heavy metal presence is mostly below detectable level.

Important water quality data and also relevant to the Limits for discharge from Thermal Power Plants are presented in **Table 3.9** . Detailed monthly results are given in **Annexure III** and the relevant standards are given in **Annexure IX**.

Results of samples of ground water show high dissolved solid content in one dugwell near the site, above the desirable limit of 500 mg/l as stipulated in Drinking Water Standard – IS-10500 (1991). Water quality from dugwell near ash pond has lower dissolved solids and no high metal concentration. Water from both the hand pumps have low pH, beyond the drinking water desirable limit (6.5-8.5) of IS-10500. Fluoride level is also low, lower than the desirable limit for drinking water (0.6-1.2). Some of the major parameters are presented in **Table 3.9**. Detailed monthly results are given in **Annexure III** and the relevant standards are given in **Annexure IX**.

Table 3.9
Major Surface Water Quality Parameters
All values in mg/l except pH

Parameter	Mahanadi		Puri Canal		Local Pond	
	Max	Min	Max	Min	Max	Min
pH	8.87	8.2	8.71	8.42	8.87	8.42
TSS	20	6	10	6	58	12
TDS	122	110	128	108	796	322
BOD	2.8	1.1	2.9	1.1	5.25	1.1
DO	6.7	5.6	7.8	7.4	6.7	5.6
Oil and Grease (mg/l)	BDL	BDL	BDL	BDL	BDL	BDL
Fluoride	0.53	<0.1	0.9	<0.1	1.32	<0.1
Copper as Cu	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Iron as Fe	1.66	<0.1	0.9	<0.1	0.9	<0.1
Zinc as Zn	0.04	0.02	0.04	<0.02	0.03	<0.02
Phosphate as PO4	0.73	<0.05	0.79	<0.05	0.97	<0.05

Table 3.10
Ground Water Quality – Important Parameters
All values in mg/l except pH

Parameter	Dugwell near the ash pond		Dugwell near site		Two Hand pumps	
	Max	Min	Max	Min	Max	Min
pH	6.6	6.46	7.26	6.62	5.9	5.5
TDS	242	230	788	654	328	112
Total Hardness (as CaCO ₃)	50.3	45.05	458.7	354.1	88.09	24.14
Chloride (as Cl)	42.11	25.97	168.5	108.8	77.23	17.55
Iron (as Fe)	0.15	<0.1	0.11	<0.1	0.67	<0.1
Copper as Cu	0.03	<0.02	<0.02	<0.02	0.02	<0.02
Zinc (as Zn)	0.03	<0.02	0.03	<0.02	3.81	<0.02
Lead (Pb)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoride (as Fl)	0.11	<0.1	0.37	0.11	0.24	<0.1
Arsenic (as As)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Faecal Coliform CFFU/100 ml	Absent	Absent	Absent	Absent	Absent	Absent

3.7 Soil

Soil samples were collected from six (6) locations. Three (3) locations were from agricultural fields, one (1) from non-agricultural field inside the proposed site area and two (2) from the fields at the proposed ash pond area.

The location of the sites are given below:

Sample 1 – Project site south of Puri canal - Agricultural Land.

Sample 2 – Project site north of Puri canal – Non-agricultural Land.

Sample 3 - Proposed ash pond area - towards south - near Ramchandi village

Sample 4 - Proposed ash pond area - towards north - near mundali village

Sample 5 - Agricultural land near Naraj station

Sample 6 - Agricultural land near Ramdaspur.

Table 3.11

Locations of Soil Quality Monitoring Stations

Soil (S) Quality Monitoring Station No.	Location	Approx Distance from Project Site	Direction	Site Characteristics
1	Project site south of Puri canal - Agricultural Land.	-	-	Agricultural Land Cultivation: Paddy etc.
2	Project site north of Puri canal – Non-agricultural Land	-	-	Non-Agricultural Land
3	Proposed ash pond area - towards south - near Ramchandi village	-	-	Agricultural Land Cultivation: Paddy, Vegetables etc.
4	Proposed ash pond area - towards north - near mundali village	-	-	Non-Agricultural Land
5	Agricultural land near Naraj station	1 km	N	Agricultural Land Cultivation: Vegetables etc.
6	Agricultural land near Ramdaspur	2.5 km	E	Agricultural Land Cultivation: Paddy etc.

Figure 3.11 shows the locations of soil monitoring stations.

The soil sampling and analysis was conducted monthly during March - May 2007 in summer season. The samples collected were homogenous representatives of each location. A random 4-5 sub-locations were identified in each of the sampling locations and soil dug out from 30 cm below the surface were uniformly mixed before homogenizing the soil samples.

The important physico-chemical characteristics and nutrient levels of the soils in the study area presented in **Table 3.12**. Details are given in **Annexure IV**. Soil quality did not vary much within the impact zone. The soils are mostly sandy soil is not very good for cultivation. As mentioned before that this zone is a meeting point of Eastern Ghat hilly region and the Mahanadi delta. The soils are slightly acidic as most of the samples have pH below 6.5 but within 5.6. Electrical conductivity is low in the range of 43-140 micromhos per cm. Sodium Absorption Ratio varied between 0.54% – 1.9%. Nutrient level was moderate. Available Nitrogen was found to be in the range of 78.3 mg/kg – 182.9 mg/kg. Available Potassium level was found to be similar to that of Nitrogen. Phosphorous was found to be in the range of 2.55 mg/kg – 17.3 mg/kg.

Figure 3.10

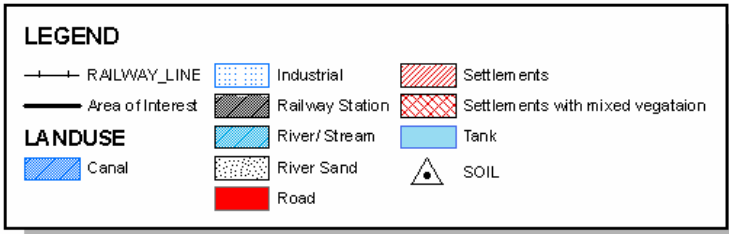
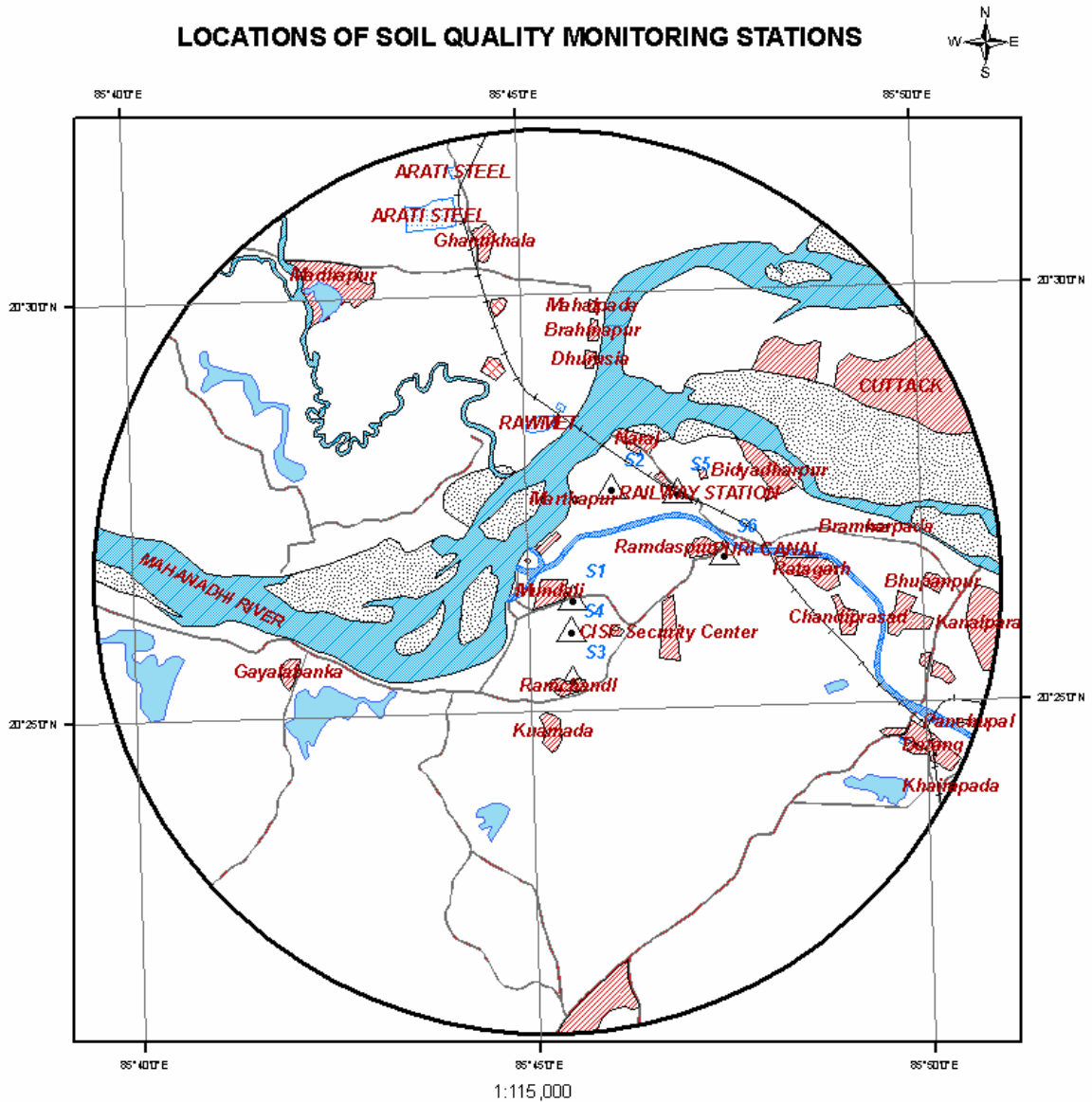


Table 3.12

Major Characteristics of Soils in the Study Area

	Texture	pH	Conductivity μmhos/cm		SAR %		Available Nitrogen mg/kg		Available Phosphorus mg/kg		Available Potassium mg/kg	
			Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
Location 1	Sandy	6.59 – 7.64	130	65	0.65	0.54	152.55	85.32	162.04	97.82	6.42	2.55
Location 2	Sandy	5.73 – 6.17	40	34	1	0.91	99.36	35.96	102.43	77.52	17.03	6.25
Location 3	Sandy	5.35 – 6.56	98	46	2.24	1.54	125.1	78.33	173.59	82.49	96.11	2.74
Location 4	Sandy	7.69 – 8.06	280	57	6.56	0.9	182.89	81.41	185.26	89.59	9.26	3.57
Location 5	Sandy	5.48 – 6.02	132	67	0.84	0.68	139.42	61.03	136.29	88.36	15.91	12.17
Location 6	Sandy	6.61 – 6.83	241	43	5.6	1.55	114.12	90.85	167.75	90.62	12.49	10.28

3.8 Noise

The noise levels were monitored at ten (10) places within the impact zone to have an idea of the noise scenario in the study area. **Figure 3.11** shows the locations. Sound pressure levels (SPL) have been measured by a sound level meter which gives a direct reading of A-weighted SPL. Equivalent sound pressure levels (L_{eq}) have been computed from the values of A-weighted sound pressure level measured. Besides maximum and minimum noise levels and 90 percentile and 10 percentile noise levels have also been noted.

Table 3.13

Locations of Noise Monitoring Stations

Noise (N) Quality Monitoring Station No.	Location	Approx Distance from Project Site	Direction	Site Characteristics
1	Mundali near Navoday School	Within 0.5 km from proposed plant boundary	W	Village and a modern school with hostel
2	Naraj	1.5 km	North	Residential and Market Area
3	Ramdaspur	2 km	South East	Village Residential Area
4	Bidyadharpur	4 km	East	Village Residential Area
5	Cuttack	8 km	NE	City Residential Area
6	Barang	7 km	SSE	Residential Area to Nandan Kanan Biological Park
7	Dhurukuria	4 km	W	Residential Area near Atagarh Forest area
8.	Goyal bank	6 km	SW	Residential Area near Elephant reserve and forest area
9.	Rail Way Station Near Naraj	1	NW	Rail Way Station
10.	Road Infront Of Navodaya Vidyalaya	1	W	Road infront of school, Frequent Traffic.

Ambient noise level monitoring has been carried out in the month of March, April and May 2007. Sound Level Meter with model Lutron-4001 has been used for noise monitoring.

At each location, noise monitoring has been conducted continuously over a period of twenty-four hours to obtain L_{eq} values at uniform time intervals of 1 hour. In each hourly time interval, L_{eq} values have been computed from SPL readings taken at uniform time intervals.

$$L_{eq} = 10 \log \frac{1}{n} \sum_{i=1}^n 10^{\frac{SPL_i}{10}}$$

where, n = number of equal time intervals.

SPL_i = SPL value of the ith time interval.

For each location, day and night time L_{eq} values have then been computed from the hourly L_{eq} values such that comparison could be made with the national ambient noise standards.

Day time L_{eq} has been computed from the hourly L_{eq} values between 6.00 a.m. and 9.00 p.m. and night time L_{eq} from the hourly L_{eq} values between 9.00 p.m. and 6.00 a.m. using the following formula:

$$L_{eq\ day} = 10 \log \frac{1}{15} \sum_{i=1}^{16} 10^{\frac{L_i}{10}}$$

$$L_{eq\ night} = 10 \log \frac{1}{9} \sum_{i=1}^8 10^{\frac{L_i}{10}}$$

where, L_i = L_{eq} value of the ith hourly time interval.

National ambient noise standard for different zones for day and night is presented in **Table 3.14**.

Table 3.15 presents the Noise Monitoring Results at each location along with the type of the location. It can be seen that the noise level was mostly within the desired level at all the site.

**Table 3.14
Standard for Ambient Noise**

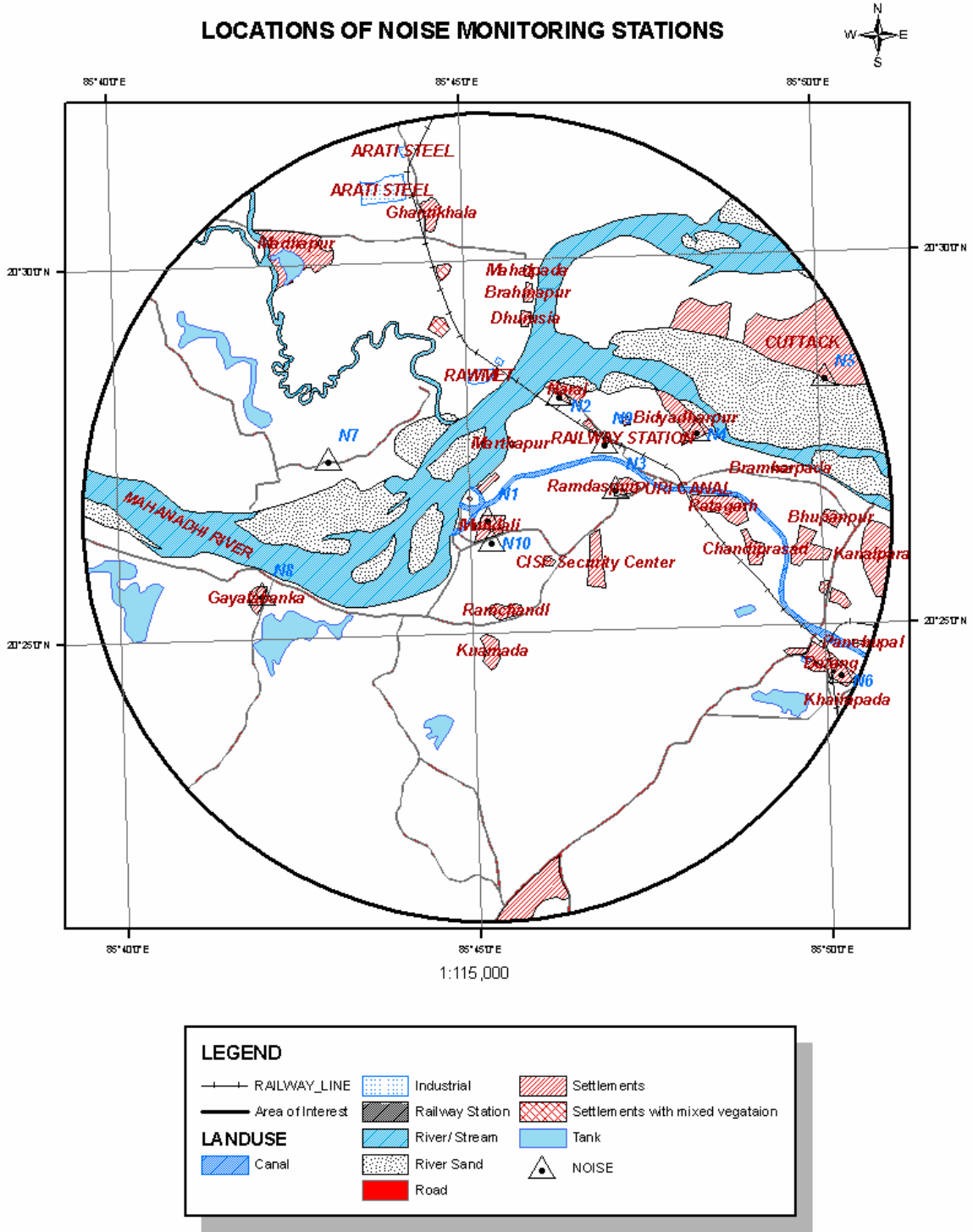
Area Code	Category of Area	Limit in dB(A) Leq Day Time	Limit in dB(A) Leq Night Time
A	Industrial area	75	70
B	Commercial area	65	55
C	Residential area	55	45
D	Silence zone	50	40

Day time is reckoned in between 6 am and 9 pm.

Night time is reckoned in between 9 pm and 6 am.

Ref: EPA Notification [G.S.R. 1063 (E), 26 Dec, 1989]

**Figure 3.11
LOCATIONS OF NOISE MONITORING STATIONS**



**Table 3.15
Noise Monitoring Results**

Sl. No.	Locations	Type	Max Equivalent Noise L_{eq} [dB(A)]		Max L_{90} [dB(A)]		Max L_{10} [dB(A)]	
			Day	Night	Day	Night	Day	Night
1	Mundali	Rural Residential	57.2	48.9	60	53	52	43
			-	-	-	-	-	-
			55.6	46.9	58	50	51	42
2	Naraj	Commercial	61.0	49.6	61	54	55	44
			-	-	-	-	-	-
			57.4	47.6	60	51	53	42
3	Ramdaspur	Rural Residential	56.5	48.6	60	53	52	41
			-	-	-	-	-	-
			53.5	47.2	56	50	48	41
4	Vidyadharpur	Rural Residential	53.8	48.3	57	52	48	41
			-	-	-	-	-	-
			51.6	45.6	54	49	48	40
5	Near Cuttak(Cda)	Urban Residential	62.7	56.6	65	60	58	47
			-	-	-	-	-	-
			62.0	55.5	65	60	55	46
6	Barang	Commercial	59.3	52.4	63	55	54	49
			-	-	-	-	-	-
			57.5	48.3	61	52	51	41
7	Dhurukudiya	Rural Near sensitive location	54.6	57.8	57	50	50	43
			-	-	-	-	-	-
			51.7	45.6	55	48	47	43
8	Goyal Bank	Rural Near sensitive location	56.0	48.0	60	52	51	42
			-	-	-	-	-	-
			55.7	46.4	58	49	49	42
9	Rail Way Station	Commercial	60.5	55.5	65	57.2	52	43
			-	-	-	-	-	-
			55.6	48.8	58	52	50	42
10	Navodaya Vidyalay	Rural Residential	60.4	52.9	64.3	56	52	48
			-	-	-	-	-	-
			57.6	50.9	60	53	50	43

It was observed that the day time as well as night time ambient noise levels in commercial, residential and sensitive areas within the study area, were mostly within the prescribed standards. However, it has exceeded the noise standards at few occasions, mainly due to the traffic as well as other urban activities in the adjoining areas.

3.9 Demography & Socioeconomy

Impact Area:

The site is located in Cuttack district and the 10 km impact zone falls mostly within the districts of Cuttack and a part in Khurda district. The area is mostly

rural and the nearest city is Cuttack is about 8 km away towards Northeast. **Figure 3.12** shows the impact study zone covering 10 km around the proposed project site.

Demographic and other socioeconomic analysis is based on District Census data 2001 and other published district statistical handbook.

Impact area is mostly rural area except a small portion of Cuttack city comes within impact zone. The impact area falls within Cuttack district of Orissa consisting of 62 villages and 21 villages in Khurda district.. However 21 villages of Khurda district occupy about 41% of the impact zone as the area towards south is less populated and a large area is afforested. In the Cuttack district most of the impact zone villages come under Barang and Gurudijhatia Police stations.

Table 3.16 presents the distribution of the villages in Impact Zone area.

Table 3.16
Villages in Impact Zone

State	District	Name of P.S	No. of villages	Area (Ha)
Orissa	Cuttack	Barang	22	
		Athagad	9	
		Gurudijhatia	27	
		Cuttack Sadar	1	
		Banki	3	
		Total	62	17738
	Khurda	Shaheednagar	6	
		Chandaka	15	
		Total	21	12343
		Total	83	30081

Population:

The impact zone consists mostly of rural area. Total rural population within impact zone is 98874. Population density for the impact zone is 329 person per sq.km which is higher than the Orissa’s population density of 236 person./sq.km, However the population density is significantly low, 186 persons/sq km, in the

southern part of the impact zone within Khurda district. Population density in rural areas in Cuttack district is higher because of closeness to urban areas. **Table 3.17** provides the details.

**Table 3.17
Population Profile (Rural)**

Impact Zone	2001 Census		
	Total	Male	Female
Cuttack Rural Impact zone	75890	38668	37222
Khurda Rural Impact zone	22984	11759	11225
Total Impact Zone	98874	50427	48447

Population Density: (no. of persons/ sq. Km)

Impact Zone Rural	Cuttack District Rural Impact zone	Khurda District Rural Impact zone	Orissa
329	428	186	236

Sex Ratio:

The sex ratio is expressed as number of females per 1000 male. Sex ratio is an important factor in demographic study. This is linked with women's development status and also occupational status of an area. The status of sex ratio in the impact zone and its comparison with the district and state is given below in **Table 3.18**.

**Table 3.18
Sex Ratio**

Nature of zone	Sex Ratio
Impact Zone	961
Cuttack District Rural	962
Khurda District Rural	955
Orissa Rural	987

It can be seen that sex ratio in the impact zone is 961 is lower than the State's rural average (987) and surprisingly the Khurda district villages have lower sex ratio. This is probably due to some impact of urbanization and migration here.

Industrial areas generally have lower sex ratio as male workers migrate from other area. **Figure 3.13** presents the scenario graphically

Scheduled Caste and Scheduled Tribe:

The scheduled Caste (SC) and scheduled Tribe (ST) are the communities scheduled under various presidential orders beginning from 1950. As per the Scheduled Castes and Scheduled Tribes Orders (amendment Act, 1976) there are altogether 59 communities scheduled as castes and 38 as tribes in West Bengal.

SC and ST population in impact area given in **Table 3.19** and **Figure 3.18** presents the demographic profile.

Table 3.19
Scheduled Castes & Scheduled Tribes Population – 2001

Area	Percentage of Scheduled Castes	Percentage of Scheduled Tribes
Total Impact zone	18.43	10.66
Cuttack District Rural Impact zone	19.58	8.71
Khurda District Rural Impact zone	14.61	17.1
Orissa	16.5	22.1

The impact zone has moderate presence of Scheduled castes population, above the average of the state (12%). However the percentage of Scheduled Tribe population (10.7%), is much lower than the state average. Khurda district impact zone has higher presence of Scheduled Tribe population (17.1%).

Literacy:

Literacy status in the area is presented in **Table 3.20**. A person who can both read and write with understanding in any language is taken as literate. In Census children aged between 0-6 years are not considered for literacy statistics.

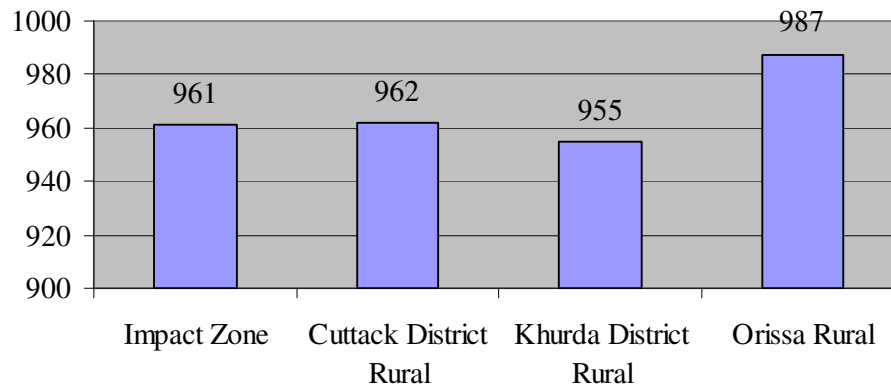
Table 3.20
Literacy Status – 2001 (in %)

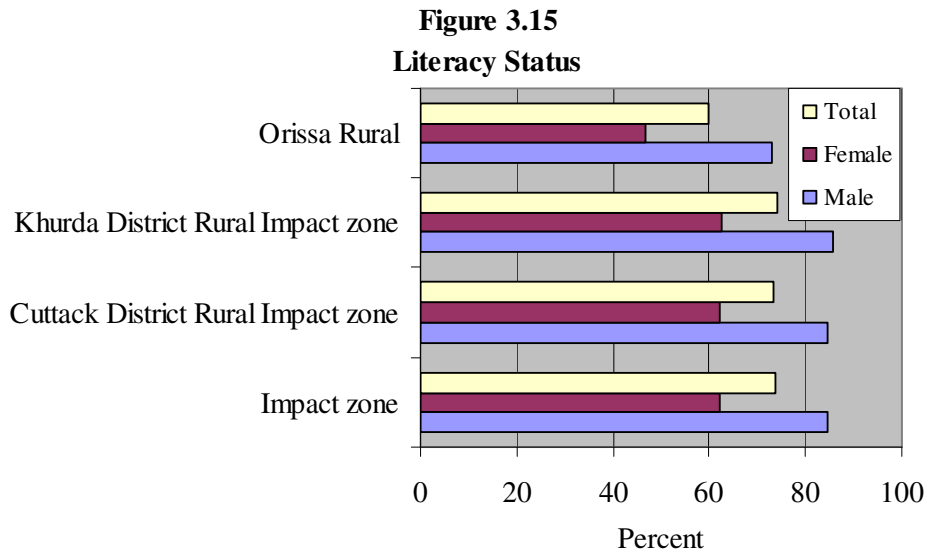
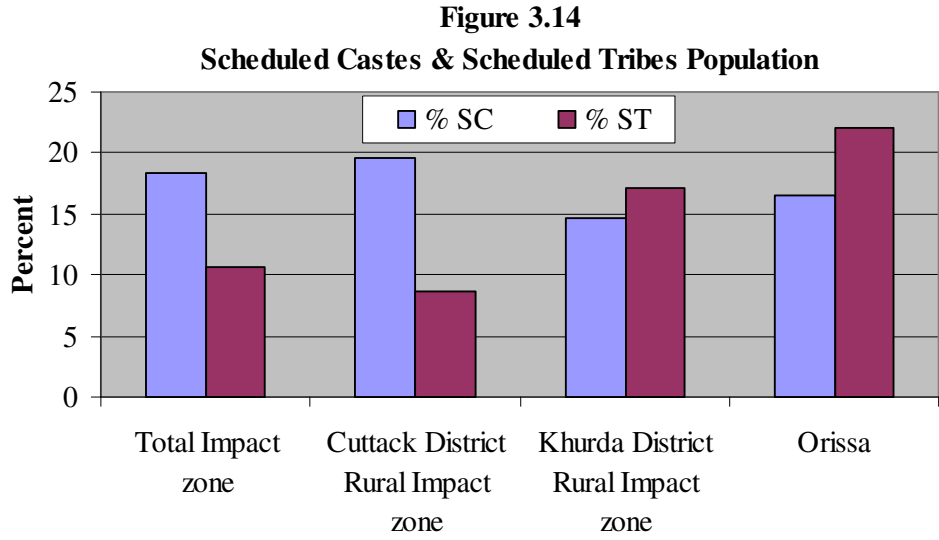
	Male	Female	Total
Impact zone	84.67	62.25	73.66
Cuttack District Rural Impact zone	84.39	62.14	73.46
Khurda District Rural Impact zone	85.59	62.6	74.32
Orissa Rural	72.9	46.7	59.8

Literacy data shows literacy scenario in the impact zone is quite good compared to the state’s average. While in rural Orissa literacy rate is 59.8%, in the impact zone it is 73.66%. Male literacy in impact zone is quite impressive at more than 84%.

Figure 3.15 presents the literary scenario.

Figure 3.13
Sex Ratio





Occupational status:

Occupational status in status can be mainly divided into three main groups -Main workers, marginal workers and non workers. Main workers are those who are engaged in any economically productive activity for 183 days or more in a year. Marginal workers are those who work less than 183 days in a year. The population

not included in main and marginal workers is considered non workers. Cultivators and agricultural laborers jointly is considered as agricultural worker. Other workers mean workers not involved in agriculture or household work. Domestic work is not considered as work.

Table 3.21 presents the occupational status of the rural and urban area.

**Table 3.21
Occupational Status**

Area	Main workers in total population %	Agriculture worker in Main worker %	Other worker in Main worker %
Impact zone	25.7	31.8	66.3
Cuttack District Rural Impact zone	26.7	30.8	67.5
Khurda District Rural Impact zone	22.3	35.3	61.7
Orissa Rural	25.8	69.9	28

The data shows that in the impact zone 25.7% of main population is main worker which is similar to the rural areas of Orissa. However among the main workers only 31.8% percent are engaged agricultural activities while the state average is as high as 69.9. This shows that the agriculture is not the major occupation here About 66% are working in other professions, including in the industries and other commercial activities in the area.

Land Use:

The impact area is partly agricultural and partly forested.

In the impact zone within Cuttack district, 13.7% of the land is under forest. Sukasana reserve forest, Brahmanbasta reserve forest, Sunimoh reserve forest, Baula reserve forest, Subasi Reserve Forest all partly falls within the impact zone. Only 13.2% of agricultural land is irrigated. As discussed above that therefore agriculture is not a major source of livelihood here. About 33% of the impact area is not available for cultivation, which are partly covered with bushes and scrubs.

General Landuse of the area has been discussed before. **Table 3.22** presents the status of landuse in impact zone.

Table 3.22
Land Use Pattern Impact Zone (Cuttack)

No. of Villages	Total Area (Ha)	Under irrigation (Ha)	Unirrigated (Ha)	Culturable Waste (Ha)	NA for cultivation (Ha)	Forest Land (Ha)
62	17738	2348 (13.2%)	5186 (29.2%)	2380 (13.4%)	5391 (33.3%)	2429 (13.7%)

Civic Amenities:

Medical Facilities

There is no major hospital in the area. Out of the 62 villages in Cuttack district 48 villages have medical facilities like Primary Health Centre. There is no hospital. Nearest urban centers of Cuttack and Bhubaneswar towns have different medical facilities.

Educational Facilities

According to Census data (2001), in the 62 villages there are 60 primary schools, 15 secondary schools, 24 middle schools and 1 Senior secondary schools. Primary educational facility is mostly available.

Drinking Water

Drinking water facilities are available in mostly all the villages and mostly is obtained from wells, handpumps and tubewells, tanks.

Electricity

36 out of 62 villages had domestic power supply (2001). Only 19 villages use power for all purposes.

Places of Interest:

There is no major place of interest within 10 km except the Nandankanan Wildlife Park and ecotourism in Chandaka Wildlife Sanctuary.

3.10 Ecology

Ecological studies forms an integral part of EIA-EMP assessment, in relation to any developmental Projects. This study includes both floral and faunal assessment in terrestrial and aquatic environment. Accordingly in the present study, both terrestrial and aquatic ecological assessment was attempted in and around the power plant.

Methodology

The surrounding area was visited on foot and vehicles to have an overall idea of the biotic components in the study zone. Specific ecologically important sites like forest areas, riverine vegetation, and river channels were studied in details during field studies. Discussion was carried out with local people to find out about local names, uses and other aspects of local flora. Local forest offices were also visited to collect information. Field visit report and Working Plan report from DFO, Chandaka Reserve Forest and Athagarh Forest Division have been utilised for the following report.

For aquatic systems, plankton were collected by sieving upto 100 litres of water through plankton net having very small pore size to collect even the microplankton and the nanoplankton and preserved with suitable fixatives like 4% formaldehyde. The plankton were analysed later under microscope.

I. Terrestrial Ecology

Forest and Vegetation Cover:

The study area contains a number of Wildlife Sanctuaries, National Parks and Reserved forests. Following is the list:

Table 3.23

Wildlife Sanctuaries, National Parks and Reserved Forests in the Study Area

Name	Distance from site	Remarks
Chandaka - Dampara <i>Wildlife Sanctuary & National Park</i>	4.0 km to S	Elephant Reserve
Nandankanan National park:	7.5 Km to SSE	White tigers, crocodile breeding and tourism
Sukasana reserve forest,	6.5. km to W	
Churang reserve forest,	4.0 km to SE	
Brahmanbasta reserve forest	6.0 km to N	
Sunimoh reserve forest	8.5 km to NNE	
Oringa reserve forest	8.0 km TO NW	
Baula reserve forest	9.5 km to NE	
Subasi Reserve Forest	8 km to NE	

The reserve forests are primarily semievergreen type with predominant tree specieses are Kangada (*Xylia xylocarpa*), Kasi (*Bridelia retusa*), Giringa (*Pterospermum heyneanum*), Moi (*Lannea coromandelica*), Kalicha (*Diospyros sylvatica*), Kalchua (*Glochidion lanceolarium*), Dhaman (*Grewia tiliifolia*), Anonla (*Embica officinalis*), Ambo (*Mangifera indica*), Sidha (*Largerstroemia parviflora*), Sumari (*Caesia fistula*), Kochila (*Strychnos nux-vomica and Strychnos potatorum*), Bel (*Aegle marmelos*), etc. In addition there are patchy Sal forest, teak plantation, thorny bamboo brakes (*Bambusa bambos*) and scrub vegetation dominated by Eupatorium. In settlement areas there are number of Orchard species and plantations.

Floral Assessment:

The dominant flora of the study area and adjoining villages are depicted in the **Table 3.24**. A total of 202 trees, 152 shrubs, 251 herbs & climbers, 9 fern species are reported.

However in the proposed project site there are isolated trees, scrubs, village orchards and patchy plantation.

Among the terrestrial flora there are a number of plant species which have potential medicinal value. The details are given in **Table 3.24**.

Phyto-Sociological Analysis of the Flora:

An attempt has been made to assess the phytosociology of the vegetation cover in Chandaka reserve forest Nandan Kanan National Park and some of the village orchards. The details are given in **Table 3.26**. Random quadrates of 10m x 10m were taken up for this study.

As the urbanisation processes increased over the time, the vegetation cover is very fast denuded. The natural forest became degraded followed creation of scrub land with patchy Bamboo breaks.

Rare and Endangered Plants Species:

From the detailed floristic analysis, it appears that in the proposed project site, there is no rare, endemic or endangered plants. However in the vicinity there are reserve forests, sanctuaries and national park areas. There are few rare plant species.

Fauna Assessment:

Among the various fauna, Amphibian, reptiles, mammals and butterflies were recorded from the project sites and their surrounding areas. The details are given in the respective **Tables 3.27-3.31**.

Butterflies: A total 12 species butterflies recorded from this area.

Amphibian: The amphibian fauna is limited to only three species.

Reptiles: With respect to reptiles 29 species reported in this area.

Birds: With respect to avian fauna, a total 170 species were observed in this area. Most of the birds are residential type.

Mammals: A total 34 species of mammals were observed during survey. Most of the fauna said to be schedule II, III & IV in the entire study area, but there are a few which are said to be schedule – I. These are all found in sanctuaries and reserve forest.

Sensitive Areas:

In 1982, **Chandaka Wildlife Sanctuary** was declared covering the major part of Chandaka reserve forest. (Lat. 20°16'05" to 20°26'03' N and Long. 85°34'42" to 85°44'30" E). The total area is about 189 Sq. Km. Within the sanctuary Chandaka Elephant reserve is demarcated by the forest Dept. Elephant is one of the flagship species and indicative of the potential productivity of the habitat. In addition, there are a number of mammals viz' Leopards, Chital, Barking deer, Mouse deer, Wild pig, common langur, Rhesus monkey, small Indian Civet, Common Indian mongoose, small Indian Mongoose, Ruddy mongoose, sloth bear, Pangolin and Hyena etc were reported from this sanctuary. The prominent birds of the sanctuary are Peafowl, Red jungle fowl, crested Serpentine Eagle, Black headed Oriole, Great Horned Owl, Paradise Fly Catcher, Conical and Stone Curlew. Among the reptiles, Bengal monitor lizard and rock pythons and quite common. In addition, other important reptiles are chameleon, common Skink, Indian flap shell Turtle, Russell's Viper, common Krait and common rattle snake.

Another important area is the **Nandan Kanan National Park**, notified in 1979. The area lies between lat. 20°17' to 20°23' N and long. 85°49'3" to 85°59'5" E. This park is located about 7.5 km in SSE direction from proposed project site. Nandankanan zoo lies in the splendid environs of the CHANDAKA forest, along the rippling water of the KANJIA LAKE. It also contains a botanical garden and part of it has been declared a sanctuary. Like Chandaka Sanctuary, these national parks have over 65 mammals' species, 20 reptile species and 80 birds species. There are lots of captive animals in Zoo. It's famous for its white tiger population. This National Park sprawls across the Chandaka forest, where the flora and fauna flourish in their natural habitat. Wild mammals like Sambar, spotted Deer, Rhesus Monkey, Hanuman langur are living freely outside the enclosures.

Rare and Endangered Animals:

The buffer region particularly in sanctuaries and national park a number of schedule I animals are existed. These are all endangered now in Indian subcontinent.

II. Aquatic Ecology

In the study area, there are a good number of water bodies viz ponds, jheels, swamps, canals, and rivers viz' Mahanadi and Kathrari. All these water bodies comprises of good number flora and fauna. A systemic survey was conducted with respect to aquatic flora, fauna and benthic organisms.

Aquatic Floral Assessment (Macrophytes):

There are a number of fresh water macrophytes and marsh plants found in the ponds, jheels and swamps. The details are given in the **Table 3.32**. Over 30 species of macrophytes are reported from this area during our survey.

Planktons:

There are good numbers of planktons (microscopic organisms found in the different categories of water bodies. During field survey there were 10 planktons samples collected from rivers (during low and high tides) and ponds & beels with help of plankton net (40 mesh). Fifty liters of water samples were filtered for plankton analysis in each site. The details are given in the **Table 3.33**.

Among the water samples, riverian water showed greater diversity while highest load found in fish water ponds. None of the planktons said to unique with respect to their occurrence. During winter maximum planktonic load found.

Aquatic faunal assessments:

a) Fish Fauna:

During the field survey both inland pond fishes and riverian fishes were recorded with interaction with villagers and fishermen. A detailed checklist of fresh water fishes are given in the **Table 3.34**.

b) Aquatic birds:

A good number of aquatic birds were observed during field survey. The most common forms were depicted in **Table 3.35**.

Table 3.24

List of Most Common Terrestrial Plants Species of the Project Sites and its Surrounding Area

A. Trees:

Sl. No.	Scientific Name	Common/local Name	Family
1.	<i>Mangifera indica</i>	Mango	Anacardiaceae
2.	<i>Anacardium occidentale</i>	Cashew nut	Anacardiaceae
3.	<i>Nephelium litchi</i>	Litchi	Anacardiaceae
4.	<i>Bombax malabaricum</i>	Red Silk Cotton Tree	Bombacaceae
5.	<i>Eriodendron anfractuosum</i>	White Silk Cotton Tree	Bombacaceae
6.	<i>Cassia fistula</i>	Indian Laburnum	Caesalpiniae
7.	<i>Delonix regia</i>	Gulmohar	Caesalpiniae
8.	<i>Tamarindus indica</i>	Tamarind	Caesalpiniae
9.	<i>Saraca indica</i>	Ashok	Caesalpiniae
10.	<i>Bauhinia accuminata</i>	Camel's foot tree	Caesalpiniae
11.	<i>Peltophorum inerme</i>	Radhachura	Caesalpiniae
12.	<i>Cassia siamea</i>	Chakunda	Caesalpiniae
13.	<i>Casuarina equisetifolia</i>	Jhau	Casuarinaceae
14.	<i>Trewia nudiflora</i>	Pituli	Euphorbiaceae
15.	<i>Tamarix dioeca</i>	Nona Jhau	Euphorbaceae
16.	<i>Erythrina indica</i>	Coral tree	Fabaceae
17.	<i>Sesbania grandiflora</i>	Bakful	Fabaceae
18.	<i>Dalbergia sisso</i>	Sisso	Fabaceae
19.	<i>Pongamia glabra</i>	Karang	Fabaceae
20.	<i>Gliricidia sepium</i>	gliricidia	Fabaceae
21.	<i>Acacia auriculiformis</i>	Akasmoni	Mimosaceae
22.	<i>Acacia nilotica</i>	Babul	Mimosaceae
23.	<i>Albizia lebbeck</i>	Siris	Mimosaceae
24.	<i>Pithecolobium dulce</i>	Manila tamarind	Mimosaceae
25.	<i>Samanea saman</i>	Rain tree	Mimosaceae
26.	<i>Ficus bengalensis</i>	Banyan	Moraceae
27.	<i>Ficus religiosa</i>	Peepal	Moraceae
28.	<i>Ficus cunia</i>	Fig tree	Moraceae
29.	<i>Artocarpus integrifolia</i>	Jackfruit	Moraceae
30.	<i>Morus indica</i>	Mulbery	Moraceae
31.	<i>Syzygium cumini</i>	Jam	Myrtaceae

32.	<i>Callistemon speciosus</i>	Bottle brush tree	Myrtaceae
33.	<i>Eucalyptus globulus</i>	Eucalyptus	Myrtaceae
34.	<i>Cocos nucifera</i>	Coconut palm	Palmae
35.	<i>Phoenix sylvestris</i>	Date palm	Palmae
36.	<i>Borassus flabellifer</i>	Plamyra palm	Palmae
37.	<i>Areca catechu</i>	Betelnut palm	Palmae
38.	<i>Trema orientalis</i>	charcoal tree	Ulmaceae
39.	<i>Holoptelea integrifolia</i>	Indian elm	Ulmaceae
40.	<i>Michella champaca</i>	Champak	Magnoliaceae
41.	<i>Polyalthia longifolia</i>	Debdaru	Anonaceae
42.	<i>Aegle marmelos</i>	Wood apple	Rutaceae
43.	<i>Feronia elephantum</i>	Elephant apple	Rutaceae
44.	<i>Azadirachta indica</i>	Neem	Meliaceae
45.	<i>Swetenia mahogini</i>	Mahogany	Meliaceae
46.	<i>Grewia asiatica</i>	Pharsa	Tiliaceae
47.	<i>Thespesia populnea</i>	Tulip tree	Malvaceae
48.	<i>Pterospermum acerifolium</i>	Muchkund	Sterculiaceae
49.	<i>Calophyllum inophyllum</i>	-	Clusiaceae
50.	<i>Lagerstroemia flosreginae</i>	Jarul	Lythraceae
51.	<i>Terminalia catappa</i>	Indian Alamond	Combretaceae
52.	<i>Terminalia arjuna</i>	Arjun	Combretaceae
53.	<i>Mimusops elengi</i>	Bakul	Zapotaceae
54.	<i>Plumeria acutifolia</i>	Pagoda tree	Apocynaceae
55.	<i>Holarrhena antidysenterica</i>	Kurchi	Apocynaceae
56.	<i>Morinda citrifolia</i>	Indian Mulberry	Rubiaceae
57.	<i>Anthocephalus chinensis</i>	Kadam	Rubiaceae
58.	<i>Adina cordifolia</i>	Haldu	Rubiaceae
59.	<i>Leucaena leucocephala</i>	Subabul	Mimosaceae
60.	<i>Gravelia robusta</i>	Silver fir	Proteaceae
61.	<i>Spathodea campanulata</i>	Fountain tree	Bignoniaceae
62.	<i>Putranjiva roxburghii</i>	Putranjiva	Euphorbiaceae
63.	<i>Alstonia scholaris</i>	Chatim	Apocyanaceae
64.	<i>Mellingtonia hortensis</i>	Indian cork tree	Bignoniaceae
65.	<i>Sizigium samarangense</i>	Jamrul	Myrtaceae
66.	<i>Dillenia indica</i>	Chalta	Dilleniaceae
67.	<i>Achras sapota</i>	Sapeda	Zapotaceae



68.	<i>Moringa pterigospermum</i>	Sajina	Moringaceae
69.	<i>Psidium guajava</i>	Guava	Myrtaceae
70.	<i>Gmelina arborea</i>	Gamar	Verbanaceae
71.	<i>Tectona grandis</i>	Teak	Verbanaceae
72.	<i>Sizigium cumini</i>	Jam	Myrtaceae
73.	<i>Thevetia nerifolia</i>	Karabir	Apocyanaceae
74.	<i>Phyllanthus emblicus</i>	Amlaki	Euphorbaceae
75.	<i>Morinda coreia</i>	Acchu	Rubiaceae
76.	<i>Polyalthia simiarum</i>	Ajhado	Annonaceae
77.	<i>Mangifera indica</i>	Ambo	Anacardiaceae
78.	<i>Alangium salvifolium</i>	Ankula	Alangiaceae
79.	<i>Phyllanthus emblica</i>	Aonla	Euphorbiaceae
80.	<i>Terminalia arjuna</i>	Arjuna	Combretaceae
81.	<i>Terminalia alata</i>	Asan	Combretaceae
82.	<i>Ficus religiosa</i>	Aswastha, osta	Moraceae
83.	<i>Callicarpa tomentosa</i>	Badapatri	Verbenaccae
84.	<i>Naringi crenulated</i>	Benta (Behenta)	Rutaceae
85.	<i>Litsea glutinosa</i>	Baghatal	Lauraceae (Ledha Chhali)
86.	<i>Terminalia bellerica</i>	Bahada	Combretaceae
87.	<i>Kydia calycina</i>	Bana Kapasia	Malvaceae
88.	<i>Ficus benghalensis</i>	Bara	Moraceae
89.	<i>Crateva magna</i>	Baruna	Capparaceae
90.	<i>Aegle marmelos</i>	Bela	Rutaceae
91.	<i>Semecarpus anacardium</i>	Bhalia	Anacardiaceae
92.	<i>Syzygium fruticosum</i>	Bhulu jumu	Myrtaceae
93.	<i>Murraya koenigii</i>	Bhersunga	Rutaceae
94.	<i>Vitex peduncularis</i>	Chadheigodia	Verbenaceae
95.	<i>Dalbergia lanceolaria</i>	Chakundia	Fabaceae
96.	<i>Buchanania lanzan spreng</i>	Chara	Anacardiaceae
97.	<i>Alstonia scholaris</i>	Chhatiana	Apocynaceae
98.	<i>Stereospermum colais</i>	Chuin patuli	Bignoniaceae
99.	<i>Suregamultiflora</i>	Dalasinga (Pita khakada)	Euphorbiaceae
100.	<i>Gardenia latifolia</i>	Dam kudum (Kotranga)	Rubiaceae
101.	<i>Grewia tiliaefolia Vahl</i>	Dhaman	Tiliaceae
102.	<i>Anogeissus latifolia</i>	Dhaura	Combretaceae
103.	<i>Dalbergia paniculata</i>	Dhobani	Fabaceae

104.	<i>Ficus racemosa L.</i>	Dimiri	Moraceae
105.	<i>Ficus hispida L.f.</i>	Dimiri (Bai Dimiri)	Moraceae
106.	<i>Wrightia tinctoria</i>	Dudha Keruan	Apocynaceae
107.	<i>Schrebera swietenioides</i>	Eksira (Mukha)	Oleaceae
108.	<i>Gmelina arborea</i>	Gamhari	Verbenaecae
109.	<i>Miliusa velutina</i>	Gandha Palasa (Dom sal)	Annonaceae
110.	<i>Gandhana</i>	Premna latifolia	Verbenaecae
111.	<i>Nyctanthes arbour-tristis L.</i>	Gangasiuli	Oleaceae
112.	<i>Ziziphus xylopyrus</i>	Ghanta	Rhamnaecae
113.	<i>Albizia chinensis</i>	Ghodalenja	Mimosaceae
114.	<i>Pterospermum xylocarpum</i>	Giringa	Sterculiaceae
115.	<i>Mitragyna parvifolia</i>	Godikaima, Mundi (Mitikinia)	Rubiaceae
116.	<i>Acacia leucophloea</i>	Gohira	Mimosaceae
117.	<i>Cordial oblique willd</i>	Guala (Bhualu)	Ehretiaceae
118.	<i>Diospyros Montana</i>	Halada	Ebenaceae
119.	<i>Terminalia chebula</i>	Harida	Combretaceae
120.	<i>Barringtonia acutangula(L)</i>	Hinjala	Myrtaceae
121.	<i>Syzygium cumini (L.)</i>	Jamu	Myrtaceae
122.	<i>Premna tomentosa</i>	Jandakhai	Verbenaceae
123.	<i>Ficus benjamina L. car. Nuda (Miq.) Barrett</i>	Jari	Moraceae
124.	<i>Gardenia gummifera</i>	Jaujauka	Rubiaceae
125.	<i>Anthocephalus cadamba</i>	Kadamba	Rubiaceae
126.	<i>Nymphaea pubescens</i>	Kain (Dhala Nali)	Nymphaeaceae
127.	<i>Diospyros sylvatica</i>	Kalicha	Ebenaceae
128.	<i>Mallotus philippensis</i>	Kamalagundi	Euphorbiaceae
129.	<i>Bauhinia malabarica</i>	Kanchan	Caesalpinaceae
130.	<i>Xylia xylocarpa</i>	Kangara	Mimosaceae
131.	<i>Hymendodictyon orixense</i>	Kansa	Rubiaceae
132.	<i>Xantolis tomentosa</i>	Kanta boula (Jastimadhu)	Sapotaceae
133.	<i>Cleistanthus collinus</i>	Karada	Euphorbiaceae
134.	<i>Pongamia pinnata</i>	Karanja	Fabaceae
135.	<i>Bridelia airy-shawii</i>	Sasi	Euphobiaecae
136.	<i>Strychnos potatorum</i>	Katakala (Nirmala)	Strychnnceae



137.	<i>Euphorbia nivulia</i>	Katha Siju	Euphorbiaceae
138.	<i>Diospyros melanoxylon</i>	Kendu	Ebenaceae
139.	<i>Acacia catechu</i>	Khaira	Mimosaceae
140.	<i>Casearia elliptica</i> Wild	Khakada	Euphorbiaceae
141.	<i>Suregada multiflora</i> (Juss)	Khakada	Euphorbiaceae
142.	<i>Radermachera xylocarpa</i>	Khanda-patuli	Bignoniaceae
143.	<i>Trema orientalis</i>	Kharkas	Ulmaceae
144.	<i>Manikara hexandra</i>	Khirinkoli	Sapotaceae
145.	<i>Strychnos nuxvomica</i>	Lochila	Strychnaceae
146.	<i>Careya arborea</i>	Kumbhi	Bharringtoniaceae
147.	<i>Holarrhena pubescens</i>	Kurei	Apocynaceae
148.	<i>Wrightia arborea</i>	Kurhein/Kurei (Palo kuruhan)	Apocynaceae
149.	<i>Haldinia cordifolia</i>	Kuruma	Rubiaceae
150.	<i>Lepisanthes tetraphyllus</i> (Vahl)	Kusum	Sapindaceae
151.	<i>Schleichera aleosa</i> (Lour.)	Kusum	Sapindaceae
152.	<i>Suregada multiflora</i> (Juss)	Laha jadi	Euphorbiaceae
153.	<i>Hymenodictyon orixense</i>	Maccha	Rubiaceae
154.	<i>Ailanthus excelsa</i> Roxb.	Mahalimba (Mahala)	Simaroubaceae
155.	<i>Toona ciliata</i> Roem.	Mahalimba (Toon)	Meliaceae
156.	<i>Melia dubia</i> Cav.	Mahalimbo (Batra)	Meliaceae
157.	<i>Aphanamixis polystachya</i> (Wall.) (Pani Kusum)	Mahalimbo	Meliaceae
158.	<i>Lannea coromandelica</i> (Houtt.) Merr.	Mahi	Anacardiaceae
159.	<i>Madhuca indica</i> Gmel.	Mahula	Sapotaceae
160.	<i>Diospiros malabarica</i> (Desr.) Koste.	Mankada Kendu	Ebenaceae
161.	<i>Ehretia laevis</i> Roxb.	Masania	Ehretiaceae
162.	<i>Lepisanthes rubiginosa</i> (Roxb.) Leenh.	Mahenga Koli	Sapindaceae
163.	<i>Grewia rhamnifolia</i> Heyne ex Roth	Miriga chera	Tiliaceae
164.	<i>Mitragyna parvifolia</i> (Roxb.) Korth.	Mitikinia	Rubiaceae
165.	<i>Vitex pinata</i> L.	Morihan	Verbenaceae
166.	<i>Azadirachta indica</i> A Juss.	Nimba	Meliaceae
167.	<i>Protium serratum</i>	Nimbur moi (Raj moi)	Burseraceae



168.	<i>Memecylon umbellatum</i> Burm.f.	Niras	Melastomaceae
169.	<i>Erythrina variegata</i> L.	Paladhua	Fabaceae
170.	<i>Erythrina suberosa</i> Roxb.	-	Fabaceae
171.	<i>Butea monosperma</i> (Lam.)	Palas	Fabaceae
172.	<i>Trewia nudiflora</i> L.	Pani gambhari	Euphorbiaceae
173.	<i>Firmiana colorata</i>	Panikodalo	Sterculiaceae
174.	<i>Lepisanthes tetraphyllus</i> (Vahl).	Pani Kusum	Sapindaceae
175.	<i>Lagerstroemia reginae</i>	Patoli	Lythraceae
176.	<i>Oroxylum indicum</i> (L.)	Phanaphana	Bignoniaceae
177.	<i>Grewia subinaequalis</i>	Pharisha Koli	Tiliaceae
178.	<i>Anogeissus acuminata</i>	Phasi	Combrtaceae
179.	<i>Pterocarpus marsupium</i>	Piasal	Fabaceae
180.	<i>Garuga pinnata</i>	Pita Mahi	Burseraceae
181.	<i>Drypetes roxburghii</i> (Wall.)	Poichandia	Euphorbiaceae
182.	<i>Miliusa tomentosa</i>	Potumossu (Gandha palasa)	Annonaceae
183.	<i>Polyalthia cerasoides</i>	Potumossu	Annonaceae
184.	<i>Dillenia pentagyna</i>	Rai	Dilleniaceae
185.	<i>Eugenia rothii</i> Panigr.	Sagada Batua	Myrtaceae
186.	<i>Tectona grandis</i>	Saguan	Verbenaceae
187.	<i>Streblus asper</i>	Sahada	Moraceae
188.	<i>Shorea robusta</i> Gaertn. f.	Sal	Dipterocarpaceae
189.	<i>Garcinia xanthochymus</i>	Satyamba	Cluslaceae
190.	<i>Lagerstroemia parviflora</i>	Sidha	Lythraceae
191.	<i>Bombax ceiba</i> L.	Simuli	Bombacaceae
192.	<i>Dalbergia sissoo</i>	Sisu	Fabaceae
193.	<i>Soymida febrifuga</i>	Suam, Rohini	Meliaceae
194.	<i>Cassia fistula</i> l.	Sunari	Caesalpinaceae
195.	<i>Borassus flabellifer</i> L.	Tala	Arecaceae
196.	<i>Albizia procera</i>	Tentra	Mimosaceae
197.	<i>Famarindus indica</i> L.	Tentuli	Caesalpinlaceae
198.	<i>Albizia odoratissima</i>	Tinia	Mimosaceae
199.	<i>Zanthoxylum rhetsa</i>	Tundapoda	Rutaceae
200.	<i>Crateva adansonii</i>	Varuna	Capparaceae
201.	<i>Bambusa arundinacea</i>	Kanta Baunsa	Poaceae

202.	<i>Dendrocalamus strictus</i>	Salia Baunso	Poaceae
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B. Shrubs:

Sl. No.	Scientific Name	Common Name	Family
1.	<i>Adhatoda vasica</i>	Basaka	Acanthaceae
2.	<i>Barleria prionitis</i>	-	Acanthaceae
3.	<i>Nyctanthes arbortristis</i>	Siuli	Apocyanaceae
4.	<i>Anona squamosa</i>	Custard apple	Anonaceae
5.	<i>Calotropis procera</i>	Akando	Asclepiadaceae
6.	<i>Eupatorium odoratum</i>	-	Compositae
7.	<i>Ricinus communis</i>	Castorbean	Euphorbiaceae
8.	<i>Cestrum diurnum</i>	-	Solanaceae
9.	<i>Datura metel</i>	Dhutura	Solanaceae
10.	<i>Solanum suratensis</i>	-	Solanaceae
11.	<i>Ixora coccinea</i>	Rangan	Rubiaceae
12.	<i>Zizyphus oenoplia</i>	Kul	Rhamnaceae
13.	<i>Hyptis suaveolens</i>	Bantulsi	Labiatae
14.	<i>Leonurus sibiricus</i>	Mother wort	Labiatae
15.	<i>Tecoma stans</i>	yellow trumpetbush	Bignoniaceae
16.	<i>Abutilon indicum</i>	Indian Mallow	Malvaceae
17.	<i>Malachra capitata</i>	-	Malvaceae
18.	<i>Urena lobata</i>	-	Malvaceae
19.	<i>Hibiscus subderifa</i>	-	Malvaceae
20.	<i>Glycosmis pentaphylla</i>	-	Rutaceae
21.	<i>Murraya exotica</i>	Kamini	Rutaceae
22.	<i>Crotalaria alata</i>	-	Fabaceae
23.	<i>Capparis spinosa</i>	-	Capparidaceae
24.	<i>Bougenvalia spectabilis</i>	Bangabilas	Nyctaginaceae
25.	<i>Pluchia indica</i>	-	Compositae
26.	<i>Lippia jeminata</i>	-	Verbanaceae
27.	<i>Euphorbia trilobata</i>	-	Euphorbaceae
28.	<i>Opuntia delini</i>	-	Opantiaceae
29.	<i>Acanthus illicifolius</i>	-	Acanthaceae
30.	<i>Streblas asper</i>	-	Moraceae
31.	<i>Ipomea fistulosa</i>	Berakalmi	Convolvulaceae
32.	<i>Jatropha gossypifolia</i>	-	Euphorbaceae
33.	<i>Pedilanthus thethymeloides</i>	-	Euphorbaceae
34.	<i>Abrus plicatorius</i>	-	Malvaceae

35.	<i>Lantana camara</i>	-	Vervanaceae
36.	<i>Duranta plumieri</i>	-	Vervanaceae
37.	<i>Vitex negundo</i>	Nisenda	Vervanaceae
38.	<i>Clerodendron infortunatum</i>	Gaestri	Vervanaceae
39.	<i>Clerodendron inerme</i>	Ghetu	Verbanaceae
40.	<i>Nerium oleander</i>	Karabir	Apocynaceae
41.	<i>Premna corymbosa</i>	Agiabat	Verbenaceae
42.	<i>Bauhunia acuminata L.</i>	Ahlad	Caesalpiniaceae
43.	<i>Calotropis gigantean(L.)</i>	Arakha	Asclepiadaceae
44.	<i>Martynia annua L.</i>	Baghanakhi	Martyniaceae
45.	<i>Jatropha gossypifolia L.</i>	Baigaba	Euphorbiaceae
46.	<i>Plecosperrum spinosum Trecul</i>	Bana Banika	Moraceae
47.	<i>Cassia tora L.</i>	Bana Chakunda	Caesalpiniaceae
48.	<i>Ochna obtusata DC.</i>	Bana Kaniara	Ochnaceae
49.	<i>Thespesia lampas</i>	Bana Kappa	Malvaceae
50.	<i>Phoenix acaulia</i>	Bana Khajuri	Arecaceae
51.	<i>Tephrosia purpurea</i>	Bana Kolathia	Fabaceae
52.	<i>Tephrosia maxima</i>	--	Fabaceae
53.	<i>Tephrosia tinctoria</i>	Bana Nila`	Fabaceae
54.	<i>Ocimum gratissimum L.</i>	Bana Tulasi	Lamiaceae
55.	<i>Agave Americana L.</i>	Baramasi	Agavaceae
56.	<i>Justicia adhatoda l.</i>	Basanga	Acanthaceae
57.	<i>Vitex negundo L.</i>	Begunia	Verbenaceae
58.	<i>Flacourtia indica</i>	Bhaincha	Flacourtiaceae
59.	<i>Gardenia latifolia ait.</i>	Bhurudu	Rubiaceae
60.	<i>Urena lobata L.</i>	Bila Kapasia	Malvaceae
61.	<i>Glycosmis pentaphylla</i>	Chaldhua	Rutaceae
62.	<i>Ziziphus rugosa</i>	Chunloli (Simukoli)	Rhamnaceae
63.	<i>Barleria prionitis L.</i>	Das Kerenta	Acanthaceae
64.	<i>Barleria cristata L.</i>	--	Acanthaceae
65.	<i>Woodfordia fruticosa</i>	Dhatuki	Lythraceae
66.	<i>Canthium disocum</i>	Dolsinghi	Rubiaceae
67.	<i>Carissa spinarum</i>	Dudh (Sanakerenda) Koli	Apocynaceae
68.	<i>Wattakaka volubilis</i>	Dudhilata	Asclepiadaceae
69.	<i>Desmos longiflorus</i>	Gaichira	Annonaceae
70.	<i>Hyptis suaveolens</i>	Gai Tulasi	Lamiaceae
71.	<i>Croton bonplandianum Baill</i>	Gandha Tulasi	Euphorbiaccae
72.	<i>Potostemon benghalensis</i>	Ganda-Chulia	Lamiaceae

73.	<i>Streblus asper</i>	Ganthis Sahada	Moraceae
74.	<i>Clerodendrum viscosum</i>	Genguti	Verbenaceae
75.	<i>Cassia occidentalia L.</i>	Ghoda Chakunda	Caesalpiniaceae
76.	<i>Indigofera cassioides</i>	Giliri	Fabaceae
77.	<i>Caesalpinia digyna</i>	Gilo	Caesalpiniaceae
78.	<i>Ardisia solanacea</i>	Hada Kandali	Myrsinaceae
79.	<i>Ligustrum gamblei</i>	Haduali	Oleaceae
80.	<i>Pisonia aculeate L.</i>	Hati Ankusha	Nyctaginaceae
81.	<i>Phyllanthus regiculatus</i>	Jajanga (Pani)	Euphorbiaceae
82.	<i>Zizyphus mauritiana, Var. fruticosa</i>	Jharberi	Rhamnaceae
83.	<i>Streblus tamoides</i>	Jhumpuri	Moraceae
84.	<i>Crotolaria pallida</i>	Jhunjhunia	Fabaceae
85.	<i>Crotolaria retusa L.</i>	--	Fabaceae
86.	<i>Crotolaria verucosa L.</i>	--	Fabaceae
87.	<i>Crotolaria laburnifolia L.</i>	--	Fabaceae
88.	<i>Glochidion lanceolarium</i>	Kalchua	Euphorbiaceae
89.	<i>Catunaregam spinosa</i>	Kaleikanta	Rubiaceae
90.	<i>Dalbergia rubiginosa</i>	Kanchanai	Fabaceae
91.	<i>Zizyphus oenoplia</i>	Kantailili	Rhamnaceae
92.	<i>Mallotus repandus</i>	Kapilagundi	Euphorbiaceae
93.	<i>Polyalthia suberosa</i>	Karadia	Annonaceae
94.	<i>Lxora pavetta</i>	Karuna	Rubiaceae
95.	<i>Carissa carandas</i>	Kerendakoli	Apocynaceae
96.	<i>Allophyllus serratus</i>	Khandakala	Bignoniaceae
97.	<i>Carissa spinarum</i>	Kharkas	Ulmaceae
98.	<i>Mimosa himalayana</i>	Kirikichi Kanta	Mimosaceae
99.	<i>Desmodium heterocarpon</i>	Krushnaparni	Fabaceae
100.	<i>Pavetta tomentosa</i>	Kukurchalia	Rubiaceae
101.	<i>Pavetta crassicaulis</i>	Kukurchhalia (Pengu)	Rubiaceae
102.	<i>Uvaria hamiltonii</i>	Lekhan lili	Annonaceae
103.	<i>Hiptage benghalensis</i>	Madhabi lata (Nata Nageswar)	Malpighiaceae
104.	<i>Dendrophthoe falcate</i>	Malanga	Loranthaceae
105.	<i>Viscum articulatum</i>	Malanga (Kachila)	Loranthaceae
106.	<i>Viscum monoicum</i>	Malanga (Santhi)	Loranthaceae
107.	<i>Millettia extensa</i>	Mareda (Gurendi)	Fabaceae
108.	<i>Croton roxburghii</i>	Masundi	Euphorbiaceae
109.	<i>Helictres isora L.</i>	Modimodika	Sterculiaceae



110.	<i>Zanthoxylum rhetsa</i>	Morei	Rutaceae
111.	<i>Lantana camara L.</i>	Naga Airi	Verbenaceae
112.	<i>Cipadessa baccifera</i>	Nalabeli	Meliaceae
113.	<i>Meyna spinosa</i>	Nangala kanta	Rubiaceae
114.	<i>Atalantia monophyla</i>	Naragundi (Narguni)	Rutaceae
115.	<i>Capparis brevispina</i>	Nepheda	Capparaceae
116.	<i>Maytenus emarginatus</i>	Nunakoli	Celastraceae
117.	<i>Antidesma ghaesembilla</i>	Nuninunia	Euphorbiaceae
118.	<i>Antidesma acidum</i>	--	Euphorbiaceae
119.	<i>Embelia tsjeriam-cottam</i>	Nunununia	Myrsinaceae
120.	<i>Rauwolfia serpentine</i>	Patalagarud (Sarpagandha)	Apocynaceae
121.	<i>Abutilon indicum L.</i>	Pedipedika	Malvaceae
122.	<i>Celastrus paniculata</i>	Pengu	Celastraceae
123.	<i>Benkara malabarica</i>	Phirika	Rubiaceae
124.	<i>Breynia vitis-idaea</i>	Pohala koli (Jajan)	Euphorbiaceae
125.	<i>Chromolaena odorata</i>	Pokasunga (Bada)	Asteraceae
126.	<i>Paederia foetida L.</i>	Prasaruni	Rubiaceae
127.	<i>Casearia graveolens</i>	Sakara	Flacourtiaceae
128.	<i>Desmodium heterocarpon</i>	--	Fabaceae
129.	<i>Asparagus racemosus</i>	Satawari	Liliaceae
130.	<i>Aeschynomene aspera L.</i>	Sola	Fabaceae
131.	<i>Ichnocarpus frutescens</i>	Suam Lai (Khalua Lai)	Apocynaceae
132.	<i>Schefflera venulosa</i>	Takua (Suring laha)	Araliaceae
133.	<i>Ixora pavetta</i>	Tela Koruan	Rubiaceae
134.	<i>Sesbania bispinosa</i>	Tentua	Fabaceae
135.	<i>Toddalia asiatica</i>	Tundapoda	Rutaceae
136.	<i>Leea asiatica</i>	--	Vitaceae
137.	<i>Pseudarthria viscida</i>	--	Fabaceae
138.	<i>Derris scandens</i>	--	Fabaceae
139.	<i>Cycas circinalis l.</i>	Arguni	Cycadaceae
140.	<i>Cissampelos pareira</i>	Akanbindi	Menispermaceae
141.	<i>Solaman virginianum L.</i>	Ankaranti	Solanaceae
142.	<i>Capparis zeylanica L.</i>	Asadhua	Capparidaceae
143.	<i>Combretum roxburghii</i>	Atundi (Kala)	Combretaceae
144.	<i>Jasminum multiflorum</i>	Bana Malli	Oleaceae
145.	<i>Barleria strigosa</i>	Bansuralli	Acanthaceae
146.	<i>Calamus guruba</i>	Beta (Kanta Beta)	Arecaceae
147.	<i>Calamus viminalis</i>	Beta (Pani Beta)	Arecaceae

148.	<i>Hugonia mystax L.</i>	Chulijhinka	Linaceae
149.	<i>Ziziphus funiculosa</i>	Chunkoli	Rhamnaceae
150.	<i>Acacia pennata</i>	Dantari lai	Momosaceae
151.	<i>Aspidopterys indica</i>	Dhala atundi	Malpighiaceae
152.	<i>Calycoptersis floribunda</i>	Dhala atundi	combretaceae

C. Herbs & Climbers:

Sl. No.	Scientific Name	Family
1.	<i>Andrographis paniculata</i>	Acanthaceae
2.	<i>Justicia simplex</i>	Acanthaceae
3.	<i>Ruellia tuberosa</i>	Acanthaceae
4.	<i>Rungia parviflora</i>	Acanthaceae
5.	<i>Thunbergia grandiflora</i>	Acanthaceae
6.	<i>Daemia extensa</i>	Asclepiadaceae
7.	<i>Vinca rosea</i>	Apocynaceae
8.	<i>Aganosma caryophyllata</i>	Apocynaceae
9.	<i>Amaranthus spinosa</i>	Amaranthaceae
10.	<i>Celosia cristata</i>	Amaranthaceae
11.	<i>Achyranthes aspera</i>	Amaranthaceae
12.	<i>Alternanthera sessilis</i>	Amaranthaceae
13.	<i>Mikania scandens</i>	Compositae
14.	<i>Eclipta alba</i>	Compositae
15.	<i>Blumea lacera</i>	Compositae
16.	<i>Tridax procumbens</i>	Compositae
17.	<i>Vernonia cinerea</i>	Compositae
18.	<i>Ageratum conyzoides</i>	Compositae
19.	<i>Grangea maderaspatana</i>	Compositae
20.	<i>Gnaphalium indicum</i>	Compositae
21.	<i>Cephalandra indica</i>	Cucurbitaceae
22.	<i>Gynandropsis gynandra</i>	Capparidaceae
23.	<i>Cassia sophera</i>	Caesalpinae
24.	<i>Cassia tora</i>	Caesalpinae
25.	<i>Acalypha indica</i>	Euphorbiaceae
26.	<i>Croton bonplandianum</i>	Euphorbiaceae
27.	<i>Chrozophora plicata</i>	Euphorbiaceae
28.	<i>Desmodium gyrans</i>	Fabaceae
29.	<i>Ocimum sanctum</i>	Labiatae
30.	<i>Leucas aspera</i>	Labiatae
31.	<i>Anisomeles ovata</i>	Labiatae



32.	<i>Oldenlandia corymbosa</i>	Rubiaceae
33.	<i>Dentella repens</i>	Rubiaceae
34.	<i>Spermacoce hispida</i>	Rubiaceae
35.	<i>Solanum nigrum</i>	Solanaceae
36.	<i>Solanum trilobatum</i>	Solanaceae
37.	<i>Nicotiana plumbajinifolia</i>	Solanaceae
38.	<i>Lippia nodiflora</i>	Verbanaceae
39.	<i>Evolvulus nummularius</i>	Convolvulaceae
40.	<i>Ipomea quamoclit</i>	Convolvulaceae
41.	<i>Canscora difusa</i>	Gentianaceae
42.	<i>Hydrocotyle asiatica</i>	Umbeliferae
43.	<i>Passiflora lunata</i>	Passifloraceae
44.	<i>Sida cordifolia</i>	Malvaceae
45.	<i>Sida rhombifolia</i>	Malvaceae
46.	<i>Triumfetta rhomboidea</i>	Tiliaceae
47.	<i>Cardiospermum halicacabum</i>	Sapindaceae
48.	<i>Cleome viscosa</i>	Capparidaceae
49.	<i>Boerhaavia repens</i>	Nyctaginaceae
50.	<i>Xanthium strumarium</i>	Compositae
51.	<i>Chenopodium album</i>	Chenopodiaceae
52.	<i>Polygonum barbatum</i>	Polygonaceae
53.	<i>Rumex maritimus</i>	Polygonaceae
54.	<i>Hygrophila spinosa</i>	Acanthaceae
55.	<i>Pouzolizia indica</i>	Urticaceae
56.	<i>Cyperus rotundus</i>	Cyperaceae
57.	<i>Pennisetum typhoides</i>	Poaceae
58.	<i>Saccharum spontaneum</i>	Poaceae
59.	<i>Imperata arundinacea</i>	Poaceae
60.	<i>Cynodon dactylon</i>	Poaceae
61.	<i>Eleusine aegyptiacum</i>	Poaceae
62.	<i>Setaria glauca</i>	Poaceae
63.	<i>Argemone maxicana</i>	Papavaraceae
64.	<i>Potrasia coarctata</i>	Poaceae
65.	<i>Flurya interepta</i>	Urticaceae
66.	<i>Vitis quadrifida</i>	Vitaceae
67.	<i>Physalis peruviana</i>	Solanaceae
68.	<i>Oxalis coniculata</i>	Oxalidaceae
69.	<i>Parthenium hysterophorus</i>	Compositae
70.	<i>Derris pinnata</i>	Papilionaceae



71.	<i>Nicotiana plumbajinifolia</i>	Solanaceae
72.	<i>Justicea grandarusa</i>	Acanthaceae
73.	<i>Mikania scandens</i>	Asteraceae
74.	<i>Argemone mexicana L.</i>	Papaveraceae
75.	<i>Dioscorea puber Bl.</i>	Dioscoreaceae
76.	<i>Dioscorea glabra</i>	Dioscoreaceae
77.	<i>Dioscorea pentaphylla L.</i>	Dioscoreaceae
78.	<i>Dioscorea alata L.</i>	Dioscoreaceae
79.	<i>Dioscorea belophylla</i>	Dioscoreaceae
80.	<i>Dioscorea oppositifolia L.</i>	Dioscoreaceae
81.	<i>Dioscorea bulbifera L.</i>	Dioscoreaceae
82.	<i>Dioscorea hamiltonii</i>	Dioscoreaceae
83.	<i>Dioscorea wallichii</i>	Dioscoreaceae
84.	<i>Limnophila heterophylla</i>	Scrophulariaceae
85.	<i>Limnophila indica</i>	Scrophulariaceae
86.	<i>Limnophila repens</i>	Scrophulariaceae
87.	<i>Oxalis corniculata L.</i>	Oxalidaceae
88.	<i>Cleome viscosa L.</i>	Capparaceae
89.	<i>Cleome rutidosperma</i>	Capparaceae
90.	<i>Achyranthes aspera</i>	Amaranthaceae
91.	<i>Cleome gynandra L.</i>	Capparaceae
92.	<i>Portulaca oleracea L.</i>	Portulacaceae
93.	<i>Fimbristylis dichotoma</i>	Cyperaceae
94.	<i>Mucuna pruriens</i>	Fabaceae
95.	<i>Sida acuta</i>	Malvaceae
96.	<i>Portulaca quadrifolia L.</i>	Portulacaceae
97.	<i>Tylophora indica</i>	Asclepiadaceae
98.	<i>Vigna sublobata</i>	Fabaceae et.al.
99.	<i>Nicotiana plumbaginifolia</i>	Solanaceae
100.	<i>Atylosia scarabaeoides</i>	Fabaceae
101.	<i>Crotolaria albida</i>	Fabaceae
102.	<i>Corchorus aesutuans L.</i>	Tiliaceae
103.	<i>Rumex dentatus L.</i>	Polygonaceae
104.	<i>Peperomia pellucida</i>	Piperaceae
105.	<i>Urginea indica</i>	Liliaceae
106.	<i>Trichosanthes cucumerina L.</i>	Cucurbitaceae
107.	<i>Chlorophytum tuberosum</i>	Liliaceae
108.	<i>Bidens biternata</i>	Asteraceae
109.	<i>Cryptolepis sinensis</i>	Periploaceae

110.	<i>Phyllanthus fraternus</i>	Euphorbiaceae
111.	<i>Phyllanthus amarus</i>	Euphorbiaceae
112.	<i>Phyllanthus urinaria L.</i>	Euphorbiaceae
113.	<i>Phyllanthus virgatus</i>	Euphorbiaceae
114.	<i>Sphaeranthus indicus L.</i>	Asteraceae
115.	<i>Pueraria tuberosa</i>	Fabaceae
116.	<i>Andrographis paniculata</i>	Acanthaceae
117.	<i>Desmodium triflorum</i>	Fabaceae
118.	<i>Anisomeles indica</i>	Lamiaceae
119.	<i>Evolvulus alsinoides</i>	Convolvulaceae
120.	<i>Tragia involucrata L.</i>	Euphorbiaceae
121.	<i>Ludwigia perennis L.</i>	Onagraceae
122.	<i>.synostemon bacciforme</i>	Euphorbiaceae
123.	<i>Ipomea pes-tigridis L.</i>	Convolvulaceae
124.	<i>Tridax procumbens L.</i>	Asteraceae
125.	<i>Sida cordata</i>	Malvaceae
126.	<i>Argyreia nervosa</i>	Convolvulaceae
127.	<i>Canscora diffusa</i>	Gentianaceae
128.	<i>Aerva sanguinolenta</i>	Amaranthaceae
129.	<i>Vigna trilobata</i>	Fabaceae
130.	<i>Zornia gibbosa</i>	Fabaceae
131.	<i>Cocculus hirsutus</i>	Menispermaceae
132.	<i>Vigna adenantha</i>	Fabaceae
133.	<i>Ageratum conyzoides L.</i>	Asteraceae
134.	<i>Sida rhombifolia L.</i>	Malvaceae
135.	<i>Ampelocossus latifolia</i>	Vitaceae
136.	<i>Dicliptera bupleuroides</i>	Acanthaceae
137.	<i>Datura stramonium L.</i>	Solanaceae
138.	<i>Hemidesmus indicus</i>	Periplocaceae
139.	<i>Scirpus articulatus L.</i>	Cyperaceae
140.	<i>Uvaria lurida</i>	Annonaceae
141.	<i>Leucas aspera</i>	Lamiaceae
142.	<i>Scindapsus officinalis</i>	Araceae
143.	<i>Typhonium trilobatum</i>	Araceae
144.	<i>Passiflora foetida L.</i>	Pasifloraceae
145.	<i>Coldenia procumbens L.</i>	Boraginaceae
146.	<i>Ocimum canum</i>	Lamiaceae
147.	<i>Scindapsus officinalis</i>	Araceae
148.	<i>Cannabis sativa L.</i>	Canabinaceae



149.	<i>Orthosiphon pallidus</i>	Lamiaceae
150.	<i>Hedyotis corymbosa</i>	Rubiaceae
151.	<i>Commeliana paludosa</i>	Commelinaceae
152.	<i>Boerhavia diffusa L.</i>	Nyctaginaceae
153.	<i>Indigofera glabra L.</i>	Fabaceae
154.	<i>Indigofera linnaei</i>	Fabaceae
155.	<i>Indigofera linifolia</i>	Fabaceae
156.	<i>Indigofera nummularifolia</i>	Fabaceae
157.	<i>Caesalpinia bonduc</i>	Caesalpinaceae
158.	<i>Laportea interrupta</i>	Urticaceae
159.	<i>Amischophacelus axillaries</i>	Commelinaceae
160.	<i>Pedaliium murex L.</i>	Asteraceae
161.	<i>Tribulus terrestris L.</i>	Zygophyllaceae
162.	<i>Cryptolepis buchananii</i>	Periplocaceae
163.	<i>Euphorbia hirta L.</i>	Euphorbiaceae
164.	<i>Heliotropium indicum L.</i>	Boraginaceae
165.	<i>Acalypha indica L.</i>	Euphorbiaceae
166.	<i>Stachytarpheta jamaicensis</i>	Verbenaceae
167.	<i>Cissus vitiginea L.</i>	Vitaceae
168.	<i>Schefflera venulosa</i>	Moraceae
169.	<i>Triumfetta neglecta</i>	Tiliaceae
170.	<i>Crotolaria spectabilis</i>	Fabaceae
171.	<i>Justicia betonica L.</i>	Acanthaceae
172.	<i>Abrus precatorius L.</i>	Fabaceae
173.	<i>Combretum roxburghii</i>	Combretaceae
174.	<i>Enteda pursaetha</i>	Mimosaceae
175.	<i>Ipomoea aquatica forssk</i>	Convolvulaceae
176.	<i>Commeliana benghalensis L.</i>	Commelinaceae
177.	<i>Ampelocissus latifolia</i>	Vitaceae
178.	<i>Cayratia auriculata</i>	Vitaceae
179.	<i>Momordica dioica</i>	Cucurbitaceae
180.	<i>Cardiospermum halicacabum L.</i>	Sapindaceae
181.	<i>Alternanthera pungens</i>	Amaranthaceae
182.	<i>Amaranthus spinosus L.</i>	Amaranthaceae
183.	<i>Solena amplexicaulis</i>	Cucurbitaceae
184.	<i>Costus speciosus</i>	Scitamineae
185.	<i>Eclipta prostrate</i>	Asteraceae
186.	<i>Strobilanthes scaber</i>	Acanthaceae
187.	<i>Tephrosia purpurea</i>	Fabaceae

188.	<i>Hygrophila auriculata</i>	Acanthaceae
189.	<i>Oxalis corniculata L.</i>	Oxalidaceae
190.	<i>Desmodium triflorum</i>	Fabaceae
191.	<i>Desmodium velutinum</i>	Fabaceae
192.	<i>Desmodium heterophyllum</i>	Fabaceae
193.	<i>Butea superba</i>	Fabaceae
194.	<i>Momosa pudica L.</i>	Mimosaceae
195.	<i>Ocimum basilicum L.</i>	Lamiaceae
196.	<i>Bridelia stipularis</i>	Euphorbiaceae
197.	<i>Aristolochia indica L.</i>	Aristolochiaceae
198.	<i>Hybanthus enneaspermus</i>	Violaceae
199.	<i>Alternanthera sessilis</i>	Amaranthaceae
200.	<i>Aganosma caryophyllata</i>	Apocynaceae
201.	<i>Elephantopys scaber L.</i>	Asteraceae
202.	<i>Gymmema sylvestre</i>	Asclepiadaceae
203.	<i>Merremia tridentate</i>	Convolvulaceae
204.	<i>Cyperus rotundus L.</i>	Cyperaceae
205.	<i>Polygonum plebeium</i>	Polygonaceae
206.	<i>Smilax zeylanica L.</i>	Smilacaceae
207.	<i>Smilax perfoliata</i>	Smilacaceae
208.	<i>Eriocaulon quinqueangulare L.</i>	Eriocaulaceae
209.	<i>Solanum nigrum L.</i>	Solanaceae
210.	<i>Amorphophallus paeoniifolius</i>	Araceae
211.	<i>Emilia onchifolia</i>	Asteraceae
212.	<i>Spatholobus parviflorus</i>	Fabaceae
213.	<i>Aristolochia indica L.</i>	Aristolochiaceae
214.	<i>Hydrocera triflora</i>	Balsaminaceae
215.	<i>Vigna adenantha</i>	Fabaceae
216.	<i>Ottelia alismoides</i>	Hydrocharitaceae
217.	<i>Cyperus cephalotes</i>	Cyperaceae
218.	<i>Merremia umbellate</i>	Convolvulaceae
219.	<i>Polycarpaea aurea</i>	Caryophyllaceae
220.	<i>Aerva lanata</i>	Amaranthaceae
221.	<i>Ventilago denticulate</i>	Rhamnaceae
222.	<i>Cayratia pedata</i>	Vitaceae
223.	<i>Mollugo pentaphylla L.</i>	Molluginaceae
224.	<i>Glinus oppositifolius</i>	Molluginaceae
225.	<i>Blumea lacera</i>	Asteraceae
226.	<i>Blumea oblique</i>	Asteraceae

227.	<i>Veronica cinerea</i>	Asteraceae
228.	<i>Trianthema portulacastrum L.</i>	Aizoaceae
229.	<i>Ventilago madraspatana</i>	Rhamnaceae
230.	<i>Desmodium gengeticum</i>	Fabaceae
231.	<i>Spermacoce articularis</i>	Rubiaceae
232.	<i>Vigna triobata</i>	Fabaceae
233.	<i>Bauhinia vahlii</i>	Caesalpinaceae
234.	<i>Aeschynomene indica L.</i>	Fabaceae
235.	<i>Sida acuta</i>	Malvaceae
236.	<i>Curculigo orchioides</i>	Hypoxidaceae
237.	<i>Centella asiatica</i>	Apiaceae
238.	<i>Pergularia daemia</i>	Asclepiadaceae
239.	<i>Crotalaria prostrata</i>	Fabaceae
240.	<i>Crotalaria quinquefolia L.</i>	Fabaceae
241.	<i>Striga asiatica</i>	Scrophylariaceae
242.	<i>Mitracarpus villosus</i>	Rubiaceae
243.	<i>Valtheria indica L.</i>	Sterculianaceae
244.	<i>Eranthemum capense L.</i>	Acanthaceae
245.	<i>Triumfetta pentandra</i>	Tiliaceae
246.	<i>Blepharis maderaspatensis</i>	Acanthaceae
247.	<i>Hedyotis affinis</i>	Rubiaceae
248.	<i>Dedyotis brachiata</i>	Rubiaceae
249.	<i>Azolla imbricate</i>	Azollaceae
250.	<i>Marsilea minuta L.</i>	Marsileaceae
251.	<i>Selaginella indica</i>	Selaginellaceae

D. Fern

Sl. No.	Scientific Name	Family
1.	<i>Pteris longifolia</i>	Polypodiaceae
2.	<i>Diplazium sp.</i>	Polypodiaceae
3.	<i>Nephrolepis sp.</i>	Polypodiaceae
4.	<i>Drinaria sp.</i>	Polypodiaceae
5.	<i>Adiantum caudatum</i>	Polypodiaceae
6.	<i>Adiantum philippense L.</i>	Adiantaceae
7.	<i>Ampeloteris prolifera</i>	--
8.	<i>Lygodium flexuosum (L.)</i>	Lygodiaceae
9.	<i>Pteris cretica L.</i>	Pteridaceae

(This list excludes most of the cultivated and horticultural plant species.)

Table 3.25

Inventory of Local Medicinal Plants (found in and around Project Site)

Sl. No.	Species	Plant parts used	Purpose for which used
1.	<i>Eclipta alba</i>	Whole plant	Antiseptic
2.	<i>Sida cordifolia</i>	Root	Antiseptics
3.	<i>Alstonia scholaris</i>	Bark	Gastric ailment
4.	<i>Terminalia arjuna</i>	Bark	Gastric ailments
5.	<i>Aegle marmelos</i>	Fruits, root, leaves	Gastric ailments
6.	<i>Holarrhena antidysentrica</i>	Bark	Gastric ailments
7.	<i>Azadiracta indica</i>	Bark, leaf, seed	Gastric ailment
8.	<i>Clerodendron inerme</i>	Root, leaves	Rheumatism
9.	<i>Vitex negundo</i>	Seed, root	Rheumatism
10.	<i>Tamarindus indica</i>	Leaf, fruit	Edible
11.	<i>Hygrophila spinosa</i>	Leaves, stem	Gastric complaint
12.	<i>Hyptis suaveolens</i>	Leaves	Skin infection
13.	<i>Nyctanthes arbor-tristis</i>	Leaves	Fever, Rheumatism
14.	<i>Daemia extensa</i>	Whole plant	Catonhal affections
15.	<i>Datura metel</i>	Fruit	Cardiac ailment
16.	<i>Acacia nilotica</i>	Leaves, buds	Toothache
17.	<i>Albizia procera</i>	Root, bark	Eye problems

Table 3.26

Phyto - Sociological Analysis of the Flora of Buffer Region Project.

Location	Species	Frequency	Density	Abundance
Chandaka reserve forest	a) <i>Xylia xylocarpa</i>	50	2.0	0.4
	b) <i>Bridelia retusa</i>	40	1.5	0.3
	c) <i>Pterospermum heyneanum</i>	30	1.0	0.3
	d) <i>Lannea coromandelica</i>	30	1.5	0.5
	e) <i>Grewia tiliifolia</i>	20	1.0	0.5
	f) <i>Aegle marmelos</i>	20	1.5	0.7
	g) <i>Diospyros sylvatica</i>	30	2.0	0.6
	h) <i>Burserra serrata</i>	10	1.0	1.0
	i) <i>Bambusa sp.</i>	30	3.0	1.0
Nandan-Kanan National Park	a) <i>Terminalia arjuna</i>	30	3.0	1.0
	b) <i>Adina cordifolia</i>	20	1.5	0.7
	c) <i>Bridelia retusa</i>	30	1.0	0.3
	d) <i>Mangifera indica</i>	20	1.0	0.5
	e) <i>Cassia fistula</i>	20	1.5	0.7

	<i>f) Lagerstromia parviflora</i>	20	1.0	0.5
	<i>g) Strychnos potatorum</i>	10	1.0	1.0
	<i>h) Enpatorium odoratum</i>	20	1.0	0.5
Mundali village orchards	<i>a) Cassia fistula</i>	10	1.0	1.0
	<i>b) Acacia auriculiformis</i>	20	2.0	1.0
	<i>c) Capparis spinosa</i>	20	3.0	1.5
	<i>d) Azadiracta indica</i>	20	1.0	0.5
	<i>e) Salmalia malabaricum</i>	10	1.0	1.0
	<i>f) Syzizium cumini</i>	10	1.0	1.0
	<i>g) Eupatorium odoratum</i>	30	3.0	1.0
	<i>h) Pondanus sp.</i>	10	10	1.0
	<i>i) Stables asper</i>	20	20	1.0

**Table 3.27
Butterflies Recorded at Project Area**

Family	Common Name	Scientific Name	Position in Wildlife Protection act
Papilionidae	1.Common Mormon	<i>Papilio polytes</i>	IV
	2.Crimson Rose	<i>Pachliopta hector</i>	I
Pieridae	3.Mottled Emigrant	<i>Catopsilia pyranthe</i>	IV
Lycaenidae	4.Lime Blue	<i>Chilades laius</i>	IV
Nymphalidae	5.Common castor	<i>Ariadne merione</i>	IV
	6.Danaid Eggfly	<i>Hypolimnas misippus</i>	IV
	7.Blue Tiger	<i>Tirumala limniace</i>	I
	8.Striped Tiger	<i>Danaus genutia</i>	IV
	9.Plain Tiger	<i>Danaus chrysippus</i>	IV
	10.Common Indian Crow	<i>Euploea core</i>	IV
	11.Common Evening Brown	<i>Mycanitis leda</i>	IV
	12.Grey Pansy	<i>Junonia atlites</i>	IV

**Table 3.28
Amphibia Recorded in and around the Project Site**

Species	Common English Name	Status	Wildlife Schedule
FAMILY – BUFONIDAE			
1. <i>Bufo melanostriatus</i> (Schneider)	Common Indian Toad	Common	IV
FAMILY – RANIDAE			
2. <i>Rana cynophlyctis</i> (Schneider)	Skipping Frog	Common	VI
3. <i>Rana limnocharis</i> (Boie)	Paddy field frog	Common	VI

**Table 3.29
Reptiles of the Study Area**

Sl. No.	Common English Name	Species	Families/order	Position as per Wild Life Schedule
A. Lizards				
1.	Indian Chameleon	<i>Chameleon zeylanicus</i> (Laurenti)	Hamelecoidae	II
2.	Bramhiny skink	<i>Mabuya carinata</i> (Schneider)	Cincidae	IV
3.	Little skink	<i>Mabhya macularia</i> (Blyth)	Cincidae	IV
4.	Snake skink	<i>Lygosoma punctatus</i> (Beddome)	Cincidae	IV
5.	Common garden lizard	<i>Calotes versicikiw</i> (Daudin)	Gamidae	II
6.	Rock lizard	<i>Psammophilus dorsalis</i> (Gray)	Gamidae	II
7.	Forest lizard	<i>Calotes rouxi</i> (Dum. & Bibr)	Gamidae	IV
8.	Fan throated lizard	<i>Sitana ponticeriana</i> (Cuvier)	Gamidae	IV
9.	Spotted Indian House Gecko	<i>Hemidactylus brookii</i> (Gray)	Ekkonidae	II
10.	Common Indian House Gecko	<i>Hemidactylus flaviviridis</i> (Ruppell)	Gekkonidae	IV
11.	Tree Gecko	<i>Hemidactylus leschenaultia</i> (Dum, & Bibr)	Gekkonidae	II
12.	Bengal Monitor lizard	<i>Varanus bengalensis</i> (Schneider)	Varanidae	II
13.	Yellow monitor lizard	<i>Varanus flavescens</i> (Gray)	Varanidae	II
B. Snakes:				
14.	Indian Python	<i>Python molurus molurus</i> (Linn.)	Oidae	I
15.	Russell's Viper	<i>Daboia russelii</i> (Shaw & Nodder)	Viperidae	I
16.	Common Krait	<i>Bungarus caeruleus</i> (Schneider)	Lapidae	I
17.	Indian Rat. Snake	<i>Ptyas mucosus</i> (Linn.)	Olubridae	IV
18.	Russelis viper	<i>Vipera russelli</i>	Oridae	I
19.	Acellate cobra	<i>Naa oxiana</i> (Eichwald)	Lapidae	I
20.	Common Vine Snake	<i>Ahaetualla nasuta</i> (Lacepede)	Olubridae	II

21.	Common wolf snake	<i>Lycodon aulicus</i> (Linn.)	Olubridae	IV
22.	Buffstriped Keelback	<i>Amphiesma stolata</i> (Linn.)	Olubridae	IV
23.	Binocellata Cobra	<i>Naja naja</i> (Linn.)	Lapidae	II
24.	Cheekered keelback	<i>Xenochrophis piscator</i> (Schneider)	Olubridae	IV
25.	Banded Krait	<i>Bungarus fasciatus</i> (Schneider)	Lapidae	II
26.	Common Work snake	<i>Ramphotyphlops braminus</i> (Daudin)	Typhlopidae	IV
27.	Tree snake	<i>Dendrelaphis tristis</i> (Daudin)	Olubridae	I
28.	Cat snake (Ijadian Gamma)	<i>Boiga trigonata</i> (Schneider)	Colubridae	I
29.	Forsten's Cat snake	<i>Boiga forsteni</i> (Dum. & Bibr.)	Colubridae	II

**Table 3.30
Avifauna of the Study Area**

Sl. No.	Common English Name	Species (Scientific Name)	Family	Position as per WLS
1.	Black crowned Night heron	<i>Nycticorax nycticorax</i>	Ardeidae	IV
2.	Grey heron	<i>Ardea inerea</i>	Ardeidae	IV
3.	Indian Grey Hornbill	<i>Ocyrceros birostris</i>	Bucerotidae	IV
4.	Small green Bee eater	<i>Merops orientalis</i>	Meropidae	IV
5.	Blue tailed Bea eater	<i>Merops philippinus</i>	Meropidae	IV
6.	Jungle fowl	<i>Gallus gallus murghi</i>	Phasianidae	IV
7.	Spourfowl	<i>Galloperdix spadicea</i>	Phasianidae	IV
8.	Ramhiny Starling	<i>Sturnus pagodarum</i>	Sturnidae	IV
9.	Indian Myna	<i>Acridotheres tristis</i>	Sturnidae	IV
10.	Weaver bird	<i>Ploceus philippinus</i>	Ploceidae	IV
11.	Blue Jay (Indian roller)	<i>Coracias benghatensis</i>	Coraciidae	IV
12.	Eastern Skylark	<i>Alauda gulgula</i>	Alaudidae	IV
13.	Greater Racket tailed drongo	<i>Dicrurus paradiseus</i>	Dicruridae	IV
14.	Common Indian Nightjar	<i>Caprimulgus asiaticus asiaticus</i>	Latham	IV
15.	Hite throated Ground Thrush	<i>Zoothera citrine cyanotus</i>	Muscicapidae	IV
16.	Pied brushchat	<i>Saxicola caprata</i>	Muscicapidae	IV
17.	White browed Bulbul	<i>Pycnonotus luteolus</i>	Pycnonotidae	IV
18.	Lack winged stilt	<i>Tedorna ferruginea</i>	Anatidae	IV
19.	Bramhiny Duck	<i>Tedorna ferruginea</i>	Anatidae	IV
20.	Blossom headed parakeet	<i>Pataculca cyanocephala</i>	Psittacidae	IV

21.	Paddy field pipit	<i>Anthus rufulus</i>	Motacillidae	IV
22.	Brown rock pipit	<i>Anthus similes</i>	Motacillidae	IV
23.	Oriental Tree Pipit	<i>Anthus hodgsoni</i>	Motacillidae	IV
24.	Indian House swift	<i>Apus offinis offinis</i>	Apodidae	IV
25.	Little Brown Dove	<i>Treptopelia senegalensis</i>	Columbidae	IV
26.	Small Minivet	<i>Pericrocotus cinnamomeus</i>	Mpephagidae	IV
27.	Black Shouldered kite	<i>Elanus caeruleus</i>	Accipitridae	IV
28.	Mottled Wood owl	<i>Strix ocellata</i>	Strigidae	IV
29.	Spotted Dove	<i>Streptopelia chinensis</i>	Columbidae	IV
30.	Collared Scops owl	<i>Otus bakka moena</i>	Sturnidae	IV
31.	Common Hoopoe	<i>Upupa epops</i>	Upupidae	IV
32.	Crested serpent eagle	<i>Spilornis cheela</i>	Accipitridae	IV
33.	Purple rumped Sunbird	<i>Nectarines zeylonica</i>	Nectariniidae	IV
34.	Purple sunbird	<i>Nectarinia asiatica</i>	Nectariniidae	IV
35.	Tufted pochard	<i>Aythya fuligula</i>	Anatidae	IV
36.	Oriental magpie Robin	<i>Copsychus saularis</i>	Muscicapidae	IV
37.	White breasted waterhen	<i>Amaurornis phoenicurus</i>	Rallidae	IV
38.	Ronze winged Jacana	<i>Metopidius indicus</i>	Jacanidae	IV
39.	Jungle crow	<i>Corvus macrorhynchos culminates sykes</i>	Corvidae	IV
40.	Ailor bird	<i>Orthotomus sutorius</i>	Muscicapidae	IV
41.	White Ibis	<i>Threskiornis melanocephalus</i>	Threskiornithidae	IV
42.	Ashy-Crowned sparrow Lark	<i>Eremopterix grisea</i>	Alaudidae	IV
43.	Rufous tailed Finch lark	<i>Ammomanes phoenicurus</i>	Alaudidae	IV
44.	Indian Tree pie	<i>Dendrocitta vagabunda</i>	Corvidae	IV
45.	Cattle Egret	<i>Bubulcus ibis</i>	Ardeidae	IV
46.	Openbilled stork	<i>Anastomus oscitans</i>	Ciconidae	IV
47.	Spot Billed duck	<i>Anas poecilorhyncha</i>	Anatidae	IV
48.	House sparrow	<i>Passer domesticus</i>	Passeridae	IV
49.	Pied starling	<i>Sturnus contra</i>	Sturnidae	IV
50.	Eurasian eagle-owl	<i>Bubo bubo</i>	Strigidae	IV
51.	Iue rock Pigeon	<i>Columba livia</i>	Columbidae	IV
52.	Cotton teal	<i>Nettapus coromandelianus</i>	Anatidae	IV
53.	Red vented bulbul	<i>Pycnonotus cafer</i>	Pycnonotidae	IV
54.	Jungle Myna	<i>Acridotheres fuscus</i>	Sturnidae	IV
55.	Booted Hawk Eagle	<i>Hieraetus pennatus</i>	Accipitridae	IV
56.	Common kestrel	<i>Falco tinnunculus</i>	Accipitridae	IV
57.	Pallid Harrier	<i>Circus macrourus</i>	Accipitridae	IV
58.	Pied Harrier	<i>Circus melanoleucos</i>	Accipitridae	IV
59.	Western Marsh Harrier	<i>Circus acrogenus</i>	Accipitridae	IV
60.	Common Button Quil	<i>Turnix suscitator</i>	Phasianidae	IV
61.	Common Quail	<i>Coturnix coturnix</i>	Phasianidae	IV
62.	Rain Quail	<i>Coturnix coromandelica</i>	Accipitridae	IV
63.	Yellow bittern	<i>Ixobrychus sinensis</i>	Ardeidae	IV
64.	Black headed oride	<i>Oriolus xanthornus</i>	Oriolidae	IV
65.	Golden Oriole	<i>Oriolus oriolus</i>	Oriolidae	IV
66.	Lack crested Bulbul	<i>Pycnonotus melanicterus</i>	Pycnonotidae	IV

67.	Large Whistling teal	<i>Dendrocygna bicolor</i>	Anatidae	IV
68.	Orange breasted Green Pigeon	<i>Treron bicincta</i>	Columbidae	IV
69.	Yellow legged Green Pigeon	<i>Treron Phoenicoptera</i>	Columbidae	IV
70.	Ellow throated sparrow	<i>Petronia xanthocollis</i>	Passeridae	IV
71.	Ufous backed Shrike	<i>Lanius schah tricolor</i>	Laniidae	IV
72.	Black drongo (King crow)	<i>Dierurus macrocercus</i>	Dicruridae	IV
73.	White bellied Drongo	<i>Dicrurus cerulescens</i>	Dicruridae	IV
74.	Black Drongo	<i>Dicrurus macrocercus</i>	Dicruridae	IV
75.	Black headed cuckoo shrike	<i>Coracina malanoptera</i>	Campephagidae	IV
76.	Black bittern	<i>Lxobrychus flavicollis</i>	Ardeidae	IV
77.	Brown shrike	<i>Lanius cristatus</i>	Laniidae	IV
78.	Indian Pond heron	<i>Ardeola grayii</i>	Ardeidae	IV
79.	Darter (Snake bird)	<i>Anhinga rufa melanogaster</i>	Phalacrocoracidae	IV
80.	Purple heron	<i>Ardea purpurea</i>	Ardeidae	IV
81.	Ferruginous Pochard	<i>Aythya nyroca</i>	Anatidae	IV
82.	Brown Fish owl	<i>Ketupa zeylonensis</i>	Sturnidae	IV
83.	Heart spotted woodpecker	<i>Hemicircus canente</i>	Picidae	IV
84.	Lesser Golden backed Woodpecker	<i>Dinopium benghalense</i>	Picidae	IV
85.	Rufous woodpecker	<i>Celeus brachyurus</i>	Picidae	IV
86.	House erow	<i>Corvus splendens</i>	Corvidae	IV
87.	Common teal	<i>Anas crecea</i>	Anatidae	IV
88.	Graganey	<i>Anas querquedula</i>	Anatidae	IV
89.	Rufous Turtle Dove	<i>Streptopilia decaocto</i>	Columbidae	IV
90.	Basanta Brown headed Barbet	<i>Megalaima zeylanica caniceps</i>	Capitonidae	IV
91.	Little Egret	<i>Egretta garzetta</i>	Ardeidae	IV
92.	Asian Koel	<i>Eudynamys scolopacea scolopacea</i>	Cuculidae	IV
93.	Brown capped Pigmy woodpecker	<i>Dendrocopus nanus</i>	Picidae	IV
94.	Greater Coucal	<i>Centropus sinensis</i>	Cuculidae	IV
95.	Yellow wagtail	<i>Motacilla flava</i>	Motacillidae	IV
96.	Northern Pin tail	<i>Anas acuta</i>	Anatidae	IV
97.	Large pied wagtail	<i>Motacilla maderaspatensis</i>	Motacillidae	IV
98.	White wagtail	<i>Motacilla alba</i>	Motacillidae	IV
99.	Grey wagtail	<i>Motacilla cinerea</i>	Motacillidae	IV
100.	Screech owl (Barn owl)	<i>Tyto alba</i>	Strigidae	IV
101.	Shall Blue Kingfisher	<i>Alcedo atthis bengalensis</i>	Alcedinidae	IV
102.	Lesser Pied King fisher	<i>Ceryle rudis leucomelanura</i>	Alcedinidae	IV
103.	White breasted King fisher	<i>Halcyon smyrnensis</i>	Alcedinidae	IV
104.	Oriental Honey Buzzard	<i>Pernis ptilorhyncus ruficollis</i>	Accipitridae	IV
105.	Median Egret	<i>Mesophoyx intermedia</i>	Ardeidae	IV

106.	White necked stork	<i>Ciconic episcopus</i>	Ciconiidae	IV
107.	White eyed Buzzard	<i>Butastur teesta</i>	Accipitridae	IV
108.	Pariah kite (Black kite)	<i>Milvus migrans</i>	Accipitridae	IV
109.	Common Peafowl	<i>Pavo cristatus</i>	Phasianidae	IV
110.	Spotted Munia	<i>Lonchura punctulata</i>	Ploceidae	IV
111.	Black headed Munia	<i>Lonchura malacea</i>	Ploceidae	IV
112.	White throated Munia	<i>Lonchura malabarica</i>	Ploceidae	IV
113.	White rumped Munia	<i>Lonchura striata</i>	Ploceidae	IV
114.	Streak throated Swallow	<i>Hirundo fluvicola</i>	Hirundinidae	IV
115.	Black winged stilt	<i>Himantopus himantopus himantopus</i>	Recurvirostri dae	IV
116.	Small Pranticole (Swallow Plover)	<i>Clarcola lacteal</i>	Glareolidae	IV
117.	Northern Shovler	<i>Anas clypeata</i>	Anatidae	IV
118.	Common Moorhen	<i>Gallinule chloropus indica</i>	Rallidae	IV
119.	Little cormorant	<i>Phalacrocorax niger</i>	Phalacrocora cidae	IV
120.	White throated fantail Flycatcher	<i>Rhipidura albicollis</i>	Muscicapidae	IV
121.	White browed fantail Flycatcher	<i>Rhipidura aureola</i>	Muscicapidae	IV
122.	Dabchick (Little Grebe	<i>Tachybaptus ruficollis</i>	Podicipitidae	IV
123.	Spotted owlet	<i>Athene brama</i>	Strigidae	IV
124.	Eurasian collared Dove	<i>Streptopelia decaocto</i>	Columbidae	IV
125.	Tick ell's Flower pecker	<i>Dicaeum erythrohynchos</i>	Dicaeidae	IV
126.	Ashy Prinia (Wren Wabler)	<i>prinia socialis</i>	Muscicapidae	IV
127.	Frankin's prinia (Wren warbler)	<i>Prinia hodgsonii</i>	Muscicapidae	IV
128.	Indian Myna	<i>Acridotheres tristis</i>	Sturnidae	IV
129.	Paradise Flycatcher	<i>Terpsiphone paradise</i>	Muscicapidae	IV
130.	Common pochard	<i>Aythya ferina</i>	Anatidae	IV
131.	Little Green Heron	<i>Ardeola striatus chloriceps</i>	Ardeidae	IV
132.	Indian white backed vulture	<i>Gyps bengalensis</i>	Accipitridae	IV
133.	Yellow legged Buttonquail	<i>Turnix tanki</i>	Turnicidae	IV
134.	Black tailed Godwit	<i>Limosa limosa</i>	Charadriidae	IV
135.	Common Greenshank	<i>Tringa nebularia</i>	Charadriidae	IV
136.	Wood Sandpiper	<i>Tringa glareola</i>	Charadriidae	IV
137.	Common Sandpiper	<i>Actitis hypoleucos</i>	Charadriidae	IV
138.	Common Snipe	<i>Gallinago gallinogo</i>	Charadriidae	IV
139.	Black bellied tern	<i>Gterna acuticaudata</i>	Laridae	IV
140.	River tern	<i>Sterna cuurantia</i>	Laridae	IV
141.	Jungle Babbler	<i>Turdoides striatus</i>	Muscicapidae	IV
142.	Large Grey Babbler	<i>Turdoides malcolmi</i>	Muscicapidae	IV
143.	Common Babbler	<i>Turdoidep caudatus</i>	Muscicapidae	IV
144.	Rufous bellied Babbler	<i>Dumetia hyperythra</i>	Muscicapidae	IV
145.	Lesser Whistling Teal (Duck)	<i>Dendrocygna javanica</i>	anatidae	IV

146.	Shikra	<i>Accipiter badius</i>	Falconidae	IV
147.	Brain fever bird	<i>Hierococcyx carius</i>	Cuculidae	IV
148.	Small Green-biled Malkoha	<i>Phaenicophacus viridirostris</i>	Cuculidae	IV
149.	Pied crested cuckoo	<i>Clamator jacobinus</i>	Cuculidae	IV
150.	Indian Plaintive Cuckoo	<i>Cacomantis passerinus</i>	Cuculidae	IV
151.	Collared Scopoe owl	<i>Otus bakkamoena</i>	Strigidae	IV
152.	Copper smith Barbet	<i>Megalaima haemacphala indica</i>	Capitonidae	IV
153.	Nakta duck (Comb duck)	<i>Sarkidiornis melanotos</i>	Anatidae	IV
154.	Common lora	<i>Aegithina tiphia</i>	Irenidae	IV
155.	Rose ringed parakeet	<i>Psittacula krameri manillensis</i>	Psittacidae	IV
156.	Asian palm swift	<i>Cypsiurus parvus balasiensis</i>	Apodidae	IV
157.	Red winged bush lark	<i>Mirafra erythroptera</i>	Alaudidae	IV
158.	Red rumped swallow	<i>Hirundo daurica</i>	Hirundinidae	IV
159.	Common wood shrike	<i>Tephrodornis pondicerianus</i>	Corvidae	IV
160.	Greyt partridge (Francolin)	<i>Francolinus pondicerianus</i>	Phasinidae	IV
161.	Red wattled lapwing	<i>Vanellus indicus</i>	Charadriidae	IV
162.	Yellow wattled lapwing	<i>Vanellus malabaricus</i>	Charadriidae	IV
163.	Lesser white throat	<i>Sylvia curruca</i>	Muscicapidae	IV
164.	Orphean Warbler	<i>Sylvia hortensis</i>	Muscicapidae	IV
165.	Wryneck	<i>Jynx torquilla</i>	Picidae	IV
166.	Common Swallow	<i>Hirundo rustica</i>	Hirundinidae	IV
167.	Striated Swallow	<i>Hirundo daurica</i>	Hirundiidae	IV
168.	Shrike	<i>Coracina macci</i>	Campephagid a	IV

Source: Field visit report; Working Plan report from DFO, Chandaka Reserve Forest and Athagarh Forest Division.

**Table 3.31
Mammals of the Study Area**

Sl. No.	Common English Name	Species	Families	Position in the WLS
1.	The flying fox	<i>Pteropus giganteus</i> (Brunnich)	Pteropodidae	I
2.	Falvous fruit Bat	<i>Rousettus leschenaultia leschenaulti</i> (Desmarest)	Pteropodidae	I
3.	Short nosed Fruit Bat	<i>Cynopterus sphinx sphinx</i> (Vahl)	Teropodidae	II
4.	The Indian Pangolin	<i>Manis crassicaudata</i> (Gray)	Anidae	I
5.	Indian Wild dog	<i>Cuon alpinus</i> (Pallas)	Anidae	I
6.	Indian tree shrew	<i>Ananthana ellioti</i> (Waterhouse)	Upaiidae	I

7.	The Indian Wild Pig	<i>Sus scrofa cristatus</i> (Wager)	Uidae	I
8.	Indian giants squirrel	<i>Ratufa indica centralis</i> (Ryleg)	Ciuridae	I
9.	Jungle Cat	<i>Felis chaus kutas</i> (Pearson)	Elidae	I
10.	The Jackal	<i>Canis aureus</i> (Linn.)	Anidae	I
11.	The Grey Musk Shrew	<i>Suncus murinus</i> (Linn.)	Oricidae	I
12.	The Ratel	<i>Mellivora capensis indica</i> (Kerr)	Ustelidae	I
13.	Five striped palm squirrel	<i>Funambulus pennati</i> (Wroughton)	Sciuridae	I
14.	Three Striped palm squirrel	<i>Funambulus palmarum</i> (Linn.)	Sciuridae	I
15.	Common Langur	<i>Semnopithecus entellus entellus</i> (Duf.)	Cercopithecidae	I
16.	The Indian Elephant	<i>Elephas maximus indicus</i> (Cuvier)	Elephantidae	I
17.	The Striped Hyena	<i>Hyaena hyaena hyaena</i> (Linn.)	Yaenidae	I
18.	Indian Porcupine	<i>Hystrix indica</i> (Kerr.)	Ystricidae	I
19.	Leopard	<i>Panthera pardus fusca</i> (Meyer)	Elidae	I
20.	The Indian Fox	<i>Vulpes bengalensis</i> (Shaw)	Anidae	I
21.	Barking Deer	<i>Muntiacus muntjak</i> (Zimmermann)	Cervidae	I
22.	The Spotted Deer	<i>Axis axis axis</i> (Erleben)	Ervidae	I
23.	Indian Bush Rat	<i>Golunda ellioti</i> (Gray)	Muridae	I
24.	Indian Mole Rat	<i>Bandicota bengalensis</i> (Gray & Hardw.)	Muridae	II
25.		<i>Bandicota indica</i> (Bechstein)	Uridae	II
26.		<i>Mus booduga</i> (Gray)	Uridae	II
27.		<i>Cremnomys blanfordi</i> (Thomas)	Uridae	II
28.		<i>Rattus rattus</i> (Linn.)	Uridae	II
29.	Common Indian Mongoose	<i>Herpestes edwardsi</i> (Geoffroy)	Herpestidae	I
30.	Small Indian Mongoose	<i>Herpestes auropunctatus</i> (Hodgson)	Herpestidae	I
31.	Rhesus Macaque	<i>Macaca mulata mulatto</i> (Zimm.)	Ercopithecidae	I
32.	Small Indian Civet	<i>Viverricula indica indica</i> (Desmarest)	Viverrid	II
33.	Common Palm Civet	<i>Paradoxurus hermaphroditus</i> (Pallas)	Viverridae	II

34.	The Indian hare	<i>Lepus nigricollis ruficaudatus</i> (Cuvier)	Leporidae	I
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Table 3.32

List of Aquatic Macrophyte and Swamp Plants

Sl. No.	Scientific Name	Family
1.	<i>Ottelia alismoides</i>	Alismataceae
2.	<i>Alternanthera phylloxeroides</i>	Amaranthaceae
3.	<i>Colocasia esculenta</i>	Araceae
4.	<i>Hygrophilla spinosa</i>	Acanthaceae
5.	<i>Lemna purpusila</i>	Lemnaceae
6.	<i>Eichornia crassipes</i>	Hydrocharitaceae
7.	<i>Ludwigia apscendens</i>	Onagraceae
8.	<i>Nymphaea naucheli</i>	Nymphaeaceae
9.	<i>Spirodela polyrhiza</i>	Lemnaceae
10.	<i>Vallisneria spiralis</i>	Hydrocharitaceae
11.	<i>Urticularia sp.</i>	Lentibulariaceae
12.	<i>Typha domingensis</i>	Typhaceae
13.	<i>Enhydra fluctuan</i>	Compositae
14.	<i>Ipomea aquatica</i>	Convolvulaceae
15.	<i>Pistia stratiotes</i>	Hydrocharitaceae
16.	<i>Salvinia natans</i>	Salviniaceae
17.	<i>Azolla pinnata</i>	Salviniaceae
18.	<i>Phargmites karka</i>	Graminae
19.	<i>Sagittaria sagififolia</i>	Alismataceae
20.	<i>Marsilea minuta</i>	Marseliaceae
21.	<i>Ceratophyllum demursum</i>	Ceratophyllaceae
22.	<i>Scirpus articulatus</i>	Cyperaceae
23.	<i>Nymphoides speltatum</i>	Gentianaceae
24.	<i>Monochorea hastae</i>	Hydrocharitaceae
25.	<i>Hydrolea zeylanica</i>	Hydrophyllaceae
26.	<i>Eclipta prostrata</i>	Compositae
27.	<i>Aeschynomene aspera</i>	Fabaceae
28.	<i>Limnophila indica</i>	Scrophulariaceae
29.	<i>Trapa bispinosa</i>	Trapaceae
30.	<i>Jusea repens</i>	Ongraceae

Table 3.33
Plankton Diversity and Load

Plankto types		Plankton load (no/100 lit)		
		Sw ₁	Sw ₂	Sw ₃
(A) Phytoplanktons:				
1.	<i>Micro cystis sp</i>	100	50	200
2.	<i>Navicula sp.</i>	50	40	--
3.	<i>Chlorocella sp.</i>	30	60	20
4.	<i>Scenedesnus sp.</i>	40	50	30
5.	<i>Spirogyra sp.</i>	--	--	60
6.	<i>Closterium sp.</i>	30	40	40
7.	<i>Netrium sp.</i>	40	50	20
(B) Zooplanktons:				
1.	<i>Brachionus sp.</i>	30	40	50
2.	<i>Keratella sp.</i>	20	20	20
3.	<i>Cyclops sp.</i>	10	10	20
Total load :		350	360	460

Locations: Sw₁ – Mundali weir site on river Mahanadi, Sw₂ – Puri main canal and Sw₃ – Swamps near Railway Station.

Table 3.34
List of Fishes available in Rivers & Inland Water Bodies

Sl. No.	Scientific Name	Common Name
1.	<i>Salmostoma sardinella</i> (Hamilton)	Chela
2.	<i>Hypophthalmichthys molytrix</i> (Valenciennes)	Silver carp
3.	<i>Catla catla</i> (Hamilton)	Catla
4.	<i>Cirrhinus mrigala</i> (Hamilton)	Mrigal
5.	<i>Cyprinus carpio</i> (Linnaeus)	American rui
6.	<i>Labeo rohita</i> (Hamilton)	Rohu
7.	<i>Labeo bata</i> (Hamilton)	Bata
8.	<i>Labeo kalbasu</i> (Hamilton)	Kalbous
9.	<i>Osteobrama cotio cotio</i> (Hamilton)	Chanda
10.	<i>Puntius saphori</i> (Hamilton)	Punthi

11.	<i>Clarius batracus</i> (Linnaeus)	Magur
12.	<i>Heteropneustes fossilis</i> (Bloch)	Singi
13.	<i>Channa striatus</i> (Bloch)	Shol
14.	<i>Channa orientalis</i> (Schneider)	Chang
15.	<i>Channa punctatus</i> (Bloch)	Lata
16.	<i>Lates calcarifera</i> (Bloch)	Bhetki
17.	<i>Oriochromis mossambica</i> (Peters)	Tilapia
18.	<i>Glossogobius giuris</i> (Hamilton)	Beley
19.	<i>Anabas testudineus</i> (Bloch)	Koi
20.	<i>Mastacembelus armatus</i> Lacepede	Pakal
21.	<i>Mastacembelus pancalus</i> Hamilton	Pakal

Tables 3.35

List of Aquatic Birds

Common Name	Scientific Name
Indian river Tern	<i>Sterna aurantia</i>
Common teal	<i>Anas crecca</i>
Bronzewinged Jacaua	<i>Metopidius indicus</i>
Purple heron	<i>Ardea purpurea</i>
Blackwinged stilt	<i>Himantopus himantopus</i>
Cormorant	<i>Phalacrocorax carbo</i>
Cotton teal	<i>Nettapus coromandelianus</i>
Little cormorant	<i>Phalacrocorax niger</i>
Little egret	<i>Egretta gazetta</i>

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