Conducting baseline studies for Thane Creek

Preliminary report

Objective 2- Biodiversity of Thane creek.

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Introduction

This report on the literature regarding the Thane Creek is basedon the context of the GoI-GIZ-CMPA Maharashtra Project that intends to improve the protection of biodiversity by promoting participatory approaches to the conservation and management of coastal and marine protected areas (CMPA), and supporting the creation of new protected areas in the future. By involving stakeholders at local, state and national levels, it is expected to make a significant contribution to the conservation of areas rich in biodiversity, without compromising the resource use and livelihood options of the local population.

The overall objective of the project is 'to contribute to the improvement of the conservation, and sustainable use of biodiversity in the pilot protected areas while taking into consideration the economic circumstances of the local population'.

Thane Creek is one of the sites of the project. It originates at its northern extremity from the Ulhas River extends over a distance of 26 km, opening at the Southwest in Mumbai's Harbor. With its designation as Flamingo sanctuary during July 2015, this study has further emphasized the importance to conserve the creek while taking stock of the natural resources and dependence of the local populace. The project on Thane creek with three objectives designed by the funding agency (Mangrove cell and GIZ India), has been initiated since October 2015.

Of the three objectives given below, this preliminary report covers the **second objective**.

1. *Derive a baseline understanding of Thane creek through previous studies conducted and existing literature for Thane Creek on the issues of environmental & biodiversity conservation including anthropogenic pressure like pollution and waste dumping.*
2. *Document the present biodiversity of Thane creek covering the major aspects of flora and fauna.*
3. *Undertake the stakeholder analysis withan especial focus on the Flamingo sanctuary area.*

To achieve the second objective, the following **methodology**was used to document several different components of the biodiversity.

Mangrove diversity – 1 x 1 km grids were plotted across the Thane Creek, and 24 gridswere sampled as per the stratified random sampling. Within the grids, two quadrats each of 25 x 25 meters size at an approximate distance of 200 meters were studied for the mangrove diversity and abundance. Within each of the plots the mangrove and the mangrove associate plants were identified and counted.

Insect and arachnid diversity – the plots of the mangroves were studied and also examined for the diversity of insects. The plants within the plots were scanned thoroughly for the occurrence of insects and arachnids. To identify the species photographs were taken on the field and later identified in the laboratory.

Bird diversity –The avifaunal diversity was studied both within the mangroves and along the creek. Within the mangroves the point count method was used, wherein the birds were documented based on sight or sound for theduration of 15 minutes within the plots where the mangroves were studied. Along the creek, boat surveys were undertaken and the direct sighting method was used during the lunar phases as well as the high tide and the low tide. The birds

were sighted using the 45 x 7 binoculars as well as using photographic and video graphic evidence.

Fish diversity – The fish fauna available in the creek was directly procured from the local fishermen during their fishing activity in the creek.

Plankton diversity – The phytoplankton was collected during the lunar phases using a wide mouth container. 200 ml of water was collected in a plastic bottle and fixed with lugol's iodine and later decanted to observe the phytoplankton under the compound microscope

The zooplankton sampling was undertaken using plankton 60 um net that was towed in the water for approximate 5 minutes at several sampling locations along the creek. The plankton collected was fixed and preserved in 10% formalin. The zooplankton was later identified using the dissecting and compound microscope.

Benthos – the benthic samples were collectedfrom the intertidal region of Thane Creek during the neap and spring tide. Soil samples were collected using a handheld grab and sediment were passed through a 500mmsieve, and the benthic organisms obtained were preserved in 70% ethanol.

The megabenthos like the crabs, gastropods and their like were also sampled from the mangrove plots in an area of 1 x 1 m subquadrats with four replicates.

Results and discussion

The Thane creek and the mangroves surrounding it are located in the country's major metropolitan city – Mumbai. This ecosystem is surrounded by both industries and anurban populace that is constantly growing. This growth in demography has been the major cause of concern for the biodiversity of the region.The biodiversity studies undertaken for Thane creek have revealed a vast species composition occupying different niches. The flora and fauna observed during the present study are given here below.

The floristic diversity of the selected sampling stations from Thane creek showed the presence of eleventrue mangrove species representing eight genera and six families. Among the 11 species the mangroves belonging to the *Avicennia* genera are the most dominant ones. The mangrove associate species comprised of 27 species belonging to 17 families, with the plants belonging to Acanthaceae and Malvaceae represented by three species each. The list of mangroves is as given in table1 & 2 below.

Table 1: List of true mangrove species found along the Thane Creek

Family	Scientific name	Common name	Type
Acanthaceae	*Acanthus ilicifolius*	Sea Holly	Mangrove shrub
Avicenniaceae	*Avicennia marina acutissima*	Grey mangrove	Mangrove tree
	Avicennia marina marina	Grey mangrove	Mangrove tree
	Avicennia officinalis	Indian Mangrove	Mangrove tree

Myrsinaceae	*Aegiceras corniculatum*	River Mangrove	Mangrove shrub
Rhizophoraceae	*Bruguiera gymnorrhiza*	Burma Mangrove	Mangrove tree
	Ceriops tagal	Tagal Mangrove	Mangrove shrub
	Rhizophora mucronata	Asiatic Mangrove	Mangrove tree
Sonneratiaceae	*Sonneratia alba*	Sweet-Scented Apple Mangrove	Mangrove tree
	Sonneratia apetala	Sonneratia Mangrove	Mangrove tree
Euphorbiaceae	*Excoecaria agallocha*	Blinding Tree	Mangrove shrub

Table 2: List of Mangrove Associates found along Thane Creek.

Family	Scientific name	Common name	Type
Acanthaceae	*Hygrophila schulli*	Marsh Barbel	Mangrove associated herb
	Hygrophila auriculata	Marsh Barbel	Mangrove associated herb
	Hygrophila sp.	-	Mangrove associated herb
Aizoaceae	*Sesuvium portulacastrum*	Sea Purslane	Mangrove associated shrub
Amaranthaceae	*Alternanthera sessilis*	Sessile Joyweed	Mangrove associated shrub
	Celosia argentea	Cockscomb Crested	Mangrove associated shrub
Asteraceae	*Pluchea odorata*	shrubby camphorweed	Mangrove associated herb
Caesalpiniaceae	*Cassia sps.*	-	Mangrove associated shrub
Convolvulaceae	*Ipomoea sps.*	-	Mangrove associated herb
Cyperaceae	*Cyperus rotundus*	Common Nut Sedge	Mangrove associated herb
	Cyperus scariosus	Umbrella Sedge	Mangrove associated herb
Dioscoreaceae	*Dioscorea pentaphylla*	Five Leaf Yam	Mangrove associated climber
Euphorbiaceae	*Euphorbia hispida*	Bristly Spurge	Mangrove associated herb
	Euphorbia hirta	Asthma Weed	Mangrove associated herb
Fabaceae	*Derris trifoliata*	Common Derris	Mangrove associated climber
	Mucuna pruriens	Velvet Bean	Mangrove associated climber
Malvaceae	*Abelmoschus manihot*	Sweet Hibiscus	Mangrove associated shrub
	Abelmoschus sps.	Hibiscus	Mangrove associated shrub
	Sida acuta	Common Wireweed	Mangrove associated shrub
Mimosaceae	*Acacia sps.*	-	Mangrove associated Tree
	Pithecellobium dulce	Madras Thorn	Mangrove associated Tree
Myrsinaceae	*Aegiceras corniculatum*	River Mangrove	Mangrove associated shrub
Oxalidaceae	*Biophytum sensitivum*	Little Tree Plant	Mangrove associated shrub
Poaceae	*Cynodon dactylon*	Bermuda Grass	Mangrove associated herb
	Panicum sps.	-	Mangrove associated herb
Salvadoraceae	*Salvadora persica*	Meswak	Mangrove associated shrub
Verbenaceae	*Clerodendrum inerme*	Glory Bower	Mangrove associatedshrub

Phytoplankton- forms the essentiallink between the abiotic factors and the biota in the aquatic ecosystem. The phytoplanktonsare the primary producers of the aquatic food chain, and play a pivotal role in making energy available to the higher organisms. Some plankton species are known to produce toxins which kill fish and other organisms. Due to various anthropogenic activities, there is tremendous pollution pressure on the waters of the creek and estuaries, which affects the phytoplankton type and density, thereby necessitating their study. During the present study, the phytoplankton was observed during the spring and neap tide. The phytoplankton community comprised of 35 species of which *Skeletonema sp. Rhizosolenia sp.* and*Thalassiosira sp.* were the dominant ones. These species are known to withstand high levels of pollutants and therebyto indicate the stress levels in the creek ecosystem. The list of phytoplankton species recorded is given in Table 3.

Table 3. List of Phytoplankton observed from Thane creek

1 *Amphirora sp.*
2 *Amphora sp.*
3 *Anabaena sp.*
4 *Aphanocapsa sp.*
5 *Chaetoceros*
6 *Chaetoceros sp.*
7 *Chromomonas sp.*
8 *Ciliate sp.*
9 *Cocconeis sp.*
10 *Coscinodiscus sp.*
11 *Cyclotella sp.*
12 *Fluviatilis sp.*
13 *Gymnodinium sp.*
14 *Gyrosigma sp.*
15 *Isthmia sp .*
16 *Lauderia sp.*
17 *Leptocylindrus sp.*
18 *Mallomonas sp.*
19 *Melosira sp.*
20 *Navicula sp.*
21 *Nitzschia sp.*
22 *Odontella sp.*
23 *Peridinium sp.*
24 *Phacus sp.*
25 *Pin n u la ria s p .*
26 *Pleurosigma sp.*
27 *Prorocentrum sp.*
28 *Protoperidinium sp.*
29 *Pseudo-nitzschia sp.*
30 *Rhizosolenia sp.*
31 *Scenesesmus Obliques*
32 *Skeletonema sp.*

33 *Spirulina sp.*
34 *Surirella sp.*
35 *Thalassiosira sp.*

Fishery – the importance of mangroves as fishery habitats are well recognised. Thane creek has also supported the livelihood of several fishing villages along its course. However,several reports are indicating its decline. During the present study, eleven species of edible finfish and three species of crustaceans were recorded that are as follows.

Table 4: List of fish obtained from Thane creek.

SR NO	ORDER	FAMILY	GENUS and SPICIES
1	Cyprinodontiformes	Aplocheilidae	*Aplocheilus lineatus* (Striped panchax)
2	Perciformes	Terapontidae	*Therapon jarbua* (Target Fish)
3		Gobiidae	*Periopthalmus sp*
4			*Boleopthalmus sp*
5			*Tripauchen vagina* (Burrowing goby)
6		Cichlidae	*Tilapia mossambica* (Mozambique tilapia)
7		Latidae	*Lates calcarifer* (Barramundi)
8	Elopiformes	Megalopidae	*Megalops cyprinoides* (Indo pacific tarpon)
9	Mugiliformes	Mugilidae	*Mugil sp.*
10	Siluriformes	Ariidae	*Arius thalassinus* (Giant sea catfish)
11		Bagridae	*Mystusgulio* (Long Whiskers Catfish)
	5	**9**	**11**

Insecta - Presence of insects in the mangroves is critical because Insects perform many roles within theecosystem as pollinators, herbivores, carnivores, decomposers, and food sources for other organisms. As a group, they are the most abundant and important group in the phylum Arthropoda. During our study, we recorded 67 insects belonging to 30 different families and eight orders. The order Lepidoptera was most dominant with 30 different species. The list of observed Insects is as below.

Table 5: list of insects observed from Thane creek.

SR NO	ORDER	FAMILY	GENUS and SPECIES
1	Diptera	Syrphidae	Hover fly
2		Sarcophagidae	*Sarcophaga sp* (Flesh fly)
3		Muscidae	*Musca domestica* (House fly)
4		Tipulidae	Crane fly
5		Culicidae	Mosquito

6		Asilidae	Robber fly
7		Calliphoriae	*Lucilia sericata*(Green bottle fly)
8	Hemiptera	Pseudococcidae	Mealy bug (Scale insect)
9		Cicadellidae	*Cicadella viridis* (Green leaf hopper)
10		Pyrrhocoridae	Red bug
11		Reduviidae	Assassin bug
12		Pentatomidae	Stink bug
13		Membracidae	Tree hopper
14		Gerridae	Water strider
15	Hymenoptera	Vespidae	*Ropalidia fasciata* (Common paper wasp)
16			Potter wasp
17		Apidae	*Apis indica* (Honey bee)
18			*xylocopa sp.* (Carpenter bee)
19		Formicidae	*Crematogaster sp*
20			*Tapinoma melanocephalum* (Ghost ant)
21			*Paratrechina longicornis* (Longhorn crazy ant)
22			*Tetraponera rufonigra* (Slender ant)
23			*Camponotus sp.*
24	Lepidoptera	Crambidae	*Hymenoptychis sordida* (pneumatophore moth)
25		Nymphalidae	*Junonia almana* (Peacock Pansy)
26			*Junonia orithya* (Blue pansy)
27			*Junonia hierta*(Yellow pansy)
28			*Danaus chrysippus* (Plain tiger)
29			*Danaus genutia*(Striped tiger)
30			*Tirumala limniace* (Blue tiger)
31			*Euthalia aconthea* (Common baron)
32			*Ariadne merione* (common castor)
33			*Euploea core* (Common crow)
34			*Mycalesis perseus* (Common Evening bushbrown)
35			*Neptis hylas* (Common sailor
36			*Hypolimnas misippus* (Danaid eggfly)
37			*Junonia atlites* (Grey pansy)
38			*Acraea terpsicore* (Tawny coster)
39			*Junonia iphita* (chocolate pansy)
40			*Hypolimnas bolina* (Great eggfly)
41		Papilionidae	*Graphium evemon eventus* (Blue jay)
42			*Pachliopta aristolochiae* (Common Rose)
43			*Papilio polytes* (Common mormon)
44		Lycaenidae	*Jamides celeno* (Common cerulean)
45			*Acytolepis puspa* (Common Hedge Blue)
46			*Talicada nyseus* (Red pierrot)
47			*Caleta caleta*(Angled pierrot)

48		Pieridae	*Catopsilia pomona* (Common emigrant)
49			*Eurema hecabe* (Common grass yellow)
50			*Ceporanerissa* (Common Gull)
51			*Leptosia nina* (The Psyche)
52			*Colotisamata* (Salman Arab)
53			*Ixias pyrene* (Yellow orange tip)
54	Mantodea	Hymenopodidae	*Odontomantis sp* (Asian ant mantis)
55		Mantidae	*Mantis sp* (Praying mantis)
56	Neuroptera	Chrysopidae	Green lacewing
57		Myrmeleontidae	Antlion lacewing
58	Odonata	Gomphidae	*Gomphus vulgatissimus* (Common club tail)
59		Libellulidae	*Aethriamanta brevipennis* (Scarlet marsh hawk)
60			*Crocothemis servilia*(Ruddy marsh skimmer)
61			*Diplacodes trivialis* (Blue ground skimmer)
62			*Neurothemis tullia* (Pied paddy skimmer)
63			*Trithemis pallidinervis* (Long legged marsh glider)
64			*Bradinopyga geminata* (Granite Ghost)
65			*Brachythemis contaminata*(Ditch jewel)
66	Orthoptera	Gryllidae	Cricket
67		Gryllotalpidae	Mole cricket
	8	**30**	**67**

Avifauna – birds are not exactly aquatic creatures but there are large number of birds that are solely dependent on the environment for their survival. The mangrove ecosystems are known to provide a vital habitat for several species of birds and their occurrence can throw light on the ecosystem characteristics. Thane creek a flamingo bird sanctuary is surrounded by mangroves along both its banks and has extensive mudflats that support a variety of bird life. During the present study 153 species of birds representing 52 families was recorded with 76 wetland and shore birds. The list of birds during the study period of November 2015 to February 2016 is presented in Table 6.

Table 6: List of birds observed from Thane creek.

SR NO	ORDER	FAMILY	SCIENTIFIC NAME	COMMON NAME
1	Passeriformes	Dicruridae	*Dicrurus leucophaeus*	Ashy drongo
2			*Dicrurus macrocercus*	Black drongo
3		Cisticolidae	*Prinia socialis*	Ashy prinia
4			*Prinia inornata*	Plain prinia
5			*Orthotomus*	Tailorbird
6		Monarchidae	*Terpsiphone paradisi*	Indian Paradise flycatcher
7		Ploceidae	*Ploceus philippinus*	Baya weaver

8		Leiothrichidae	*Turdoides caudata*	Common babbler
9			*Turdoides striata*	Jungle babbler
10		Sturnidae	*Acridotheres tristis*	Common Myna
11			*Gracupica contra*	Asian Pied Starling
12			*Sturnia malabarica*	Chestnut-tailed starling
13			*Acridotheres fuscus*	Jungle myna
14		Nectariniidae	*Leptocoma zeylonica*	Purple rumped sunbird
15			*Cinnyris asiaticus*	purple sunbird
16		Dicaeidae	*Dicaeum erythrorhynchos*	Pale billed Flowerpecker
17			*Dicaeum agile*	Thick billed flowerpecker
18		Corvidae	*Corvus macrorhynchos*	Indian Jungle Crow
19			*Corvus splendens*	House crow
20		Hirundinidae	*Ptyonoprogne concolor*	Dusky crag martin
21			*Hirundo smithii*	Wire tailed Swallow
22			*Hirundo rustica*	Barn Swallow
23		Oriolidae	*Oriolus kundoo*	Indian golden oriole
24		Passeridae	*Passer domesticus*	House sparrow
25			*Petronia xanthocollis*	Yellow-throated sparrow
26		Muscicapidae	*Saxicoloides fulicatus*	Indian robin
27			*Copsychus saularis*	Oriental Magpie robin
28			*Saxicola caprata*	Pied Bushchat
29			*Ficedula parva*	Red breasted flycatcher
30			*Cyornis tickelliae*	Tickell's blue flycatcher
31			*Muscicapa latirostris*	Asian Brown Flycatcher
32			*Saxicola maurus*	Common stonechat
33		Estrildidae	*Euodice malabarica*	Indian silverbill
34			*Lonchura punctulata*	Scaly breasted munia
35			*Lonchura malacca*	Tricoloured Munia
36		Emberizidae	*Emberiza bruniceps*	Red headed bunting
37		Pycnonotidae	*Pycnonotus cafer*	Red vented bulbul
38			*Pycnonotus jocosus*	Red-whiskered bulbul
39			*Pycnonotus luteolus*	White-browed bulbul
40			*Pycnonotus leucotis*	white eared bulbul
41		Laniidae	*Lanius schach*	Long tail shrike
42		Phylloscopidae	*Phylloscopus griseolus*	Sulphur bellied warbler
43			*Phylloscopus trochiloides*	Greenish Warbler
44			*Phylloscopus occipitalis*	Western crowned warbler
45		Motacillidae	*Motacilla flava*	Yellow Wagtail
46			*Anthus rufulus*	Paddyfield Pipit
47			*Motacilla cinerea*	Grey Wagtail
48		Acrocephalidae	*Acrocephalus dumetorum*	Blyth's Reed Warbler
49			*Acrocephalus stentoreus*	Clamorous Reed Warbler

50		Rhipiduridae	*Rhipidura albogularis*	White spotted fantail
51		Cisticolidae	*Cisticola juncidis*	Zitting Cisticola
52		Sylviidae	*Chrysomma sinense*	Yellow Eyed babbler
53		Aegithinidae	*Aegithina tiphia*	Common Iora
54		Fringillidae	*Carpodacus erythrinus*	Common Rosefinch
55	Pelecaniformes	Threskiornithidae	*Threskiornis melanocephalus*	Black headed ibis
56			*Platalea leucorodia*	Eurasian spoonbill
57			*Plegadis falcinellus*	Glossy ibis
58		Ardeidae	*Nycticorax nycticorax*	Black-Crowned Night Heron
59			*Ardea alba*	Great egret
60			*Ardeola grayii*	Indian pond heron
61			*Ardea alba*	Great Egret
62			*Ardea cinerea*	Grey heron
63			*Ardea intermedia*	Intermediate egret
64			*Bubulcus ibis*	Cattle Egret
65			*Egretta garzetta*	Little egret
66			*Ardea purpurea*	Purple heron
67			*Egretta gularis*	Western reef egret
68			*Butorides striata*	little heron
69	Cuculiformes	Cuculidae	*Eudynamys scolopaceus*	Asian koel
70			*Centropus sinensis*	Greater coucal
71			*Clamator jacobinus*	Jacobin cuckoo
72	Apodiformes	Apodidae	*Cypsiurus balasiensis*	Asian Palm Swift
73	Accipitriformes	Accipitridae	*Milvus migrans*	Black kite
74			*Circus macrourus*	Pallid Harrier
75			*Circus pygargus*	Montagu's Harrier
76			*Haliastur indus*	Brahminy kite
77			*Circus aeruginosus*	Eurasian marsh harrier
78			*Clangaclanga*	Greater spotted eagle
79			*Clanga pomarina*	Lesser spotted eagle
80			*Accipiter badius*	Shikra
81			*Ictinaetus malaiensis*	Black Eagle
82			*Butastur teesa*	White-eyed Buzzard
83			*Buteo buteo*	Common Buzzard
84			*Accipiter nisus*	Eurasian Sparrowhawk
85			*Milvus migrans govinda*	Black-eared Kite
86		Pandionidae	*Pandion haliaetus*	Osprey
87	Charadriiformes	Scolopacidae	*Limosa limosa*	Black tailedgodwit
88			*Limosa lapponica*	Bar-tailed Godwit
89			*Tringa erythropus*	Spotted Redshank
90			*Tringa totanus*	Common Redshank
91			*Actitis hypoleucos*	Common sandpiper

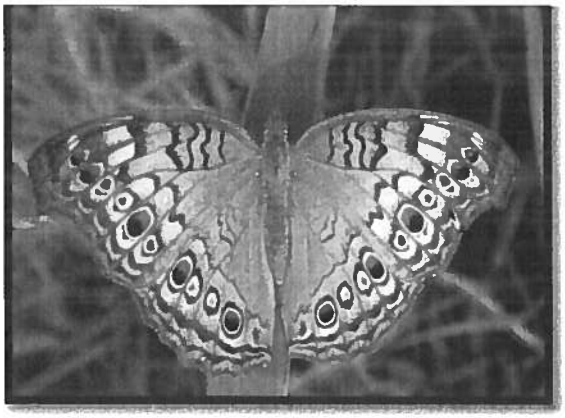
92			*Tringa nebularia*	Common Greenshank
93			*Calidris ferruginea*	Curlew Sandpiper
94			*Xenus cinereus*	Terek sandpiper
95			*Tringa ochropus*	Green sandpiper
96			*Calidris alba*	Sanderling
97			*Calidris pygmaea*	Spoonbill Sandpiper ???
98			*Calidris temminckii*	Temminck's Stint
99			*Calidris minuta*	Little stint
100			*Numenius arquata*	Eurasian curlew
101			*Gallinago gallinago*	Common Snipe
102			*Tringa stagnatilis*	Marsh sandpiper
103			*Tringa glareola*	Wood sandpiper
104			*Tringa erythropus*	Spotted redshank
105		Laridae	*Chroicocephalus ridibundus*	Black headed gull
106			*Chroicocephalus genei*	Slender-billed Gull
107			*Larus barabensis*	Steppe Gull
108			*Larus canus*	Mew gull
109			*Ichthyaetus ichthyaetus*	Pallas's Gull
110			*Larus heuglini*	Heuglin's Gull
111			*Chroicocephalus brunnicephalus*	Brown headed gull
112		Recurvirostridae	*Himantopus himantopus*	Black winged stilt
113			*Recurvirostra avosetta*	Pied Avocet
114		Sternidae	*Gelochelidon nilotica*	Gull billed tern
115			*Sterna aurantia*	River tern
116			*Thalasseus sandvicensis*	Sandwich tern
117			*Hydroprogne caspia*	Caspian Tern
118			*Chlidonias hybrida*	Whiskered tern
119		Charadriidae	*Charadrius mongolus*	Lesser sand plover
120			*Pluvialis fulva*	Pacific Golden Plover
121			*Charadrius leschenaultii*	Greater Sand Plover
122			*Charadrius dubius*	Little Ringed Plover
123			*Vanellus indicus*	Red wattled lapwing
124	Coraciiformes	Meropidae	*Merops persicus*	Blue cheek bee eater
125			*Merops philippinus*	Blue tailed bee eater
126			*Merops orientalis*	Green bee eater
127		Alcedinidae	*Alcedo atthis*	common kingfisher
128		Halcyonidae	*Halcyon smyrnensis*	White Breasted kingfisher
129	Columbiformes	Columbidae	*Columba livia*	Blue Rock pigeon
130			*treptopelia senegalensis*	Laughing dove
131			*Streptopelia chinensis*	Spotted dove
132	Anseriformes	Anatidae	*Anas clypeata*	northern shovler
133			*Dendrocygna javanica*	Lesser whistling-duck

134			*Anas acuta*	Northern Pintail
135			*Anas penelope*	Eurasian Wigeon
136			*Anas crecca*	Eurasian Teal
137			*Anas poecilorhyncha*	Indian Spot-billed Duck
138			*Tadorna ferruginea*	Ruddy Shelduck
139			*Anas querquedula*	garganey
140	Galliformes	Phasianidae	*Perdicula asiatica*	Jungle Bush Quail
141	Suliformes	Phalacrocoracidae	*Microcarbo niger*	Little cormorant
142			*Phalacrocorax fuscicollis*	Indian cormorant
143	Gruiformes	Rallidae	*Amaurornis phoenicurus*	White breasted waterhen
144			*Fulica atra*	Eurasian coot
145	Piciformes	Megalaimidae	*Megalaima haemacephala*	Coppersmith barbet
146		Picidae	*Jynx torquilla*	Eurasian wryneck
147	Podicipediformes	Podicipedidae	*Tachybaptus ruficollis*	Little Grebe
148	Ciconiiformes	Ciconiidae	*Mycteria leucocephala*	painted stork
149	Psittaciformes	Psittaculidae	*Psittacula krameri*	Rose ringed parakeets
150	Strigiformes	Strigidae	*Otus brucei*	Pallied scops owl
151		Tytonidae	*Tyto alba*	Barn Owl
152	Phoenicopteriformes	Phoenicopteridae	*Phoenicopterus roseus*	Greater Flammingo
153			*Phoeniconaias minor*	Lesser Flammingo
	18	**52**	**153**	**153**

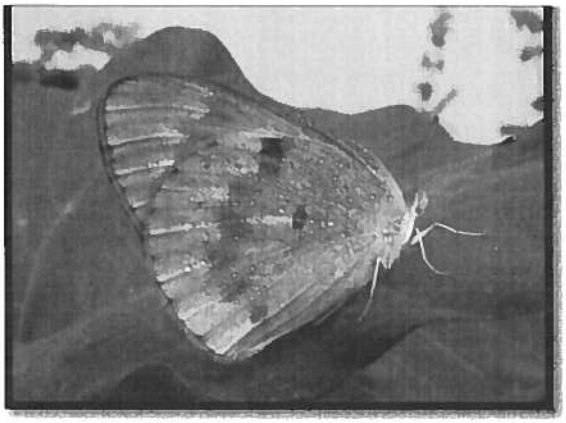
Work to be done.

It is a preliminary report of the biodiversity that we have recorded during the study period. We are still processing the data for zooplankton, insects, fish, birds and mangroves. A qualitative and quantitative report will be provided with the necessary analysis for better understanding of the Thane creek ecosystem.

Some selected Photographs of insects taken during diversity study:



Grey pansy (*Junonia atlites*)



Salmon arab (*Colotis amata*)

Flesh fly (*Sarcophaga sp*)

flock of Curlew sandpipers

flamingos from Thane creek

flock of Gulls