BEFORE HONOURABLE NATIONAL GREEN TRIBUNAL
WESTERNZONE BENCH, PUNE

APPLICATION NO. 62 OF 2019

BETWEEN:

Paryavaran Bachav Samity ..... **Applicant**
Regd Office: At. Kukaras, Rampara,
Taluka Veraval,
Dist. Gir Somnath, Pin: 362268

VERSUS

Union of India & Ors.
Through Secretary, ... **Respondent**
Ministry of Environment and Climate Change,
Indira Paryavaran Bhavan,
Jorbagh Road, New Delhi-110003

AFFIDAVIT BY RESPONDENT NO. 7
SIMAR PORT PVT. LTD. (PROJECT PROPONENT-PP)

Next Date: 21-February-2022

UPLOADED ON NGT WEBSITE AND CIRCULATED TO OTHER RESPONDENTS BY EMAIL.

INDEX ON NEXT PAGE

Place: Pune
Date: **23-12-2021**

Filed by:

R.B.Mahabal रघुनाथ भालचंद्र महाबळ
BE (Mechanical), ME (Industrial Management) VJTI-Mumbai, LLM (Mumbai)
Chartered Engineer, Fellow of Indian Institution of Engineers, IIE Arbitrator
ex-Govt. Environmental Laboratory Analyst, NABET Accredited EIA Consultant
ADVOCATE NATIONAL GREEN TRIBUNAL
Bombay High Court [Roll No.MAH/349/2012]
B - 202, Chandravijay Society, Opposite Bansuri Hotel,
Phule Road, Mulund East, Mumbai 400081, Maharashtra
mahabal60@gmail.com 7400116222 / 022-21631573

Raghunath Mahabal High Court Mumbai ADVOCATE

INDEX

LIST OF ABBREVIATIONS USED

Short-form	Full-form
CRZ	Coastal regulation Zone
MoEF&CC	Ministry of environment, Forest & Climate Change
NGT	National Green Tribunal
OA	Original Application
MoEF	Ministry of Environment & Forests
EC	Environmental Clearance
EIA	Environmental Impact Assessment
CSIR	Council for Scientific and Industrial Research
NEERI	National Environmental Engineering Research Centre
NIO	National Institute of Oceanography
GCZMA	Gujrat Coastal Zone Management Authority
EMP	Environmental management plan
EAC	Expert Appraisal Committee
HPCL	Hindustan Petroleum Corporation Limited
HSEPL	HPCL Shapoorji Energy Pvt. Ltd.
LNG	Liquefied natural Gas
ToR	Terms of reference
PP	Project Proponent
MMTPA	Million Metric Tonnes per Annum
SPPL	Simar Port Pvt. Ltd.
PESO	Petroleum & Explosives Safety Organization
GMB	Gujrat Maritime Board
GHG	Green House Gases
CO2	Carbon Dioxide
HTL	High Tide Line
LTL	Low Tide Line

SCZMA	State Coastal Zone Management Authority
CR^{+6}	Hexavalent Chromium
CRZ	Coastal regulation Zone
PCCF	Principal Chief Conservator of Forests
RTI	Right to Information
GWIL	Gujrat Water Infrastructure Limited

BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
WESTERN ZONE BENCH AT PUNE

ORIGINAL APPLICATION NO. 62 / 2019

IN THE MATTER OF:-

Paryavaran Bachav Samity ..... Appellant

VERSUS

Union of India & Ors. ..... Respondents

REPLY ON BEHALF OF RESPONDENT NO. 7
SIMAR PORT PVT. LTD. (PROJECT PROPONENT – PP)

I, Captain Nitin Bhalchandra Bondre, aged about 48 years, hereby solemnly affirm and state as under:-

1. I am presently a Director of Simar Port Pvt. Ltd. (hereinafter referred to as the '**Answering Respondent**'), arraigned as Respondent No. 15 in the Present Application before this Hon'ble Tribunal.

2. In my above capacity, I am conversant with the facts and circumstances of the present Application and possess the necessary authority to file this reply as per the directions of this Hon'ble Tribunal in its order dated 15.05.2019.

3. Paryavaran Bachav Samity (hereinafter referred to as **"The Appellant"**) has filed the present Application on 9.8.2019, challenging the Environmental and CRZ Clearance dated 05.03.2019 granted to the Answering Respondent by the Ministry of Environment, Forests & Climate Change (hereinafter referred to as '**MoEF&CC**') for

the project 'Extension of Breakwater at Chhara Port, Village Chhara-Sarkhadi, Taluka Kodinar, District Gir Somnath, Gujarat".

PRELIMINARY OBJECTION TO THE ISSUES RAISED IN THE APPLICATION, MAINTAINABILITY U/S 16(h) OF THE NGT ACT AND BAR DUE TO LIMITATION

4. At the outset, it is most respectfully submitted that the present Application is filed merely for creating a nuisance and apparently with some ulterior motive. The application was registered on 9.8.2019. Hon'ble NGT vide order dated 04.08.2021 had directed the Applicants to serve notice on respondents. During the hearing on 27.08.2021, it was humbly submitted by M/s Simar Port Pvt Ltd that they have not received papers. Despite this papers were not served. Hence, during the hearing on 21.09.2021 request for papers was once again placed on records. After much persuasion, the finally, Applicant emailed papers on 24.09.2021.

5. It is most respectfully submitted that the present OA is not maintainable and deserves to be rejected by the orders by this Hon'ble Tribunal on the issue of maintainability alone. On this behalf, it is most respectfully submitted on behalf of the answering Respondent as under:-

a) The Environmental Clearance (EC) as well as the Coastal Regulation Zone (CRZ) clearance had been granted by MoEF for the project for the development of the Port at Village Chhara, Junagarh District, Gujarat in the year 2014 [on 06.01.2014]. The majority of the contentions raised in the present Application pertain to the entire project for the development of the Port. Being conscious and aware of this apparent position against the

maintainability of the present Application, camouflage has been sought to be created by the Appellant by sneaking into the present Application a couple of contentions that are related to the extension of the Breakwater for the Port Project.

b) Appeals (30 of 2019 and 49 of 2019, are filed under Section 16 of NGT Act, challenging EC and CRZ Clearance granted by MOEFCC vide letter dated 05.03.2019 for extension of the breakwater are pending with Hon'ble NGT. Now, after going through the Affidavits of the Respondents, the Appellant has filed the present application under section 14 of the NGT Act raising the substantial question of environmental damage.

c) Without prejudice to the above submission against the maintainability of the present application, it is further respectfully submitted that the present Application seeks to canvass multiple alleged causes of action, which is impermissible as per Rule 14 of the National Green Tribunal (Practice and Procedure) Rules, 2011. Rule 14 of the National Green Tribunal (Practice and Procedure) Rules, 2011 reads as under:

> *"**14. Plural Remedies**:- An application or Application, as the case may be, shall be based upon a single cause of action and may seek one or more relief provided that they are consequential to one another."*

d) This Hon'ble Tribunal had to interpret Rule 14 of the 2011 Rules in its judgment in *Ojasvi Party v Ministry of Environment and Forests* O.A. No. 108 of 2016 (decided on 11.07.2017), wherein reference was made to the decision of this Hon'ble Tribunal in *Vikas K. Tripathi v The Secretary, Ministry of Environment and Forests* MANU/GT/0124/2014 (decided on 01.10.2014). The relevant extracts of the said judgment are reproduced below:-

*".....**13.** In view of the above, it is clear that multiple reliefs have been sought by the applicants in this application. The prayers made in the application are not only different in nature but relates to various remedies under the relevant laws. The present application primarily relates to Section 14 and the enactments which are enumerated in Schedule I which has been appended to it. It has been specifically given under the Rules of Practice and Procedure of this Tribunal that no multiple reliefs can be sought. The relevant rule of the National Green Tribunal (Practices and Procedure) Rules, 2011 is as follows:*

*"**14. Plural remedies** - An application or Application, as the case may be, shall be based upon a single cause of action and may seek one or more relief provided that they are consequential to one another."*

The only exception is when the relief is consequential to the other.

***14.** In this regard, we may refer to the case of Vikas K. Tripathi Mumbai v. The Secretary, MoEF, (01.10.2014) and the relevant extract reads as under:*

"21..... We shall deal with his contention to set the right issue once for all, in as much as it is likely to be raised in many such cases on similar ground. Rule 14 of the NGT (Practices and Procedure) Rules, 2011 reads as follows.....

22. Perusal of Rule 14, without any prejudicial notions in the mind, will make it amply clear that any Application or Application, as the opening words imply are distinct remedies

under which the particular relief may be sought on a single cause of action. Thus, if properly read the rule provide as follows:

i) There may be either a single Application or Application. In other words, it cannot be a comprehensive or hybrid type of pleadings like Application-cum-Application, as captioned by the Appellant-cum-Applicant (Vikas Tripathy) as in the present Application/Applications.

ii) The Application or Application, whatsoever it may be must be filed on a single cause of action. Thus, it cannot be filed on several causes of action. In other words, an application cannot be filed with combined causes challenging different ECs or orders, nor an Application can be filed challenging different orders or different violations under the different laws.

iii) Still, however, the choice given to the Appellant/Applicant is to ask for a grant of more than one relief in case such reliefs are consequential. In other words, if a relief depends upon the grant of another relief, then a grant of more than one relief is permissible.

23. We cannot overlook and brush aside main provisions of the NGT Act, which do not provide for any kind of permission to allow the filing of two Applications, one against the time-barred EC, coupled with another EC for revised construction plan along with an Application under Sections 14, 15 and 18 of the NGT Act, 2010. In case, Vikas Tripathi is genuinely interested in the cause of the environment and feels that the project in question has caused violations of EC conditions/deterioration of the environment, then he is at liberty to file a separate Application under Section 14(1)(2) read with Sections 15 and 18 of the NGT

Act, 2010 if so advised and if it is permissible under law. He cannot, however, club all such Applications and Applications together and explore to examine whether one cap fits on another".

***15.** Therefore, the instant application does not deserve consideration by the Tribunal, also for the reasons that plural remedies have been sought by the applicants which are different in nature, relate to different causes of action and are to be taken up before different authorities/forums....."*

e) It is thus clear from the principles of law laid down by this Hon'ble Tribunal in *Ojasvi Party (supra)* that cases, where plural remedies are sought, cannot be entertained in light of Rule 14 of the 2011 Rules. It is impermissible for a litigant to club together and all allied issues related to a particular project in a single set of proceedings. The said judgment, in the most humble submission of the answering Respondent, squarely applies to the present Application as well and establishes that even otherwise and additionally, in the light of Rule 14 of the 2011 Rules, the present application is not maintainable.

f) The Appellant has failed to demonstrate his locus to file the present Application. The Appellant has not been present at any of the Public Hearings conducted by the Answering respondent, either in person or through any representation. The present application has been filed making baseless allegations which are even otherwise untrue and misconceived and that too without any documents or material whatsoever to support the said

allegations, clearly pointing to ulterior motives and lack of *bona fides* on the part of the Appellant in filing the present application.

6. It is respectfully submitted that the application deserves to be rejected at the threshold itself, *inter alia*, on the ground that the contents of the Application, the unsubstantiated/baseless allegations and statements, ulterior motives, lack of *bona fides,* lack of material to support the contentions raised, and the issue of the bar of limitation make it clear that the Application is entirely devoid of any merits whatsoever there is no case made out against the Answering Respondent.

7. The Appellant has sought to raise belated, time-barred as well as irrelevant and extraneous issues under the guise and veil of the present Application filed in April 2019. In the garb of the present Application, the Appellant has sought to raise issues concerning the grant of Environmental Clearance on 06.01.2014 for the original length of 1,700 mts. of Breakwater for the Port Project, i.e. granted over 7 years ago. None of the said issues was raised by the Appellant at any stage including during the detailed and comprehensive public consultation process held before the grant of the EC dated 06.01.2014. It is most respectfully reiterated that all such grounds and contentions raised by the Appellant which are governed by the EC dated 06.01.2014 are barred by limitation deserving rejection at the threshold itself.

8. It is respectfully submitted that the entire process of obtaining Environmental Clearance for the project was carried out and completed in keeping with the letter and spirit of the Environmental Impact Assessment Notification 2006. The Environmental Impact Assessment (EIA) and other supporting studies have been carried out

by reputed autonomous institutions including CSIR-NEERI (National Environmental Engineering Research Institute) and CSIR-NIO (National Institute of Oceanography). All disclosures have been made by the answering Respondent to the concerned authorities at all stages, and at no stage has the Answering Respondent kept back any information from any public authority including the Gujarat Coastal Zone Management Authority (GCZMA), the Expert Appraisal Committee (EAC), or the MoEF&CC.

9. A comprehensive Environment Management Plan (EMP) was submitted as part of the EIA and found to be adequate and sufficient by the Competent Authorities during the appraisal process, and the EC was issued incorporating relevant conditions for safeguarding the environment.

10. In view of the above, it is the most humble submission of the answering Respondent that the present application is not maintainable and in any case, it is devoid of any merits whatsoever and deserves rejection by orders of this Hon'ble Tribunal at the threshold itself.

BACKGROUND OF THE PROJECT AND OTHER RELATED PROJECTS IN THE SAME AREA

EC DATED 06.01.2014 FOR DEVELOPMENT OF PORT BY ANSWERING RESPONDENT

11. It is submitted that the answering Respondent, under a concession agreement with the Gujarat Maritime Board [consequent to an International Competitive Bidding process], had commenced the process of developing an all-weather, deep-draft port at Villages

Chhara and Sarkhadi in Taluka Kodinar in District Gir Somnath, Gujarat and the development is in progress.

12. The port is proposed to be developed in phases. Under Phase I, the Answering Respondent plans to develop a facility for handling coal quantities of 8 million metric tonnes per annum. Facilities proposed by the Answering Respondent and approved by MoEF&CC in Phase I include construction of:-

a) **Breakwater** (Length: 1700m, Width: 75m at bottom, Height: 10m above CD level),

b) **Berth** (One No., Length: 350m, Width: 25m),

c) **Approach Trestle** (Length: 2265m, Width: 12m);

d) **Capital Dredging of 1.5 million cum**,

e) **Maintenance Dredging of 150,000 Cum per annum,**

f) **Development of Coal Stackyard** (32 Ha), and

g) **Allied infrastructure facilities**.

13. MoEF&CC, after following the due process [including a detailed and comprehensive public consultation process held on 19.11.2010], and after obtaining recommendations from both Gujarat Coastal Zone Management Authority (GCZMA) and the Expert Appraisal Committee (EAC), granted both the Environmental Clearance (EC) and the CRZ Clearance for Phase I of the port Project on 06.01.2014.

14. Breakwater is an offshore structure [like a wall] that protects the harbour from the force of waves. In the present case, the breakwater is being developed at a distance of about 2500 m (or 2.5 km) from the shoreline, and parallel to the shoreline. The EC dated

06.01.2014, the Port project also approved the Breakwater of the length of approx. 1700 m originally envisaged in Phase I of the port project.

SUB-CONCESSION AGREEMENT WITH HSEPL

FOR DEVELOPMENT OF LNG REGASIFICATION PLANT – PHASE II

15. In Phase II of the port development, the Answering Respondent entered into a sub-concession agreement with HPCL Shapoorji Energy Ltd (HSEPL) – a Joint Venture of Hindustan Petroleum Corporation Limited [HPCL – a Govt. of India corporation] and the Shapoorji Pallonji Group – to develop an LNG Regasification Terminal within the port area.

16. Natural Gas is generally extracted at off-shore facilities. Thereafter, by a process of cooling [at approx. (-)162^{0}C], it is converted into LNG (Liquified Natural Gas) for ease of transportation by tanker ships – since LNG occupies only 1/600th of the volume of Natural Gas in its gaseous state. LNG Regasification Terminals are used for unloading LNG from tanker ships. In the Regasification plant, the LNG is then converted into Natural Gas for distribution through gas pipelines.

17. To provide tranquil conditions for berthing and safe LNG unloading operations at all times of the year, there had come into existence the necessity for extending the length of the breakwater at the Port from 1700m to 4500m. As mentioned above, the breakwater is intended to dissipate the near-shore wave energy and maintain tranquil conditions inside the harbour area to facilitate smooth and

safe loading and unloading of cargo from large refrigerated vessels carrying LNG.

18. It is most respectfully submitted that the extension of the Breakwater at the port is not a separate project in itself. Breakwater is only a part of the Port project and the extension of the breakwater is only a modification to the existing infrastructure of the port project, which has been approved by the Environmental Clearance dated 06.01.2014.

19. As such, in the most humble submission of the answering Respondent, an extension of the length of the already proposed/scheduled and approved breakwater is not a new project. Accordingly, it was not necessary for the entire process, as envisaged under Clause 7 of the EIA Notification of 2006, to be repeated. However, as a responsible developer and project proponent, the Answering Respondent applied for Environmental Clearance for the extension of the breakwater.

EXEMPTION FROM PUBLIC CONSULTATION GRANTED BY EAC FOR EXTENSION OF BREAKWATER

20. At this stage, it deserves to be pointed out that under the EIA Notification of 2006, the following scheme is envisaged for new projects and Expansion / Modernization of existing projects:-

a) **New Projects**:- For New Projects, in terms of Clause 7(i) of the EIA Notification of 2006, it is mandatory to comply with 4 stages for grant of EC i.e. –

   i. Screening (only for Category B projects).

ii. Scoping

iii. Public Consultation

iv. Appraisal

b) **Expansion / Modernization of existing Projects**:- EC is granted to any new Project only after complying with the stage-wise process, including public consultation, as prescribed in Clause 7(i) of the EIA Notification of 2006. Thereafter, for any expansion/modernization of the Project, as per Clause 7(ii) of the EIA Notification of 2006, the Expert Appraisal Committee (EAC) is vested with the power to decide on the due diligence necessary for such projects. For ready reference, Clause 7(ii) of the EIA Notification of 2006 is reproduced as under:-

"7(ii) Prior Environmental Clearance (EC) process for Expansion or Modernization or Change of product mix in existing projects: *All applications seeking prior environmental clearance for expansion with increase in the production capacity beyond the capacity for which prior environmental clearance has been granted under this notification or with increase in either lease area or production capacity in the case of mining projects or for the modernization of an existing unit with increase in the total production capacity beyond the threshold limit prescribed in the Schedule to this notification through change in process and or technology or involving a change in the product-mix shall be made in Form I and they shall be considered by the concerned Expert Appraisal Committee*

or State Level ***Expert Appraisal Committee*** *within sixty days, who* ***will decide on the due diligence necessary including preparation of EIA and public consultations*** *and the application shall be appraised accordingly for grant of environmental clearance."*

21. In the present case, as mentioned hereinabove, before the grant of EC dated 06.01.2014 for the Port project, a detailed and comprehensive process of public consultation had been undertaken on 19.11.2010. The necessity for extension of the length of the already approved Breakwater had arisen having regard to the Phase II development of the LNG Regasification Plant, for providing safe and tranquil conditions for berthing and unloading of the LNG vessels.

22. The sub-concessionaire viz. HSEPL applied for a grant of EC for the LNG Regasification Plant, whereas the answering Respondent applied for a grant of EC for the extension of Breakwater.

23. According to the answering Respondent's application for grant of EC for the extension of the Breakwater, the Terms of Reference (ToR) for the Environmental Impact Assessment (EIA) were communicated by MoEF&CC *vide* letter No. 11-2/2014-IA-III dated 18.06.2014.

24. As per this letter, the competent authority, viz. the Expert Appraisal Committee (EAC) – having considered the matter within the four corners of the above-mentioned statutory scheme envisaged under Clause 7(ii) of the EIA Notification of 2006, had found it appropriate for acceding to a waiver from the public consultation process on, inter alia, the ground that a detailed and comprehensive public consultation for the Port project had already been conducted

on 19.11.2010; the proposed extension of the berth is within the Port boundary, and that the EC sought by HSEPL would also include the process of public consultation.

25. Vide letter dated 18.06.2014 of MoEF&CC, it was also communicated that the ToR would be valid for 2 years for submission of EIA / EMP reports.

EIA BY AUTONOMOUS INSTITUTION: CSIR-NEERI

26. As per the procedure established under the EIA Notification 2006 and the ToR granted on 18.06.2014, the Environmental Impact Assessment was carried out by an autonomous body, viz. Council for Scientific and Industrial Research (CSIR) - National Environmental Engineering Research Institute (NEERI). The EIA report prepared by CSIR-NEERI was submitted to the GCZMA for an appraisal on 26.04.2016. Thus, the EIA Report was submitted within the two year validity period of the ToR. GCZMA was, thereafter, pleased to recommend and forward the EIA for CRZ Clearance *vide* letter no. ENV-10-2016-72-E (T Cell) dated 02.02.2017.

27. The EAC recommended the project for Environmental and CRZ Clearance as reflected in the Minutes of the 18th Meeting of the EAC held on 25th-27th May 2017 and both the said clearances were granted on 05.03.2019. Further, for setting up of the 5 MMTPA [Million Metric Tonnes per Annum] LNG Regasification Terminal, the sub-concessionaire, M/s HSEPL separately applied for EC and after following the prescribed process under the EIA Notification of 2006 including a detailed and comprehensive public consultation held on 18.12.2015, the same had been granted on 05.03.2019.

CONSENTS UNDER AIR AND WATER ACTS

28. Besides and in addition to the EC, the Answering Respondent has also been granted consent under the Water (Prevention and Control of Pollution) Act, 1974 [hereinafter referred to as the "Water Act"] and the Air (Prevention and Control of Pollution) Act, 1981 [hereinafter referred to as the "AIR Act"] by the Gujarat Pollution Control Board [GPCB].

CONSTRUCTION WORK FOR BREAKWATER

29. The construction activity for the breakwater of an initial length of 1700m, as approved in the EC dated 06.01.2014, had commenced at the site from October 2017. Considerable amounts of time, money and resources have already been expended in the development of the Port project, and which has also generated employment for hundreds of persons in the local region. It is without prejudice to the submission that all these activities are entirely legal and valid and the present Application is ex-facie time-barred.

30. In the present application, the Appellant has challenged the EC dated 05.03.2019 granted for the extension of Breakwater. Furthermore, there is a separate Application No. 31 of 2019 filed by the same Appellant, simultaneously yet separately challenging the Environmental Clearance granted for the LNG Regasification Terminal at the Port being developed by the sub-concessionaire M/s HPCL Shapoorji Energy Ltd.

PRESENT APPLICATION BEING DEVOID OF MERITS AND LACKING BONAFIDE

31. In the most humble submission of the answering Respondent, it is clear from the documents submitted by the Appellant herein without any application of mind, along with untrue, misconceived and baseless allegations - that the ostensible motive is to mislead the Hon'ble Tribunal to create an unwarranted impediment to delay the project, which is being built at considerable cost and which will be an asset to the nation.

32. It is most respectfully submitted that the Appellant has not come before this Hon'ble Tribunal with clean hands. It is the strong belief of the Answering Respondent that the Appellant has a vested interest in stalling the project and is using this recourse to cause irreparable harm and damage to the project. It is humbly submitted that the relief sought by the Appellant in the subject Application would cause serious, irreparable damage to the stakeholders, i.e. the project sponsors, contractors, lenders, local workmen and sub-contractors engaged at the site. The *mala fide* intent of the Appellant is evident from the nature of the prayers in the Application, which asks this Hon'ble Tribunal to strike down the Environmental Clearance duly granted as per procedure, without bringing out any specific deficiencies in the entire EC process and remedies, if any, towards the same.

33. It is strongly believed by the answering Respondent that the purpose of these proceedings is entirely oblique and appears to be to use this august forum for personal gain and commercial extortion by causing delay to the project.

PARA-WISE COMMENTS TO THE MAIN GROUNDS AND AVERMENTS MADE IN PARA 8 OF THE MEMO OF APPLICATION

34. In view of the abovementioned background, the Answering Respondent seeks to leave to submit comments on the submissions made by the Appellant, as recorded by this Hon'ble Tribunal in its order dated 15.05.2019. Furthermore, the Answering Respondent is also submitting comments on the grounds summed up in Para 8 of the Application Memo. The Answering Respondent reserves the right to submit a detailed para-wise reply to the Application if required, or when directed to do so by this Hon'ble Tribunal.

Sr	Allegation	Response
1	That is 2010 M/s Simar Port, a Shapoorji Pallonji Company, proposed to develop a deep draft, direct berthing all-weather port at Chhara in Gujarat. *That the proposed limit of the breakwater was 1700 m*. Although, there were several objections received on behalf of many organizations/individuals on the ground of violations of rules under Environmental law, inadequacy of compensation in land acquisition and other issues. Finally, a Public hearing took place wherein the local people representatives villagers participated, the objections	PP fully agrees with the Applicant that all public hearing concerns were amicably settled. An applicant has stated the facts. PP is thankful to the Applicant for accepting the same. No further response from PP is required.

Sr	Allegation	Response
	were amicably settled and the local people extended support of the project strictly on the terms envisaged in the Project Proposal. True copy maps showing the project location are annexed herewith and marked as **ANNEXURE A-3**.	
2	Shockingly in 2014, HPCL Shapoorji Energy Ltd., a joint venture between Shapoorji Pallonji Group and Hindustan Petroleum Corporation Ltd., proposed. MOEF for development of LNG storage and regasification terminal at village Chhara Taluka Kodinar, District Gir Somnath, at the same project area where *M/s* Simar Port obtained permission for construction of deep draft, direct berthing all-weather port.	• MoEF&CC granted EC approval for the development of Phase 1 of the project vide letter dated 6th January 2014. • Comprehensive EIA report submitted by PP while applying for EC clearly stated in Chapter -2 that LNG Terminal of capacity 5 MMTPA forms part of the Port Master Plan (Annexure-I). • Thus, there was no shocking development as apprehended by the Applicant
3	That M/s Simar Port made a request to MOEF for an extension of the breakwater from 1700 m to 4956 m. It is pertinent to mention here that the request for an extension was for an area of 3256 m,	The applicant has stated the facts. PP is thankful to the Applicant for accepting the same. Breakwater is an offshore structure [like a wall] that

Sr	Allegation	Response
	which is near twice the area granted originally.	protects the shoreline from the force of waves. In the present case, the breakwater is being developed at a distance of about 2500 m (or 2.5 km) from the shoreline, and parallel to the shoreline. The EC dated 06.01.2014 approving the Port project also approved the Breakwater of the length of approx. 1700 m originally envisaged in Phase I of the port project. In Phase II of the port development, M/s SPPL entered into a sub-concession agreement with the answering Respondent - HPCL Shapoorji Energy Ltd (HSEPL) – a Joint Venture of Hindustan Petroleum Corporation Limited [HPCL – a Govt. of India corporation] and the Shapoorji Pallonji Group – to develop an LNG Regasification Terminal within the port area. Phase-II of the project had been conceived much after the public hearing/consultation and appraisal process of Phase-I of the Project had already taken place in 2010. To provide tranquil conditions for berthing and safe LNG unloading operations at all

Sr	Allegation	Response
		times of the year, there had come into existence the necessity for extending the length of the breakwater at the Port from 1700m to 4500m. As mentioned above, the breakwater is intended to dissipate the near-shore wave energy and maintain tranquil conditions inside the harbour area to facilitate smooth and safe loading and unloading of cargo from large refrigerated vessels carrying LNG.
4	That HPCL Shapoorji Energy Ltd. made a separate application for the development of LNG storage and regasification terminal at village Chhara Taluka Kodinar, District Gir Somnath.	The applicant has stated the facts. PP is thankful to the Applicant for accepting the same. M/s. HPCL Shapoorji Energy Pvt. Ltd (HSEPL) through a sub-concession agreement, propose to develop the LNG Regasification Terminal within the port area. Hence, M/s HSEPL separately applied for EC for setting up 5 MMTPA LNG Regasification Terminal.
5	That LNG or liquefied natural gas storage tank is a specialized type of storage tank used for the storage of Liquefied Natural Gas. It is pertinent to note that the	Comprehensive EIA report submitted by PP while applying for EC clearly stated in Chapter -2 that LNG Terminal of capacity 5 MMTPA

Sr.	Allegation	Response
	original project was for the construction of the all-weather port and after obtaining necessary permissions and approvals the Project Proponents made a total switchover	forms part of the Port Master Plan. LNG Storage and Regasification Terminal is being constructed under sub-concession Agreement by HSEPL (now HPCL LNG Ltd) as a part of Phase 2 port development. All necessary approvals have been obtained by HSEPL from all statutory bodies including PESO, MoEF&CC and GMB. There was no switchover as alleged by the Applicant.
6	The LNG terminals could significantly impact the local fishing shrimping, and eco-tourism industries, with 500-foot tall flaring towers, the release of millions of gallons of effluent water, the brown haze that would come with the estimated quadrupling of local air pollution. The terminals pave over hundreds of acres of wetlands, and require hundreds of miles of new pipeline · Exporting LNG is disastrous for the climate, the terminals would account for greenhouse gas emissions. The same climate concerns with fracking and pipelines	The LNG Terminal is for Storage of Liquefied Natural Gas (LNG) under cryogenic conditions and Regasification before transporting the same thru Cross country pipelines to the consumption centres. To promote Energy Security and also reduce Carbon footprint, the Govt. of India has desired to increase the use of Natural Gas in the Energy basket from the current level of 6 % to 15 % by 2030. Natural gas is the cleanest burning fossil fuel. It offers various environmental advantages over other energy sources. Using natural gas

Sr	Allegation	Response
	apply here any inevitable. Leaking along the way releases methane, a super-potent greenhouse gas. LNG is natural gas - primarily methane - which has been chilled to minus 260 degrees.	improves air quality (by reducing smog), reduces of GHGs and decreases the possibility of acid rains. These clean-burning facts of natural gas have led to a boost in natural gas consumption all over the world. Consequently, this clean source of energy has continuously increased its share in the global energy mix in the last few decades and the shining prospects for the future are still to be realized. Unlike oil and coal which are composed of complex molecules with high carbon, nitrogen and sulphur contents, the principal component of natural gas is methane. As a result, the combustion of oil and coal leads to the release of harmful by-products which include high levels of carbon emissions, nitrogen oxides and sulphur dioxides. Furthermore, oil and coal combustion results in other harmful products such as particulate matter in the forms of ash and soot. For generating a particular amount of energy, natural gas produces approximately 25% less carbon dioxide than

Sr	Allegation	Response
		gasoline, 27% less than fuel oil, 30% less than crude oil and 45% less than coal. Even though methane as the principal component of natural gas is an important Greenhouse Gas, studies underpin that reductions in CO2 emissions significantly reciprocate the negative effects of GHG release resulting from natural gas combustion. Petrol or diesel-powered cars are one of the key causes of smog generation. Since natural gas emits fewer nitrogen oxides and particulate matter, it does not contribute to smog formation. Compared with Petrol/diesel-fired engines, Gas-fired engines cut carbon monoxide and carbon dioxide up to respectively 97% and 25%. Acid rains are another growing environmental concern, and natural gas is well capable to tackle this problem effectively. When Nitrogen oxides or sulphur oxides make a reaction with water vapour existing in the atmosphere, nitric or sulphuric acids are produced. These acids then

Sr	Allegation	Response
		fall on earth as acid rains. Coal-fired power plants are considered the major cause of acid rains. Natural gas does not emit sulphur oxides and produces 80% fewer nitrogen oxides compared to coal. The EIA study of the LNG Terminal at Chhara was carried out by National Environmental Engineering Institute Nagpur, a Govt of India Research Institute. The report brings out the Socio-Economic benefits of LNG Terminal in addition to its role in improving the environment and its minimal impact on surroundings including Sea and Land.
7	According to the United States Environmental Protection Agency - a major contributor to the greenhouse effect, second only to carbon dioxide, and is about 21 times more powerful at warming the atmosphere than carbon dioxide	The Reply under para 6 is considered for a reply to para no 7.
8	That the Project Proponents proposed to build the Project in two Phases, Phase - I & Phase - II. That Phase - I was	The applicant has stated the facts which make it clear that PP followed stipulated procedures for obtaining EC

Sr	Allegation	Response
	the construction of breakwater on 1700 m, which was initially granted in January 2014. That, Phase - II was the construction of the Breakwater on the extended area of 3256 m.	and CRZ Clearance. PP is thankful to the Applicant for accepting the same.
9	The MOEF finalized the Terms of Reference on 13th June 2014 in respect of the Application submitted by HPCL Shapoorji Energy Ltd For the Development of LNG storage and regasification terminal which were as follows:- (i) Submit the details of the various applicable regulations including safety regulations along with the proposed compliances. Also details of safety aspects associated with· handling of LNG vis a vis other cargo in other facilities · within the port. (ii) Submit the details of the Hazop analysis. (iii) Submit the layout along with the port boundary. (iv) Submit details of Risk Assessment, Disaster Management Plan	The applicant has merely reproduced TOR issued by MOEFCC. Hence, no response is required.

Sr	Allegation	Response
	including emergency evacuation during natural and man-made disaster like floods, cyclones, tsunami and earthquakes etc along with design details.	
	(v) Submit a copy of the layout superimposed on the HTL/LTL map demarcated by an authorized agency on 1:4000 scale along with the recommendation of the SCZMA.	
	(vi) Submit the details of the storage and regasification, distribution network etc and vulnerability of human habitation vis a vis LNG associated risks.	
	(vii) Type of LNG carriers proposed taking into account the future growth in vessel sizes beyond the present-day market trend and the handling aspects of such vessels from environmental considerations.	
	(viii) Submit the Hydrodynamic study as	

Sr	Allegation	Response
	required under OM dated 03.11.2009.	
	(ix) Ship Navigation simulation studies cover approach channel and turning circle to ensure the safety of LNG. carriers under various hydrodynamic conditions.	
	(x) Submit the details of the reclamation along with th source of materials and their quantity & quality.	
	(xi) Submit the details of shoreline changes along with the shore protection if required.	
	(xii) Submit the details of the Environmental Management Plan and Environmental Monitoring Plan with parameters. The EIA report shall be based on the comprehensive marine data of not later than 3 years.	
	(xiii) Submit the details of the fishing activity and the likely impact due to the activity.	
	(xiv) Submit the details of the land break-up along with the land use plan and	

Sr	Allegation	Response
	Details of green belt development.	
	(xv) Submit the details of the solid/liquid wastes generation and their management.	
	(xvi) Submit the details of Water requirement, source, impact on competitive users.	
	(xvii) Submit the details of the eco-sensitive areas, if any.	
	(xviii) Submit the details of the Oil Spill Contingency Management Plan.	
	(xix) Submit the details of dredging sludge quantity quality ·in · terms of its toxic metals (at least Cr^{+6}, Arsenic, Mercury, and lead) and its disposal with quantity (reclamation/ dredging disposal site) If the disposal is in the sea, location, the justification for selecting such location, the dispersal of dumping material, its effect on the marine environment, effect of fishes.	

Sr	Allegation	Response
	(xx) Submit the details of the study on connectivity and its carrying capacity (both road and railway) A true copy of the terms of reference dated 13th June 2014 issued by MOEF bearing F.No.ll-1/2014-IA.III is annexed herewith and marked as **ANNEXURE A-4**. That the MOEF also directed that Project Proponent conduct a public hearing as per the provisions of the Environmental Impact Assessment Notification, 2006	
10	The MOEF finalized the Terms of Reference on 18th June 2014 with respect of Application submitted by M/s Simar Port for extension of Breakwater which was as follows;- (i) Submit a copy of the layout superimposed on the HTL/LTL map demarcated by an authorized 'agency on a 1:10000 scale along with the recommendation of the SCZMA. (ii) Type of LNG carriers proposed taking into	The applicant has merely reproduced TOR issued by MOEFCC. Hence, no response is required.

Sr	Allegation	Response
	account the future growth in vessel sizes beyond the present-day market trend and the handling aspects of such vessels from environmental considerations. (iii) Submit the details of the fishing activity and the likely impact due to the activity. (iv) The EIA report shall be based on comprehensive marine data not older than 3 years. A true copy of the letter dated 18th June 2014 issued by MOEF bearing F.No.I1-2/2014-IA.III is annexed herewith ·and marked as. ANNEXURE A-5	
11	That shockingly the public hearing was exempted on the basis that the public hearing was. conducted on 19.11.2010 while obtaining the Environmental and CRZ Clearance for the Port and the proposed extension of the berth is within the Port boundary. Whereas, the extension of the berth was for 325.6 m which is an almost two-fold increase in the	The necessity for extension of the length of the already approved Breakwater (of length 1700 m) had arisen having regard to the Phase-II development of the LNG Regasification Plant, for providing safe and tranquil conditions for berthing and unloading of the LNG vessels. The proposed sub-concessionaire viz. HSEPL applied for a grant of EC for

Sr	Allegation	Response
	original breakwater area of 1700 m. There was a tremendous increase in the breakwater area, consequently, the effects would be more than what was contemplated in the 2010 public hearing. The public has a stake in pollution load and water requirements. The Decision-making process in exempting from the public hearing was not based on correct principles. The MOEF erred in appreciating that a Public hearing is a prime requisite for environmental clearance and hence the exemption granted by. the. MOEF is· bad in law and undemocratic. That the Environmental Impact Assessment Notification, 2006 envisages the mandatory public hearing before granting permission of the project.	the LNG Regasification Plant, whereas the answering Respondent applied for a grant of EC for the extension of the breakwater. Expert Appraisal Committee (EAC) under Clause 7(ai) of the EIA Notification of 2006, had found it appropriate for acceding to a waiver from the public consultation process on, inter alia, the ground that a detailed and comprehensive public consultation for the Port project had already been conducted on 19.11.2010; the proposed extension of the breakwater is within the Port boundary, and that the EC sought by HSEPL would also include the process of public consultation.

RESPONSE TO VARIOUS GROUNDS THAT ARE RELEVANT TO THE BREAKWATER EXTENSION PROJECT

35. It is respectfully reiterated that the Appellant has made unsubstantiated allegations, devoid of facts or merit, and has challenged the elaborate and multi-layered and probing process established by statute for the grant of Environmental Clearance.

36. The Appellant has made sweeping allegations that are vague and without any specifics, such that they can be levelled against the validity of any Environmental Clearance, not just the present project.

37. It is most respectfully submitted that all such issues that are raised without any supporting facts or proof ought to be omitted and removed from consideration by this Hon'ble Tribunal.

38. The answering Respondent is giving its para-wise comments to the grounds raised in Para VII of the Application. The Answering Respondent prays for liberty to file a detailed response and additional facts and documents if required, and as and when.

Sr	Allegation	Response
A	That the Environmental Clearance granted is bad in law and against the rules as envisaged in the Environment Impact Assessment Rules, 2006.	The applicant is aware of the apparent position against the maintainability of the present application and hence has sought a camouflage to be created by bringing the issue of grant of EC (which falls under Section 16 of NGT Act) in OA filed under section 14 which is for addressing the substantial question of environment and environmental damage if any.
B	That the project has been going on in the blatant violations of the terms mentioned in the Environmental and CRZ clearance. That the following	(i) As per EIA Report prepared by CSIR-NEERI and CSIR-NIO, there are no mangroves at the project site. Hence, the question of protecting

Sr	Allegation	Response
	conditions have not been complied with:- (i) No steps have been taken for protection or plantation of mangroves trees; (ii) No steps taken for Conservation of Lion; (iii) Marine Conservation Centre has not been developed; (iv) No development of green belt outside port boundary; (v) No steps taken to prevent blockage of rivers; (vi) No steps taken to prevent pollution in the sea; (vii) No steps were taken to protect the marine ecosystem and sea life	mangroves does not arise. GCZMA has directed a mangrove plantation of 300 ha through Gujarat Ecology Commission. This will be undertaken after the commissioning of the port. (ii) Lion Conservation Plan was prepared and submitted to PCCF Gujarat and the same was taken into consideration by MOEFCC while stipulating conditions in EC. Lion Conservation Plan will be implemented after the commissioning of the port. (iii) Marine Conservation Centre will be developed after the commissioning of the port. (iv) Activities related to the development of the green belt will be undertaken after the commissioning of the port. (v) There are no rivers within the port site. (vi) No effluents are going to sea and the question of

Sr	Allegation	Response
		marine pollution is ill-founded. (vii) As per EIA Report prepared by CSIR-NEERI and CSIR-NIO proposed project will not be affecting marine ecology.
C	That the construction of the project has been going on continuously in blatant violation of the Environment Protection Act and Rules; that with each passing day the ongoing project is adding more damage to the environment and marine ecosystem.	This is a vague allegation without any supporting observations/documents/records and is denied.
D	That extension of the berth is almost two times the existing capacity, for which also Environmental Clearance was granted but without giving any public hearing or public consultation.	Expert Appraisal Committee (EAC) under Clause 7(ai) of the EIA Notification of 2006, had found it appropriate for acceding to a waiver from the public consultation process on, inter alia, the ground that a detailed and comprehensive public consultation for the Port project had already been conducted on 19.11.2010; the proposed extension of the breakwater is within the Port boundary; that the EC sought by HSEPL would also include

Sr	Allegation	Response
		the process of public consultation.
E	That in absence of requisite public hearing as provided by Notifications dated 2006 the Environmental Clearance dated 05/03/20 19 can be termed as illegal.	The applicant is aware of the apparent position against the maintainability of the present application and hence has sought a camouflage to be created by bringing the issue of grant of EC (which falls under Section 16 of NGT Act) in OA filed under section 14 which is for addressing the substantial question of environment and environmental damage if any.
F	That there is a basic flaw in the Environmental Clearance granted in favour of Simar Port, Respondent No.7. It is apparent that when the public hearing took place in the year 2010, the same was based on the first application which Respondent No.7 had preferred for setting up Port and construction of 1700 m of the breakwater. The objections were raised by the persons concerned. However, when Environmental Clearance came to be granted vide order dated 05/03/2019 on the second application preferred by Respondent No.7 for	The applicant is aware of the apparent position against the maintainability of the present application and hence has sought a camouflage to be created by bringing the issue of grant of EC (which falls under Section 16 of NGT Act) in OA filed under section 14 which is for addressing the substantial question of environment and environmental damage if any.

Sr	Allegation	Response
	extension of the breakwater, the requirement of public hearing/public consultation was waived by the authority on the assumption that in the year 2010 public hearing. was already undertaken. It is undisputed that in the year 2010 when the public hearing was given, the objections and suggestions were taken into consideration by the authority and Environmental Clearance was accorded, but, thereafter, when the second application was preferred for enhancing the breakwater area by almost double, people were not made aware of this proposal of Respondent No.7 and the authority proceeded to accord Environmental Clearance admittedly waiving public hearing.	
G	That in order to develop the project area and for the entry of vehicles a large number of Schedule I - Protected trees, extinct species of trees like Taad, Pipal, Vaad, Neem, Sharu, Hawan and Saag were axed down. Deforestation is impacting the wildlife of the area. The heavy vehicles that arrive at the port carrying the	PP is thankful to the Applicant for accepting the fact that trees were cut only after obtaining requisite permission from the concerned authorities. PP will be developing a 100 meter vide green belt which will result in the plantation of over 1 lakh trees during the

Sr	Allegation	Response
	goods and construction material are doing serious damage to the natural and animal habitat of the area. The headlights are fog lights of the heavy vehicles passing at night have become a nightmare for the wildlife in the area. That a complaint was also made by the present Petitioner in the office of Range forest officer. That the Project. The Proponent was granted permission to cut 208 babul trees by the Range forest officer and a letter was forwarded to Mamlatdar by the Range forest officer to grant further permission to the Project Proponent for cutting down 353 trees. A true copy of the complaint dated nil made by the Petitioner in the office of Range Forest Officer is annexed herewith and marked as **ANNEXURE A-6**. A true copy of the order dated 23/02/2019 granted to *M/s* Simar Port for cutting down 208 Babul trees is annexed herewith and marked as **ANNEXURE A-7**. A true copy of the letter no. Land-C/1877 dated	operation phase in and around the port as per stipulation of the Forest Dept. The project proponent is also going to provide underpasses with Elevated Road levels for smooth passage of wild animals as per stipulation of Forest Dept. The project proponent has already entered into correspondence with the Forest Dept for planning the Green belt and stand committed to developing the green belt as per the advice of the Forest Dept.

Sr	Allegation	Response
	07/06/2018 sent by Range Forest Officer is annexed herewith and marked as **ANNEXURE. A-8**. True photographs. showing cutting down of trees are annexed herewith and marked as **ANNEXURE A-9**	
H	That the project area has severely affected the marine life including that of sea turtles, the nesting area of the sea turtles lies within the project site. The main plant area of the proposed project has the presence of turtle breeding grounds where thousands of turtles lay eggs every year. There are government turtle nurseries in the area. The survival of sea turtles and marine ecology is at stake due to the project construction. The Petitioner has received important details through RTI reply wherein the Range Forest Officer has admitted that the Turtle nesting area exists in Chhara area and the Petitioner to visit the area personally for more information, details of forest area, dams, birds and wildlife were also given, that the	The waterfront for the proposed port is a rocky one and is not a turtle breeding ground as apprehended by the Applicant. A photograph of the waterfront is enclosed in Annexure-II.

Sr	Allegation	Response
	Range forest officer chose not to disclose the information of injury to wildlife. A true copy of the RTI reply dated 26/02/2019 received by the Petitioner is annexed herewith and marked as **ANNEXURE A-10**	
I	There has been an increase in deaths of dolphins and whales in the area, thus affecting the marine ecosystem at large. The Schedule - 1 Species of a whale shark is also present in this area, many of which have died. Thus, the project has not left the marine ecosystem a safe place anymore.	Whale sharks are found deep inside the sea, at depths more than 40 m and at a distance of over 10-12 km. Hence, project activities will not be affecting whale sharks. Letter submitted by Prakriti Nature Club substantiating the above understanding is enclosed at Annexure-III.
J	That the surrounding area of 10 km have a presence of forest, wildlife, marine ecology, wetland, fertile land, bird sanctuary etc., this information was not disclosed in the EIA report	EIA Report by CSIR-NEERI has addressed these aspects comprehensively in Chapter 3 section 3.5. The same is enclosed as Annexure-IV.
K	Between 1990-2010 about 560 attacks by lions were recorded in villages Chhara, Sarakadi, Nanavada, Mul-Dwarka, Pandara, Pipili, devil, Kaj, Kadodara, Velan, Barda, Damli, this states clearly that	EIA Report by CSIR-NEERI has addressed these aspects comprehensively in Chapter 3 section 3.5.

Sr	Allegation	Response
	there is a wide presence of lions, which was not disclosed in EIA Report	
L	The surrounding area is a habitat for various wild animals such as leopards, wild pigs, chital etc. The project has caused serious damage to the lives of wild animals. A true copy of the photograph showing the presence of wildlife is annexed herewith and marked as **ANNEXURE A-11**	EIA Report by CSIR-NEERI has addressed these aspects comprehensively in Chapter 3 section 3.5.
M	That a survey conducted by the Prakruti Nature club Kodinar & Forest· Department reveals that every year more than 1.5 lakhs of international migratory birds from Siberia, Middle Europe, Russia and Kazakistan come to wetland located in the area ·and this place is a home for such migrating birds. That the project has adversely affected the migration process. The place is being modernized in a neglectful manner which will have deep ramifications on the life cycle of migratory birds. A true copy of the survey report conducted by Prakruti	EIA Report by CSIR-NEERI has addressed these aspects comprehensively in Chapter 3 section 3.5.

Sr	Allegation	Response
	Nature club Kodinar & Forest Department is annexed herewith and marked as **ANNEXURE A-12**	
N	The project is using a lot of groundwater which has resulted in depletion of the level of groundwater in the area. Despite clear directions from the MOEF, the Project proponents have been using the groundwater for construction purposes. The affected area has fertile land, major revenue earning crops are grown in this area, but due to the project, the agricultural land is badly affected.	The project site does not use groundwater thru borewell and construction water is being procured by the construction agencies from outside sources thru tankers. Hence the question of depletion of water level does not arise. As regards water requirements during the operation phase, GWIL has agreed to supply water requirements thru their pipeline which is currently available about 10 km away from the project site. The approval from GWIL is attached.
O	That the Petitioner addressed a letter to the MOEF regarding cancellation of the Environmental Clearance but to no avail. A true copy of the representation dated nil sent by the Petitioner to the MOEF is annexed herewith and marked as **ANNEXURE A-13**.	The applicant is aware of the apparent position against the maintainability of the present application and hence has sought a camouflage to be created by bringing the issue of grant of EC (which falls under Section 16 of NGT Act) in OA filed under section 14 which is for addressing the substantial question of

Sr	Allegation	Response
		environment and environmental damage if any.
P	That the specific issues were raised by the Petitioner and other activists regarding the presence of wildlife, forest area, sea turtles, rivers, archaeological sites and within a 10 km radius of the Project area but the issues were not addressed. A true copy of the representations of the Petitioner and other activists are annexed herewith and marked as **ANNEXURE A-14**.	EIA Report by CSIR-NEERI has addressed these aspects comprehensively in Chapter 3 section 3.5.

39. It is most respectfully submitted that ports and other similar infrastructure projects are of national importance. The Appellant herein is attempting to use the legal process of this august forum to fulfil his personal agenda and vested interests, and not for any genuine environmental cause. It is the strong belief of the answering Respondent that this is being done only with a view to getting a work contract and supply contracts of several crore rupees through such pressure tactics.

40. Due to such forced, unnecessary and unwarranted litigation, projects such as the present one are delayed for several years. This leads to a rise in costs for the Answering Respondent and also wastes the valuable time of this Hon'ble Tribunal and other similar fora.

41. In view of the facts as stated hereinabove, the Answering Respondent, therefore, submits that the present Application deserves to be rejected with exemplary costs against the Appellant for indulging in such vexatious litigation.

Simar Port Pvt. Ltd.

Authorised Signatory

Place:	Mumbai	Nitin Bondre
Date:	23-12-2021	Respondent No. 7

TARY
Name:B.C.Adhyaru
Area Kodinar
Dist. Gir Somnath
Reg. No.
Kodinar/583/2005
Renewal Date
11/08/2025
T. OF GUJARAT

VERIFICATION AND AFFIDAVIT

I, Nitin Bhalchandra Bondre, hereby state that I have verified the contents of the reply being submitted as above, including the para-wise comments contained in the tables therein.

I state that all the above information is true and correct to the best of my knowledge and no relevant material facts have been deliberately suppressed.

I file this affidavit of verification on solemn affirmation and oath.

Simar Port Pvt. Ltd.

Authorised Signatory

Place:	Mumbai	Nitin Bondre
Date:	23-12-2021	Respondent No. 7

NOTARY
Name:B.C.Adhyaru
Area Kodinar
Dist.. Gir Somnath
Reg. No.
Kodinar/583/2005
Renewal Date
11/08/2025
GOVT. OF GUJARAT

R. B. Mahabal रघुनाथ भालचंद्र महाबळ
BE (Mechanical), ME (Industrial Management) VJTI-Mumbai, LLM (Mumbai)
Chartered Engineer, Fellow of Indian Institution of Engineers, IIE Arbitrator
ADVOCATE - High Court, Bombay [MAH/349/2012] National Green Tribunal
Home: B - 202, Chandravijay Society, Opp. Bansuri Hotel,
Phule Road, Mulund East, Mumbai-400081, Maharashtra.
Email: mahabal60@gmail.com Phone: 7400116222

NOTARIAL

NOTARY
Name:B.C.Adhyaru
Area : Kodinar
Dist.. Gir Somnath
Reg. No.
Kodinar/583/2005
Renewal Date
11/08/2025
GOVT. OF GUJARAT

Sr.No. 56/2022
Solemnly affirmed before me by
Shri Nitin Bhalchandra Bondre
who is identified by Advocate
Shri self to whom
I Personally know

Bharat C. Adhyaru
Advocate & Notary
Kodinar, Dist.: Gir Somnath
15 JAN 2022

SIMAR PORT PRIVATE LIMITED

137

Ax.-I

Development of Greenfield Port at Chhara, Junagadh District, Gujarat

ENVIRONMENTAL IMPACT ASSESSMENT & ENVIRONMENTAL MANAGEMENT PLAN

FINAL REPORT

JUNE 2011

CONSULTING ENGINEERING SERVICES (INDIA) PVT. LTD.
57, NEHRU PLACE, (5TH FLOOR), NEW DELHI - 110019

T.C.

2.1 INTRODUCTION

The proposed port at Chhara is located on the South coast of Gujarat State, on the west of Diu Island. The offshore condition at the port location is characterized by an existing offshore shoal bank, approximately 6.0 km long, parallel to the shoreline facing the Arabian Sea.

Traffic Forecast relied on the information provided by SPPL. Cargo traffic for coal is based on the requirement of thermal coal for the proposed thermal stations to be built. SP has a plan to build a 1320 MW capacity power plant. Other industries also indicated some interest to import coal through Chhara port.

On the basis of above, the port has been planned to be developed in **Phase-I** (2013-2014) to handle import of bulk coal of **8 MTPA** and upto 30 MTPA ultimately over the master plan horizon. The final layout of Phase-I development is presented in Drawing No. 2008054/MN/DPR/M-10 (on shore facilities) and Drawing No. 2008054/MN/DPR/D-01 (off shore facilities).

2.2 PROJECTED TRAFFIC

The expected traffic volumes for the port (base case) are summarized in the **Table-2.2.1** given below.

Table-2.2.1 Projected Cargo Traffic

SL No.	Commodity	Cargo Volume (MTPA)		Import / Export	Loose Bulk / Bagged / Container
		Phase I	Master Plan		
1	Coal	8	30	Import	Dry Bulk
2.	Other Bulk Cargo	-	2.0	Import/ Export	Break Bulk
3	Containers	-	2.0 (MTEUs)	Import/ Export	Containers (TEUs)
4	LNG (Provisional)	-	5.0	Import	Liquid bulk

Source: Detailed Project Report

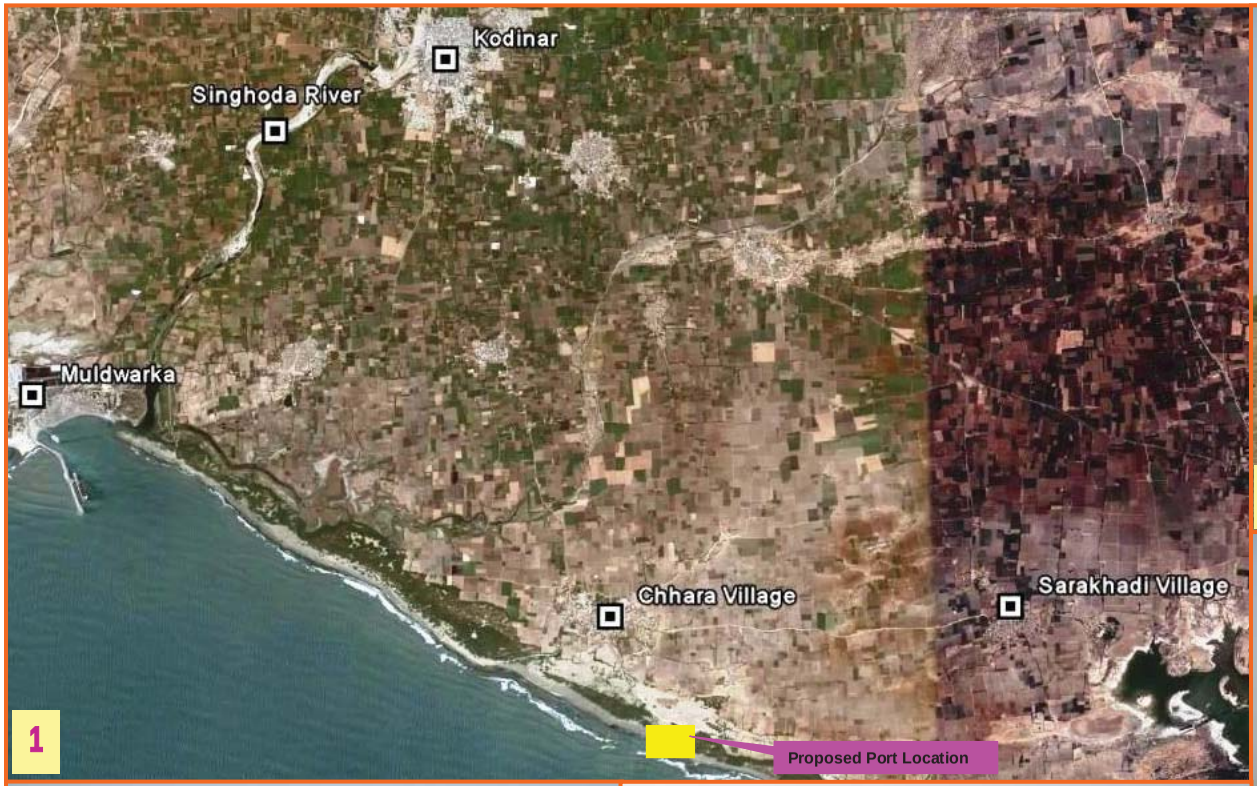
2.3 DESIGN VESSEL SIZES

The design vessel sizes have been arrived at based on a detailed shipping analysis considering the following aspects:

a) Vessel records
b) Shipping freight analysis
c) Construction cost analysis
d) Economic analysis of each ship class

Based on this analysis, the design vessel sizes are presented in the **Table-2.3.1** below:

T.C.



1	Map showing location of Proposed Port Location
2, 3 & 5	View of Chhara Coast at Proposed Port Area
4	View of the Proposed Port Area, Chhara

Ax.-II

139

T.C.

Dinesh Goswami
(President)
+91 98985 15362

PRAKRUTI PARIWAR TRUST SANCHALIT
TRUST REG No. GUJ/F2727

Jignesh Gohil
(Vice President)
+91 99783 11011

PRAKRUTI NATURE CLUB KODINAR
Environment Education & Research center
Email:- dinesh_goswami2008@yahoo.com, jignesh.gohil2009@gmail.com
Email : prakrutinatureclub@gmail.com Website : www. prakrutinatureclub.org
Marutinagar Society, Opp. Kanya Chhatralay, Veraval Road, Kodinar- Dist. Gir Somnath, Gujarat, (INDIA)

Ref.No. PNAKDR/201819/10/02 Date.: -20
તા.૨૫.૧૦.૨૦૧૮

પ્રતિ, શ્રી
પ્રાદેશિક અધિકારી શ્રી
ગુજરાત પોલ્યુશન નિયંત્રણ બોર્ડ
જુનાગઢ.

વિષય :– મોજે છારા ગામ ખાતે આવનાર મેસર્સ વેસ્ટ કોસ્ટ લિકવિડ ટર્મીનલ પ્રાઈવેટ લિમિટેડના એલ.પી.જી. અને લિકવિડ સ્ટોરેજ ટર્મીનલ પ્લાન માટેનો સુચિત જેટી પ્રોજેકટ બાબતે .

જયભારત સાથ જણાવવાનું કે તા. ૨૬.૧૦.૨૦૧૮ ના રોજ રાખવામાં આવેલ જાહેર સુનાવણી સંદર્ભે જણાવવાનું કે,

(૧) કોડીનાર તાલુકાના છારા દરિયા કિનારા ઉપર જેટી થવાની છે, જે ગુજરાત તેમજ કોડીનાર તાલુકાના વિકાસ માટે ખુબજ સારી બાબત છે. જેના દ્વારા કોડીનાર તાલુકાના સ્થાનીક લોકોને રોજગારી એક નવી તક ઉભી થશે અને તાલુકાના વિકાસમાં વધારો થશે. જયારે આવો મોટો પ્રોજેકટ કોડીનાર તાલુકામાં થતો હોય ત્યારે પ્રકૃતિ નેચર કલબ કોડીનાર આ પ્લાન્ટને આવકારે છે.

(૨) છારા ગામના દરિયા કિનારે વસતા વન્ય જીવોમાં રક્ષિત પ્રાણીઓનો વસવાટ છે. પરંતુ તેના જીવન પર કે તેની સંખ્યામાં કોઈ અસર થતી જોવા મળેલ નથી આથી જેટી આવવાથી વન્ય જીવ સૃષ્ટી પર કોઈજ પ્રકારનો ખતરો પણ નથી. આજે પણ મુળદ્વારકા જેટી આસપાસના વિસ્તારમાં વન્યજીવો સહીસલામત વસવાટ કરેછે. આથી આ પ્રોજેકટ આવવાથી કોઈ હરકત નથી.

(૩) સૌરષ્ટ્રના દરિયામાં વ્હેલ શાર્ક માછલી પ્રજનન માટે આવેછે. અને છેલ્લા ૨૦ વર્ષથી અમારી સંસ્થા દ્વારા આ માછલીને માછીમારોની જાળમાં ભુલમાં ફસાઈ જાયછે અને તેને સહીસલામત દરિયામાં મુકત કરવાની કામગીરી કરવામાં આવેછે. અત્યાર સુધીમાં અંદાજે ૪૫૦ જેટલી વ્હેલ માછલી મુકત કરી છે. આ જેટી પ્રોજેકટથી આ જીવને કોઈ પ્રકારનું નુકશાન કે અડચણ થતી નથી. આ માછલી નો વસવાટ ૫૦ થી ૬૦ કી.મી. દુર સમુદ્રમાં ૩૦ થી ૪૦ વામ પાણીમાં જોવા મળેછે. અને તેને આ જેટી બનવાથી તેની જાન પર કોઈ જોખમ નથી કે તેને કોઈ અડચણ નથી. દર વર્ષે તેની સંખ્યામાં ઉતરોતર વધારો થયો છે. જેનુ હાલ જીવંત ઉદાહરણ છે મુળદ્વારકા પર અંબુજા જેટી હોવા છતાં તેની સંખ્યામાં વધીછે. આથી આ જેટી છારા માં પડે તેમાં કોઈ હરકત નથી.

(૪) ભારતના બીજા નંબરના દરિયાઈ કાચબા જે આપણા સૌરાષ્ટ્રના દરિયા કિનારે માળા બનાવી અને ઈંડા મુકવા આવેછે. આ કાચબાના સંરક્ષણ માટે અમારી સંસ્થા દ્વારા આ કાચબાને બચાવવાની કામગીરી

This letter (Ax. III) is the part of the submission and Respondent no. 7 not going to rely or depend on its content. Also, this letter is not a part of the argument or ground of the argument.

T.C.

છેલ્લા દશેક વર્ષથી કરવામાં આવેછે. આ કાચબાની સંખ્યામાં ઉતરોતર વધારો કરવા માટે તેના સંરક્ષણ માટે હેચરી ફાર્મ બનાવવાની યોજના કરવામાં આવશે તો તેની સંખ્યામાં અકલ્પનીય વધારો નોંધાઈ શકેછે. કારણકે અતયાર સુધી તેના માળા માંથી માછીમાર લોકો ઈંડા ચોરીને ખાઈ જતા તેના પર કંટ્રોલ આવશે. આથી આ જેટીના આવવાથી કોઈપણ પ્રકારની તકલીફ થતી નથી આજે પણ મુળદ્વારકા અને તેના આસપાસના દરિયાઈ વિસ્તારમાં કાચબાના માળા બનેછે. જે જીવંત ઉદાહરણ છે.

(૫) આપણો વિસ્તાર યાયાવર પક્ષીઓ માટે પણ ખુબજ પ્રખ્યાત છે. અહીં દર વર્ષે ૧ થી ૨ લાખ અને ૫૦ થી ૬૦ અલગ–અલગ પ્રજાતીના પક્ષીઓ આવેછે. જેની દર વર્ષે અમારી સંસ્થા દ્વારા ગણતરી કરવામાં આવેછે. આ પોજેકટ સાથે આ પક્ષીઓને કોઈજ પ્રકારની તકલીફ ઉભી થાય નહી કારણકે જેટીના વિસ્તારથી તે ઘણીજ દુર છે. જયારે મુળદ્વારકા ની જેટી બંદરથી (૧ કિમી મઠ, ૩ કિ.મી. બરડા, ૫ કિ.મી. કણજોતર) વિસ્તારમાં અસંખ્ય પક્ષિઓ દર વર્ષે ઉતરોતર વધારા સાથે આવે છે. આથી આ જેટીના આવવાથી યાયાવર પક્ષીઓની પ્રજાતી પર કોઈજ પ્રકારનું જોખમ ઉભુ થાય તેવી કોઈજ શકયતા અમોને જોવા મળતી નથી.

આથી કોઈપણ પ્રકારના પર્યાવરણના અને જીવ સૃષ્ટિના વાહિયાત મંતવ્યો થી દુર રહી ખરેખર જે વન્ય જીવની કામગીરી થાયછે તેઓની વાતને પ્રાધાન્ય આપીને કાર્યવાહી થાય જેથી સાચી હકીકતો અને દરેકને ન્યાય મળે તેમજ આવા મોટા પ્રોજેકટ આવવાથી દરીયાઈ જીવો અને પર્યાવરણ ને નુકશાન ન થાય તેવી ખુબ કાળજી લઈ અને પર્યાવરણ અને દરીયાઈ જીવ સૃષ્ટીની સંખ્યામાં ઉતરોતર વધારો થાય તેવું આયોજન થાય અને કાયમી ધોરણે એના પર કામગીરી થાય એવી અમારી પ્રકૃતિ નેચર કલબ દ્વારા રજુઆત કરીએ છીએ આ જેટી પ્રોજેકટને આવકારીએ છીએ .

આપનો વિશ્વાસુ,

દિનેશગીરી ડી. ગૌસ્વામી
પ્રમુખ
(પ્રકૃતિ નેચર કલબ કોડીનાર)

જીજ્ઞેશ એમ. ગોહીલ
ઉપપ્રમુખ
(પ્રકૃતિ નેચર કલબ કોડીનાર)

This letter (Ax. III) is the part of the submission and Respondent no. 7 not going to rely or depend on its content. Also, this letter is not a part of the argument or ground of the argument.

T.C.

3.5 Biological Environment

The main objective of this study is to establish present baseline environmental conditions of the study area through available data/information supported by field studies, wherever necessary. To predict the impacts on relevant environmental attributes due to the proposed project and recommend adequate mitigation measures to minimize/reduce adverse impacts and to prepare an Environmental Impact Assessment (EIA) report. The study has been carried by primary survey of the project area in consultation with the local habitants and secondary data review. The assessment of fauna have been done on the basis of secondary data collected from different government departments like forest departments, wildlife departments and fisheries departments *etc.*

Study Area and Climate:

The study area (area within 15 km distance) consists of Tropical Dry Deciduous, Northern Tropical Thorn and Littoral and Swamp Forest. Project site is located in the coastal village of Chhara (Gujarat). Chhara village is located approximately at Latitude - 20° 43′ 19.56″ N and Longitude- 70° 44′ 28.73″ E in newly created Gir Somnath District. The shore line is on the south face of the area stretching for a length of 2.5 Km. Kodinar is the nearest town (**Fig. 3.5.1)** and **Plate 3.5.1** shows the general overview of the sampling locations for biological studies in the study area.

Reconnaissance:

The present ecological study of the biological environment in the study area was undertaken with special reference to Flora characteristics and impact with the objectives of:

- Assessment of baseline flora and fauna etc. within the study area
- Prediction of biological stress in the study area
- Delineation of measures for abatement/reduction of biological stress
- Identification of rare plants of economic importance including medicinal plants and wildlife species which require protection and conservation
- Identification of measures for protection and conservation of flora, fauna including wildlife, migratory avi-fauna, rare and endangered species, medicinal plants etc.
- Collection of secondary data on agricultural activity, crops etc.

A detailed survey was carried out in May 2014; November 2014 and February 2015 to provide detailed profile and baseline of the biological environment for the study area.

T.C.

Sampling Locations:

The sampling locations were selected on the basis of aerial distance from the proposed site *viz.,* between Project site and 5 km radius, between 5 and 10 km and 10 to 15 km radius. Vegetation sampling was carried by the stratified random sampling. In statistical terms, the sampling locations are independent and identically distributed. Total 14 sampling location was identified for study on biological environment based on topography, vegetation structure, pattern and distribution. Details of sampling location are shown in **Table 3.5.1**.

The observations were made in and around different villages covering their agricultural fields, marshy lands, waste lands, grazing lands/*vidis* (if present) coastal vegetation.

3.5.1 Floral Assessment

3.5.1.1 Study Methodology

A quantitative study was done to determine the diversity of Tropical Dry Deciduous, Northern Tropical Thorn and Littoral and Swamp Forests present in the study area. Stratified random quadrat survey was conducted in the study area. Least count method was used for inventorization of plant species. Quadrat size of 10m x 10m was used to determine trees; 5m x 5m for shrubs and climbers. For herbs and grasses quadrat size of 1m x 1m was used. Importance Value Index (IVI) was calculated from data analysis and quantifying the data with respect to Frequency, Density, Abundance. The IVI values reflect the dominance of species in an area.

For the purpose of recording the abundance of different plant species in study area, the density of each species was measured initially for each sample point and subsequently extrapolated for the entire study area. The identification of the flora of the project site and surrounding 5km, 10 km, and 15 km of the study area was carried mainly based on available secondary literature, personal observations and in-depth exploration of the entire area. The structure and composition of vegetation was studied by taking observations on diverse plant species and their numerical composition at each sampling site.

3.5.1.2 Terrestrial Flora Forest Types in Study Area

On the basis of forest classification proposed by Champion and Seth 1968, the Gir Somnath district consists of Tropical Dry Deciduous, Northern Tropical Thorn and Littoral and Swamp Forest. Agro forests are common in many patches around the human habitations around the project site. Most of the area is open scrubland and the remaining is having agricultural land and few portions of sparse, short heighted mangrove vegetation.

Within the sampling area, prominent tree species were *Prosopis juliflora, Acacia nilotica, Azadirachta indica, and Zizyphus jujube. Cassia auriculata, Calotropis*

procera, Capparis sepiaria, Derris indica and *Salvadora oleoides* were other commonly recorded species **(Plate 3.5.2)**. *Prosopis juliflora* was found growing luxuriously associated with other species in the study area. The common trees observed near human habitations were Bargad *(Ficus bengalensis)*, Pipal *(Ficus religiosa)*, Neem *(Azadirachta indica)*, Nariyal *(Cocos nucifera)*, Aak *(Calotropis procera)*, Rambans *(Agave americana)*.

Few sample plots were also surveyed in coastal mudflat areas (around 7 km from port boundary) near Vanakbara. The coastal mudflat areas are covered by sparse *Avicennia marina* (a mangrove species), a common coastal mangrove species.

There are four reserved forest and five patches of unclassified forest within 10 km of the proposed port boundary (**Table 3.5.2**). Name of the village where the forests are located, area and approximate distance from the boundary of the proposed port boundary are presented in **Table 3.5.1**.

3.5.1.3 Structure and Composition of Vegetation in the Study Area

The striking feature of the study area is the large portion of the landscape which is devoted for agricultural practices. The forest types are open shrub type with dominant bushes which are found abundantly in arid zone. In floristic terms with the record of 184 species Kodinar is one of the richest coastal talukas of Gir-Somnath district that includes 61 woody plants, 104 herbs and 19 climbers as reported in GEC, 2011 report on coastal talukas. The coastal mudflat areas have sparse *Avicennia marina* (a mangrove species). A few other terrestrial species are also associated with these species on fringe, drier and higher areas of the mudflats. As reported in GEC, 2011 report on coastal talukas Kodinar has lowest density of woody plants among other talukas of Gir Somnath.

Aegle marmelos, Acacia nilotica, Calotropis gigantia, Prosopis juliflora, Peltophorum pterocarpum, Salvadora oleoides and *Zizyphus jujuba* are also associated with dominant tree species on fringe, drier and higher areas of the mudflats. *A. marina* sparsely grows in mudflats (7 km from port boundary) of the study area.

Natural Vegetation in the study area is typically grassland vegetation with some patches of agro forestry and sparse mangrove vegetation. Generally trees and mangroves observed here have low stunted branches with diffuse crown cover. The common forest of the *P.juliflora* or Gando bawar was observed and among other prominent trees Neem, Bargad and Nariyal can be commonly seen in the study area. A major portion of the area is occupied by high saline zone of land interspersed with trees, thorny bushes and scrub lands. Dependency of villagers on natural vegetation in this region is more for fodder and firewood. Most of the vegetation aggregates are near villages. Normally the area is covered with coarse and low perennial grasses and other non-grass species. The floristic study reveals species composition, which represents poor gene pool uniformly spread in restricted vegetation patches around human settlements. The Flora of forest area was represented by stunted trees and shrub species. Dominant shrub species in the area are *Prosopis juliflora* and *Zizyphus nummularia.* Other wild invasive species are *Lantana camara, Agave americana, Euphorbia nivulia, Calotropis*

gigantea, Aloe barbadens etc. Prominent herb species and grasses in the site include *Cynodon dactylon, etc.* **(Plate 3.5.3)**.

Besides, agricultural fields in agro-forests; tree species were observed along roads and households in the villages. The major species are Neem (*Azadirachta indica*), Baval (*Acacia nilotica),* Khair (*Acacia catechu*) and Pipal (*Ficus religiosa)* Shrubs are the dominant perennial species of this area, represented mainly by Ganda Baval (*Prosopis juliflora)*, Aakado (*Calotropis procera* and *Calotropis gigantea)*, Chani Bor (*Zizyphus nummularia*), Ketki (*Agave americana)*, Fafdo Thor (*Opuntia sp*), Thor (*Euphorbia nivulia)* Kerdo (*Capparis deciduas)* and Lantana (*Lantana camara*). Herbaceous species constitute of Tulsi (*Ocimum sanctum*), Kothimdu (*Cucumis callosus*) Anghedo (*Achyranthes aspera*), Darudi (*Argemone mexicana*) Marvel grass (*Dichanthium annulatum*), Piludi (*Solanum nigrum*) *Panicum antidotale* and *Cenchrus ciliaris.* The climbers were observed along the agricultural hedges and road side hedges of the study are such as Chanothi *(Abrus precatorius)* Galo (*Tinospora cordifolia*).

Detailed Floral overview of the study area with special reference to the district is present in **Annexure IV** sourced from Forest Department and as reported in GEC, 2011 report on talukas.

Zone 1 (within Project Site and 5 km Aerial Radius): A major portion of the area is occupied by high saline zone of land interspersed with trees, thorny bushes and scrub lands. In order to reduce transpiration the leaves of most of the plants are reduced in size, for *e.g.* dominant tree and shrub species of the area are Nariyal (*Cocus nucifera*), Bawar(*P. juliflora*), Saru (*Casuarina spp),* Khejri (*P. cineraria*) *etc. Zizyphus nummularia, Calligonum polygonides, Calotropis gigantea and Calotropis procera*. Prominent herb and grass species recorded from the study area *are Heteropogon controotus, Sehima neroosum, Themeda quadivalvis, Tridex procumbens etc.* **(Fig. 3.5.2)**

Zone 2 (between 5 and 10 km Aerial Radius): The vegetation consists of plantation dominated by the exotic species such as *Prosopis cineraria, Eucalyptus sp., P.juliflora, Casuarina equisetifolia, Delonyx regia, Ailanthus excelsa* and *Acacia auriculiform*is. The other species which are seen in the Zone 2 were Mango (*Mangifera indica*), Drum stick or Sargavo (*Moringa oleifera*), Sitafal or Custard apple (*Annona squamosal*), Aonla or Indian goose berry (*Embilca officinalis*), Bordi *(Zizyphus mauritiana*), Jamun (*Syzygium cumini*), Nariyal (*Cocos nucifera*), Chikoo (*Acrus sapota*), and Guava or Jamfal (*Psidium guajav*) Shrub species are interspersed with trees these include *Acacia jacquemontii, Capparis decidua, Leptadenia pyrotechnica Zizyphus nummularia, Calligonum polygonides,Calotropis gigantea and Calotropis procera*. Prominent herb and grass species recorded from the study area *are Apluda mutica, Heteropogon contortus, Sehima neroosum, Themeda quadrivalvis, Tridex procumbens* etc*.* **(Fig. 3.5.3)**

Zone 3 (between 10 and 15 km Aerial Radius): The structure of vegetation shows three different strata in zone 3 i.e. Top, Middle and Ground. Different vegetation structure was observed by the NEERI team dominated by dry deciduous and grassland

species. In tropical dry deciduous forest *Shorea robusta* (Sal) and *Tectona grandis* (Teak) was found to be most dominant plant species associated with other species such as *Anogeissus latifolia, Adina cordifolia, Petrocarpus marsupium, Boswellia serrata, Dalbergia latifolia, Holoptelea integrifolia, Terminalia belerica, Syzygium cumini, Bombax ceiba.* Shrub species interspersed with shrub species are *Acacia jacquemontii, Capparis decidua, Leptadenia pyrotechnica, mangrove species (Avicinnea marina)* are also observed in some area. Prominent herb and grass species recorded from the study area are *Heteropogon controotus, Sehima neroosum, Themeda quadivalvis, Tridex procumbens etc*. **(Fig. 3.5.4)**

3.5.1.4 Mangroves

Mangroves are salt tolerant forest ecosystem of tropical and subtropical intertidal regions of the world. Where conditions are sheltered and suitable, the mangroves may form extensive and productive forests, which are the reservoirs of a large number of species of plants and animals. The role of mangrove forests in stabilizing the shoreline or the coastal zone by preventing soil erosion and arresting encroachment on land by sea is well recognised thereby minimising water logging and formation of saline banks.

The shoreline of the Saurashtra coast is less indented. Sandy beach forms a continuous linear strip from Dwarka to Diu. Sand is coarse and pebbly from Bhadbhadiya to Mithivardi and fine grained near Gopnath, Vadhera and Jafarabad, Saval Bet, Dolia, Mahuva, Mul Dwarka and Dhamlei. The rocky coast outlines sandy beach near Dwarka, Chorvad and Porbandar. The coasts between Porbandar and Chorvad consist of sporadic exposures of ridges and rocks. The Saurashtra coast is different from the coast of the two gulfs. Mudflats are restricted near Dholera, Mahuva, Pipavav Bandar, Jafarabad Creek, Diu and Porbandar. Mangroves are found in few patches. The forest department has afforested coastal area between Porbandar and Jafarabad. Coastal dunes, at places provide ideal ground for nesting of sea turtle. Saltpans are found in higher tidal areas between Bhavnagar and Diu.

Mangroves on Saurashtra coast from Dwarka to Khambhat are confined to limited mudflats and creeks. These mangroves are sparse and scrubby and consist of *Avicennia*. Significant presence of number of industries in this region has threatened the survival of these patches. District-wise mangrove cover and status of mangrove in the South Saurashtra coast region reveals that comparatively mangrove cover is less. As per satellite data of 1998, mangrove cover was 1520 ha in Bhavnagar District, whereas it was very meager (100 ha) in Junagadh (now Junagadh and Porbandar) District. Total mangrove cover in three districts of South Saurashtra in 1998 was about 1620 ha but another area about 2040 ha in intertidal mudflat is available for mangrove development. The lagoon type water body is present in the northern portion of the coast. It has vegetation cover as shown in satellite map. However there are no mangroves in the seaward side. The nearest mangrove cover which is present at the mouth of Madhwad creek is about 9 km away from the proposed LNG Terminal.

3.5.1.5 Medicinal Plants in the Study Area

Plants have been the sources of invaluable medicinal plants since the time man realized the preventive and curative properties of plant and started using them for human health. In this report, we are presenting prominent medicinal species present in the study area having medicinal properties. Local people, particularly those from remote areas, have been using various local preparations of medicinal plants from time immemorial. Plants species used by locals for various medicinal purpose in study area are mentioned and listed in **Table 3.5.3**. Medicinal plants recorded included *Phyllanthus emblica (*Aawla*), Azadirachta indica (*Neem*), Ficus benghalensis (*Bargad*)* as common one in near by villages. The common herbal medicinal flora of the study area consists of *Aegle marmelos*, *Azadirachta indica*, *Calotropis procera, Commlina benghalensis, Datura metal, Euphorbia hirta, Euphorbia species, sida cordata* were observed in region.

Rare and Endangered Flora: The IUCN Red List is the world's most comprehensive inventory of the global conservation status of plant and animal species. *Hyphaene dichotoma (Hoka / Palm tree)* and *Commiphora wightii* reported from the Kodinar taluka have been assigned the status of *Lower* Risk/near threatened (ver 2.3) as International Union for Conservation of Nature (IUCN). *Hyphaene dichotoma* is common tree in the coastal belt of Gujarat. IUCN Red List of Threatened species mentioned *Dalbergia latifolia* as VU (vulnerable) and *Hyphane indica* is also classified VU. *Hyphane indica* or “Ravan Tad” is branched palm, which belongs to coastal areas of Saurashtra and South Gujarat. *Dalbergia latifolia* is also considered in VU category which needs to be conserved. IUCN Red List of Threatened species mentioned *Commiphora wightii* as data deficient. These species are present in Reserve forest of the area but not in close vicinity of study area. Hence, there will be no impact on status of these plants.

3.5.2 Faunal Assessment

3.5.2.1 Study Methodology

The assessment of wild life fauna was carried out by detailed field observation, enquiring with local people and on the basis of secondary data collected from different government offices like District forest office, Fishery department *etc***.** During entire studies, both direct and indirect evidences of wildlife were recorded. Field observations of avifauna in the study area were carried out in the month of May; November and February, 2014. Avifauna was regularly observed and recorded during evening and early morning at Mul-Dwarka and Khaj wetland. This was done for both waterfowls and surrounding terrestrial birds. The bird diversity was classified according to its family and its detail was also mentioned. Aquatic avifauna population was enumerated by point count and direct counting methods and flock count which count the group of bird present over a location. Olympus binocular model number 10 X50 DPS I was used for bird watching. Birds identified by referring the key. Birds were observed and documented during early morning hours. The relative abundance of birds was estimated and their monthly fluctuations information was studied by the available literature from the forest department. Canon DSLR Camera is used to capture the photograph of the sighted birds. All sightings of bird

species on site were recorded migratory Birds were also identified by means of their calls and other signs such as nests and feathers. Many of the avifauna diversity were personally observed by NEERI team during field visits.

3.5.2.2 Faunal Diversity in Study Area

Saurastra region has dry deciduous forest, but extensive tracts of grasslands. Grassland map (ISRO) of India depicted that the *Prosopis juliflora* covering about 25% of the non agriculture land in Saurastra.

Mammals, Ungulates and Rodents: Mammal species recorded from the region are few. However, most are not populous as in some protected areas. The broad context of presence and absence of different species in studied talukas can be represented in **Table 3.5.4**. Further, **Table 3.5.5** shows the mammalian species in Kodinar taluka by local people during the interaction with local public on field and on the basis of secondary data collected from different government offices like District Forest office and reports from GEC. According to the focused group discussions and personal interviews with the villagers, GEC taluka report, 2011 Nilgai (*Boselaphus tragocamelus)* are most frequent visitors in their agricultural fields and are also responsible for crop depradation. Some of other important herbivores and large mammals found in and around the study area are Indian five stripped squirrel, Garden mongoose, Indian Hare, Wild Boar, Chinkara, Langur, spotted deer *etc.* Important carnivores present in the area are Indian stripped hyena, jungle cat, jackal and leopard *etc*. Asiatic lion (*Panthera leo persica*) found in the Gir National Park are also reported to be straying in study region near some coastal forest areas. NEERI biology team has not observed or sighted any leopard or Asiatic Lion during field survey.

Herpeto-Fauna: Reptiles are difficult to sight and are very rare to be recorded in a short time frame of the visit. During the survey, record of reptile species was quite restricted mainly due to the winter period of sampling in most of the talukas. The sighting of Indian monitor lizard *Varanus bengalensis* was frequent during the road transits suggesting their vulnerability to road traffic. Efforts were made to record the reptilian diversity of the study areas using the available direct and indirect evidences. Herpeto Fauna includes both, amphibians and reptiles. These species have a prominent role in the ecological balance and natural conservation. The species of amphibians and reptiles recorded during the study period from the study area are given in **Table 3.5.6**. The important reptiles include Common garden lizard, Common Indian monitor, fan throated lizard and little skink.

Avifauna: During survey NEERI team observed the presence of Peacock (*Pavo cristatus*), Common Babbler (*Turdoides caudata*), Gidh (*Neophron peronoterus*), House crow (*Corvus splendense*), Baya (*Ploceus philipinus*), Kabboter (*Coumbia livia*), Owl (*Bubo bubo*), House sparrow (*Passer domesticus*), Indian Black Ibis (*Pseudibis papillosa*), Large Cuckoo-shrike (*Coracina macei*), Tree Pipit (*Anthus trivialis*), White-throated Kingfisher (*Halcyon smyrnensis*), and Baj or Eagle (*Corcatus gallicus*) **(Plate**

3.5.5 and 3.5.6). The lists of birds species both terrestrial and migratory are mentioned in **Table 3.5.7**.

Important Migratory Birds: Several migratory birds that come to Gujarat including Rosy pelican and Brahminy ducks have also been observed in the study area **Plate 3.5.7** and **Plate 3.5.8**. During winter, large numbers of resident Flamingos and migratory birds frequently visit wetland. Seagulls, Pelican, Flamingo, Common and Domicile Crane, Coot, Penta Stroke, Rosy Pelican, Common Teal, Cotton Teal and different species of Ducks can be spotted in the wetlands.

Insect Diversity: The study area has many families of insects. Prominent odonata insects present in the project site are variety of colourful Dragonfly, Butterfly, Coleopterans, Dung beetles *etc*. Some Hymenopteran species like yellow striped hunters mating, ants have also been observed in the study area. The insect species observed during field visit were Beetles (Coleoptera), Moths and alli (Lepidoptera), Praying mantises (Mantodea), Grasshoppers and allies (Orthoptera), Stick insects (Phasmatodea), Termites (Isoptera), Cockroaches (Blattodea) *etc*. The **Table 3.5.8** shows the insects observed during field study.

Domestic Fauna: Animal husbandry is popular in the region. Domestic animals are integral part of the ecosystem of the area. They feed on agricultural remains and in the open scrubland. Every farmer owns buffalos and cows. Other animal reared in the study area include Goat, Ox, Cat and Dog *etc*.

3.5.2.3 Ecologically Sensitive Areas

There are no protected areas like National Parks, Wildlife Sanctuary and Biosphere Reserves within 10 km radius of the proposed site but, Reserve Forests and unclassified forests are present in Sarakhadi, Nanavada and Charra villages. The same has been confirmed by the State Forest Department documents.

Gir Wildlife Sanctuary and National Park is located at a distance of approximately 22 km from the proposed project site. The Coastal thorn forest habitats in the study area provides shelter to several important species, such as Asiatic Lion (*Panthera leo persica*), Nilgai (*Boselaphus tragocamelus*), Wild Pig (*Sus scrofa*), Cheetal (*Axis axis*) *etc.*

According to Bharat Jethwa, 2011 and GEC, 2011; local forest officers and local people have been encountering presence of lions in coastal forest. Asiatic Lions are sighted in this marginal habitat, which is not their natural habitat and that could have negative impact on the population of the dispersing species. Such habitats are ecologically termed as “population sink” for the species and may also result in man animal conflict in the region. However, off late the population of lion is decreasing in this coastal forest tract and now only vagrant lions visit this area once in a while.

Wetlands: There are two fresh water bodies within 10 km radius of the proposed project site. These are Panchpipalva Bandhara and Sodam Bandhara.

Eventhough, legally, as per Wetland Conservation Rules 2010, these water bodies are not designated as wetland, commonly these water bodies are referred as wetlands.

(a) Panchpipalva Bandhara (Kaj Nanavada Wetland)

The Kaj and Nanavada are wetlands are two big fresh water wetlands near Kodinar seacoast. While, Sodum Bandhara are other less popular wetlands present in the coastal area of Charra near project site. Kaj , Nanavada and Sodam Bandhara wetlands offer site for the migratory birds among them Kaj wetland is identified under the IBA Code IN-GJ-06 situated in newly created district of Gir Somnath. **Plate 3.5.9** showing the Kaj wetland which acts as important habitat of the Migratory birds during winter season. The Bombay Natural History Society has listed the Kaj-Nanavada wetland as one of important wetland and important Birds Conservation area. The habitat type of the area is Freshwater Swamp and the area is not-officially protected and not defined. Site is known to hold, on a regular basis, > 1% of a biogeographic population of a congregatory water bird species. The wetland is facing siltation due to over-grazing in the catchment area. This is an irrigation reservoir, and the villagers have the right to use water for irrigation. The lake is bordered by three villages- Nanavada, Pipalava and Chikhli. Maximum depth of the lake is 2 m. During the hightide, particularly on full moon and no moon days, tidal water from the Arabian Sea touches the bandhara. Thus, one side of the water body is a large, shallow freshwater lake with moderate vegetation and on the other side the tidal mudflat attracts waterfowl in winter. The maximum water is seen during July and August and minimum during March when the lake is totally dry.

As the farmers of surrounding villages draw the water to irrigate their crops from October onwards, the lake almost dries out by the end of February or March. The farmers use diesel engine or submersible water pumps to draw the water. Birds are the best known and the most easily recognizable of all animals. Panchpipalva Bandhara is also known as Kaj Nanavada Wetland, which is located at a distance of **9.0 km** from the proposed project site towards North-East direction. The Panchpipalva Bandhara is constructed on Sangawadi and Rupen River are near village Panchpipalva of Kodinar Taluka. The Bandhara is implemented with aim to prevent tidal water which enters through the creek and to harvest rain water. The bandhara has 4760 m long earth dam with a 700m long waste weir. Four km approach road leads from Dolasa village to Chikhli village. Terrain around Panchpipalva bandhara site is flat land with some small size hillocks having gentle slope towards the sea. Total seven surrounding villages get benefit from this bandhara which are Nanavada, Malgam, Advi, Panchpipalva, Dolasa, Velva and Chikhli. Except Chilkhi village, all five villages belong to Kodinar Taluka, whereas Chilkhi village belongs to Una taluka. Main occupation of these villages is seasonal agriculture that is totally dependent on this bandhara for water.

(b) Sodam Bandhara

Sodam Bandhara is located on Sodam River. The distance of Sodam Bandhara Barrage from the proposed port boundary is approximately **3.0 km**. The surrounding area of Sodam Bandhara wetland has a gentle slope towards sea. Sodam

bandhara is linked with Panchpipalava Bandhara by a spreading channel with aim to receive water from Panchpipalava Bandhara. This spreading channel provides artificial recharge to aquifer through surface water spreading along a narrow but elongated stretched cannel. This canal is 4.45 km long. Of this length, 2715 m canal passes through waste land, 1340 m passes through cultivated land of Kaj village and 400 m passes through cultivated land of Nanawada village of Kodinar taluka.

3.5.3 Agriculture

The striking feature of the project area is the large portion of the landscape of the study area that is devoted for agricultural practices. Study area is covered with large area of agricultural land **(Plate 3.5.11)**. The agriculture field is interrupted by pastures (*vidis*) and waste land. The agriculture crops grown in the area consist of Groundnut (*Arachis hypogaea*), Pear millet (*Pennisetum typhoides*), Wheat (*Triticum aestivum*) and vegetables such as Methi (*Trigonella foenumgranecum*). Large fields of Cotton (*Gossypium spp*.), Groundnut (*Arachis hypogaea*) and Sugarcane (*Saccharum officinarum*) were observed throughout the area **(Plate 3.5.10)**. Groundnut and Cotton crops were more common in Kaj and Nanawada areas whereas the major crop grown in Kodinar area was Sugarcane. The other major crops of the study area are Pearl millet (*Pennisetum glaucum*) and Wheat (*Triticum aestivum*). Jowar (*Sorghum vulgare*) is also cultivated in the area. Most of the agricultural fields have planted trees such as Nariyal (*Cocos nucifera),* Neem (*Azadirachta indica*), Vad (*Ficus bengalensis*), Badam (*Terminalia catappa*) and Sabaval (*Leucenia leucocephala*). Pulses cultivated in this area are Mag (*Vigna aconitifolia*), Tuver (*Cajanus cajan*).

Bhindi (*Abelmoschus esculentus*) Methi (*Trigonella foenumgranecum*) and Brinjal (*Solanum melongena*) are the vegetables grown in the study area. Fruit yielding varieties observed in the villages were Sitafal (*Annona squamosa*), Tadfali (*Borassus flabellifer*), Papaya (*Carica papaya*), Khajoor (*Phoenix dactylifera*), Jamfal *(Psidium guajava)*, Amali *(Tamarindus indicum)* Mango (*Mangifera indica*) and Chikku (*Achras zapota*)**.** 70% of study area is classified as semi-arid to arid climate. Out of total irrigated area, 16–17% is irrigated by government-owned canals and 83–84% by privately owned tube wells and other wells extracting groundwater. The main agriculture crops grow in the field and the seasonal productivity of crops are shown in **Table 3.5.9, 3.5.10** and **3.5.11** repectively. The common kharif crops grown in the study area are Mung (*Vigna radiata*), Groundnut, Sorghum etc. while the wheat, gram, onions are rabbi crops. Based on report published by Gujarat Ecology Commission, 2011 net sown area in Kodinar taluka is reported to have increased in last few years, indicating improvement in irrigation infrastructure in the study area.

Coastal Vegetation

Mangrove Vegetation

Agriculture Field

Embankment on River Kodinar

Wetland at Kaj

Vegetation on Coastal Area

Plate 3.5.1: Overview of the Study Area

Coconut

Kejari

Ravan Tad

Bargad

Adusa

Saru

Plate 3.5.2: Floristic Characteristics of Study Area

Aak (*Calotropis procera*)

Cassia tora

Ber (*Ziziphus spp.*)

Tat (*Euphorbia tirculli*)

Beach Morning Glory (*Ipoemea pes capre*)

***Salicornia brachita* robx. A salt mass**

Plate 3.5.3: Herbs and Shurbs Observed in the Study Area

Mangroves Vegetation at Kodinar Gujarat

Avicinnea marina

Plate 3.5.4: Mangrove Vegetation (*Avicinnea Marina)* Located Near Velan About 11.4 Km Form Port Boundary in South East Direction

Crow

Peahen

Hoopoe

Grey Headed Bunting

Cattle egret

Ibis

Plate 3.5.5: Terrestrial Avifauna Observed in the Study Area

Red Wattled Lapwing

Black Drongo

Green Bee Eater

Indian Spotted Eagle

Greater Caucal

White Breasted Nuthatch

Plate 3.5.6: Terrestrial Avifauna Observed in Study Area

Fulvous Whistling Duck

Great Egret

Open Bill Stork

Night Heron

Hooded Crane

Black Winged slit

Plate 3.5.7: Migratory Birds Observed in Kaj Wetland

Little cormorant

Crane

White breasted Kingfisher

Pied Kingfisher

Eurasian Coot

Moor Hen

Plate 3.5.8: Migratory Birds Observed At Kaj Wetland Site

Flamingoes Flock at Kaj Wetland

Open Bill Stork Flock at Kaj Wetland Site

Plate 3.5.9: Kaj Wetland and Migratory Birds Observed in the Study Area

(about 7.2 Km From Port Boundary In North East Direction)

Cotton Crop

Castor oil Crop

Sugarcane Crop

Coconut Plantation

Livestock (Sheep)

Livestock (Cow)

Plate 3.5.10: Agriculture and Animal Husbandry in the Study Area

Agriculture Field after Ploughing

Agriculture Field After Harvesting

Sorghum (Jowar)

Pennisetum glaucum (Bajra)

Plate 3.5.11: Agricultural Land in the Study Area

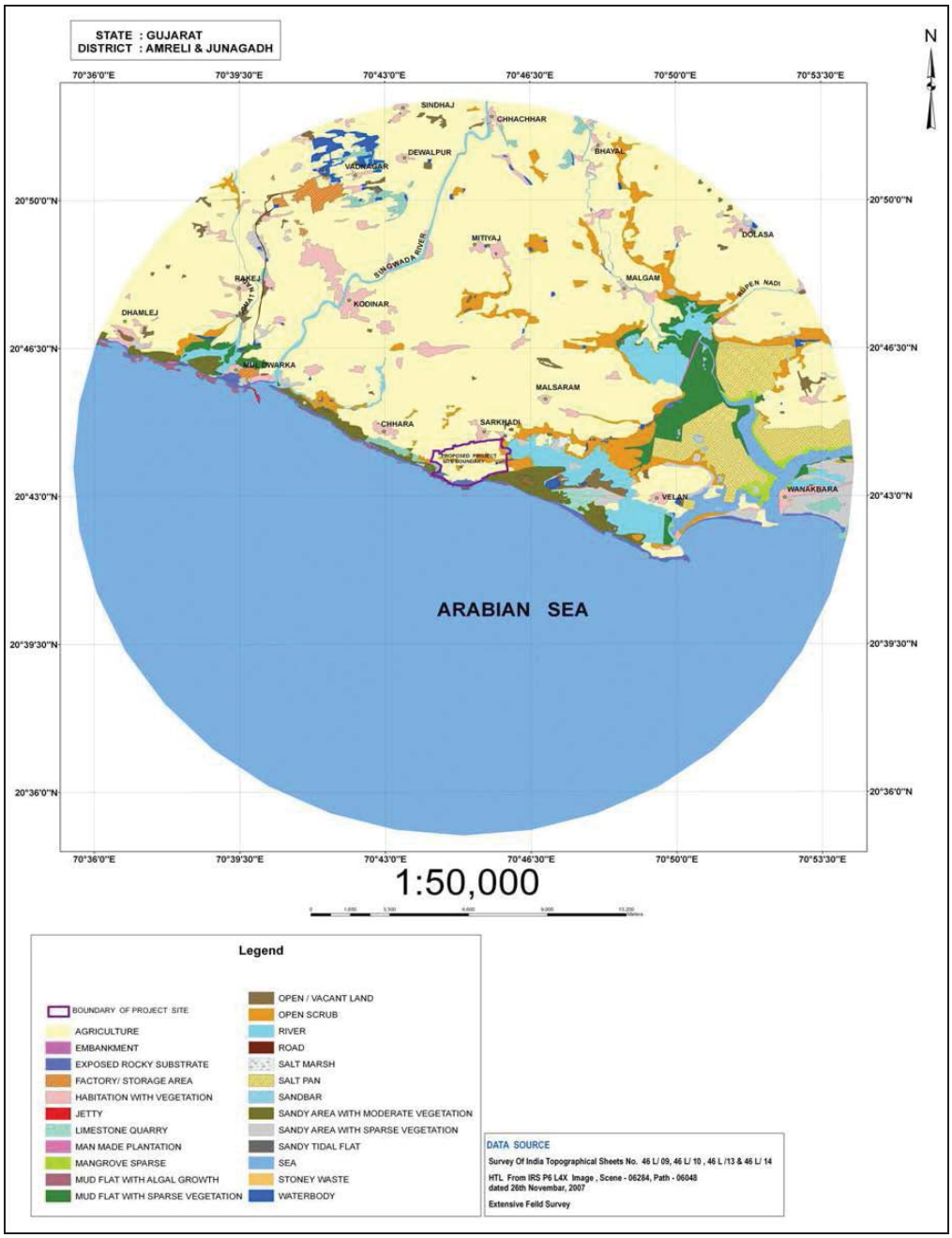


Fig. 3.5.1: Biological Map for Study Area

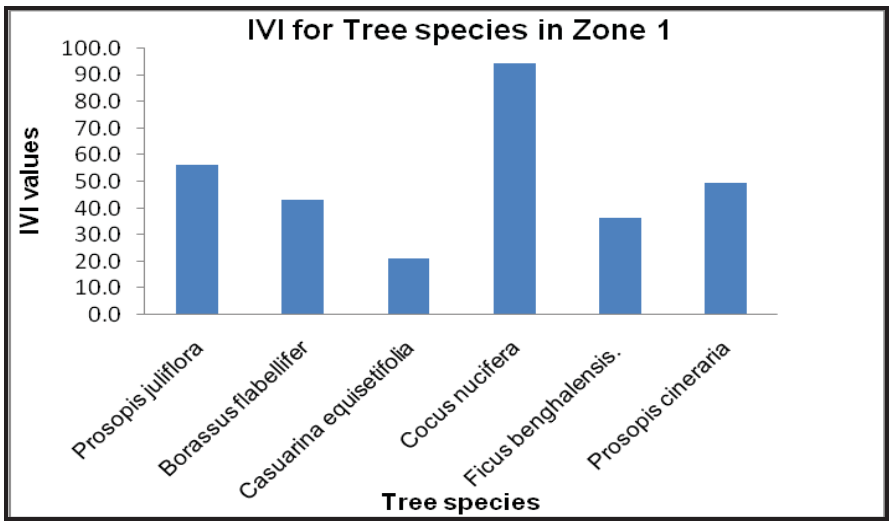


Fig. 3.5.2: Importance Value Index of Important Trees in Zone 1

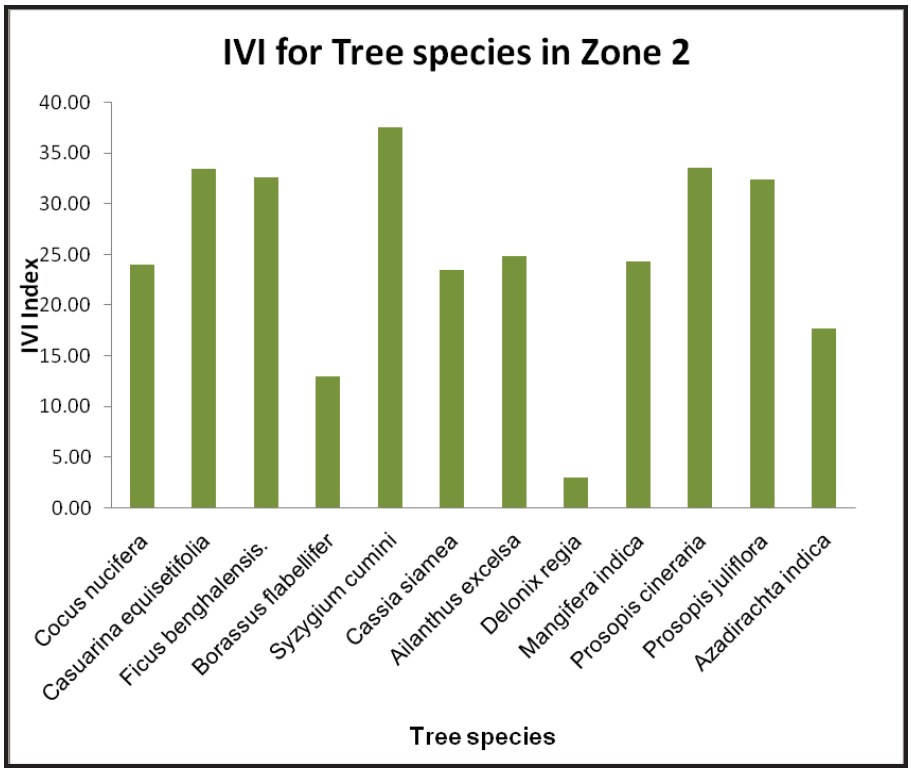


Fig. 3.5.3: Importance Value Index of Important Trees in Zone 2

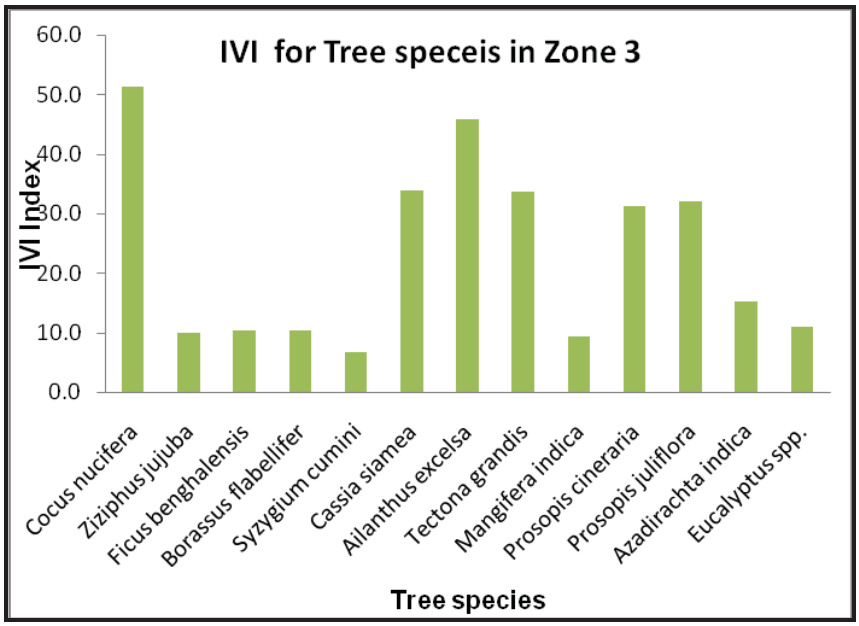


Fig. 3.5.4: Importance Value Index of Important Trees in Zone 3

Table 3.5.1 : Sampling Location for Biological Studies in Charra Village of Kodinar Taluka

Sr. No.	Sample Location	Geographical Position	Distance in km
		Latitude-Longitude	
1.	Malshram	N $20^0$45'10.3" E $70^0$46'58.1"	4 Km
2.	Nanawada	N $20^0$45'49.2" E $70^0$48'19.9"	10 Km
3.	Jantrakhadi	N $20^0$46'44.8" E $70^0$48'18.0"	9.2 Km
4.	Malgaon	N $20^0$47'53.3" E $70^0$48'29.9"	12 Km
5.	Kaj	N $20^0$44'55.3" E $70^0$47'36.0"	7.2 Km
6.	Pipali	N $20^0$44'64.0" E $70^0$45'22.0"	9 Km
7.	Panandar	N $20^0$46'00.9" E $70^0$41'13.2"	4.4 Km
8.	Velan	N $20^0$41'92.6" E $70^0$50'01.5"	11.4 Km
9.	Devali	N $20^0$46'58.3" E $70^0$43'7.5"	4.3 Km
10.	Mul-Dwarka	N $20^0$45'59.4" E $70^0$39'63.5"	6.5 Km
11.	Sarakhadi	N $20^0$44'77.8" E $70^0$42'85.5"	1 Km
12.	Mitiyaj	N $20^0$48'46.5" E $70^0$44'40.9"	8.5 Km
13.	Kadodra	N $20^0$46'19.2" E $70^0$44'10.1"	6.7 Km

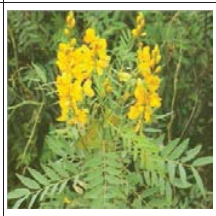
Table 3.5.2 : Forest Area within 10 km Radius from the Project Site

Village Name	Survey No	Area (Ha)	Category of Forest	Approximate Distance from the Port boundary
Sarakhari	587	135.73	Reserve Forest	0.05 km
Chhara	532	228.33	Reserve Forest	0.05 km
Nanavada	207	353.79	Reserve Forest	8.0 km
	207/4	14.01	Reserve Forest	8.0 km
Velan	394 /paiki	82.38	Unclassified	5.0 km
	394/5	43.01	Unclassified	
	384/64	110.72	Unclassified	
	384 /paiki	222.37	Unclassified	
	272/1	67.82	Unclassified	

Source: Forest Department, Junagarh (Gir-Somnath), Secondary information

Table 3.5.3 :Prominent Medicinal Plants Present in the study area

Sr. No.	Common Name	Pictures	Botanical Name	Family	Medicinal Properties
1.	Amla		*Phyllanthus emblica*	Phyllanthaceae	Amla is used to revitalize potency and the digestive system, treat constipation, reduce fever, cough and purify blood. It is a rich source of Vitamin C.
2.	Ashwagandha		*Withania somnifera*	Solanaceae	Ashwagandha is effective for insomnia and it releases stress. It lowers blood pressure.
3.	Bargad		*Ficus benghalensis*	Moraceae	Bargad is effective in curing dysentery and chronic diarrhea. It is also helpful in treating dental problems.
4.	Bel		*Aegle marmelous*	Rutaceae	Bel is used in the treatment of diarrhea, haemorrhoids and hair loss problem. It has anti-microbial property and reduces gastric ulcer.
5.	Ghritkumari		*Aloe vera*	Xanthorrhoeaceae	It has great healing properties and is used in skin burn and wounds. It is effective in the treatment of intestinal worms, indigestion, asthma etc.
6.	Isabgol		*Plantago ovata*	Plantaginaceae	It is used as laxative. It treats diarrhea, constipation, diabetes and acidity

Sr. No.	Common Name	Pictures	Botanical Name	Family	Medicinal Properties
7.	Jeevanti		*Leptidinea reticulata*	Asclpiadaceae	It is used to treat diabetes and its also a remedy for cough. It cures ulcers and diseases of bloods.
8.	Kounch		*Mucuna pruriens*	Fabaceae	It is used in the treatment of nervous disorder and sexual disorder.
9.	Neem		*Azadirachta indica*	Meliaceae	It has anti-biotic and anti-inflammatory properties. It is traditionally used in hair and skin problems.
10.	Safed-musli		*Chlorophytum borivillianum*	Asparagaceae	It is used in curing diabetes, arthritis and increasing body immunity.
11.	Sankhapushpi		*Evolvulus alisinoides*	Convolvulaceae	It is used in improving memory and intellect. It acts as a stress releaser. It is also used in the treatment of sexual disorder.
12.	Senna or Sonamukhi		*Cassia angustifolia*	Fabaceae	It stimulates proper enzyme secretion and purifies blood. It also treats constipation, indigestion osteo-arthritis gout and is used as an laxative.
13.	Shatavari		*Asparagus racemosus*	Asparagaceae	It is used in the treatment of dysentery, hyperacidity, stomach ulcers and bronchial infections. It also cleanses the blood and female reproductive organs.

Source: Personal observations of NEERI team, Local informants, Secondary information

Table 3.5.4 : Faunal Diversity of the Study Area

Sr. No.	Common Name	Scientific Name
	Mammals	
1	Blue bull	*Boselaphus tragocamelus*
2	Chinkara	*Gazella gazelle*
3	Chital/ Spotted deer	*Axis axis*
4	Indian Five Striped Squirrel	*Funambulus pennant*
5	Indian Fox	*Vulpes bengalenis*
6	Indian Hare	*Lepus nigricollis*
7	Indian mongoose	*Herpestes edwadsi*
8	Jackal	*Canis aueus*
9	Jungle cat	*Felis chaus*
10	Langur	*Presbytis entellus*
11	Leopard	*Panthera pardus*
12	Stripe Hyena	*Hyaena hyaena*
13	Wild boar	*Sus scrofa*
	Reptiles	
14	Common Garden lizard	*Calotes versicolor*
15	Indian Chameleon	*Chameleon zeylanicus*
16	Common Monitor Lizard	*Varanus bengalensis*
17	Spotted Supple Skink	*Lygosoma punctatus*

Source: Personal observations of NEERI team, Local informants, Secondary information and documents of Forest Department, Junagarh (Gir-Somnath)

Table 3.5.5 : Mammals Reported from the Study Area

Sr. No.	Order	Family	English Name	Scientific Name	Local Name	Status
1	Chiroptera	Pteropodiate	Short-Nosed Fruit Bat	*Cynopterus sphinx*	Chamachidiyu	LC
2	Primates	Cercopitecidae	Hanuman Langur	*Presbytis entellus*	Hanuman langur	LC
3	Pholidota	Manidae	Indian Pangolin	*Manis crassicaudata*	Kidikhau	R & E
4	Lagomorpha	Leporidae	Indian Hare	*Lepus nigricollis*	Sasloo	LC
5	Rhodentia	Sciuridae	Five striped Palm Squirrel	*Funambulus pennant*	Panch tapkavali Khiskoli	LC
6	Rhodentia	Muridae	Field Mouse	*Mus booduga*	Kshetriya oonder	LC
7	Rhodentia	Muridae	Common House Rat	*Rattus rattus girenis*	Oonder	LC
8	Rhodentia	Muridae	Rock Rat	*Rattus rattus rattus*	Oonder	R
9	Rhodentia	Muridae	Indian Porcupine	*Hystrix indica*	Shahudi	LC
10	Carnivora	Canidae	Indian Fox	*Vulpes bengalenis*	Shiyal	LC
11	Carnivora	Canidae	Ratel or Honey Badger	*Mellivora capensis*	Lonkdi	LC
12	Carnivora	Mustelidae	Small Indian Civet	*Viverricula indica*	Ghorkhodiya	E
13	Carnivora	Viverridae	Commom Mongoose	*Herpestes edwadsi*	Vij	LC
14	Carnivora	Herpestidae	Small Indian Mongoose	*Herpestes auropunctatus*	Noliyo	LC
15	Carnivora	Herpestidae	Stripe Hyena	*Hyaena hyaena*	Noliyo	LC
16	Carnivora	Felidae	Asiatic Lion	*Panthera leo persica*	Jharakh	LC
17	Carnivora	Felidae	Leopard	*Panthera pardus*	Savaj	R & E
18	Carnivora	Felidae	Jungle cat	*Felis chaus*	Jungle biladi	LC
19	Carnivora	Felidae	Desert cat	*Felis libyca*	Rann biladi	LC
20	Artiodactyla	Cervidae	Indian Wild Boar	*Sus scrofa*	Jangli bhund	LC
21	Artiodactyla	Cervidae	Sambar	*Cervus unicolor*	Sambar	LC
22	Artiodactyla	Bovidae	Chital/Spotted Dear	*Axis axis*	Chital	LC
23	Artiodactyla	Bovidae	Chinkara/Indian Gazelle	*Gazella gazelle*	Chinkara	E
24	Artiodactyla	Bovidae	Nilgai/Blue Bull	*Boselaphus tragocamelus*	Rose/Nilgai	LC

E = Endangered; R = Rare and LC = Least Concern

Source: Local informants, Secondary information and documents of Forest Department, Junagarh (Gir-Somnath)

Table 3.5.6 : Details of Reptile Species in the Study Area

Sr. No.	Order	Family	Common Name	Species
1		Trionychidae	Indian flapshell turtle	*Lissemys punctata*
2	Lecertilia	Gekkonidae	Brook house Gecko	*Hemidactylus brookii*
3			Yellow-green house Gecko	*Hemidactylus flaviviridis*
4			Termite hill Gecko	*Hemidactylus triedrus*
5			Spotted ground Gecko	*Geckoella collegalensis*
6		Agamidae	Indian garden lizard	*Calotes versicolor*
7			Fan throated lizard	*Sitana ponticeriana*
8		Chamaeleonidae	Indian chameleon	*Chamaeleo zeylanicus*
9		Scincidae	Spotted supple skink	*Lygosoma punctatus*
10			Keeled grass skink	*Mabuya carinata*
11			Bronz back grass skink	*Mabuya macularia*
12		Varanidae	Bengal monitor	*Varanus bengalensis*
13	Serpentes	Typhlopidae	Brahminy worm snake	*Ramphotyphlopus braminus*
14		Boidae	Common Sand Boa	*Eryx conicus*
15			Red sand boa	*Eryx johnii*
16			Indian Rock python	*Python molurus*
17		Colubridae	Common vine snake	*Ahaetulla nasuta*
18			Brown vine snake	*Ahaetulla pulverulenta*
19			Buff striped keelback	*Amphiesma stolata*
20			Common cat snake	*Boiga trigaonata*
21			Common bronze back tree snake	*Dendrelaphis tristis*
22			Indian trinket snake	*Elaphe Helena*
23			Common wolf snake	*Lycodon aulicus*
24			Bandad kukri snake	*Oligodon arnensis*
25			Streaked kukri snake	*Oligodon taeniolatus*
26			Rat snake	*Ptyas mucosa*
27			Bandad racer	*Argyrogena fasciolata*
28			Dumeril's balck headed snake	*Sibynophis subpunctatus*
29			Chekered keelback water snake	*Xenochrophis piscator*
30		Elapidae	Common Indian Krait	*Bungarus caeruleus*
31			Slender coral snake	*Calliophis melanurus*
32			Spectacled cobra	*Naja naja*
33		Viperidae	Russell's viper	*Daboia russellii*

Source: Local informants, Secondary information and documents of Forest Department, Junagarh (Gir-Somnath)

Table 3.5.7 : Checklist of Bird Species observed near Kaj Wetland during November 2014 and February 2015 within the Study Area

Common Name	Number of Birds
Asian Open Bill *	B
Asian Palm Swift	C
Ashy Crowned Sparrow Lark	A
Alpine Swift	C
Bay-Backed Shrike	B
Barred Button quail	B
Black Drongo *	B
Black Headed Gull *	A
Black-Headed Ibis *	A
Black Ibis *	D
Black Kite *	B
Bank Myna *	D
Black-Crowned Night Heron	A
Bonelli's Eagle	A
Booted Warbler	C
Brown Rockchat	C
Black-Shouldered Kite	A
Barn Swallow	D
Bluethroat Flycatcher	A
Black Tailed Godwit	B
Baya Weaver *	D
Black-Winged Stilt	B
Common Babbler *	C
Common Coot *	D
Common Crane *	B
Comb Duck	D
Common Greeanshank	C
Common Hoopoe *	A
Common Kesteral	C
Common Moorhen *	A
Common Pochard *	B
Common Redshank	B
Clamorous Reed Warbler	C
Curlew Sandpiper	A
Common Snipe	A

Common Name	Number of Birds
Chestnut Shouldred Petronia	C
Caspian Tern	B
Common Sandpiper	C
Common Tern	C
Dusky Crag Martin	B
Demoiselle Crane	D
Eurasian Collared Dove *	B
Eurasian Hobby	A
Eurasian Marsh Harrier *	A
Euresian Spoonbill *	D
Eurasian Sparrowhawk	A
Egyptian Vulture	A
Grey Breasted Prinia *	A
Gull-Billed Tern	C
Great Egret *	A
Gray Francolin	C
Grey Heron *	A
Gray Plover	D
Graceful Prinia	A
Garganey	C
Green Sandpiper	C
Greater Sand Plover	A
Great Tit	A
House Crow *	D
Heuglin's Gull	D
House Swift	D
Indian Bush Lark *	A
Indian Cormorant*	B
Intermediate Egret	B
Indian Nightjar *	A
Indian Peafowl *	B
Indian Pond Heron *	C
Indian Robin *	B
Isabelline Wheatear	A
Jungle Babbler *	D
Jungle Bush Quail	C
Jungle Prinia *	B

Common Name	Number of Birds
Little Cormorant	C
Little Egret *	B
Large Gray Babbler	A
long Legged Buzzard *	A
Little Ringed Plover *	A
Lesser Sand Plover	B
Little Stint	B
Little Tern	A
Long-Tailed Shrike	A
Lesser Whistling-Duck	B
Marsh Sandpiper	A
Pied Bushchat	A
Peregrine Falcon	A
Painted Francolin	A
Purple Heron *	A
Plum-Headed Parakeet *	B
Paddyfield Pipit *	A
Pintail Snipe	A
Painted Stork *	D
Purple Swamphen	C
Red necked Falcon	B
Rock Pigeon *	B
Red Rumped Swallow	B
Red Wattled Lapwing	A
Ruddy Shelduck	A
River Tern	C
Red Throted Flycatcher *	C
Rufous Treepie *	A
Rufous-Tailed Shrike	A
Red-Vented Bulbul *	B
Red-Wattled Lapwing *	D
Spot-Billed Duck *	D
Sarus Crane	A
Shikra *	A
Spotted Redshank	A
Thick-Billed Flowerpecker	A
Tawny Eagle	A

Common Name	Number of Birds
Tree Pipit	A
Variable Wheatear	A
White Browed Fantail	A
White-breasted Waterhen	A
Western Reef Egret	A
Wood Sandpiper	B
Whiskered Tern	B
White Throated Kingfisher *	B
White Wagtail *	A
Yellow-Footed Green Pigeon *	D
Yellow Wagtail	A
Yellow-Wattled Lapwing *	B
Zitting cisticola	A

A= 1-2 birds; B= 3-5 birds; C= 6-10 birds; D= more than 10 birds

Source: Report published by Ecological Profile of Coastal Talukas around Gulf of Khambhat Gujrat Ecology Commission, 2011 and Personal observations of NEERI team*

Table 3.5.8 : Insect Species Observed in the study area

Sr. No.	Order	Common Name	Scientific Name
1.	Hymenoptera	ant	*Solenopsis invicta*
2.	Araneae	grass spider	Tegenaria domestica
3.	Orthoptera	grasshopper	*Chloealtis conspersa*
4.	Apodiformes	humingbird	*Archilochus colubris*
5.	Lepidoptera	least skipperling	*Ancyloxypha numitor*
6.	Mantodea	praying mantis	*Mantis religiosa*
7.	Lepidoptera	luna moth	*Actias luna*
8.	Lepidoptera	red admiral	*Vanessa atalanta*
9.	Lepidoptera	sheep moth	*Hemileuca eglanterina*
10.	Hemiptera	bed bug	*Cimex lectularius Linnaeus*
11.	Orthoptera	carolina locust	*Dissostiera carolina*
12.	Lepidoptera	large wood nymph	*Cercyonis pegala*

Source: Personal Observations of CSIR-NEERI Team

Table 3.5.9 : Production of Yield of different Crops in the study area for Summer 2013-14

Crops	Yield	Total Yield of Junagarh (Gir-Somnath) District
Ground-nut	1200	5195
Bajara	3200	8965
Mung	700	5395
Black-gram	20	1955
Sesame	1200	42100
Vegetables	1400	6745
Sugar-cane	7300	9815
Onion	20	290
Gumguar	0	545
Fodder Crops	2500	20350
Total	**17540**	**101355**

Source: Agriculture Deparment of Junagarh (Gir-Somnath) District with inclusion of data only for proposed project taluka i.e. Kodinar of newly created Gir Somnath District

Table 3.5.10 : Production of Yield of different Crops in the Study Area in Kharif Season 2013-14

Crops	Yield	Total Yield of the Junagarh (Gir-Somnath) District
Ground-nut	22600	386235
Sesam	0	2280
Casto	0	455
Bajara	2350	9905
Pigeon Pea	0	175
Green gram	50	1970
Black gram	50	3345
Cotton	4800	79150
Sugarcane	1700	5080
Vegetable	900	5925
Fodder crop	4100	19395
Gum guar	0	605
Total	**36550**	**514520**

Source: Agriculture Deparment of Junagarh (Gir-Somnath) District with inclusion of data only for proposed project taluka i.e. Kodinar of newly created Gir Somnath District

Table 3.5.11 : Production of Yield of different Crops in the Study Area in Rabi Season 2013-14

Crops	Yield	Total Yield of Junagarh (Gir-Somnath) District
Wheat	16500	205125
Bajara	1700	5095
Sorghum	0	4340
Chickpea	60	12985
Onion	20	5680
Garlic	10	9985
Cumin	0	20335
Coriander	0	26750
Castor	150	875
Mustard	10	120
Sugar-cane	7200	13100
Vegetables	200	8380
Fodder crops	1300	20205
Mung	0	405
Total	**27150**	**333479**

Source: Agriculture Deparment of Junagarh (Gir-Somnath) District with inclusion of data only for proposed project taluka i.e. Kodinar of newly created Gir Somnath District

3.5.4 Aquatic Biology

The present study was conducted to determine the biological indicators of water quality and pollution status at Chhara by biological analysis of Zooplankton and Phytoplankton and Shannon Wiener Diversity Index. **Plate 3.5.12** shows the coastal area of Mul-Dwarka and Fish landing center. The studies were conducted by collecting 12 water samples from pond water, surface water, coastal water, river water, dug water and ground water from nearby village of Chhara.

3.5.4.1 Methods

(a) Phytoplankton Analysis

The Lackey Drop (Micro transect) Count Method (Lackey, 1938; Edmonson, 1963) is a simple method for obtaining counts of phytoplankton with considerable accuracy. Organisms were counted under microscopes in strips on slide from a drop of centrifuged, decanted and concentrated volume of sample and number of individuals of each organism is counted in 45 × magnification. The number is expressed per ml of the sample. The formula is given as:

$$\text{Sp./ml} = \frac{Y \times S \times D \times X}{V}$$

Where,

Y is average number of each organism per strip; it is the number of organisms divided by total number of strips observed for a sample

S is number of microscopic strips in 18 mm length of cover slip

D is number of drops making up for 1 ml in a pipette (number can vary according to type of pipette used)

X is volume of concentrated sample after centrifuging and decanting supernatant water

V is the volume in ml of water used for centrifugation

For studying community structure, the species were grouped in taxonomic classes and the percentages of groups were calculated from total counts of sample.

The diversity was calculated for each community by Shannon Winner Diversity Index. The proportion was obtained by dividing the number of individuals of total number of individuals in a sample for which $\log_2$ proportion is obtained from index table.

$$d = -\sum_{n}(ni/N).\log_2(ni/N)$$

Where,

n : Number of species

N : Total number of individuals of all species

ni : Number of individuals of "i" th species

d : Shannon Winner Diversity Index

(b) Zooplankton Analysis

Zooplankton density is always lesser than phytoplankton density; therefore around 20-50 L of water is passed through plankton net (mesh size 50 µm) to concentrate zooplankton. Entire water is centrifuged, decanted and concentrated to make 2 ml volume for observation in S-R (Sedgwick-Rafter) counting cell. Zooplankton is counted in 10 x magnification. Its number per m^3 is expressed by the formula:

$$Sp./m^3 = \frac{C \times V_2}{V_1 \times V_3}$$

Where,

C : Total number of counted individuals of species in a sample

V_1 : Volume of concentrated sample through plankton net

V_2 : Centrifuged, decanted and contrasted volume of sample in ml

V_3 : Volume of grab sample in m^3 i.e. 20 L/1000

For studying community structure, species are grouped in taxonomic classes and percentages of groups are calculated from total counts of sample. The diversity is calculated for each community by Shannon Wiener Diversity Index (SWDI).

$$d = -\sum_{n}(ni/N).\log_2(ni/N)$$

Where,

n : Number of species

N : Total number of individuals of all species

Ni : Number of individuals of "i" th species

D : Shannon Winner Diversity Index

Where proportion is obtained by dividing the number of individuals of a species by total number of individuals of all species for which $\log_2$ proportion is obtained by Index table (Shannon, 1968).

Sampling location of water bodies and details of water samples are shown in the **Table 3.5.12**.

3.5.5 Assessment of Biological Quality of Water

3.5.5.1 Phytoplankton

The details of water samples for studying phytoplankton community in surface water and ground water for Pre-monsoon season is shown in **Table 3.5.13**. The details of water samples for studying phytoplankton community in surface water and ground water for Post-monsoon season is shown in **Table 3.5.14**. Total algal count during the study period varied in general within 4 families, comprising 25 species (**Table 3.5.16**). Chlorophyceae was most dominant of this report.

The class **Chlorophyceae** was represented by 10 species such as Ankistrodesmus, Cosmarium, Storastrum, Ulothrix, Tetrahedron, Chlorella, Chlamydomonas, Closterium, Chlorococcum, Botrycoccusetc while, **Bacillariophyceae** was represented by 7 species viz. Cyclotella, Nevicula, Nitzschia, Meridian, Cymbella, Synedra, Diatoma while, **Myxophyceae** was represented by 5 species such as Gomphospheria, Anabaena, Scendesmus, Anasystis and Chamaesiphon etc.

Shannon Winner Diversity Index – During the study, the SWDI values varied from 1.093 to 2.75 **Table 3.5.15**. The values of SWDI indicated medium to good levels of plankton biodiversity with low to medium impact of organic pollution or adverse factors.

3.5.5.2 Zooplankton

The details of water samples for studying Zooplankton community in surface water and ground water for Pre and Post-monsoon season is shown in **Table 3.5.16**..

In surface water the SWDI and zooplankton count varies between 0.20-2.32 and total zooplankton count were in the range of 300-500 no/ml **Table 3.5.17**. Total species count during the study period varied in 5 families comprising 26 species. Rotifer was most dominant of this report. The group Rotifer was represented by 13 species such as *Lecane, Lapedella, Nothalca, Herbatraca, Monostyla, Brachionus, Kertella, Fillinia, Tricocera, Rotaria, Macrotrachella, Epiphanes,* Rotifer sp. etc while, Cladocera was represented by 5 species viz. *Sida, Dapnia, Alonella, Moina, Bosmina*, etc. The group Protozoa was represent by 1 species viz. *Arcella.* This indicates that the surface water is Oligotrophic with low productivity.

The SWDI index and Zooplankton count showed the presence in ground water in the range of 1.32-2.94 and 300-10000 respectively. The ground water collected from 8 different places which showed some variability toward the pollution. Samples from village Kodinar, Mul-Dwarka, Chhara, Sarakhadi, Nanawads, Kadodra, Kaj and Mitiyaj showed organic pollution due to dominance of rotifer from Zooplankton whereas remaining water samples had good water quality due to presence of diatoms as a dominant species. Presence of rotifer in all samples and from the SWDI value, it indicates that there was a medium impact of pollution in water bodies. The list of identified zooplankton species is given in **Table 3.5.18**

Plate 3.5.12: Coastal Area of Mul-Dwarka and Fish Landing Center

Table 3.5.12 : Sampling Location for Biological Studies (Pre-monsoon 2014)

Sr. No.	Sample Location	Geographical Position Latitude-Longitude	Distance in km
1.	Malshram	N $20^0$45'10.3" E $70^0$46'58.1"	4
2.	Nanawada	N $20^0$45'49.2" E $70^0$48'19.9"	10
3.	Jantrakhadi	N $20^0$46'44.8" E $70^0$48'18.0"	9.2
4.	Malgaon	N $20^0$47'53.3" E $70^0$48'29.9"	12
5.	Kaj	N $20^0$44'55.3" E $70^0$47'36.0"	7.2
6.	Pipali	N $20^0$45'58.2" E $70^0$42'18.4"	9
7.	Panandar	N $20^0$46'00.9" E $70^0$41'13.2"	4.4
8.	Velan	N $20^0$43'08.8" E $70^0$49'21.1"	11.4
9.	Devali	N $20^0$46'58.3" E $70^0$43'7.5"	4.3
10.	Mul-Dwarka	N $20^0$45'35.1" E $70^0$39'38.5"	6.5
11.	Sarakhadi	N $20^0$45'23.3" E $70^0$45'03.4"	15
12.	Mitiyaj	N $20^0$48'46.5" E $70^0$44'40.9"	8.5
13.	Kadodra	N $20^0$46'19.2" E $70^0$44'10.1"	6.7

Table 3.5.13 : Details of Water Sampling Locations (Pre-monsoon Season)

Sr. No.	Sample Location	Geographical Position Latitude-Longitude
	Surface Water (Costal Water)	
1.	Near village Chhara	N 20^{0}43'59.1" E 70^{0}43'06.8"
2.	Near village Mul-Dwarka	N 20^{0}45'35.1" E 70^{0}39'38.5"
	Coastal Backwater Reservoir	
3.	Sodam Bandhara (Near village Velan)	N 20^{0}43'09.9" E 70^{0}48'50.5"
	River water (River Singhoda)	
4.	Near village Mul-Dwarka	N 20^{0}45'57.6" E 70^{0}40'00.7"
	Ground Water (Dug Well)	
5.	Village Chhara	N 20^{0}44'46.8" E 70^{0}42'44.6"
6.	Village Kodinar	N 20^{0}48'38.7" E 70^{0}41'53.1"
7.	Village Mul-Dwarka	N 20^{0}45'51.5" E 70^{0}40'00.7"
8.	Village Sarakhadi	N 20^{0}45'23.3" E 70^{0}45'03.4"
9.	Village Nanawada	N 20^{0}46'11.8" E 70^{0}48'25.3"
10.	Village Kododra	N 20^{0}46'19.2" E 70^{0}44'10.1"
11.	Village Kaj	N 20^{0}45'06.5" E 70^{0}47'01.1"
12.	Village Mitiyaj	N 20^{0}48'46.5" E 70^{0}44'40.9"

Table 3.5.14 : Details of Water Sampling Locations (Post-monsoon Season - 2014)

Sr. No.	Sample Location	Geographical Position
		Latitude-Longitude
	Surface Water	
1.	Near village Mul-Dwarka	N $20^0$45'35.1" E $70^0$39'38.5"
2.	Near village Chhara	N $20^0$43'57.2" E $70^0$43'05.8"
3.	Sodam Bandhara (Near village Velan)	N $20^0$43'09.8" E $70^0$48'50.0"
4.	Near village Mul-Dwarka	N $20^0$45'56.3" E $70^0$40'19.0"
5.	Village Kodinar	N $20^0$47'49.14" E $70^0$42'00.53"
	Ground Water	
6.	Village Kodinar	N $20^0$48'38.7" E $70^0$41'53.1"
7.	Village Mul-Dwarka	N $20^0$45'51.5" E $70^0$40'0.60"
8.	Village Chhara	N $20^0$44'46.8" E $70^0$42'44.6"
9.	Village Sarakhadi	N $20^0$44'27.0" E $70^0$44'50.8"
10.	Village Nanawada	N $20^0$45'30.2" E $70^0$49'41.9"
11.	Village Kododra	N $20^0$46'20.4" E $70^0$44'10.6"
12.	Village Kaj	N $20^0$45'06.4" E $70^0$47'01.0"
13.	Village Mitiyaj	N $20^0$48'46.4" E $70^0$44'41.1"

Table 3.5.15 : Biological Parameter- Phytoplankton (Pre-monsoon and Post-monsoon, 2014)

Sr. No.	Sampling Locations	Season	Phyto-plankton Sp./ml	Percentage Composition Of Algal Group						Shannon Weiner Diversity Index*
				Chloroph-yceae	Bacillario-phyceae	Myxophy-ceae	Chrysoph-yceae	Euglenoph-yceae	Rhodo-phycae	
	Surface Water (Costal Water)									
1.	Near village Mul-Dwarka	Pre Monsoon	20	86	-	14	-	-	-	1.98
		Post-monsoon	22	91	9	-	-	-	-	1.667
2.	Near village Chhara	Pre Monsoon	8	33	-	50	-	17	-	2.24
		Post-monsoon	8	50	50	-	-	-	-	2.156
	Costal Backwater Reservoir									
3.	Sodam Bandhara (Near village Velon)	Pre Monsoon	14	20	50	20	-	10	-	2.62
		Post-monsoon	9	78	-	-	-	22	-	1.435
4.	Village Kodinar	Post-monsoon	7	86	-	-	14	-	-	1.84
	River Water (River Singhoda)									
5.	Village Mul-Dwarka	Pre Monsoon	13	33	45	22	-	-	-	2.09
		Post-monsoon	12	42	33		25			1.886
	Ground Water (Dug Water)									
6.	Village Kodinar	Pre Monsoon	11	37	50	13	-	-	-	2.75
		Post-monsoon	25	44	52	4	-	-	-	1.198
7.	Village Mul-Dwarka	Pre Monsoon	13	11.1	55.5	11.1	11.1	11.1	-	2.72
		Post-monsoon	7	71	-	-	-	29	-	1.378
8.	Village Chhara	Pre Monsoon	22	25	69	-	-	-	6	2.05
		Post-monsoon	13	62	38	-	-	-	-	1.459
9.	Village Sarakhadi	Pre Monsoon	17	33	50	-	-	17	-	2.43
		Post-monsoon	5	80	-	20	-	-	-	1.522
10.	Village Nanawada	Pre Monsoon	10	43	43	-	-	14	-	2.52
		Post-monsoon	6	100	-	-	-	-	-	1.458
11.	Village Kadodra	Pre Monsoon	17	8	75	-	-	17	-	1.97
		Post-monsoon	14	93	7	-	-	-	-	1.428
12.	Village Kaj	Pre Monsoon	8	33	17	17	33	-	-	2.24
		Post-monsoon	11	82	18	-	-	-	-	1.093
13.	Village Mitiyaj	Pre Monsoon	14	40	50	10	-	-	-	2.44
		Post-monsoon	8	100	-	-	-	-	-	1.406

-: Not detectable

*Ranges of Shannon-Wiener Diversity Index:

<1: indicate maximum impact of pollution or adverse factor

1-2: indicate medium impact of pollution or adverse factor

>2: indicate minimum impact of pollution or adverse factor

Table 3.5.16 : Biological Parameters-Phytoplankton Species (Pre-monsoon and Post-monsoon, 2014)

Family	Species	
	Pre Monsoon	Post-monsoon
Chlorophyceae	*Ankistrodesmus sp.*	*Ankistrodesmus sp.*
	Cosmarium sp.	*Pteromones sp.*
	Storastrum sp.	*Oocystis sp.*
	Ulothrix sp.	*Ulothrix sp.*
	Tetrahedron sp.	*Tetraspora sp.*
	Chlorella sp.	*Chlorella sp.*
	Chlamydomonas sp.	*Chlaymodomonas sp.*
	Closterium sp.	*Coelastrum sp.*
	Chlorococcum sp.	*Botryococcus sp.*
	Botryococcus sp.	
Bacillariophyceae	*Cyclotella sp.*	*Cyclotella sp.*
	Nevicula sp.	*Meridian sp.*
	Nitzschia sp.	*Diatoma sp.*
	Meridian sp.	
	Cymbella sp.	
	Synedra sp.	
	Diatoma sp.	
Myxophyceae	*Gomphospheria sp.*	*Gomphosphoria sp.*
	Anabaena sp.	*Anabaena sp.*
	Scenedesmus sp.	
	Anasystis sp.	
	Chamaesiphon sp.	
Chrysophyceae	*Uroglena sp.*	*Uroglena sp.*
Euglenophyceae	*Euglena sp.*	*Euglena sp.*
	Phagus sp.	
	Trichomonas sp.	
Rhodophyceae	*Rhodomonas sp.*	

Pre-monsoon:

Phytoplankton – Phytoplankton counts observed in water samples from near village Mul-Dwarka and other places such as near village Chhara presented in **Table 3.5.15**. Total algal count during the study period varied between in general 6 family comprising 27 species were observation water sample **Table 3.5.16**. Chlorophyceae was most dominant of this report.

The class **Chlorophyceae** was represented by 10 species such as *Ankistrodesmus, Cosmarium, Storastrum, Ulothrix, Tetrahedron, Chlorella, Chlamydomonas, Closterium, Chlorococcum, Botrycoccusetc while,* **Bacillariophyceae** was represented by 7 species viz. *Cyclotella, Nevicula, Nitzschia, Meridian, Cymbella, Synedra, Diatoma etc.* The class **Rhodophyceae** was represented by 1 species viz. *Rhodomonas.*

Shannon Weiner Diversity Index – During the study, the SWDI values varied from 1.97 to 2.75 **Table 3.5.15**. The values of SWDI indicated medium to good levels of plankton biodiversity with low to medium impact of organic pollution or adverse factors.

Post-monsoon:

Phytoplankton – Phytoplankton counts observed in water samples from near village Mul-Dwarka and other places such as near village Chhara presented in **Table 3.5.14**. Total algal counts during the study period varied between in general 5 family comprising 15 species were observed in water sample **Table 3.5.16**. Chlorophyceae was most dominant of this report.

The class **Chlorophyceae** was represented by 9 species such as *Ankistrodesmus, Pteromones, Oocystis, Ulothrix, Tetraspora, Chlorella, Chlymodomonas, Coelasterum, Botrycoccusetc* while, **Bacillariophyceae** was represented by 3 species viz*. Cyclotella, Meridia,* and Diatoma etc. The class **Chrysophyceae** and **Euglenophyceae** were rarely present and represent by 1-1 species viz*.* ***Uroglena*** and ***Euglena.***

Shannon Winner Diversity Index – During the study, the SWDI values varied from 1.84 to 2.156 **Table 3.5.15**. The values of SWDI indicated medium to good levels of plankton biodiversity with low to medium impact of organic pollution or adverse factors

Table 3.5.17 : Biological Parameter- Zooplankton (Pre-monsoon and Post-monsoon 2014)

Sr. No.	Sampling Location	Season	Zooplankton Sp./m³	Percentage Organism in Groups					Shannon Weiner Diversity Index
				Rotifer	Coelenterate	Cladocera	Copepod	Protozoa	
	Surface Water (Costal Water)								
1.	Near village Mul-Dwarka	Pre-monsoon	500	80	-	20	-	-	2.320
		Post-monsoon	4133.3	61	-	-	39	-	0.964
2.	Near village Chhara	Pre Monsoon	500	80	-	20	-	-	1.921
		Post-monsoon	4933.3	-	-	46	22	-	1.621
	Costal backwater reservoir								
3.	Sodam Bandhara (Near village Velan)	Pre Monsoon	300	100	-	-	-	-	1.584
		Post-monsoon	7733.3	19	-	48	33	-	1.488
	River Water								
4.	Village Mul-Dwarka Village Kodinar	Pre Monsoon	400	50	-	25	-	25	0.20
		Post-monsoon	4400	-	-	85	15	-	0.614
		Post-monsoon	2533.3	26	-	42	32	-	1.557
	Ground Water (Dug Well)								
5.	Village Kodinar	Pre Monsoon	500	80	-	-	20	-	2.320
		Post-monsoon	11333.3	21	-	-	79	-	1.503
6.	Village Mul-Dwarka	Pre Monsoon	700	71	-	-	29	-	2.807
		Post-monsoon	2800	-	-	62	38	-	0.958
7.	Village Chhara	Pre Monsoon	10000	80	-	-	20	-	1.324
		Post-monsoon	-	-	NIL	-	-	-	-
8.	Village Sarakhadi	Pre Monsoon	700	57	-	14.3	14.3	14.3	2.521
		Post-monsoon	1600	50	-	-	50	-	0.432
9.	Village Nanawada	Pre Monsoon	500	40	40	20	-	-	1.921
		Post-monsoon	8266.6	34	-	47	19	-	1.600
10.	Village Kododra	Pre Monsoon	600	67	-	33	-	-	2.248
		Post-monsoon	3600	22	-	11	67	-	1.225
11.	Village Kaj	Pre Monsoon	900	67	22	-	11	-	2.946
		Post-monsoon	2400	22	-	-	78	-	0.765
12.	Village Mitiyaj	Pre Monsoon	300	67	-	-	33	-	1.584
		Post-monsoon	2533.3	42	-	58	-	-	0.982

Table 3.5.18 : Biological Parameters - Zooplankton Species (Pre-monsoon and Post-monsoon 2014)

Groups	Species	
	Pre-monsoon	**Post-monsoon**
Rotifer	*Lecane sp.*	*Monostyla sp.*
	Lapedella sp.	*Brachionus sp.*
	Nothalca sp.	*Kertella sp.*
	Herbatraca sp.	
	Monostyla sp.	
	Brachionus sp.	
	Keratella sp.	
	Fillinia sp.	
	Tricocera sp.	
	Rotaria sp.	
	Macrotrachella sp.	
	Epiphanes sp.	
	Rotifer sp.	
Cladocera	*Sida sp.*	*Latonasetifer sp.*
	Daphnia sp.	*Kurzlaclotissima sp.*
	Alonella sp.	*Ilyocryptussordidus sp.*
	Moina sp.	*Diaphanosomabrachyrum sp.*
	Bosmina sp.	*Moinamicrura sp.*
Copepod	*Diaptomussp.*	*Eucylopusperionophorous sp.*
	Eucalanus sp.	*Cyclops strenus sp.*
	Macrosatella sp.	*Ergasiluschautauqaensis sp.*
	Calanus sp.	*Cyclops sp.*
	Cyclops sp.	*Eucylopusperionophorous sp.*
	Certia sp.	*Cyclops strenus sp.*
Coelentera	*Hydra sp.*	
Protozoa	*Arcella sp.*	

Pre-monsoon:

Zooplankton – Zooplankton counts observed in water samples from near village Mul-Dwarka and other places such as near village Chhara presented in **Table 3.5.17**. Total groups count during the study period varied in general, within 5 families, comprising 14 species (**Table 3.5.18**). Rotifer was most dominant species.

The class **Rotifer** was represented by species such as *Lecane, Lapedella, Nothalca, Herbatraca, Monostyla, Brachionus, Keratella, Fillinia, Tricocera, Rotaria, Macrotrachella, Epiphanes, Rotifer,* while, **Cladocera** was represented by 5 species *viz. Sida, Daphnia, Alonella, Moina and Bosmina etc.* The class **Copepoda** *was represented by 6 species viz. Diaptomus, Eucalanus, Macrosatella, Calanus, Cyclops and Certia.*

Shannon Weinner Diversity Index – During Pre-monsoon, the SWDI values varied from 0.20 to 2.946 (**Table 3.5.18)**. The values of SWDI indicated medium to good levels of plankton biodiversity with low to medium impact of organic pollution or adverse factors.

Post-monsoon

Zooplankton – Zooplankton counts observed in water samples from near village Mul-Dwarka and other places such as near village Chhara presented in **Table 3.5.17**. Total algal counts during the study period varied in general within 3 families, comprising 15 species (**Table 3.5.18**). Chlorophyceae was most dominant species.

The class **Rotifer** was represented by 3 species such as Monostyla, Brachionus, Kertella, while, **Cladocera** was represented by 5 species viz. Latona setifer, Kurzlaclotissima, Ilyocryptussordidus, Diaphanosomabrachyrum, Moinamicrura etc. The class **Copepoda** was represented by 4 species such as Eucylopusperionophorous, Cyclops strenus, Ergasiluschautauqaensis, Cyclops etc.

Shannon Winner Diversity Index – During the study, the SWDI values varied from 1.621 to 0.621 (**Table 3.5.17**). The values of SWDI indicated medium to good levels of plankton biodiversity with low to medium impact of organic pollution or adverse factors.

3.5.6 Fisheries

Fish production during winter season and other oceanographic condition offers good facilities for marine fishing. The main fish available in the district are catla, rohu, mrigal, cat fish and prawns. Pisiculture activities in the district have been undertaken in the coastal as well as inland waters. Local markets of fish in study area showed in crop wise marine fish landing center in Mul-Dwarka and local fishing market in Kodinar as shown in **Plate 3.5.6.1**. The shrimps contributed to maximum catch in marine fish production followed by miscellaneous fishes, Bombay duck, Coilia, Mullet and Shrimps during the year 2011-2012. The study area has a large potential for fisheries. Details of inland and marine fish production for the year 2000-2001 to 2011-2012 are given in **Table 3.5.6.1** and **3.5.6.2**. The sea prawns are abundantly found in the district. The fishing

crafts for fishing in the study area are non-mechanized and small and large boats whereas fishing gears are gill nets, bag nets and cast nets. The species wise inland fish productivity of Junagarh (Gir-Somnath) district is shown in **Table 3.5.6.3** and Species wise marine fish production in district of Junagarh (Gir-Somnath) for year 2011 – 2012 is given in **Table 3.5.6.4**.

There were about 2900 mechanized boats owned by the fishermen families at Mul-Dwarka, nearly half of them being trawlers. Gill netters constituted 42%. Mechanized boats were concentrated more in Junagadh. Other facilities like ice factories, cold storage, freezing plants, frozen storages, fishmeal plants and fish Pulverizes, canning plant, oil extraction plant, boat building yards, service stations and co-operatives are available.

3.5.6.1 Fishery Status of Junagarh (Gir-Somnath) District

The prevailing fishery status of the region is evaluated on the basis of data available from the department of fisheries, Government of Gujarat and experimental fishing undertaken in creeks and Gulf segments during the present and earlier studies. High tidal movements, uneven topography and unusually strong currents make trawling or gill netting for fish difficult and risky in the creeks. Evidently, no large-scale commercial fishing operations prevail in these shallow creeks except for minor shore based hand-net and gill net operations. However, along the northern coast of the Gulf, fishing by trawlers is common particularly off Mandvi, Modhwa, Mundra, Bhadreshwar and Tuna. Depending on the topography of the coast and type of fishing, necessary modifications are made to economize fishing operations by local operators. Small, plank built canoes and traditional crafts like the sail boat which is locally known as “Machuwa” are also deployed for fishing. The gears commonly used by these traditional crafts are drift nets, gill nets and large bag nets. Gujarat is a leading state in marine fish landings and during 2005-06 the local landings were 6.6×10^5 tones. Landings at various centers of the District contribute about 10% to the total landings of the state. The landing of the district, which was around 8.1×10^4 tones during 2002-03, is the highest for the previous 30 years, followed by a decrease during 2003-04, 2004-05 and 2005-06. Recent 7 years composition of fish catch indicates the incidence of 27 different groups, the common groups being small sciaenid, Bombay duck, Coilia, Prawns, Ribbon fishes, Sharks and Shrimps. Month wise composition of fish landings of the district indicates that October-December period is peak season followed by January and September with March-July period as the lean season. The landings at Mundari contribute about 0.6 to 3.9% to the total landings of the district. The composition of fish catch at Chhara indicates incidence of 20 different groups with October to January as the peak landing period.

Composition of fish landings at these centers reveals the occurrence of 21 different groups. Common groups are Bombay duck, Coilia, Mullet, Catfish, Ribbon fish, White Pomfret, Small sciaenid, Shrimps and Prawns. During experimental fishing in April 2010 the fish catch rate varies between 4.3 and 14.7 kg/h (aver. 8.8 kg/h). This catch consists of 48 species of fishes, 9 species of prawns and 7 species of crab, Loligo and Squilla. *Harpadonnehereus, Coiliadussumieri, Johniusglaucus, Arius* sp.

*Polynemustetradactylus, Pampuschinensis, Pampusargenteus, Pomadasyusmaculatum, Sillagosihama, Nematodosanasus, Gerruslucidus, Oligoplites*sp*, Leturacanthussavala and Sparidentexa hasta* wererecorded as the most dominant species. The other common species are *Otolithes*sp*, Polynemustetradactylus, Arius caelatus, Thryssavitrirostris, Pallonaditchella, Caranoxpara* and *Scoliodonlaticaudus*. Prawns are mostly represented by species *Parapenaeopsissculptilis, Exopalaemonstyliferus, Exopalaemonensirostris* and *Metapenaeus,* whereas crabs are presented mostly by *Matutaplanipes* and *Charybdis annulata*. During October 2007, the trawl net catch rate varied between 2.8 and 18.5 kg/h (aver. 9.2 kg/h), which was comparable with that of April 2007 catch. This catch consists of 54 species of fishes, 7 species of prawns and 9 sp. of Crabs, Loligo, Squilla etc. with *Harpadonnehereus, Coiliadussumieri, Polynemustetradactylus, Otolithes*sp*, Ilishamegaloptera, Pampusargenteus, Arius ariva, Liza parsia, Trichiuruslepturus, Johniusvogleri, Arius* sp*, Johniusglaucus*as being the most dominant species.

***Loligo vulgaris* (Loligo)**

Information Collection Regarding Fishes

Fish Sorting

Tilapia Sparrmanii

***Penaeusmonodon* (Prawns)**

***Tenualosailisha* (Palwa)**

Plate 3.5.6.1: Fish Landing Center and Local Fish Market at Mul-Dwarka

Table 3.5.6.1 : Inland and Marine Fish Production of Junagarh (Gir-Somnath) District (2000-01 to 2011-12)

Year											
2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
Inland Fish Production (Production in MT)											
43	127	86	72	169	103	84	51	8	12	17	73
Ponds and Tanks Production (Production in MT)											
24	250	31	3	1	10	34	72	11	18	18	24
Reservoirs Production (Production in MT)											
0	0	0	92	298	311	308	561	115	226	296	412
Marine Fish Production (Production in MT)											
318340	270742	298032	247559	233294	281456	300804	259763	250781	265049	280229	280897

Ref: Fisheries Department of Junagarh (Gir-Somnath) District

Table 3.5.6.2 : Marine and Inland Fish Production of Junagarh (Gir-Somnath) District for the Year 2011-12

Sr. No.	Fish Production (MT)			% Annual Prod. Growth Rate			Value (Lakhs Rs)			Avrg. Price (Rs/kg)	
	Marine	Inland	Total	Marine	Inland	Total	Marine	Inland	Total	Marine	Inland
1.	692488	91231	783719	0.52	6.12	1.14	394488.87	65991	460480	56.97	72.33

Ref: Fisheries Department of Junagarh (Gir-Somnath) District

Table 3.5.6.3 : Specieswise Inland Fish Production of Junagarh (Gir-Somnath) District

Sr. No.	Name of Fish	Fish Production (MT)		% Change in Year 2011-12
		2010-11	2011-12	
1.	Catla	8583	12589	13.80
2.	Rohu	11634	13429	14.72
3.	Mrigal	9901	11851	12.99
4.	Kalbasu	1056	983	1.08
5.	Minor carp	17	7	0.01
6.	Wallago-attu	3198	3206	3.51
7.	Scorpion	336	360	0.39
8.	Murrel	3257	3408	3.74
9.	Catfish	8018	7889	8.65
10.	Bombay duck	314	314	0.34
11.	Clupida/hilsa	816	1933	2.12
12.	Mullets	2587	2083	2.28
13.	Eel	486	727	0.80
14.	Prawn (Shrimp)	2956	3090	3.39
15.	Prawn (Medium)	6559	6310	6.92
16.	Prawn (Jumbo)	138	139	0.15
17.	Bekti	3	0	0.00
18.	Crab	211	223	0.24
16.	Levta	572	586	0.64
17.	Mahasheer	38	12	0.01
18.	Misc.	25292	22092	24.22
	Total	**85972**	**91231**	**100.00**

Ref: Fisheries Department of Junagarh (Gir-Somnath) District

Table 3.5.6.4 : Specieswise Marine Fish Production in Junagarh (Gir-Somnath) DIstrict for the Year 2011-12

Sr. No.	Name of Fish	Production (MT)
1.	White pomfret	1228
2.	Black pomfret	1000
3.	Bombay duck	13130
4.	Thread fin	223
5.	Jew fish	2153
6.	Hilsa	545
7.	Other clupeids	3501
8.	Coilia	674
9.	Shark	5542
10.	Mullet	200
11.	Cat fish	12562
12.	Eel	2298
13.	Leather jacket	1790
14.	Seer fish	3643
15.	Indian salmon	85
16.	Ribbon fish	36908
17.	Silver bar	3604
18.	Perch	5966
19.	Small scieneidies	123233
20.	Shrimp	6708
21.	Prawns (m)	903
22.	Prawns (J)	215
23.	Lobester	174
24.	Crab	5112
25.	Cuttle/squids	15003
26.	Tuna	3372
27.	Carangies/mecarel	6614
28.	Rani fish	4658
29.	Sole	4450
30.	Miscellaneous	15403
Total		**2808975**

Ref: Fisheries Department of Junagarh (Gir-Somnath) District

T.C.