

# THE DHAMRA-CHANDBALI PORT EXPANSION PROJECT, ORISSA, INDIA

## Critique of the Environmental Impact Assessment



By Dr. Paul Johnston & Dr. David Santillo  
Greenpeace Research Laboratories,  
School of Biosciences, University of Exeter  
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Authors: Dr. Paul Johnston & Dr. David Santillo  
Greenpeace Research Laboratories (Greenpeace International)  
School of Biosciences, University of Exeter  
Exeter, EX4 4PS, UK  
Publishers: Greenpeace India, 3360, 13th B Main,  
Indirangar, HAL II Stage, Bangalore, 560 038.  
Tel: +91 80 4115 4861 Fax: +91 80 4115 4862. [www.greenpeaceindia.org](http://www.greenpeaceindia.org)  
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Contact: [ashish.fernandes@in.greenpeace.org](mailto:ashish.fernandes@in.greenpeace.org)

# 1 Introduction

The Dhamra-Chandbali Port Project is far from being a simple expansion of the existing Dhamra fishing port, located some 4km upstream of the river and which can currently handle around 200 mechanised vessels, as well as some 300 traditional craft. By contrast, the proposal involves a large scale development to the north of the existing port, on the area between the existing high and low tide limits. Phase I, to be completed by 2009 will involve construction of 0.7 km of berth space with associated handling facilities for bulk and general cargoes. When fully realised, the project will provide for 13 berths of 18m depth, a dredged channel to this depth and a rail connection to the national rail network. This will make the facility the deepest water port in India, capable of handling vessels up to 180,000 deadweight tonnes.<sup>1</sup>

The traffic potential is likely to be largely determined by the exploitation and export of mineral resources inland together with steel products, and the import of coal for coking and energy generation. It is possible that the port could also serve as an import point for crude oil, though the predominant cargo type is envisaged to be dry bulk.<sup>2</sup> The construction of the channel will involve the construction of constraining dikes and the construction (capital) dredging will require supplementation with periodic maintenance dredging.. It is projected that the dredged material will, in part, be used in reclamation of the tidal areas in which the facility will be located. The total “land take” is estimated at 9,200 acres exclusive of the intertidal area proposed, according to the EIA.

Overall, as noted in Chapter 15 of the Detailed Project Report, the development of the port facility is a key part of a wider policy in Orissa of moving from a predominantly agricultural economy towards increased industrialisation. The developers recognise that this development will have concomitant environmental impacts and these have been the subject of an Environmental Impact Assessment. This Assessment has been used as the basis for the Orissa Pollution Control Board issuing a “No Objection Certificate” to the proposed development. On the same basis, the Principal Secretary Environment & Forest to the Government of Orissa has given the project environmental clearance.

Clearly, this is a large scale development project, and the Environmental Impact Assessment prepared by Kirloskar Consultants Ltd is a key document underpinning the acceptance, in environmental terms, of the proposed development. Accordingly, the Assessment<sup>3</sup> is worth considering in some detail; the remainder of the current document provides a critique of that Assessment.

## 2 Purpose of an Environmental Impact Assessment

Appendix II of the new EIA Notification issued in September 2006<sup>4</sup> by the Ministry of Environment and Forests, Government of India, specifies several considerations to be taken into account by any EIA. While the 1997 EIA and grant of clearance predates this version of the EIA notification, these guidelines have remained relatively constant and are an indication of the basic requirements of a good EIA. Some of the considerations that are more relevant to this particular project, and which have been either neglected or inadequately addressed, are:

### **Land environment**

*1.5 Will the proposal involve alteration of natural drainage systems? (Give details on a contour map showing the natural drainage near the proposed project site)*

*1.6. What are the quantities of earthwork involved in the construction activity-cutting, filling, reclamation etc. (Give details of the quantities of earthwork involved, transport of fill materials from outside the site etc.)*

*1.8. Will the low lying areas & wetlands get altered? (Provide details of how low lying and wetlands are getting modified from the proposed activity)*

### **Water environment**

*2.8. What would be the impact of the land use changes occurring due to the proposed project on the runoff characteristics (quantitative as well as qualitative) of the area in the post construction phase on a long term basis? Would it aggravate the problems of flooding or water logging in any way?*

### **Fauna**

*4.1. Is there likely to be any displacement of fauna- both terrestrial and aquatic or creation of barriers for their movement? Provide the details.*

*4.2. Any direct or indirect impacts on the avifauna of the area? Provide details.*

*4.3. Prescribe measures such as corridors, fish ladders etc to mitigate adverse impacts on fauna.*

Further, the European Community has defined and adopted legislation on the need for Environmental Impact Assessments as enshrined in the relevant council directive (Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment, as amended by Council Directive 97/11/EC). Although not applicable in law to India, this Directive is nevertheless a useful benchmark against which to assess the content of EIAs and Environmental Impact Statements, including those which relate to projects outside the EU. It should be seen as defining the minimum standards required for EIAs globally.

The Directive states in Article 3:

*The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case and in accordance with Articles 4 to 11, the direct and indirect effects of a project on the following factors:*

- human beings, fauna and flora;*
- soil, water, air, climate and the landscape;*
- material assets and the cultural heritage;*
- the interaction between the factors*

*mentioned in the first, second and third indents.;*

Moreover, Article 5 specifies:

*The information to be provided by the developer in accordance with paragraph 1 shall include at least:*

- a description of the project comprising information on the site, design and size of the project,*
- a description of the measures envisaged in order to avoid, reduce and, if possible, remedy significant adverse effects,*
- the data required to identify and assess the main effects which the project is likely to have on the environment,*
- an outline of the main alternatives studied by the developer and an indication of the main reasons for his choice, taking into account the environmental effects,*
- a non-technical summary of the information mentioned in the previous indents.*

### **ANNEX III INFORMATION REFERRED TO IN ARTICLE 5 (1)**

*1. Description of the project, including in particular:*

- a description of the physical characteristics of the whole project and the land-use requirements during the construction and operational phases,*
- a description of the main characteristics of the production processes, for instance, nature and quantity of the materials used,*
- an estimate, by type and quantity, of expected residues and emissions (water, air and soil pollution, noise, vibration,*

*light, heat, radiation, etc.) resulting from the operation of the proposed project.*

*2. An outline of the main alternatives studied by the developer and an indication of the main reasons for this choice, taking into account the environmental effects.*

*3. A description of the aspects of the environment likely to be significantly affected by the proposed project, including, in particular, population, fauna, flora, soil, water, air, climatic factors, material assets, including the architectural and archaeological heritage, landscape and the inter-relationship between the above factors.*

*4. A description (1) of the likely significant effects of the proposed project on the environment resulting from:*

- the existence of the project,*
- the use of natural resources,*
- the emission of pollutants, the creation of nuisances and the elimination of waste, and the description by the developer of the forecasting methods used to assess the effects on the environment.*

*5. A description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment.*

*6. A non-technical summary of the information provided under the above headings.*

*7. An indication of any difficulties (technical deficiencies or lack of know-how)*

encountered by the developer in compiling the required information.

(1) This description should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the project.

The full text of the Directive may be accessed via: <http://eur-lex.europa.eu/LexUriServLexUriServ.do?uri=CELEX:31985L0337:EN:HTML>

Critically, following the production of numerous EIA/EIS documents of questionable quality, the Commission produced additional guidance which can be accessed via: <http://ec.europa.eu/environment/eia/eia-guidelines/g-review-full-text.pdf>

This document *inter alia* considers that a good EIS should contain:

- A clear structure with a logical sequence for example, describing, existing baseline conditions, predicted impacts (nature, extent and magnitude), scope for mitigation, agreed mitigation measures, significance of unavoidable/residual impacts for each environmental topic.
- A table of contents at the beginning of the document.
- A clear description of the development consent procedure and how EIA fits within it.
- Reads as a single document with appropriate cross-referencing.
- Is concise, comprehensive and objective.
- Is written in an impartial manner without bias.
- Includes a full description of the development proposals.

- Makes effective use of diagrams, illustrations, photographs and other graphics to support the text.
- Uses consistent terminology with a glossary.
- References all information sources used.
- Has a clear explanation of complex issues.
  - Contains a good description of the methods used for the studies of each environmental topic.
  - Covers each environmental topic in a way which is proportionate to its importance.
  - Provides evidence of good consultations.
  - Includes a clear discussion of alternatives.
  - Makes a commitment to mitigation (with a programme) and to monitoring.
  - Has a Non Technical Summary which does not contain technical jargon.

The Dhamra EIA can be broadly assessed using these metrics. Superficially, the Detailed Project Report and Environmental Assessments, taken together, appear to meet many of the Indian and European Community criteria given above. Upon more detailed consideration, however, a number of considerable shortfalls emerge, largely relating to the identification, prioritisation and analysis of likely impacts. In order to address the full extent and serious nature of these shortcomings it would be necessary largely to rewrite the EIA in order to provide a more balanced and holistic overview of the likely impacts, together with proposals for their mitigation.

### 3 Environmental Impacts of the Dhamra Port Project

**B**roadly, the environmental impacts of the Dhamra project fall into three categories:

- Firstly, the construction phase of the project will lead to considerable physical disturbance of the environment and overall modification to the existing physical and ecological baseline conditions.
- Secondly, the normal operation of the port will also create impacts due to the loading operations, shipping movements and ship-related activities such as refuelling, engineering and maintenance dredging.
- Finally, impacts may result from non-routine events such as an oil or chemical spill, grounding, collision, or fire and/or explosion either on a vessel or on shore. Obviously the likelihood of such an event will be linked to the mix of activities carried out. For example, if oil, LPG or chemical cargo are being shipped through the port then the risks of a catastrophic incident will be higher as compared to those associated with the handling of largely inert cargoes.

The indirect impacts of the development, by encouraging the development of infrastructure outside the immediate port area and increased exploitation of natural resources in the region as a whole, could extend over a wide area. Accordingly, it is questionable as to whether a study which considers in detail only issues within a 10km radius of the proposed development with more general treatment over a 20km radius is sufficient to capture the full impacts likely to flow from the development. This is particularly the case given the handling of bulk cargoes consisting of coal and iron ore, together with liquid and other specialty cargoes. In order to capture the full spectrum of external impacts of a

development of this scale, the detailed considerations should extend over a radius of at least 30km, particularly in respect of terrestrial transport impacts and impacts related to shipping operations.

#### **i) Consistency of Information**

The information presented in the Environmental Impact Assessment is not entirely consistent with that presented elsewhere in relation to the project. One illustration of this relates to the fundamental data on port capacity. In the Environmental Clearance Report <sup>3</sup>, the port is described as providing for a draft of 14m. In the Detailed Project Report <sup>2</sup> (2-7 to 2-11) the ultimate draft provided for is 16m while the Company website suggests that the capacity will be 18m. While this inconsistency might seem trivial at first, it has a large influence on the expected intensity of operations, since this will govern the size of ships entering the port. At 12m draft, the size of ship accommodated (Panamax size, around 60,000 deadweight tons) is very different to sizes accommodated at 16m draft (essentially small Capesize, too big for the Panama and Suez canals and of typically above 120,000) deadweight tonnes. The EIA (Section 2.4.3) notes that initial draft provided for will be 14m, with the intention to dredge to 16m or deeper in subsequent years to allow the passage of larger vessels. Assuming that the 18m figure (greater than 150,000 deadweight tonnes) is the latest development intention, this has potentially significant implications for the scale and extent of environmental impacts compared to the earlier figures and should be clarified explicitly by a supplementary environmental analysis. Moreover, the EIA

considers two options for the port's location, one on the Kanika Sands itself, and the other on the mainland, before discarding the mainland option in favour of Kanika Sands. The EIA then goes on to evaluate impacts on the basis of the port location on Kanika Sands. However, the project as it is currently being implemented locates the port on the mainland and not Kanika Sands. Such a fundamental discrepancy then calls into question the credibility of the entire EIA as a basis on which to gauge the environmental impacts of the project. (Fig 1, Pg 14)

Similar observations apply to the details given of likely operations at the port. The port is largely projected to handle bulk cargoes, principally coal and iron ore (Detailed Project Report Page 45). However, under Section 9.4 of this report, reference is made to liquid, fertiliser and container cargoes, tank farm facilities and LNG handling facilities, while under Section 8.1, crude and product liquid cargoes are referred to. The precise function of the port facilities is a matter of some importance, since the hazards involved in handling coal, steel and ores are quantitatively and qualitatively very different to the hazards involved in handling generalised mixed container cargoes. The potential hazards associated with crude and product petroleum/chemicals and LNG are potentially very serious indeed, and would require a very different degree of major incident preparedness (emergency plans) to provide health, safety and environmental protection both within the port and in the surrounding area. These further inconsistencies in the content of the report need to be rectified.

The standard of illustration in the document is very poor. Much could be gained by adding various maps and diagrams of the quality available on the developers' website.

## **ii) Hazard/risk analysis and Emergency Plan**

The possibility of a much wider spectrum of activities taking place as development progresses (as noted above) essentially means that the risk assessment carried out and reported in Chapter 6 of the Environmental Impact Assessment is seriously deficient. It considers the major hazard to arise from fire/explosion associated with the storage of fuel oil and diesel oil on the site and the possibility of oil spillage. The maximum credible hazard analysis needs to be re-evaluated to take account of the possibility that chemicals such as pesticides and specialty chemicals may be present in containerised cargo likely to be handled at the facility.

There is one key omission from the hazard/risk analysis undertaken. Given that a significant element of the bulk cargo is projected to be coal, little analysis of the risks associated with this cargo has been made. Bulk coal can ignite spontaneously as a result of oxidation reactions taking place. In addition, the evolution of methane gas in cargo spaces is a potential explosion hazard. Such events, particularly those taking place on board a vessel, can be extremely challenging to bring under control. Given that this is such a well known problem with such cargoes<sup>5, 6</sup> the fact that the EIA does not address it must be regarded as a serious inadequacy.

Fertiliser cargoes and stockpiles can also ignite spontaneously and when burning give off toxic fumes. A recent fire of this type took place off Spain in February 2007.<sup>7</sup> Ammonium nitrate is particularly hazardous. Once again, the failure to consider the potential hazards associated with this cargo group must be considered a serious deficiency of the EIA.

The Environmental Assessment and the Detailed Project Report do not consider the impacts of cyclones in the area. These could have significant impacts upon port operation and safety. Depressions and cyclonic storms are only enumerated for the years between 1891 and 1991. Accordingly, the report does not cover the highly damaging storm event of 29<sup>th</sup> October 1999, with winds of more than 250 Kph, tidal waves rising 7 metres (normal tidal height is 4.75 m above chart datum in the area) and torrential rains. An estimated 10,000 people were killed and many buildings destroyed.<sup>8</sup> A similar event took place in 1971 and, in general, such high intensity storms appear to have an approximate return period of around fifty years, as do major flooding events. Moreover, the intensity of such events may well increase in the future as a result of climate change. Accordingly the omission of any analysis of the impacts of these events upon port operations, together with the lack of an analysis of how the development might affect the severity of the impacts of such events, constitutes a fatal flaw.

A number of events could take place as a result of an intense cyclone, each of which require analysis and accommodation in the emergency plan proposed for the development:

- i) foundering/grounding/collision of vessels in, or in the vicinity of, the port.
- ii) loss of hazardous cargo (chemicals, petroleum products) from both ship and shore areas
- iii) breach of onshore storage containment of bunker oil of LNG

These important potential events are not currently considered in the documentation. The potential impacts of the loss of pesticides carried as part of containerised general cargoes upon fisheries and aquatic resources could be severe and effectively irreversible. A modelling exercise carried out for the English Channel (between the UK and France) suggested that a spill of only 10 tonnes of the organophosphate pesticide pirimiphos ethyl could result in significant contamination over an area of 10,000 square kilometres<sup>9</sup>. If a substantial chemical spill was carried inland in Orissa on a tidal surge, significant impacts could extend to freshwater aquatic resources.

### **iii) Potential Ecological Impacts**

The Baseline Environmental Status presented under Chapter 3 of the EIA should be a key informational element of the overall assessment. Far from being a considered and well structured evaluation, however, it is arguably the weakest element of the information presented. The baseline evaluation restricts itself to detailed study within a 10km radius and lesser consideration of issues within 20km of the development. These distances seem somewhat arbitrary. In approaching the study in this way, the greater part of Bhitarkanika Conservation Area is omitted from consideration. Indeed, a very significant proportion of the mangrove

resources in the Conservation area lie within 25km of the proposed development site. Some lie even closer; for example, the mangroves on the island (Kalibhanj Dian, part of Bhitarkanika Sanctuary) due south of the existing Dhamra fishing port and the particularly rich mangrove assemblage found on the Kanika Sands on a relatively newly formed island. While this area was sampled as one of the four limited sampling sites, its unique vegetation is only mentioned briefly (Page 3-81). Moreover, the Gahirmatha Marine Sanctuary, a globally highly important Olive Ridley turtle nesting area, is also excluded from in-depth consideration, despite lying partly within a 20km radius of the proposed development, with the main nesting beaches less than 15 km. from the port.

In addition, it is inevitable that the port will increase shipping movements in the area and this will inevitably cause increased traffic through offshore areas used by the turtles. This has not been considered within the supporting documentation for the proposed development. While noise has been considered to some degree in the environmental assessment, one key source of noise impacts appears not to have been considered at all. Construction will require piling of the site in order to secure a firm foundation, and this will inevitably lead to high ambient noise levels for some time during construction. Port operation and shipping will also create underwater noise, elevated well above background (and almost certainly above noise levels associated with the more limited fishing activities in the port as it currently exists). Turtles are known to be sensitive to noise<sup>10</sup>, although their precise responses to

increased noise levels remain largely conjectural. Even so, elevated noise may well deter adults from nesting sites and could also lead to other modified behaviour. This needs to be more closely examined. Impacts on aquatic fauna have not been considered at all. Cetaceans are also known to be affected by increased noise levels due to shipping traffic<sup>11,12</sup>. and the waters off the port site are known to harbour several species of dolphins. These aspects need to be examined for the EIA to have any scientific credibility in relation to these potential impacts.

In addition, the EIA does not consider in detail the impacts of the development on the ecological systems which are going to be obliterated by the reclamation and building in the intertidal area. This is a matter of considerable concern. The EIA suggests, on the basis of the map included between Pages 3-72 and 3-73, that in the area to be occupied by the port development, mangrove coverage is sparse or the area is scattered shrub/swampland with only dense mangrove to the north of the area in question. This does not appear to be based upon direct observation. None of the sampling sites addressed this area, which could again be construed as a form of systematic bias in the way the assessment was carried out. Indeed, images posted on the development company website (<http://www.dhamraport.com/images/006.jpg>) clearly show the existence of significant mangrove cover along the coast. This mangrove cover undoubtedly has considerable value in protecting against the impact of storms<sup>13</sup>, but this role is not considered in the EIA.

The impact analysis in relation to the mangroves seems to be predicated upon the fact that no endangered species of mangrove are present in the development area and, therefore, that any impacts will be minimal. Given the ecological value of mangrove as a biological assemblage, and the particular richness of the mangroves in the area, this is an entirely incorrect basis upon which to assess the impacts. In fact, consideration of impacts in terms of endangered species is a common thematic throughout the ecological section of the EIA. Even if it was defensible simply to assess potential impact on this basis, it then begs the question as to why the endangered species and systems present in areas immediately adjacent to the development area (especially turtles) have not been considered.

The port site is an extensive intertidal mudflat zone, and such areas typically sustain a diversity of fish, crustacean, amphibian and reptile species. Development of the port site, as per the latest plans available, will require extensive engineering (landfilling) of the site in order to raise the level, thereby destroying this habitat. The EIA has not dealt with this angle at all. There is in fact no mention of the amount of earth filling that will be undertaken or its impacts, even though this is a basic requirement for the preparation of the port.

On Page 4-11, the assessment asserts that there is little inshore fishing activity in the area and the waters are not considered to be significant spawning or nursery areas. This statement suggests that insufficient baseline survey work has been done in the

area, since estuaries, together with mangroves, tend to be highly important as both spawning and nursery areas. This important aspect needs to be clarified.

Accordingly, the baseline study overall can be regarded as highly inadequate with respect to consideration of true ecological conditions and it is difficult to understand how the Dhamra project could have been approved without detailed consideration of the areas and aspects identified above. The problems are compounded by the facts that the baseline study is predicated upon information obtained from only four sampling sites, as detailed in Section 3.8.5.2., and that many of the supporting references are somewhat old. None of the sites sampled address the baseline situation in the Reserve or Sanctuary areas. Indeed the exclusion of consideration of these areas can be construed as a form of bias in the document.

The process descriptions for port-side operations are, in some respects, quite detailed, particularly in relation to handling systems, rail interfaces and similar. Despite describing these processes, however, the EIA signally fails to take account of potential impacts of these operations upon the wider environment. Similarly, there is a tendency in the document to describe regulatory conditions which apply without describing in detail how these are going to be met.

One further important area which has been neglected in the EIA relates to the impacts of dredging activities during the construction phase and subsequently as part of the maintenance dredging program.

Although the statement that current sediments are largely unpolluted may be

defensible, no baseline data seem to be presented to support this conclusion and no impact is attributed to the current Dhamra port. It is unlikely that historical and ongoing port and related activities in the area have had no impact on levels of contaminants in the local environment. In addition, the analysis of potential for smothering effects and negative impacts of sediment plume formation is extremely superficial. Given the large scale of both capital and maintenance works, the analysis of this needs to be considerably expanded such that the EIA can present a realistic picture of current and likely future impacts.

The estuarine system on which the current Dhamra port operates is a depositional area, as attested by the presence of mangroves, the presence of the Kanika sands and the deltaic nature of the country. Any mobilisation of sediment in these areas will inevitably impact upon sediment dynamics in areas external to the study area. Long term physical modification of benthic communities can take place as a result of dredging and disposal, even of clean sediments.<sup>14</sup>

Moreover, even if it can be shown to be of relatively minor importance now, sediment contamination is an issue of potential future importance. As shipping operations intensify in the area, the levels of contamination will inevitably increase.<sup>15</sup> In addition to metal contamination, a variety of important organic contaminants can also be generated by shipping activity. These contaminants can be mobilised into the wider environment via dredging and dumping activities. No detailed consideration of this is included in the EIA, nor of methods to mitigate the impacts or to

handle the dredge spoils generated in a responsible manner.<sup>16</sup> It is worth noting, in this regard, that India is not party to the London Convention (1972) or its 1996 Protocol, both of which provide for the prevention of marine pollution from the dumping of wastes, including dredge spoils. The extent to which permitting regimes in India provide for similar degrees of impact assessment and precautionary environmental protection is therefore unclear.

Ship operations can also lead to a further significant ecological impact. Discharge of ballast waters can lead to the introduction of alien species,<sup>17</sup> and/or to the release of substantial quantities of ballast water treatment chemicals. The distribution of alien species in ballast water is a serious problem globally, and the Dhamra port project could lead to significantly greater likelihood of damaging invasions of this kind, on a local or regional level. Once again, the EIA does not consider this issue, nor options for treatment or responsible handling of ballast waters which could reduce the risk of introduction of alien species by this means.

Overall, therefore, the poor quality of ecological information comprehensively undermines the EIA. As a particularly egregious example, and one which suggests that the author(s) have little expertise in certain areas, Table 3.27 purports to be a list of endangered species in the study area. Reference to the text on page 3-92 suggests that these are marine zooplankton. It is of some concern, therefore, that each specific name appears to be erroneously spelled, and that in any case, even if these errors

are corrected, each species listed is actually found in freshwater, not seawater. Moreover, the references cited in support of such assertions date back to the 1970s and 1980s. The errors of nomenclature also

extend to other areas of the text.

In short, the level of detail implied by the volume of text coverage of ecological analysis and impacts obscures the fact that this section of the EIA is seriously flawed.

## 4. Conclusions and Recommendations

Consideration of the Dhamra Port EIS and Detailed Project Report indicate some extremely serious omissions and shortcomings in the analysis of impacts. These conspire to undermine fatally the analysis, suggesting in turn that the decision to permit the development may be seriously misguided. The most important problems relate to:

- i) failure to describe fully the baseline ecological conditions (Bhitharkanika, Gahirmatha)
- ii) failure to identify fully the potential ecological impacts
- iii) failure to consider potential extreme weather events and impacts of climate change.

Overall, while many of the issue areas addressed by the report apparently conform

superficially to the requirements of an Indian EIA and perhaps even an EU EIA/EIS, in practice, the level of evidential support and analysis in these documents fall well short of the required standards and of the quality necessary to support an informed and reliable judgment on the suitability and acceptability of the development.

Accordingly, given the national importance of the Bhitharkanika Reserve and the global importance of the Gahirmatha turtle breeding beaches, there is a need for the assessment to be repeated and reworked completely in order to accommodate the issues identified above in a suitably comprehensive manner.

The documents would also benefit from substantial restructuring, correct prioritisation of issue areas, and proportionate analysis based upon this prioritisation.



Fig.1: Map showing discrepancy between port site chosen by the EIA and the one currently being developed.



Fig.2: Map showing distances between port site and Bhitarkanika and Gahirmatha Sanctuaries.

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