

## Review of the Environmental Impacts of the Sethusamudram Ship Canal Project (SSCP)

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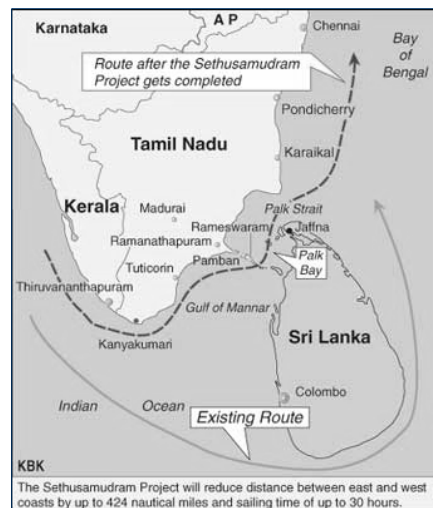
### Introduction

The Sethusamudram Ship Canal Project (SSCP) is a 167 km long shipping canal, and envisages the creation of a navigable canal from the Gulf of Mannar to the Bay of Bengal to facilitate the movement of ships. The proposed SSCP site is located in a globally significant marine ecosystem – the Gulf of Mannar Biosphere Reserve, one of world's richest marine biological resources. A total of 10 true mangrove and 24 mangrove associated species have been recorded from the islands in the Biosphere Reserve (Jeganathan, *et al*, 2006). It has 3,600 species of plants and animals that make it India's biologically richest coastal region (Global Environment Facility, 1999). It is, of course, specially known for its corals, of which there are 117 species belonging to 37 genera (Kelleher, 1995). Out of the 14 species of seagrasses under six genera known from Indian seas, thirteen species occur in the Gulf of Mannar Biosphere Reserve (Venkataraman & Wafar, 2005). And 5 species of sea turtles have been recorded here – olive ridleys, green turtles, hawksbills, leatherbacks and loggerheads. Green turtles and olive ridleys are found in significant numbers and this area serves as an important feeding ground (Bhupathy, 2007).

The project will also adversely affect the Palk Strait between India and Ceylon which is about 75 km-wide, with a water depth of 9-13 m, except where local coral reefs rise above the sea level (Ramesh and Kannupandi, 1997). The Palk Strait is an inlet of the Bay of Bengal. The Palk Strait is 64 km to 137 km wide and 137 km long. The Palk Bay is also considered as one of the five major reef formations in India<sup>1</sup>. A total of 61 species of algae are distributed among the three major groups –

green algae (14 genera and 28 species), brown algae (eight genera and 13 species), and red algae (17 genera and 20 species). Of the 14 species of seagrasses under six genera known from Indian seas, 11 species are known to occur in the Palk Bay (Venkataraman and Wafar, 2005).

The project documents claim that ships moving from the west coast to the east coast of India do not need to navigate around Sri Lanka but can use the channel to save 36 hours of shipping time and 570 nautical miles. It involves dredging in an 89 km-stretch for a width of 300 m and for a depth of 12 m for ships less than 30, 000 DWT (dead weight tonnage) with draft restricted to 10m. The project route is shown below<sup>2</sup>:



The proposed canal has the potential to have very significant consequences on some of the most important marine biodiversity areas of mainland India. The Gulf of Mannar and Palk Bay regions have some of India's richest coral reef ecosystems and are also home to some of the most extensive

<sup>1</sup> Also see [http://envfor.nic.in/report/9798/con\\_nat.html](http://envfor.nic.in/report/9798/con_nat.html)

<sup>2</sup> Source: <http://sethusamudram.tamilar.org/>

and diverse seagrass meadows in the country. Apart from being ecosystems of high productivity and diversity, they perform vital ecosystem functions, protecting coastal systems, and serving as nursery grounds for fish stocks that sustain local fishing communities. Given the shallow nature of the Palk Bay and the Adam's Bridge area, it will require considerable dredging of the sea floor to attain this depth. The Palk Bay is considered to be one of the biggest sediment sinks along the east coast (Chandramohan *et al.*, 2001), and in order to keep the canal open, a certain level of dredging will have to be maintained through the operating life of the canal. These activities will introduce dramatic changes in the marine environment of the Gulf of Mannar and Palk Bay. This article is aimed at evaluating the project planning and design and explore if it has considered the biological diversity of the region as well as predicted the potential environmental impacts of the project on the region. This involved an analysis of all the SSCP documents and relevant literature to arrive at a multi-pronged assessment of the implications of the SSCP. Only some of the key issues of the project are discussed here.

### **Technical aspects in Project Design, EIA and related studies**

For a project such as the Sethusamudram Ship Canal Project (SSCP) to be environmentally sound and well-designed, a full understanding of the project area, its ecology, its environmental processes, the project activities – namely dredging and waste disposal and movement of ships in the region is a must. It has been stated that the navigation channels of ports on the east coast of India face three major and persistent problems (1) Problems due to sedimentation, (2) Problems due to tropical cyclonic disturbances, and (3) Issues related to dumping of dredged material (Ramesh, 2005a). Thus, to arrive at an environmentally sound and well-designed channel, the Sethusamudram Ship Canal Project should have been backed by a complete scientific understanding of the several parameters and factors in the project area, including sub-surface geology, bathymetry, sedimentation process and transport regime in the project, impacts of monsoon, cyclones, storm surges etc., impacts of dredged disposal and impacts on biodiversity and fisheries.

The sub-surface geology and bathymetry help determine the alignment of the canal and the type of dredging required. Once this is known, the sedimentation from the dredging activity as well as dredge disposal can be ascertained. This also determines the amount of capital dredging and its costs. This sediment dispersion can be predicted by knowing the sediment quality (from the sub-surface geology studies) coupled with the modelling of various scenarios of ocean-met and physico-chemical parameters. The scenarios should be based on primary data as well as past historical data. Once this is done the impact of the sedimentation on biodiversity especially reefs can be extrapolated. Sedimentation and transport regimes and factors affecting these determine the level of maintenance dredging required, as well as the possible sites for disposal of dredged material and the environmental impacts of this activity.

### **Sub-Surface Geology, Sedimentation and Disposal**

All documents especially the NEERI EIA (National Environmental and Engineering Research Institute) reflect a poor understanding and information of the sub-surface geology. Consequently, the kind of dredging that is required in this region and its impacts on the environment were not estimated scientifically. Thus the present views on environmental impacts of dredging and disposal of the dredged material in this region is incomplete and is potentially much greater than stated in the NEERI EIA.

The lack of studies and data in the EIA and other documents on the littoral processes and flow characteristics that will affect the channel in the Palk Straits region have been pointed out by many experts (Rajendran 2005a; Rajendran, 2005b; Ramesh, 2004; Ramesh, 2005a; Ramesh 2005b). In fact, critics have pointed out that the NEERI EIA failed to incorporate the information and data from the most important research papers on the sedimentation process in the project area that had been published in peer reviewed science journals after the year 1989 (Ramesh 2004b; Ramesh, 2005a; Ramesh, 2005b). Some of these are Sanil Kumar *et al.* (2002), Ramasamy *et al.* (1998), and Chandramohan (2001). In fact, the L&T Ramboll Detailed Project Report (DPR) observation

(section 4.3.3, page 4-5) on the NEERI Techno Economic Feasibility Assessment Report (TFEAR) is that “the annual maintenance dredging in the Adam’s Bridge area is mentioned to be 0.1 million cu.m in the NEERI report, which is not substantiated by scientific assessments or calculations.”

Though the project area comprises of three distinct water bodies – the Gulf of Mannar, Palk Bay and the Bay of Bengal, which are governed by different forcing factors with respect to the wind and tides, which results in different wave climates and circulation patterns, the NEERI EIA report assessed the maintenance dredging in the Sethusamudram Ship channel based on the silt movement pattern on the east coast and not any data from the project region. Thus one can conclude that the NEERI EIA and other project documents have not addressed the question of sedimentation dynamics comprehensively, rendering the estimates on capital and maintenance dredging conclusion of the modelling studies to be wrong on scientific grounds. This also makes the prediction of the environmental impacts of the dredging and disposal of dredged material incomplete and inaccurate. Furthermore, the exact role of cyclones in influencing the sedimentation pattern has also not been studied in detail (Ramesh, 2005a; Ramesh, 2005b).

The SSCP’s EIA should have included information on suitable disposal sites, since the project is located in an ecologically sensitive area and this activity involves obvious environmental implications. Rajendran further states that the EIA is ambivalent on the identification of sites for environmentally safe disposal of dredged material thus posing an environmental hazard to marine organisms (Rajendran, 2005a; Rajendran, 2005b). There is ample evidence that the NEERI EIA, a decisive document which should have contained critical information on the impacts of the SSCP, does not adequately assess impacts of dredge disposal on the environment. Aspects such as disposal of dredge spoils have implications for the ecosystem and also for the very activity of dredging, which the TFEAR alludes to, in highlighting the costs of dredging (NEERI, 2004b). By deferring such critical and decisive

studies, the project pays short shrift to its own economic and ecological viability.

### Loss of Scheduled / Protected Species

Section 3.2 of the NEERI EIA states that the “Presence of corals along the proposed ship canal alignment is negligible”. Again in Section 1.3 it states, “The corals along the proposed channel alignment in Adam’s Bridge do not exist though major groups of biological resources like sea fans, sponges, pearl oysters, chanks and holothuroids at various sampling points have been recorded.” From the above statements it may be inferred that corals (along with sea fans, sponges, pearl oysters, chanks and holothuroids) though negligible, do exist along the proposed ship canal alignment. Further, the EIA report in section 6.4.1.2 and 6.6 states, ‘Due to dredging, the bottom flora and fauna on an area of about six sq km along the channel alignment in Adam’s Bridge and about 16-17 sq km in Palk Bay/Palk Strait area will be lost permanently. The same is also mentioned on page 12-4 section 12.6.2.3, paragraph 2 of the L&T Ramboll DPR.

Reading the above three points together, it is clear that the dredging activity for the canal will result in the loss of corals, sea fans, sponges and holothurians which are all protected species under the Indian Wild Life (Protection) Act, 1972.<sup>3</sup> This under the WLPA would mandate permission and clearance of the Central Government i.e. Ministry of Environment and Forests (MoEF) (if the species were in Schedule I and from Chief Wildlife Warden of Tamil Nadu for species other than those under Schedule I). There is no evidence that the project authorities even took measures to inform the State Board for Wildlife, or the Chief Wildlife

<sup>3</sup> MoEF (2001), S.O.665 (E), [11/7/2001] - Amendments to Schedule I and Schedule III of the Wild Life (Protection) Act, 1972 (53 of 1972), MoEF, New Delhi.

Available at [http://envfor.nic.in/legis/wildlife/so665\(e\).htm](http://envfor.nic.in/legis/wildlife/so665(e).htm)  
All Corals- Part IV A of Schedule I Entries nos. 1 to 4.,  
All Sea Fans -Part IV A of Schedule I Entries no. 5, All  
Sea cucumbers (All Holothurians) -Part IV C of  
Schedule I Entries no. 1, Sponges - Schedule III Entries  
no. 20

Warden of Tamil Nadu, or the Central Government of the loss of these species by the project activities.

### **Economics of the Project**

Even if the environmental impacts have not been properly evaluated, the project must justify these from the economic benefits that will accrue. A closer look at the financial and economic aspects of the project reveals many glaring gaps. First among them is that the cost savings by ships have not been adequately detailed out and are grossly exaggerated. This is especially true for ships (non-coastal) coming from Europe/Africa or other locations. The fuel savings for many of these ships is actually negative, while the total savings (including reduction in time charter) actually works out to just 30 per cent of what is claimed by the L&T Ramboll DPR for most non-coastal ships. This significantly lower level of savings implies that the tariff that can be charged by SSCP will be much lower than that claimed by the L&T Ramboll DPR. The above three factors have significant revenue implications, as over 60 per cent of these non-coastal ships (which contribute to a projected 70 per cent of the revenue of the project) that 'benefit' will not be willing to pay the amount as claimed in the L&T Ramboll DPR. For argument's sake let us ignore the above gap and assume that ships would use the canal. The project estimates that US \$ loans will have to be repaid at an interest of four per cent, and rupee loans at an interest of eight per cent. These rates might have been accurate when the DPR was prepared; today lending rates hover around eight per cent for dollar loans and 13 per cent for rupee loans. The cost of credit and capital has been grossly underestimated and if current figures are used, the project is likely to drain the Indian economy. The project should either be a revenue earner for the government or serve some larger public purpose (like roads contribute to infrastructural development) and in this case the SSCP does not seem to do either.

### **Conclusion**

This article has summarised several major shortcomings in the EIA and other related documents of the project in terms of adequacy and gaps and methods used to assess environmental impacts, but

more importantly, in terms of data on basic parameters such as sub-surface geology, bathymetry, and sedimentation process in the project area. These data gaps are responsible for the poor design of the project, under-estimations of costs, and the poor assessment of risks, hazards and environmental impacts of the project. Most importantly the project itself admits to the loss of corals, sea fans, sponges, holothurians, which are all protected/scheduled species under the Wild Life (Protection) Act, 1972 for which the proponents failed to seek clearance from the Chief Wildlife Warden and Central Government as required by law. Some of the basic requirements as per the EIA Notification 1994 and guidelines laid down by the MoEF, such as risk analysis/assessment and disaster management plan, have simply not been done. The economic analysis of the project calls for a revised study of economic benefits and reveals that in the present scenario, the project will be a financial white elephant.

In light of the above, one can conclude that the project has not been adequately assessed for the environmental impacts to the biodiversity of the Palk Strait, Palk Bay and the Gulf of Mannar and will have serious impacts and cause drastic changes to the biodiversity of the region. It is likely to also cause major impacts and losses of fisheries and livelihoods to the region. Reviewing the current status of the implementation phase of the project, considerable environmental and economic damage has probably already been done.

*(This article is an abridged version of a few chapters from a more comprehensive report titled 'Review of Environmental and Economic Impacts of the SSCP' by Sudarshan Rodriguez, Jacob John, Rohan Arthur, Kartik Shanker and Aarthi Sridhar which is to be published soon.)*

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