COASTAL ENGINEERING IMPACTS OF THE PROPOSED SETHUSAMUDRAM SHIP CHANNEL PROJECT

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Abstract

Under the Sethusamudram Ship Canal Project (SSCP), the State Government of India will construct a 260 km long shipping canal one section 120 km long from Tuticorin Port to Adam's Bridge, and another 140 km long from Adam's Bridge (North of Rameshwaram) to the Bay of Bengal. Supposedly, it is to be constructed entirely within the territorial waters of India. The canal will have a depth of 12 meters, enabling 10,000 to 12,000 GRT vessels to pass through. During the dredging (estimated to take up to four years), nearly 84 million cubic metres of sand is to be removed from the area. The projected cost of the SSCP is more than USS 1 billion.

The whole idea behind the SSCP is ostensibly to save on the travel time which is usually required to skirt around the south side of Sri Lanka in order to get from an eastern seaport in India to the country's west coast. According to the Daily Mirror of July 11 (which quoted a report in "the Hindu" newspaper) the federal government has projected that savings in fuel costs, once the SSCP is completed, will be between USS 1,700 and US$ 4,100 for vessels with loads of 100-500 metric tones. It is estimated by the Indian Government that it will save Indian Rs 2.15 billion (about USS 50 million) in foreign exchange in the first year of its operation in 2008.

Though there has been a demand from various quarters for the implementation of the project, there is also opposition to it from environmentalists. They point out that the dredging of the Palk Strait and the Gulf of Manner could affect the ecology of the zone by changing currents, which could:

1. Cause changes in temperature, salinity, turbidity and flow of nutrients
2. Lead to higher tides and to more energetic waves, and hence to coastal erosion.
3. Affect the local sea temperature and thereby alter the pattern of sea-breezes and hence affect rainfall patterns.

Hence the main objective of this research study will be:

- To find out the changes in hydrodynamic flow regime
- To identify changes in sediment transport
- To find out possible problems associated with dredged material dispersal and dumping of dredged material
- To Identify possible damages to India and Sri Lanka due to future tsunami For this study MIKE 21 HD, ST, PA models have been used. The basic input to the HD model consists of time series data of predicted water levels in the regional model boundaries, Bathymetry of the area and wind data. In addition to that, field measurement will be required to calibrate the model. But due to lack of filed measurement models are not calibrated to a degree normally expected.

Computations were performed on a nested grid set-up starting from a larger regional model and gradually reducing to smaller models while moving towards the area of interest. Objective of this nested approach is to use known tidal constituents to drive the HD model and to arrive at more accurate and finer grid resolutions towards the area of interest.

The boundary conditions for the larger "Regional Model" were based on the tidal constituents from Kalipinya, Tuticorin Port and Cuddlier Port. South The boundary conditions for the larger

"Regional Model" were based on the tidal constituents from Kalpitiya, Tuticorin Port and Cuddalore Port. Southern boundary conditions were obtained by interpolating the generated tides of Kalpitiya and Tuticorin Port whereas for the northern boundary, generated tide at Cuddalore Port was directly used. Two small and more refined models were nested within this larger model. The simulations within a sub grid model are based on boundary conditions extracted from the immediately higher model. The nested grid set-up, on which the hydrodynamic modeling was performed

The setting up of the hydrodynamic models originated from this "Regional Model" which extends from Kalpitiya/Tuticorin Port in the south, up to Cuddalore Port in the north. The model was set-up with a grid resolution of 1000 m x 1000 m. The size of the model is 200 km x 400 km and The model is oriented with its Y-axis directed 20 degrees westwards.

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Declaration

The work included in the thesis in part or whole has not been submitted for any other academic qualification at any institution.

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LIST OF ABBREVIATIONS

ABBREVIATIONS	EXPANTION
2D	Two Dimensional
ADI	Alternating Direction Implicit
CD	Chart Datum
CSD	Cutter Suction Dredgers
DHI	Danish Hydraulic Institute
EIA	Environmental Impact Assessment
GRT	Gross Registered Tonnage
GOM	Gulf of Mannar
HD	Hydrodynamic
IEE	Initial Environmental Examination
m	Meter
m/s	meter per second
m^3/s	Cubic meter per second
NE	North East
NW	North West
PA	Particle Analysis
PTCS	Pallavan Transport Consultancy Services
SSCP	Sethusamudram Ship Canal Project
ST	Sediment Transport
SW	South West
TSHD	Trailer Suction Hopper Dredgers
W	West