

**COASTAL AND ENVIRONMENTAL IMPACTS  
ARISING FROM MAJOR COASTAL  
INFRASTRUCTURE DEVELOPMENT PROJECTS**

V.A.N. Soysa

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the Degree Master of Science

Department of Civil Engineering

University of Moratuwa

Sri Lanka

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## DECLARATION

“I declare that this thesis/dissertation does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any University or other institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text”.

.....

Signature

V.A.N. Soysa

Department of Civil Engineering

University of Moratuwa

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## DECLARATION

“I have supervised and accepted this thesis for the submission of the degree”

.....

.....

Signature of the supervisor:

Date

Professor S. S. L. Hettiarachchi

Department of Civil Engineering.



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.....

.....

Signature of the supervisor:

Date

Professor S. P. Samarawickrama

Department of Civil Engineering.

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## ABSTRACT

Sri Lanka being an island state, strategically located in the Indian Ocean, has a high potential for the developments of its economy in the coastal zone. During the reason past, there have been major development projects undertaken by the Government of Sri Lanka including the developments of ports, tourism industry and urban development. At the same time, it must be noted and recognised that the coastal zones are environmentally very sensitive and have to be conserved in order for well-being of unique coastal eco-system, This conflict between development and conservation has raised major issues among the environmental protectionist. Such groups have raised concerns of the impacts of development project on the coastal zone. Although many coastal region development projects have been undertaken, hardly any project has been monitored to study its impact on the environment.

In this respect, planned monitoring of Colombo South Harbour (CSH) project, one of the largest engineering projects to be undertaken in Sri Lanka, provided an excellent opportunity to study the impacts arising from appreciable disturbances to the seabed and neighbouring regions. The analysis of this monitoring, which is the major part of this research study identifies the extent of impact arising from mega coastal projects. Both CSH and associated Loading Out Point (LOP) at Wadduwa have therefore been considered, In addition, it focused on the Kirinda Fishery Harbour project, which failed in the first instances as well as after rehabilitation. The impact on vessels manoeuvring during extreme hazardous condition was investigated via the case study of Shimoda port Japan, undertaken by the researcher during a training programme at Port and Airport Research Institute, Japan.

From this research study, it is concluded that no significant coastal environment impacts are raised due to CSH project as far as sea water quality, air quality and suspended particles levels are concerned. However, threshold values for noise levels were frequently exceeded at quarry site. Further, LOP at Wadduwa indicated severe erosion at northern sections, and significant accumulation at southern sections. Observed data and calculations revealed that with the beach nourishment, for duration of a month, still amount of over 900 m<sup>3</sup> of volume for a stretch of 50 m along the coastline, eroded around 0+150 N to 0+500 N and the value decreases to 250 m<sup>3</sup> around 0+750 N to 0+900 N.

From the results of numerical simulations for drifting bodies at Shimoda port, specific locations were identified as the safest and most suitable locations to be developed for berth and moor purposes at Shimoda port minimizing the intensity and probability of collision hazard.

It is expected that detailed research studies will high-light the extent of impacts on the coastal zone of large civil engineering projects which interact with coastal water. Such interaction includes dredging, reclamation, construction of major coastal works, and its impact on livelihood of the coastal community during and after construction.

In the absence of detailed monitoring during and after construction, one would only speculate the long term impacts without cross comparison with prevalent condition away from projects.

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## LIST OF ABBREVIATIONS

|        |   |
|--------|---|
| ABOP   | Air Blast Over Pressure   |
| ANZECC | Australian and New Zealand Environment and Conservation Council |
| BOD    | Biological Oxygen Demand  |
| BS     | British Standards   |
| CCD    | Coast Conservation Department                                   |
| CEA    | Central Environmental Authority                                 |
| COD    | Chemical Oxygen Demand  |
| CSH    | Colombo South Harbour   |
| CSHP   | Colombo South Harbour Project                                   |
| CZMP   | Coastal Zone Management Plan                                    |
| EIA    | Environmental Impact Assessment                                 |
| ICM    | Integrated Coastal Management                                   |
| ISO    | International Organisation for Standards                        |
| LOP    | Loading Out Point   |
| MPCEM  | Master Plan for Coast Erosion Management                        |
| NE     | North-East  |
| NTU    | Net Turbidity Unit  |
| OBS    | Optical Back Scatter  |
| PARI   | Port and Airport Research Institute                             |
| PM     | Particle Matter   |
| SAM    | Special Area Management   |
| SW     | South-West  |
| TSHD   | Trailing Suction Hopper Dredger                                 |
| TSS    | Total Suspended Sediment  |
| UDA    | Urban Development Authority                                     |