COASTAL AND ENVIRONMENTAL IMPACTS ARISING FROM MAJOR COASTAL INFRASTRUCTURE DEVELOPMENT PROJECTS

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Thesis submitted in partial fulfilment of the requirements for the Degree Master of Science

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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”.

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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$^3$ 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$^3$ 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.
# TABLE OF CONTENTS

Declaration of the candidate i
Declaration of the supervisor ii
Acknowledgements iii
Abstract iv
Table of Content v
List of Figures viii
List of Tables xi
List of abbreviations xii

## CHAPTER 1 – INTRODUCTION

1.1 Need of Coastal Infrastructure Development in Global Context 01
   1.1.1 Sea Transportation 02
   1.1.2 Fishing and Aquaculture 03
   1.1.3 Recreational and Tourism 03
   1.1.4 Protection Measurements 04

1.2 Coastal Environmental Management in Global Context 04
   1.2.1 Natural Impacts 05
   1.2.2 Impacts from Population Growth 05
   1.2.3 Impacts from Industries 06

1.3 Need of Coastal Infrastructure Development in Local Context 07
   1.3.1 Orientation and positioning of Sri Lanka 07
   1.3.2 Need of capacity extension 07
   1.3.3 Enhancing the preparedness against natural hazards 08

1.4 Coastal Environmental Management in Local Context 08
   1.4.1 Current status 09
   1.4.2 Future Challenges 10

## CHAPTER 2 - APPROACH TO THE PROBLEM

2.1 Coastal Infrastructure Development in Sri Lanka 11
   2.1.1 Implementation of Policy, Legislations and Management Plan 11
   2.1.2 Coastal Infrastructure Development 14

2.2 Selected Case Studies 17
   2.2.1 Colombo South Expansion Project (CSH Project) 17
   2.2.2 Pothupitiya Loading Out Point (For CSH Project) 18
   2.2.3 Kirinda Fishery harbor 19
   2.2.4 Shimoda Port 20
CHAPTER 3 - COASTAL ENVIRONMENTAL IMPACTS AND MITIGATORY MEASURES

3.1 Coastal and Environmental Impacts
   3.1.1 Coastal Impacts
   3.1.2 Environmental Impacts

3.2 Mitigatory Systems
   3.2.1 Mitigation by Design
   3.2.2 Mitigatory Measures

3.3 Compliance Monitoring

3.4 Impact Monitoring

CHAPTER 4 - COLOMBO SOUTH PORT EXPANSION PROJECT

4.1 Design features of the breakwater
   4.1.1 Design against Failures
   4.1.2 Mitigation by Design

4.2 Hydraulic Performances of the break water

4.3 Impact Monitoring
   4.3.1 Water Quality
   4.3.2 Suspended Sediment Levels
   4.3.3 Noise Levels
   4.3.4 Air Quality
   4.3.5 Settlements

4.4 Impact Monitoring Data and Analysis
   4.4.1 Water Quality
   4.4.2 Suspended Sediment Levels
   4.4.3 Noise Levels
   4.4.4 Air Quality
   4.4.5 Settlements

4.5 Results

CHAPTER 5 - WADUWA LOADING OUT POINT AND QUARRY SITE

5.1 Impact Monitoring
   5.1.1 Water Quality
   5.1.2 Noise Levels
   5.1.3 Air Quality
   5.1.4 Ground Vibration
   5.1.5 Shore Profile Variation

5.2 Impact Monitoring Data and Analysis
   5.2.1 Water Quality
   5.2.2 Noise Levels
   5.2.3 Air Quality
   5.2.4 Ground Vibration
   5.2.5 Shore Profile Variation

5.3 Results
CHAPTER 6 - KIRINDA FISHERY HARBOUR 71
6.1 Background and Rehabilitation 71
6.2 Investigations and Findings 72
6.3 Results 77

CHAPTER 7 - SHIMODA PORT, JAPAN 78
7.1 Background 78
7.2 Numerical Simulation 79
  7.2.1 Scenario One (I) 80
  7.2.2 Scenario Two (II) 80
7.3 Numerical Model Set up 81
7.4 Simulation Results and Discussion 81
  7.4.1 Scenario One (I) with two parts 81
  7.4.2 Scenario Two (II) with four parts 84

CHAPTER 8 - DISCUSSION AND CONCLUSIONS 91
8.1 Discussion 91
8.2 Conclusions 92

References 94
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1.1</td>
<td>Coastal population and shoreline degradation</td>
<td>5</td>
</tr>
<tr>
<td>Figure 1.2</td>
<td>Coastal Zone Boundaries</td>
<td>9</td>
</tr>
<tr>
<td>Figure 1.3</td>
<td>Legal Boundaries of Sri Lankan Coastal Zone</td>
<td>9</td>
</tr>
<tr>
<td>Figure 2.1</td>
<td>Fishery Harbours and Anchorage Points in Sri Lanka</td>
<td>15</td>
</tr>
<tr>
<td>Figure 2.2</td>
<td>Layout of proposed Colombo port south development project</td>
<td>17</td>
</tr>
<tr>
<td>Figure 2.3</td>
<td>Layout of Pothupitiya Loading Out Point</td>
<td>18</td>
</tr>
<tr>
<td>Figure 2.4</td>
<td>Layout of Kirinda Fishery Harbour</td>
<td>19</td>
</tr>
<tr>
<td>Figure 2.5</td>
<td>Port area of Shimoda, Japan</td>
<td>20</td>
</tr>
<tr>
<td>Figure 4.1</td>
<td>Significant failure types of a breakwater</td>
<td>32</td>
</tr>
<tr>
<td>Figure 4.2</td>
<td>Toe and Berm for a breakwater</td>
<td>33</td>
</tr>
<tr>
<td>Figure 4.3</td>
<td>Wave energy components at a breakwater</td>
<td>34</td>
</tr>
<tr>
<td>Figure 4.4</td>
<td>Sampling locations for water quality monitoring</td>
<td>36</td>
</tr>
<tr>
<td>Figure 4.5</td>
<td>Suspended sediment level monitoring locations</td>
<td>37</td>
</tr>
<tr>
<td>Figure 4.6</td>
<td>Noise level and air quality monitoring locations</td>
<td>39</td>
</tr>
<tr>
<td>Figure 4.7</td>
<td>Selected structures for settlement monitoring</td>
<td>40</td>
</tr>
<tr>
<td>Figure 4.8</td>
<td>Water Quality Parameters (I) at CSH</td>
<td>41</td>
</tr>
<tr>
<td>Figure 4.9</td>
<td>Water Quality Parameters (II) at CSH</td>
<td>42</td>
</tr>
<tr>
<td>Figure 4.10</td>
<td>Water Quality Parameters (III) at CSH</td>
<td>43</td>
</tr>
<tr>
<td>Figure 4.11</td>
<td>Total Suspended Sediment Levels at monitoring locations in CSH</td>
<td>44</td>
</tr>
<tr>
<td>Figure 4.12</td>
<td>TSS levels variations with respect to the mean values</td>
<td>45</td>
</tr>
<tr>
<td>Figure 4.13</td>
<td>Monitored Noise levels at CSH</td>
<td>47</td>
</tr>
<tr>
<td>Figure 4.14</td>
<td>Air quality measurements at CSH</td>
<td>48</td>
</tr>
<tr>
<td>Figure 5.1</td>
<td>Water Quality Monitoring Locations at LOP</td>
<td>51</td>
</tr>
<tr>
<td>Figure 5.2</td>
<td>Noise levels and Air Quality monitoring locations</td>
<td>52</td>
</tr>
<tr>
<td>Figure 5.3</td>
<td>Ground Vibration monitoring locations</td>
<td>54</td>
</tr>
<tr>
<td>Figure 5.4</td>
<td>Water Quality Parameters (I) at LOP</td>
<td>55</td>
</tr>
<tr>
<td>Figure 5.5</td>
<td>Water Quality Parameters (II) at LOP</td>
<td>56</td>
</tr>
</tbody>
</table>
Figure 5.6 - Water Quality Parameters (III) at LOP

Figure 5.7 - Monitored Noise Levels at LOP

Figure 5.8 - Monitored Noise Levels at Quarry site

Figure 5.9 - Air Quality Measurements at LOP

Figure 5.10 - Air Quality Measurements at Quarry site

Figure 5.11 - Blasting Monitoring at Quarry site

Figure 5.12 - Statistical distribution of Ground Vibration (top) and Air Blast Over Pressure (below)

Figure 5.13 – Southern part view of LOP at the breakwater, initial beach condition in July (left) and accumulated sediment condition in October (right) 2008.

Figure 5.14 - Northern part view of LOP, beach condition in August (left), September (middle) and October (right) 2008.

Figure 5.15 - Shoreline changes around LOP

Figure 5.16 – Shore profile variation adjacent to Northern section

Figure 5.17 - Selected Shoreline profiles during March and April 2009

Figure 5.18 - Shore profile variation at Northern LOP

Figure 5.19 - Accumulation or Erosion for unit length at each section at 500 m interval.

Figure 6.1 - Kirnida Fishery Harbour layout with orientation of structures

Figure 6.2 - Contour map at Kirinda Fishery Harbour premises, surveyed in 1994 (top) and 2004 (bottom)

Figure 6.3 - Siltation volumes and flowering pattern

Figure 6.4 - Bathymetry data November 2004 (left), February 2005 (middle), and November 2005 (right)

Figure 7.1 – Aerial View on Shimoda Port

Figure 7.2 - Positions of floating bodies for Scenario Part 1 (top) and Part 2 (bottom)

Figure 7.3 - Topography features at Shimoda Port

Figure 7.4 - Selected four locations for Scenario 2 simulation

Figure 7.5 - Position of floating bodies (left), wave details (right) at t=0 min (top), t=60min (middle), t=120 min (bottom) S1_PI

Figure 7.6 - Position of floating bodies (left), wave details (right) at t=0 min (top), t=60min (middle), t=120 min (bottom) S1_PII
Figure 7.7 - Position of floating bodies (left), wave details (right) at t=0 min (top), t=60min (middle), t=120 min (bottom) S2_PI

Figure 7.8 - Position of floating bodies (left), wave details (right) at t=0 min (top), t=60min (middle), t=120 min (bottom) S2_PII

Figure 7.9 - Position of floating bodies (left), wave details (right) at t=0 min (top), t=60min (middle), t=120 min (bottom) S2_PIII

Figure 7.10 - Position of floating bodies (left), wave details (right) at t=0 min (top), t=60min (middle), t=120 min (bottom) S2_PIV
LIST OF TABLES

Table 2.1 - Length of existing coast protection structures by coastal sector 15
Table 4.1 - Noise level monitoring locations 38
Table 5.1 - Noise Level Monitoring Stations 52
Table 7.1 - Details of drifting bodies with major displacements for Scenario Two (II) 89
Table 7.2 - Floating bodies with major displacements 90
## LIST OF ABBREVIATIONS

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