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IMPACT OF MARINE OIL SPILLS TO SRI LANKA AND IT'S NUMERICAL MODELLING

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This thesis was submitted to the Department of Civil Engineering of the University of Moratuwa in partial fulfilment of the requirement for the Degree of Master of Science.

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Sri Lanka
August 2004

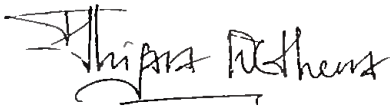
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Declaration

The work described in this thesis has carried out in the Department of Civil Engineering, University of Moratuwa, Sri Lanka, under the supervision of Prof. S.S.L. Hettiarachchi and Dr. S.P. Samarawickrama.

The author wishes to declare that, except for commonly understood ideas, or where specific reference has made to the work of authors, the content of thesis has his original work and include nothing, which is the outcome of work done in collaboration. The work has not been previously submitted, in part or in whole to any other university for any degree, diploma or any other qualification.



T. Welhena

October 2004

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Abstract

Over the last couple of decades there has been a growing concern regarding the marine pollution due to spill of oil from ship operations and accidents. This is because the oil spills have devastation and obnoxious effect on marine ecology, which may not be recovered. Hence, there is a need for analyzing or predicting the movement of spilled oil slicks.

The occurrence of oil spills is fundamentally a matter of probability. There is no certainty regarding the amount of oil that would be transported, or the size or likelihood of a spill that would occur, during the period where the predication is carried out. Neither can the winds and ocean currents that transport oil spills be known for certain. A probabilistic event such as an oil-spill occurrence or oil-spill contact to an environmentally sensitive area cannot be predicted with certainty. Only an estimate of its likelihood (its probability) and the vulnerability of such sensitive resources can be quantified.

Such estimations can easily be done with the help of advanced computer modelling techniques. Numerical models have various aspects and various modelling methods based on the level of the accuracy required by the purpose it is being used.

In this study, impact of marine oil spills to South west coast of Sri Lanka has been investigated using available numerical modelling techniques combined with a set of available environmental data. The extensive amount of modelling work was carried out in areas where the overall sensitivity of the coastal zone is high.

OILMAP _4, an oil spill probability and fate model developed by Advanced Science Associates of USA has been used for all the modelling work and in house model developed by Wijeratne (1997) was used for exploring the numerical modelling techniques.

Having identified the areas most exposed to potential oil spills, the methodology was proposed to assess risk involved in each area by a method of risk score allocation. Such a scoring method directly reflects the level of attention need to pay regarding preventive measures and planning for response operations.

Based on the results of modelling and risk assessment there is a strong and urgent demand for well prepared plan to meet those circumstances. Hence scope of the study is extended to identify the requirement of an oil spill contingency management plan and its development guidelines.

Acknowledgement

This report is an outcome of full time research based masters degree programme in engineering conducted in the department of civil engineering, university of Moratuwa from 2003 Aug to 2004 Aug. I put my fullest attempt in order to achieve this exercise a successes. Even though this report was produced by me as a post graduate student there were lots of academic members, individuals and organizations involved in the entire process in national scale. All supervisors, examiners and other colleagues who not only made provisions for the ease of my research activities but also gave very good constructive criticisms to improve whole process are highly regarded.

First and foremost I would like to pay my sincere gratitude to professor S.S.L Hettiarachchi, as my supervisor and Dr. S P Samarawickrama, as my second supervisor from University of Moratuwa for their for their remarkable supervision throughout the study period.. Especially to Dr. Samarawickrama, this whole attempt would not have been a success without your tireless effort and invaluable guidance right through out the programme.

Secondly I would like to express my sincere thanks to my external supervisor Dr. NMT Wijeratne from Faculty of Engineering University of Ruhuna for your invaluable information in numerical modelling and true dedication for examining me even coming from Galle.

Also I should obliged to my external examiner Dr. AGT Sugathapala, for your kind intervention in examining this programme and supervising right through out.

I should specially thank all my supervisors and examiners for their invaluable co-operation in correcting this report event at a short notice and short period of time.

This is a project fully sponsored Asian Development Bank funding programme for higher studies in Sri Lanka. All the financial support was given to me by the ADB funding programme and provision of facilities and coordination given to me by the Director of the postgraduate studies. So my heartiest thank should go to Prof (Mrs.) M.N. Ratnayake and her supportive staff members.

Finally my grateful thank goes to all the colleagues who shared coastal research room with me for their advice and encouragement and all the non –academic staff members for their various supports and any other whose names I couldn't mention. I should also remind the Capt. O.L. Samaranayake for his kind support in developing real life scenarios for modelling.

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Content

Declaration	i
Acknowledgementii
Abstractiii
Contentsiv
List of Figuresxi
List of Tablesxiv
Abbreviationsxvi.
Chapter 1: Introduction	
1.1 Basis of the study.....	01
1.2 Purpose and objective of the study.....	.02
1.3 Prediction of Oil in the sea.....	02
1.4 Numerical Models used for the study.....	.03
1.5 The identification and assessment of risk of oil spills.....	.03
1.6 Decision making.....	.04
1.7 Planning for the risk.....	.04
1.8 Literature Review.....	.05
Chapter 2: Numerical Modelling of Marine Oil Spills	
2.1 Introduction.....	.06
2.2 Computer Modelling.....	.06
2.2.1 Tactical (emergency) spill response.....	.07
2.2.2. Strategic (contingency) planning.....	.07
2.2.3 Post-Spill assessment.....	.07
2.3 Mechanism of Oil Spill Modelling.....	.08
2.3.1 Hydrodynamic Behaviour.....	.08
2.3.2 Weathering.....	11
2.4 Numerical Modelling Approaches.....	16
2.4.1 General.....	16
2.4.2. Numerical Modelling.....	16
2.4.3. Application of FDM's in oil spill modelling.....	17
2.5 Summary	20
Chapter 3: Environmental Data	
3.1 Data Requirements.....	21
3.2 Oilmap Database.....	21
3.3 Environmental Parameters relevant to Sri Lanka.....	22
3.3.1 Wind.....	22
3.3.2 Tides.....	22
3.3.3 Ocean Surface Temperature.....	23

3.3.4 Ocean Currents.....	23
3.3.5 Waves.....	23
3.4 Review of Available Data.....	23
3.4.1 Wave Data.....	23
3.4.2 Wind Data.....	24
3.4.3 Current Data.....	24
3.5 Conclusion and recommendation.....	24

Chapter 4: Oil Spill Modelling

4.1 Introduction.....	30
4.2 Modelling Criteria.....	32
4.2.1 Advection.....	32
4.2.3 Diffusion.....	33
4.2.4 Spreading.....	33
4.2.5 Evaporation.....	33
4.2.6 Entrainment.....	33
4.2.7 Emulsification.....	33
4.2.8 Shoreline deposition.....	33
4.3 Data Required.....	34
4.3.1 Grids.....	34
4.3.2 Wind.....	34
4.3.3 Currents.....	34
4.3.4 Oil Properties.....	34
4.4 Modelling Options.....	36
4.4.1 Stochastic Model.....	36
4.4.2 Oil spill trajectory and fates model.....	39
4.4.3 Receptor Model.....	39
4.4.5 Subsurface Model.....	39
4.5 Model Setup.....	40
4.5.1 Defining the Land Water Grid.....	40
4.5.2 Identification of the type of model.....	40
4.5.3 User input of Spill information.....	40
4.5.4 Selecting relevant environmental data.....	42
4.5.5 Defining model parameters.....	42
4.5.6 Selecting model options.....	43
4.5.7 Running the model and viewing the results.....	44
4.6 Incorporation of Additional Information.....	45
4.6.1 Editing and Importing Environmental data.....	46
4.6.2 Importing external geographical / physical information as GIS shape file.....	47

4.6.3 Incorporation of Response tools.....	48
4.6.4 Reviewing oil data.....	49
4.7 Modelling for Initial Screening of points along the South–West Coast.....	49
4.7.1 Modelling Locations.....	49
4.7.2 Objectives and Modelling Criteria.....	51
4.7.3 Input Data.....	51
4.7.4 Results obtained.....	52
4.7.5 Selected Case Studies.....	55
4.8 Conclusions.....	58
4.8.1 Modelling.....	58
4.8.2 Input Data.....	59

Chapter 5: Oil Spill Modelling for High Probable and High Sensitive Areas

5.1 Introduction.....	60
5.2 Modelling for High Risk Areas.....	61
5.2.1 Spill Information.....	61
5.2.2 Data.....	61
5.2.3 Options and parameters.....	61
5.3 Modelling for High Sensitive Areas.....	66
5.3.1 Negombo.....	66
5.3.2 Beruwala.....	68
5.3.3 Hikkaduwa.....	69
5.3.4 Unawatuna.....	71
5.3.5 Rekawa.....	73
5.3.7 Hambantota.....	74
5.4 Trajectory Modelling for High Risk/High Sensitive Areas.....	76
5.5 Conclusions.....	81

Chapter 6: In House Oil Spill Model 83

6.1 Introduction.....	83
6.2 Modelling criteria.....	83
6.3 Hydrodynamic Behaviour.....	83
6.3.1 Drifting of the Oil Slick.....	84
6.3.2 Spreading of Oil Slick.....	85
6.3.3 Shore Line Deposition.....	85
6.4 Weathering.....	86
6.4.1 Evaporation.....	86
6.5 Model Setup.....	86
6.5.1 Data.....	87

6.5.2 Model Boundaries.....	87
6.5.3 Model execution.....	87
6.6 Model Applications.....	90
6.6.1 Scenario Information.....	90
6.6.2 Oil spill Model Information.....	91
6.6.3 Observations and Comparison.....	92
6.7 Conclusions and Recommendations.....	92

Chapter 7: Guideline for Identification of Possible Risk and Resources Affected

7.1 Definition of risk.....	98
7.2 Rationale of identification of the risk.....	98
7.3 Methods available in identifying the risk.....	99
7.3.1 Consequences.....	99
7.3.2 Type of operations carried out.....	99
7.3.3 Information on naval traffic.....	99
7.3.4 Accident history.....	100
7.3.5 Ability to implement response operations and cost of cleaning.....	100
7.3.6 Predictions through numerical models.....	100
7.4. Procedure for risk identification.....	100
7.4.1 Framework.....	100
7.4.2 Probability of Occurring.....	101
7.4.3 Vulnerability of Incidents.....	102
7.5 Supportive Information in Identifying Risk.....	102
7.5.1 Meteorological Characteristics.....	103
7.5.2 Coastal Features.....	103
7.5.3 Natural Resources.....	105
7.5.4 Population and industries.....	107
7.5.5 Summary.....	107

Chapter 8: Risk Assessment

8.1 Introduction.....	108
8.2 Objectives of the Risk Assessment.....	108
8.3 Method of Risk Evaluation.....	108
8.3.1 Hypothesis.....	108
8.3.2 Rationale of evaluation.....	109
8.4 Analysis of factors contributing towards each specific measures Identified.....	109
8.4.1 Probability of occurring.....	110
8.4.2 Vulnerability of damage.....	110
8.5 Rationale of allocating relative risk scores.....	112

8.5.1 Scoring Methods.....	112
8.5.2 Possibility of Occurring.....	113
8.5.3 Vulnerability of damage.....	113
8.6 Factors contributing for Incidents.....	114
8.6.1 Accident History.....	114
8.6.2 Number of Vessel Movements (overall).....	116
8.6.3 Ship Movements for Oil Tankers-Local.....	116
8.6.4 Ship Movements for Oil Tankers-International.....	117
8.6.5 Movements of Ships other than Oil Tankers.....	118
8.6.6 Traffic Density and Congestion.....	121
8.6.7 Navigational Hazards.....	123
8.6.8 Transit time through area.....	124
8.7 Vulnerability of damage.....	124
8.7.1 Classification of Coastal Zone.....	124
8.7.2 Environmental Resources.....	127
8.7.3 Ranking of Environmental Resources.....	127
8.7.4 Socio-economics.....	128
8.7.5 Impact on economic resources.....	131
8.7.6 Identifying social values of resources.....	131
8.7.7 Prioritization of resources and allocating relative risk values.....	132
8.8 Possibility of affecting.....	134
8.8.1 Factors considered.....	134
8.8.2 Allocation of risk scores.....	137
8.9 Most probable length and highest probability of affecting.....	138
8.9.1 Factors considered.....	138
8.9.2 Allocation of risk scores.....	138
8.10 Effectiveness of preventive measures and combat processes.....	139
8.10.1 Requirement.....	139
8.10.2 The Tiered response.....	140
8.10.3 Rationale of score allocation.....	141
8.11 Possibility and Vulnerability considered together.....	143
8.11.1 Rationale.....	143
8.11.2 Descriptive evaluation of the risk matrix with respect to oil spills.....	144
8.11.3 Method followed for deriving the Final Score.....	145
8.11.4 Evaluation of factors contributing towards each measure identified.....	145
8.12 Relative Risk Assessment for selected sites.....	148
8.12.1 Possibility of affecting.....	148
8.12.2 Vulnerability of the damage.....	149
8.12.3 Possibility of affecting and Vulnerability of the damage	

considered together.....	150
8.12. 4 Discussion.....	150

Chapter 9: Assessment of risk in ports and port related activities

9.1 Introduction.....	152
9.2 Basis of Assessment.....	152
9.2.1 Areas considered.....	152
9.2.2 Rationale of Scoring.....	152
9.3 Factors to be considered.....	152
9.3.1 Number of Vessel Movements.....	152
9.3.2 Traffic density and congestion.....	153
9.3.3 Navigational Hazards.....	153
9.3.4 Transit time through ports.....	154
9.3.5 Amount of Oil Imported and Exported.....	154
9.3.6 Number of bunkering operations.....	155
9.3.7 Number of pipeline operations.....	155
9.3.8 Accident History.....	155
9.4 Estimation of the Risk for a Worse Scenario.....	158
9.5 Summary.....	158

Chapter 10: Guide Lines for Development of a Contingency Management Plan.

10.1 Introduction.....	159
10.2 Purpose and Objectives.....	159
10.3 Scope and content of the plan.....	159
10.4 Compliance with international response strategy.....	160
10.5 National Responses strategy.....	160
10.6 Tiered Response.....	161
10.7 The National Oil Spill Contingency Management Plan [NOSCP].....	162
10.8 Identification of High Risk Areas.....	164
10.8.1 Identification of high priority areas.....	164
10.8.2 Priorities for protection.....	165
10.9 Responsibility and Response Organisations.....	165
10.9.1 Different bodies responsible.....	165
10.9.2 Response organization.....	166
10.9.3 Task for the different bodies within the Response Organization.....	167
10.10 Notification of the Incident.....	172
10.10.1 General.....	172
10.10.2 Reports of oil pollution.....	172
10.10.3 Method of Reporting	172
10.11 Response Operations and Resource allocation.....	173

10.11.1 The response methods include.....	173
10.11.2 Key Response Operations.....	174
10.11.3 Cooperation with industry.....	176
10.11.4 Allocation of Resources.....	176
10.12 Logistics Funding and Damage Assessment.....	178
10.12.1 Logistics.....	178
10.12.2 Immigration and customs formalities for assistance from other countries....	178
10.12.3 Financial Procedures and Funding.....	179
10.12.4 Responsibility for Injury.....	180
10.12.5 Damage Assessment.....	180
10.12.6 Cost recovery.....	181
10.13 Preparedness and Planning.....	181
10.13.1 Information.....	181
10.13.2 Joint training and exercises.....	181
10.13.3 Preventive Measures.....	182
10.14.4 Update of NOSCP and Basic Data.....	182

Chapter 11: Conclusions and recommendations

11.1 Significance of marine oil spills to Sri Lanka.....	184
11.2 Numerical Modelling.....	184
11.3 Environmental Data.....	185
11.4 Oil Spill Modelling.....	185
11.5 Risk Identification and Assessment.....	186
11.6 Contingency planning.....	187

Bibliography.....	189
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Annexes

Annex I: Environmental Data.....	191
Annex II: Oil Spill Modelling.....	200
Annex III: Environmental Data for In House Model.....	203
Annex IV: Data for Risk Assessment.....	207

List of figures

- 2.1 Details of Evaporation of Common Oil Types
- 2.2 Different stages of weathering of medium crude oil
- 2.3 Modelling grid for Finite Difference model
- 3.1 Locations of Wind Data Available in the Oilmap
- 3.2 Comparison of Wind speeds between met department data and Colombo Port Records
- 3.3 Comparison of Wind direction between met department data and Colombo Port Records
- 3.4 Comparison of Wind speed between met department data and Oilmap data - April 1996
- 3.5 Comparison of Wind direction between met department data and Oilmap data- April 1996
- 3.6 Comparison of Wind speed between met depart data and Oilmap data - July 1996
- 3.7 Comparison of Wind direction between met department data and Oilmap data- July 1996
- 3.8 Comparison of Wind speed between met department data and Oilmap data - October 1996
- 3.9 Comparison of Wind direction between met department data and Oilmap data- October 1996
- 4.1 Diagram of the Oilmap oil spill model system
- 4.2 Individual trajectory runs used in probability calculations-with currents
- 4.3 Individual trajectory runs used in probability calculations-without currents
- 4.4 Output of stochastic model showing water surface oiling probability contours
- 4.5 Output of stochastic model showing shoreline oiling probability contours
- 4.6 Output of stochastic model showing water time travel probability contours
- 4.7 Sample output of a trajectory model run
- 4.8 (a) Stochastic spill information window
- 4.8 (b) Trajectory spill information window
- 4.9 Environmental Data selection window
- 4.10 Model parameter window
- 4.11 (a) Stochastic Model Options window
- 4.11 (b) Trajectory Model Options window
- 4.12 weathering report
- 4.13 Mass Balance Pie Chart
- 4.14 Wind Editor 46
- 4.15 (a) Hydro dynamic grid for defining and viewing currents
- 4.15 (b) Spatial current input window
- 4.16 GIS information incorporation window

- 4.17 Boom information incorporation window
- 4.18 Dispersant information incorporation window
- 4.19 Information of over flight Observations
- 4.20 Main shipping routes around Sri Lanka
- 4.21 Selected modelling points 50
- 4.22 Critical Spill Points in the month of July
- 4.23 Critical Spill Points in the month of January
- 4.24 Water Probabilities (Point 12 – July)
- 4.25 Time Probabilities (Point 12 – July)
- 4.26 Shore Probabilities (Point 12 – July)
- 4.27 Stretch of shoreline having a probability greater than 20%
- 4.28 Most probable area
- 4.29 Water Probabilities (Point 26 – July)
- 4.30 Time Probabilities (Point 26 – July)
- 4.31 Shore Probabilities (Point 26 – July)
- 5.1 Spill occurred at SPBM – January
- 5.2 Spill occurred at SPBM – November
- 5.3 Spill occurred at SPBM – July
- 5.4 Spill occurred offshore of Negombo – May
- 5.5 Spill occurred offshore of Beruwala – June
- 5.6 Spill occurred offshore of Hikkaduwa – June
- 5.7 Spill occurred offshore of Unawatuna – April
- 5.8 Spill occurred offshore of Rekawa – March
- 5.9 Spill occurred offshore of Hambantota – April
- 5.10 Spill occurred offshore of Hikkaduwa
- 5.11 Weathering results for Miri Light (without response)
- 5.12 Mass Balance of the Spilled Oil (without response)
- 5.13 Spill occurred offshore of Hikkaduwa
- 5.14 Weathering results for Miri Light (with response)
- 5.15 Mass Balance of the Spilled Oil (with response)
- 6.1 Computer Structure Chart of the Model Setup
- 6.2 Location map of Dye Release, Port of Colombo, 26th November 2003 91,
- 6.3 Results at time 07 15 AM
- 6.4 Results at time 07 45 AM
- 6.5 Results at time 08 15 AM
- 6.6 Results at time 09 00 AM
- 6.7 Results at time 10 45 AM

- 8.1 Classification of Sri Lankan Accidents
- 8.2 Classification of accidents, by location
- 8.3 Movement of Oil Tankers in Sri Lankan waters
- 8.4 International oil routes in Central Asia
- 8.5 Sri Lanka in the major sea routes of the Indian Ocean
- 8.6 Average movement of ships other than oil tankers
- 8.7 Vessel traffic density for 1996 (COADS 2001)
- 8.8 Vessel traffic density (AMVER 2001)
- 8.9 VOC emissions from crude oil transport
- 8.10 Coastal segments
- 8.11 Economic value
- 8.12 Modelling locations considered
- 8.13 Tiered concept
- 8.14 Risk Assessment Hierarchy
- 8.15 Possibility and Vulnerability considered together
- 8.16(a) Linear relationship
- 8.16(b) Hyperbolic relationship
- 8.17 Risk Matrix
- 10.1 Tiered Response Hierarchy
- 10.2 Organizational Structure for Response Operations

List of Tables

- 2.1 Spreading of Oil in Water – Equations
- 2.2 Examples of Oil Solubility Data
- 2.3 Weathering of some common oils
- 3.1 Extreme Significant Sea Wave Height & Swell Wave Height in Colombo.
- 4.1 Diffusion coefficients defined
- 4.2 Assumed minimum oil thickness for selected oils
- 4.3 Parameters for Medium Crude Oil
- 4.4 Critical Points on monthly basis
- 4.5 Monthly variation of affected length and highest probability
- 5.1 Monthly variation of affected length and highest
- 8.1 Risk scores ranges for different factors considered
- 8.2 Risk scores ranges selected for degree of impact of the damage
- 8.3 Accident history of Sri Lanka.
- 8.4 Relative risk scores based on Sri Lankan history
- 8.5 Relative Score given for Ship Movement (for oil tankers)
- 8.6 Ships Arrival in Sri Lanka and Colombo (1990-1995)
- 8.7 Nationality of Major Shipping Nations Calling in Colombo (1990-1995)
- 8.8 Relative scores given for ship movement
- 8.9 Environmental sensitivity ranking
- 8.10 Areas to be scored in identifying the degree of impact
- 8.11 Scores for different risk levels
- 8.12 identification of probable areas
- 8.13 Allocation of risk scores based on the probability of affecting
- 8.14 Allocation of risk scores based on the probability of affecting
- 8.15 allocation of the risk scores based on the most probable length of affecting
- 8.16 allocation of the risk scores based on the strength of the combat operations
- 8.17 Relative scores for Possibility of occurring
- 8.18 Allocation of risk scores for degree of impact
- 8.19 Allocation of risk scores for effectiveness of the response operations
- 8.20 Final Risk scores derived for vulnerability of the damage.
- 8.21 Final Scores Derived
- 9.1 Number of Vessel Movements (Oil Tankers) Per Month in the Port of Colombo
- 9.2 Relative Scores given for Transit Time
- 9.3 Relative Scores Assigned In Relation to Amount of Oil Imported or Exported

- 9.4 Total Number of Ships Arrived by Purpose of their Visit to Colombo (1990-1995)
- 9.5 Relative Score Given for Pipeline Operations
- 9.6 Accident history of Port of Colombo
- 9.7 Incidents of Spills by Cause, 1974 -2000 (Global Statistics)
- 9.8 Relative Score Assigned for Risk Analysis for Operational Failures in Ports
- 9.9 summary of the
- 10.1 The arrangement of local response criterions with respect to the Tiered concept.
- 10.2 Different responsible bodies
- 10.3 Proposed amount of equipment that have to be localised in Colombo, Galle and Hambantota