



Bay of Bengal Large Marine Ecosystem Project



Country report on pollution Sri Lanka

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of Food and Agriculture Organization of the United Nations concerning the legal and development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The BOBLME Project encourages the use of this report for study, research, news reporting, criticism or review. Selected passages, tables or diagrams may be reproduced for such purposes provided acknowledgment of the source is included. Major extracts or the entire document may not be reproduced by any process without the written permission of the BOBLME Project Regional Coordinator.

BOBLME contract: PSA-GCP 144/07/2010 (Azmy);
PSA-RAPRD 17/5/13 (Miththapala);

For bibliographic purposes, please reference this publication as:

BOBLME (2013) Country report on pollution - Sri Lanka BOBLME-2011-Ecology-14

Sri Lanka report on coastal pollution loading and water quality criteria

S. A. M. Azmy

Edited by Dr Sriyanie Miththapala

Table of contents

| | | |
|--------|---|----|
| 1 | The Bay of Bengal coast of Sri Lanka | 1 |
| 1.1 | Bio-geographical features | 1 |
| 1.1.1 | Climate | 1 |
| 1.1.2 | Rivers | 3 |
| 1.1.3 | Bathymetry | 3 |
| 1.1.4 | Wave climate | 4 |
| 1.1.5 | Surface winds | 5 |
| 1.1.6 | Surface currents | 5 |
| 1.1.7 | Primary productivity | 6 |
| 1.1.8 | Coastal ecosystems..... | 7 |
| 1.1.9 | Maritime jurisdiction | 9 |
| 1.1.10 | The coastal zone | 10 |
| 1.1.11 | Coastal administrative divisions | 11 |
| 1.2 | Coastal activities of high economic value..... | 11 |
| 1.2.1 | Urbanization | 12 |
| 1.2.2 | Tourism..... | 12 |
| 1.2.3 | Industries | 14 |
| 1.2.4 | Ports and harbours | 16 |
| 1.2.5 | Oil exploration..... | 17 |
| 1.2.6 | Coal power plants | 18 |
| 1.3 | Coastal activities important for livelihoods and human well-being | 19 |
| 1.3.1 | Fisheries | 19 |
| 1.3.2 | Aquaculture | 21 |
| 1.3.3 | Agriculture | 22 |
| 2 | Overview of sources of pollution..... | 24 |
| 2.1 | Land-based pollution (point and non-point source) | 25 |
| 2.1.1 | Sewage discharge | 25 |
| 2.1.2 | Agricultural and aquaculture residues | 26 |
| 2.1.3 | Accumulation of solid waste..... | 28 |
| 2.1.4 | Sedimentation..... | 30 |
| 2.1.5 | Industrial effluents..... | 31 |
| 2.1.6 | Fish waste | 32 |
| 2.1.7 | Thermal pollution | 33 |
| 2.2 | Sea/marine-based pollution | 33 |
| 2.2.1 | Marine litter | 33 |
| 2.2.2 | Minor oil discharges and ballast water | 36 |
| 2.2.3 | Oil spills | 36 |

| | | |
|-------|---|----|
| 2.2.4 | Priority categories of parameters | 37 |
| 3 | Existing water and sediment quality objectives and targets | 37 |
| 4 | The National Programme — Coastal Ocean Monitoring and Prediction System..... | 45 |
| 4.1 | Mapping hotspots along the coast | 45 |
| 4.2 | Time series analysis and significant findings | 46 |
| 4.3 | The role of Ministry of Environment and Ministry of Fisheries | 46 |
| 4.4 | National Laboratories..... | 47 |
| 4.5 | Marine and coastal protected areas | 49 |
| 5 | Present status of marine pollution: contaminant levels in water, sediments, fish and other biological resources | 51 |
| 5.1 | Eutrophication and nutrient dynamics; Chlorophyll; Chemical oxygen demand; Suspended substances | 51 |
| 5.2 | Oil pollution, oil spills and ecological impacts of oil pollution | 52 |
| 5.3 | Heavy metals and persistent organic pollutants (POPs) | 53 |
| 5.4 | General status and trends of marine pollution..... | 55 |
| 6 | Transboundary coastal pollution issues and concerns..... | 56 |
| 6.1 | Ballast water | 56 |
| 6.2 | Oil spills | 57 |
| 7 | International instruments, conventions, protocols and programmes adopted and relevant to coastal and marine pollution..... | 57 |
| 8 | Policy, economic instruments and legal mechanisms for pollution control | 68 |
| 8.1 | Policies | 68 |
| 8.2 | Laws related to the coast and prevention of pollution..... | 70 |
| 8.2.1 | Laws related to the prevention and control of water pollution | 70 |
| 8.2.2 | National Environmental Act (NEA) No. 47 of 1980 | 71 |
| 8.2.3 | Marine Pollution Prevention Act No. 59 of 1981 and its amendment No.35 of 2008 | 73 |
| 8.2.4 | Coast Conservation Act No. 57 of 1981 and amendment of 1988..... | 73 |
| 8.2.5 | Other laws that have a bearing on the coastal zone..... | 73 |
| 8.3 | Water quality standards | 77 |
| 8.4 | EIA for projects that have potential impacts on the water quality and coastal and marine environment in general | 78 |
| 8.5 | Other instruments and key sectoral policies..... | 79 |
| 8.5.1 | Agricultural policy | 79 |
| 8.5.2 | Integrated Coastal Zone Management | 79 |
| 8.5.3 | Organic farming..... | 80 |
| 8.6 | Market-based instruments | 80 |
| 8.6.1 | Fertiliser subsidies | 80 |
| 8.6.2 | Environmental conservation levy act no. 26 of 2008 | 80 |
| 8.6.3 | Tax incentives..... | 81 |

| | | |
|------|--|----|
| 9 | Institutional mechanisms for pollution control and enforcement of existing policies and legislations | 81 |
| 9.1 | The Central Environmental Authority (CEA)..... | 81 |
| 9.2 | Coast Conservation and Coastal Management Department (CCD) | 81 |
| 9.3 | Marine Environment Protection Agency (MEPA)..... | 82 |
| 9.4 | Ministry of Environment and Renewable Energy..... | 82 |
| 9.5 | National Solid Waste Management Support Centre (NSWMSC)..... | 82 |
| 9.6 | The Ministry of Local Government and Provincial Councils..... | 82 |
| 9.7 | Provincial councils | 83 |
| 9.8 | Local authorities | 83 |
| 9.9 | National Aquatic Resources Research and Development Agency (NARA) | 83 |
| 9.10 | Northwestern Provincial Environmental Authority | 84 |
| 9.11 | Other agencies indirectly involved in pollution control in the coastal zone..... | 84 |
| 10 | Gaps | 85 |
| 10.1 | Information/Data | 85 |
| 10.2 | Policies and legislation | 85 |
| 10.3 | Overlapping mandates..... | 85 |
| 10.4 | Implementation issues | 86 |
| 10.5 | Report card of pollution status to public | 87 |
| 11 | Priority actions and Remedial measures required at | 87 |
| 11.1 | At the national level | 87 |
| 11.2 | At the provincial level..... | 87 |
| 11.3 | At the local level | 87 |
| 12 | Summary and conclusions | 88 |
| 13 | Acknowledgements | 88 |
| 14 | References..... | 89 |

List of figures

| | |
|---|----|
| Figure 1 Sri Lanka's HDI ranking compared to South Asia | ix |
| Figure 2 Simplified peneplain map of Sri Lanka | 1 |
| Figure 3 Simplified climatic zones of Sri Lanka | 2 |
| Figure 4 Sri Lanka: rivers | 3 |
| Figure 5 Sri Lanka: bathymetry and continental shelf | 4 |
| Figure 6 Sri Lanka's coastal wave climate..... | 4 |
| Figure 7 Summer and winter currents in the Indian Ocean..... | 6 |
| Figure 8 Average surface concentration of chlorophyll in Sri Lanka's coastal waters | 7 |
| Figure 9 Selected coastal ecosystems of Sri Lanka | 8 |
| Figure 10 Diagram illustrating the definition of the maritime zone | 9 |
| Figure 11 Legal boundaries of the coastal zone | 10 |
| Figure 12 Coastal districts of Sri Lanka..... | 11 |
| Figure 13 Concentration of population on the coastline and proposed metro regions..... | 12 |
| Figure 14 Sri Lanka tourist arrivals 2009-2012..... | 13 |
| Figure 15 Occupancy Rates by Resort Region..... | 13 |
| Figure 16 Accommodation (rooms) per region | 13 |
| Figure 17 Planned tourism zones..... | 14 |
| Figure 18 Distribution of large industries (left) and small and medium industries (right) | 15 |
| Figure 19 Ports in Sri Lanka..... | 16 |
| Figure 20 Oil exploration areas and bulk storages | 18 |
| Figure 21 Coal power plants in Sri Lanka..... | 19 |
| Figure 22 Fisheries harbours and fish landing sites | 21 |
| Figure 23 Land use in Sri Lanka | 23 |
| Figure 24 The increase in use of synthetic fertilisers in Sri Lanka | 26 |
| Figure 25 Irresponsible solid waste disposal dumped near Puttalam Lagoon..... | 29 |
| Figure 26 Irresponsible solid waste disposal on the banks of the Bentota Ganga | 30 |
| Figure 27 Trash fish at a fish landing site | 33 |
| Figure 28 Highly polluted East-West shipping lane | 37 |
| Figure 29 Sri Lanka's maritime boundary with India | 56 |

List of tables

| | |
|---|----|
| Table 1. Human Development Indices (HDI) for Sri Lanka | ix |
| Table 2 Coastal wave climate through the year | 5 |
| Table 3 Pressure gradients across the island in selected months | 5 |
| Table 4 Extent of coastal habitats | 8 |
| Table 5 Number of establishments and persons engaged by district, 2003 | 15 |
| Table 6 Performance of port services Sri Lanka | 17 |
| Table 7 Number of fish landing sites per fisheries district | 17 |
| Table 8 Number of boats | 20 |
| Table 9 Export quantity and value of shrimp | 22 |
| Table 10 Land cultivated under various crops | 23 |
| Table 11 Type of pollution, sources and main adverse impacts | 25 |
| Table 12 Extent of synthetic pesticides used in Sri Lanka | 26 |
| Table 13 Water quality and impact on fish and fisheries in selected rivers and estuaries ... | 28 |
| Table 14 Municipal solid waste collection by the local authorities in coastal districts | 29 |
| Table 15 Solid waste dumped in selected areas of four coastal districts | 29 |
| Table 16 Waste loads from industries located in coastal areas with high or medium pollution | 31 |
| Table 17 Selected water quality parameters of Lunawa lagoon | 32 |
| Table 18 Types of marine litter | 34 |
| Table 19 General inventory of marine and beach litter observed in Sri Lanka | 36 |
| Table 20 Tolerance limits for industrial/ domestic waste discharged into marine coastal areas | 38 |
| Table 21 Tolerance limits for industrial/ domestic discharged into inland surface waters ... | 39 |
| Table 22 Tolerance limits for industrial waste discharged on land for irrigation purposes ... | 40 |
| Table 23 Tolerance limits for waste from rubber factories discharged to inland surface waters | 41 |
| Table 24 Tolerance limits for waste from textile factories discharged into inland surface waters | 42 |
| Table 25 Tolerance limits for waste from being discharged from tanning industries | 42 |
| Table 26 Drinking water standards (Sri Lanka Standards for potable water – SLS 614, 1983) | 44 |
| Table 27 Coastal water pollution at selected sites (Jayaweera, 2003) | 45 |
| Table 28 Coastal and Marine Protected Areas in Sri Lanka | 50 |
| Table 29 Oil and chemical spills in Sri Lankan waters | 53 |
| Table 30 Mean Trace metal concentration in Negombo Lagoon | 54 |
| Table 31 Coastal and marine pollution related treaties and conventions ratified by Sri Lanka | 65 |
| Table 32 Regional programmes | 66 |
| Table 33 Ongoing major projects | 67 |
| Table 34 List of policies relevant to water pollution | 69 |
| Table 35 List of regulations made under the National Environmental Act | 72 |
| Table 36 List of laws which have a bearing on the coastal zone of Sri Lanka | 76 |
| Table 37 Proposed ambient water quality standards for different use classes | 78 |
| Table 38 Agencies indirectly involved in pollution control in the coastal zone | 84 |

List of acronyms

| | |
|--------|--|
| ADB | Asian Development Bank |
| BCAP | Biodiversity Conservation Action Plan |
| BOBLME | Bay of Bengal Large Marine Ecosystem |
| BOD | Biological Oxygen Demand |
| BOI | Board of Investment |
| BUNKER | International Convention on Civil Liability for Bunker Oil Pollution Damage |
| BWM | International Convention for the Control and Management of ships' Ballast Water and Sediments |
| CBD | International Convention on Biological Diversity |
| CCD | Coast Conservation and Coastal Management Department (formerly Coast Conservation Department) |
| CEA | Central Environmental Authority |
| CISIR | Ceylon Institute of Scientific and Industrial Research |
| CLC | International Convention on Civil Liability for Oil Pollution Damage |
| CMS | Convention on the Conservation of Migratory Species of Wild Animals |
| COD | Chemical Oxygen Demand |
| COP | Conference of Parties |
| CRMP | Coastal Resources Management Project |
| CZMP | Coastal Zone Management Plan |
| DDT | Dichlorodiphenyltrichloroethane |
| DECOM | Delimitation of the Outer Edge of the Continental Margin of Sri Lanka |
| DFAR | Department of Fisheries and Aquatic Resources |
| DO | Dissolved Oxygen |
| DWC | Department of Wildlife Conservation |
| EC | Equatorial current |
| EEZ | Exclusive Economic Zone |
| EIA | Environmental Impact Assessment |
| EICC | East India coastal current |
| ELCS | Environmental Laboratory and Consultancy Services |
| EPL | Environmental Protection Licence |
| EPZ | Export processing zone |
| EU | European Union |
| FAO | Food and Agricultural Organization |
| FD | Forest Department |
| FFPO | Fauna and Flora Protection Ordinance |
| FMA | Fisheries Management Area |
| GCOS | Global Climate Observing System |
| GDP | Gross Domestic Product |
| GEF | Global Environmental Facility |
| GOOS | Global Ocean Observing System |
| GPA | Global Programme of Action for the Protection of the Marine Environment from Land-based Activities |
| HDI | Human Development Index |
| IAS | Invasive alien species |
| ICZM | Integrated Coastal Zone Management |
| IDAY | One-day boats |
| IEE | Initial Environmental Examination |
| IMUL | In-board multi-day boats |
| IOGOOS | Global Ocean Observing System in the Indian Ocean |
| IP | Industrial park |
| IPM | Insect Pest Management |
| IPNM | Insect Plant Nutrition Management |

| | |
|----------|--|
| ITI | Industrial Technology Institute |
| IUCN | International Union for Conservation of Nature |
| JICA | Japan International Corporation Agency |
| LKR | Sri Lankan rupees |
| MARPOL | International Convention for the Prevention of Pollution From Ships |
| MEPA | Marine Environmental Protection Agency |
| MoE | Ministry of Environment now Ministry of Environment and Renewable Energy |
| MOENR | Ministry of Environment and Natural Resources now Ministry of Environment and Renewable Energy |
| MOFE | Ministry of Forests and Environment now Ministry of Environment and Renewable Energy |
| MOH | Medical of Health |
| MoU | Memorandum of Understanding |
| MPPA | Marine Pollution Protection Agency now MEPA |
| MTRB | Mechanised traditional boats |
| NAQDA | National Aquaculture Development Authority |
| NARA | National Aquatic Resources Research and Development Agency |
| NASA | National Aeronautics and Space Administration |
| NBSB | Non-mechanised beach seine boats |
| NEA | National Environmental Act |
| NGO | Non-governmental organization |
| NOS COP | National Oil Spill Contingency Plan |
| NPA | National Programme of Action |
| NSWMCSC | National Solid Waste Management Support Centre |
| NTRB | Non-mechanised traditional boats |
| NTU | Nephelometric turbidity units |
| OFRP | Out-board reinforced plastic boats |
| OPRC-HNS | Protocol on Preparedness, Response and Co-operation to pollution Incidents by Hazardous and Noxious Substances |
| PA | Protected area |
| PAA | Project Approving Agency |
| PCB | Polychlorinated Biphenyls |
| PIC | Prior informed consent |
| POP | Persistent Organic Pollutants |
| PPP | Purchasing power parity |
| SAARC | South Asian Association for Regional Cooperation |
| SACEP | South Asia Co-operative Environment Programme |
| SAM | Special Area Management |
| SAS | South Asian Seas |
| SASP | South Asian Seas Programme |
| SEA | Strategic Environment Assessment |
| SLTDA | Sri Lanka Tourist Development Authority |
| SMC | Summer monsoon current |
| SOFA | Small Organic Farmers' Association |
| STP | Sewage treatment plant |
| SWM | Solid waste management |
| TEU | Twenty-foot equivalent |
| UDA | Urban Development Authority |
| UN | United Nations |
| UNCED | United Nations Conference on Environment and Development |
| UNCLOS | United Nations Convention of the Law of the Sea |
| UNEP | United Nations Environment Programme |
| USD | United States dollars |
| WHO | World Health Organization |
| WMC | Winter monsoon current |

Preamble

Sri Lanka is an island located in the Bay of Bengal, off the southern coast of India, between latitudes 5°55' and 9°51' N, and longitudes 79°41' and 81°53' E. Extending over approximately 65,610 km², Sri Lanka has a coastline about 1,620 km (CZMP, 2006).

The population in 1981 was 14.8 million and is now estimated to be around 20.3 million (Dept. of Census and Statistics, 2011 and 2012). It is projected to increase to 21-23 million by 2020-2030

(<http://siteresources.worldbank.org/INTSRILANKA/Resources/LKAgingChapl.pdf>).

Sri Lanka's human development indices are among the best in South Asia (ADB, 2012).

| Indicator | Value |
|--|----------|
| HDI (2012) | 0.72 |
| HDI Ranking | 92.00 |
| Life expectancy at birth (years) | 75.10 |
| Mean years of schooling (of adults) (years) | 9.30 |
| Adult literacy rate, both sexes (% aged 15 and above) | 91.2 |
| GDP per capita (2005 PPP \$) | 4,929.00 |
| Poverty (population living below 1.25\$ PPP per day (%)) | 7.00 |
| Maternal mortality ratio (deaths of women per 100,000 live births) | 35.00 |
| Carbon dioxide emissions per capita (tonnes) | 0.60 |

Table 1. Human Development Indices (HDI) for Sri Lanka

(Source: <http://hdrstats.undp.org/en/countries/profiles/LKA.html>)

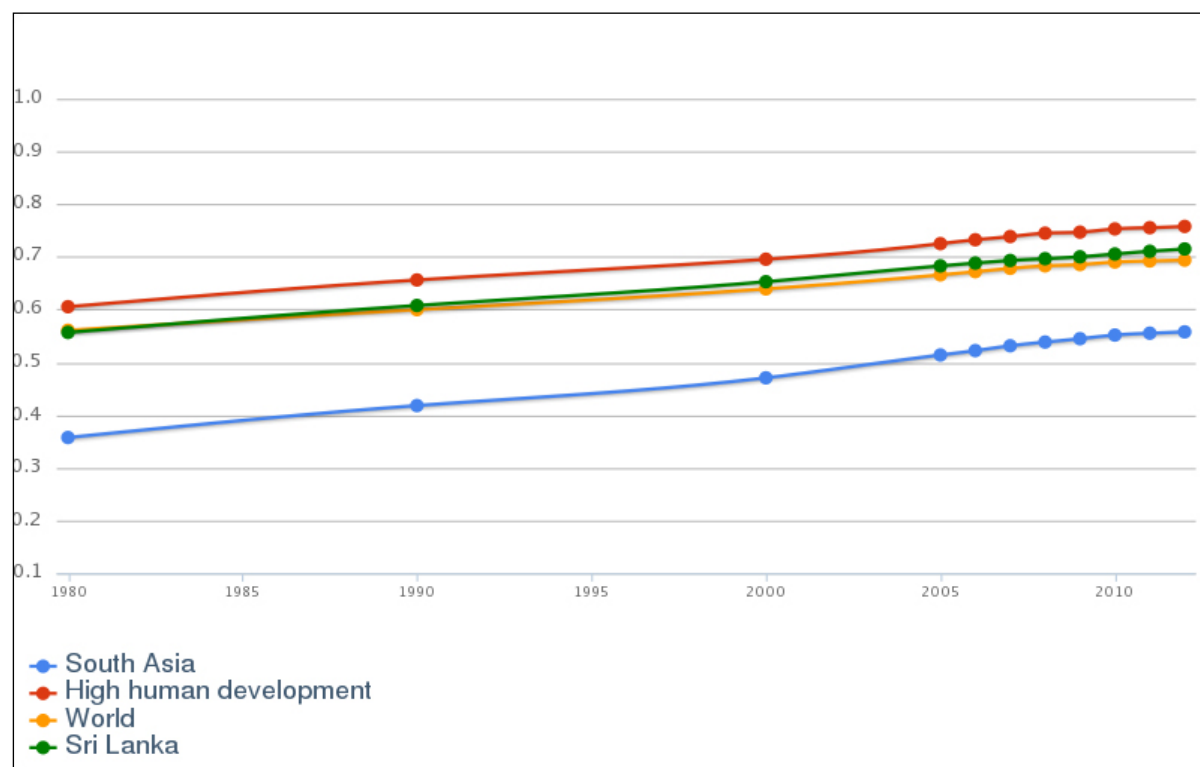


Figure 1 Sri Lanka's HDI ranking compared to South Asia

(Source: <http://hdrstats.undp.org/en/countries/profiles/LKA.html>)