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Implementation of a contingency plan for effective marine pollution prevention in Sri Lanka

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WORLD MARITIME UNIVERSITY

Malmö, Sweden



**IMPLEMENTATION OF A CONTINGENCY PLAN
FOR EFFECTIVE MARINE POLLUTION
PREVENTION IN
SRI LANKA**

by

Karunasena D.A

Sri Lanka

**A dissertation submitted to the World Maritime University in partial
fulfillment of the requirements for the award of the degree of**

MASTER OF SCIENCE

in

Maritime Administration and Environmental Protection

2000

DECLARATION

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views which are not necessarily endorsed by the University

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ABSTRACT

Title of Dissertation: Implementation of a Contingency Plan for Effective Marine Pollution Prevention in Sri Lanka

Degree: MSc

An early preparedness is the internationally recognized approach for the prevention of ship source marine pollution. The designated land based institutions will assist and undertake the control and prevention of marine pollution from ships when those are out of control under the distress.

In major oil spill situations, when state institutions are not well organized to deal with the problem it can cause more damage to the environment and also will cost more than of organizing of Institutions for the job. Sri Lanka is not an oil producer or major importer but it is situated near the major oil tanker route between the Middle East and the Far East. This presents a risk of oil pollution to the Sri Lanka waters. The implementation of the National Oil Spill Contingency Plan is therefore of vital importance for the protection of all coastal regional resources as well as of the marine environment.

The vast amount of technical capabilities belonging to different resources groups needs to be coordinated within a limited time period in combating oil pollution and presents a challenging task for the lead agency of the contingency plan. This dissertation will examine what might be one of the best approaches to handling oil spill problems and will look at necessary reforms in the maritime sector administration in improving the effectiveness of the contingency plan of Sri Lanka.

Key Words: Marine pollution, Prevention, Coastal, Lead Agency, Effectiveness, Contingency, Sri Lanka

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LIST OF ABBREVIATION

| | |
|-----------------|---|
| CFC | Chlorofluorocarbons |
| CLC | Civil Liability Convention |
| EEZ | Exclusive Economic Zone |
| GNP | Gross National Product |
| GRT | Gross tonnage |
| ICS | Incident Command System |
| IGOSS | Integrated Global Ocean Station System |
| IMO | International Maritime Organization |
| IMDG | International Maritime Dangerous Goods |
| INDOEX | Indian Ocean Experiment |
| IOPC | International Oil Pollution Compensation |
| ITCZ | Inter Tropical Convergence Zone |
| MAPMOP | Marine Pollution Monitoring Pilot Project |
| MPPA | Marine Pollution Prevention Authority |
| MFARD | Ministry of Fisheries & Aquatic Resources Development |
| MOU | Memorandum of Understanding |
| NARA | National Aquatic Resources Agency |
| NHO | National Hydrographic Office |
| NOAA | National Oceanic and Atmospheric Administration |
| NO _x | Nitrogen Oxides |
| OSC | On-Seen Commander |
| OPA | Oil Pollution Act |
| PSC | Port State Control |
| SDR | Special Drawing Rights |
| SO _x | Sulfurs |
| UNCLOS | United Nation Convention on Law of the Sea |
| VOC | Volatile Organic Compound |
| TOVALOP | Tanker Owners Voluntary Agreement concerning Liability for Oil Pollution |

CHAPTER I

INTRODUCTION

Oil is, and will be the single most important source of energy in the world for the foreseeable future, mainly because of the ample global supply and reserves, easy transportability, and unavailability of economically and technically feasible substitute.

Furthermore there is a strong relationship between energy and the economy. Energy influences the economy, and economy influences the energy. It can be said economic growth means growing demand of energy and changes in price of energy or disruption of energy supply will certainly have an impact on the economy. The price increase of oil in recent time proves to be the case.

In last decade due to the faster growing economy in Far East countries, mainly in Japan major portion of Middle East crude oil transported to the Fareast and it will continue to grow further in future. The crude transport by sea obviously causes numerous way of marine pollution. A little research available to estimate the present level of pollution in the Indian Ocean and the Sri Lanka is the main Island become a hostage in the Indian sub continent to the marine pollution due to crude oil movement between Middle East and Far East. One can argue that there was no threat for the Coastal waters of Sri Lanka, as so far major accident not happened in the region. However the Sri Lanka can not ignore the situation if it has an effect for the marine resources. The scientists says fish resources are diminishing around west coast of Sri Lanka but no reason put forward for the cause.

Some coastal states, knowing the effects of marine pollution rules and regulations are tightening to prevent and clean up their oceans. A tough new law was enacted in 1990 in the United States to prevent and clean up ocean pollution famously known as Oil Pollution Act 1990 (OPA 90).

This new law has resulted in the following:

- a) Increase tanker owners liability eight fold, from UD\$ 150 per gross ton to US\$1200 per ton or US\$ 10 million, whichever is greater.
- b) Require double hull on all tankers and barges within 25 years if enters the US waters.
- c) Set up a federal trust fund of US\$ 1 billion to be financed by a fee of 5 cent per gallon on imported oil to be paid by the petroleum companies
- d) Allow the provinces to enact their own stricter laws, many of which provide for unlimited liability in the event of oil spill.

The small island like Sri Lanka can not ignore the marine environmental pollution and also can not perform like a developed maritime nation do as there are many other priorities in front of the country. Although the successive governments have taken number of cause of actions to protect the marine environment and the results are not much appreciable for the effort made in this respect. In 1981 the marine pollution prevention Act was brought to the Parliament of Sri Lanka and established the Marine Pollution Prevention Authority (MPPA) giving the responsibility to act up on the subject. The beginning of the Act described the purpose as:

“An Act to provide for the prevention, reduction and control of pollution in Sri Lanka waters; to give an effect to international conventions for the prevention of pollution of the sea and for matters connected with or incidental thereto....”

(Marine pollution Prevention Act 1981, Sri Lanka)

In 1995 MPPA has established a National Oil Contingency Plan but later found the need of amendment to get the finance and the necessary staff for the organization. Therefore in 1998 plan was revised and published in February 1999. The revised national oil spill contingency plan has define its policy to obtain the resources from

other local institutions during an spill and coordinating of the resources the main task of MPPA. This approach is needed greater effort and lead to complex structure of organization. The author's main concern is the organizational structure requirement to address the pollution prevention issues in implementation of the National Oil Spill Contingency Plan.

In this study, the Chapter Two will discuss the geographical scope of Sri Lanka and the marine environment, the tanker movements in the Indian Ocean, its effects for the marine pollution in coastal waters. It will further discuss other contributory factors for the marine pollution. In addition the few major oil spills took place in the world in last three-decade with their brief the accounts and impacts will be discussed in the same chapter to give awareness of the effects of oil pollution.

The third chapter will be devoted to express how the maritime affairs should be handled for the best interest of the country taking few examples from developed maritime nations and make comparison with organizational structure as a whole that handles maritime affairs in Sri Lanka. The National Oil Spill Contingency Plan has suggested number of resource groups, combining various institutions to carry out the implementation of oil spill contingency plan and effects of those groups will be examined in relation to the set goals.

The marine pollution problems are mostly of an international nature. Therefore the international instruments are necessary to solve the issues confronting the individual parties. The application of the international conventions to national laws is a best method to improve the legal regime to handle the incidents. In the fourth chapter, this subject will be discussed.

Chapter Five is devoted to discussing the main features required for an oil spill contingency plan and will make a comparison with the plan of Sri Lanka.

The oil pollution prevention and action of clean up operation governs the polluter pay principle. Chapter Six will discuss the method of obtaining the compensation for the oil pollution damage and its limitations.

Chapter Seven will discuss the organizational command structure need for the oil pollution response organization and effect of the Incident Command System Model during an oil spill combating operation.

The final chapter will discuss and recommend the best course of actions available to improve the maritime sector as well as actions needed for effective implementation of a National Oil Spill Contingency Plan in Sri Lanka.

CHAPTER II

PHYSICAL AND MARINE ENVIRONMENT OF SRI LANKA

2.1 Maritime boundary and marine environment of Sri Lanka



Figure 1: Map of Sri Lanka in Indian Ocean

Sri Lanka is situated in the Indian Ocean, off the southern tip of India (Figure 1). The island covers an area of 65,610 square kilometers that include the inland water bodies of 870 square kilometers. Sri Lanka's coastline circles along about 1,585 kilometers of sandy beaches, extensive lagoons and estuaries, mangroves, coastal marshes and dunes. Seaward of the coastal line lie reefs of coral or sand stone and shallow beds of coastal estuarine sea grass. Beneath and beyond extends the continental shelf. Except in the north, where it links Sri Lanka and India, this submerged plateau reaches outward to 20 kilometers before it falls away through the continental slope to the deeper sea floor. The continental shelf covers about 30,000

square kilometers or equivalent to nearly half the land area of the country. The Exclusive Economic Zone covers nearly (EEZ) 517,000 square kilometer (Figure 2). The narrow passage called "Palk Strait" that separates Sri- Lanka and India.

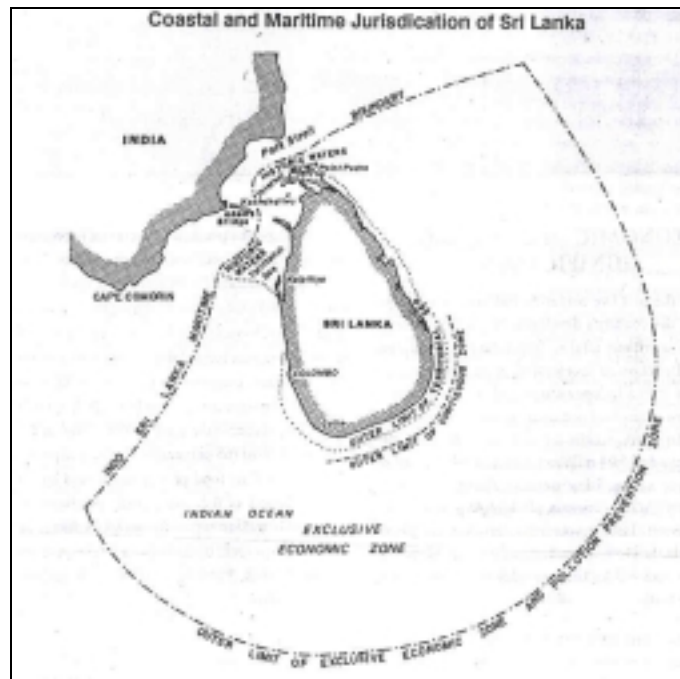


Figure 2 Coastal and Maritime Jurisdiction of Sri Lanka

Source: National Hydrographic office -Sri Lanka

2.1.1 Climatic conditions

The climate of Sri Lanka generally influenced by two monsoon seasons, namely southwest (May to October) and northeast (December to March). The wind pattern undergoes a complete shift during January and July as a result of the monsoons. This annual cycle is dominated by the heating and cooling of Asiatic continent.

The climate is typically tropical in the lowlands with an average temperature of 27 °C in Colombo. In the higher elevations it can be quite cool with temperatures going down to 16 °C at an altitude of nearly 2,000 meters. Bright, sunny warm days are the rule and are common even during the height of the monsoon - climatically Sri Lanka has no off season. The southwest monsoon brings rain to the western, southern and

central regions of the island between May to July while the northeast monsoon rains occur in the northern and eastern regions in December and January.

2.1.2 Wind patterns

The velocity of the wind across the country is usually less than 50 kilometer per hour. Weak and variable breezes exist during inter monsoonal periods. Also throughout the season, winds intensify and often change the direction in the afternoon. The winds of the northern inter-tropical convergence zone (ITCZ) normally operate from south to north and typical equatorial convergence storms are experienced all over the country, usually late afternoon. During the month of May, winds of the ITCZ flow towards the north and rainfall is received all over the country but with the heights concentration over the southwestern areas with the arrival of the month June, the southwest monsoon is at peak force, and the southwestern area of the island receives even more rain. The northeastern part of the land will experience occasional rain from convection storms that exist during the periods of monsoon break. During cyclone weather condition in both the Bay of Bengal and Arabian Sea majority of tropical convection storms winds reach more than 120 kilometers per hour and follow the path towards north of the island.

There is a pattern, that repeats itself every 10-15 years wherein cyclone move closer and cross over the island causing considerable damage to the coastal areas of the northern and eastern parts of the country. The cyclones in 1964, 1978 and 1991 badly affected the coastal zone in northern and eastern part of the country.

2.1.3 Wave, Tide and Currents pattern

Much of the swell that affects Sri Lanka, that originates in the south Indian Ocean (40-50 degrees south) because of the influence of high depressions and storms. This moves in northerly direction and is felt along the coast of the southern half of the island. The highest waves are during the southwest monsoon and that travels about 800 km between Maldives Island chain and Sri Lanka. During the northeast monsoon

the winds blow over short stretches of water from the north and even wind blowing from the Bay of Bengal does not produce steady large waves. By and large exploitable energy of the waves is relatively low during the period as well as during the inter-monsoonal periods (Swan, 1981).

There are different type of sea current available around Sri Lanka and some currents developed in the Bay of Bengal, the Arabian Sea, as well as in the equatorial region meet in this area and are affected by the monsoon. The strongest currents are felt along the southern coastal line. The coastal currents over the continental shelf are parallel to the coastline and are stronger off the eastern coast than off the western coast. In addition the massive water exchanges between the Bay of Bengal, the Arabian Sea and the Equatorial oceanic zone result in currents reaching velocities approximately one meter per second or more during October to January in the southern coast of Sri Lanka

During the monsoon period the waters between India and Sri Lanka experienced currents of velocity in the range of 2.5 to 3.0 meter per second. The coastal currents are complicated by the interaction of shelf topography, counter of the coastline, water depth, wind intensity and direction and tidal influence.

The seas around Sri Lanka are micro-tidal with tidal range of 750 centimeters during the spring tide and 25 centimeter at neap tide. The period between tides is approximately 12 hours and is thus semidiurnal. The tidal waves move southwards along the west coast of India, heading towards Sri Lanka twice a day so that western coast of island experiences high tide synchronously. The tidal crest arrives at the southwest coast near the Port of Galle within about 12 minutes and then moves in an anti-clockwise heading to eastward and northward reaching the east coast port of Trincomalee and the northeastern coast some 5-6 hours later.

2.1.4 Sandy beaches and sediments

The beaches of Sri Lanka are rich in sands containing mineral such as ilmenite, rutile, monozite and zircon. Over three fourths of the 1 785 kilometers length of coastline are beach areas. The formation of these beaches are based on the contour of the coast line, nature of coastal and submerged land forms adjacent to the beaches as well as the wave energy that brings the sand from the sea. In addition, most of the beaches act as barriers and are supported by the lagoons, swamps, and ill-drained terrains. They are also sometimes found between headlands and river mouths. These beaches are also relatively narrow due to the low tidal range and low wave energy that brings less sand from the sea.

2.1.5 Inland water bodies and rivers

The total area of inland water bodies approximately 870 square kilometers that consist of six rivers, the two longest rivers being the Mahaweli and Kelani. The Mahaweli is the longest river, 325 kilometers in length with an average annual discharge of 7,650 million cubic meters of water primarily utilized for hydro- electric power generation and, downstream, for the irrigation of agricultural land covering nearly one sixth of the country. The second longest river Kelani, which has a length of 144 kilometers running to the sea from the capital Colombo, and is that city's main source of fresh water.

The natural environmental and geographical features of the country are favorable to human life, but most of the unplanned human intervention has posed a major threat to both living and non-living resources today. The protection of the marine environment by intervention of the State is essential task to ensure the well being of the society.

2.2 Maritime industry and pollution issues

Over the past five centuries, following foreign occupation, the country's development has been closely linked to maritime affairs. Expansion of international trade and

commerce has accelerated population shifts to the coasts. Since independence from British rule in 1948, coastal settlement grew in size, economic importance, particularly in the south, southwest and west. The 1998 census recorded that 8 million people, that is 44% of total population of the country, live in coastal districts. Out of this coastal districts population nearly 55% are living in near the coastal line. Fishing, tourism, industry and agriculture sustain the growing economy of the coastal regions. The 24% of the land area that covers the west and south west coastal regions and also nearly 44% of the total population of the country living in these area, directly or indirectly depend upon those economic activities. The capital city Colombo, six municipal councils out of total thirteen of the country are found in this area and the two main commercial ports, ten fisheries ports and twenty nine fish landing centres are located in the west and south west coasts. Fishing contribute nearly 2% of the gross national product and recent studies have shown coastal area fishing in decline. In addition, sun, sand and surf of are Sri Lanka's major tourist attractions and offers recreational opportunities for the people. The tourism industry brings in foreign exchange as well as creates employment for people. The main shipping lane between the Far East, Middle East and Europe turn through the west and the south west coastal areas of Sri Lanka. More than 1000 crude tankers move every month in addition to other cargo ships through this shipping lane.

All of the above stated economic activities of the coastal regions results a heavy land based pollution. A recent study carried out by the Ministry of Environment (Municipal waste, Sri Lanka, 1999) shows nearly 2694 tons of municipal waste are generated per day, and of which 37% is generated by the capital city, Colombo. Even up to now there is no proper land based waste management system other than use for landfills. This causes ground water pollution and in turn has a major effect in the pollution of coastal waters.

Addition the ships and crude tanker movement ship based industries contribute to sea pollution dramatically. Oil, in particular, can be blamed for numerous incidents of

sea pollution around Sri Lanka. Figure 3 shows the intensity oil slicks in the southwest coast of Sri Lanka. Although the data provided in the figure 3 little old (1975-1978), the current situation can not be impressive rather than poor. This is because continually increase of crude vessel movement in region and very little or no effective action so far made to implement adequate regulatory regime within jurisdiction of the country arrest the all marine pollution problems.

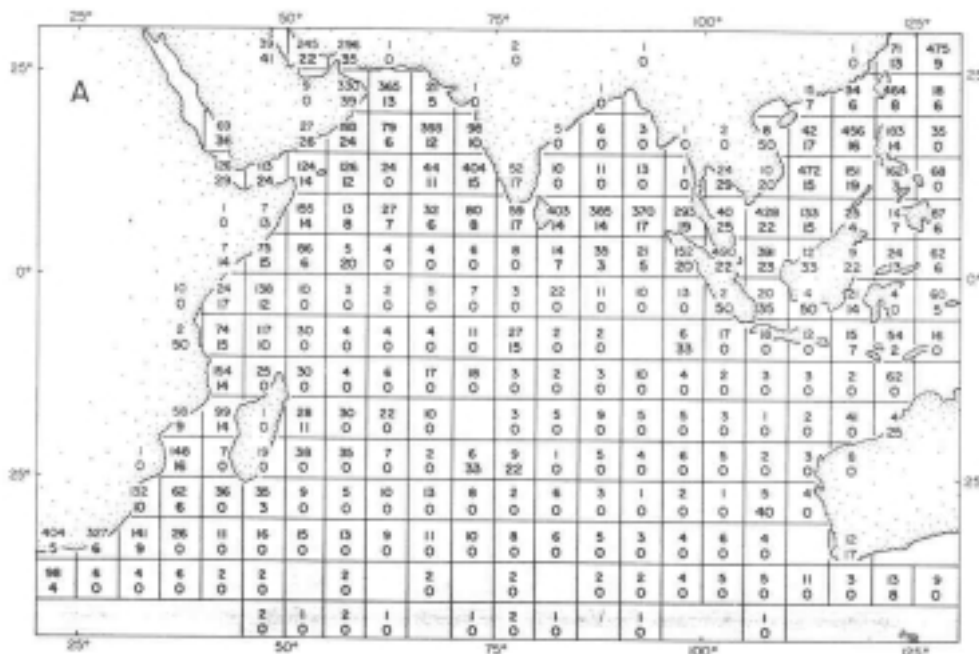


Figure 3: Geographical distribution of data of oil slicks on the Indian Ocean (1975-1978)- (Upper value: Total number of visual observation) of oil slicks for $5^{\circ} \times 5^{\circ}$ square of latitudes and longitude (Lower value: Positive reports from total observations) of the Indian Ocean.

Source: Global Oil pollution study report 1975-1978

These oil slicks are coinciding with the tanker route between Middle East and Japan. According to a study made by Integrated Global Ocean Station System (IGOSS, 1978) the oil slick concentration is much higher in the west coast Sri Lanka than in the east coast. Figure 4 below shows the concentration and distribution pattern of oil slicks in the Indian Ocean according to the study.

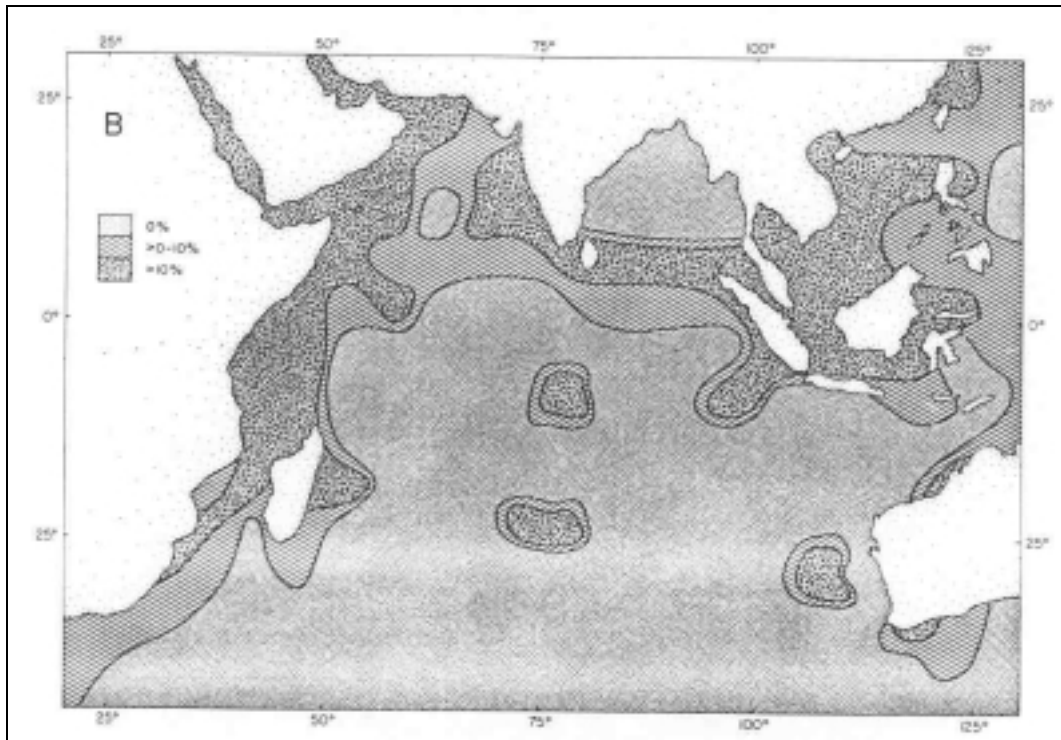


Figure 4- Pictorial presentation of data, the distribution of oil slicks in the Indian Ocean as indicated by the percentage of positive reports. Total number of visual observation of oil slicks for 5° x 5° square of latitude and longitude of the Indian Ocean.

Source: Global Oil pollution study report 1975-1978

The same report has given an indication of concentration of tar balls in the West coast of Sri Lanka is much higher compare with the coast line of the Indian sub continent.

2.2.1. Operational discharges by ships

Approximately 3350 ships are arriving at the Port of Colombo annually, and this figure is expected to continue and expand in future. The following diagram shows the number of ships visited at Port of Colombo during the year 1999. Although it is prohibited to do so, many ships discharge wastes as well as bilges in coastal waters when law enforcement is weak in a country. Most ships that visit the port of Colombo as soon as they are off three nautical mile southwest coast discharge

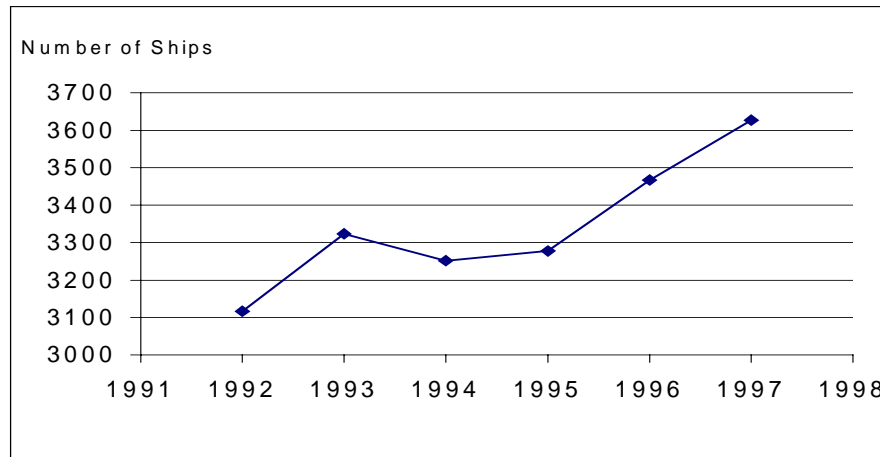


Figure 5 Number of ship arrived to Port of Colombo during 1991-1997
 Source: ILS- Shipping Statistics Year Book 1998

bilge water and pollute the marine environment. The law enforcement can only be possible by having an effective coast guard system policing the waters in three nautical mile range around Sri Lanka that enable to control the unauthorized operational discharges from ships

2.2.2 Tanker movement in southwest coast in Sri Lanka

Japan is the world's second largest oil consumer, imports major portion of crude oil from Middle East. According to a 1994 world crude oil sea born trade statistic, Japan has imported 171 millions (Appendix 1 in page 85) of crude oil import from Middle East. Crude oil is transported by tankers and moved via the Indian Ocean, that is the southwestern coast of Sri Lanka.

Some 200 kilometers south of Colombo is a small coastal town called *Dondar*, The shipping lane connecting the Far East and the Middle East lies 12 nautical miles southwest of this town maintain a traffic separation. According to the Statistics every month more than 1000 oil tankers transit through the *Dondar* traffic separation scheme of the shipping lane and has potential risk for a collision accident. The Table 1 shows the number of oil tankers transit through the *Dondar* traffic separation

scheme each month during 1999. This area is most nearest for tanker route and any accidental spill will not take to reach the coast and it will be matter of hours.

Table 1: Number of Crude oil tanker transit via Dondar shipping lane to Japan during the Year 1999. Source: Vessel Traffic Service, Port Authority of Singapore

| Month | Number of tankers |
|--------------|--------------------------|
| January | 1112 |
| February | 999 |
| March | 1129 |
| April | 1061 |
| May | 1075 |
| June | 1085 |
| July | 1252 |
| August | 1317 |
| September | 1189 |
| October | 1295 |
| November | 1121 |
| December | 1145 |

The volume of traffic increases the probability of accidental risk may also increase. Although no major accidents have been reported at Dondar separation scheme up to the present time it should be considered one of the risky area to have an oil spill. Addition to that this area is subject to high seasonal monsoon and any accidental oil spill poses greater pollution risk for the coastal region of the country.

2.2.3 Accidental oil spills

Ship casualties could occur due to collision, grounding, fire, explosion or breakdown due to structural failures. Furthermore these may be due to human error, equipment failure, lack of information in connection with navigational aids or other reasons. As stated earlier the accident of oil tankers may result in large quantities of oil spills in to the sea and depend up on the circumstances. These oil spills cause significant damage to the marine environment in the short as well as the longer term.

There are number of major tanker accidents occurred in the world during last three decades that have caused heavy marine and environmental pollution and some of these incidents are given in the Table 2.

Table 2: Some of Tanker accidents and caused oil spills

| Name of the Tanker | Year | Oil spill (mt) | Sea Area accident caused |
|---------------------------|-------------|-----------------------|------------------------------------|
| Torry Canyon | 1967 | 119000 | South West England |
| Amoco Cadiz | 1978 | 227000 | Brittany |
| Castillo de Belver | 1983 | 257000 | Cape Town |
| Iliad | 1983 | 80000 | Sfaktiria Island of Greece |
| Exxon Valdez | 1989 | 37000 | Alaska – Pr. William sound |
| Braer | 1993 | 85000 | Shetland Island of United Kingdom |
| Keumdong | 1993 | 1280 | Republic of Korea |
| Kihnu | 1993 | 100 | Tallinn- Estonia |
| Yeo Myung | 1995 | 440 | Maemul Island of Republic of Korea |
| Sea Empress | 1996 | 72000 | South-West Wales of United Kingdom |

The first most recognized major tanker accident was in 1967 when the tanker *Torrey Canyon* ran a ground on off south- west coast of England. The vessel was complete by wrecked spilling 119,000 tons of heavy crude oil.

The Liberian registered tanker *Braer* grounded south of the Shetland Islands (United Kingdom) on 5 January 1993. The ship eventually broke up, both the cargo and bunker fuel of 85,000 tons spilled out The oil spray blown by strong winds and affected the farmland and houses close to the coast. United Kingdom government imposed a band the fishing in the area that was affected by oil spill, prohibiting the capture, harvest and sale of all kind of fishes from within the area. The end result was that there were 2000 compensation claims including a clean up claim amounting

to US\$ 46 million. Out of those claims US\$ 4.8 million paid by the insurer of the vessel and US\$ 41 million paid by the Civil Liability Fund Convention.

On August 3, 1995, the Korean tanker *Yeo Myung* (138 GRT) laden with 440 tons of heavy fuel oil was collided with a tug off Maemul Island, near Koeje island off the coast of South Korea. Approximately 40 tons of heavy fuel oil was spilled. Clean up operations were initially carried out by the local authorities but subsequently handed over to a specialist group. The clean up cost amounted to US\$ 523,000 and the fisheries cooperatives affected have claimed US\$ 6.9 million for the loss of fisheries and mariculture. In addition the tourism sector near the beaches of Koeje Island claimed US\$ 1.7 million for loss of business. Fish farmers claimed an additional US\$ 230,000 for the damage caused to fish farms near the area.

The Estonian tanker *Kihnu* (949 GRT) grounded on 16 January 1993 close to the Port of Tallinn in Estonia. It was estimated that some 100 tonnes of heavy fuel oil and 40 tonnes of diesel oil were spilled as a result of the grounding. The clean up operations were carried out not only by Estonia but by Finland since the spill has affected the sea and beaches of the Finland. The clean up cost US\$ 65,100 was borne by the Finnish government subsequently paid by the CLC fund. The above sum was paid for the preventive action taken by the Finish Government but not for the assistance given to the Estonian authorities.

The above stated accidents and their brief accounts help us to gain a basic understanding of the cause and effect of oil spills.

2.2.4 Single point buoy mooring (SPBM) at port of Colombo

In 1988 a Single Point Buoy Mooring (SPBM) was established 4 1/2 nautical miles off the breakwaters of Port of Colombo to facilitate the pumping of crude oil from carriers through a submarine piping system to the oil refinery plant for the purpose of processing. This operation obviously increased the potential risk of pollution of sea

near the capital Colombo. The most recent accident reported was July 1998 when nearly 75 tons of light crude oil were spilled during discharge operations, causing pollution to the beaches of the most populated areas near the capital Colombo. The clean up operations were completed within 2 days with the use of dispersants. The authorities apparently employed this medium without due regard to the harmful effects it is known to cause the environment.

2.2.5 Bunker service

The Petroleum Corporation of Sri Lanka provides bunkering services inside the Port of Colombo. Approximately 600,000 tons of marine diesel and marine gas oil are supplied annually to vessels by the service. Five barge vessels are used for this purpose and minor fuel spills occur during the bunkering. There were 3 small scale (10 –50 tons) spill incidents reported from this unit in 1998 and 1999. According to the authorities these spill were caused lack of proper maintenance and regular inspection of the equipment.

Proper attention has to be paid for the human element as well as the vessels and equipment involved in order to minimize the spills during operation.

2.2.6 Refineries and storage system

The crude oil refinery plant is located about 14 km from Colombo and has a refining capacity of 6,900 tons per day and stores nearly 40% refined fuel are stored in surface tanks that are located in the city's high security zone. In 1997, however, four tanks of each having a capacity 60,000 liters caught fire, burning all the fuel within two days, part of which reached the sea through the area's canal system. This is yet another system that could result in a greater impact for marine pollution if the policy of zero tolerance in fire protection is not maintained.

2.2.7 Dry-docking and ship repairs

The Colombo Dockyard Limited (CDL) is the country's biggest ship repair yard with four docks having the capacity to repair up to 100,000 DWT vessels. The specifications of the dry docks are as follows:

| Dock No | Capacity (Dwt) | Length (m) | Width (m) | Height (m) |
|----------------|---------------------------|-----------------------|----------------------|-----------------------|
| 1 | 30 000 | 213 | 26.0 | 9.7 |
| 2 | 8 000 | 107 | 16.5 | 6.7 |
| 3 | 8 000 | 122 | 16.0 | 5.5 |
| 4 | 100 000 | 236 | 44.0 | 8.9 |

The average annual intake for the repair yard is around 150 ships and although action has been taken by the yard to minimize oil pollution, minor oil spills are inevitable during the repairs.

2.2.8 Ethnic conflict and marine environment pollution

Since the ethnic conflict started in 1983 in northern Sri Lanka, all material, food and passenger transport carried by sea plus all Navy vessels and aircraft have been targeted for attack. More than 15 vessels have been sunk by the rebel groups in the last 10 years. This also contributes to oil pollution in coastal waters. Furthermore the location of sunken ship wrecks are not monitored and taken into nautical charts, so other vessels navigating over the sunken ships results even more accidents.

2.2.9 Fishery vessels

Although fishing vessels are smaller in engine capacity there is big fleet of around 38,000 are operating through out the country. These vessels also discharge waste, garbage and burn considerable amounts of fuel oil on daily basis and pollute the marine environment.

2.3 Other sources of marine pollution

Approximately 24% of population are living in urban areas and coastal cities and have a major problem of disposal of domestic waste. For example, the swage generated in the cities and urban areas are discharged with out any proper treatment to the canal system. Furthermore industrial waste water, sludge water from kitchen and laundries also reaches the canal system and finally end up at sea with out any treatment. The Colombo's seaward area consist approximately 3 100 hectare and out which 2100 hectare that cover northern part of the city all these waste water directly discharged in to the *Kelani* river. The Southern portion which consist of 1 000 hectare discharged directly to sea via another cannal. It has been estimated sewage flow consist of organic load of 10,000- 26 400 kg BOD₅/d the to the Kelani river.

2.3.1 Ground water pollution

The most serious threat to ground water comes from nitrate and bacterial (fecal) contamination. The rural sector sewage effluent from pit latrine soakaways and septic tanks, causing bacterial contamination and absorb to the rivers and canals then affects for the ground water pollution. In addition the leakage of pesticides into ground water may also occur in main agricultural areas. All inland water pollution finally affects the marine environment.

2.3.2 Air pollution

There are many sources of air pollution in the modern world. Fossil fuel is the single largest contributor to atmospheric pollution. Recent studies have shown that ship exhaust emission may now be responsible for up to 14% of world wide nitrogen oxides (NO_x) emission and approximately 8% of sulfur oxides (SO_x). Also it has been estimated that the world annual fuel consumption by ships amounts to 140 million tones, consisting of the 4% the world's total fuel consumption. In addition the equipment use in ships are uses NO_x and SO_x, halons used for fire extinguishers, chlofluorocarbans (CHCs) for refrigeration and air conditioning plants and volatile

organic compound (VOC) and those emissions to the atmosphere causes damage to human health as well as terrestrial/aquatic ecosystem. It is therefore important to ensure proper regulation and effective control of the machinery and equipment of vessels to minimize the emission of such gases to the atmosphere.

2.3.3 Ballast water

The carrying of ballast water is essential for the ship for her stability. However, studies carried out in some countries have shown that many species of bacteria, plants and animals can survive in viable form in the ballast water and sediment carried in ships even after the voyage of several weeks' duration. Subsequent discharge of ballast water or the sediment into the waters at discharging ports may seriously upset the existing ecological balance due to the colonies of harmful species that are arrived with the ballast water. The potential danger has been identified worldwide and many regulations are now in force to control the effects.

2.4 Coastal zone management

Many environmental pollution issues are inherently the byproduct of the negligence of human activities leading to the coastal zones. Given less priority, it has developed from a community to an issue of national issues of national significance. Most of these could have been minimized at the community level if those been integrated into urban management programs. The sewage and garbage disposal management in urban and coastal cities needs high priority of action plan. In Sri Lanka, the Coast Conservation Act enacted in 1981 and subsequently amended in 1996 to incorporate action on coastal pollution issues.

2.5 Importance of safeguarding the marine environment

Both marine pollution and air pollution have dual effects on the sun's rays reaching oceanic waters. In oceans, limited sunlight threatens the survival of plankton, the key organisms in the food chain. As it was discussed previously (figure 3) in the Indian Ocean that the oil slick concentration is much higher in the southwest coast of Sri Lanka. Furthermore in recent study (ie. Indian ocean experiment-INDOEX 1998)

carried out by the Institute of Oceanography in San Diego, USA, has found a thick cloud of tiny particles over the Indian ocean covering 10 million square kilometers from the Arabian Sea to Bay of Bengal and spilling over into the equatorial Indian Ocean to about 5 degrees south of the equator, partly covers air space over the Sri Lanka. The team leader of INDOX, Ramanathan expressed his view, the danger of Indian Ocean pollution for the article of National Science Foundation News in June 1999:

If you cut the amount of sunlight going in to the ocean, you will also impact the amount of moisture evaporating from the sea surface either regionally or globally and consequently entire hydrological cycle is being perturbed. A reduction of sunlight reaching the ocean surface can also have a detrimental effect on plant life that depends on photosynthesis, including plankton, which provides link in the marine food chain. (NFS News, June 1999)

The effects of these clouds may be very complex and need further studies for a conclusion. However the pollution of the Indian Ocean has an impact over the countries in the region and therefore effective measures need to be taken by both Sri Lanka as well as other States in the region for the protection of their vast body of waters.

CHAPTER III

MARINE ENVIRONMENT PROTECTION

3.1 Environmental issues and management

In the previous chapter, it was discussed the sources of pollution and the effect for the marine environment in Sri Lanka. The pollution is predominantly a result of the action of people and the amount waste generated in Sri Lanka from the land based sources are considerably lower compared to other countries like India, Pakistan and Bangladesh in the region. Of cause, one reason is less population. However the non-availability of proper system of management and inadequate facilities for the safe disposal of waste has become a growing problem for the country in protecting the marine environment. In the growing economy, it will be aggravated with increasing of industrialization. Therefore legislation, enforcement, facilities, infrastructure and support services are essential elements for the prevention of pollution and waste management in the country. Current status of ships generated pollution management also has no difference, only a few legislative steps have taken recent past to address the issue. This chapter will try to address the current plans and problems confronting the management of marine environment protection.

3.1 .1 Effective organizational structure for maritime affairs

Effective and efficient organizational structure is vital important for any organization for its successfulness of its intended mission. Many of the developed maritime nations are having effective organizational structure from the highest level of legislative council to the lowest implementation level. There is a common feature in most of these countries in handling the maritime affairs and have some common features in those organizational structures. Few examples are France, Germany, Finland and Sweden. The Ministry of Transport and Communication is the key

Ministry holds responsibility and for the maritime affairs, and the subject operates under the department of Maritime Transport in the above countries. The policy development and implementation are the two key functions of the department. In broader sense followings are task carried out by the maritime transport department:

- Supervision of maritime safety
- Protection of the marine environment against pollution from ships
- Pilotage
- Search and rescue
- Marine surveying and the production of nautical charts

The Swedish maritime administration handles two additional functions namely making of fairways and icebreaking. In the above countries, the organizational structure dealing with maritime affairs are given the appendices 2 to 5 in pages 77-80. In comparison the model structure in figure 6 is common for the four countries discussed above.

In China, the maritime affairs operate under the Ministry of Communications and there are 14 major departments to administer the maritime affairs under a Director General's office. The Appendix 6 in page 86 gives the complete structure of the maritime administration in China. The marine pollution prevention and hydrographic services are also two key department functions under the maritime administration. Maritime affairs are generally international in nature and all the elements that are needed for the the administration should be developed in parallel structure for easy and effective implementation This is the policy prevailing in the countries discussed above.

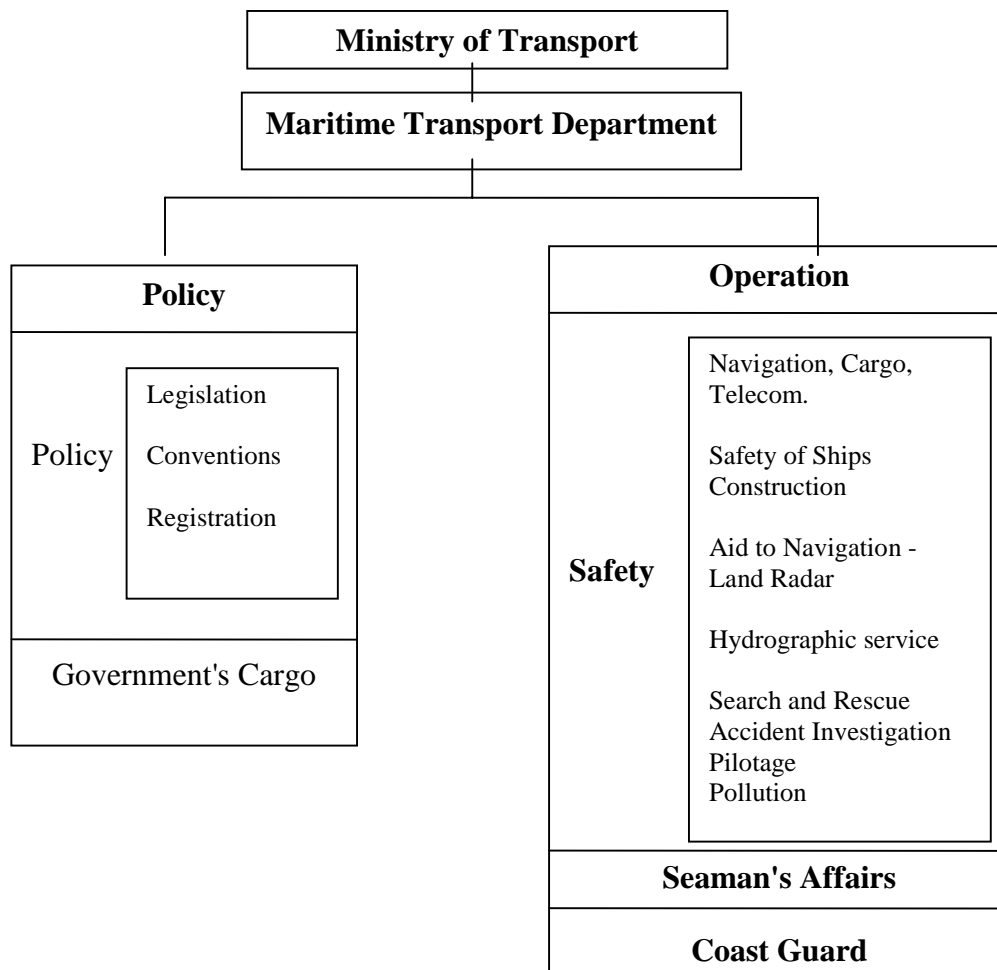


Figure 6: Model structure for maritime transport administration

3.1.2 Protection of natural environment in Sri Lanka

The Central Environmental Authority of Sri Lanka was established under the National Environmental Act No.47 of 1980 and further amended in 1988 to protect the natural environment of the country. Furthermore in 1999 the same act was redrafted to incorporate the functions of the Ministry of Environment in related to environmental issues. The National Environmental act has not provided provision for the marine pollution prevention. Furthermore until 1980's there was no organization to regulate and protect the marine environment in Sri Lanka. In 1981, creation of the Marine Pollution Prevention Authority (MPPA) under the Ministry of Port and Shipping was the bench marked to address the marine pollution issues. Also in 1981, the Marine Pollution Prevention Act No.59 was passed by the Parliament and

3.1.3 The maritime administration and marine pollution prevention

The maritime administration was first created during the British rule (1815-1948) by passing the Merchant Shipping Act of 1863. However, the present Merchant Shipping Act was developed in 1971 after the independent. The Ministry of Shipping Aviation and Tourism took in-charge of the maritime affairs during 1970's. Then 1980's the maritime affairs were brought under a new Ministry, Trade and Shipping. In 1990's the Ministry of Trade and Shipping was split to two and the Ministry of Shipping becomes as

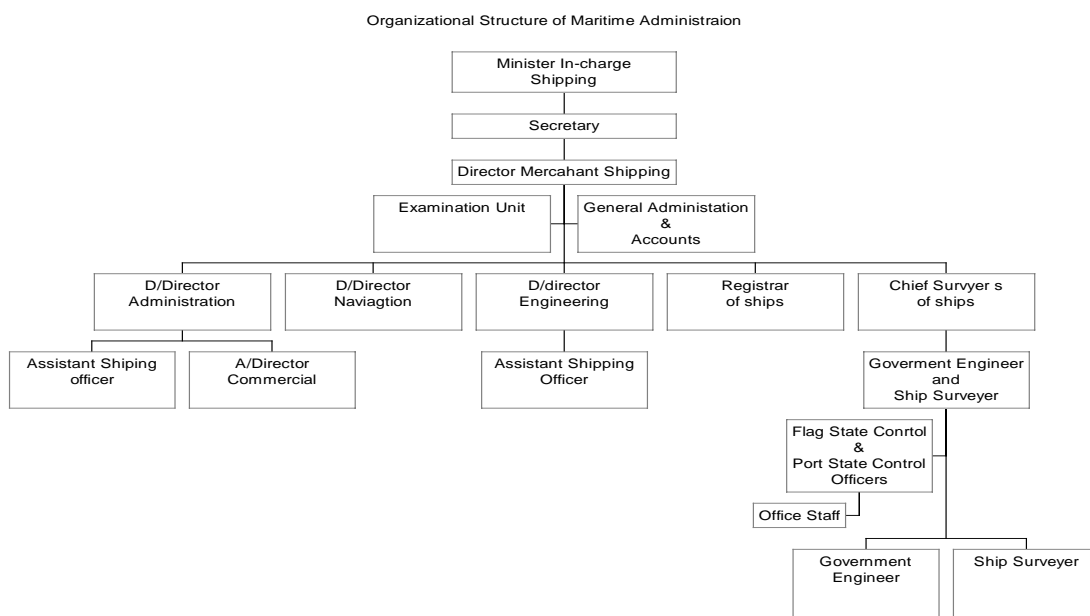


Figure 7: Organisational structure of the Maritime administration of Sri Lanka

Source: Merchant shipping Directorate of Sri Lanka

the Ministry of Ports & Shipping. Then the Maritime Administration and the Pollution Prevention Authority be come under the Ministry command structure for the implementation policy of maritime affairs as well as protection of marine environment. However in 1999 the Ports and Shipping has become further two ministries and the Ministry of Ports is currently responsible for the supervision of MPPA and the maritime administration has brought under the Ministry of Shipping. Figure 7 shows the current structure of the Maritime Administration.

The role of Ministry of Ports is to give the guidance and develop the policies to operate the commercial ports more efficiently and effectively and bring highest economic return. In the case of policy development and guiding on marine pollution prevention under the same ministry as a national service, it seems the two roles are in conflicting nature. The role of marine pollution prevention and protection as a subject is more linked towards the maritime administration and environmental management than the port management. This development seems discontinuation of the direct link between the Marine Pollution Prevention Authority and the Maritime Administration. It will be a benefit in operation point of view if the maritime administration and the marine pollution prevention authority have single command structure for the policy development to function more effectively in protecting the marine environment.

In current status maritime administration powers are regulating thorough the ministry in charge and efficiency is in question relation to need of the country for economic development. Therefore it need certain amount of autonomy to improve the efficiency and effectiveness. For example, the maritime administration of Denmark has a power to implement the international legislation without a parliament Act if the State is ratified the conventions (Danish Environmental Protection Agency Report 1999) where as in implementation of the international conventions in Sri Lanka need parliament endorsement. This is will take considerable amount of time. This procedure will help to avoid the delay of implementation of international conventions and that will benefit to the country to regulate maritime industry more speedily.

3.1.4 Indian Ocean memorandum of understanding (IOMU)

The substandard ships are more dangerous for the marine environment. The port state control (PSC) is the final safety net available to eliminate the substandard ships visiting their ports. Therefore world have been divided administratively to seven regions to act upon those substandard ships through the Port State Controls (PSC) action. The countries in particular region has signed a Memorandum of

Understanding to fulfil the role of Port State Control and to have a regional cooperation for the task. Memoranda of Understanding are currently operating in the European Union (Paris MOU), Asia Specific (Tokyo MOU), West Africa (Abuja MOU), Mediterranean (Mediterranean MOU), Caribbean (Caribbean MOU), Black Sea (Black Sea MOU), Latin American (Viña del Mar MOU) and Indian Ocean (Indian Ocean MOU).

Paris MOU countries has annual target of inspection is 25% of the total vessels visiting their ports and the Tokyo MOU countries target is 50% of total vessels that are visiting their ports. In 5 June 1998 the countries belongs to Indian Ocean Memorandum of Understanding, where Sri Lanka is also a member and has signed an agreement to inspect the minimum of 10% of total ships visiting the ports. The highest potential risk for the sea pollution is substandard ships and the inspection by PSC and sharing the information of Port State Controls for further action is one way of removing the risk of pollution of marine environment. This is one of the important actions taken recent past as a collective effort of member states of Indian MOU with the assistance of IMO.

The effectiveness of port state control inspection depends upon the training and experience available to the PSC officers and these areas requires more improvements in quality and quantity of staff in line with the demand of Colombo port. As stated above marine pollution prevention matters are concerned, no plan has been developed to identify the ships polluting Sri Lanka's waters other than inspection of certificates for conformity with anti-pollution regulation. There are evidence of crude washing carried out by many tankers along the tanker route west coast in Sri Lanka and this is only can be controlled and minimized having a surveillance with a effective coast guard regime that covers the tanker route within the Jurisdiction of the country. In addition the National Ocean

Research Institute should monitor the water quality along the tanker route, then it can be understood the level of oil pollution. However implementation of such program has a slow progress due to inadequate resources and other priorities.

When the crude tankers entering and passing through the coastal waters of a state, there should be a mechanism to monitor or reporting system to the coastal state. This arrangement has a greater advantage because, during an oil spill, quick response can be organized as well as the state can make necessary decision in advance to minimize the possible threats from the spill. For example, any vessel carrying crude in Canadian waters must report in advanced to the Marine Environment Protection Agency and also should produced a certificate of guarantee from a marine pollution response organization. There is no such reporting system at present available and Sri Lanka should make request to IMO reasoning out the need and that will benefit to the region. At present in the Far East route only monitoring take place at the vessel traffic service of Singapore.

3.1.5 Hydrographic services

The maintenance of navigational aids as well as updating of nautical charts within the maritime jurisdiction of the country is one of the key functions of the maritime administration. In this respect the close link between the Maritime Administration and Hydrographic Service is vital important for the preparation and updating of nautical charts. This could be a one of the reason many countries have developed their hydrographic service under the maritime administration. For example, monitoring of ship wracks and notice to the mariners one of a function of hydrographic service.

The proposal was made to establish a National Hydrographic Service in Sri Lanka is coinciding with the United Nation's Law of the Sea Conference in 1980. The National Hydrographic Office (NHO) was established in 1981 under the direction of three key Ministries namely the Defense, Fisheries and Land. In the current status

there is very little working relationship between the Hydrographic Service and the Maritime Administration. The functions of Hydrographic Service is govern from the amended act of Aquatic Resource Research and Development in 1997 and is operating under the National Aquatic Resources Agency (NARA) of Ministry of Fisheries and Aquatic Resources Development (MFARD). As earlier stated the production of the nautical charts and updating, investigation and monitoring of obstacles in navigational routes within the national jurisdiction are need grater attention of the maritime administration as it provides the information for safe navigation. Also when a ship is grounded within the maritime jurisdiction, there should be a mechanism to report for the Hydrographic Service to make a survey the position for the safety requirements for future navigation. However this part has not paid attention in the implementation process both in hydrographic service as well as in maritime administration. In December 1999, a coastal trading ship was grounded as it has run over sunken ship wrack in the coastal waters in northern part of the country. Therefore the nautical chart updating and notice to the mariners, the action plan need a review to avoid such accidents and the two institutions are needed close cooperation in respective tasks.

3.1.6 Monitoring of marine environment pollution

Today's society because of the development of information technology and the electronic media most of the people are aware that, there is a growing problem of environmental pollution and where ever it happens. The preparedness for the prevention of pollution always need some form of scientific evidence for the authorities to act up on. The fundamental reason behind is that every State has their owned priorities in diverting the resources. In chapter two, it was discussed the amount of pollution taking place particular to the Indian Ocean and specially with regard to oil slicks and tar concentration. However the limited research material found available in the marine pollution pertaining to the Indian Ocean. The marine pollution monitoring pilot project (MAPMOPP), on Global Oil Pollution Survey has made an comparison of pollution all the oceans from the data collected between

1975-1978 and that shows Indian Ocean pollution more significant comparative to other oceans (IGOSS-Report p 25).

Table 3: Dissolved / Dispersed petroleum residue concentration in various region/ $\mu\text{g} / \text{l}$

| Region | Gaussian Statistics | | | Lognormal Statistics | | | |
|---------------------------|---------------------|-----------|------|----------------------|----------|------|------|
| | n | \bar{c} | s | n | $\log c$ | s | G.M. |
| Baffin Bay | 104 | 0.11 | 0.12 | 93 | -1.05 | 0.37 | 0.09 |
| Indian Ocean | 45 | 60.1 | 92.7 | 36 | +0.95 | 1.29 | 8.9 |
| Japan | 1666 | 0.31 | 1.21 | 1640 | -0.88 | 0.56 | 0.13 |
| Mediterranean Sea | 465 | 2.0 | 5.0 | 462 | -0.48 | 0.94 | 0.33 |
| North American East Coast | 80 | 0.11 | 0.10 | 71 | -1.03 | 0.31 | 0.09 |
| North Sea | 90 | 0.02 | 0.12 | 9 | -0.81 | 0.38 | 0.15 |
| South China Sea | 272 | 0.20 | 0.28 | 256 | -0.98 | 0.57 | 0.10 |
| Strait of Malacca | 14 | 0.11 | 0.12 | 10 | -0.89 | 0.27 | 0.13 |

Sources: IGOSS -Global Oil pollution report, NOAA

The summary of its finding is given in table 2. The analysis has given a comparison of these oceans with regard to petroleum oil slicks and the tar concentration. The table 2 above shows that even that number of samples of dispersed petroleum residue taken from the Indian ocean (45) are low for the study, still results are indicating for heavy pollution is taking place in the Indian Ocean. This has been proved further from analysis given in the Indian sub-continent oil slick data discussed in earlier chapter. That has indicated, in the west coast of Sri Lanka out of 59 samples collected, there were 17 positive reports of oil slicks but in the east coast Sri Lanka and out of 403 samples only 14 were positive. This figures highlight the greater concentration of oil slicks in the west coast and it could be due to two reasons namely:

- Crude Oil tanker route between Far East and Middle East
- Operational discharge by ships (bilge and tanker washing)

Sri Lanka has not developed so far an effective program to monitor the marine pollution in regular basis. The report like IGOSS is alarming need of regular basis

monitoring and implementation international legislation with regard to ship source pollution to protect the marine environment around Sri Lanka.

During past three decades most of potential threats from ships for the marine environment have been identified. In summary the general form of substances and activities that contribute to marine pollution are:

- Oil
- Noxious liquid and substances
- Harmful goods in packed form
- Sewage and garbage
- Extensive sulfur oxide from the combustion of fuel oil and nitrogen oxide from diesel engines
- Discharge of volatile organic compound from tanker cargoes
- Discharge of halons and chlorofluoro carbons that effects to deplete the ozone layer
- Discharge of ballast water

In the same time many of these areas are concerned necessary preventive measures has been identified and international convention put in place. But the implementation of the international conventions is varying and that are depending upon the resources capability of individual country. However the monitoring and research studies are vital important to take precautionary action.

3.2 State responsibility in marine pollution prevention and management

It is obvious that marine pollution prevention and the preparedness for prevention are primarily a responsibility of the State. There are five steps to be followed in developing proper organizational structure for the task. The first step is necessary to have effective flag state implementation. Secondly the legal regime on the basis of international conventions with regard to the marine pollution prevention. Thirdly the

inspection regime or the port state control is to arrest and eliminate the sub standard ships visiting their ports. The fourth item is to have a coast guard regime to play a supportive role as a policing agency within the coastal jurisdiction. At last the above institutions should work together with a common objective for the set targets. All actions and out comes should regularly review and adjust if any deficiencies are observed in the individual respective programs. Furthermore regional cooperation is another requirement in the maritime affairs and it will help to overcome problems and difficulties and benefits for the region as a whole.

In this chapter it was point out that maritime affairs are generally international nature so that all issues in marine pollution, pertaining to ship sources has to be dealt with the international conventions. Therefore the next chapter will be discussed the international conventions and the national laws that are needed to protect the marine environment.

CHAPTER IV

MARINE ENVIRONMENT PROTECTION LEGISLATION

The first international convention on marine pollution prevention was the International Convention for the Prevention of Pollution of the Sea by Oil, in short known as OILPOL entered in to force in 1954 with an agreement of 40 countries. The convention imposed an obligation on ship owners, operators and masters their ships to minimize their accidental and operational pollution. However the enormous growth of oil transport and the size of tankers, the increase of chemicals being carried out by sea and growing concern for the world's environment as a whole made many felt that OILPOL is inadequate to arrest and minimize the pollution of sea. This chapter deals with later developments in the international legislation relevant Marine Environment Protection and the actions taken by Sri Lanka to give an effect those international legislation.

4.1 International Convention for the Prevention of Pollution from Ships 1973/78 (MARPOL 73/78)

As stated above the growing problems in maritime accidents and the pollution of the sea by the shipping industry was a major concern at IMO in the 1970's. As a result IMO has convened a diplomatic conference to draft a new convention on prevention of marine pollution in 1973. The conference resulted in the adoption of the International Convention for the Prevention of Pollution from Ships (MARPOL 73).

MARPOL is the most ambitious international marine pollution convention. It applies to ships of all types and covers the technical aspects of pollution from ships, except the disposal of waste into sea by dumping. The convention has two Protocols dealing with

reports on incidents involving harmful substances, arbitration and six Annexes which contain regulations for the prevention of various forms of pollution:

- Annex I: Prevention of pollution by oil
- Annex II: Control of pollution by noxious liquid substances in bulk
- Annex III: Prevention of pollution by harmful substances carried by sea in packaged form
- Annex IV: Prevention of pollution by sewage from ships (this is not yet in force)
- Annex V: Prevention of pollution by garbage from ships
- Annex VI: Prevention of air pollution from ships (this is not yet in force and up to now Sweden and Norway are only parties to Annex VI)

4.2 *Torrey Canyon* Incident

In March 17, 1967 the tanker *Torrey Canyon* ran ground near the Scilly Isles- outside United Kingdom territorial waters with a cargo of 119 000 of oil on board. Approximately 60 000 tons of oil discharged as a result of grounding. The British Government then ordered the wreck bombed so as to burn the remaining oil. This action was contrary to the international law at the time. This incident lead to a general review the international law connected with maritime matters. One of the few problems crated *Torrey Canyon* incident was who is responsible for the environmental damage as well as for the victims of the accidents. The development three major International Conventions were the final out come by IMO to overcome those issues.

4.2.1 The Convention relating to Intervention on High Seas in Cases of Oil Pollution 1969

In November 1969 IMO has convened a diplomatic conference and adopted the Convention relating to Intervention on High Seas in cases of Oil pollution casualties. One of the incidents happened, prior the diplomatic conference, the action of the British

Government against *Torrey Canyon* was justified by the International Law Commission indicating as an act of necessity. It was the doctrine formed the basis of the convention. The Intervention Convention of 1969, allows parties to take action necessary to prevent, mitigate or eliminate grave and imminent danger to their coastline or related interests such as fishing activities, tourism, living resources and of wildlife from pollution or threat of pollution of sea by oil. The convention to apply, the stated interests should be directly affected or threatened. Hence there is a power to the coastal State to intervene on purely on environmental ground. Also the convention is not restricted to the tankers and applies to any floating craft. However the convention does not apply to an installation or device engaged in the exploration and exploitation of resources from seabed as well as ships belongs to Government that not in trade and warships. When taking action by the coastal State in danger, the State must only act after due consultation with appropriate interests, including flag state(s), ship(s) involved, the owner(s) of the ship(s) or cargoes in question appointed for the purpose.

The convention is a guide to develop national laws enable to make an institutional powers to take measures to prevent, mitigate or eliminate in the event that there is grave and imminent danger to the coastline of the state or the related interests. The actions may me be to

- move the ship or part of the ship to another place
- remove cargo from the ship
- salvage the ship, part of the ship
- sink or destroy the ship or part of the ship
- sink, destroy or discharge into the sea any of the ship's cargo
- take over control of the ship or art of the ship

4.2.2 International Convention on Civil Liability for Oil Pollution Damage 1969

The main issue raised by the *Torrey Canyon* incident was who is to be held responsible for the damage caused by oil pollution. Addition to that the basis for the determination of liability and the level of compensation for the damage were the other issues. At the time only easy was to identify the parties responsible were the owners of the ship and the cargoes.

In November 1969, IMO convened a diplomatic conference an adopted a convention dealing with the civil liability of the ship or cargo owner for the damage suffered as a result of the pollution casualty. The purpose of the International Convention (CLC) on Civil Liability for Oil Pollution Damage 1969, to ensure that adequate compensation is paid to victims and the liabilities is placed on the ship owner.

The CLC Convention applies only to the bulk carriers (tankers) and to damage caused by persistent oils carried on board by such vessels. Under the convention, if ship carries more than 2,000 tons of oil in bulk must carry a recognized financial guarantee certificate or insurance cover that endorsed by the state authority. The insurance cover should specify the limitation of liability. The ship owner's liability will be exempted, if the pollution is a result of a war, natural phenomenon or caused by act of third party or negligence of government or authority responsible for navigational aids. If the pollution has occurred as a result of fault or deliberate action of the ship, then owner's liability will not be limited. Those are major elements of Civil Liability Convention.

4.2.3 International Fund Convention for Compensation for Oil Pollution Damage 1971

Some of the delegates participated to the diplomatic conference on CLC 1969 had an opinion the liability limits established were too low under the CLC, and that the compensation made available in some cases therefore might prove to be inadequate. This

situation lead to convened another diplomatic conference in 1971 by IMO and that resulted to adopt a convention, the International Oil Pollution Compensation Fund 1971 and also known as IOPC Fund 1971

The main feature of the fund is that made up of the contribution from oil importers. The fund is administered by the secretariat of the fund. Under the CLC the ship owner's liability will be limited and the idea was to establish a fund to compensate the liability, when it exceed the amount of ship owner or his insurer's strict liability, he is incapable of settle the liability. Also fund will under take liability when the ship owner is exempted for his liability. The fund was came to effect in October 1978 and any oil pollution damage, the compensation payable was limit to 60 million Special Drawing Rights (SDR) including the sum actually has to be paid by the ship owner or his insurer under the CLC 1969. However the CLC 1969 and the 1971 Fund Convention was again amended to improve the condition both coverage as well as amount of compensation.

4.2.4The International Convention on Civil Liability for Oil Pollution Damage 1992 and Fund Convention 1992

The compensation payable by the 1971 Fund in respect of a incident is limited to an aggregate amount of 60 million SDR that include the sum actually pay by the ship owner or his insurer. As many of member states of IMO had an opinion need of increase the amount of compensation because of the inflation on the real values. Therefore in 1992 the limits of liability has amended to sum of 135 million SDR. This amendment become as 1992 Fund Convention.

Also the fund in 1971 as well as 1992, will not compensate the following circumstances

- The damage occurred in a State which was not a member of the fund
- The pollution damage resulted from act of war or was caused by a spill from a war ship

- The claimant can not prove the damage resulted from an incident involving one or more ships as defined.

As a results of the implementation of the 1992 Fund Convention, 1971 fund has ceased fund with effect from October 1999.

4.3 International Convention on Oil Pollution Preparedness Response and Cooperation 1990 (OPRC 90) and its characteristics

In 1989, the *Exxon Valdez* oil spill in Alaska, authorities attempted to coordinate the clean up operation at the beginning had to some face logistical problems. The one problem was that considerable amount of time wasted to get access for the international and domestic equipment as well as took more time to arrive the equipment.

In the other hand US government was unprepared to handle such a massive oil spill at the time. Subsequently United State Government is prepared a proposal on "Development of International Emergency Response for Oil Spills Cleanup" to the summit of Industrialized countries held in Paris in July 1989, The summit has accepted US proposal.

The Paris summit has influenced the adoption of International Convention on Oil Pollution Preparedness Response and Cooperation 1990 (OPRC 90) Convention in November 30, 1990 by IMO and another important development in marine pollution prevention. The Convention entered into force in May 13, 1995. The OPRC Convention has given opportunities to improve capability of individual state and to prepare a plan for respond to catastrophic oil spills. There were two objectives of the OPRC convention, one is to facilitate the international cooperation and mutual assistance in preparing for and responding to major oil spill incidents and other is to encourage to develop and maintain adequate capability to deal with pollution emergencies.

The important technical aspects to the OPRC convention:

- compromise to undertake nationally or in cooperation with other countries all necessary measures

- give a provision for oil pollution emergency plan for the ships, offshore platforms and sea- ports.
- recommend to establish oil pollution reporting procedures, establishment of national and regional system for preparedness and response, mutual assistance, exchange of information, promotion of research development, training and technical cooperation on this subject.

4.4 United Nations Convention on the Law of the Sea (UNCLOS 82)

The United Nation on Law of the Sea (UNCLOS 82) has ratified in December 1982 and entered into force on 16 November 1994. The Convention deals with many issues such as international rights of navigation, Coastal State rights and obligation, deep-sea bed mining and other related issues. The part XII of the convention is relevant to the protection and preservation of the marine environment. The UNCLOS 82 Article 194 specifies the role of the State in protection and prevention of marine environment.

Article 194: Measures to prevent reduce and control pollution of marine environment

States shall take, individually or jointly as appropriate, all measures consistent with this convention that are necessary to prevent, reduce and control pollution of the marine environment from any source, using for this purpose the best practicable means at their disposal and accordance with their capabilities, and they shall endeavor to harmonize their policies in this connection.

Furthermore Article 198 describes the responsibility of the affected State to notify the other neighboring States if the pollution is imminent danger to those States.

Article 198: Notification of imminent or actual danger

When a State becomes aware of cases in which the marine environment is imminent danger of being damaged or has been damaged by pollution, it shall be immediately notify other States it deems likely be affected by such damage...

In the case of preparedness for prevention, mitigation or elimination program in combating Oil pollution, IMO guide lines or the International Convention on Oil Pollution Preparedness Response and Cooperation 1999 (OPRC 90) has a link to the Article 199 of UNCLOS 82.

Article 199: Contingency plans against pollution

In the cases referred to in article 198, States in the area affected, in accordance with their capabilities, and the competent international organizations shall cooperate to extent possible, in eliminating the effects of pollution and preventing or minimizing the damage...

In addition UNCLOS 82 Article 200 and 201 discuss the need of regulation through scientific research studies and shares the data and information between the States in cooperate manner to mitigate and control the pollution of marine environment.

Monitoring on a regular basis is important to understanding the changes and effects in the marine environment caused by all types of pollution. UNCLOS 82, Article 204 discuss necessity of regular monitoring and assessment of risk and effect of the marine environment.

Article 204: Monitoring of the risks or effects of pollution

1. States shall, consistent with the right of other States, endeavour, as far as practicable, directly or through the competent international organizations, to observe, measure, evaluate and analyze, by recognized scientific methods, the risks or effects of pollution of the marine environment.
2. In particular, States shall keep under surveillance the effects of any activities which the permit or which the engage in order to determine whether these activities are likely to pollute marine environment.

The above stated international conventions are most important for guidance to develop the national legislation, rules and regulation to prevent, control and elimination of pollution of marine environment.

4.5 Marine pollution protection policy in global sense and policy developments in Sri Lanka

One of the important feature of OPRC convention is that develop regional agreements and arrangements for responding to marine pollution emergencies. However these agreements can not fully effective with out sufficient capacity and resources of the States participating in them. As the Convention has a facilitated for the international cooperation in reinforcing the regional agreements, the initiative and interest of individual state can make the reality of the programs.

In the previous chapter it was discussed current status of national legislation to protect the marine environment of Sri Lanka, That is the parliamentary Act No.59 of 1981, the marine pollution prevention.

The Act has stated (Marine pollution Prevention Act, Sri Lanka, 1981) the interests related to Sri Lanka waters or the fore- shore included:

- marine, coastal, port or estuarining activities including fisheries activities
- the promotion of tourism and preservation and development of tourist attractions of Sri Lanka waters or on the fore shore including beaches and coral reefs
- the health of the coastal population and their well being
- the protection and conservation of living marine resources and wild life

The marine pollution prevention act, the defined interests are seems limited to few activities. Therefore the expansion of scope is necessary to obtain the full effect for the protection of marine environment. In broader prospective the act should contribute to safeguarding nature and environment, thus ensuring sustainable social and economic development in respect of human conditions of life and of protection of flora and fauna.

If it is further elaborates that "aim at preventing and reducing pollution of environment in particular the marine environment, from ships, aircraft, fixed and floating platforms by solid, liquid, gases or other substances which may"

- cause hazards to human health
- harm living resources and marine life
- cause hindrance to legitimate uses of the sea or reduce amenities

The full effect of enforcement and its performance needed will normally be judged by the society, so it is necessary to have a provision in the act, acceptance of complaints by the interest parties such as local councils, societies of nature conservation, fisheries associations, public health Organizations and research institutions.

4.6 Enforcement problems, issues and the port state control

The protection environment is essential for the development society and the maintenance of environmentally sound economic development is a challenging task for a government unless all elements of society is shared the contribution. In the other hand awareness of pollution and related problems is vital important for the people to action in any society. This is the general problem mainly confronted by all developing countries in pollution problems and no exception for Sri Lanka.

In the case of land based pollution although some of the legal enforcement as well as action plan is placed in the urban areas, due to constrains in input resources, low priority of constant supervision and monitoring caused less effectiveness of the programs. In addition ship source pollution, although basic legal framework and the institutions are created, pooling of technical resources and skill managerial personal not in placed yet and that caused delay in effective implementation.

The IMO Conventions placed the responsibility for technically and environmentally safer ship on the flag State. Moreover the PSC is most useful instrument to assist in implementation of the minimum standard requirement for safe shipping and the cleaner oceans. The experienced PSC Officer necessary and should guide them to carry out PSC inspection on the basis of:

SOLAS 74, regulation I/9, regulation IX/6, regulation XI/4, Load lines 66, article 21

- MARPOL 73/78, article 5 and 6, regulation 8A of Annex I, regulation 8A of Annex II, regulation 8 of Annex III and regulation 8 of Annex V
- STCW 78, article X and regulation I/4
- Tonnage 69, article 12

The authorized PSC Officers should inspect the vessels on the basis of the initiative of the administration. Also this will be done on the basis of information provided by another party or else of the information given by the member of the crew, professional body or other individual with an interest in the safety of ships, its crew and passengers or the protection of the marine environment. The PSC inspection already placed in Sri Lanka

The international conventions provide a two-way approach to protect the marine environment, that is having a better regulatory regime to eliminate the sub standard ships visiting their ports and other is better preparation for any pollution threat causing from ships. In the case of preparation for a pollution threat, it will be a major investment and subsequently the cost can be recovered from polluter and the fund.

The next chapter will analyze the fundamental features necessary for a contingency plan and compare with the plan of Sri Lanka. In addition it will also discuss the improvements necessary for the latter to approximate more closely the ideal plan for Sri Lanka, in the light of its unique conditions.

CHAPTER V

OIL SPILL CONTINGENCY PLAN

The development of national contingency plan for oil spill control and pollution prevention, it may have number of fold because of sources and type of pollutant may be different. The two main streams are land base oil pollution and other is the sea base oil pollution. The sea base oil pollution can be in two forms, one is from ships and other from exploration and exploitation of seabed. For example oil platforms. Therefore when developing a national contingency plan it is important to consider the full spectrum of the subject to avoid any duplication of interests and resources and to obtain the optimum benefit from the effort. This chapter will discuss the essential elements for necessary for the implementation of a National Oil Spill Contingency Plan for Sri Lanka.

5.1 Policy and Strategy on oil pollution control contingency plan

Contingency plan should have two main elements namely strategy and operational plan. The strategy segment will define the policy, responsibilities and rationale for the operational plan is basically a checklist with pointer to information sources (figure 8). Plan should be a single document with all essential information for easy and need of regular updating and listing and dating of amendments. Strategic plan defines the policy and generally it is the area of controls necessary and methods of control the oil spills. Areas will be specifies in particular country. In particular to Sri Lanka the sources of oil pollution need attention to control:

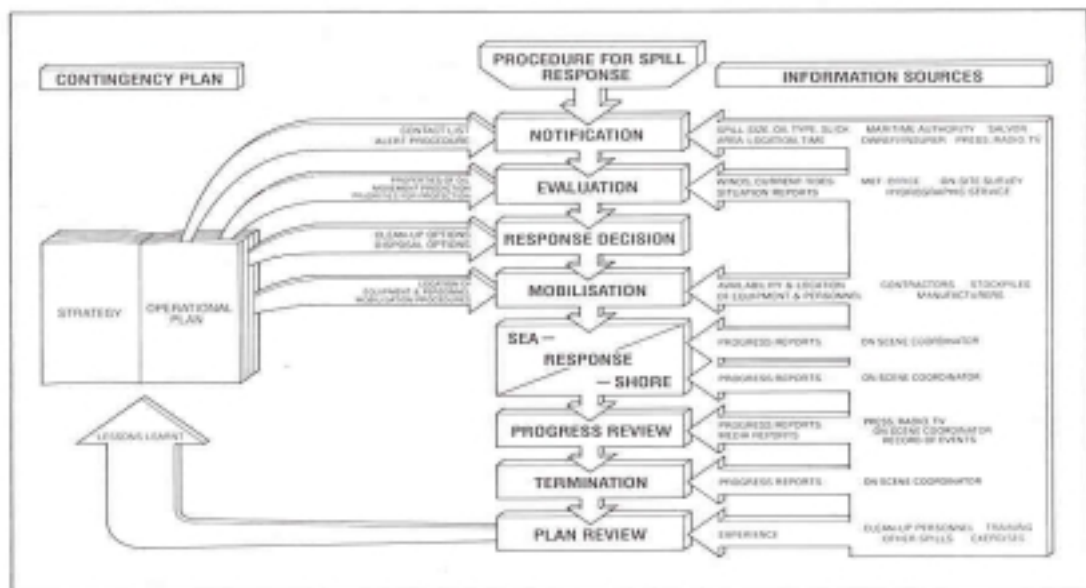


Figure 8: Role in contingency Planning in oil spill response

Source: Marine Contingency planning , Pardo .F, 1999

- Operational Discharges from ships
- Accidental spills from ships

If a country is producing oil in off shore then the operational discharge from off shore production centres as well as accidental oil spills of those should be taken to account.

The geographical area that will be covered from the plan should be identified and reference made to any other plans. In particular to Sri Lanka more concentration should be given to the coastal zone parallel to Middle East - Far East shipping route. In the planning process ecologically and economically sensitive coastal belt against oil pollution should be identified and inserted to maps. This information is more useful during an oil spills occurs to act with special care as well as dividing level of operation such as local level, regional level or national level. In general environmental impact assessment of the coastline can be divided as:

- Coastal fishing zones,
- Commercial and fishery harbours

- Coastal tourist resorts and hotels
- Coral reef that near the coast and special designated areas
- Industrial complexes near the coast

In oil spill incidents, experience has shown even by application of best available techniques, in preventive measures at the source for the minimizing the risk of both operational discharge and accidental spills has not shown 100% satisfactory.

However still combating oil pollution is a successful cure and that depends first and foremost on quick response action. There are three elements that influence the response, namely the contingency plan established, the structure of organization, the skill of the personnel involved and the equipment available for combating operations.

The contingency plans has to have following elements:

- Reporting and surveillance system
- Alarm system
- Communication
- Deployment of personnel and equipment
- Command structure
- Logistics
- Updated knowledge about the operational area

The institution responsible for the implementing the plan should be a body either within the government agency or with very strong links to the government because many options will arise during the combating operation and that are in technical and political nature so that requires quick decisions.

Combating oil pollution is a very complex matter and organization should have wide range of technocrats in different background such as Engineers, Marine Specialist

experienced in ship operators, Off- shore Specialists, Marine Biologists, Lawyers etc. The personnel designated for the combating operations must be familiar with the equipment and able to work as a team by utilizing available resources more effectively within designated areas.

5.2 National Oil spill Contingency Plan of Sri Lanka

The current National Oil Spill Contingency plan of Sri Lanka, has given the responsibility for combating oil pollution at sea to the Ministry of Port Development and Rehabilitation and Reconstruction of Sri Lanka, which has delegated the planning and operational aspect for its subordinate organization, MPPA. The Appendix 8 in page 92 shows the organizational structure of MPPA, as a response organization for combating oil spills. When an oil spill occurs, the clean up operation should be activated within very short period. In the other hand the authorities will implement the rescue operation for the ship subjected to distress, that will be under the command structure of maritime administration. Therefore the Maritime Rescue Coordinating Centre (MRCC) and the response organization, MPPA has to work with close cooperation in such maritime incidents.

The Ministry of Shipping is in-charge of the Maritime Administration of Sri Lanka and generally any maritime rescue operations will be collaborated with the Navy and Airforce of the Ministry of Defense. In the other hand the Ministry of Port, Development and Rehabilitation is the in-charge for the Marine Pollution Prevention Authority (MPPA). In fulfilling the task MPPA has a authority to obtain or to request advice and assistance from various specialist agencies such as wildlife, fisheries, military forces and other relevant agencies. However this arrangement has a tendency of refusal of supplying the resources if those institutions are not in adequate with resources. Therefore from the operational point of view, restructuring of the maritime administration and response organization, MPPA for a single ministerial command

structure will be more fruitful. In addition development of necessary resource groups with the deployment of personnel for the different functions totally depend up on the organization command structure and this will be discussed under another topic in chapter seven.

5.2.1 Communication

The communication plays important role in all aspect of the contingency plan. The reporting system, surveillance, alarm system and handling of public media are key areas need grater attention in planning. In the contingency plan of Sri Lanka although these issues are addressed, development surveillance has not emphasis. In addition in the response plan, communication logistical support heavily weighted for the Navy. In communication it is important all communication channels must have a over all control from the lead agency to avoid any miscommunication, especially to the media.

5.2.2 Oil spill reporting

The contingency plan has paid more attention for the oil spill reporting system and it is worth to have a reporting centre that will work round the clock to coordinate and communicate with relevant authorities for quick action. The public should inform the contact telephone numbers, like other important telephone numbers known to the public such as fire brigade, police, ambulance and emergency hospital service etc

5.2.3 Oil spill alerting

When an oil spill is reported, the reporting center should able to activate complete contingency plan. Therefore all activities should be defined and delegated from the plan itself. When an On Seen Commander is appointed, he should be able to work referring the Contingency Plan Manual. The first task of OSC is to visit the spilled site and he should be able to reach in shortest period of time to get firsthand information over the spill and act accordingly. The best is to use a helicopter if the daylight is available and

video filming, establishment of ground communication with the helicopters vital important at this mission. In this event some time helicopter may have no facility for the ground communication other than to communicate with aviation ground control stations. Therefore detailed communication plan is essential in the contingency plan.

5.2.4 Resource groups

The contingency plan has identified the key institutions that will be supported with the equipment and services. The table No.4 shows the organizations and the nature of equipment and service expected for the contingency plan.

Table 4:Resource Holders Group: Equipment and Service contributors identified in the Contingency plan

| Organization | Nature of equipment/service |
|----------------------------------|--|
| Sri Lanka Port Authority | Small vessels, oil recovery equipment, dispersants |
| Sri Lanka Navy | Communication links, Sea transport, Medical services |
| Ceylon Shipping Corporation | Agency services and ships business |
| Fisheries Harbors Corporation | Waterfront facilities, storage at fishery harbours |
| National Aquatic Resource Agency | Environmental impact assessment |
| National Hydrographic Office | Hydrographic services |
| Sri Lanka Police | Civil security |
| Sri Lanka Army | Manpower, Medical service, local transport |
| Sri Lanka Air Force | Arial surveys, application of dispersants, Air transport |
| Ceylon Petroleum Corporation | Storage facility for recovered oil, road tankers |
| Coast Conservation Department | Coastal data, Coastal area administration law |

Source: National Oil Spill Contingency Plan of Sri Lanka

Contingency plan has delegated the responsibility to respective organizations to provide manpower, machinery, equipment and services when it is necessary. This will be in effective unless identify the specific need in terms of quantity and quality and advice them to prepare and keep in the inventory with those organizations. In addition regular common audit program is necessary to keep the system in up date condition. This should

be a task of resource coordinating authorities. It is more appropriate to have formal agreement between the MPPA and resources groups of machinery, equipment and manpower.

Furthermore many of these organizations haven't fully exposed to an actual oil spill environment and therefore common training program should be developed and provide training to personals those responsible for specific tasks. This should be a regular program in all aspect of the contingency plan. In addition the present oil contingency plan has to be reinforced and some of these are discussed below.

5.3 Planning of oil pollution response

In the first instant after oil spill is identified, resources groups has to be directed in accordance with the contingency plan. It is more helpful the establishment of a technical commission integrated by experts on different disciplines which collaborate with the on-seen commander (OSC) and the national authorities. Once the contingency plan is fully operative, it is time to prepare a plan of operation normally with the assistance of the technical commission. It is obvious at that more events will develop and rapidly changing and therefore it is essential to be revised the plan every day after evaluation and updating of the situation. The plan of operation should have following elements.

- Evaluation of the present situation
- Establishment of priorities in line with resources threatened
- Identification of specific tasks and group of operations and head of groups
 - main groups : oil contaminant and recovery
 - monitering and surveillance
 - logistic
 - shoreline clean up operation
 - waste management and disposal
 - Operation on board/system originating the spill

- Defining the objectives for each group
- Organizing of communication
- Organizing of logistic aspects such as transport, accommodation, food and medical services
- Organizing of reporting and contact with the media and public
- Organizing of the administration in particular a log books with all the resources mobilized and the costs, contracts and claims for pollution damage

5.4 Evaluation of oil spill through aerial survey and observation

Aerial survey will help more effectively assess the oil spill and its movement study for the combating operation. By observing the colour from aircraft it can be estimated the quantity of the in the spill with some degree of accuracy. The table 5 shows the relationship between appearance, thickness and volume different type of oil.

Table 5: Appearance of Oil in water: Relation between Appearance, Thickness and volume

| Oil type | Appearance | Approx. thickness (mm) | Approx. volume (m³/km²) |
|------------------------|-------------------|-------------------------------|--|
| Oil sheen | Silver | > 0.0001 | 0.1 |
| Oil sheen | Iridescent | >0.0003 | 0.3 |
| Crude/ Fuel Oil | Black/dark brown | >0.1 | 100 |
| Water in oil emulsions | Brown/ orange | >01.0 | 1000 |

Source: International Tanker Owners Pollution Federation Ltd.- Technical Information paper.

The length and breadth of oil spill can be calculated determining the aircraft speed and time taken to pass from one side to another. If the area of spill is worked out then table 5 above can be guided to determine the approximate quantity of oil in the spill. Also spill movement monitoring is another task need to be attended and there are modern

instruments and computer software programs available to predict the movement of oil spills under the different wind and wave conditions and even under low visibility.

5.5 Clean up of oil at sea

There are number of methods can be applied to remove the oil from spills. These action need to plan with careful consideration of the amount of oil, type of oil, the area of the spill, how far from the coast, wind direction, spill movement and technical capabilities of the combating team. If the spill is far away from the coast and spill movement can be predicted as not reaching the coast, oil is thick (heavy crude) easy burnable oil then most cost effective is to burn the spill. One important thing is note that the oil smokes can reach the land causing health problems for the community.

If the spill is near the coast, collecting by mechanical means is the best method is to clean up the sea. In the mechanical method it is needed vessels, skimmers, booms, pumps, temporary storage facility at sea including the trained staff for the operation. In windy condition handling of booms are more difficult and operation some time may not effective.

The characteristics of hydrocarbon play an important role in use of dispersants and that may not effective for the heavy crude oil, heavy fuel oil and lubricants. In the other hand light oil such as diesel, light crude oil is easy to disperse naturally without use of dispersants. Therefore it is important to evaluate the negative impact prior to use of dispersants. Environmental activist groups will oppose the use the disperasants so they may bring various issues to obstruct this kind of actions. Therefore planners should be well prepared for the situations of this nature and put it in writing in the contingency plan specially when handling the public media regarding use of dispersants.

5.6 Shore line clean up operation

Sandy beaches clean up operation will be not useful to carry out as long as sea is throwing out the crude oil to the beaches. Therefore this action should be started after the completion of clean up operation in the sea. The employment of manual methods is the most effective method of collecting crude contaminated sand and those has to be separately stored and transfer for the separation of sand and crude from the mix. The motivation is highly essential during the shoe line clean up as it is more time consuming as well as it is labour intensive task. The main points that is need to be considered during the shoreline clean up are;

- avoid use heavy equipment
- to sign a contract with specialized company
- continue to monitoring of all beaches to adopt work to the new situations
- to establish working teams for each beach under supervision of one technician
- oily sand and debris arrange to transport to an authorized installation for incineration

In spill response situations planners must consider the health risks that are faced by the personals in two ways. First, the plan must be prepared to deal with the acute or immediate effects of exposure to substance. Second, the plan must address the measures need to ensure that the response personnel do not suffer chronic effects from the exposure to the substance. It is essential to provide necessary protective clothing and equipment those engage in clean up operation of the coastline.

5.7 Logistic support

During major spills one of the problem faced by authorities is to get the equipment for the site due to inadequate infra structure facilities. There are heavy skimmers, booms, pumps need to be transported by air from various countries and some time the necessary lifting gears are not available in the airport. In the same time road access are not

sufficient to transport the equipment. The employment of military engineering unit is a one solution. Therefore careful planning necessary for the logistic support services.

5.8 Oil spill response policy and resource implication

One of the problems for a developing country is constrains of resources both equipment and trained personals for combating large oil spills. Therefore the action plan should be developed in line with the capacity of the available and for the projected resources. However understanding the reality, planning must be done for the worst spill could happen within the responsibility of country's jurisdiction. This plan is necessary to activate in the second phase. All the important resources (available in different part in the world) necessary and the locations of those should be identified and maintained in a owned database with some of mutual agreement. The planning should not leave to do after the oil spill happened. Also it will benefit to have a regional cooperation in developing the resources for combating oil pollution.

As discussed earlier for a developing country it is difficult to make major investments to acquire high cost capital equipment within shorter period of time, even though those investment can be recovered in longer run by avoiding losses due to oil pollution incidents. However some of the cost can be claimed from the ship owner or from his insurer or from the IOPC fund. The State can reduce the burden in direct financing for equipment and services by encouraging the privet sector to participate for marine pollution response services. The next chapter will be devoted to discuss the compensation of marine pollution.

CHAPTER VI

OIL POLLUTION COMPENSATION

The State is responsible for any cost related to the clean up of the environment after an oil spill incident if there is an immediate impact for the people as well as for the environment. As a consequence, mechanism for recovering cost from the polluter is necessary.

Prior to the *Torrey Canyon* incident there was no well recognized international legislation which came first but rather voluntary agreement between the tanker owners (TOVALOP) to contribute money for the purpose of compensation of governments who were obliged to bear the cost of cleaning up their coastline. But TOVALOP contributions failed to compensate the huge amount of claims raised by both individual and States that caused by the number of major oil spills.

The development of International Convention on Civil Liability and Compensation for Oil Pollution Damage in 1969 (CLC) and subsequently supported by the International Oil Pollution Compensation (IOPC) Fund 1971 brought a relief for both the tanker owners as well as to the victims of oil pollution damage. In chapter IV, CLC and IOPC Fund in detail was discussed and this Chapter will discuss about the preparation of the claims and the settlement of claims by Ship owner and by CLC fund.

6.1 Ship owner's liability and P & I Clubs

Protection and Indemnity Association is commonly known as P & I Clubs exist to provide ship owners with insurance for liabilities incur they may occur to third parties. A P & I Clubs is the association of ship owners and other with similar interest in ships or in

shipping. The association is a generally registered company of limited by guarantee, and is managed either by a board or a separate partnership, in each case appointed by the members. The association gives the financial guarantee for the third party liabilities for the members according to the rules of the association and its raises the funds from the members to run the club. The members annual premium will vary and that is depend up on the amount had claimed for the previous year and current year expenditure. The third party liability that undertake by the P & I club will exclude the liability against the oil (persistent oil) pollution. There is a separate insurance cover for the hull and machinery for most of sea going vessel and addition to the P & I cover. The following are items cover under a P & I club:

- Personal injury to or illnesses of life of crew members and passengers and loss of their effects
- One fourth of collision liability
- Excess sum in collision liability, including in excess of the limit of the hull polices and items claimed of claim excluded from policies such as pollution, dock damage wrack removal, loss of life, personal injury and illness.
- Oil pollution liabilities
- Other claims for damage to property including damages to other ships and their cargo out collision, and dock damage
- Removal of wracks of entered ship
- Liabilities for losses or damage to the cargo and other property on board an entered ship

6.2 Condition for the exemption of shipowner from his liability

The IOPC Fund shall undertake to pay the compensation for pollution damage when the ship owner has no liability under the CLC convention. The ship owner will exempt from his liability for the pollution damage under the terms of CLC, if the incident happened due to force majeure or an act of war, the international act of a third party or negligence of a government.

Furthermore IOPC Fund shall undertake to pay the compensation to the victims when the ship owner is liable under the terms of CLC is not financially capable of assuming his obligation and his financial capability will not cover the admissible claim.

Also IOPC Fund shall pay the compensation for admissible claims which exceed the owner's liability under the CLC Convention or the any other international Convention on the limitation of liability of ship owner.

6.3 Financial guarantee requirement for oil carrying vessels

The majority of seagoing ships obtain financial guarantees from P & I club. In the case of tankers that are carrying oil more than 2000 tons oil as bulk cargo need to have compulsory financial guarantee under the Article 7 of Civil Liability Convention. After the *Exxon Valdez* oil spill of 1989 in Alaskan waters, the oil tankers visiting the Californian State, domestic legislation imposed financial guarantee required up to

US\$ 700 millions under the Oil Pollution Act 1990 of USA (OPA90). The group clubs offers a maximum of financial guarantee up to US\$ 500 million under the ordinary P & I cover, but excess cover of US\$ 200 million there is extra charge for the tanker owner. In addition to the financial guarantee, the tankers visiting the US ports need a "Response Plan" which is a contingency procedure in the event of spill.

6.4 Claims

The expenses incurred and damages caused by oil spills as well as cost of action taken for the preventive measures can be claimed from the ship owner and also where applicable from the available international compensation regime. That is CLC and IOPC Fund Convention. The preparation of claims need of accurate data and information monitoring practice through out the operation, just after the spill happened and official termination of action against the spill.

6.4.1 Governing law and proof for the claims

In marine pollution liability cases there may be many nationals involved. The owner and the crew of ship involved may be different nationalities, Flag of the ships can be another State and the same time the geographical location of the spill will be another State. The

legal regimes that are involved in the case always may be international nature. Therefore it is essential to understand the law governing the claims and most cases has to be litigated in the courts to prove the all claims are valid against the polluter, the ship owner. For example the IOPC Fund shall incur no obligation to pay if the claimant can not prove that the damage resulted from an incident involving one or more ships, in other word, if the sources of pollution is unknown. If the court action is necessary the most appropriate are in the State the spill took place or the State where physical presence of defendant, ship owner, preferred in most common law countries. In the other hand some countries environmental laws are not sound enough to prove the case or to get reasonable claim for the victims. Therefore it is important to go though the legal regime of the country in relation to the international convention such as CLC when handing the pollution cases and channeling the claims to the insurer of the ship or to the CLC fund.

6.4.2 Information needed in claims

Under the CLC and IOPC Fund, coastal State can make a claim from the shipowner and subsequently from the Fund to compensate the damage caused by oil pollution incident. The claims against IOPC Fund should be made in writing (including telefax or by telex) The claim should be presented clearly with sufficient supporting documents such as work sheets, attendance sheet of work force, accounts, photographs of any events to be proved related to operation that enable to asses damage. Also the claim should submit in English or French language that will help to settle quickly according to the IOPC Fund Manual. The information need to provided with the claim

- The name and address of the claimant and of an representative
- Identity of the ship involved in the incident
- The date, place and specific details of the incident
- Type of pollution damage sustained
- The amount of compensation claimed

The CLC and Fund Convention 1992 covers the cost of pollution response and clean-up incurred any one before discharge of oil has taken place. The type of claims which are normally covered by the fund are:

- Measures to prevent or minimize pollution e.g. deploying booms protect the fish farm
- Clean up operations at sea and the shore
- Disposal of recovered oil and oil debris
- The cleaning or replacement of damaged property
- Economic loss suffered as a result of contamination by those who depend directly on earning from coastal or sea related activities (e.g. fisherman's income)

The claims should forward to the IOPC Fund at following address:

International Oil Pollution Compensation Fund

4 Albert Embankment

London SE 1 7SR,

United Kingdom

6.4.3 Complex situations in preparation of claims

In response situations there are different type of claims may originate. For example claim for the surveys of the environment will be not accepted as a claim. Feather more if the claim is submitted for amount of oil that is collected as mix of sea water and oil will be not accepted and claim is entitle to only for the amount of consist. The basis of calculation of cost can be modified, that is acceptable to the claim assessment committee of IOPC Fund. Can it be claim the damage for the environment that can not be assessed in monitory terms according to the market price and that is purely difficult to value the loss properties in the environment? Yes it can. That can be compensated on an equitable basis which may be established by the court on the grounds of opinion of experts. For example, if group of experts give an opinion for a particular oil spill, some area of sea environment growing of plankton or food chain is damaged or reduced and that effect ultimately diminished the fishing ground. This kind of claim should work out in scientific basis and in the claim must include, the average environment condition prior to the spill and amount of oil spill, affected water mass, concentration of oil and rate of reduction of the food chain and reduction of fish population. Also in presenting the carefully analyzed evidence and procedure adopted for the claim will benefit for the justification of claim by claim evaluation board of the IOPC fund.

6.5 Civil Liability Convention and Fund Convention and their limitation

In chapter 4, it was discussed in detail the International Convention on Civil Liability for Oil Pollution Damage 1969 and the International Fund for Compensation for Oil Pollution, 1971 and its protocol 1992. It is necessary to understand the limitation of liability of the ship owner as well contribution of IOPC Fund 1971 and 1992 in relation to CLC.

A State, which is a party to CLC and 1992 Fund Convention, the compensation will be for a ship not exceed 5 000 gross tonnage, equal to 3 million SDR (about US\$4.1 million) and that include the ship owner's liability. The ship 5 000 to 140 000 gross tonnage, ship owner's liability is 3 million plus 420 SDR (about US\$567) for each additional unit of tonnage. The ship gross tonnage is over the 140 000, ship owner liability is amount to 59.7 million SDR (about US\$ 80 million). The fund will only activate when the ship owner has completed his obligation or he must prove that no obligation or the victims.

The maximum compensation available for single incident under 1992 Fund, including the ship owner liability is 135 million SDR (about US\$182 million). Under the 1971 Fund this amount is 60 million SDR. As the 1992 funds is fully implemented 1971 fund was ceased with effect from 15 May 1998. Sri Lanka became a party to the 1992 Fund Convention and CLC 1969.

The good oils spill contingency plan is only produce effective results if an only if a dynamic organizational structure is available to implement the plan. It is because all the events of the plan are targeted to combine skill human resources and other material resources in violent environment against the time. Therefore the most actions are need better coordination with timely decisions. These aspects will be discussed in the following chapter.

CHATER VII

ORGANIZATIONAL STRUCTURE FOR OIL POLLUTION RESPONSE

The process of contingency planning for marine environmental emergencies the assumes that spills of oil pollutants, and hazardous materials will occur while these materials are being produced, stored, transported or utilized. In practice the influence or active role of the State for the contingency planning depends on two factors. One is the contribution of maritime sector for the development of the national economy and the other is scientific proof that there is potentially imminent and grave danger of marine pollution to the society both socially and economically. It can be observed that in day to day many of the institutions both public and private in most of developing countries invest vast amount of resources in different scale to mitigate the marine pollution without proper assessment and answering to why these are happening again and again. Some time total cost of such investment is much greater than the implementation of specific preventive program. Implementation of effective contingency plan with prior environmental impact assessment (EIA) can safeguard the environment as well as the limit the real cost of the emergency in such situation. Therefore it's necessary a well planned organizational structure to implement a contingency plan.

7.1 Concept and contingency planning process

The are two fundamental questions will be raised during the process of contingency planning and the answers to that derive the contingency plan. These questions are:

What are the threats? What is at risk?

The answer is a "possible response" and that refers as Contingency plan. The application of this principle is more important in contingency plan. Giving consideration to the threats of oil pollution for the marine environment in Sri Lanka, there are main two sources of oil pollution can be identified.

Nearly 16% of energy requirement of Sri Lanka depend upon crude oil imports. According to IOPC Fund, in 1997 Sri Lanka has imported about 1,997 298 tons of crude oil that is approximately 0.16% of world sea born crude trade. The import of the crude oil is generally from the Middle East and transported to Port of Colombo, then discharge to the SPBM, 4 1/2 miles off the port, to reach the storage at refinery about 20 km off Colombo City. Every month 2 00,000 tons of crude oil bring for the refining. It has been identified many of the spills are causing during the charging or discharging operation because of equipment failure or else human error. In particular to Sri Lanka during the transportation or at discharge operation of oil, if any spill happens near the port, it will effect the commercial activities of the port and related business. In addition the river *Kelani* that supplies the fresh water for the city of Colombo will be affected.

In addition fishing, tourism, ship repairs, recreational activities along the beaches around city will be affected.

The second potential source discussed in chapter II that is potential threat from Middle East to Far East shipping route and the tanker movement. According the statistics more than 1000 tanker passing through the Sri Lanka waters every month. If major accident happens coinciding with southwest monsoon, the spill may reach the coastline within matter of few hours. The fisheries and tourism are main activities and sources of income for the population in south and southwest coast. The coastline from the western to the southeastern, approximately 250 kilometers and if and oil spill happens those areas may be affected. In addition to that there are three main rivers falling to sea from west and

southwest coast, the pollution of this fresh water streams causes problem for the land ward population. Those are the resources at risk.

The sensitivity along the coastline has to be studied for a worst probable oil spill to make right decision and for the contingency planning. The upgrading of present oil contingency plan, with detail study of resources at risk is essential for the action plan. The simplest example in case of oil spill, to safe guard all fresh water streams and all fishery harbours contingency plan should explain the amount floating booms required, who will attend to the job, response time, the logistic support required for each items that is going to protect. Therefore the full-scale risk assessment along the coastline parallel to shipping route should be carry out by a competent team to make the most practicable contingency plan.

7.2 Environmental impact assessment and sensitivity maps

During a possible worst oil spill, contingency plan first priority is to pay attention for the areas adversely can affect and may disturb the normal life of the people. The basically these area can be classified in to six groups, namely:

- Food chain
- Air purity
- Water intakes
- Wild life
- Fisheries
- Tourism
- Public health

The immediate problems may arise in fish supply for the domestic market as well as for the hotel industry. If the spill has an explosion or fire it may causes health problems due to pollution of atmosphere, sometime contaminate the wild life, birds, and fishery farms.

The tourist may leave the area and hotels industry will face business crises in short terms. The public health areas may need additional support to accommodate more patients. These all areas need analytical study and prepare sensitivity maps to respond for the situation. In addition to the priority order, contingency plan should established proposal of safeguarding mechanism in respective to each resource.

7.3 The Lead Agency

The Oil spill Response Organization of Sri Lanka, MPPA has identified the some assisting agencies for the oil spill combating operation. These agencies have to be fitted to lead agency organizational structure more effective manner or similar model given in figure 9 to plan the resources for combating oil pollution.

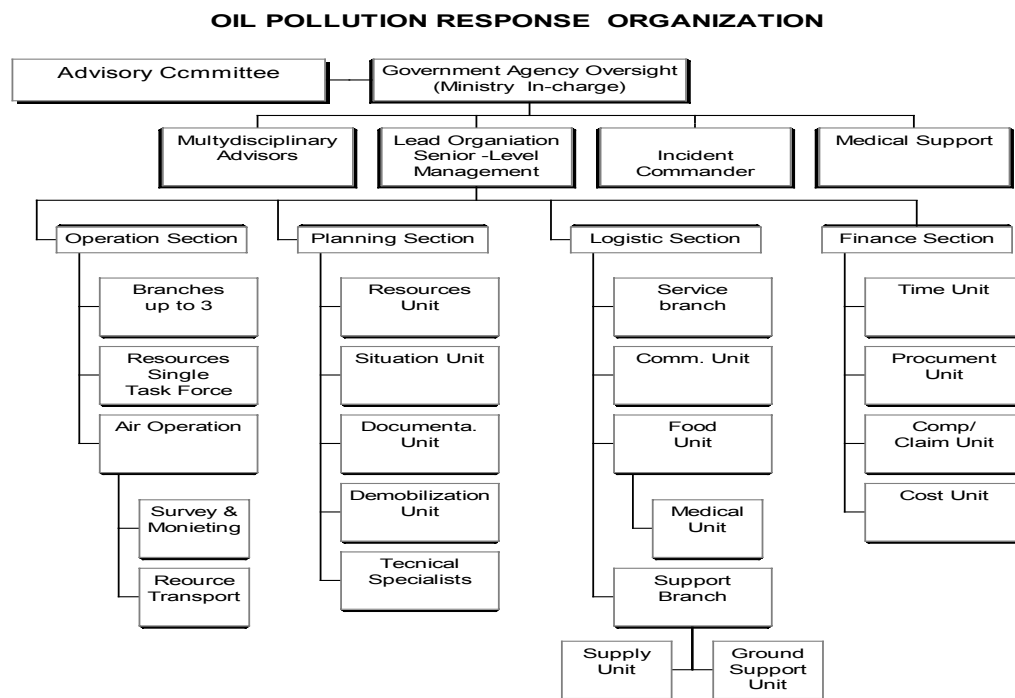


Figure 9. Oil Pollution Response Organization - grouping of Task & Structure

For example Situation Monitoring Unit of the Planning Section in the given model can be fitted the Oceanography and Hydrographic units of NARA to develop a spill

monitoring system and there should be an institutional agreement for the services with lead agency. The Communication Unit of Logistic section should develop a system for the communication with the assistance of the Navy, Air force and Marine Telecommunication Authority. Like wise every aspect of oil spill combating operation need planning well in advance and make stockpile of resources that can be accessed with minimum time period.

7.4 Governing factors of emergency response

During an oil spill response, there are number of complex events has to be performed within very short period of time. It is good to understand the response order and followings are the main events need attention when developing the contingency plan

- Identify and secure the source of oil spill (ship) and location
- Eliminate the potential for a greater risk
- Monitor and track the spill
- Protect the resources that can be affected from the spill
- Recover the spill
- Clean up the contaminated areas and equipment
- Restore contaminated and damaged resources and areas

7.4.1 Identify and secure the source of oil spill

By law the reporting of oil spills or any other hazardous martial spills has to be notified to the authorities for the action to safeguard the interest of the State. But still identifying and securing the source some time more difficult task and that need special action plan and it is more technical operation. The one reason is that during a spill there can be more vessels within the spill area and therefore it is difficult to pinpoint actual polluter without proper investigation. So that authorities have to accesses cargo manifest of all suspected vessels even samples of the cargo has to be collected to compare with the spill. The administration must issue permit to enter for the suspected vessels to identified

polluter vessel. Of course experienced and competent persons are essential to access the shipboard engineering operation system to check and pick the samples of cargo and bunker fuel from the ship. Even it may be difficult to determine without right equipment. The legally valid procedure should be followed when collecting the samples. The identifying and securing the spill sources is most important step in marine spill emergency management that will reduce action against the protection of resources at risk

The coast guard service can be employed in the event of locating the polluter. Currently Ministry of Fisheries of Sri Lanka has taken some steps to develop a system to act upon illegal fishing. The Coast Guard Service development is needed with broader prospective considering international shipping matters such as prevention of oil pollution from ships, piracy and illegal drugs and arm transport.

The Flag State and Port State Control should be vigilant and act speedily to identify the suspected ship. IMO Resolution A. 542(13) has provided guidance for the reporting and identification of sources and to act against the polluting vessels.

7.4.2 Eliminate the potential for a greater spill

After determining the source of pollution, next step is to take action to prevent further development of the spill. The action may be re-float the vessel and pump out the remaining cargo or bunker to another vessel to avoid further spilling. Another action may be towing of the vessel to an area that will reduce the harmful effect for the resources at risk and then take appropriate actions. The towing action at this stage is generally more difficult, sometime may cause explosion and fire. Therefore need a greater attention for the safety aspect of the individuals in the operation and special equipment, clothing and communication must be provided. The people should only involved the operation those who have good training and experience for the job. The requirement and guideline such operation should be documented in the contingency plan

7.4.3 Monitor and track the spill

Monitoring and tracking of the spill is important to ensure that appropriate response is to be provided. The Substances would migrate based on prevailing winds and tidal condition. Therefore monitoring and tracking is essential to make effective response. There are some computer software available to predict and monitor the spill movement provided the input data of wind speed and tides and topography of the area. The tide and current measurements in regular basis around the coastal zone will help during an oil spill. Therefore Oceanographic Service should undertake the monitoring function as a mandatory work in their work program.

Also during a spill operational decision can be made by aerial surveillance supplemented by remote sensing. The remote sensing is a better technique during night and at the time of low visibility. However the technique is considerably expensive. The systems of tracking should be defined in the contingency plan.

7.4.4 Contain the spill and protect resource at risk

It is although simplest way suggested to deploy some form of barricades around the leading edges of the spill or that some barricades is erected that precludes the transport the spill to place where valuable resources would suffer damage. It can be said that deployment of the floating booms is one good solution. But in actual practice it may involve the transport of heavy equipment such as trucks and unloading equipment folk lift and the boats for lay the booms and vessels with skimmers to the spill site to collect the oil. The equipment deployment is more difficult at heavy weather conditions. Therefore the specific training is essential for the personals to deploy booms in rough weather condition. Therefore contingency plan should address the training issue for the handing of such equipment.

The contingency plan should establish the order of resources that are going to protect during an oil spill because there are pressure groups will influence the decisions according to the wishes of respective groups. This may results difficult to manage situations with available resources. For example, hotel owners association will influence to protect the beaches even the off season of tourist by hindering the need of protection of fishery harbours.

7.4.5 Recover the spill

The recovery of spill is the most difficult task to be accomplished during spill response to a marine environment emergency. It is one of the areas where contingency plans likely to be severely deficient. One reason is that separation of substance from water is difficult and results is that large quantity of water will recover along with the spill substances. In the other hand with the time passes, spill will become thin layers and operation will become less efficient.

The placement of booms to recover the oil can be accomplished by towing the boom between two vessels or by positioning stationary location and taking the advantage of natural flow of substances toward the boom because of the wind force. In general floating of boom effective with the help of boats, but it has some speed limitation and that is approximately 1.5 - 2.5 knots and increase of speed will loses the substance beneath the boom through a process of "entrainment". Once the accumulated substance thickness around 1-2 centimeters most of the skimming equipment available can be operated with considerable efficiency.

In the contingency plan, number of floating booms that are necessary for operation should be indicated. The source of supply, minimum time that will take if any additional booms are requested on urgency, all details should be inserted to the plan. Having the details of suppliers including contact telephone numbers or fax numbers will help to obtain the service speedily during major oil spill. Also it should be noted that selecting

of booms to take care the quality factor, that is essential because higher strength and performance against oily water are important parameters when selecting the booms. The experience user should be consulted for purchase. The equipment and tools for a response operation will be not aim in this chapter.

7.4.6 Clean up the contaminated areas and equipment

When the spill recovery fails or insufficient then it will reach the shoe line, so that contaminated area clean up should be carried out. The clean up technique and strategies for various types of substances should be drawn up taking into account the type of shoreline, seasonal biological activities that take place on the shoreline. In the contingency plan these techniques has to be defined according the each stretch of the shoreline. If it is not done in the plan, it is difficult to arrange the equipment and manpower available for this phase of response.

All equipment used in a spill response has the possibility of spreading the effect of the spill for the non-contaminated border areas unless those equipment are not cleaned prior to transfer for those areas. It is very important for the contingency plan to detail the steps that must be followed to provide for the decontamination of the equipment uses in the response. A final consideration relative to clean up that should be addressed by contingency plans is the question of "How clean is clean?"

7.4.7 Restore contaminated/damaged resources and areas

At last contaminated or damaged resources and other areas affected need to bring as far as practicably possible status that had originally. For example planting of new grass along the shoreline, filling with new sand the beaches those contaminated sand are removed are some of the action. This kind of activity not necessarily to handle within the contingency plan but can be delegated to local group to handle with the supervision of local authorities.

7.5 Incident command structure and coordination

So far in this chapter discussed the activities involved during a spill crises management aspect and as a response organization how the things put in place according to contingency plan. But even best technical methods for responding to emergencies do not guarantee a successful operation unless it does have a management system that can quickly organize and focus people from many disparate organizations. By looking at the program of MPPA and the command structure it seems more likely a autonomous and affirmative coordinating institution aiming to share the resources but are closely control by them. This means multi agency /organization teams are formed to address different activities of the contingency plan. However, individual members have primary allegiance to their respective agencies.

It will be more effective for the response, the representatives of the participating organizations are formed into one response organization and then the positions of the organization are more based upon individual expertise rather than agency affiliation. This system will help to accommodate procedures of individual organizations as far as practicable and develop a unique procedure for the task implementation. Also the response organization works for one leader and focused on one action plan and the command system of this nature is known as Incident Command Systems (ICS).

The advantage of having ICS model management tool for emergency response during an oil spill that works with following basic components:

- Common Terminology
- Modular Organization
- Integrated Communication
- Consolidated Action Plan
- Manageable Span of Control

- Designated Incident Facilities
- Comprehensive Resources Management

The figure 10 shows the model of ICS organizational structure that is more logistically defined to act with multi organizational responses.

Incident Command system model

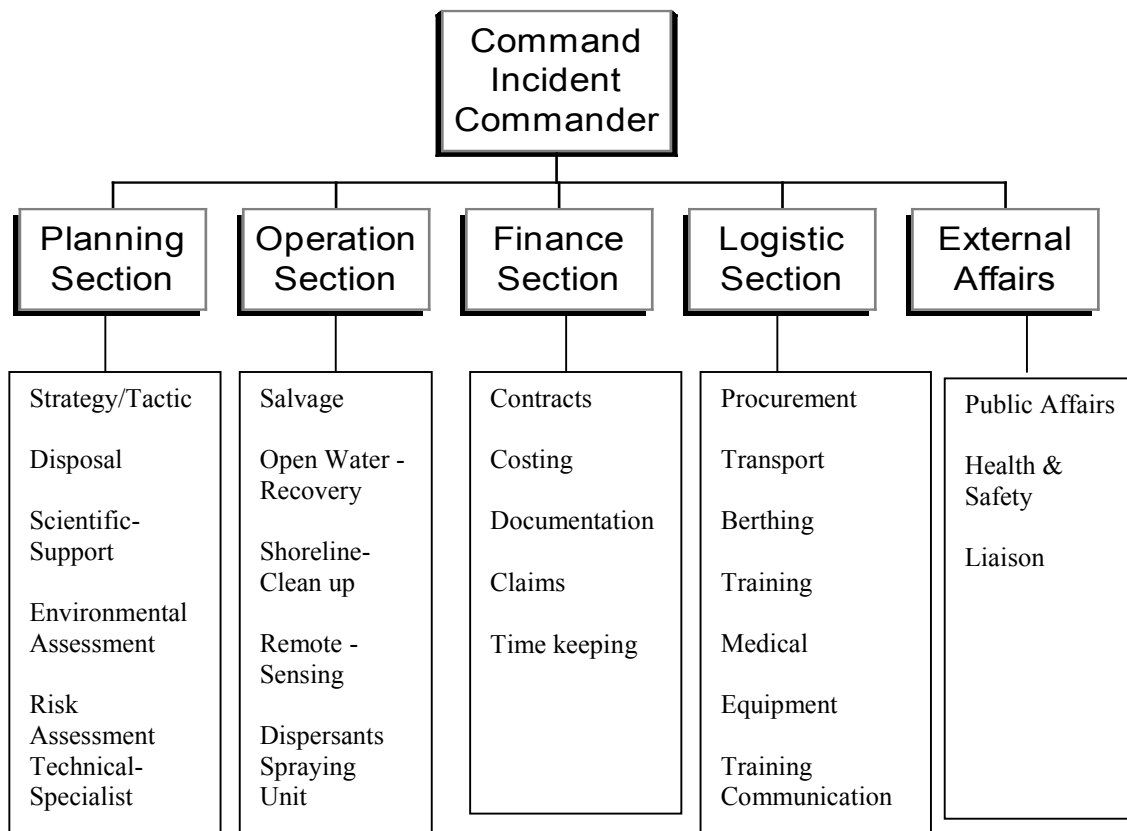


Figure 10: ICS Model for Response Organization showing the Positions description, responsibilities are described in the reference position manuals

The characteristics of ICS system is that effective span of control, modular format of action plan, integrated communication within the organization, comprehensive resources management. The modular format provides the "top-down" organizational structure, and

which can be used for any incident. The modules are organized on functional basis and comprises planning section, operation section, finance section, logistic section and external affairs section. These features will benefit for the effective results as the leading agency has a clear role and responsibility to formulate action plan and to optimize the use of limited resources. Also organization can expand and contract to manage the various functions.

In relation to the MPPA, support is required from the other institutions to develop and implement the contingency plan. For example, preparation of the base map of coastline that is needed for post incident restoration work has been currently assigned to the Coast Conservation Department. This task requires numerous inputs from various sources such as coastal fisheries, tourist and hotel industry, provincial councils and regional institutions along the coastline. It therefore has to be coordinated to obtain the expected result rather than assigning the task to a single institution. The individual resources group responsibilities are defined in contingency plans as:

It will be the responsibility of the resources groups to provide the require machinery and manpower as necessary for the oil spill response actions. All equipment shall be maintained in prime operational order and supplied together with the required support services and operational crew. , *National Contingency Plan, Sri Lanka 1999, p17*

Consequently, even it is difficult to set the command structure similar to ICS, this author believes that efforts towards it are worthwhile because in the end, lead agency MPPA can make sure all the actions covered the contingency plan is under its total control.

7.6 International Cooperation

It is unrealistic and impossible from economic point of view to justify the establishment of contingency organization on the concept of" the worst thinkable accident" even most wealthy country. The one approach is to make an agreement for mutual assistance

with neighboring States both on bilateral and mutual basis. By article 12 of the International Convention on Oil Pollution Preparedness Response and Cooperation promote the bilateral and mutual agreement between neighboring countries to assist each other in four areas when developing contingency organization. The areas are sharing of information, education and training, technical services and technical assistance for combating and prevention of oil pollution.

Exchanges of information with regard to spills helps to take appropriate actions for the both affected states. Also both states can promote joint training program in the field of oil pollution preparedness and response task. In addition it may facilitate cooperation in research and development for the oil pollution preparedness and response, including technologies and technique and surveillance, contaminant, recovery, dispersions, clean up and otherwise minimizing or mitigating of oil pollution and for restoration. Furthermore it can provide the technical assistance in capacity building for the establishment of effective response program for the region. One example is the Helsinki Convention, that is the agreement between the countries bordering the Baltic Sea to take care of pollution in the Baltic Sea. Under the agreement there are regular jointly organised oil spill combating training program will be carried out by the member states as a part of preparation for an oil spill incidents. There is also an agreement between Denmark and Germany to protect the southern Baltic Sea and Wadden Sea bordering the two countries. Another bilateral agreement is between Canada and Denmark to protect the area between Greenland and Canada. The bilateral agreements are more important in dealing with marine environment protection especially training of operational staff for oil combating operations. The Indian sub continent States should develop a common program in the same subject.

CHAPTER VIII

CONCLUSION

The purpose of this dissertation is to review some the aspects of the National Oil Spill Contingency Plan of Sri Lanka that was published 1999 to give an understanding to the reader the difficulties that the government faces in the implementing phase and solution that are available to counter those difficulties. Setting the goals for any national interest requires an understanding of the needs in broader prospective. In other words the setting of goals for the national institutions and their placement in the proper administrative framework will have a greater impact for the progress of the institution and for the expected output. Therefore the author in the first place has examined the institutional development for maritime affairs in Sri Lanka and compared it with some countries in both the developed and the developing world.

In the previous chapters we have observed that no clear goals were set for managing maritime affairs in Sri Lanka during the last two decades and that has resulted in a situation where closely linked interconnected maritime matters have moved in different directions. The Ministry of Environment is the key Ministry responsible to maintaining and to safeguarding the nature and the environment. It has taken reasonable steps and developed expertise to address the environment pollution issues for many years. As a relatively smaller country, the protection of the marine environment is vital important for its sustainable development. Furthermore handling of environmental problems by more than one ministry will duplicate the areas of interest and will be less cost effective.

Therefore the institutions dealing with maritime affairs require closer cooperation among them to obtain the effective results.

In the present set up, the Marine Pollution Prevention Authority is being of a subordinate institution of Ministry of Port, priority of acquisition of resources to implement the national oil contingency plan mostly depend up on the financial resources available for the affairs. In the other hand the Ministry of Port directly supervise the state owned commercial port business and those are currently under heavy competition with privet port operators. This has effect for the day to day decision making process concerning marine pollution prevention, especially financing.

The National Aquatic Resources Agency (NARA) of the Ministry of Fisheries play important role in marine research and advisory role for the government concerned with both living and non living resources. In addition the marine research functions, hydrographic service functions under National Aquatic Resources Agency. Also the Ministry of Fisheries has taken some steps to develop a coast guard regime to protect the marine resources as well as to rescue the fisherman those subject to distress at sea. However the maritime administration also has a search and rescue role with the support of the Navy and Air force. But this system has no linked to the need of marine environment protection as well as to assist the fisherman those subject to distress. If the search and rescue can be expanded to broader prospective take into account policing of marine environment and absorbing the task of search and rescue of fisherman as well, another coast guard regime is not necessary. This will avoid the duplication of resources and improve resources capability as a whole for the maritime sector. The maritime administration is the enforcement authority for the merchant-shipping act of Sri Lanka and the international conventions related to shipping. Also the maritime administration is a operate under the Ministry of Shipping and is advisory unit for the government for the shipping affairs and as well as supervises the state owned shipping company. In this

complex system of organizations with limited resources in each sector, it is difficult to coordinate and pool the necessary resources to protect the marine environment or keep in standby those resources in the event of major oil spill.

The two solutions can be proposed to administer the marine environmental protection and prevention issues in Sri Lanka more effectively like many countries has developed this area.

The proposals are:

- a) Develop the marine pollution prevention discipline under the Ministry of Environment, as it is the key ministry, responsible for all environmental protection issues and should act as a regulatory regime and in supervisory role in marine pollution prevention. In addition there should be effective link between the Marine Pollution Prevention Authority and the institution under the Ministry of Fisheries and Aquatic Resources Development to develop effective response organization with the cooperation of Maritime Administration. The Ministry of Fisheries and Aquatic Resource should take the control of MPPA, then it will be more effective to make joint program with the institutions belongs to a single ministry than in the current status. This may create an effective combination of institutions for the implementation of Contingency Plan.

- b) Develop a separate Ministry for the maritime affairs to administer all regulatory matters connected to the maritime trade and for the protection of marine environment. The proposed ministry should comprise with four National Institutions namely
 - Maritime Administrative Authority
 - National Hydrographic Service
 - Marine Pollution Prevention Authority
 - National Coast Guard Service

In the same time the Ministry of Environment should take the responsibility for the legislation matters related to marine environment protection and also reception facilities for ship generated wastes in ports and shore and final treatment of ship generated wastes.

The Solution (a), having the role for the Ministry of Environment can give the full effect for the international conventions providing the necessary legislation, recommendation and guidelines to act for the prevention of marine pollution. In the current status, the Marine Pollution Prevention Authority has to depend upon the services both the Ministry of Environment and the National Aquatic Resources Agency of the Ministry of Fisheries for the expertise that is needed grater coordination between the three ministries. The amalgamating of the Marine Pollution Prevention Authority for the Ministry of Fisheries will reduce the dependency between the two different ministries. The second advantage is that the Marine Pollution Prevention Authority can access to the resources of the Ministry of Fisheries for the monitoring of spills, assessments of damages, hydrographic service, coast guard services and available other resources such as all fishery harbours and facilities. The basic principle here is that involvement of less number of ministries helps to speed up the action during crisis management.

The solution (b) will be the most appropriate because all necessary organizational frame work can be placed under a single ministry for the development of the maritime sector and as well as to protect the marine environment with maintaining a sustainable economic development. As discussed in earlier chapter the key institutions stated in the proposal (b) are currently functioning more independently under three ministries namely, shipping, port and fisheries. The most of the state run projects are cost expensive, slow progress and in many cases due to lack of coordination between the relevant ministries causes duplication of work, delay in the decisions making process.

In development of the economy, government is encouraging the private sector partnership and in port and shipping sectors and therefore more regulatory measures are needed to protect the state interests that include the protection of marine environment. The proposal (b) will help to develop the maritime trade in line with current trend of privatization of commercial ports and related other business

By developing a Ministry for the maritime affairs can take care political, legal and financial matters including national maritime legislation particular to four institutions proposed in the solution (b). The main advantage of taking the all key institutions to single ministerial command is that gives the easy coordination, shearing of resources and will avoid the delay in making the decisions. At last it will reduce the administrative cost.

The Maritime administration should take the responsibility to promote and develop safer shipping and economical fairways in the coastal shipping. The administration of flagged ships on safety matters and the protection of marine environment part of the responsibility of the maritime administration. The training and education of seafarers should not be the responsibility of the Maritime administration, but setting of standards for the training according to international requirement and auditing of quality of training and issuing of certificate of competence is a responsibility of the administration. Also cooperation with IMO and other international agencies is another responsibility of maritime administration.

The National Hydrographic Service will be responsible for hydrographic surveys, chart production, planning and construction of fairways, maintenance of fairways and navigational aids. Also preparation of sensitivity maps for the marine pollution prevention, surveys of obstacles for the safe navigation and notice to the mariners part of the responsibility of the hydrographic service.

The Marine Pollution Prevention Authority will be the response organization for the marine pollution prevention and carry out the all function of response organization that was described in an earlier chapter.

The National Coast Guard Service will be responsible for the maritime search and rescue, sea boarder patrolling and environmental protection at sea. These functions needs close collaboration with Navy and the other agencies related to the marine pollution prevention.

The capacity building for the marine pollution prevention, both international cooperation and development of capital fund is vital important. In the other hand Sri Lanka has not yet ratified the International Convention on Oil Pollution Preparedness Response and Cooperation (OPRC) 1990 and may provide an opportunity to make a progress in this field and the government should attempt to develop the minimum requirement for the ratification of the convention. This convention will play important role in facilitating international cooperation at the global level, as well as in reinforcing regional arrangements and national oil pollution preparedness and response.

The investment is necessary for the acquisition of equipment for marine pollution prevention and development of funds for the equipment is another challenging task for a developing country like Sri Lanka. However carefully calculating the need, worthwhile to impose a tariff for the gross tonnage of vessels visiting the port to compensate the for marine pollution prevention that can be partly utilized for the building of equipment fund. The similar tariff system is available in Canada: any oil tanker enters the Canadian waters need a guarantee certificate from an oil pollution response organization. The major response organization that provide the service in Canada currently charge for certificate on gross tonnage basis of vessels and the current rate is charge 0.36 Canadian

dollars per ton. In addition imposing a tariff for the crude import will be an another source of improving the fund and this practice is available in Australia. The argument can be placed against, it is difficult to impose such tariff that has impact on ships visiting the port of Colombo and further there is an effect for increase for oil price. But the main argument is that basic equipment is necessary for the country in combating oil pollution, if not during a crises situation it will be an unbearable investment the country can not afford.

The National Oil spill Contingency Plan of Sri Lanka has stressed the serious shortage of the trained personals for the marine pollution prevention and associated disciplines. Therefore international cooperation and assistance has to be sought to train the personals as well as to obtain the relevant technology, equipment and facilities. Furthermore joint research and development programmes should carry out with the international cooperation to understand the level of marine pollution and that may provide timely information to take precautionary action. Then easy to take appropriate action not only against the oil spills but also effects on other hazardous material, bllast water exchange, operational discharges and crude oil washing along the shipping route within the Sri Lanka territorial waters. Taking the steps for the promotion of bilateral and multilateral agreements between the neighboring States and the countries of the Indian Ocean Memorandum of Understanding will be a other solution for the capacity building and that may benefit both countries to share the resources for combating the marine pollution.

Finally developing a practical exercise covering all the areas of contingency plan and put in to regular practice will benefit both the authorities and actual partners who implement the plan in a real situation. By doing so can minimize the shortcomings of the activities of enabling to have a full effect of the contingency plan in the prevention of marine pollution.

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APPENDICES

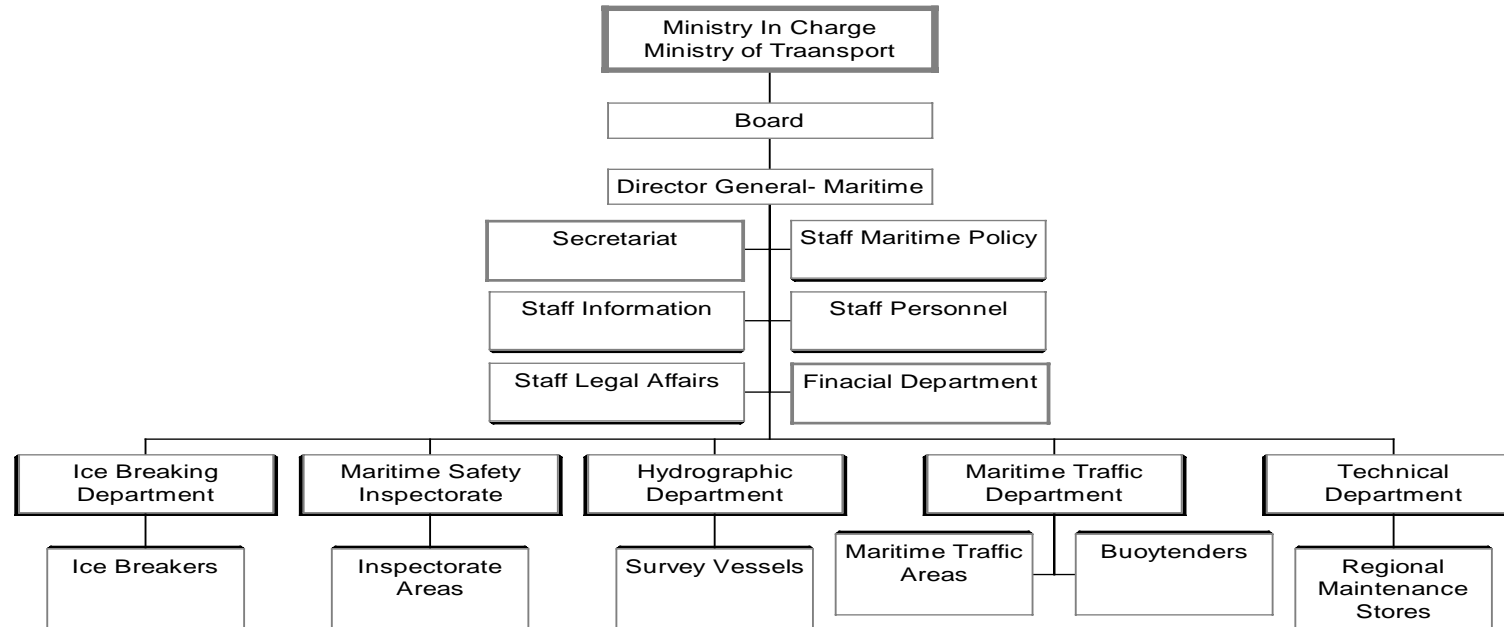
- Appendix 1 World Crude oil sea borne trade 1994**
- Appendix 2 Organizational Structure of Maritime Administration in France**
- Appendix 3 Policy Structure of Maritime Administration in Germany**
- Appendix 4 Organizational Structure of Maritime Administration in Germany**
- Appendix 5 Organizational Structure of Maritime Administration in Finland**
- Appendix 6 Organizational Structure of Maritime Administration in Sweden**
- Appendix 7 Organizational Structure of Maritime Administration in China**
- Appendix 8 National Oil Spill Response Organization of Sri Lanka**

World Crude Oil Sea borne trade 1994

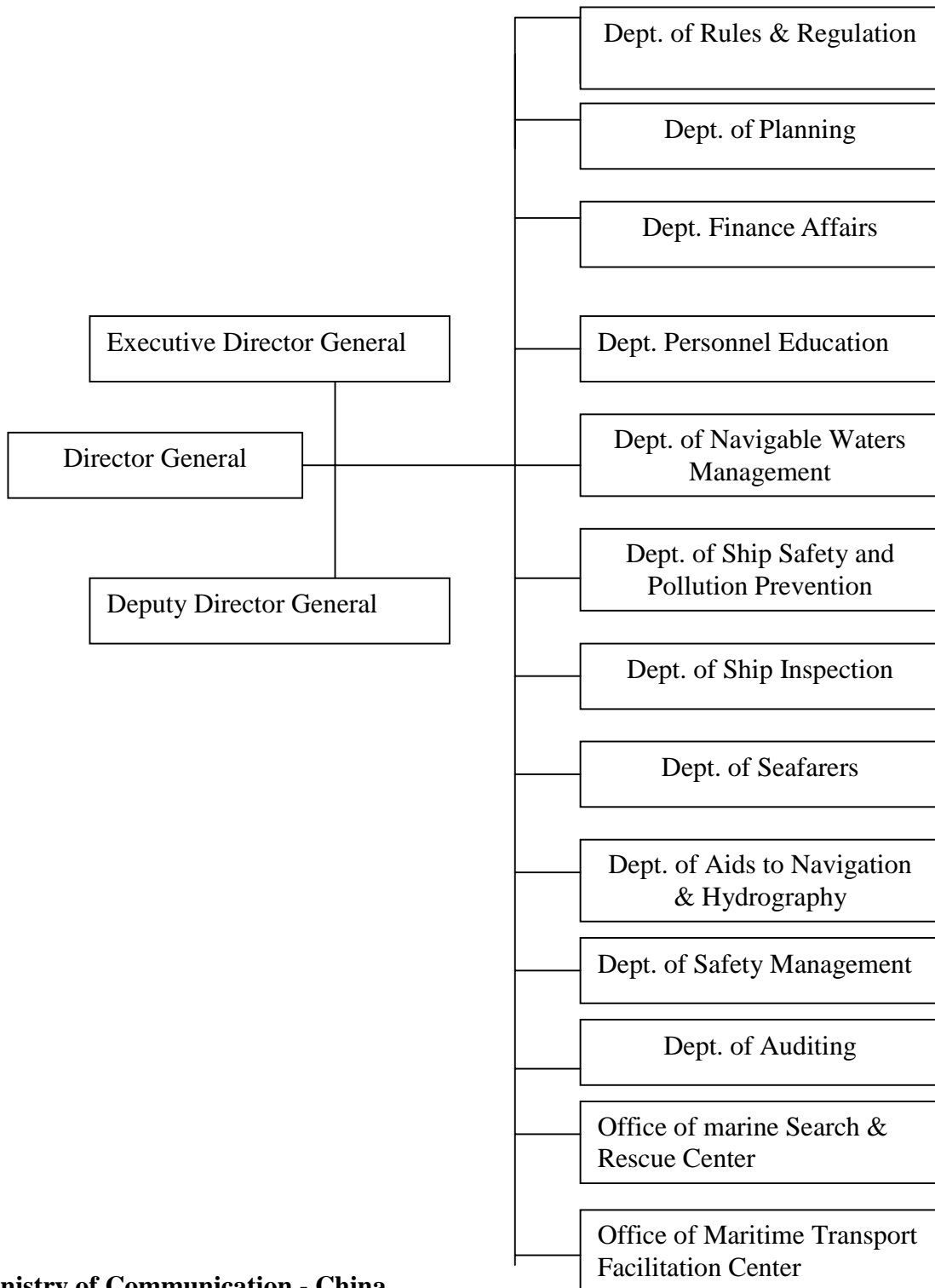
source: IMO News Monthly Journal

Appendix 6

Organizational Chart of Swedish Maritime Administration



Appendix 7



Ministry of Communication - China

Director General 's Office of Maritime Transport Organizational Structure

Source: Chinese Maritime Administration