

INDIAN COAST GUARD



CGBR No. 774

**Guidelines & Inspection Handbook
for
Pollution Response Facilities
of
Ports & Oil Handling Agencies**

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Preface

The ever-increasing dependence on oil is leading to rise in the activities concerned with sea transportation, oil exploration and production both in and around India. This poses a major threat on account of oil pollution and warrants a thorough response preparedness by all ports, oil handling agencies and concerned government agencies besides modalities for implementation of the provisions of National Oil Spill Disaster Contingency Plan (NOS-DCP).

2. *The Indian Coast Guard handbook for inspection of pollution response facilities of major, minor ports and oil handling agencies has been compiled and brought out with a broad aim of providing the basic guidelines and obtaining a consolidated data on the level of response preparedness by the stakeholders in the event of an oil spill.*

3. *This handbook, once completed, will serve as a good reference for resource management and inventory data bank for the response organisations.*



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Purpose of this handbook

1. *The purpose of this handbook is to provide the most basic knowledge and practical guidelines to the CG units, ports and oil handling agencies for preparation of their oil spill contingency plan and its execution in an oil spill emergency.*

2. *It also provides user-friendly guidelines to maintain the stockpile of essential pollution response equipment, their upkeep, operational availability and utilization methodology.*

3. *The set of inspection forms annexed as part II of this handbook would be instrumental for development of an exclusive database on the sensitive areas, provide update on operational status routines carried out on the pollution response equipment and will help the authorities to institute a viable inspection procedures to ensure strict quality control at all times.*

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Section – I

Guidelines

This section touches upon few basic and important factors, which should invariably be considered while formulating the local oil, spill contingency plan. It also provides useful information on selection procedure for ideally suited pollution response equipment and its maintenance schedule.

Contingency planning

1. The consequences of an oil spill are profound and can adversely affect harbours, beaches, wildlife, fisheries, human health, tourism and industrial plants. When these resources are affected to a considerable degree, there may be a serious impact to the local economy of the affected coastal area. Hence such incidents warrant an advanced preparedness or contingency planning.
2. It is widely accepted that countries and companies that have a properly developed contingency plan are better prepared to deal with an oil spill emergency than those that do not. The potential benefits of having a preconceived contingency plan is that it allows : -
 - (a) An effective and efficient complex response to be developed in advance.
 - (b) A limit to be placed on the extent of environmental and commercial damage.
 - (c) A local authority to indicate its concern for the presentation and protection of the environment as well as local community.
 - (d) A reduction in the number of subsequent claims for compensation.
3. Since, it is generally accepted that the local authorities are the frontline agency for dealing with oil pollution emergencies, it is therefore, appropriate that local coastal authorities develop a contingency plan to deal with unforeseen pollution incidents.
4. Contingency plans are best divided into two distinct parts. The first should be a descriptive policy document outlining the overall strategy of the plan, while the second should form the operational plan concerned with procedures to be followed when a spill occurs. The strategy segment of the plan should define the policy, responsibilities and rationale for the operational plan, which is essentially an action checklist with pointers to information sources.
5. A plan should be reasonably complete in itself and should not entail reference to a number of other publications, which causes delay. A loose-leaf format facilitates regular updating and there should be provision for listing and dating amendments.
6. In summary, an effective contingency plan will serve to promote a trained and practiced response when personnel are faced with an emergency situation.
7. In order to plan for the range of potential spill sizes, from small operational spills to worst-case scenarios, local authorities need to develop their plan based on the internationally recognised tiered response that classifies oil spills into three categories.

(a) Tier-1 is concerned with preparedness and response to a small spill within the capabilities of an individual facility or harbour authority. 700 tons is often cited as the upper limit of 'tier-1' however, the circumstances of the spill and the surrounding environment will determine the actual level of response.

(b) Tier-2 is concerned with preparedness and response to a spill that requires the co-ordination of more than one source of equipment and personnel. For a tier-2 response, assistance can come from a number of entities within a port area or from sources outside the immediate geographic area. Tier-2 describes a wide range potential spill scenarios and deals with operational spills upto 10,000 tons.

(c) Tier-3 is concerned with a major spill requiring the mobilization of all available national resources and depending upon the circumstances will likely involve mobilization of regional and international systems. It deals with the spills of more than 10,000 tons.

Aim

8. The aim of the contingency plan is : -

- (a) To provide direction and guidance to those involved in responding to an oil spill incident
- (b) To identify the most appropriate response plan to minimise the likely damage related to environment, ecology, tourism or economy of the area.

Objectives

9. The objectives of the plan are to : -

- (a) Identify the geographical area covered
- (b) Identify the responsible authority and boundary of the plan's operation
- (c) Articulate agreed command and control arrangements
- (d) Define roles and responsibilities
- (e) Identify early warning and notification procedures
- (f) Articulate a communication plan
- (g) Carry out an adequate oil spill risk assessment
- (h) Articulate a disposal plan
- (j) Identify response capability
- (k) Define mobilisation procedures

- (l) Address health and safety aspects
- (m) Identify and implement a financial control system in advance
- (n) Carry out post operation review and implement an amendment policy
- (p) Articulate procedures for dealing with the media.

Procedure

10. The development of an effective contingency plan requires the advice and assistance of the agencies mentioned below: -

- (a) Indian Coast Guard
- (b) The state/ local pollution control agency
- (c) Local fisheries and agricultural departments
- (d) Local environment protection agencies
- (e) Local wildlife agencies/ forest department
- (f) Central Industrial Security Force (CISF)
- (g) State/Local Port Authorities

11. The plan should contain responsibilities and contact details of relevant organisations and must be reviewed at least once a year. It is advisable to incorporate the following in the plan for its effectiveness : -

- (a) Emergency exercises. This will allow the plan to be tested and modified so that it will function properly in an actual incident.
- (b) Training.
 - (i) Oil spill response requires specialist training which should be developed at all levels of the response. Also, the management of an oil spill incident is a major task and has a crucial bearing on the outcome of an oil spill response. Issues such as the control of crisis situations, political interest, media pressure public environmental awareness and legal and financial implications can add substantial burdens to the oil spill response team and must be effectively handled if the overall response has to be successful.
 - (ii) Effective training hence becomes crucial for the response team in order to handle the situation aptly and correctly as the know how of the roles and responsibilities of various industries and government agencies, spill management, communication and media issues, initial spill assessment, strategic response planning, monitoring and terminating clean up,

post spill monitoring, liability and compensation, is of extreme importance.

(iii) However, experience has shown that those responsible for directing spill response, need to have a greater awareness and appreciation of the financial consequences of their decisions. Similarly, those responsible for preparing claims need a better understanding of the spill response, damage assessment and the process of working with relevant bodies to present the case for compensation.

(iv) There is no denying the fact that the oil spill combating in any capacity is a rare event for most people and therefore, it is important to keep in touch with skills and knowledge gained as part of an on-going personal training. This, too, will help in ensuring that all those involved in the response operation understand each other's role in an oil spill incident.

(v) Fisheries and agricultural organisations. Fisheries and agricultural organisations are vital in providing local and expert scientific advice in relation to sensitive resources and potential impacts of an oil spill to particular areas of the shoreline.

(vi) Tourist information centres. The local tourist information centres will hold information on local accommodation and transport agents. They can also play a role in disseminating information to the local community and potential visitors to the area.

(vii) Contractors. A major oil spill may require a response, which is beyond the capability of local resources, particularly when it occurs in a remote area. Local contractors will be able to supply equipment and casual labour required for response operation.

(viii) Local landowners. A vast quantity of oily debris and material will be collected during the clean-up operation, and therefore it is advisable to identify suitable landowners who own sufficient land. Such landowners must be notified where it is proposed to make use of a landfill site to dispose off such material. In certain circumstances it may be necessary to obtain prior permission of landowners for access during the clean up phase.

(ix) Health & safety authority. The oil spilled and the chemicals used in the response effort pose a potential health hazard to the workers and those living close to the incident site. The appropriate health and safety authority may be able to provide advice on the hazards involved and procedures to minimise their risk.

(x) Politicians/ VIP visit. Politicians and the local leaders are likely to be involved in the event specially to attract media attention. Procedures should be in place to accommodate their involvement. Procedures must also be in place to deal with the visits of VIP's.

(c) Post-incident review. Lessons learnt in an actual oil spill incident may also be incorporated into the plan review.

(d) Additional informations. The following additional informations may also be incorporated in the contingency plan : -

(i) Weather station. The weather station will be an important point of contact in the event of the incident. Weather conditions will have a direct impact on the choice of response strategies to be initiated and will require regular weather updates.

(ii) Communication network. Negotiations and consultation will have to be made in advance with government/ private telecommunication agencies who can provide a technical service to establish an effective communication network from and between the various sites of operational activity. This is of extreme importance while dealing with local print and electronic media.

(iii) Local press, radio and television network. The local press, radio and television stations will be able to assist in the release of important informations addressing the requirements of the local community and the latest update of the response operations.

(iv) Transport agents. Transport agents will be able to arrange the movement of necessary equipment and personnel to and around the incident site. They will also ensure that travel arrangements for essential items and resources are given top priority in their bookings.

Oil pollution risk assessment

12. The local authority must carry out an oil pollution risk assessment of the area in order to develop an adequate response strategy.

13. It is unlikely that all resources at risk will be defended successfully. Hence, after identifying sensitive resources, local authorities should be in a position to determine the priority areas in advance. These priority areas are to be protected first and most effectively. This will ensure that precious time is not wasted on trying to agree on priorities during the spill emergency.

14. In determining priorities, local authorities must bear in mind that public concern tends to focus on a limited range of wildlife species and not on the many other types of wildlife, which can be adversely affected. This concern should be taken into account and an appropriate balance be maintained between the environmental priorities, amenity demands and economic values of the local community.

Database

15. The development of a database of the environment prior to an incident is extremely important. Gathering such data will help to determine potential points of impact for the oil on the resources at maximum risk. The information of this type can be used as a basis for assessing the impact of an oil spill in the aftermath. This may be useful while preparing claims for cost-recovery and subsequent legal action.

Important factors

16. Oil pollution risk assessment will vary from area to area depending on the extent and type of coastline to be covered. However, it is important to identify the following factors that are important in the assessment of potential harm, a spill may cause to an area.

- (a) Potential sources of pollution
- (b) Physical features of the coastline
- (c) Types of oil handled
- (d) Sensitivity of the area
- (e) Accessibility to areas of the coastline
- (f) Regenerative ability of the area
- (g) Potential size of an oil spill
- (h) Time of the year – seasons
- (j) Quantities handled
- (k) Climatic conditions
- (l) Frequency of handling
- (m) Weather – winds and climates
- (n) Shipping vessels/types
- (p) Sea conditions– current and tides
- (q) Volume of traffic
- (r) Ability to respond
- (s) Navigational hazards
- (t) Available resources
- (u) Geographic location

Sensitive areas

17. In carrying out a risk assessment, all sensitive areas likely to be adversely affected by an oil spill needs to be identified. This includes areas that are important for their environmental, commercial and recreational purposes. In order to identify these areas, consultation should be carried out with all commercial, agricultural, wild life, forest, fisheries, tourism and environment related officials. The following may be considered while identifying the sensitive areas:

- (a) **Environmental**
 - (i) Coral reefs
 - (ii) Swamps/marshes
 - (iii) Fish/spawning grounds
 - (iv) Bird breeding/flocking areas
 - (v) Estuaries
- (b) **Commercial**
 - (i) Land and agriculture
 - (ii) Shipyards/ports
 - (iii) Aquaculture farms
 - (iv) Fish farms and fishing
 - (vi) Water intake points
- (c) **Recreational**
 - (i) Tourist beaches
 - (ii) Amenity beaches
 - (iii) Bathing beaches
- (d) **Wild life and forest**
 - (i) Mangroves
 - (ii) Endangered species
 - (iii) Marine national park
 - (iv) Wild life habitats

18. Once this oil pollution risk assessment has been carried out, the information gathered should be reproduced in map form and annexed to the operational plan. A brief summary on important features and the location of sensitive resources should also be included. List of MPAs are placed at Appendix 'R'

Oil spill response organisation

19. An ideal oil spill response organisation should broadly consist of : -

- (a) Management team
- (b) Technical team
- (c) Environmental team
- (d) Financial team
- (e) Logistics team
- (f) Press and public relations team
- (g) Wildlife response team
- (h) Hazardous material response team
- (i) Waste/collected off disposal team
- (j) Legal team

Role and responsibilities

20. The role and responsibilities of various teams are as follows:-

- (a) Management team. The management team should have overall responsibility of the spill response operation. Its main functions relate to:
 - (i) The overall execution of the plan
 - (ii) Determining strategies for priority areas and the various polluted sites
 - (iii) Reviewing operations
 - (iv) Gathering and collating information
 - (v) Authorising media releases
 - (vi) Controlling general financial aspects of the operation
 - (vii) Interacting with other agencies involved in the clean-up operation, central government, the media and public

- (viii) Preparing formal detailed management and situation reports
- (ix) Deciding when to terminate operations

(b) Technical team. The technical team should be responsible for the management of all tactical operations at the site of the incident. On the basis of the oil pollution risk assessment, the technical team working in close co-operation with the environmental team, should assess the situation, plan and implement the response operation. The basic function of technical team is as under : -

- (i) Collecting and evaluating incident information
- (ii) Identifying high risk areas
- (iii) Determining the best response strategy at each of the various polluted sites
- (iv) Monitoring the progress of the operation
- (v) Preparing daily incident logs of operations
- (vi) Allocating resources on a priority basis
- (vii) Allocating outside contractors to specific sites and tasks
- (viii) Implementing the chosen strategy
- (ix) Directing the clean-up operations

(c) Environmental team. The environmental team should have extensive, detailed local knowledge of shoreline habitats and species likely to be affected by clean-up operations. The team should be able to provide advice on human health, ecological, wildlife and amenity interests. Working in close co-operation with the technical team, this team should fulfill several basic functions, including provision of advice on : -

- (i) The risk and vulnerability of environmental features due to oil pollution
- (ii) Local sensitivities and the location of wildlife habitats of the affected coastline
- (iii) Possible/probable impacts of the oil
- (iv) Priority for protection of sensitive sites
- (v) Effect of clean-up methods on the local environment
- (vi) Potential and real effects on human health

The environment team will also carryout the following operations : -

- (i) Help to implement the chosen strategies

- (ii) Monitoring and ensuring that priorities of clean-up techniques adequately reflect environmental concerns
- (iii) Directing the wildlife response
- (iv) Co-ordinating all environmental monitoring and sampling programmes
- (v) Providing liaison links with other interested environmental organisations

(d) Financial team.

(i) The financial team should be responsible for establishing an effective and efficient financial accounting system and outlining procedures for preparing and submitting compensation claims in advance of an oil spill incident. It should establish a detailed financial accounting system for effective and efficient management of the financial aspects of an oil spill incident. The procedures need to be implemented in advance, wherein all expenditure incurred during an incident can be logged and tracked. Once these have been determined, all teams must be informed of the correct procedures to be followed in every transaction that they carry out.

(ii) It may be accepted that local authorities are responsible for shoreline clean-up, but economic assistance may not be offered by central government. Therefore, local authorities should prepare a budget for the possibility of a major oil spill incident occurring within their area. A Memorandum of Understanding could be drawn up, taking account of the prospects of the successful recovery of costs and defining how much expenditure will be allowed and on what services. However, it is impossible to accurately estimate the level of expenditure that may be incurred during an incident and it is likely that the constraints of having an 'approved emergency budget' may still have to be lifted temporarily.

(iii) Therefore, the financial arrangements cannot be too rigid. The local authorities should, however, have some means of control over the discretion of those responsible for acquiring necessary equipment, personnel, etc. to avoid the creation of further unnecessary financial problems.

(e) Logistics team.

(i) The logistics team should be responsible for organising, providing, marshalling and routing essential personnel, equipment, facilities, services and supplies to meet all the requirements of the teams involved in the incident management.

(ii) In order to determine the short and long term needs of the incident, the team should take into account the fact that the incident may last only for few days or, on the other hand might prolong up to several weeks or months.

(f) Press and public relations team.

(i) In every oil spill incident, media management is one important activity to develop confidence among the public in general, and also the various stakeholders including the statutory authorities. Bad media publicity can result in confusion and adverse comment from the interested parties resulting in enhanced claims and insurance payment. Therefore, all those interested should be kept informed about the plan and response to controlling the oil pollution in case of a spillage, and they should be made aware of the recovery plan. Hence, an efficient communication and media management team, with their roles and responsibilities clearly defined, is also an important part of the contingency plan. Service of an expert media agency can be used, depending upon the size of the spillage and the extent of damage or pollution, to make media management more effective. Oil spill response readiness can be demonstrated to media by associating them with structured mock drills.

(ii) Any oil spill incident will undoubtedly attract the interest of the local media. Where a spill poses significant risks to the environment, it is probable that it will arouse national and international interest. This can result in an influx of vast numbers of individuals, groups and agencies having an immediate impact on the availability of transport and accommodation in the local area to key personnel. The media also presents the risk of disruption and security breaches to the ongoing operational activities.

(g) Wildlife response team. The wildlife response team should have control over all the wildlife aspects of the cleanup operations. The team should collect and deal with wildlife casualties and fatalities provide advice to the various SRC teams and prepare daily incident logs.

Pollution response facilities

21. The pollution response facilities generally comprises of the following : -

(a) Containment equipment.

(i) Booms are the basic equipment for containment of an oil spill. Its general features are : -

(aa) Freeboard to prevent splash

(ab) Subsurface skirt to prevent escape of oil under the boom

(ac) Floatation by air or some buoyant material.

(ad) Longitudinal tension member (Chain or wire to withstand effects of winds waves and currents.

(ii) There are various types of containment booms, which are available in the international market for oil spill response. At times, it becomes difficult to choose the appropriate model.

In order to provide the guidance to the stakeholders a boom selection matrix is placed at Appendix 'A' and the brief detail on its various types is mentioned below : -

- (aa) Internal foam flotation boom is designed to contain oil, fuel and other water borne pollutants in temporary or permanent situations. These booms are suitable for use in sheltered and inland waters. They are fast to assemble and deploy, tough and abrasion resistant as well as easy to maintain and clean.
 - (ab) Self-inflatable boom is the most rapid, compact and easy to handle. It automatically inflates and can be deployed immediately. It does not require any air compressor or other auxiliary equipment and can be stored in a very little space when packed.
 - (ac) Pressure inflatable boom is designed for use in open shore and protected or sheltered water. It is primarily used for deflection or protection booming of shorelines, hatcheries, harbours, and port facilities. The boom can be deployed for containment and recovery of a spill product and requires a backpack blower for inflation.
 - (ad) Fence boom This general purpose fence type containment boom is a lightweight easily managed containment barrier that is ideal for operations in coastal, harbours and inland waterways. This can be deployed without the use of air blowers and other powered equipment.
- (b) Recovery equipment.
- (i) Recovery system involves skimmers, mops, sorbents etc., for quick recovery of contained oil. There are skimmers available for use in a wide range of areas like ponds, bays and harbours to coastal and open waters. Most skimmers utilize the proven oleophilic disc principle, which combines a high oil recovery rate with very low free water content.
 - (ii) The basic components of a skimmer are : -
 - (aa) An oil recovery element
 - (ab) Some form of floatation or support arrangement
 - (ac) A pump to transfer collected material to storage.
 - (iii) There are various types of skimmers available in the market. In order to provide a useful guidance for selection of the most appropriate type of skimmers, a skimmer selection matrix is placed at appendix 'B'.
- (v) Sorbents are materials used to recover spilled oil through adsorption or absorption. Oil recovery is principally done with oil skimmers or oil recovery vessels, and sorbents are used as an alternative or auxiliary spill control materials, for use when oil recovery with specialized devices is difficult because of small floating oil slicks, shallow water or inaccessibility. The sorbent must satisfy the following requirements.

- (aa) High absorption efficiency
- (ab) Easy recovery after absorption
- (ac) Easy processing after recovery

Most of the synthetic sorbents on the market are made of polypropylene fiber and are most conveniently used as pads, rolls or booms. Due consideration should be given to the performance and availability in selecting the sorbent. Performance data of various sorbent materials and its application techniques are placed at appendix 'C' & 'D'.

(c) Beach spray system. These are vacuum induced air carrying portable system for the efficient recovery of oils, mounds, tar balls from beaches, rocky foreshores and muddy coasts. These are ideal for use at locations, which are inaccessible such as jetties and piers. They are very rugged and require only one person to handle it. In addition to these, there are high-pressure hot water washer, which can be used for beach as well as equipment cleaning.

(d) Dispersant Spray system. Dispersants are a group of chemicals designed to be sprayed onto oil slicks, to accelerate the process of natural dispersion. Spraying dispersants may be the only means of removing oil from the sea surface, particularly when mechanical recovery is not possible. A comprehensive range of dispersant spray units are available to spray both concentrate and dilute dispersant, which can be temporarily or permanently mounted on vessels or can be used for beach spraying. The range also includes a helicopter dispersant spray system using TC 3 bucket.

(e) Beach Cleaning system. These system are basically used for cleaning the beach area after the pollution occurs and comprises of following:-

- (i) Heavy weight vacuum pump
- (ii) Light weight vacuum pump
- (iii) Pressure washer vacuum pump

(f) Oil spill dispersants.

(i) Dispersants are chemical agents that include surface active agents, which are partly oil and water soluble. Dispersants change the fate of oil at sea by facilitating the break down of an oil slick in to tiny droplets, which are suspended and disseminated in water mass thus enhancing the penetration of oil into the water column. Dispersed oil will degrade more rapidly than oil in a surface slick and will pose a lesser threat to the environment than oil.

(ii) Use of oil spill dispersant (OSD) is one of the options being increasingly adopted for response to oil spill. Though the increasing research on the subject has evolved into introduction of better and lesser toxic products since the earlier days, the dispersants still need to be used with discretion and due regard to sensitivity of the area where it is intended

to be used.

(iii) Also, the use of OSD is not appropriate for all types of oil. Some oils like diesel, gas oil and other light oil types usually disperse readily and, therefore, do not require any sort of treatment. Sea conditions, tides and a number of other factors are also important in determining whether treatment with OSD is the best response.

(iv) The Indian Coast Guard has issued guidelines and policy for use of OSD in Indian waters, which can be referred for further details.

(v) The list of approved oil spill dispersants (OSD), various types and their uses are placed at appendix 'E' & 'F' respectively.

(g) Storage tanks and barges. These are manufactured from high tensile strength coated fabrics with reinforced webbings, which are very strong, and compact when not in use. They are ideal for use as primary storage containers or as additional capacity for vessels with built in storage tanks and can be moored at buoys while operations continue.

(h) Storage space. Adequate storage space should be made available for keeping the pollution response equipment and other accessories in a centralised location. Effort should be made to keep the rubberized items in a centralised air-conditioned store/compartment.

(j) Personnel protection clothing. Significant quantities of protective clothing will be required in order to protect workers from the potential physical and chemical hazards they are likely to face in an oil spill clean up operations. Requirements will include head, face, eye, skin, hearing, foot and respiratory protection.

(k) Specialised Vehicles. Adequate number of specialised vehicles such as flat bed trucks, enclosed container trailers, mobile cranes, fork lifts etc., will be required for quick mobilisation of pollution response equipment to the site.

Waste disposal facilities

22. *One of the greatest logistical problems encountered in any oil spill is the disposal of the recovered oil and oily debris, such as, items of protective clothing and equipment used in the clean-up operations. It is essential that suitable temporary storage sites and port reception facilities alongwith vehicles or vessels for transportation to final disposal sites are identified. The identification of final disposal routes/sites for the waste can be the most difficult task since the availability of suitable methods may depend on the time of the year, local conditions or existing legislation.*

23. *It is vital that local authorities familiarise themselves with existing legislation and the procedures regarding disposal of oily waste, its storage and transportation, which may have to be adhered to.*

24. *In case, it is proposed that direct disposal is the best option, prior notification, and consultation with*

the organisations like Central pollution control board, State pollution control board, Indian Coast Guard and MMD may be required under relevant national legislation. Local authorities should also take note of any penalties for breach of the legislation.

25. *CPCB registered waste oil processors list and Options for separation and disposal of oil and debris are placed at appendix 'G' & 'H' respectively.*

Equipment maintenance and storage

26. There are some basic guidelines which needs to be considered by the operator/owner of the oil spill response equipment for a reliable response. It must be kept in mind that pollution equipment are generally stored for long durations without being used and then suddenly, it is required to operate at its maximum capability for extensive periods. Also, the conditions in which the equipment is required to operate vary considerably with the types of oil, sea state and weather conditions. Hence, proper care for its storage and a proven maintenance schedule must be ensured to get a trouble free and reliable performance of the equipment.

Types of maintenance

27. Although, there exists various types and schedules of maintenance, it is advisable to consider the maintenance schedule recommended in the operator's manual. Few accepted methods are as under: -

- (a) Calender system – the equipment is inspected and routines are carried out on a fixed time schedule i.e. weekly, monthly, annually.
- (b) Equipment running hours – the equipment maintenance routines are activated on reaching stipulated running hrs.
- (c) Equipment breakdown – equipment is repaired as and when defects are reported.
- (d) A combination of all or some of these maintenance methods.

28. Before deciding which form of maintenance procedure to adopt, it is essential to analyse the best option for the equipment. The requirements for pollution equipment are totally different from those, which are utilised for normal operation. The failures tend to result from lack of use of the equipment rather than its over-use. The needs to be taken into account.

29. A computerized maintenance system can be of considerable help in the planning and deciding about the number of supervisors required, for the equipment maintenance. It will also help in getting the detailed analysis on the performance graph of the equipment, viz, number of hours in operation, breakdown and failures, frequency of repairs etc. A sample of equipment maintenance schedule is placed at appendix 'J'.

Storage

30. As far as possible, equipment should be stored under cover in a dry, well-ventilated store. In order to prolong equipment life, humidity, temperature and exposure to ultraviolet radiation should be controlled. In addition, it should be protected from damage by pests. Booms which may be folded or reeled in storage, should be regularly unfolded or unreeled to prevent the material sticking together or creases forming which will lead to points of weakness.

31. Ideally, the store should provide a clear working area where equipment can be cleaned to remove oil and salt-water and some maintenance carried out. Good access to the equipment is essential, both to facilitate inspection and maintenance and also to give access to road vehicles and lifting equipment so that equipment can be deployed quickly in an emergency. However, security arrangements must also be considered to prevent vandalism and theft.

Important Informations

32. The important informations on Quantifying Floating oil, Behaviour of oil techniques to different shoreline types, Liability and compensation, Calculation of capititation charges, Powers delegated to Coast Guard, List of International pollution response agencies, Presidential notification, Marine protected areas (MPAs), coastal wetlands, classification of mangroves in India, coral reefs in MPAs and institution/organisation involved with MPAs are placed at appendix from 'K' to 'W'.

Section – II

Information Sheets

1. The information sheets annexed to section – II of this handbook is provided with a broad aim to develop an exclusive data bank on the stockpile of pollution response equipment, its operational status, routine, maintenance as well as updated information on sensitive areas and response capability of the resource agency.
2. These informations will help the related authorities to institute a viable inspection procedure to ensure strict quality control at all times.

INSPECTION DETAILS

(a) Name of the port / :
Name of the Company

(b) Date of inspection :

(c) Inspected by :

Important information

(a) Port Location :

(b) Chairman/ MD :

(c) Harbour master :
(if applicable)

(d) Dy. Chairman :
(if applicable)

(e) Dy. Conservator :
(if applicable)

(f) Pollution response :
officer

Oil Handling Informations

(a) Total quantity likely
to be handled :

(b) No. of jetties
involved:

(c) No. of SBM's
(if any) :

(d) Length of jetty :

(e) Average number of
Ships handled :

(i) Daily :

(ii) Weekly :

(iii) Monthly :

(iv) Annually :

(f) Other facilities :

Oil Discharge Information

(a) Average most
probable discharge :
(AMPD)

(b) Maximum most
probable discharge :
(MMDP)

(c) Worst case
discharge (WCD) :

(d) Spill history (if any) :

(e) Threat perception :

Resources at risk

(Sensitive areas)

(a) **Environment**

(i) Coral reefs :

(ii) Swamps/marshes :

(iii) Fish/spawning
grounds :

(iv) Bird breeding/
flocking areas :

(v) Estuaries :

Resources at risk

(Sensitive areas)

(b) Commercial

(i) Land and agriculture :

(ii) Shipyards/ports :

(iii) Aquaculture farms :

(iv) Fish farms :

(v) Water intake points :

(vi) Salt Pans :

Resources at risk

(Sensitive areas)

(c) **Plankton**

(i) Marine mammals :

(ii) Sheltered shoreline :

(iii) Shallow sub tidal :

Resources at risk

(Sensitive areas)

(d) **Recreational**

(i) Tourist beaches :

(ii) Amenity beaches :

(iii) Bathing beaches :

(iv) Pilgrimage beaches :

Resources at risk

(Sensitive areas)

(e) **Wild life and forest**

(i) Mangroves :

(ii) Endangered species :

(iii) Marine national parks :

(iv) Wild life habitats :

Resources at risk

(Sensitive areas)

(i) Name of the place :

(ii) Location :

(iii) Background :

Resources at risk

(Sensitive areas)

(i) Name of the place :

(ii) Location :

(iii) Background :

Resources at risk

(Sensitive areas)

(i) Name of the place :

(ii) Location :

(iii) Background :

Resources at risk

(Sensitive areas)

(i) Name of the place :

(ii) Location :

(iii) Background :

Oil Spill Response Organisation

(a) **Management team**

(i) Team- in-charge :

(ii) Supervisors :

(iii) Members :

(iv) Assistants :

(v) Others :

Oil Spill Response Organisation

(b) **Technical team**

(i) Team - in-charge :

(ii) Supervisors :

(iii) Members :

(iv) Assistants :

(v) Others :

Oil Spill Response Organisation

(c) **Environment team**

(i) Team- in-charge :

(ii) Supervisors :

(iii) Members :

(iv) Assistants :

(v) Others :

Oil Spill Response Organisation

(d) **Financial team**

(i) Team- in-charge :

(ii) Supervisors :

(iii) Members :

(iv) Assistants :

(v) Others :

Oil Spill Response Organisation

(e) **Logistic team**

(i) Team- in-charge :

(ii) Supervisors :

(iii) Members :

(iv) Assistants :

(v) Others :

Oil Spill Response Organisation

(f) **Press and Public relations team**

(i) Team- in-charge :

(ii) Supervisors :

(iii) Members :

(iv) Assistants :

(v) Others :

Oil Spill Response Organisation

(g) Wild life response team

(i) Team- in-charge :

(ii) Supervisors :

(iii) Members :

(iv) Assistants :

(v) Others :

Oil Spill Response Organisation

(h) **Hazardous materials response team**

(i) Team-in-charge :

(ii) Supervisors :

(iii) Members :

(iv) Assistants :

(v) Others :

Oil Spill Response Organisation**(j) Waste/collected off disposal team**

(i) Team- in-charge :

(ii) Supervisors :

(iii) Members :

(iv) Assistants :

(v) Others :

Oil Spill Response Organisation

(k) **Legal team**

(i) Team- in-charge :

(ii) Supervisors :

(iii) Members :

(iv) Assistants :

(v) Others :

Pollution Response Facilities*(Pollution response vessel)*

(a) Name of the vessel :

(b) LOA of the vessel :

(c) Width of the vessel :

(d) Tonnage :

(e) Draft :

(f) Endurance :

(g) Berthed at
Location :

(h) PR capability :

(j) Other related
informations :

Pollution Response Vessel

(a) Name of the vessel :

(b) LOA of the vessel :

(c) Width of the vessel :

(d) Tonnage :

(e) Draft :

(f) Endurance :

(g) Berthed at
Location :

(h) PR capability :

(j) Other related
informations :

Pollution Response Vessel

- (a) Name of the vessel :

- (b) LOA of the vessel :

- (c) Width of the vessel :

- (d) Tonnage :

- (e) Draft :

- (f) Endurance :

- (g) Berthed at
Location :

- (h) PR capability :

- (j) Other related
informations :

Pollution Response Boats

(a) Name of the boat :

(b) LOA of the vessel :

(c) Width of the vessel :

(d) Tonnage :

(e) Draft :

(f) Endurance :

(g) Berthed at
Location :

(h) PR capability :

(j) Other related
informations :

Pollution Response Boats

(a) Name of the boat :

(b) LOA of the vessel :

(c) Width of the vessel :

(d) Tonnage :

(e) Draft :

(f) Endurance :

(g) Berthed at
Location :

(h) PR capability :

(j) Other related
informations :

CGIS No. 7 a*(refer to para 21 of section-I)***Containment Equipment****(a) Ocean Boom**

(i) Type :

(ii) Overall length :

(iii) No. of chambers :

(iv) Chamber length :

(v) Material(fabric) :

(vi) Width :

(vii) Freeboard :

(viii) Draught :

(ix) Overall weight :

Ocean Boom

(i) Storage :

(ii) Winder :

(iii) Staked :

(iv) Reel :

Power pack

(v) Make :

(vi) Capacity :

(vii) Specification :

(viii) Status (Ops/N-Ops) :

(ix) Last operated :

(x) Operator's manual :
(held / not held)

(xi) No.of occasions deployed :
(during the last six months)

Containment Equipment**(b) River boom**

- (i) Type :

- (ii) Overall length :

- (iii) No. of chambers :

- (iv) Chamber length :

- (v) Material(fabric) :

- (vi) Width :

- (vii) Freeboard :

- (viii) Draught :

- (ix) Overall weight :

- (x) Photograph with parts :
(Attach additional sheet)

River Boom

(i) Storage :

(ii) Winder :

(iii) Staked :

(iv) Reel :

Power pack

(v) Make :

(vi) Capacity :

(vii) Specification :

(viii) Status (Ops/N-Ops) :

(ix) Last operated :

(x) Operator's manual :
(held/ not held)

(xi) No.of occasions deployed :
(during the last six months)

Containment Equipment

River boom

- (i) Type :

- (ii) Overall length :

- (iii) No. of chambers :

- (iv) Chamber length :

- (v) Material(fabric) :

- (vi) Width :

- (vii) Freeboard :

- (viii) Draught :

- (ix) Overall weight :

- (x) Photograph with parts :
(Attach additional sheet)

River Boom

(i) Storage :

(ii) Winder :

(iii) Staked :

(iv) Reel :

Power pack

(v) Make :

(vi) Capacity :

(vii) Specifications :

(viii) Status :

(ix) Last operated :

(x) Operator's manual :
(held/ not held)

(xi) No. of occasions :
deployed
(during the
last six months)

Recovery Equipment**(a) Skimmer**

- (i) Type : Brush
- (ii) Capacity :
- (iii) Dimensions :
- (iv) Weight :

Power pack

- (v) Make :
- (vi) Capacity :
- (vii) Internal pump :
- (viii) External pump :
- (ix) Quantity :
- (x) Status :
- (xi) Last operated :
- (xii) Operator's manual :
(held/ not held)
- (xiii) Photograph with parts :
(Attach additional sheet)

Recovery Equipment**(b) Skimmer**

- (i) Type : Drum
- (ii) Make :
- (iii) Capacity :
- (iv) Dimensions :
- (v) Weight :

Power pack

- (vi) Make :
- (vii) Capacity :
- (viii) Internal pump :
- (ix) External pump :
- (x) Quantity :
- (xi) Status :
- (xii) Last operated :
- (xiii) Operator's manual :
(held/ not held)
- (xiii) Photograph with parts :
(Attach additional sheet)

Recovery Equipment**(c) Skimmer**

- (i) Type : Disc
- (ii) Make :
- (iii) Capacity :
- (iv) Dimensions :
- (v) Weight :

Power pack

- (vi) Make :
- (vii) Capacity :
- (viii) Internal pump :
- (ix) External pump :
- (x) Quantity :
- (xi) Status :
- (xii) Last operated :
- (xiii) Operator's manual :
(held/ not held)
- (xiv) Photograph with parts :
(Attach additional sheet)

Recovery Equipment**(d) Skimmer**

- (i) Type : Weir
- (ii) Make :
- (iii) Capacity :
- (iv) Dimensions :
- (v) Weight :

Power pack

- (vi) Make :
- (vii) Capacity :
- (viii) Internal pump :
- (ix) External pump :
- (x) Quantity :
- (xi) Status :
- (xii) Last operated :
- (xiii) Operator's manual :
(held/ not held)
- (xiii) Photograph with parts :
(Attach additional sheet)

Recovery Equipment**(d) Skimmer**

- (i) Type : Weir
- (ii) Make :
- (iii) Capacity :
- (iv) Dimensions :
- (v) Weight :

Power pack

- (vi) Make :
- (vii) Capacity :
- (viii) Internal pump :
- (ix) External pump :
- (x) Quantity :
- (xi) Status :
- (xii) Last operated :
- (xiii) Operator's manual :
(held/ not held)
- (xiii) Photograph with parts :
(Attach additional sheet)

Floating Hose System

- (i) Hose storage reel :
- (ii) Diameter :
- (iii) Rotation speed :
- (iv) Pull :
- (v) Power supply :
- (vi) Controls :
- (vii) Quantity :
- (viii) Any other
Information :
- (ix) Photograph with parts :
(Attach additional sheet)

Floating Hose System

- (i) Hose storage reel :
- (ii) Diameter :
- (iii) Rotation speed :
- (iv) Pull :
- (v) Power supply :
- (vi) Controls :
- (vii) Quantity :
- (viii) Any other
information :
- (ix) Photograph with parts :
(Attach additional sheet)

Heli Skimmer

(i) Make :

(ii) Type :

(iii) Quantity :

(iv) Specifications :

(v) Status(Ops/N-Ops) :

(vi) Last Operated :

(vii) Operator's Manual :
(held / not held)

(viii) Photograph with parts :
(Attach additional sheet)

ROP-MOP Skimmer

- (i) Make :

- (ii) Type :

- (iii) Quantity :

- (iv) Dimension :

- (v) Rope diameter :

- (vi) Power supply :

- (vii) Mode of use :

- (viii) Rope material :

- (ix) Other details :

- (x) Photograph with parts :
(Attach additional sheet)

Sorbents

(i) Make :

(ii) Type :

(iii) Quantity :

(iv) Details :

Beach Spray System**(a) Heavy duty vacuum pump**

- (i) Make :
- (ii) Type :
- (iii) Capacity :
- (iv) Wheel mounted :
- (v) Dimensions :
- (vi) Optional attachment details :
- (vii) Power Supply :
- (viii) Status :
- (ix) Last Operated :
- (x) Operator's Manual :
(held/ not held)
- (xi) Photograph with parts :
(Attach additional sheet)

Beach Spray System**(b) Portable vacuum pump**

- (i) Type :
- (ii) Capacity :
- (iii) Wheel mounted :
- (iv) Dimensions :
- (v) Construction :
- (vi) Optional attachment details :
- (vii) Power supply :
- (viii) Status :
- (ix) Last operated :
- (x) Operator's manual :
(held/ not held)
- (xi) Photograph with parts :
(Attach additional sheet)

Dispersant Spray System**(a) Ship / boat mounted**

- (i) Type :
- (ii) Dimensions :
- (iii) Dispersant capacity :
- (iv) Dispersant pump :
- (v) Hose :
- (vi) Discharge arms :
- (vii) Discharge nozzles :
- (viii) Power supply :
- (ix) Status :
- (x) Last operated :
- (xi) Operator's manual :
(held/ not held)
- (xii) Photograph with parts :
(Attach additional sheet)

Dispersant Spray System**(b) Aerial spray system**

- (i) Type :
- (ii) Dimensions :
- (iii) Dispersant capacity :
- (iv) Dispersant pump :
- (v) Hose :
- (vi) Discharge arms :
- (vii) Discharge nozzle :
- (viii) Power supply :
- (ix) Status :
- (x) Last operated :
- (xi) Operator's manual :
(held/ not held)
- (xiii) Photograph with parts :
(Attach additional sheet)

Dispersant Spray System**(c) Other spray systems**

(i) Type :

(ii) Dimension :

(iii) Dispersant capacity :

(iv) Dispersant pump :

(v) Hose :

(vi) Discharge arms :

(vii) Discharge nozzles :

(viii) Power supply :

(ix) Photograph with parts :
(Attach additional sheet)

Beach Cleaning System**(a) Heavy weight pump**

- (i) Type :
- (ii) Make :
- (iii) Capacity :
- (iv) Dimensions :
- (v) Quantity :
- (vi) Power supply :
- (vii) Other details :
- (viii) Status :
- (ix) Last operated :
- (x) Operator's manual :
(held/ not held)
- (xi) Photograph with parts :
(Attach additional sheet)

Beach Cleaning System**(b) Light weight pump**

- (i) Type :
- (ii) Make :
- (iii) Capacity :
- (iv) Dimension :
- (v) Quantity :
- (vi) Power supply :
- (vii) Other details :
- (viii) Status :
- (ix) Last Operated :
- (x) Operator's Manual :
(held/ not held)
- (xi) Photograph with parts :
(Attach additional sheet)

Beach Cleaning System**(c) Pressure washer pump**

(i) Type :

(ii) Make :

(iii) Capacity :

(iv) Dimension :

(v) Quantity :

(vi) Power supply :

(vii) Other details :

(viii) Photograph with parts :
(Attach additional sheet)

Oil Spill Dispersant

(i) Product name : Type

(ii) Date of Manufacturing :

(iii) Shelf life :

(iv) Quantity :

(v) Whether approval :
obtained

(vi) Any other details if any :

Storage Facilities**(a) Storage tanks**

(i) Type :

(ii) Make :

(iii) Capacity :

(iv) Numbers :

(v) Other details :

(b) **Storage Barges**

(i) Type :

(ii) Make :

(iii) Quantity :

(iv) Capacity :

(v) Other details :

(c) **Storage Barges**

(vi) Type :

(vii) Make :

(viii) Quantity :

(ix) Capacity :

(x) Other details :

(d) **Storage Space**

(i) Shed :

(ii) Total area :

(iii) Dimension :

(iv) AC/non-AC :

(v) Other details :

Pollution Response Kits/Accessories

(i) Type :

(ii) Make :

(iii) Quantity :

(iv) Other details :

Pollution Response Protection Clothing

(a) Suits (make) :

(b) Quantity :

(c) Shoes /
Boots (make) :

(d) Quantity :

(e) Gloves :

(f) Quantity :

(g) Other items :

Specialised Vehicles(i) Trucks

Type/ make :

Quantity :

(ii) Trailors

Make :

Quantity :

(iii) Jeeps

Model :

Type :

Quantity :

Specialised Vehicles

(iv) Other Vehicles if any

Type :

Quantity :

List of NGO's engaged in Marine
Environment Protection in area : -

List of oil samples testing Laboratory in area : -

Any Other Informations : -

Waste Disposal

(Port reception facilities)

(a) Waste disposal facilities :

(b) Waste treatment plant :

(c) Waste disposal plan :

(d) Waste recovery tanks :

(e) Quantity :

(f) Capacity :

(g) Any other details :

Emergency Support

(a) Trauma care :

(b) Medical cover :

(c) Fire fighting assistance :

Pollution Response Training Schedules

(a) Month :

(b) Nature of training :

(c) Number of trainees :

(d) Remarks :

Pollution Response Exercise Conducted

(a) Number of exercises :

(b) Area of exercises :

(c) With Indian Coast Guard :

(d) With SPCB :

(e) With private agencies :

(f) Joint exercises :

Futuristic Plan

(a) Futuristic plan :

(b) Proposed jetty :

(c) Proposed acquisition
of PR equipment :

Interaction With Local Coast Guard Authorities

(a) Regional CG pollution
response officer :

(b) Name :

(c) Contact number :

(d) Other details :

(e) District CG pollution
response officer :

(f) Name :

(g) Contact telephone
number :

(h) Other details :

Details About Medical Facilities

(a) Name of the Hospital :

(b) Distance from the port :

(c) Facilities available :

(d) Duty MO phone No :

(e) Blood bank phone No :

(f) Limitation if any :

(g) Name of other Hospitals
with phone No :

Details About Contingency Plan

(a) Plan prepared on :

(b) Plan submitted :

(c) TO RHQ :

(d) TO CGHQ :

(e) Whether approved /
disapproved :

(f) If disapproved
reasons :

(g) Resubmission date :

(h) Present status :

Assessment of Contingency Plan

1. Has there been a realistic assessment of : -

(i) The nature and size of the possible threat

(ii) The resources at risk

(iii) The probable movement of oil spill

2. Have priorities for protection been agreed, taking into account the viability of the various protection and clean-up operations?

Assessment of Contingency Plan

3. Has a strategy for protecting and cleaning the various areas been agreed and clearly explained?

4. Has the necessary organisation been outlined and the responsibilities of all those involved been clearly stated with no 'Grey areas'?

Assessment of Contingency Plan

5. Will all who have a task to perform be aware of what is expected of them?

6. Are the levels of equipment, materials and manpower sufficient to deal with the anticipated size of spill?

Assessment of Contingency Plan

7. If not : -

(i) Is back-up resources have been identified?

(ii) Is mechanisms for obtaining their release and entry to the country have been established?

8. Have temporary storage sites and final disposal routes for collected oil and debris been identified?

Assessment of Contingency Plan

9. Are the alerting and initial evaluation procedures fully explained?

10. Are the arrangements for continual review of the progress and effectiveness of the clean-up operation fully explained?

11. Have the arrangements for ensuring effective communication between shore, sea and air been described?

Assessment of Contingency Plan

12. Have all aspects of the plan been tested and nothing significant found lacking?

13. Is the plan compatible with plans for adjacent areas and other activities?

INSPECTION/EVALUATION REPORT
For the period (_____)

1. Assessment of the port / oil handling agencies in dealing with oil spill emergencies up to

2. Adequacy of the equipment :

3. Response Preparedness :

4. Is the manpower efficient in handling equipment :

5. Is the manpower adequately trained :

6. Is the infrastructure support is adequate :

7. Final assessment :

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BOOM SELECTION MATRIX

		<u>Type of Boom</u>				
		Internal Foam Flotation	Self Inflatable	Pressure Inflatable	External Tension Member	Fence
Environmental Conditions	Offshore Hs > 3ft; V < 1kt	2	2	1	1	3
	Harbor Hs < 3ft; V < 1kt	1	1	1	2	2
	Calm Water Hs < 1 ft; V < .5 kt	1	1	1	2	1
	High Currents V > 1 kt	2*	3	2	1	3
	Shallow Water (Depth < 1 ft)	1	2	2	3	3
Performance Characteristics	Operation in Debris	1	3	2	3	2
	Excess Buoyancy	2	1	1	2	3
	Wave Response	2	2	1	1	3
	Strength	2	3	1	1	1
Convenience Characteristics	Ease of Handling	2	1	2	3	2
	Ease of Cleaning	1	1	1	3	1
	Compactability	3	1	1	2	3
	Cost/Ft 1-Low 2-Medium 3-High	1	3	2	3	2

Notes: *Hs = Significant Wave Height

***V = Velocity of Surface Current**

Source : IMO Manual on Oil Pollution

SKIMMER SELECTION MATRIX

		Generic Type of Skimmer																				
		Oleophilic Surfaces				Weir				Vacuum Units		Hydrodynamic Devices		Other Methods								
		Brush	Disc	Rope	Rope/Belt (Catamaran Mounted)	Sorbent Belt (Downward Moving)	Sorbent Belt (Upward Moving)	Advancing Weir/Boom	Saucer	Screw/Auger	Self-Leveling	Vortex	Vacuum system with Weir	Skimmer head	Rope	Rope/Belt (Catamaran Mounted)	Hydro cyclone	Submersion Plane	Water Jet	Combination Trawl/Boom	Paddle Belt	
Operating Environment		Open Seas Hs>3FT; V<1kt	2	2	1	1	1	1	2	2	3	3	3	2	3	3	3	3	1	3		
		Harbours and Bays Hs>3FT; V<0.7kt	1	1	1	1	1	1	1	1	2	3	3	1	2	3	2	2	3	1	3	
		Protected In Shore Hs>1FT; V <0.5kt	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
		High Currents <2kt	2	3	2	1	1	2	1	2	3	2	3	2	3	3	2	2	2	2	2	
		Shallow waters <1ft	2	2	1	3	3	3	3	3	1	3	2	2	1	3	2	3	3	2	1	
		Debris (including Ice)	1	3	1	1	2	1	2	3	3	2	3	3	3	3	3	1	3	2	3	2
Oil Viscosity		High Viscosity (>1000cSt)	1	2	2	2	2	1	2	2	2	1	3	2	2	3	2	1	1	1		
		Medium Viscosity (100-1000cSt)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	1	1	2	1
		Low Viscosity (<100 cSt)	1	2	2	2	1	3	1	1	1	2	1	1	1	1	1	1	1	1	2	2
Skimmer Characteristics		O/W Pickup Ratio*	1	2	1	1	2	2	2	2	3	2	3	2	3	3	2	2	2	1	2	
		Pickup Rate	2	2	3	2	2	2	2	1	2	3	3	2	3	3	2	2	2	3	2	2
		Ease of Deployment	1	1	2	1	1	1	2	3	1	2	1	2	1	1	1	2	3	2	3	2

* O/W Pickup Ratio = % Oil in skimmed Products
HS = Significant wave height
CST = Centistokes
V = Velocity of surface current

Source : Manual on oil spill

Sorbents materials application techniques

Sl. No	Form of sorbents	Description of technique
01.	Squares and strips (pads)	Placed in confined areas to pick up small quantities of oil; they should be left for a period of time for greater effectiveness.
02.	Rolls	<p>Used in the same manner as squares and strips but usually more convenient since they can be torn or cut off at the optimum length.</p> <p>Very effective in protecting walkways, boat decks, working areas, previously uncontaminated or cleaned areas; can be used to cover areas used as temporary storage sites for oily materials.</p> <p>Disposal is facilitated by rolling up sorbent and placing in suitable container.</p>
03.	Booms	<p>Can serve a dual function by absorbing oil and acting as a boom but is only effective in very quiet waters.</p> <p>The tightly compacted sorbent material encased in mesh restricts oil penetration thus requiring the boom to be rotated and moved around in the oil to work efficiently. It is usually better to drive the oil into the boom.</p> <p>Can be used effectively to protect sheltered areas against oil contamination. Also can be deployed behind skimmers to pick up excess or missed oil.</p> <p>Disposal is accomplished by folding, rolling, and/or stuffing the boom into plastic or burlap bags for removal.</p>
04.	Loose materials	Loose sorbent materials are not recommended for use in oil spills on water. However, loose organic materials have been successfully used to stabilize stranded oil in remote or inaccessible locations.

The point require attention when using sorbents:

* Matted sorbent will not remain on the oil surface when distributed in strong winds because of its light weight (50 g to 200 g per sheet). Two to three sheets of matted sorbents in ply will be more effective in windy conditions.

Oil absorbing capacity of sorbents

SORBENT	Maximum oil absorbing capacity GM/GM sorbent		Buoyancy after prolonged contact with oil on water
	High Viscosity oil 3,000 cSt 25° C	Low Viscosity oil 5 cSt 25° C	
INORGANIC			
Vermiculite	4	3	Sinks
Volcanic ash	20	6	Floats
Glass wool	4	3	Floats
NATURAL ORGANIC			
Corn cob	6	5	Sinks
Peanut husks	5	2	Sinks
Redwood fiber	12	6	Sinks
Wheat straw	6	2	Sinks
Peat moss	4	7	Sinks
Wood cellulose fiber	18	10	Sinks
SYNTHETIC ORGANIC			
Polyurethane foam	70	60	Floats
Urea formaldehyde foam	60	50	Floats
Polyethylene fibers	35	30	Floats
Polypropylene fibers	20	27	Floats
Polystyrene powder	20	20	Floats

Source: IMO (Manual on oil pollution)

List of approved Oil Dispersants (OSD)

The NIO and Coast Guard approved list of oil spill dispersants (OSD) are enumerated below.

Type II - Water dilutable (1 part of dispersant: 10 parts of sea water is to be used in the ratio 1 part of diluted dispersant: 2-3 parts of oil)

COREXIT-9500 - (JAN 2003)

BG Exploration & Production India Ltd.,
1st Floor, Midas Sahar Palza
Kondivita, MV Road, Andheri (E), Mumbai - 400 059
Phone : 022-28395841 Fax : 022-28395201

Gold Crew - (Feb 2003)

MS Centerprise
Mayurpankh, 5th Floor
Agiany Lan, Jambli Naka, Thana (W) - 400 601
Phone : 022-25401010/25971880 Fax: 022-25373542

FireChem - (Feb 2003)

M/s Fire Chem Private Ltd
B-4, Rana Commercial Complex
Sector-20 B, Near Ajronda, Faridabad - 121 007
Phone : 0129-25288196/25288197 Fax : 0129-25288700

Spilcare-O - (Dec 2004)

Spilcare - O Metaclean Pvt. Ltd
AB-146, 3rd Main Road, Anna Nagar,
Chennai - 600 040, Phone : 044-26200482 Fax : 044-26281457

Type III - Concentrate (to be used neat in the ratio 1 part of dispersant : 25 parts of oil)

COREXIT-9500 - (JAN 2003)

BG Exploration & Production India Ltd.
1st Floor, Midas Sahar Plaza
Kondivita, MV Road, Andheri (E) Mumbai -400 059
Phone : 022-28395841 Fax : 022-28395201

Challenger-OSD EF III - (Aug 2003)

Challenger Chemicals & Polymers Private Ltd.
PR No. 6917, 3 Balasundaram Lay Out
Siddhanaidu School Raod,
New Siddhanaidu, Coimbatore - 641 044
Phone : 044-2216224 Fax : 0422-2213181

Spilcare-O - (Dec 2004)

Spilcare - O Metaclean Pvt. Ltd
AB-146, 3rd Main Road, Anna Nagar,
Chennai - 600 040
Phone : 044-26200482 Fax : 044-26281457

NOVA CHEMICALS - (JUNE 2005)

Pragji Vrindavan CHS
Room No.50, 4th floor, 20/24 Old Hanuman Lane
Kalbadevi, Mumbai - 400 002. Phone/Fax : 022-56347337

ICG requirements for selection of OSD :

Physical State	: Flowing clear and homogenous liquid free from suspended solid.
Stability	: Between 100-90%
Efficiency	: Above 60% for Type-III Above 50% for Type-II after dilution
Flash Point	: 60°C Minimum
Cloud Point	: 0 to -5°C
Shelf Life	: 5 to 10 years
Validity	: Should be in possession of valid NIO evaluation certificate
Date of Manufacture	: Within 3 months of date of supply

Oil and chemical dispersant types and uses

Oil Type	Dispersant Type		
	Type 1	Type 2	Type 3
Light Distillate Fuels	✓ ¹	✓ ¹	✓ ¹
High Spreading Rate Product and Crudes	✓	✓	✓
Low Spreading Rate More Viscous Crudes, Residues, Weathered Oils and Emulsions	<i>x</i>	✓ ³	✓ ³
Waxy Crudes	<i>x</i>	✓ ³	✓ ^{2,3}
Water-in-oil emulsions	<i>x</i>	✓ ³	✓ ³
Non-Spreading Oils	Dispersion not feasible		

Notes:

- (i) Application of dispersants in this case should be solely for the purpose of controlling a fire hazard. Dispersants are not normally used on such fuels because of their high rate of evaporation and because of their high toxicity.
- (ii) May be more effective if diluted with hydrocarbon solvent.
- (iii) Effectiveness may be limited.

Source : IMO (Manual on oil pollution)

CENTRAL POLLUTION CONTROL BOARD REGISTERED
USED / WASTE OIL RE-PROCESSORS

Sl. No.	Name of the unit	Waste permitted and Quantity allowed	Registration Valid upto (DD-MM-YYYY)
A	Gujarat		
1.	M/s. Western India Petro Chem Industries Plot No. 62, 63 GIDC, Vartej, Dist. Bhavnagar, Gujarat	Used Oil - 1800 KLA	12-08-2006
2.	M/s. Khazeer Industries 206/B, Vartej, Budhel Road, Vartej, Bhavnagar-364 004, Gujarat	Used Oil -3000 KLA	12-08-2006
3.	M/s. Jawrawala Petroleum 200/33, B/H, Kashiram Textile Mill Narol, Ahmedabad-382 405, Gujarat	Used Oil - 600 KLA	15-08-2006
B	Haryana		
1.	M/s Bharat Oil & Grease Company C-4/15, MIE, Bahdurgarh, Jhajjar, Haryana	Used Oil - 2880 KLA	12-08-2006
C	Jharkhand		
1.	M/s Mangalam Lubricants Pvt. Ltd. RanchiKhunti Road, P.O. Hardag Distt. Ranchi, Jharkhand	Used Oil - 1590 KLA	11-08-2006
D	Karnataka		
1.	M/s. Balaji Refineries B-5&6, Veera Sandra Industrial Estate Bangalore - 562 158, Karnataka	Used Oil - 1100 KLA	24-03-2006
E	Kerala		
1.	Southern Refineries Ltd., Kuzhinjaavila, Parassala P.O. Trivendrum - 695 502, Kerala	Used, Waste Oil - 19500 KLA	30-10-2005
F	Maharashtra		
1.	Industrial Esters and Chemicals Pvt. Ltd. A-10, MIDC, Ambernath, Thane, Maharashtra	Waste Oil - 8550 MTA	12-11-2005
2.	Deepak & Company B-20, Road No. 16 Wagle Industrial Estate, Thane, Maharashtra	Used Oil/Waste Oil - 1800 KLA	27-03-2006
3.	M/s. Shiva Petro-Synth Specialitis Ltd. Plot No. 2 & 3, Village Mahim, Tal. Palghar, Dist.Thane Maharashtra	Waste Oil - 7500 KLA	15-08-2006

Sl. No.	Name of the unit	Waste permitted and Quantity allowed	Registration Valid upto (DD-MM-YYYY)
G	Rajasthan		
1.	M/s. Anna Petrchem Pvt. Ltd. E-49, Growth Centre, Phase-II, Ambaji Industrial Area, Abu Rod, Dit. Sirohi, Rajasthan	Waste Oil - 30,000 KLA	17-08-2006
H	Uttar Pradesh		
1.	Bharat Oil Company (India) Regd. E-18, Site 4, Sahibabad Distt. Ghaziabad Uttar Pradesh Email : boc@vsnl.com bharatoilindia@yahoo.com Website: www.bharatoilcompany.com www.bharatoil.com	Used Oil -3000 KLA	04-04-2006
2.	M/s Mineral Oil Corporation D-13, Panki Industrial Area, Site-I, Kanpur - 208 022, Uttar Pradesh	Used Oil -1200 KLA	12-08-2006
J	West Bengal		
1.	M/s. Bristol Petroleum Pvt. Ltd. 26/5/D-5, A.M. Ghosh Road, Budge-Budge, 24, Parganas (South), West Bengal	Used Oil - 1200 KLA	18-08-2006

Options for separation and disposal of oil and debris

<i>Type of material</i>	<i>Separation methods</i>	<i>Disposal methods</i>
Liquids		
Non-emulsified oils	Gravity separation of free water	Use of recovered oil as fuel or refinery feedstock
Emulsified oils	Emulsion broken to release water by : - heat treatment - emulsion-breaking chemicals - mixing with sand	Use of recovered oil as fuel or refinery feedstock Burning Return of separated sand to source
Solids		
Oil mixed with sand	Collection of liquid oil leaching from sand during temporary storage Extraction of oil from sand by washing with water or solvent Removal of solid oils by sieving	Use of recovered liquid oil as fuel or refinery feedstock Direct disposal Stabilization with inorganic material Degradation through land farming or composting Burning
Oil mixed with cobbles, pebbles or shingle	Collection of liquid oil leaching from beach material during temporary storage Extraction of oil from beach material by washing with water or solvent	Direct disposal Burning
Oil mixed with wood, plastics seaweed and sorbents	Collection of liquid oil leaching from debris during temporary storage Flushing of oil from debris with water	Direct disposal Burning Degradation through land farming or composting for oil mixed with seaweed or natural sorbents
Tar balls	Separation from sand by sieving	Direct disposal Burning

SAMPLE MAINTENANCE SCHEDULE FOR
POLLUTION RESPONSE EQUIPMENT

S.No	Equipment	1 st week	2 nd week	3 rd week	4 th week		Maint. activities
I	Vac Pak Pressure Cleaning System						
1	10 HP Diesel Engine & High Pressure Washer					1 2 3 4 5 6 7	Clean filters (Fuel, LO, air). Check battery water level and SG. Check for leakages and arrest, if any. Replace LO, if necessary. Check for missing/loose mounting bolts/other bolts and attend. Check oil level in blower unit. Assemble accessories and run for 15 min. and check for satisfactory performance including feed back instrument, clean, dry and paint wherever required.
2	Hopper with Hose set					1 2 3	Check hoses for defects. Clean hopper after use. Apply paint wherever required on hopper including internal surfaces.

II	Mop Skimmer						
1	15 HP Diesel Engine & internal gear pump					1 2 3 4 5 6 7 8 9	Clean filters (fuel, LO,air) Check battery water level and SG. Check for leakages and arrest, if any. Replace LO, if necessary. Assemble accessories and run on deck for 30 min. and check for satisfactory performance including feed back instrument. Check oil level in blower unit. Clean, dry and paint wherever required. Inspect for loose /missing mounting bolts. Tighten all nuts-bolts.
2	Mop Unit					1 2 3 4 5	Visually inspect for any abnormality. Pressure clean after use, dry before storage. Paint wherever required. Inspect for loose /missing mounting bolts. Tighten all nuts-bolts.
3	Pump Unit					1 2 3 4 5 6	Visually inspect for any abnormality. Pressure clean after use, dry before storage. Paint wherever required. Inspect for loose /missing mounting bolts. Tighten all nuts-bolts. After running, drain water from pump and rinse with LO before storage.

S. No.	Equipment	1 st week	2 nd week	3 rd week	4 th week		Maint. activities
III Disk Skimmer							
1	4 HP Diesel / Hydraulic Power Pack with Electrical/ manual start, hose set (suction and discharge) and accessories						1 Clean filters (fuel, LO, air) 2 Check battery water level and SG. 3 Check for leakages and arrest, if any. 4 Replace LO, if necessary. 5 Inspect hydraulic oil tank. 6. Run for 30 min and check for satisfactory. 7 Performance including feed back instrument. 8 Inspect for loose /missing mounting bolts. 9 Tighten all nuts-bolts.
2	Skimmer Head						1 Visually inspect scrapers/ drums /hoses for any abnormality. 2 Pressure clean after use, dry before storage. 3 Paint whenever required. 4 Check quick connects for integrity. 5 Inspect for loose/missing bolts. 6 Tighten all nuts-bolts.
3	RBS Pump Int						1 Visually inspect for any abnormality. 2 Pressure clean after use, dry before storage. 3 Paint wherever required. 4 Inspect for loose/missing mounting bolts. 5 Tighten all nuts-bolts. 6 After running, drain water from the pump and rinse with lub oil before storage. 7 Check diaphragm.

IV Spray System for Dispersant							
1	4 HP Diesel Engine & internal pump						1 Clean filters (fuel, LO,air) 2 Check battery water level and SG. 3 Check for leakages and arrest, if any. 4 Replace LO, if necessary. 5 Inspect for loose /missing bolts. 6 Run for 1 hr and check for satisfactory. performance including feedback instruments. 7 Clean, dry and apply paint wherever required.
2	Dispersant Spray Accessories						1 Visually inspect for defects and clogs. 2 Pressure clean after use. 3 Apply paint wherever required.
3	2000 Imp. Gallons Flexible Dispersant Storage Tank						1 Manually lay on deck, inflate and check for leakages, repair, if any. 2 Pressure clean and dry before storage.

S. No.	Equipment	1 st week	2 nd week	3 rd week	4 th week		Maint. activities
V	Tanks						
1	Floating Tank 12 cu.m					1	Manually lay on deck and carry out visual inspection for defects, repair, if any
						2	Connect hoses, inflate on deck and hold for 1 hour to check leakages, if any
						3	Clean and wrap back after drying
2	Floating Tank 25 cu.m					1	Manually lay on deck and carry out visual inspection for defects, repair, if any
						2	Connect hoses, inflate on deck and hold for 1 hour to check leakages, if any
						3	Clean and wrap back after drying

VI	Inter-tidal Boom						
1	Beachflex 45 inter-tidal boom in 20m sections					1	Check hydraulic system fluid level, refill/replace as necessary.
						2	Check for damages to pipes, hoses.
						3	Manually lay section-wise on deck, inflate and check for leakages, patch repair, if necessary.
						4	Pressure clean after use and dry before storage.
2	Diesel Hydraulic Power pack for powering sea reel 250 (Kubota 6.0 HP Diesel)					1	Clean filters (Fuel, LO, air).
						2	Check battery water level and SG.
						3	Check for leakages and arrest, if any.
						4	Replace LO, if necessary.
						5	Check and attend loose/missing mounting/other bolts
						6	Run for 1 hr and check for satisfactory Performance including feed back instrument.
						7	Clean, dry and apply paint whenever required.
3	Beach flex Water Pump					1	Check for belt condition, replace if necessary.
						2	Inspect pulleys.
						3	Lubricate moving parts in contact.
						4	Check for leakages and arrest, if any.
						5	Run for 30 min. and check performance incl. That of feedback instrument.
						6	Drain water from pump and rinse with lub oil.
						7	Clean, dry and apply point whenever required.

S. No.	Equipment	1 st week	2 nd week	3 rd week	4 th week		Maint. activities
VII Coastal Boom							
1	GP-10-2E Power Pack C/W Spark Arrestor, Chalwyn Valve and Hoses					1 2 3 4 5 6	1 Clean filters (Fuel, LO, air). 2 Check battery water level and SG. 3 Check for leakages including hoses and arrest, if any. 4 Replace LO, if necessary. 5 Check and attend loose/missing mounting/other bolts. 6 Clean, dry and apply paint whenever required.
2	Hi Sprint 1500 IN 50 Mtr sections C/W Unicon Connecors					1 2 3 4 5	1 Check hydraulic system fluid level, refill/replace as necessary. 2 Check for damages to pipes, hoses 3 Check for any unusual noise. 4 Check proper functioning of feedback instrument. 5 Pressure clean after use and dry before storage.
3	PB 6000 Air Inflator					1 2 3 4 5 6	1 Check for belt condition, replace if necessary. 2 Inspect pulleys. 3 Lubricate moving parts in contact. 4 Check for leakages and arrest, if any. 5 Run for 30 min. and check performance incl. that of feedback instrument. 6 Clean, dry and apply point whenever required.
4	Type 400 Boom Reel Hydraulic					1 2 3 4 5	1 Check hydraulic system fluid level, refill/replace as necessary. 2 Check for damages to pipes, hoses. 3 Check for any unusual noise. 4 Check proper functioning of feedback instrument. 5 Pressure clean after use and dry before storage.

QUANTIFYING FLOATING OIL

Gauging the thickness and coverage of floating oil is a difficult task. Therefore an accurate assessment of the quantity of any oil observed at sea is virtually impossible. At best, the correct order of magnitude can be estimated by considering certain factors. The gravity-assisted spread of spilt oil is quite rapid and most liquid oils will soon reach an equilibrium thickness of about 0.1 mm characterised by a black or dark brown appearance. Similarly, the colouration of sheen roughly indicates its thickness (see the Table below)

<i>Oil Type</i>	<i>Appearance</i>	<i>Approximate Thickness</i>	<i>Approximate Volume (m^{1/3}/km^{1/2})</i>
Oil sheen	Silvery	0.0001 mm	0.1
Oil sheen	iridescent	0.0003 mm	0.3
Crude and fuel oil	black/dark brown	0.1 mm	100
Water-in-oil emulsions (mousse)	brown/orange	>1 mm	>1000

A guide to the relation between the appearance, thickness and volume of floating oil at sea *

To estimate the amount of floating oil it is necessary to gauge its thickness and determine the surface area. Accurate estimates are complicated by the patchy incidence of floating oil. To avoid distorted views, it is necessary to look vertically down on the oil when assessing its distribution. By estimating the percentage coverage of the oil type in question, the actual area covered relative to the total sea area affected can be calculated from timed overflights at constant speed. Aerial photography will sometimes allow the percentage of floating oil to be calculated more accurately and the use of a polaroid or other types of instant picture camera can therefore be valuable.

* "Response to Marine Oil Spills," ITOPF Ltd. 1987, Page 1.16

To illustrate further the process of estimating oil quantities the following example is given:

“During aerial reconnaissance flown at a constant speed of 180 knots, crude oil ‘mousse’ and silver sheen were observed floating within a sea area, the length and width of which required respectively 75 seconds and 45 seconds to overfly. The percentage cover of ‘mousse’ patches within the contaminated sea area was estimated at 10% and the percentage cover of sheen at 90%”.

From this information it can be calculated that the length of the contaminated area of sea measured is:

$$\frac{75 \text{ (seconds)} \times 180 \text{ (knots)}}{3600 \text{ (seconds in one hour)}} = 3.75 \text{ nautical miles or } 6.945 \text{ kilometers}$$

Similarly, the width is:

$$\frac{45 \times 180}{3600} = 2.25 \text{ nautical miles or } 4.167 \text{ kilometers}$$

The total area is 8.4375 square nautical miles which is approximately 29 square kilometers. The volume of “mousse” can be calculated as 10% (percentage coverage) of 29 (square kilometers) x 1000 (approximate volume in m³ per km² - from the Table. As 50 % of this mousse would be water, the volume of oil present would amount to approximately 1450 m³. A similar calculation for the volume of sheen yields 90% of 29 x 0.1 which is equivalent to approximately 2.61 m³ of oil.

It can be seen from the example that the sheen, though may cover a relatively large area of sea surface, the volume of oil contained will be negligible. Therefore, it is crucial that the observer is able to distinguish between sheen, thicker oil, and emulsion.

Behaviour of oil on some common types of shore - line

Type	size range	Comments
Rocks, boulders & artificial structures	>250 mm	Oil is often carried past rocky outcrops and cliffs by reflected waves but may be thrown up onto the splash zone where it may accumulate on rough or porous surfaces. In tidal regions, oil collects in rock pools and may coat rocks throughout the tidal range. This oil is usually rapidly removed by wave action but is more persistent in sheltered waters.
Cobbles, pebbles & shingle	<2->250 mm	Oil penetration increases with increasing stone size. In areas experiencing strong wave action, surface stones are cleaned quickly by abrasion whereas buried oil may persist for some time. Low viscosity oil may be flushed out of the beach by natural water movement.
Sand	0.1-2 mm	Particle size, water table depth and drainage characteristics determine the oil penetration of sand beaches. Coarse sand beaches tend to shelve more steeply and dry out at low water enabling some degree of penetration to occur particularly with low viscosity oils. Oil is generally concentrated near to the high water mark. Fine grained sand is usually associated with a flatter beach profile remaining wet throughout the tidal cycle so that little penetration takes place. However, some oil can be buried when exposed to surf conditions, for example during a storm
Mud (mud flats, marshes, mangroves)	0.1 mm	Extensive deposits of mud are characteristics of low energy environment. Little penetration of the substrate by oil occurs because the sediment is usually water logged, but oil can persist on the surface over long period. If the spill coincide with a storm, oil can become incorporated in the sediment and persist indefinitely. Animal burrows and plant root channels can also bring about oil penetration.
Corals		Most corals are submerged at all stages of the tide and so are unlike to be affected by floating oil but; in some parts of the world, corals dry out at low water. In such cases oil adheres in much the same way as for rocky coasts, resulting in serious damage to the coral and reef communities. However, the strong currents and wave conditions associated with coral reefs are likely to bring about rapid cleaning.

Application of techniques to different shore-line types

	PRIMARY CLEAN-UP					FINAL CLEAN-UP						
	Pumping/ skimming	Mechanical recovery	Manual recovery	Natural recovery	COMMENTS	Low pressure flushing	High pressure washing sandbasting	Dispersants	Natural organic sorbents	Batch washing	Natural recovery	COMMENTS
Rocks, boulders and artificial structures	V	N/A	V	+	Poor access may prevent pumping/ skimming Exposed/ remote shorelines best left to natural recovery.	N/A	V	+	+	N/A	V	Avoid excessive abrasion of rocks/artificial structures. Clean-up of boulders difficult and often gives poor results.
Cobbles, pebbles & shingle	V	X	V	+	Exposed/ remote shorelines best left to natural recovery	V	X	+	+	+	+	If load bearing character good, consider pushing oiled material to surf zone to enhance natural recovery.
Sand	V	+	V	+	Heavy equipment only applicable on firm beaches.	V	X	V	N/A	+	+	Solid oil can be recovered using general beach cleaning machines. Enhance natural recovery by ploughing/ harrowing.
Mud flats, marshes & magroves	+	X	+	V	Operations preferably carried out on the water from small, shallow draught vessels.	+	X	X	+	N/A	V	Operations should preferably be carried out on the water from small, shallow draught vessels.

V = recommended
+ = possibly useful

X = not recommended
N/A = not applicable

LIABILITY AND COMPENSATION

SUPPLEMENTARY FUND

Increased levels of compensation will now be available for victims of oil pollution from oil tanker accidents w.e.f 03 Mar 2005 with entry into force of the 2003 Protocol establishing an International Oil Pollution Compensation Supplementary Fund by a diplomatic conference held at the IMO Headquarters in London in May 2003. The aim of the new Fund is to supplement the compensation available under the 1992 Civil Liability and Fund Conventions with an additional third tier of compensation. The Protocol is optional and participation is open to all States party to the 1992 Fund Convention. The 2003 Supplementary Fund will be financed by contributions payable by oil receivers in the States, which ratify this new Protocol. However, for the purpose of contributions it will be considered that there is a minimum aggregate quantity of 1 million tones of contributing oil received in each Member State of the Supplementary Fund.

INCREASED LIMITS

The total amount of compensation payable for any one incident will be 750 million Special Drawing Rights (SDR) (about US\$ 1145 million), including the amount payable under the existing Civil Liability and Fund Conventions. This significantly increases the maximum compensation available from the limit of 203 million SDR (approximately US\$ 314 million) under the 1992 Fund. The 2003 Protocol comes in the wake of oil pollution incidents such as the ERIKA (France, 1999) and PRESTIGE (Spain, 2002), and is designed to address the concerns of those States which consider that the 1992 CLC and Fund limits, although enhanced by approximately 50% in November 2003, might still be insufficient to cover all valid claims arising out of a major tanker accident. The Supplementary Fund will facilitate the payment of compensation at 100% of the amount of damage agreed between the Fund and the victim, without resorting to the practice of prorating the payment of claims.

VOLUNTARY AGREEMENT IN SUPPLEMENTARY FUND

Recognising that the introduction of the Supplementary Fund will increase the financial exposure of oil receivers in some States, the International Group of P&I Clubs, with the support of ship owners, has agreed to increase the limit of liability of small tankers (up to at least 30,000 GT in size) in those same States through a Voluntary agreement that will come into effect at the same time as the Supplementary Fund. As a result, the limit for small tankers will be increased to SDR 20 million (US\$ 30 million) by way of indemnification. This arrangement is known as the Small Tanker Oil Pollution Indemnification Agreement (STOPIA). The extra amount will be reimbursed to 1992 Fund contributors (via the 1992 Fund) in the event of an incident in a State in which the Supplementary Fund Protocol is in force but irrespective of

whether or not the total value of claims exceeds the 1992 Fund limit. This is designed to help maintain an equitable sharing of the burden of oil spill compensation between tanker owners and oil cargo interests.

The Supplementary Fund Protocol was to enter into force three months after it has been ratified by at least eight States, which have received a combined total of 450 million tons of contributing oil in a calendar year. These conditions were fulfilled on 3rd December 2004 when the Protocol had been ratified by Denmark, Finland, France, Germany, Ireland, Japan, Norway and Spain. The Supplementary Fund has come into force w.e.f 3rd March 2005.

MAXIMUM AMOUNTS OF COMPENSATION AVAILABLE UNDER THE CONVENTIONS
(EXPRESSED IN US\$ MILLIONS – rates as on April 2005)

TANKERS GROSS	1969 CLC	1992 CLC	1992 FUND	Supplementary
Tonnage		(Post-Nov 2003)	(Post-Nov 2003)	FUND
5,000	1.0	7.0	313.7	1145
25,000	5.2	26.4	313.7	1145
50,000	10.3	43.8	313.7	1145
1,00,000	20.5	99.6	313.7	1145
1,40,000	21.6	138.7	313.7	1145

Claims & Compensation : Few Guidelines

1. The Government of India has ratified payment of compensation conventions adopted by IMO that provides relief to the persons affected by oil pollution from ships flying foreign flags within the territorial waters of India. In order to assist the affected persons due to this oil pollution, international established guidelines for presenting claims under various categories are summarized below for your appropriate action.

2. Possible scope of compensation covered under the ratified conventions and Indian Merchant Shipping Act.

(a) Clean up operations at sea and on shore – are considered as preventive measures. Compensation may be payable for the cost of measures to combat oil at sea, to protect marine resources vulnerable to oil, to clean shore lines and to dispose off collected oil/oily waste.

(b) Presentation of claims. It is essential for the claimant to submit cost of clean up and damages with supporting documents showing how the operations are linked with actions taken. Specific information pertaining to claims is itemized as below:

(i) Delineation of the area affected by using maps or nautical charts, supported by photographs, video tapes or other recording media.

(ii) Analytical evidence such as chemical analysis of oil samples, relevant wind, tide and current data observation and plotting of floating oil movements.

(iii) Summary of events, including a description and justification together with an explanation of why the various working methods were selected.

(iv) Dates on which work was carried out at each site.

(v) Labour costs including overtime.

(vi) Travel, accommodation and living costs for response personnel.

(vii) Equipment costs at each site.

(viii) Cost of replacing equipment damaged beyond reasonable repair.

(ix) Consumable materials (description, by whom supplied, quantity, unit cost and where used).

(c) Property damage - reasonable cost of cleaning, repairing or replacing property contaminated by oil may be compensated.

(d) Presentation of claims – It is essential for claimant to submit evidence of the damage to their property with supporting documents confirming that repairs, cleaning or replacement have been

undertaken. Specific information pertaining to claims is itemized as below:

- (i) Extent of pollution damage to property supported by photographs and other evidences.
 - (ii) Cost of repair work
 - (iii) Age of damage item replaced.
 - (iv) Cost of restoration such as repairs of roads, piers etc.
- (e) *Economic loss in the fisheries and fish processing sectors etc.* Compensation may be payable for loss of earning by the owners of property contaminated by oil.
- (f) *Presentation of Claims –*
- (i) The geographic proximity of business activity to the contaminated area.
 - (ii) Degree to which business economically depended.
 - (iii) The extent to which claimant had alternative source of supply.
 - (iv) Extent to which the claimants business forms and integral part of the economical activity.
 - (v) Nature of loss or alleged loss due to contamination.
 - (vi) Monthly break down of income for the period of loss and over the previous three years.
 - (vii) Monthly break down of quantity of each marine product caught, harvested or processed.
 - (viii) Said overheads and methods of calculation of loss.
- (g) *Economic loss under tourism sector –* Claims for such economic loss may qualify for compensation only if loss was caused by contamination.
- (i) The geographic proximity of business activity to the contaminated area.
 - (ii) Degree to which business economically depended.
 - (iii) The extent to which claimant had alternative sources of supply.
 - (iv) Extent to which the claimants business forms and integral part of the economical activity.
 - (v) Nature of loss or alleged loss due to contamination.
 - (vi) Monthly breakdown of income for the period of loss and over the previous three years.
 - (vii) Monthly break down of quantity of each marine product caught, harvested or processed.
 - (viii) Details of changing in capacity of business occurred and during the previous three years.

(ix) Said overheads and method of calculation of loss.

(h) Cost of measures to prevent pure economic loss – Such economic loss may qualify for compensation only if the measures are reasonable.

Presentation of claims –

(i) Details of nature, purpose, timings and target group for marketing activities.

(ii) Detailed break down of the cost of any marketing strategy.

(iii) Details and cost of normal marketing strategy and campaigns if any.

(iv) Result of the additional marketing activities.

(j) Environmental damage and post spills studies – Acceptable claims for economical loss due to environmental damage may include reduction in revenue for a marine park or reduction in catches of commercial species of marine product directly affected by the oil.

Presentation of claims-

(i) Delineation of the area affected by using maps or nautical charts, supported by photographs, video tapes or other recording media.

(ii) Analytical evidence such as chemical analysis of oil samples, relevant wind, tide and current data, observation and plotting of floating oil movements.

(iii) Details and results of any studies undertaken.

(iv) Detailed description of any reinstatement measures undertaken.

3. It is advised to convey these brief guidelines to all stakeholders associated with the oil pollution incident so that a comprehensive record and log of all activities is maintained to put up an effective claim against the polluting ship. Further details on making claims by the affected persons due to pollution can be obtained from the claim manual which is a publication of International Oil Pollution Compensation Fund. Moreover, it does not address legal issues in details and therefore should not be seen as an authoritative interpretation of relevant international conventions. For further details regarding recording and filing claims expert opinion may be sought. The address and other details of International Oil Pollution Compensation Fund are as follows:

International Oil Pollution Compensation Fund

Portland House
Place
LONDON SW1E 5PN
United Kingdom

Telephone : +44 (0)20 7592 7100
Telefax : +44 (0)20 7592 7111
E-mail : info@iopcfund.org
Website : www.iopcfund.org

The role of the P & I Clubs with regard to marine casualties

Protection and Indemnity Associations or P & I clubs exist to provide shipowners with insurance for liability they may incur to third parties. Meaning, in this context, anybody other than the insured shipowner .approximately 85% of all ocean-going ships are entered in protection and Indemnity Associations. In the case of tankers the figure is closer to 95%.

The risk covered by P & I Clubs are numerous and do include oil pollution liabilities. The intergovernmental regimes and voluntary industry agreements which cover compensation and liability for tankers have been covered under paragraph 5.4. However, other ships can cause oil pollution from leakage of bunkers fuel.

In a typical serious casualty., the shipowner is faced with a number of immediate and urgent problems which include the decision as to whether or not to attempt salvage of the ship and cargo or to dispose of either or both as simply as possible, causing the least possible amount of further damage. If oil has been spilled the owner may be required to take immediate action to deal with the ensuing pollution. A P and I Club, through its local correspondent, will provide advice on the shipowner's rights and duties and negotiate on the shipowner's behalf with the appropriate authorities to take fast and effective action to minimize the damage and subsequent liabilities. At a later stage the Club will assist in determining eventual liability for the damage and the extent of the compensation.

One important principle is that the shipowner must pay the claim in the first instance and only then claim reimbursement from the P & I Club. As a general rule, the P & I Club will not pay claimants direct. there may be exceptions, for example, in case of oil spills from tankers when the Liability Convention applies, and also when the P & I Club has given a letter of undertaking providing a guarantee of payment of the shipowner's liabilities, but in most cases the P & I Club still insists that the principle should be maintained that the shipowners pays first.

Note : -

Additional details may also be obtained from IMO Manual on oil pollution-II Contingency plan.

CALCULATION OF CAPITATION CHARGES

No. OP/0818/CGHQ/1614/DO/(CG) / D (N-II)
 Government of India
 Ministry of Defence
 New Delhi, the 13 July, 1992

To

the Director General
 (with 40 spare copies)

**SUB: CALCULATION OF DAILY HIRE CHARGES OF CG SHIPS
 AND AIRCRAFT IN RESPECT OF SERVICES RENDERED
 TO CENTRAL MINISTRIES / STATE GOVTS / PORT AUTHORITIES**

Sir,


I am directed to convey the sanction of the President to the adoption of the following basis for determining the hire charges in respect of CG Ships & aircraft utilised for rendering assistance to civil authorities. This will be operative for one year from the date of issue and will thereafter be reviewed.

- (a) Pay and Allowance - This element will be worked out on the basis of capitation rates appropriate to each rank.
- (b) 26% of (a) above to cover the element of expenditure viz. pensionary charges, accomodation charges, Element to cover public clothing and difference in coast of personal clothing etc. Messing treatment, Hospitalisation and Medical treatment, Education allowance, TA, DA and Leave Travel Concessions etc.
- (c) 20% overheads on (a) above to cover establishment and administrative charges ie. logistic supports.
- | | | |
|-----------------------------------------|---|----------------------------------------------------------------------------------------------|
| (d) Interest on capital Cost | } | 70% of the original capital cost is to be assessed for recovery on account of these element. |
| (e) Depreciation | | |
| (f) maintenance & Repair charges | | |
| (g) cost of sonsumable stores for ships | | |
- (h) Fuel charges on account of fuel during the period of assistance rededered will be calculated on the basis of past consumption of fuel per nautical mile in respect of each ship/type of ship. Criteria

for fixing the standard rate of consumption of fuel will be taken as 2/3rd of full power consumption of fuel per nautical mile in respect of each ship/type of ship. In case of aircraft, the charges on account of fuel consumption will be calculated on the basis of consumption of aviation fuel per hour for type of air craft proceeding at maximum speed.

2. For the purpose of calculating average daily hire charges of elements at (a) to (g) above, CG Ships will be taken to be available for active service for a maximum number of 240 days in a year. In case of assistance carried out/rendered by the detached parties/diving team, where no efforts by any ships is involved, the pay and allowances elements of such parties/team will also be calculated based on capitation rates. In addition, overhead charges as per (b) and (c) above will also be recoverable.
3. This issues with the concurrence of Min of Fin (Def/N) vide their uo No. 868/NC/92 of 1992.

your faithfully,



(Dilbagh Singh)

DESK OFFICER, GOVT OF INDIA

Copy to:-

The Chief Secretaries to the govt of all States except Jammu & Kashmir, Punjab, Rajsthan, Uttar Pradesh, Madhya Pradesh, Bihar, and Assam.

The Chief Commisiioner, Andamans & Nicobars.

All Ministries of the Govt of India.

Air HQrs - 20 copies

Naval HQrs - 20 copies

DADS

CGDA

DFA(N) 'C' Group.

Army HQ (MODte) - 20 copies

DDADS Bombay

CDA (N), Bombay (with a copy signed in ink)

Tele 3387237

Coast Guard Headquarters
National Stadium Complex
New Delhi - 110001

OP/0818

23 July 1999

The Commander
Coast Guard Region (E)
Chennai

The Commander
Coast Guard Region (A & N)
Port Blair

The Commander
Coast Guard Region (W)
Mumbai

ELEMENTS OF DAILY HIRE CHARGES - SERVICE TO CIVIL AUTHORITY

1. Refer to the Coast Guard Headquarters letter even number dated 07 Aug 92.
2. The revised daily hire charges are required to be worked out taking into consideration of V Pay Commission implementation and induction of new class of ships in service.

Capitation Charges of Personnel and Cost of Ships

3. The elements of hire charges for ships under current rates are as follows:-

(a) Capitation Rates in Respect of CG Personnel

(i) DIG	Rs.2,18,400,00 per annum
(ii) Commandant	Rs.1,95,600,00 per annum
(iii) Dy Commandant	Rs.1,51,200,00 per annum
(iv) Asst Commandant	Rs.1,29,000,00 per annum
(v) P/Sahayak Engineer	Rs.1,11,000,00 per annum
(vi) U/Sahayak Engineer	Rs.1,02,000,00 per annum

(vii) Sahayak Engineer	Rs. 87,000,00 per annum
(viii) P/Adhikari	Rs. 1,02,000,00 per annum
(xi) U/Adhikari	Rs. 87,000,00 per annum
(x) Adhikari	Rs. 78,000,00 per annum
(xi) P/Navik	Rs. 48,600,00 per annum
(xii) U/Navik	Rs. 45,840,00 per annum
(xiii) Navik	Rs. 42,900,00 per annum

(b) Capitation Cost of CG ships

(i) AOPV	Rs. 12983 lakhs per vessel
(ii) OPV	Rs. 4400 lakhs per vessel
(iii) FPV	Rs. 2900 lakhs per vessel
(iv) IPV	Rs. 925 lakhs per vessel
(v) SDB	Rs. 840 lakhs per vessel
(vi) IB	Rs. 203 lakhs per vessel

Cost of Fuel Consumption

4. The cost shared be calculated for fuel as given below:-

<u>Type of Ship</u>	<u>2/3 of Full Power Consumption (fuel in litres per hour)</u>	<u>Cost of Fuel Current Rate*</u>
(a) AOPV	1050	1050 x * =
(b) OPV	960	960 x * =
(c) FPV	560	560 x * =
(d) IPV	560	560 x * =
(e) SDB	560	560 x * =
(f) IB	272	272 x * =

Daily Water consumption

5. Charges for the water to be worked out on the basis of actual consumption on prevailing rates in the port from where water was taken.

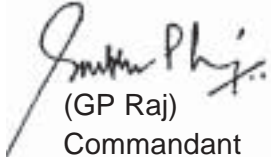
Sanctioned complement for Each Type of Ship

6. The sanctioned complement of each type of ship is given below:-

	<u>DIG</u>	<u>Comdt</u>	<u>Dy Comdt</u>	<u>Asst Comdt</u>	<u>Sos</u>	<u>P/Nvks</u>	<u>Others</u>
AOPV	1	3	4	4	12	18	63
OPV	1	2	3	2	8	15	69
FPV	-	1	4	-	3	7	20
IPV	-	-	1	4	3	7	20
SDB	-	-	1	3	4	5	21
IBs (for a set of 2 boats)	-	-	3	-	6	7	4

7. RHQs/DHQs are requested to calculate the hire charges for the Coast Guard assistance rendered to civil authorities in accordance with this letter.

8. This letter surpercedes CGHQ letter No. OP/0818 dated o7 Aug 92 on the same subject.


(GP Raj)
Commandant
Joint Director (Ops)
for Director General

Copy to :-

All District Headquarters

All CG Shore Establishments

No. OP/0818/AC/CGHQ/2063/DO(T)D(N-II)
 Government of India
 Ministry of Defence
 New Delhi the 20 December, 2004

To
 The Director General
 Coast Guard Headquarters
 New Delhi

**RECOVERY RATES IN RESPECT OF
 HIRING OF COAST GUARD AIRCRAFT**

Sir,

I am directed to say that the recovery of the rates in respect of different types of aircraft of Coast Guard has been reviewed and it has been decided to fix recovery rates for the air assistance being provided to various agencies is as under :-

<u>Sl.</u>	<u>Type of Aircraft</u>	<u>Recovery Rates</u> <u>Per flying hour</u>
(a)	Dornier	Rs. 77,000/-
(b)	Chetak	Rs. 55,000/-

2. In addition to above recovery rates, detention charges will also be realised at the rate of 50% of the above rate. The detention charges, will, however, be applicable subject to the following conditions :-

- (a) No detention charges will be levied for a detention of two hours, beginning from the time the aircraft remain idle at a stretch at an outstation.
- (b) Detention charge at the rate per hour shall be charged for detention in excess of two hour e.g., if an aircraft is detained at an outstation for a total period of three hours at a stretch, the detention charges shall be levied for one hour at the applicable rate.
- (c) A part of the hour shall be treated as full one hour and detention charges levied accordingly, i.e. detention of three hours and 15 minutes is to be treated as 4 hours, the chargeable hours in this case being two hours.
- (d) Detention period is to be calculated from the time of landing to the time of taking off of the aircraft.

D. R. Tokankar
 20/12/04

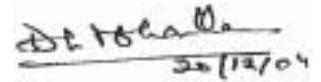
The above recovery rates and the detention charges will also be applicable in respect of :-

(a) Air assistance rendered by Coast Guard to State Govt/Govt bodies during natural calamities/ flood relief operations, supply dropping etc.

(b) Air assistance rendered to foreign Govt. though the Ministry of External Affairs.

4. The above rate will be effective from the date of issue of this letter and are valid until further orders.

5. This issue with the concurrence of Ministry of Defence (Fin/CG) vide U.O. No. 732/Fin/CG dated 10 Dec 04. These orders have been issued on the lines of orders issued by Navy for similar aircraft/ helicopters vide order No. MF AO/0826/NHQ/3333/D (N-IV)/04 dated 05 Oct 04.



Your faithfully,

(DM Verma)
Desk officer (Trg)

Copy to:-

1. CGDA, New Delhi
2. Dy DADS, Mumbai
3. CDA (Navy), Mumbai - 02 Copies (one copy signed in ink)
4. DFA (CG)/MoD (Fin)
5. Air Headquarters
6. Naval Headquarters

CALCULATION OF CAPITAION CHARGES PER DAY FOR INDIAN COAST GUARD VESSELS

Description	AOPVs	OPVs	FPVs	IBs
Total Pay & Allowances per day for total manpower onboard	48011.50	38666.90	16509.70	4548.90
262% of (a) to cover the element of expenditure viz. Pensionary charges. Accommodation charges, element to cover Public Clothing and difference in cost of Personnel Clothing etc. Messing Treatment, Hospitalisation and Medical treatment, Education All. TD/DA/ LTC etc.	1,25,790.13	1,01,307.28	43,255.41	11,918.12
20% of overhead on (a) above to cover establishment and administrative charges i.e. Logistic Support	9,602.30	7,733.38	3,301.94	909.78
Capitation cost of Indian Coast Guard ships	35,56,986.30	15,06,849.31	7,94,520.54	55,616.44
Water charges @ Rs. 75/- per tons for per day	1050.00	900.00	900.00	150.00
Total Hire charges per day	37,41,440.23	16,55,456.89	8,58,487.59	73,143.24

123

Calculation of fuel charges for the total fuel consumption.

Description	AOPVs	OPVs	FPVs	IBs
** Rate of Fuel consumption for per hour (In Ltrs)	1050	960	560	272
Fuel charges for ICG ships per hour underway @ Rs.39.16 per Ltr.	41,118.00	37,593.60	21,929.60	10,651.52

As per para (b) & (c) of MOD letter OP/0818/CGHQ/1614/DO(CG)/D(N-II) dated 13 July 1992

Para 3 (b)& 4 of ICGHQ ketter OP/0818 dated 23 July 1999.

CALCULATION OF PAY & ALLOWANCES FOR OFFICERS & ENROLLED PERSONNEL AS ON 01 JAN 2005

TOTAL PAY

	PAY SCALE	A/PAY	D/PAY	R/PAY	T/PAY	DA@30%	HRA@30%	CCA	TPT	KMA/CMA	GCB	RA	P/MONTH	P/DAY
DIG	16400-20000	18200	9100	0	27300	3822	8190	300	800	150	0	850	41412	1380.4
COMDT	14300-18000	16300	8150	0	24450	3423	7335	300	800	150	0	850	37305	1243.6
COMDT (JG)	12000-16500	14250	7125	0	12375	2992.5	6412.5	300	800	150	0	850	32800	1096
DY COMDT	10000-15200	12600	6300	0	18900	2646	5670	300	800	150	0	850	29316	977.2
A/COMDT	8000-13500	10750	5375	0	16125	2257.5	4837.5	300	800	150	0	850	25320	844
PSE	7000-11500	9250	4625	200	13875	1942.5	4162.5	300	800	60	117	850	21707	723.6
USE	6500-10500	8500	4250	0	12750	1785	3825	300	800	60	117	850	20087	669.6
SE	5500-8000	7250	3625	0	10875	1522.5	3262.5	300	800	60	117	850	17087	569.6
P/YTK	5000-8000	6500	3250	0	9750	1365	2925	300	800	60	78	850	15428	514.3
U/YTK	4500-7000	5750	2875	0	8625	1207.5	1587.5	200	800	60	39	850	13669	455.6
YTK	4000-6000	5000	2500	0	7500	1050	2250	200	800	60	0	850	12010	400.3
P/ADH	6500-10500	8500	4250	0	12950	1813	3885	300	800	60	117	850	20375	675.8
U/ADH	6500-10500	8500	4250	0	12750	1785	3825	300	800	60	117	850	20087	669.6
ADH	5500-9000	7250	3625	0	10875	1522.5	3262.5	300	800	60	117	850	17087	569.6
P/NVK	3200-4900	4050	2025	50	6125	857.5	1837.5	200	800	60	117	850	10147	338.2
U/NVK	3200-4900	4050	2025	0	6075	850.5	1822.5	200	800	60	78	850	10036	334.5
NVK	3050-4590	3820	1910	0	5730	802.2	1719	100	800	60	39	850	94002	313.3
P/NVK(AV)	4000-6000	5000	2500	0	7500	1050	2250	300	800	60	78	850	12188	406.3
U/N(DB)	3050-6590	3820	1910	0	5730	802.2	1719	100	800	60	78	850	94392	314.5
NVK(DB)	2750-5400	3575	17875	0	53625	750.75	1608.75	100	800	60	39	850	8871	295.3
E/F	2550-2200	2875	14375	0	42125	603.75	1293.75	100	800	60	39	850	7359	245.3
	B/P	R/P	NPA	D/PAY	DA	HRA/CH/Q	CCA	TA	KMA	OFPUALL	CCB	RA		
SURG LT	9600	400	4063	6250	2844	4755	300	800	200	250	0	850	30312	1010.4
LMA	4320	0	0	2160	907	1800	100	100	75	125	80	850	10517	350.56

CAPITATION CHARGES PER DAY FOR ICG VESSELS

AOPV

OPV

FPV

IB

	<u>PER DAY</u>	<u>STRENGTH</u>	<u>AMOUNT</u>	<u>STRENGTH</u>	<u>AMOUNT</u>	<u>STRENGTH</u>	<u>AMOUNT</u>	<u>STRENGTH</u>	<u>AMOUNT</u>
DIG	1380.4	1	1380.4	1	1380.4	0	0	0	0
COMDT	1243.6	3	3730.8	2	2487.2	1	1243.6	0	0
COMDT(JG)	1096	2	2192	2	2192	1	1096	0	0
DY COMDT	977.2	2	1954.4	1	977.2	2	1954.4	1	977.2
A/COMDT	844	3	2532	1	844	1	844	0	0
PSE	723.6	1	723.6	0	0	0	0	0	0
USE	669.6	1	669.6	1	669.6	0	0	0	0
SE	569.6	2	1138.2	1	569.6	1	569.6	1	569.6
P/YTK	514.3	1	514.3	1	524.3	0	0	1	0
U/YTK	455.6	7	3189.2	5	2278	3	1366.8	1	455.6
YTK	400.3	2	800.6	2	800.6	1	400.3	0	0
P/ADH	675.8	1	675.5	1	675.8	0	0	0	0
U/ADH	669.6	2	1339.2	1	669.6	1	669.6	0	0
ADH	569.6	4	2278.4	3	1708.8	0	0	1	569.6
P/NVK	338.2	9	3043.8	7	2367.4	3	114.6	0	1014.6
U/NVK	334.5	29	9700.5	26	8697	9	3010.5	1	334.5
NVK	313.3	24	7519.2	23	7205.9	9	2819.7	1	313.3
P/NVK(AV)	406.3	1	406.3	1	406.3	0	0	0	0
U/N(DB)	314.5	3	943.5	3	943.5	2	629	1	314.5
NVK(DB)	295.7	4	1182.8	4	1182.8	1	295.7	0	0
E/F	245.3	3	735.9	3	735.9	1	245.3	0	0
SURG LT	1010.4	1	1010.4	1	1010.4	0	0	0	0
LMA	350.6	1	350.6	1	350.6	1	350.6	0	0
TOTAL		107	48011.5	91	38666.9	38	16509.7	11	4548.9

Tele : 3382423

TATRAKSHAK MUKAHYALA
Coast Guard Headquarters
National Stadium Complex
New Delhi - 110 001

LW/0201

26 March 1996

The Commander
Coast Guard Region (West)
Bombay

The Commander
Coast Guard Region (A&N)
Port Blair

The Commander
Coast Guard Region (East)
Madras

POWERS DELEGATED TO THE COAST GUARD OFFICERS
IN RELATION TO THE PREVENTION OF POLLUTION
OF THE SEA BY OIL

1. The provisions relating to the prevention of pollution of the sea by oil are contained in the new part, XI- A of the Merchant shipping Act, 1958 which was substituted by the Merchant Shipping (Amendment) Act, 1983; and in the Merchant Shipping (Prevention of Pollution of the Sea by Oil) Rules, 1974.

2. One of the statutory duties of the Coast Guard under section 14 of the Coast Guard Act. 1978, is to preserve and protect the maritime environment and to prevent and control marine pollution. The part XI-A of the Merchant Shipping Act, 1958, deals with prevention and containment of pollution of sea by oil. The prevention and containment of Pollution of sea by oil. The important provisions of this Part relevant to the Coast Guard are

(a) Section 356-G - relating to power of boarding ships and tankers of category as mentioned in sub section (2) of section 365A for inspection and taking copies of do.

(b) Section 356-J - relating to power to give notice to owner, agent, master or charterer of the polluting ship or owner, oprator, lessee or licensee of polluting off-shore instalations.

(c) Section 356-K - relating to power to take measures for preventing or containing oil pollution and power of detention till damages/expenses paid.

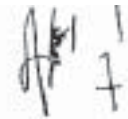
(d) Section 356-L - relating to power to requisition services or assistance from owners of Indian ship, barge or any equipment.

3. The notifications delegating the power under each of the above mentioned sections has been notified in the Gazette of India as under :

- (a) Section 356 -G : Powers delegated to all CG officers vide SO 2322 dated 20 June 1979
- (b) Section 356-J : Power delegated to Coast Guard officers of the rank of Dy Comdt. and vide SO 2148 dated 24 July 1990
- (c) Section 356-K : Power delegated to Coast Guard officers of the rank of Dy Comdt. and above for the purpose of sub-section (1) of this section vide SO 559 (E) dated 13 July 1990
- (d) Section 356-L : No powers have at present been delegated to Coast Gurad officers under this section. However, DG Shipping has been vested with the power to requisition ships for lightening and other assistance

4. Power delegated under section 356-G enables the Coast Guard officer to go on board a ship and inspect and satisfy the adequacy of measures taken to prevent escape of oil from the ship, Similarly power under Section 356-J enables officers of the Coast Guard of the rank of Dy Comdt. and above to issue notice to the concerned authority of the polluting ship to initiate section for minimissing pollution. In case the said authority fails to take action as per notice given under 356-J, A Coast Guard officers of the rank of Dy Comdt. and above can wide sub section (1) of section 356-K to prevent and control pollution from the ship.

5 The contents of this letter may be give wide circulation so that officers are acuainted with the said power vested under the Merchant Shipping Act1958 with regard to marine pollution by oil.



(AKS Chauhan)
Commandant
Law Officers
For Director Genral

Note :
(refer CGO-5/98
for Notifications and amplifications)

**LIST OF INTERNATIONAL POLLUTION
RESPONSE RESOURCE AGENCIES**

OIL SPILL RESPONSE LIMITED (OSRL)
(For Response and Consultancy Enquiries)

Lower William Street
Southampton
SO14 5QE UK

Telephone : +44(0)23 8033 1551
Fax : +44(0) 23 8033 1972

Web : www.oilspillresonse.com
E-Mail : osrl@osrl.co.uk

EAST ASIA RESPONSE LIMITED, (EARL)
(For All Enquiries)

2, Jalan Samulun
Singapore-629120

Telephone : 00 65 266 1566
Fax : 00 65 266 2312

Web : www.earl.com.sg
E-Mail : admin@earl.com.sg

CATEGORY I MARINE PROTECTED AREAS (NATIONAL PARKS AND SANCTUARIES)

(MPAs having entire areas in intertidal/subtidal or sea water-mangroves,
coral reefs, lagoons, estuaries, beaches etc.)

Sr. No.	Name of the MPA (District) State/UT	Year of declaration	Area (sq. km)	Habitats and important wildlife
1	2	3	4	5
1.	Mahatma Gandhi Marine NP, Wandoor (South Andaman) Andaman	1983	281.50	Entry point (Wandoor) at 29 km from Port Blair, altitude- 0 to 85m. Ecosystem: 15 lushly islands and several islets of the Labyring group; area of islands- 61.0 sq. km and territorial water 220.5 sq. km; tropical evergreen forest, mangroves, coral reefs,creeks, sea watec Key species: Marine life, dolphin, dugong, saltwater crocodile, corals, sea turtles (Green, Olive Ridley), marine fishes, sea cucumber, sea anemones; birds-300 species of birds, mainly white bellied sea eagle, Andaman teal, reef heron, parakeets. Land mammals: Spotted deer, wild boar, Himalayan palm civet and flying fox.
2.	Rani Jhansi Marine NP (Richies Archipelogo) Andaman	1996	256.14	Ecosystem: Evergreen forests, mangroves (tidal swamps) and coral reefs. Key species: Corals, marine life, sea cucumber, salt water crocodile, dugong, dolphin, sea turtle and birds.
3.	Lohabarrack (Salt water Crocodile) Sanctuary (South Andaman)	1987	100.00	25 km from Port Blair adjoining Marine National Park; altitude - 0 to 15m. Ecosystems: Dense mangroves (tidal forest), littoral forest, network Andaman of creeks and marine water, tropical evergreen forests. Key species: Reptiles- Salt water crocodile, sea turtle (Hawksbill, Leather backed, Olive Ridley, Green), water monitor; mammals -dolphin, wild boar, spotted deer, Indian elephant, Himalayan palm civet; birds-Andaman dark serpent eagle, crested serpent eagle, white bellied sea eagle and harriers.
4.	Gulf of Kachchh Marine NP (Jamnagar) Gujarat	1982	162.89	First Marine Park of India; southern coast of the Gulf of Kachchh, near Jamnagar, Navabandar 10 km from Jamnagar, Ecosystem: 42 islands (33 coral islands, 20 with mangroves) mangroves, coral reefs, mudftats, creeks, beaches and scrub forest. Species: Marine life, corals, fishes, crabs, prawns, shark, mammals- dugong, dolphin, porpoise, jackal; reptiles- sea turtle, sea snakes, and 208 species of birds.
5.	Marine Sanctuary, Gulf of Kachchh (Jamnagar) Gujarat	1980	295.03	Along coast of Jamnagar district. Ecosystems: Mangroves, intertidal mudflats, beaches and coral reefs. Key species: corals, marine life, dugong, dolphin, sea porpoise, turtle and high abundance of birds.

1	2	3	4	5
6	Malvan Marine (Sanctuary) (Sindhudurg) Maharashtra	1987	29.12	Ecosystem: Intertidal area, marine water, coral patches Sanctuary , sandy beach. Key species: Corals, marine life and birds.
7.	Bhitar Kanika NP (Cuttak) Orissa	1988	145.00	Ecosystem: Estuary, delta, mangroves (about 80% of total mangroves in the state), terrestrial moist forest and eco-tone with marine environment near estuary, surrounded by Bhitar Kanika Sanctuary. Key Species: Reptiles - salt water crocodile, water monitor python, king cobra; mammals- fishing cat, hyena, spotted deer, otter, wild boar, porcupine, 190 species of birds and crabs, prawns and marine life. Site of tilted Lord Shiva temple, silted pond and collapse palace under forest takes back in the memory lane to the glorious past of the Kaling, ancient village of old mariners.
8.	Bhitar Kanika Sanctuary (Kendrapara) Orissa	1975	672.00	Ecosystem: Estuary, mangroves (133 sq.km), terrestrial forest and eco-tone with marine environment. Key Species: Reptiles- salt water crocodile, water monitor, python, king cobra; mammals-dolphin, fishing cat, hyena, spotted deer, otter, wild boar, porcupine, 190 species of birds and aabs, prawns and marinelife.
9.	Gahirmatha Marine Sanctuary (Kendrapara) Orissa	1997	1,435.00	Ecosystem: Mainly sea water with width of 20 km towards sea, extensive sandy beach, estuary, mangroves (27 sq. km) and eco-tone with marine environment. Key species: Humpback dolphin, snub fish dolphin, finless black porpoise, largest sea turtle (Olive Ridley) nesting in the world, salt water crocodile, shark, birds, high abundance of fish.
10.	Chilka (Nalabund) WLS (Khundra, Puri, Ganjam) Orissa	1987	15.50	Location and ecosystem: Chilka (area about 891 sq km) is at the east coast and Nalaband Sanctuary. covers a island and lagoon water in the central part of the Chilka, brackish water and island. Key species: Salt water crocodile, dolphin, fishes, prawns and variety of birds.
11.	Gulf of Mannar Marine NP (Ramnathpuram / Tuticorin) Tamil Nadu	1980	6.23	Ecosystem: 21 islands, coral reefs, mangroves, sea grass beds and beaches; Key species: Corals, marine life, sea anemones, fishes, shark; mammals- dugong, dolphin; reptiles- sea turtle, sea snakes, water birds, sacret chank, pearl oysters and 10 species of sea grasses.
12.	Pulicat Lake (Bird) Sanctuary Tiruvellore Tamil Nadu	1980	153.67	Ecosystem: Lake of brackish water of rain (river) and sea water, mangroves, estuarine environment, algal beds. Key species: Fishes and water birds.
13.	Point Calimere Sanctuary (Nagapattinum) Tamil Nadu	1967	17.26	Ecosystem: Tidal swamp, mangroves, creek and evergreen forest. Key species: Birds, blackbuck, fishes.
14.	Coringa Wildlife Sanctuary (East Godavary) Andhra Pradesh	1978	235.70	Ecosystem: Mangroves, estuary and backwater (bay), creeks, mudflats. Key species: Otter fishing cat, birds, crabs, and fishes etc.

1	2	3	4	5
15.	Krishna Wildlife Sanctuary (Krishna/Guntur) Andhra Pradesh	1999	194.81	Ecosystem: Mangroves (major part is full of mangroves); backwater (bay), creeks and mudflats. Key species: Otter, fishing cat, birds, crabs and fishes, sea turtle, salt water
16.	Pulicat Lake Bird Sanctuary (Nellore) Andhra Pradesh	1976	500.00	Ecosystem: Lake of brackish water of rain (river) algal beds. Key species: Fishes and water birds. and sea water, mangroves, estuarine environment,
17.	Sundarbans National Park Tiger Reserve (North & South 24-Pargana) West Bengal	1973/ 1984	1,330.10	Within the boundaries of Biosphere Reserve and Sundarbans World Heritage Site and Tiger Reserve Ecosystem: Mangroves, estuaries, creeks, swampy islands and mudflats. Key species: Tiger, chital, fishing cat, leopard cat, Gangetic dolphin, common dolphin, estuarine crocodile, Salvator lizard, grey water monitor, Bengal monitor lizard, Batagur terrapin, sea turtle (Olive Ridley, Green Hawksbill), fishes, prawns, crabs and birds like curlew, golden pelican, sea eagle, herons, and trans Himalayan migratory birds.
18.	Halliday Sanctuary (South 24 -Pargana) West Bengal	1976	5.95	Within boundaries of Biosphere Reserve and Sundarbans World Heritage. Ecosystem: Mangroves, estuaries, swampy islands and mudflats. Key species: Tiger, chital, fishing cat, dolphin, estuarine crocodile, Salvator lizard, grey water monitor, Batagur terrapin, sea turtle (Olive Ridley Green, Hawksbill), fishes, prawns, crabs and birds like curlew, golden pelican, sea eagle, herons, and trans Himalayan migratory birds.
19.	Lothian Island Sanctuary (South 24 -Pargana) West Bengal	1998	38.00	Within boundaries of Biosphere Reserve and Sundarbans World Heritage. Ecosystem: Mangroves, estuaries, aecks, swampy islands and mudflats. Key species: Fishing cat, dolphin, estuarine crocodile, Salvator lizard, grey water monitor, Batagur terrapin, sea turtle (Olive Ridley, Green, Hawksbill), fishes, prawns, crabs and birds like curlew, golden pelican, sea eagle, herons, and trans Himalayan migratory birds.
20.	Sajnakhali Sanctuary (South 24 -Pargana) West Bengal	1976	362.4	Within boundaries of Biosphere Reserve and Sundarbans World Heritage. Ecosystem: Mangroves, estuaries creeks, swampy islands and mudflats. Key species: Tiger, chital, fishing cat, dolphin, sestuarine crocodile, salvator lizard, grey water monitor, Batagur terrapin, sea turtle (Olive Ridley, Green, Hawksbill), fishes, prawns, crabs and birds like curlew, golden pelican, sea eagle, herons, and trans Himalayan migratory birds.
Total area			6236.30	

CATEGORY II MARINE PROTECTED AREAS

(Islands MPAs in Andaman & Nicobar and Lakshdweep Islands, which have major parts in marine ecosystem and some part in terrestrial ecosystem)

Sr. No.	Name of the MPA (District) State/UT	Year of Declaration	Area (sq. km)	Habitats and important wildlife
1	2	3	4	5
1.	North Buttan N.R (Middle Andaman) Andaman	1987	0.44	Ecosystem: Evergreen forest, littoral forest, mangroves, beach and coral reefs. Key species: Water monitor, Himalayan palm civet, wild boar, corals, marine life, sea turtle (Hawksbill, Olive Ridley, Green) and birds; altitude- 0 to 49m.
2.	Middle Buttan N. P. (Middle Andaman) Andaman	1987	0.44	Ecosystem: Evergreen forest, littoral forest, mangroves, beach. Key species: Coral reef, marine life, sea turtle (Hawksbill, Olive Ridley, Green), Water monitor, Himalayan palm civet, wild boar and birds. Location: at 70 km from Port Blair; altitude-0 to 33m.
3.	South Buttan N.P. (Middle Andaman) Andaman	1987	0.03	Ecosystem: Evergreen forest, littoral forest, mangroves, beach. Key species: Coral reefs, marine life, sea turtle (Hawksbill, Olive Ridley, Green), Water monitor, Himalayan palm civet, wild boar and birds; altitude- 0 to 21m.
4.	North Reef Island Sanctuary (North Andaman) Andaman	1987	3.48	225 km from Port Blair; altitude- 0 to 11m. Ecosystem: Evergreen forest, littoral forest, mangroves, beach. Key species: Coral reef, marine life, water monitor, green sea turtle and sea birds.
5.	South Reef Island Sanctuary (Middle Andaman) Andaman	1987	1.17	Altitude: 0 to 2 m. Ecosystem: Beach, coral reefs. Key species: Corals, marine life, sea turtle, good reef area remains outside the boundaries of the sanctuary.
6.	Cuthbert Bay Sanctuary (Middle Andaman) Andaman	1987	5.82	Ecosystems: Splendid beach, creek. Key species: Sea turtle (Olive Ridley, Leather backed and Green), reticulated python, dugong, crab eating macaque and Nicobar megapode.
7.	CingueSanctuary (South Andaman) Andaman	1987	9.51	Location: South of Rutland Island, altitude - 0 to 163m. Ecosystem: Evergreen forest, coral reef, beach. Keyspecies: Corals, chank, marine life and sea turtles.
8.	Galathea Bay Sanctuary Great Nicobar	1997	11.44	Ecosystem: Evergreen forests, mangroves. Key species: Leather backed turtle, salt water crocodile.
9.	Parkinson Island Sanctuary Middle Andaman	1987	0.34	Altitude: 0 to 2 m. Ecosystem: Evergreen and littoral forest, mangroves.

1	2	3	4	5
10.	Mangroves Island Sanctuary Middle Andaman	1987	0.39	Altitude: Almost sea level. Ecosystem: Mangroves, marine life, crabs, fishes, etc..
11.	Blister Island Sanctuary North Andaman	1987	0.26	Ecosystem: Mangroves, beach, marinelife and birds.
12.	Sandy Island Sanctuary South Andaman	1987	1.58	Ecosystem: Sandy island area, Altitude: Almost at sea level. Key species: Marine life, crabs and birds.
13.	Pitti Wildlife Sanctuary** Lakshadweep	2000	0.01	A small sandy island surrounded by sea; a bird sanctuary; sea birds, crabs and marine creatures.
Total - 13			34.91	

CATEGORY III-A MARINE PROTECTED AREAS

(Small part in marine ecosystem/environment but major part in terrestrial ecosystem or fresh water lake)

Sr. No.	Name of the MPA State/union territories (District)	Year of declaration	Area (sq. km)	Habitats and important wildlife
1	2	3	4	5
1	Wild Ass Sanctuary in Little Rann of Kachchh (Kutch, Surendranagar, Patan) Gujarat	1973	4953.70	Saline desert, islands (bets), wetlands, creeks (seawater inputs), brackish water, scrubby mangroves in small patch, saline and marshy vegetation; wild ass, wolf, foxes, bluebull, jackal, jungle cat, wildboar water birds.
2	Great Rann WLS (Kutch) Gujarat	1976	7506.20	Saline desert, islands (bets), wetlands, creeks (seawater inputs), brackish water, saline and marshy vegetation; Flamingo city (largest nesting ground of flamingo), wild ass, caracal, wolf, foxes, jungle cat, desert cat, wildboar water birds.
3	Khijadia (Bird) WLS (Jamnagar) Gujarat	1981	6.10	Reclamation bund across creeks, seasonal sweet water lake but brackish water in part of the year; water birds.
4	Chorao (Dr. Salim Ali) Bird Sanctuary (North Goa) Goa	1988	1.78	Bird Sanctuary, mangroves, estuary.
5	Balukhand-Konark WLS (Puri) Orissa	1984	71.72	Sandy area, sea shore, Casuarina plantation.

1	2	3	4	5
6	Kolleru Wildlife Sanctuary (West Godavari) Andhra Pradesh'	1998	308.55	Lagoons (mainly fresh water but open in Bay of Bengal), birds, fishes and aquatic life.
7	Fudam Wildlife Sanctuary Diu		2.18	Birds
8	Narendrapur Wildlife Sanctuary West Bengal	1982	0.10	Influence by marine ecosystem
10	Bibhutibhushan Wildlife Sanctuary West Bengal (North 24-Pargana)	1980	0.64	
No. of PAs - 10			12892.04	

CATEGORY III-B MARINE PROTECTED AREAS

(Islands in Andaman and Nicobar which partially or fully cover marine environment)

Sr. No.	Name of the MPA	Year of declaration	Area (sq. km)	Habitats and important wildlife
1	2	3	4	5
1	North Brother Island Sanctuary	1987	0,75	Coast, beach, evergreen forest, altitude 0-4m.
2	South Brother Island Sanctuary	1987	1.24	Beach, evergreen forest, altitude 0-2m,
3	Cyde Island Sanctuary	1987	0.54	Evergreen forest, mangroves, foreshore, altitude 0-31m.
4	Defence Island Sanctuary	1987	10.49	Evergreen forest, mangroves, beach, extensive coastal line, altitude 0-55m.
6	Kyd Island Sanctuary	1987	8.00	Evergreen forest, mangroves, littoral and beach, altitude 0-206m.
7	James Island Sanctuary	1987	2.10	Evergreen forest, extensive mangroves, altitude 0-41m.
8	Stoat Island Sanctuary	1987	0.44	Evergreen forest, mangroves, altitude 0-23m.
9	Bluff Island Sanctuary	1987	1.14	Evergreen forest, mangroves.
10	Cone Island Sanctuary	1987	0.65	Evergreen forest, mangroves, altitude 0-71m.
11	Hump Island Sanctuary	1987	0.47	Beach, evergreen forest.
12	Spilke Island-I Sanctuary	1987	0.42	Evergreen forest, mangroves.

1	2	3	4	5
13	Roper Island Sanctuary	1987	1.46	Evergreen forest, mangroves.
14	Ranger Island Sanctuary	1987	4,26	Evergreen forest, mangroves.
15	Entrance Island Sanctuary	1987	0,96	Evergreen forest, mangroves.
16	Snake Island Sanctuary	1987	0.03	Evergreen forest, mangroves.
17	Sea Serpent Island Sanctuary	1987	0.78	Evergreen forest, mangroves.
18	Gander Island Sanctuary	1987	0.05	Evergreen forest, mangroves.
19	Curlew Island Sanctuary	1987	0.03	Evergreen forest, mangroves.
20	Campbell Bay WS	1992	429.00	Tropical evergreen forest, part of Nicobar Biosphere Reserve; mangroves, tree fern, ground orchids, crab eating macaque, giant robber crab, megapode, Nicobar pigeon.
21	Megapode Island Sanctuary	1985	0.12	Ecosystem: Semi-evergreen, littoral mangroves (tidal swamp). Key species: Water monitor, Andaman wood pigeon, white-bellied sea eagle.
22	South Sentinal Island Sanctuary	1977	1.61	Location: 103 km from Port Blair altitude-0 to 15 m. Ecosystem: Tropical evergreen forest, littoral forest, mangroves (tidal swamp) and sandy beach. Key species: Flying fox, Nicobar pigeon, salt water(estuarine) crocodile, water monitor, sea turtles (Green, Olive Ridley, Loggerhead, Leatherback).
23	Tillong Chang Island Sanctuary	1985	16.83	Ecosystem: Tropical evergreen forest, semi-evergreen forest, littoral forest, mangroves (tidal swamp). Key species: Water monitor, salt water (estuarine) crocodile, Indian wild boar, spotted deer, megapode, Nicobar pigeon, Andaman wood pigeon, crested serpent eagle, whater bellied sea eagle.
24	Shearme Island Sanctuary	1987	7.85	Altitude-0 to 22m, Ecosystem; mangroves
25	East Island Sanctuary	1987	6.11	Altitude-0 to 56m; Ecosystem: mangroves, beach
26	West Island Sanctuary	1987	6.40	Altitude-0 to 18m; Ecosystem- Evergreen forest, mangroves, beach
27	Battimalv Island Sanctuary	1985	2.23	Ecosystem: Evergreen forest, littoral forest, mangroves; Indian wild boar, megapode, Nicobar pigeon.
28	Bennet Island sanctuary	1987	3.46	Altitude-0 to 56m; Ecosystem - evergreen forest, mangroves
29	Buchanan Island Sanctuary	1987	9.33	Mangroves
30	Swamp Island Sanctuary	1987	4.09	Mangroves, mudflats

1	2	3	4	5
31	Spike Island Sanctuary	1987	11.70	Mangroves
32	Elat Island Sanctuary	1987	9.36	Mangroves
33	Interview Island Sanctuary	1985	133.00	Ecosystem: Evergreen forest, mangroves, littoral forest. Key species: salt water crocodile, sea turtle (Howksbill) and water monitor, wild boar, spotted deer, Indian elephant
34	Narcondam Island Sanctuary	1977	3.48	Evergreen and semi-evergreen forests, littoral forest and mangroves (tidal swamp); Flying fox, Nicobar pigeon, Andaman wood pigeon, Andaman drongo, crested serpent eagle, white bellied sea eagle, Andaman scops owl, water monitor
35	Landfall Island Sanctuary	1987	29.48	Evergreen forest, mangroves (tidal swamp) and beach.
36	Jungle Island Sanctuary	1987	0.10	Mangroves, almost at sea level
37	Mayo Island Sanctuary	1987	0.10	Mangroves, beach and marine life.
38	Point Island Sanctuary	1987	3.07	Evergreen forest, mangroves and beach.

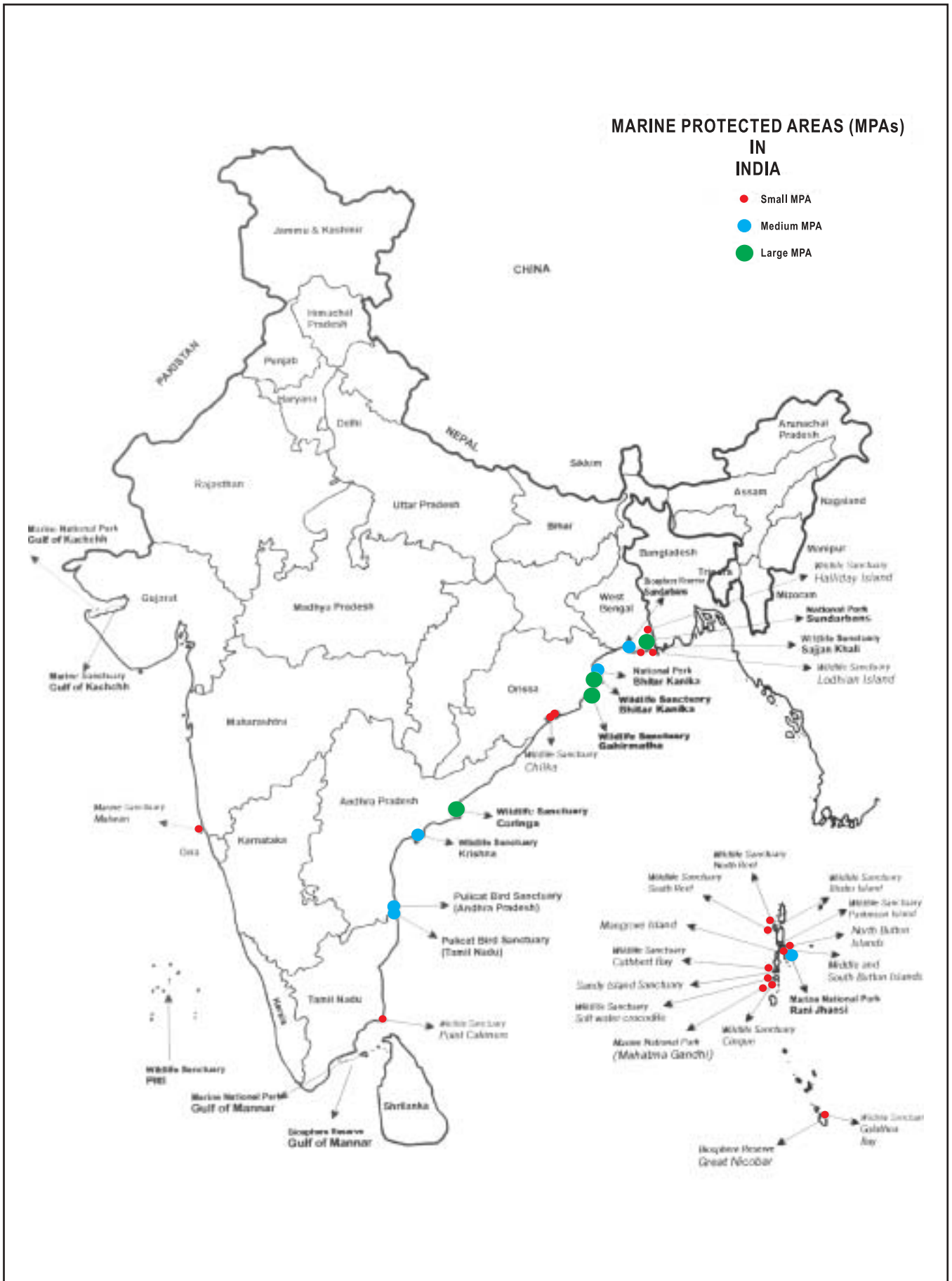
There are other following island sanctuary and national park which have surrounding boundaries/areas of the sea.

1	2	3	4	1	2	3	4
39	Arial Island	1987	0.05	66	Jungle Island	1987	0.52
40	Belle Island	1987	0.08	67	Mask Island	1987	0.78
41	Bingham Island	1987	0.08	68	North Island	1987	0.49
42	Duncan Island	1987	0.73	69	Oliver Island	1987	0.16
43	East of Inglis Island	1987	3.55	70	Orchid Island	1987	0.10
44	Montogemery Island	1987	0.21	71	Ox Island	1987	0.13
45	Passage Island	1987	0.62	72	Oyster Island-I	1987	0.08
46	Patric Island	1987	0.13	73	Oyster Island-II	1987	0.21
47	Pitmen Island	1987	1.37	74	Paget Island	1987	7.36
48	Potanma Island	1987	0.16	75	Peacock	1987	0.60
49	Sir Hugh Rose Island	1987	1.06	76	Point Island	1987	3.07
50	Sisters Island	1987	0.36	77	Ross Island	1987	1.01
51	Snake Island-1	1987	0.73	78	Reef Island	1987	1.74
52	Talabaicha Island	1987	3.21	79	Rowe Island	1987	0.01
53	Bamboo Island	1987	0.05	80	Shark Island	1987	0.60
54	Bondoville Island	1987	2.55	81	Surat Island	1987	0.31
55	Brush Island	1987	0.23	82	Table (Delgarno) Island	1987	2.29
56	Chanel Island	1987	0.13	83	Table (Excelsior) Island	1987	1.69
57	Curlew (B.P.) Island	1987	0.16	84	Temple Island	1987	1.04
58	Curlew Island	1987	0.03	85	Tree Island	1987	0.03
59	Dot Island	1987	0.13	86	Trilby Island	1987	0.96
60	Dottrell Island	1987	0.13	87	Tuft Island	1987	0.29
61	Egg Island	1987	0.05	88	Turtle Island	1987	0.39
62	Girjan Island	1987	0.16	89	Wharf Island	1987	0.01
63	Kwanglung Island	1987	0.57	90	White Cliff Island	1987	0.47
64	Goose Island	1987	0.01				
65	Latouche Island	1987	0.26				
No. of Total - 90						862.34	

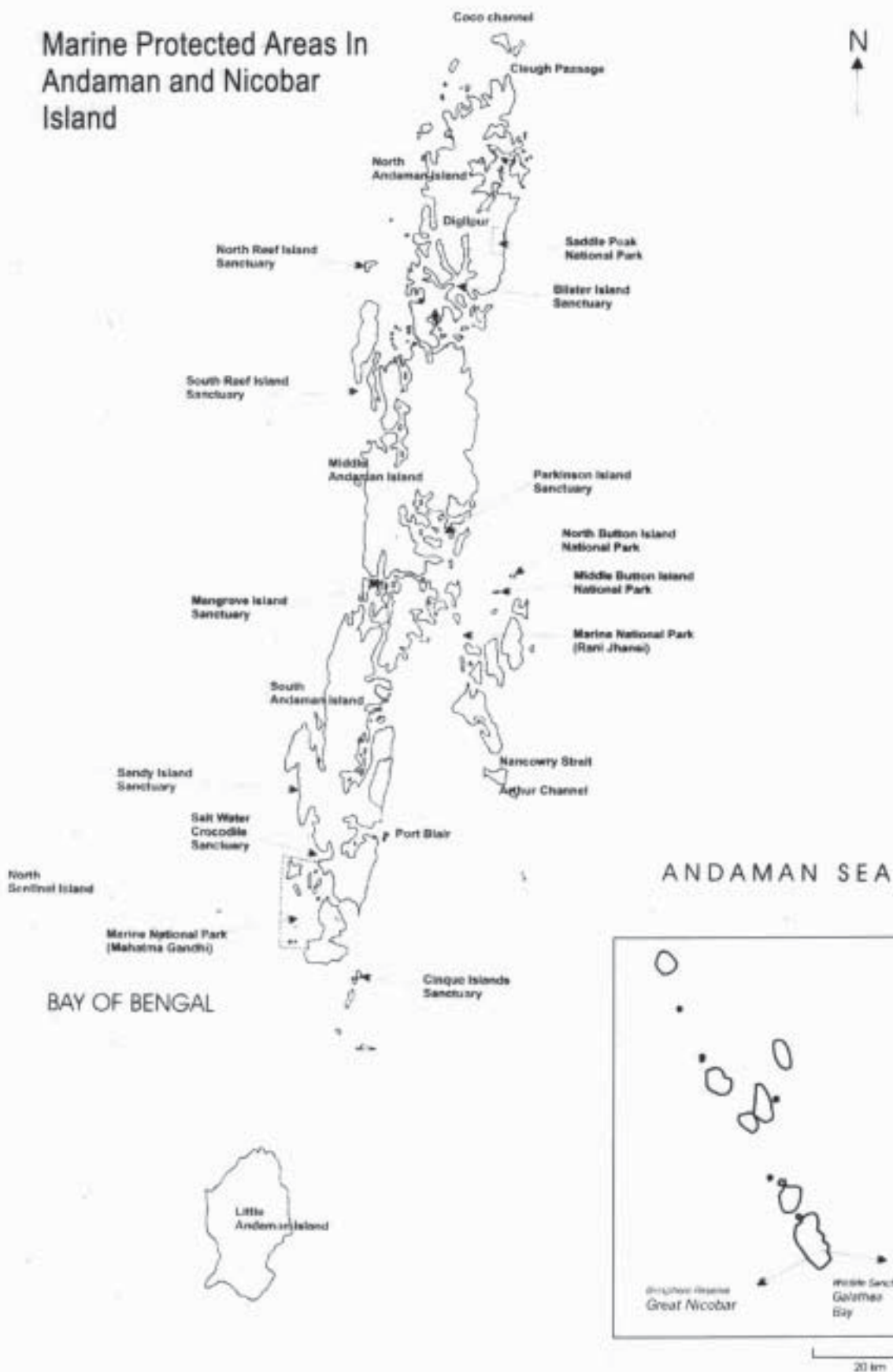
Source : Anon, 1991

MARINE PROTECTED AREAS (MPAs) IN INDIA

- Small MPA
- Medium MPA
- Large MPA



Marine Protected Areas In Andaman and Nicobar Island



EXTENT OF DIFFERENT TYPES OF COASTAL WETLANDS IN INDIA
(Area in sq. km.)

Sr. No.	Category of Wetlands	Name of Wetlands	Area of wetlands
Natural			
1	Estuaries	97	1540
2	Lagoon	34	1564
3	Creeks	241	192
4	Backwater	32	171
5	Tidal mudflats	663	23621
6	Sand/beach/spit/bar	772	4210
7	Coral reefs	487	841
8	Rocky coast	85	177
9	Mangroves	858	3401
10	Salt pans/marsh vegetation	161	1698
11	Other vegetation	117	1391
	Total	3547	38806
Man-made			
12	Salt pans	106	655
13	Aquaculture	356	769
	Total	462	1424
Total coastal wetlands		4009	40230

Small coastal wetlands covering area less than 56.3 ha have not been accounted in above figures.

Source: ISRO (1998).

DISTRIBUTION OF COASTAL WETLANDS IN DIFFERENT STATES

Coastal wetlands, ISRO, 1998

Sr. No.	State/UT	Coast Line(km)	Mangroves														Total
			(FSI, 1999)	Margoves reefs	Coral	Estuaries	Lagoons	Creeks	Back water	Tidal mudflats	Sandy beach/Sand bar	Salt Marsh veg.	Other veg.	Rocky	Saltpan	Aqua-culture ponds	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Gujarat	1650 (including Daman & Diu)	1031.0	388.6	130.2	-	-	-	-	21913.7	106.1	1003.9	1059.9	20.7	459.5	-	25082.6
2	Maharashtra	720	108.0	159.7	-	-	-	-	-	632.3	50.5	57.9	28.1	51.9	20.0	-	1000.3
3	Goa	104	S.0	5.5	-	-	-	-	-	66.3	9.9	-	0.7	4.5	0.4	-	87.4
4	Kerala	560	-	5.5	-	370.1	-	8.7	61.0	46.3	340.7	0.1	-	-	11.8	-	178.3
5	Karnataka	280	3.0	-	-	13.1	-	65.6	9.3	15.1	25.1	32.9	-	-	11.8	-	178.3
6	Tamil Nadu (including Pondicherry)	980	21.0	39.5	18.1	11.7	69.7	33.9	3.4	138.4	3230.9	255.4	92.3	-	93.8	-	3987.1
7	Andhra Pradesh	960	397.0	336.6	-	-	354.4	38.0	95.1	259.1	68.1	261.1	154.0	-	33.8	254.3	1854.5
8	Orissa	432	215.0	239.7	-	-	916.7	-	1.8	369.2	219.3	52.1	32.5	-	17.5	5.4	1854.3
9	West Bengal	210	2125.0	1753.2	-	1129.8	0.5	16.0	-	116.4	88.5	34.1	Z3.4	-	14.2	428.6	3604.7
10	Lakshadweep Islands (Approx.)	120	-	-	-	310.4	-	221.5	-	-	10.8	-	-	-	-	-	542.7
11	Andaman & Nicobar Islands (Approx.)	1500	966.0	470.1	382.7	15.1	1.2	29.9	0.2	50.4	59.9	-	-	68.0	-	-	1077.6
12	Pondicherry	NA	-	2.1	-	-	-	-	-	5.6	-	-	0.6	-	-	-	8.3
13	Diu	NA	-	-	-	-	-	0.2	-	4.7	0.3	0.9	-	0.1	3.6	-	9.8
14	Daman	NA	-	-	-	-	-	-	-	2.6	0.1	-	-	1.9	0.4	-	5.0
Total		7516	4871.0	3400.5	841.4	1539.7	1564.0	192.3	170.8	23620.6	4210.2	1698.4	1391.0	176.9	655.9	768.9	4029.6

Source: FSI, 1999; ISRO, 1998.

* Manmade- Salt pans and aquaculture ponds

** Other- Salt marsh/marsh vegetation, other vegetation, rocky coast

Mangrove cover data has been taken from FSI Report (1999) and rest from ISRO (1998) report. Thus, total differ from the ISRO report.

CLASSIFICATION OF MANGROVES OF INDIA INTO FIVE CATEGORIES AS PER THEIR LOCATION SETTINGS AND DISTRIBUTION IN DIFFERENT STATES

(i) **Onshore Mangroves**

- Gujarat** : Small patches of mangroves along the creek near Porbandar, Miyani, Mahua, Diu, Jafrabad, Buthrani, Ghogha Jetty, Pipavav bandar in Saurashtra.
- Orissa** : Balasore coast (fringing the open coast from near Amarnagar to Karanymal, Sona Habelisai and from Sons Nabilii to Nechanpur).

(ii) **Estuarine Mangroves**

- Gujarat** : Stunted and sparse mangroves form near Mahi, Dhandhar, Kim and Sena estuaries; small patch on Alia island at the mouth of Narmada estuary; Tapti, Umargam and Kalak estuaries,
- Maharashtra** : Estuaries of Amba, Ulhas, Savitri, Kindalika, Dharamtar and along the creeks of Panvel, Vasai, Vaitrana, Vijay Durg; Patalganga and Kundalika; estuaries in Thane and Mumbai.
- Goa** : Along the bank of rivers Chapora, Terekhol, Sal, Mandovi, Mapuca and Zauri.
- Karnataka** : Along Mulki, Sita- Swarna rivers; in the Chakra- Haldi- Kolluru estuarine complex, Sharavati estuarine complex near Honavar, Tadri creek, Aganashani estuarine complex near Kumta and the Kalinadi estuarine complex near Karwar.]
- Kerala** : Very small patches of mangroves at Kumaragom, Chembu, Vallarpadam, Navakuvu, Pappinisseri, Chelluva, Kunjimangalam, Mangalam, Dharmodam and Veli.
- Tami Nadu** : Dense mangroves of Pichavaram fed by Vellar estuary and seperated by a complex network of creeks.

(iii) **Deltaic Mangroves**

- Gujarat** : Indus deltaic mangroves in and around Kori creek near Pakistan (Pir Sonai, Sugar, Sir Kharo, Ramaria, Kalichod, Sindhodic and Sethwara islands and creeks near Jakhau.
- West Bengal**: Sundarbans- the vast delta complex of the Ganga and Brahmaputra rivers (single largest block of mangrove formation in the world) , mainly in the 24 Parganas district.
- Andhra** : Godavari and Krishna deltaic regions- Coringa, Gautami and Vashistha-Godavari Deltaic region; Goluleru creek and Krishna delta- (more widespread on the western tidal flats of the Krishna delta); Sarada, Ramperu and Panneru estuarine areas,
- Tamil Nadu** : Cauvery delta coastal strip from Cuddalore to Chatram near Point Calimere and Pennar delta; Muthupet- Adhirampatinam in west to Point Calimere of the southern end of the Cauvery delta,
- Orissa** : Delta of Mahanadi, Brahmani, Baitarani and Dhammra. Baitar Kanika (Brahmani - Baitarani delta) has the second single largest block of mangrove formation after Sundarbans in the country.

(iv) **Mangroves of the Gulf**

- Gujarat** : Gulf of Kachchh (Kachchh, Rajkot and Jamnagar districts); Mundra and Kandla area in Kachchh, Navalakhi in Rajkot, 20 islands (Pirotan, Zindra, Chhad, Dedeka - Mundeka, Bhains bid, Bhaider, Noru, Chank, Narara, Dhani, Khara Chusna and Kalubhar) and coast mangroves (Jodiya, Khijadia near Rozi Bandar, Nava Bandar, Bedi Bandar, Mashuri Creek, Singach, Sikka, Narara, Poshitra, Asota) in Jamnagar; Shrubby mangroves near Bhavnagar and Alia bet in the Gulf of Khambhat.

(v) Mangroves on offshore islands

Andaman & Nicobar : The deeply indented coastline of the Andaman and Nicobar islands result in innumerable creeks, bays and estuaries and facilitates the development of mangroves. The basic requirement of soil type, topography along with temperature is favourable for their growth. Andaman and Nicobar mangroves are the second largest in India in terms of species diversity. The mangroves mostly fringed the creeks, lagoons and muddy as well as flat rocky shores.

Legally notified mangroves as forest (Reserved or unclassified)

State	Notified area (sq. km.)	Remarks
Gujarat	1324.4	About 40 sq. km. of mangroves are not part of notified forests.
West Bengal	4263.0	Most of the mangroves are notified as forests.
Orissa	339.1	Small part of mangroves is not part of forests
Andhra Pradesh	NA	Major part of mangroves is legally forest (about 400 sq. km. is forest)
Andaman & Nicobar Islands	NA	Most of the mangroves are part of adjoining terrestrial forest (about 960 sq. km.), which are notified as forests.
Tamil Nadu	NA	Major part of has been notified as forest (about 22 sq. km.)
Goa	NA	

Total : About 7,300 sq. km. area of intertidal zone has been legally notified as forest (reserve or unclassified forest) in India (five states and a union territory)

MANGROVES IN MARINE PROTECTED AREAS

- Gujarat** : Entire mangroves (about 140 sq. km), including mangroves on 20 bays in Jamnagar district is in Marine National Park and Sanctuary. Thus, about 14% of total mangrove cover in the state get total protection under the MPAs. Mangroves in Kachchh are not part of the MPA, but major part of them has been notified as forests. A total of 1324.4 sq. km has been notified as mangrove forest under IFA 1927 in the state. Except mangroves in Kachchh (except part of mangroves in Mundra and Kandla port), Rajkot and Jamnagar, rest of mangroves in Porbandar Junagadh, Bhavnagar, Bharoach, Surat and Valsad have not been notified as forests.
- Andhra Pradesh** : Two MPAs- Coringa Wildlife Sanctuary and Krishna Wildlife Sanctuary cover most of the mangroves in Andhra Pradesh. Over 60% of total mangroves in the state are in MPA. They are also notified as forests.
- Tamil Nadu** : Good mangroves (Pichchhavaram and Pulicat) in the state are not part of the MPA. Point Calimere Wildlife Sanctuary covers small part of the mangroves in the state.
- Andaman and Nicobar Islands** : Major part of mangroves in Andaman and Nicobar Islands is outside the PAs. Mahatma Gandhi and Rani Jhansi Marine National Park and other sanctuaries in the Andaman Nicobar provide protection to substantial area of the mangroves. Most of the mangroves are part of legally notified forests.
- Orissa** : Major part of mangroves in Orissa is protected in two sanctuaries-Bhitarkanika and Gahirmala Marine Sanctuaries. Bhitarkanika cover 133 sq. km and Gohirmata about 15 sq. km of mangroves. A total

area of 339.1 sq. km has been notified as mangroves under IFA 1927 in Orissa coast. Some mangroves in the state do not have adequate legal protection as they are not part of the PAs or notified forests.

West Bengal : Sundarbans Tiger Reserve (1,330.1 sq. km), Sajjakhali Wildlife Sanctuary (362.4 sq. km), Lothian Wildlife Sanctuary (38.0 sq. km) and Halliday Wildlife Sanctuary in West Bengal cover substantial, almost half of the total mangroves in Sundarbans. Notified mangrove area in the state is 4,263 sq. km.

Mangroves in Maharashtra, Goa, Karnataka, Kerala and major part in Tamil Nadu do not have protection under MPA. Mangroves in Maharashtra, Karnataka and Kerala do not have adequate legal protection as they are not part of the MPA or notified forests.

LIST OF MANGROVE AREAS IDENTIFIED BY NATIONAL MANGROVES COMMITTEE FOR CONSERVATION

Area/Site	State/Union Territory	Area/Site	State/Union Territory
1. Northern Andaman	Andaman and Nicobar Islands	17. Gulf of Kachchh	Gujarat
2. Northern Nicobar	Andaman and Nicobar Islands	18. Gulf of Khambhat	Gujarat
3. Sundarbans	West Bengal	19. Coondapur	Karnataka
4. Mahanadi Delta	Orissa	20. Dakshin Kannada	Karnataka
5. Bhitarkanika	Orissa	21. Achra / Ratnagiri	Maharashtra
6. Mangrove Genetic Resource Centre	Orissa	22. Devgad	Maharashtra
7. Subernarekha	Orissa	23. Vijay Durg	-
8. Devi	Orissa	24. Veldur	-
9. Dharma	Orissa	25. Kundlika & Revdanda	-
10. Coringa	Andhra Pradesh	26. Mumbra-Diva	-
11. Godavari Estuary	Andhra Pradesh	27. Vaitarna River	-
12. Krishna Estuary	Andhra Pradesh	28. Vasai-Manori Creek	-
13. Pirchavaram	Tamil Nadu	29. Shreevardhan-Varal-Turumbadi & Kalsuri	Maharashtra
14. Muthupet	Tamil Nadu		
15. Ramnad	Tamil Nadu	30. Vembanand	Kerala
16. Goa	Goa	31. Pondichery	Pondichery

Source : Anon. India 2001 and Anon. (2002).

Note : "Kalibhanj Dia (850ha), a part of Mangroves of Bhitarkanika in Orissa has been identified as National Mangrove Genetic Resource centre by the Ministry of Environment and Forests, GOI. This area adjoining Dhamra Port is one of the richest sites of species diversity in the world where a total of 32 core mangrove species, including 2 species endemic to the area, have been recorded".

DISPOSITION OF MANGROVES IN INDIA



CORAL REEFS IN MARINE PROTECTED AREAS

Area/State	Extent of area in the MPA
Andaman and Nicobar	: Extent of coral reef is large and it is believed that large area of live coral reef in deep water is not surveyed. Only part of the reefs is covered under the MPAs, whereas large area is outside the MPAs.
Lakshadweep Island	: There is no MPA in Lakshadweep, which covers the coral reef areas. Thus no area of the coral reefs in the union Territory has legal protection, although reef area is second largest after Andaman and Nicobar Islands.
Gulf of Mannar and Palk Bay in Tamil Nadu	: 15 coral islands are part of the MPA, whereas other coral reefs in the Gulf of Mannar and Palk Bay under permanent water are beyond the boundary of the MPA.
Gulf of Kachchh in Gujarat	: Major part of coral reefs exposed during low tides on islands and the coast are in the MPA, whereas part of the reefs in inter-tidal, sub-tidal and permanently covered water are outside the MPA. Major part of the reef is in the MPA. Total 42 islands along with submerged reefs are part of the MPA.
Singhdurg Coast in Maharashtra	: Patches of corals in Singhdurg coast are legally protected under Malwan Marine Sanctuary.

The existing centre of Zoological Survey of India at Port Blair has been designated as the National Coral Reef Research Institute.

INSTITUTIONS/ORGANISATIONS INVOLVED WITH COASTAL WETLANDS AND MPAS

Important institutions/organisations involved in management, conservation and research in marine areas as follows.

1. Ministry of Environment and Forest, Government of India, CGO Complex, Paryavaran Bhavan, Lodhi road, New Delhi.
2. National Wetlands, Mangroves and Coral Reef Committee
3. Wildlife Institute of India (WII), Dehra Dun
4. Zoological Survey of India (ZSI), Kolkata.
5. National Institute of Oceanography (NIO), Goa
6. Botanical Survey of India (BSI), Kolkata
7. Central Marine Fisheries Research Institute, Cochin
8. Gujarat Ecological Education and Research (GEER) Foundation, Gandhinagar
9. M. S. Swaminathan Research Foundation, Chennai
10. Forest and Environment Departments in the States and Union Territories
11. Fisheries Department in the States and Union Territories
12. Coral Research Institute, Port Blair (proposed)
13. Central Soil Salinity Research Institute, Port Cannurg
14. Bombay Natural History Society (BNHS), Mumbai
15. Dc Salim Ali Centre for Ornithology, Coimbatore.
16. Annamalai University, Tamil Nadu.
17. Kamraj University, Madurai
18. Saurashtra University (Bioscience Department), Rajkot
19. Andhra University, Vishakhapatnam
20. Marine Protected Area Authority, Gulf of Kachchh (Jamnagar), Gulf of Mannar, Wandoor Marine Park, Sundarban Tiger Reserve and others engaged for managing MPAs.
21. Institute of Brackish Water Aquaculture, Chennai
22. Mangrove Society of India, Goa.