出國報告（出國類別：其他）

出席「亞太經濟合作(APEC)訓練計畫：海洋油污預備、應變與評估（第 1 階段）」

服務機關：行政院環境保護署
姓名職稱：宋欣真簡任技正
派赴國家：韓國麗水
出國期間：103 年 11 月 2 日至 5 日
報告日期：103 年 12 月

目錄

摘要

有鑑於海洋溢油事件不僅對海洋造成污染，也會對各會員體之海洋生態、漁業及社會經濟環境造成鉅大之影響，韓國於 APEC 海洋及漁業工作小組（OFWG）提出西元 2014 年辦理海洋油污預備、應變與評估（Preparedness, Response and Assessment of Oil Spill , PRAOS）（第 1 階段）計畫，並獲得 APEC 秘書處批准辦理。韓國邀請我方派員擔任專家講者分享案例。爰分享西元 2012 年 2 月發生在澎湖的泰籍化學輪 Oberon 擱淺溢油案，內容包括事發後的即時應變措施、海岸油污染清除作為、船貨及殘油移除與船體移除。參加訓練計畫經濟體，包括蘇俄、智利、馬來西亞、印尼等會上及會後有許多提問與討論，國際海事組織（IMO）、澳洲及印尼之專家講者對於我方的海洋污染應急處理也給予肯定。

壹、 緣起及目的

有鑑於海洋溢油事件不僅對海洋造成污染，也會對各會員體之海洋生態、漁業及社會經濟環境造成鉅大之影響，APEC 海洋及漁業工作小組（OFWG）提出西元 2014 年辦理海洋油污預備、應變與評估（Preparedness, Response and Assessment of Oil Spill , PRAOS）（第 1 階段）計畫，並獲得 APEC 秘書處批准辦理。

海洋油污預備、應變與評估（Preparedness, Response and Assessment of Oil Spill, PRAOS）計畫包括：海洋油污染事故之分享經驗；進行現場教育和培訓計畫，特別是發展中之經濟體缺乏經濟基礎設施和專業知識；有關可用來幫助各經濟體環境影響評估的資源共享；提供技術援助，提供有效的防漏油的方案和應急程序的操作手冊以協助發展中之經濟體；並發展防止油污染事故 APEC 區域合作。第 1 階段課程主要在於案例分享、國際公約架構與規定及海洋油污染應急與處理策略作法。本次之主辦機關為韓國。

貳、 出席代表

本次訓練參加之會員體包括智利、澳洲、韓國、馬來西亞、巴布亞紐幾內亞、秘魯、菲律賓、俄羅斯、泰國、越南等，擔任專家講者則來自聯合國國際海事組織（IMO International Maritime Organization）技術官員（Officer responsible for OPRC HNS）Ms. Colleen O'Hagan、澳洲海事安全局（Australian Maritime Safety Authority）Mr. Jamie Storrie、印尼海洋及漁業部（Ministry of Marine Affairs and Fisheries ）Mr. Setiyo Pranowo Widodo、韓國船舶及海洋工程研究所（KRISO Korea Research Institute of Ships and Ocean Engineering） Dr. Seong-Gil Kang、韓國海岸防衛隊麗水區域海洋事務及港口管理機構（Korea Coast Guard(KCG)/ Yeosu Regional Maritime Affairs & Port Administration）Mr. Choi Hyeon Kyu、韓國海洋環境管理法人機構（KOEM Korea Marine Environment Management Corporation）多位講者及我方行政院環境保護署簡任技正宋欣真，如圖1。

圖1開幕合影

參、 訓練過程

一、開幕致詞

訓練課程開始由海洋政策辦公室副部長（Deputy Minister for Marine Policy Office）、海洋環境管理法人機構（KOEM Korea Marine Environment Management Corporation）副總裁及國際海事組織（IMO International Maritime Organization）技術官員代表分別致開幕詞。韓國主要說明申辦此次訓練計畫的過程及目的是 APEC 有鑑於海洋溢油事件不僅對海洋造成污染，也會對各會員體之海洋生態、漁業及社會經濟環境造成鉅大之影響，因此藉由舉辦 2014 年辦理海洋油污預備、應變與評估（Preparedness, Response and Assessment of Oil Spill , PRAOS）（第 1 階段）計畫，逐步提升各會員體的海洋油污染應變能力。國際海事組織的技術官員主要介紹國際海事組織作為聯合國的一個專門機構，是全球船舶安全，保全和國際航運的標準制定機構，創造一個公平的競爭場，使在一致的標準下確保船舶安全及國際航運兼顧環境保護。另概要介紹這幾年有關國際公約在海洋環境保護上面之發展。

二、訓練課程重點

（一） 主辦單位韓國海洋環境管理法人機構（KOEM Korea Marine Environment Management Corporation）介紹

2014 年海洋油污預備、應變與評估（Preparedness, Response and Assessment of Oil Spill , PRAOS）第 1 階段計畫是由韓國海洋環境管理法人機構（KOEM Korea Marine Environment Management Corporation）取得主辦權。該機構的前身是西元 1997 年成立的 Korea Marine Pollution Response Corp.，主要負責的業務是溢油應變及廢油的收集與處理。在西元 2007 年 12 月韓國發生 Hebei Spirit 事件後，為強化海洋環境管理工作，更名為 Korea Marine Environment Management Corp. 並逐步擴大業務範圍延伸至海洋海岸污染的清理、海洋生態系統與海岸濕地調查、棲地復育、海洋環境管理、海洋事務等，職員約 600 人。

（二） 訓練課程

本訓練在韓國麗水 2012 年世界博覽會場址（圖 2）舉辦，課程共五天，內容著重在溢油應變相關，包括溢油應變概述、開放水域應變策略、海岸應變策略、緊急應變設備操作訓練、損害賠償相關國際公約、海洋油污染緊急應變計畫擬定、媒體溝通及桌面演練。我方受主辦單位邀請指派專家參加此訓練計畫，第 1 日分享我國個案經驗，於第 2 日提供建言與評論，相關機票及日支生活費等費用由 APEC 秘書處支付。

圖 2 訓練會場

本次訓練第一天、第二天課程為主辦單位韓國海洋環境管理法人機構（KOEM Korea Marine Environment Management Corporation）、溢油應變概要、開放海域與岸際油污染清理、緊急應變計畫與案例分享，西北太平洋行動計畫海洋污染預備及應急區域合作(Northwest Pacific Action Plan Marine Environmental Emergency Preparedness and Response)與國際海事公約法令架構等各項之介紹。

溢油應變概要與開放水域油污染清理策略由國際海事組織（IMO International Maritime Organization）技術官員 Ms. Colleen O'Hagan 說明；澳洲海事安全局（Australian Maritime Safety Authority）Mr. Jamie Storrie 說明緊急應變計畫與海岸油污清理策略。另 3 個案例分享，分別是由印尼海洋事務與漁業部 Mr. Setiyo Pranowo Widodo 介紹 Montara Well Head Platform 事故的監控、韓國介紹 Hebei Spirit、我方介紹 M/V Oberon。有關西北太平洋行動計畫海洋污染預備及應急區域合作(Northwest Pacific Action Plan (NOWPAP) Marine Environmental Emergency Preparedness and Response(MERRAC))由韓國船舶及海洋工程研究所(Korea Research Institute of Ships and Ocean Engineering KRISO)人員說明，並由韓國 Depart. Of Coast Guard Studies Mokpo National Maritime University 助理教授 Chae-Hyun Lim, Ph.D 介紹國際海事公約法令架構。

我方分享的案例是西元 2012 年 2 月發生在澎湖的泰籍化學輪 Oberon 擱淺溢油案。該輪載重噸 2,980 噸，於 1984 年建造，因失去動力，受東北季風影響偏離航道，致擱淺在澎湖吉貝目斗嶼西北方。船上有 57 噸油品及 1,061 噸丁烯。包括事發後的應變中心運作，即時應變措施運用衛星、油污染擴散模式模擬科技工具協助應變處理與環境安全維護、後續海岸油污染清除可能面臨的問題點與因應作為、丁烯及船上殘油移除與船體移除，全案由事發之 2 月 19 日至 7 月 12 日殘骸完全移除過程順利。參加者包括蘇俄、智利、馬來西亞、印尼等會上及會後有許多提問與討論，國際海事組織（IMO）、澳洲及印尼之講者對於我方的海洋污染應急處理也給予肯定。

韓方分享的 Hebei Spirit 是 2007 年 12 月 7 日發生，一艘載著吊車的駁船與 Hebei Spirit 油輪相撞，導致約 10,000 噸原油外洩污染 70 公里海岸線及鄰近 101 個小島。韓國動員警察、軍方及國內應變組織與鄰近國家支援應變。岸際清理於 2008 年 7 月完成，島嶼清理於 2008 年 10 月完成，計收集廢油 4,175 噸、含油廢棄物 32,074 噸。水產養殖受影響區域 340 平方公里、39,800 個家庭受到影響，漁業、觀光及生態受到嚴重影響，總計求償 40 億美金。事故之後，韓國在預防爾後類似事故做法，主要為強化沿海區域及港口的 Vessel Traffic Service (VTS)，並且強化對單殼油輪的管制，比國際公約實施日期提早，自 2010 年起禁止單殼油輪進入韓國海域。在事故發生後處理方式的改進，包括建立統一的指揮系統，由韓國海岸巡防機關擔任應

變指揮官及負責應變的控制，海洋政策部負責環境復育、賠償與國際合作事宜，地方政府負責海岸清理及志工的管理；修訂國家緊急應變計畫及區域行動計畫，使其更符合大型油污染緊急應變所需，並細部化到各地方政府，且包括有害及有毒化學物質 Hazardous and Noxious Substances (HNS)事故的應變處理；建立海洋環境研究與訓練所，該所於西元 2010 年 11 月 25 日開幕（圖 3），建物包括教室、視聽室、人工海岸、海池及住宿區，專職海洋環境研究與訓練工作，其中人工海岸及海池（圖 4）之建立係由法國水域意外事故研究調查中心(CEDRE)協助建立。

圖 3 KOEM 海洋環境研究與訓練所

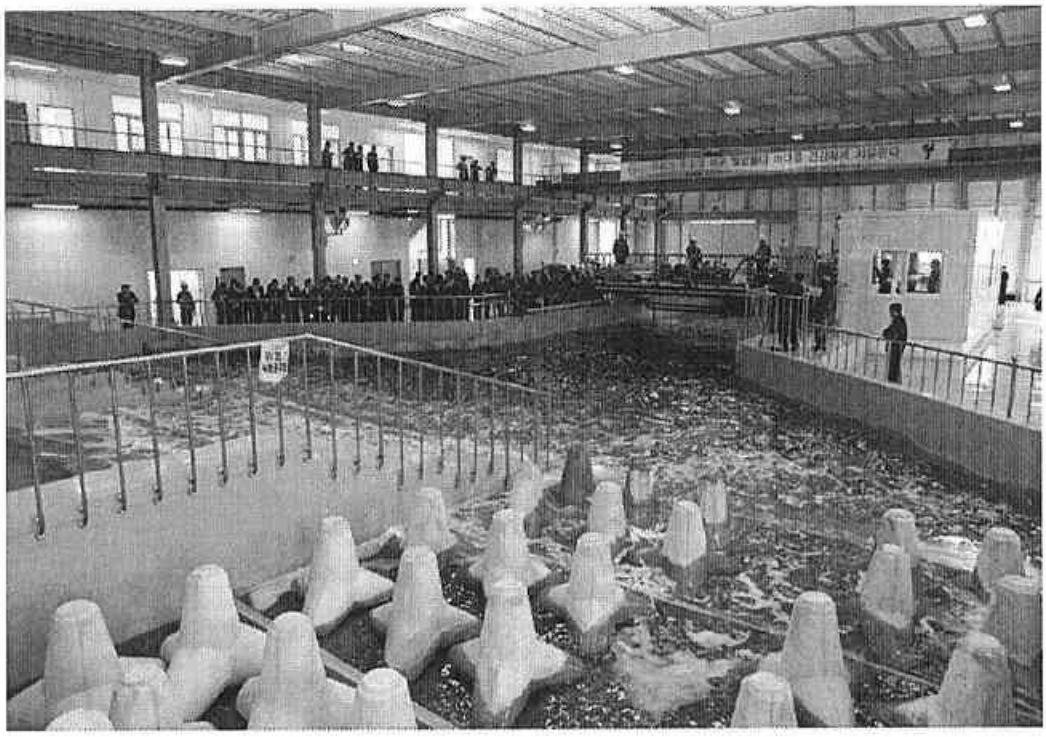


圖 4　KOEM 人工海岸及海池

印尼分享的案例是 Montara Well Head Platform 海上鑽井平台漏油事件，該事件發生在西元 2009 年 8 月 21 日上午，於距離澳大利亞西北海岸 140 英里之海上發生。該海域是屬熱帶海域由澳大利亞，印尼，東帝汶和巴布亞新幾內亞（PNG）共享的半封閉阿拉弗拉海和東帝汶海（Arafura and Timor Seas ATS），有豐富的生物和非生物資源，主要為漁業，石油和天然氣儲量。印尼經濟海域受此事件影響，藉由衛星影像、海水水質調查、社會及經濟影響調查後向鑽井平台所屬澳洲 PTTEP 公司提出索賠申請，惟談判陷入僵局現正進行訟訴訟中。案例分享的重點在於印尼海洋科學之基礎建設 (Indonesia Infrastructure Development for Space Oceanography INDESO 圖 5）於本事件之應用，包括海洋數值模式及光學與雷達衛星影像運用。

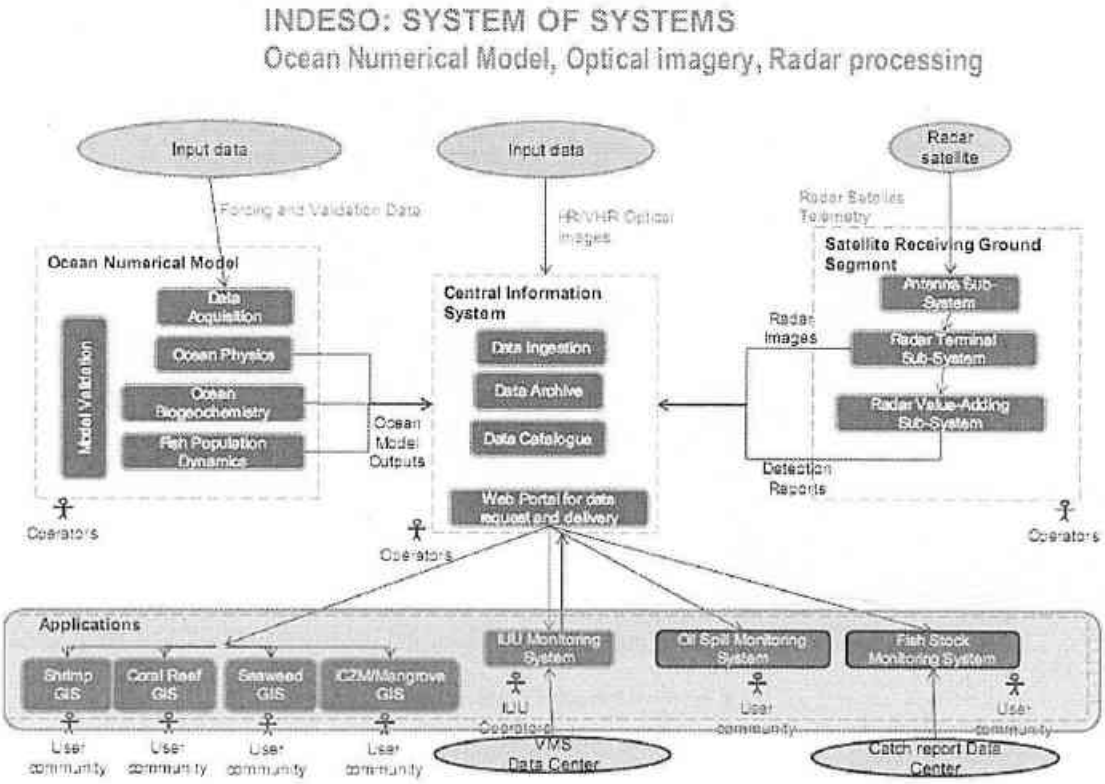


圖 5　INDESO　Indonesia Infrastructure Development for Space Oceanography

全世界計有 18 個海洋區域合作計畫（圖 6），其中西北太平洋行動計畫 (Northwest Pacific Action Plan (NOWPAP)) 海洋污染預備及應急 (Marine Environmental Emergency Preparedness and Response(MERRAC))的任務是在西北太平洋行動計畫區域內，制定有關海洋污染防備與反應區域合作系統，區域內包括蘇俄、韓國、日本及中國大陸。MERRAC 相關任務包括開展在西北太平洋行動計畫區域的區域合作，應對各種地區性活動，MERRAC 架構涵蓋秘書處、聯絡員會議和 NOWPAP 區域溢油應急計畫。並配合西北太平洋區域(NOWPAP)協調處（RCU），國際海事組織（IMO），以及其他國際/區域組織建立區域合作框架，以備海洋污染緊急應變。現階段工作重點在於油及化學品之洩漏緊急應變與海洋垃圾，未來預計的發展議題除現有工作外，尚包括壓艙水引起的外來種入侵問題、損害賠償及防止船舶污染的國際公約(International Convention on the Prevention of Pollution from Ships (MARPOL))等議題。

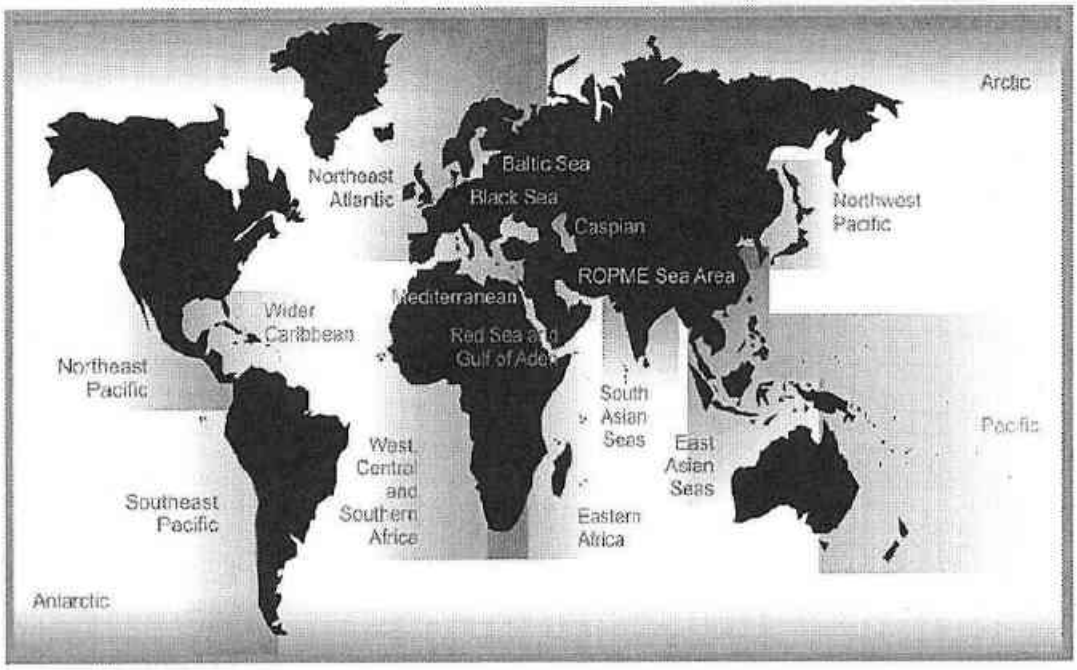


圖 6 全世界計有 18 個海洋區域合作計畫

在國際海事公約法令架構的內容則是由聯合國海洋法公約開始，介紹各污染相關公約的發展。另開放水域與岸際油污染清理策略、緊急應變計畫擬定等屬海洋污染處理的內容，詳如伍、附件資料。

訓練課程之第二天下午主辦單位安排現場參觀韓國海岸防衛隊麗水區域設備庫及訓練中心。韓國海岸防衛隊職責之一為海上環境保護，包括防止海上污染及防止污染海底生態與海洋污染緊急應變。訓練第 2 天下午參訪海岸防衛隊麗水區域設備庫及訓練中心。韓國在 Hebei Spirit 事件後，強化海洋污染應變能量，建置麗水設備庫。麗水設備庫共計 3 層樓，1 樓貯放車輛及機械設備、2 樓及 3 樓貯放吸油棉、防護衣及各式套裝個人清潔工具。並以電腦化管理進出數量，隨時掌控倉儲數量。至於海岸防衛隊之訓練中心有人造海岸及水池，海岸巡防隊人員現場示範汲油器操作。該訓練中心作為海岸防衛隊人員海洋油污染應變及處理專業訓練場所。

圖 7 韓國海岸巡防隊麗水設備庫 1 樓車輛及機械設備

圖 8 韓國海岸巡防隊麗水設備庫 1 樓浮筒式動力作業平台

圖 9 海岸巡防隊麗水設備庫吸油棉貯存情況

圖 10 清除工具組裝

圖 11 韓國海岸防衛隊麗水訓練基地

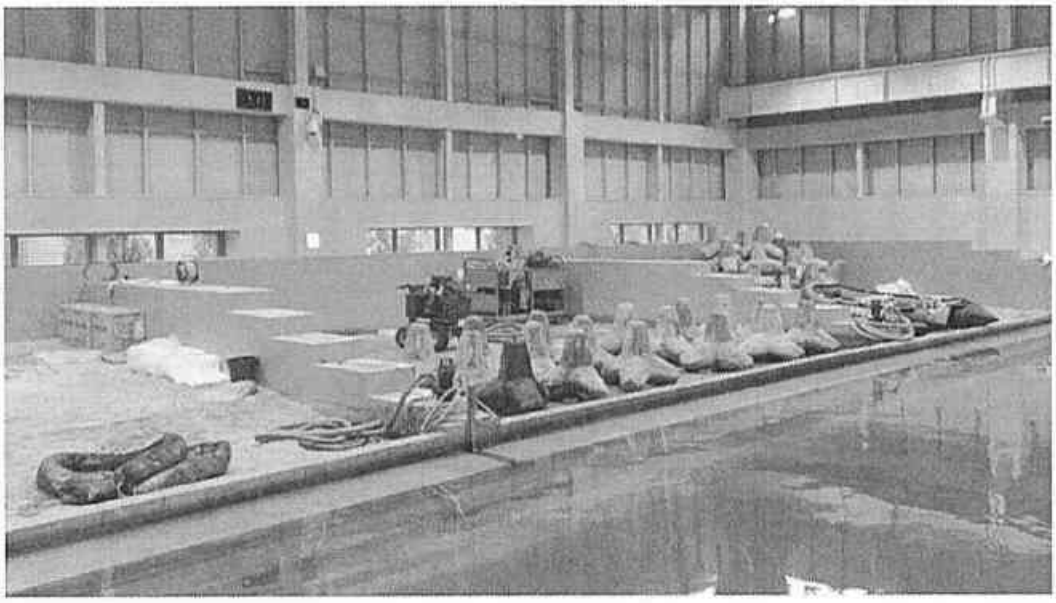


圖 12 韓國海岸防衛隊麗水訓練基地室內人造海岸及水池

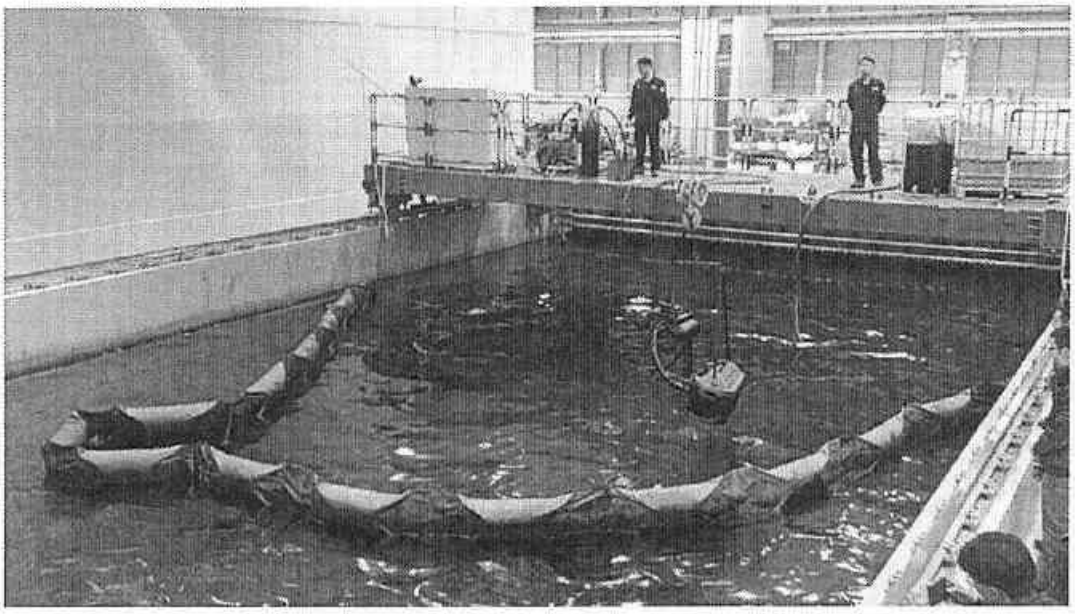


圖 12 韓國海岸防衛隊麗水訓練基地室內人造水池

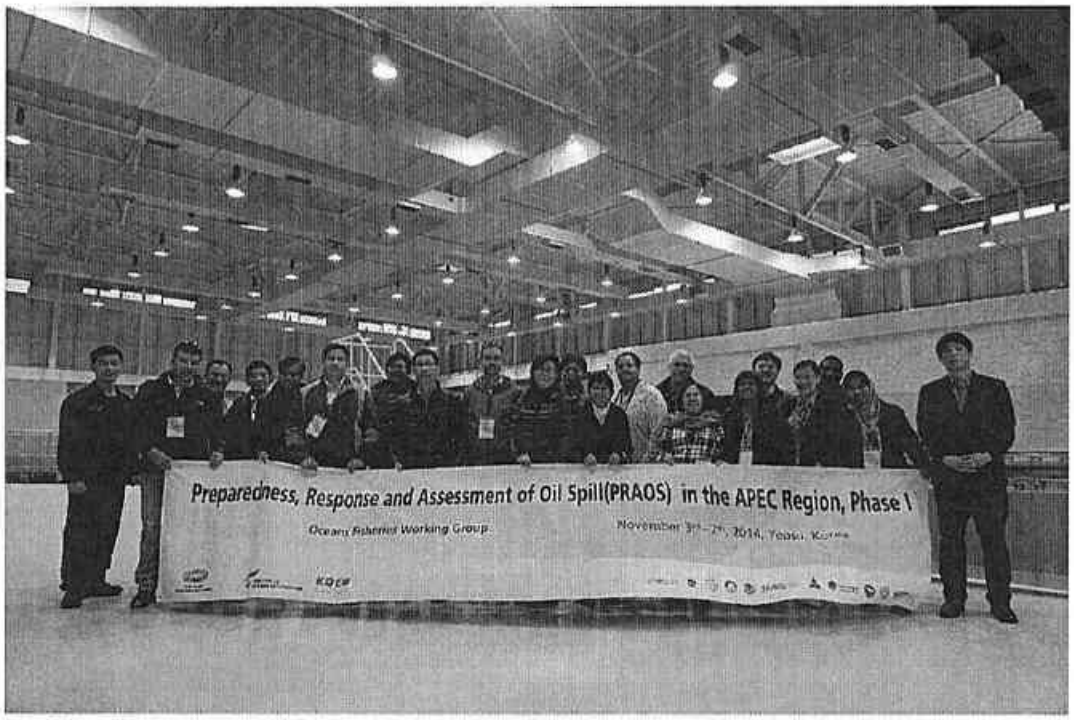


圖 13 韓國海岸防衛隊麗水訓練基地

肆、 心得及建議事項

一、出席本次 APEC 訓練計畫，分享我國處理案例之經驗，並與聯合國國際海事組織（聯合國航運安全保障與防止船舶造成海洋污染的專責機構）及太平洋周邊國家交流海洋污染應變實務經驗，實屬相當難得機會。

二、建議本署未來積極主動參與國際活動與會議，延伸觸角，擴展視野，藉由類似經驗交流活動，建立國際關係，更有助於海洋環境保護。

伍、 附件資料

Preparedness, Response and Assessment of Oil Spill (PRAOS) in the Apec Region, Phase I

Colleen O'Hagan

Overview of Spill Response

Asia-Pacific Economic Cooperation

IMO

International Maritime Organization

- Specialized UN agency with a global mandate for addressing maritime issues
- Mandate....

Safe, secure and efficient shipping on cleaner oceans

IMO

IMO Convention

The need for IMO:

- Shipping – international
- Underpins world trade
- Assets move between jurisdictions
- Universally applicable standards

IMO Convention:

- Adopted Geneva 1948
- Entered into force 1958
- First IMO meeting 1959

IMO

Inherently Dangerous

IMO

IMO Initiatives

- IMO Conventions
- Co-operation & Regional Arrangements
- Stronger Industry Involvement
- OPRC-HNS Technical Group
- R & D Forums
- IMO`s Technical Co-operation Programme

Background Risk

Marine traffic present the risk of marine oil pollution from:

- Collisions
- Groundings
- Transfer of oil cargo and bunkers
- Other marine accidents

Petroleum exploration and production provides further risk of pollution

Background Risk

Such pollution can threaten:

- Sea-birds
- Marine life
- Fisheries
- Coastal installations
- Recreation areas

The response to such pollution requires careful advance planning

IMO

Background Risk

Shipping transports 90% of global trade

- a very powerful and positive force
- making a major contribution to global trade and prosperity
- a relatively small negative impact on the global environment
- statistically, the least environmentally damaging mode of transport, when its productive value is taken into consideration

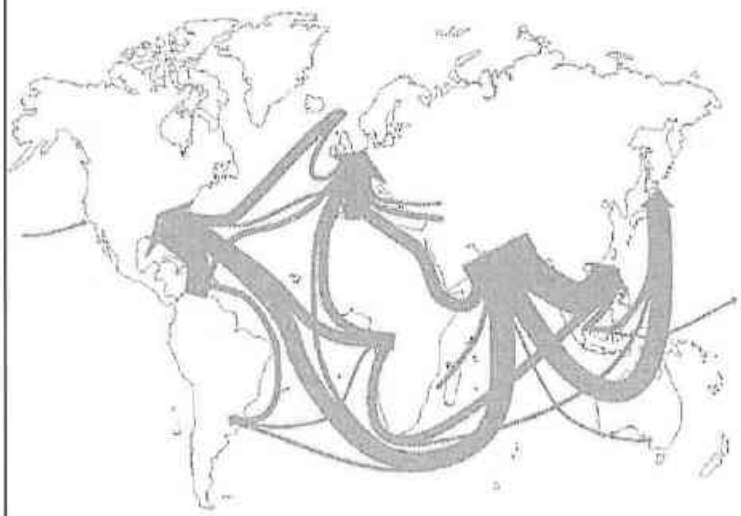
IMO

Crude Oil Seaborne Trade - 1973

Source:
Fearnley' s

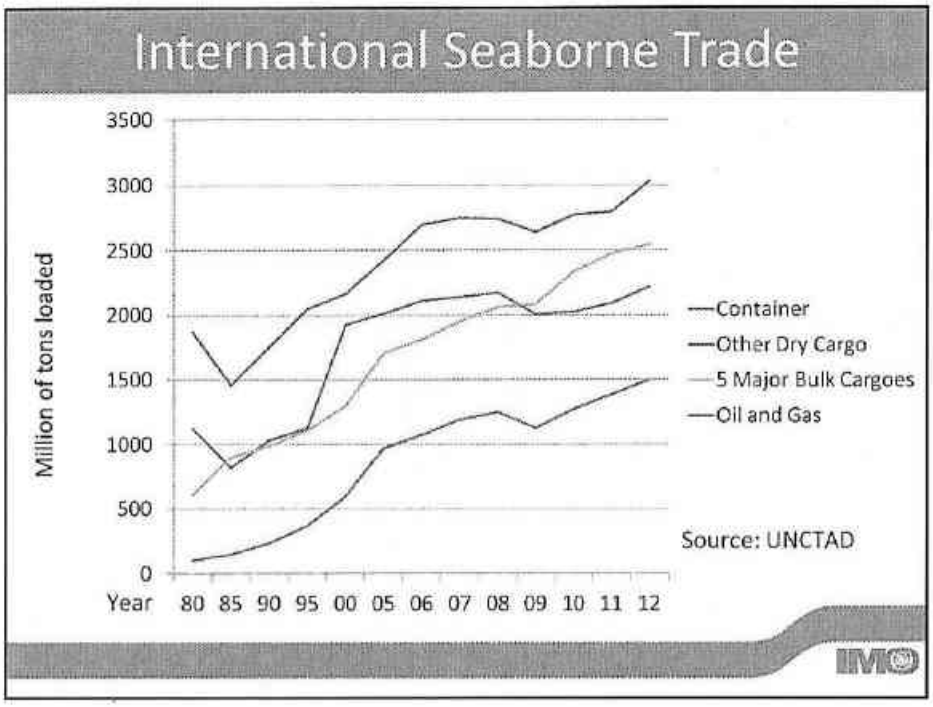
IMO

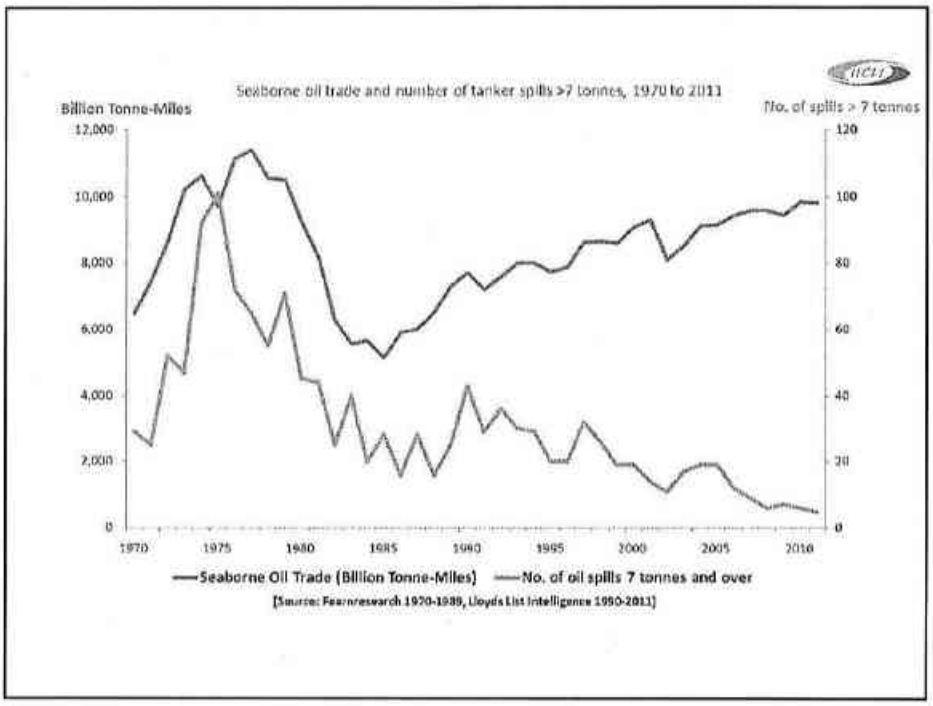
Crude Oil Seaborne Trade - 2002

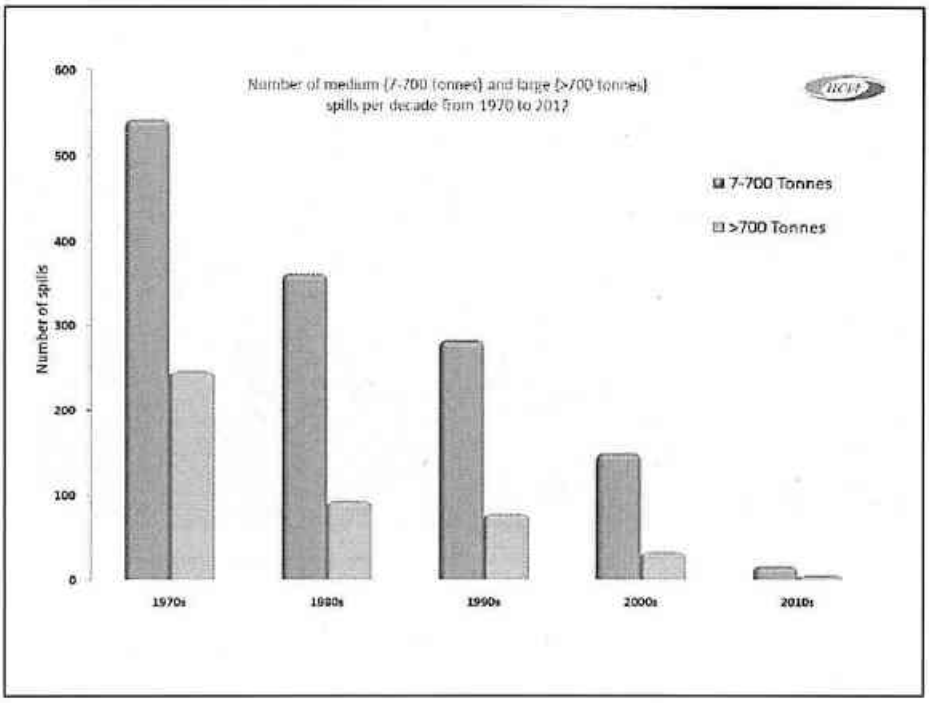


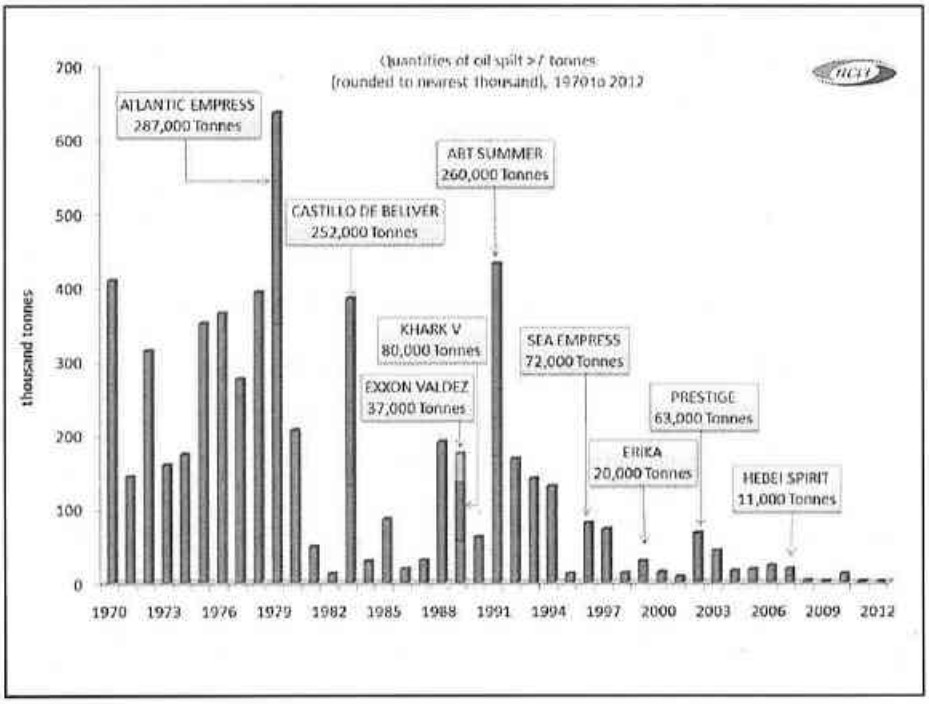
Source:
Fearnley' s

IMO









Accidents still occur

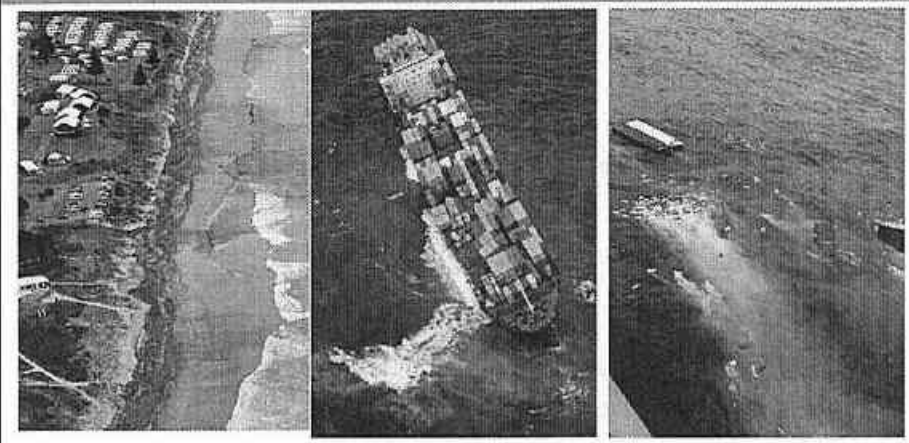


Photo Credit: Maritime New Zealand

IMO Treaty Instruments

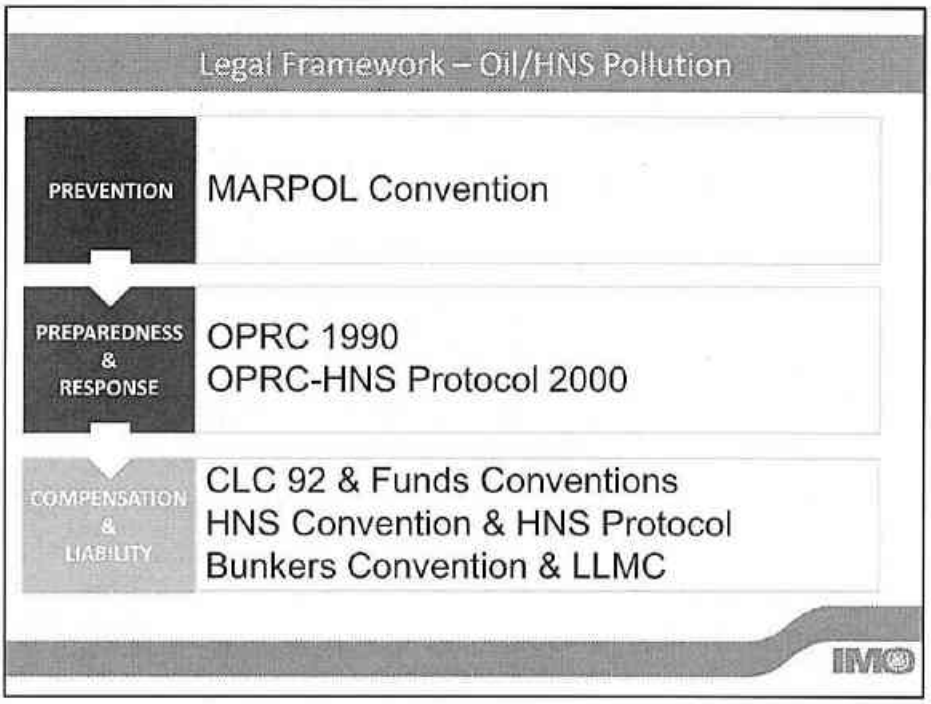
IMO has adopted 51 treaty instruments[1]

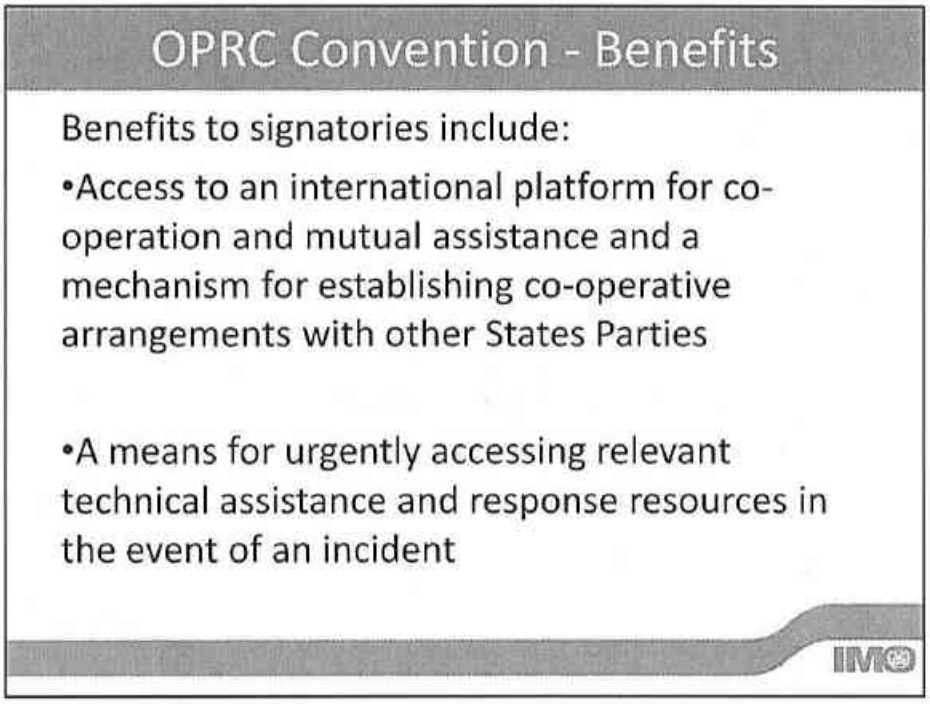
- 23 are directly environment related

Key amongst these is the OPRC Convention

- Global framework for international co-operation in combating major incidents or threat of marine pollution

Note 1: As at February 2013





OPRC Convention - Benefits

Benefits to signatories include:

- A framework for the development of national and regional capacity to prepare for, and respond to incidents

- Participation in a network for the exchange of new research and development information, best practices and practical experiences in response.

IMO

General IMO Benefits

In addition all member States can:

- Access training and support for developing the essential preparedness and response structures and legislation, at national and regional levels

- Through IMO's Integrated Technical Co-operation Programme.

IMO

OPRC Convention – Key Articles

Article	Description
3	Oil pollution emergency plans
4	Oil pollution reporting procedures
5	Action on receiving an oil pollution report
6	National and Regional systems for preparedness and response
7	International co-operation in pollution response

IMO

OPRC: Obligations of Parties

National system for responding **promptly** and **effectively** to oil pollution incidents:

- A national contingency plan
- Designated national authorities:
  - Responsible for preparedness & response
  - Operational contact point(s)
  - Requesting & rendering assistance

IMO

OPRC: Obligations of Parties

Establish individually or through bilateral or multilateral co-operation:

- minimum level of pre-positioned equipment commensurate with risk
- programme of exercises & training
- plans & communications capabilities
- mechanism for co-ordinating response

IMO

OPRC: Pollution Emergency Plans

"Local" [oil] pollution emergency plans to be co-ordinated with national system for:

- operators of offshore units
- appropriate sea ports
- appropriate oil handling facilities

+

- flag ships of the Contracting Party

(also MARPOL requirement)

IMO

OPRC: Reporting Requirements

To establish pollution reporting procedures for:

- discharges from their ***own*** activities
- ***any*** observed event at sea involving the discharge of pollution
- reporting obligations on:

  flag ships, offshore units, sea ports, oil handling facilities, maritime inspection vessels or aircraft, civil aircraft

IMO

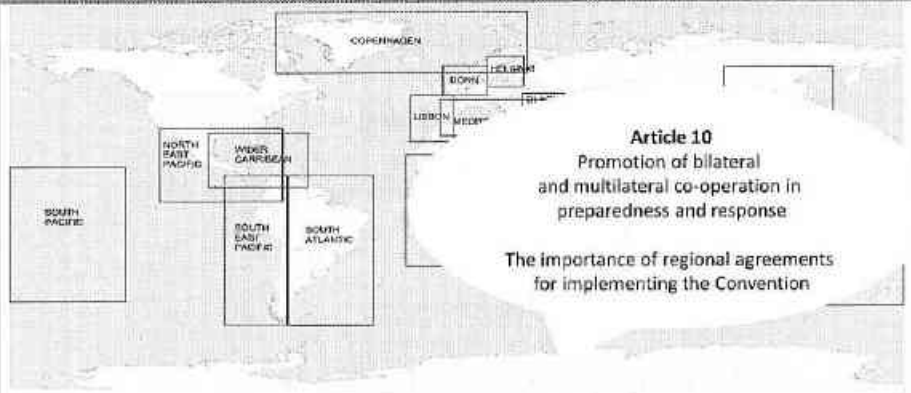
OPRC: International Obligations

Obligation of Contracting Parties to:

- Assess nature, extent and possible consequences of incident
- Inform all States whose interests may be affected
- Provide assistance if requested by another Party subject to capabilities and availability of relevant resources

IMO

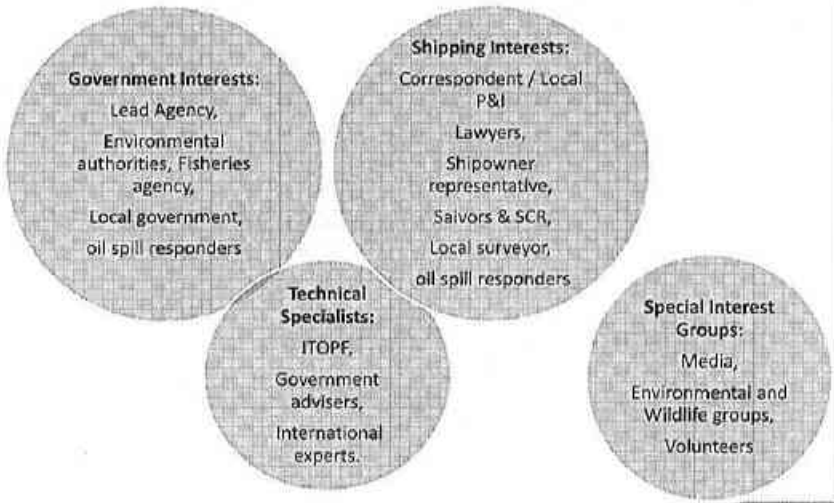
Cooperation: A regional approach



- OPRC encourages a regional approach to capacity building
- Practically every region in the world has a regional agreement
- There are a number of very effective regional agreements which are contributing to achieving the objectives of the OPRC Convention
- Calls for government – oil/shipping industry cooperation

IMO

Parties in Spill Response



IMO

Lead Agency

Competing priorities / challenges:

Operational

Political

Public pressure

Economic

Environmental

Media

Functions:

Manager

Team Leader

Co-ordinator

Accountability

Spokesperson

IMO

Response Objective

- The overall objective of oil spill response is to minimize impacts to:
  - Biological resources
  - Economical activities
  - Human use of shoreline
- A limited number of response options are available to achieve this objective
- No universal option!
- Oil type, weather conditions and oil trajectory will affect choices

IMO

Steps in Spill Response

- Assess situation
- Activate contingency plan
- Activate organisational response
- Prepare response action plan
- Activate operational response
- Manage on-going response
- Consolidate costs
- Debrief and report

IMO

Assess the Situation

- Organise surveillance
- Report and document
- Determine spill type, size and fate
- Assess potential hazards
- Assess potential impacts
- Assess political/economic factors

IMO

Activate Contingency Plan

- Inform higher authorities / senior management
- Notify authorities and key personnel
- Activate initial response

Activate Organisational Response

- Organise response team
- Establish communications channels
- Establish command post
- Implement safety and security procedures
- Establish claims office?
- Notify, mobilise and co-ordinate contracted services

Prepare Response Action Plan

- Identify and prioritise resources at risk
- Identify resources required and additional resources if necessary
- Consult technical experts (e.g. ITOPF)
- Identify response strategies
- Maintain records
- Develop response action

IMO

Activate Operational Response

- Deploy personnel, equipment and logistical support
- Direct and supervise response operations
- Monitor adherence to plans
- Co-ordinate containment, recovery and disposal
- Conduct regular briefings

IMO

Manage On-going Response

- Surveillance
- On-going assessment
- Control the response
- Adjust strategies as required
- Monitor site safety

IMO

Deactivate Response

- Decision on terminating operations
- Assess potential for recontamination
- Post-spill monitoring
- Terminate operations

IMO

Consolidate Costs

- Verify / certify costs
- Submit costs documentation report

Debrief and Report

- Conduct operational review
- Submit final operations report
- Recommend improvements

Need for Planning

- Challenging logistics
- Needs rapid response to minimise damage
- Dependent on:
  - Pre-planned structure and organisation
  - Pre-planned strategies and polices
- Political and media attention

•A CONTINENCY PLAN

IMO

Questions?

IMO

Preparedness, Response and Assessment of Oil Spill (PRAOS) in the Apec Region, Phase I

Colleen O'Hagan

Spill Response Strategy (Open Water)

Asia-Pacific Economic Cooperation

IMO

Response Options

- The following response options are available to responders:
  - Aerial observation / Monitoring
  - Protection of sensitive resources
  - Containment and recovery
  - Dispersants
  - In situ burning
  - Shoreline clean-up

IMO

Aerial Observation

- Effectiveness of response depends on accurate data
- Collect key information about the spill:
  - Confirm source;
  - Scale of spill;
  - Oil trajectory;
  - Oil behaviour;
  - Support equipment deployment and
  - Strategic planning.

IMO

Aerial Observation

- Helicopter or fixed wing aircraft
- Trained observers or sensors (UV, SLAR, IR, etc)
- Safety (twin engine aircraft)
- Must relay information quickly to command centre.

IMO

Monitoring Only

- Oil slick not moving shoreward
- No important sensitive resources threatened
- Oil will disperse naturally
- No response technique is practicable due to weather conditions or location of spill

IMO

Protection of Sensitive Resources

IMO

Protection of Sensitive Resources

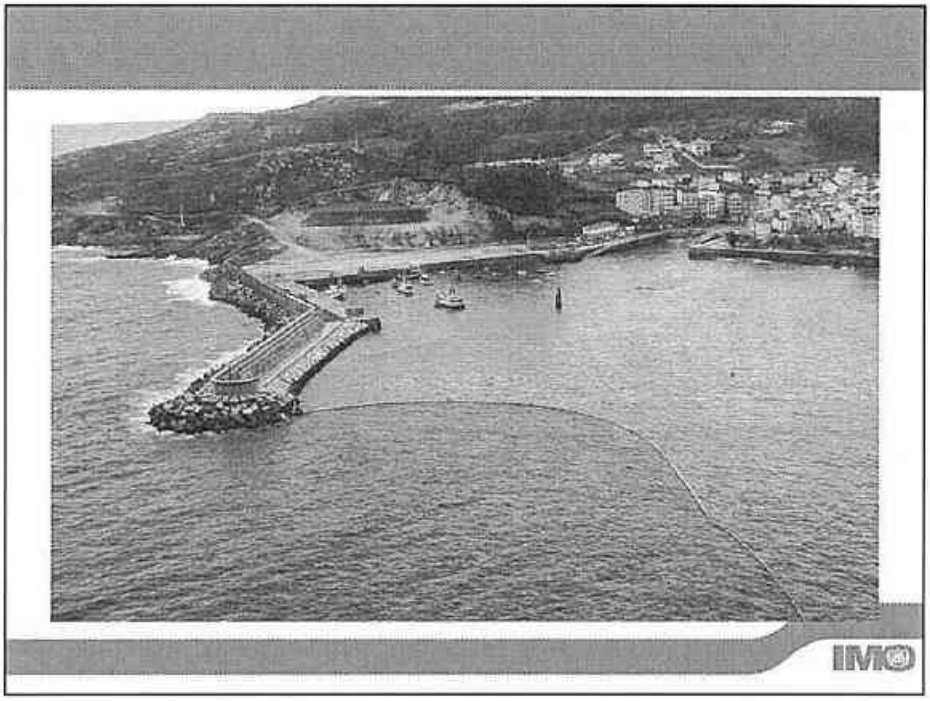
- Prevent contamination of valuable areas using booms
  - Biological (ex: marshes)
  - Economical (ex: marina)
- Requires prioritisation of sensitive resources
  - Importance of sensitivity maps
- Good use of limited resources (booms)
- High benefits for low costs

IMO

Protection of Sensitive Resources

- Limited by availability of booms
- Limited by booms failure conditions
  - Strong currents (more than 1 knots)
  - Weather conditions (waves)
- Limited protection for large sensitive areas
  - Deployed boom length is limited
- Requires maintenance once deployed
- Effective response options for near shore environment

IMO



A few words on booms

- Booms are an important tool for oil spill response
  - Shoreline protection and containment of oil
- Many types of booms on the market
  - Solid flotation vs inflatable
  - Offshore vs near shore
  - Newer systems: ocean and current busters
- Will fail in some conditions
  - Strong currents (more than 1 knots)
  - Weather conditions (waves)

A few words on booms

- Booms deployment requires substantial logistics
  - Transportation (boats, trucks)
  - Trained personnel
  - Maintenance

IMO

Containment and Recovery

IMO

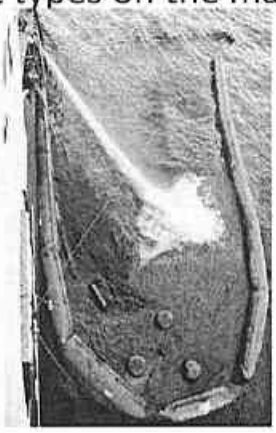
Containment and Recovery

- Objectives: stop spreading, concentrate and remove oil from the environment
- Equipment required:
  - Booms;
  - Skimmer(s) with power pack;
  - Vessel(s) to pull booms and transport equipment
  - Storage tank for recovered oil/oily water
- Significant investment up front
- Substantial logistic

IMO

A few words on skimmers

- It is basically a floating pump
- Many different types on the market
  - Weir
  - Oleophillic
  - Vacuum
  - Mechanical
- Limitations:
  - Oil type
  - Sea state
  - Debris



IMO

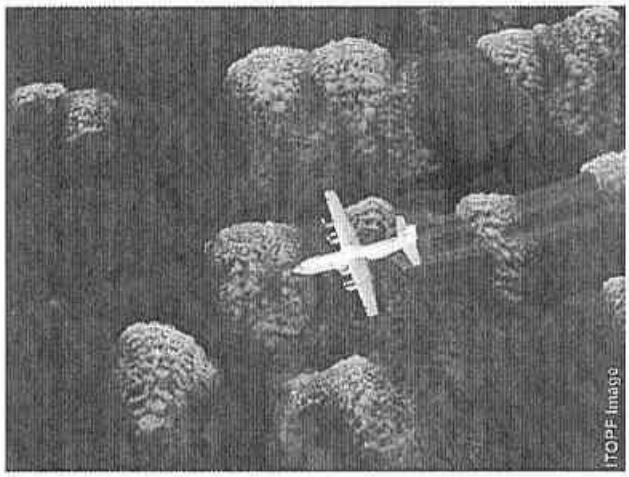
Containment and Recovery

- Success is limited by:
  - Availability of appropriate vessels
  - Weather conditions for booms operation (current, sea state)
  - Deployment time
  - Encounter rate with oil
  - Storage capacity
  - Debris

- Recovery rate of 10-15% is a success!

IMO

Dispersants



IMO

Dispersants

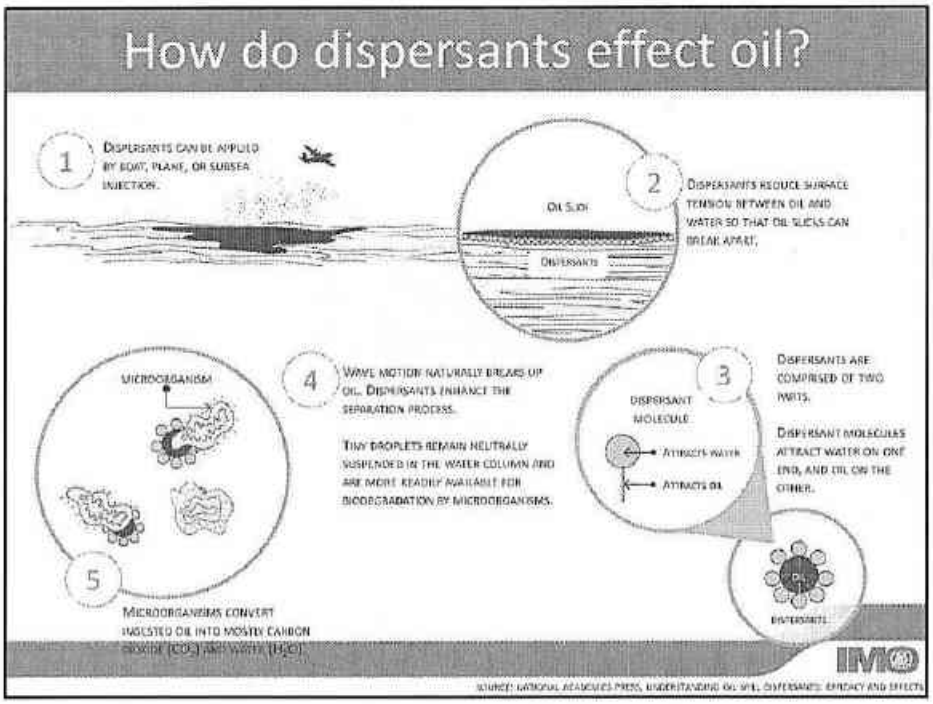
- Objective: Promote natural dispersion of oil into water column.
- Dispersants are chemical products formulated to produce micron size oil droplets that will be dispersed, diluted and eventually biodegraded in the environment.
- New generations of dispersants have low toxicity and high efficiency

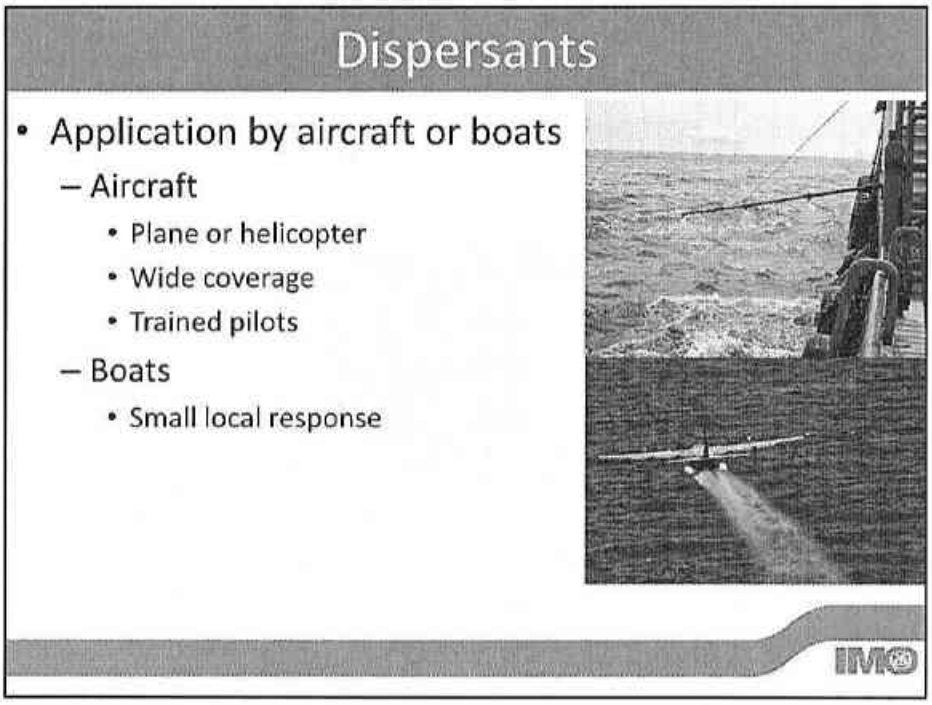
IMO

Dispersants

- How dispersants work?
  - Chemical formulation to reduce surface tension of oil
  - Oil will form micron size droplets because of mixing energy from waves
  - Because of their small size, these droplets will remain suspended in water column as a plume
  - Plume will be diluted by mixing energy and currents
  - Increase biodegradation due to larger surface area for bacteria

IMO





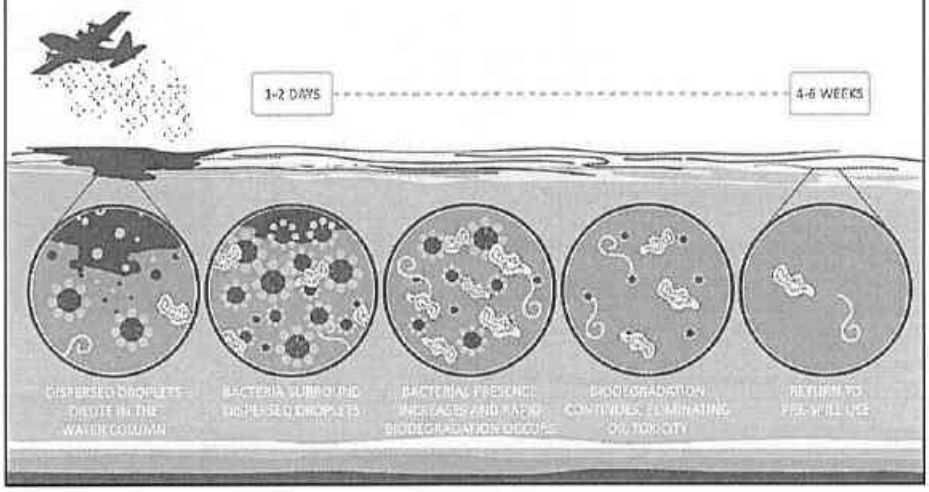
Dispersants

- Issues with dispersants use
  - Toxicity
    - Dispersants have lower toxicity than dispersed oil
    - Field test have shown higher oil concentrations in 0 to 10m water depth
    - Background oil concentration within hours
    - Short duration exposure because of dilution
  - Oil viscosity and dispersibility
    - Readily dispersible for oil viscosity below 5000cSt;
    - Moderate for oil viscosity between 5000 - 10000cSt
    - Not dispersible above 10000cSt

IMO

How do dispersants affect oil toxicity?

DISPERSANTS HELP TO BREAK APART THE OIL SLICK INTO TINY DROPLETS THAT THEN BIODEGRADE IN THE WATER COLUMN. THIS REDUCES THE EFFECTS OF OIL TOXICITY TO THE MARINE ENVIRONMENT.



Dispersants

- Issues with dispersants use
  - Oil viscosity and time
    - Weathering processes will increase oil viscosity over time;
    - Dispersants must be applied before viscosity is too high;
    - "Window of opportunity"
  - Sea state and weather
    - Mixing energy from breaking waves necessary
    - Weather conditions must permit application of dispersants

IMO

Dispersants

- Issues with dispersants use
  - Government approval
    - Usually required by national regulations;
    - List of approved dispersants;
    - Criteria for application;
    - Dispersants use policy.
  - Application zones
    - Not in shallow water (less than 10 to 20m);
    - Not near water intakes;
    - Mainly offshore
    - Net environmental benefit

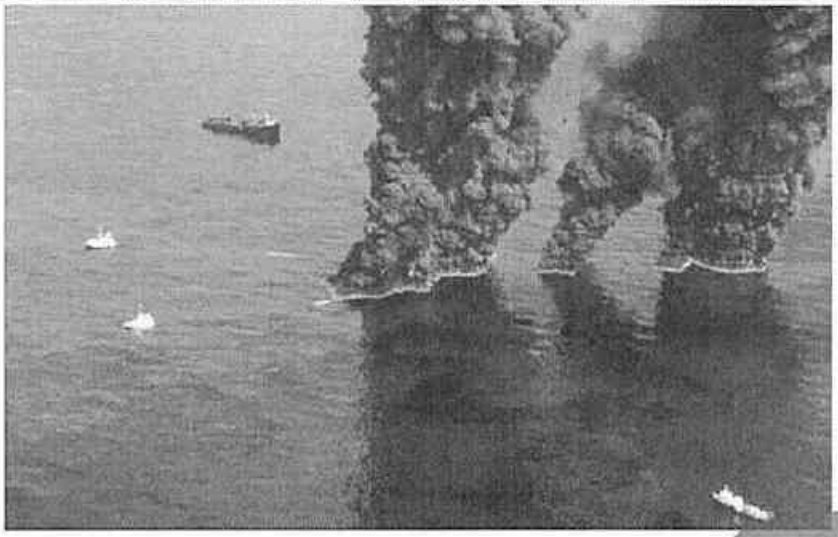
IMO

Dispersants

- Advantages
  - Elimination of oil from sea surface
    - Protection of birds and shoreline
  - Improve biodegradation of oil
  - Does not generate waste
  - Quick response (if in contingency plan)
  - Reasonable costs for potentially high benefits

IMO

In Situ Burning



IMO

In Situ Burning

- Objective: Remove oil from sea surface by ignition.
- Required equipment:
  - Vessels
  - Fire resistant booms
- Can eliminate significant quantity of oil rapidly
- Minimise wastes generation
- Especially efficient for spill in ice

IMO

In Situ Burning

- Issues with in situ burning
  - Availability of fire resistant booms
  - Oil thickness
    - A minimum of 2mm required to sustain burn
    - If less than 2mm, burning will stop
  - Smoke plume
    - Smoke = gas, CO_2, particulates;
    - Avoid exposure to smoke;
    - Must be aware of sensitive resources that might be exposed to smoke plume.

IMO

In Situ Burning

- Issues with in situ burning
  - Oil weathering
    - High viscosity oil can be harder to ignite
  - Burn residue
    - Heavy burn residue possible
    - Can be difficult to recover and sink in some cases
  - Safety
    - Fire can spread to adjacent structures, vessels.
    - Exclusion zone;
    - Avoid exposure to smoke;

IMO

How to select a response strategy?

1) Identify priorities
   - Protection of public
   - Sensitivities
     - Economical
     - Social
     - Environmental
2) Know your limiting factors
   - Type of oil
   - Weather and sea conditions

IMO

How to select a response strategy?

3) Net Environmental Benefits
   - Compare overall impacts of using strategy A with those of using method B
   - Select strategy with the least overall impacts
4) Do you have the necessary operational capacity?
   - Command and control structure
   - Availability of equipment/personnel
   - Logistics and deployment time
5) Implement response strategy
6) Evaluate success and re-assess

IMO

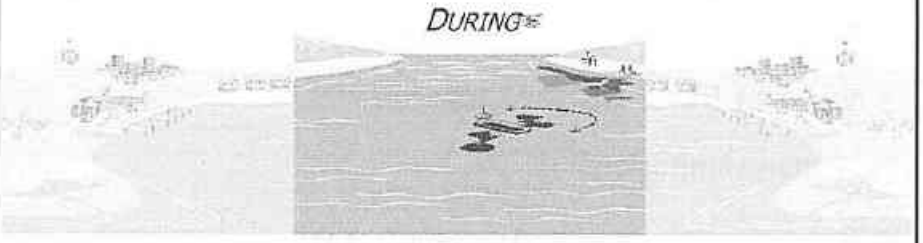
What role does NEBA play before a spill

Response Tool Selection Process

	Evaluate Data	Predict Outcomes	Balance Tradeoffs	Select Options
NEBA	Identify and prioritize environmental and community assets based on environmental sensitivities and social values	Use planning scenarios to assess potential impacts and response options for specific locations	Weigh environmental and social impacts to determine the most effective oil spill response tools and to balance tradeoffs	Establish response plans and pre-approvals to support environmental and operational goals

IMO

What role does NEBA play during a spill



RESPONSE TOOL SELECTION PROCESS

	EVALUATE DATA	PREDICT OUTCOMES	BALANCE TRADEOFFS	SELECT OPTIONS
NEBA	ENGAGE STAKEHOLDERS TO ASSESS SPILL- AND SITE-SPECIFIC CONDITIONS AND ANTICIPATED IMPACTS	CONFIRM EFFECTIVENESS AND FEASIBILITY OF PRE-PLANNED RESPONSE OPTIONS TO ACHIEVE OPTIMAL RESULTS	RE-EVALUATE AND ADAPT RESPONSE TO ADDRESS EVOLVING CONDITIONS	FACILITATE RAPID DECISION-MAKING AND ADAPTATION OF OIL SPILL RESPONSE BASED ON ENDPOINT EVALUATIONS

IMO

What role does NEBA play after a spill

RESPONSE TOOL SELECTION PROCESS

	EVALUATE DATA	PREDICT OUTCOMES	BALANCE TRADEOFFS	SELECT OPTIONS
NEBA	CONFIRM SITE-SPECIFIC CONDITIONS AND IMPACTS AFTER RESPONSE	IDENTIFY RESTORATION OPTIONS AND WHAT THEY MAY ACHIEVE	ENGAGE STAKEHOLDERS TO DETERMINE THE MOST EFFECTIVE RESTORATION ACTIVITIES	PERFORM RESTORATION ACTIVITIES UNTIL AGREED-UPON ENDPOINTS ARE ACHIEVED

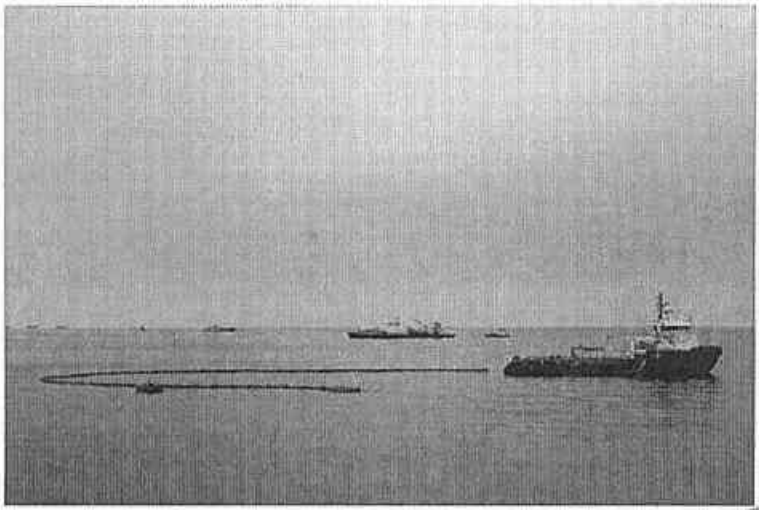
IMO

Conclusion

- Various response options available for oil spills
- None of these options are perfect
  - many limitations
- You are likely to use a combination of methods
- At the strategic level, you must know available options, their limitations and impacts.

IMO

Questions



IMO

Preparedness, Response and Assessment of Oil Spill (PRAOS), Phase I

Planning for response

Jamie Storrie
Manager
Marine Environment Pollution Response
Australian Maritime Safety Authority

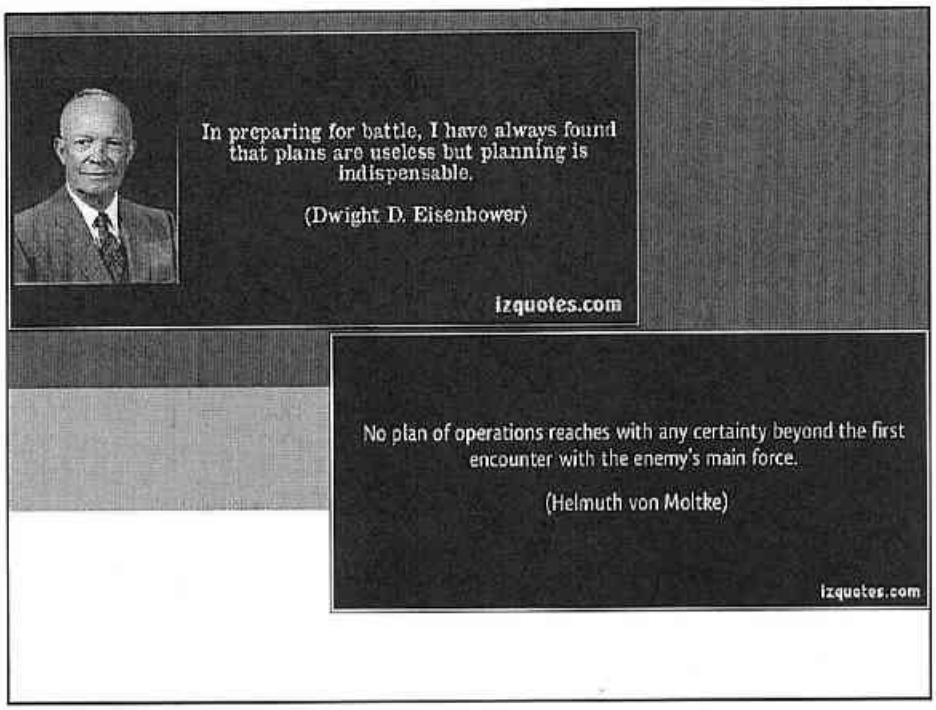
APEC
Asia-Pacific Economic Cooperation

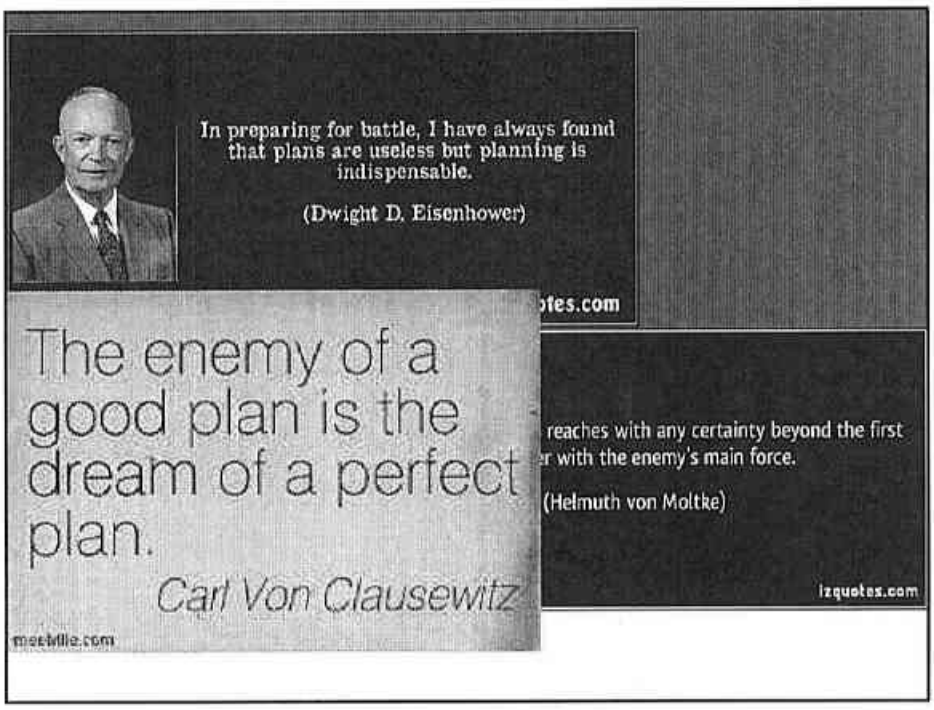
Australian Government
Australian Maritime Safety Authority

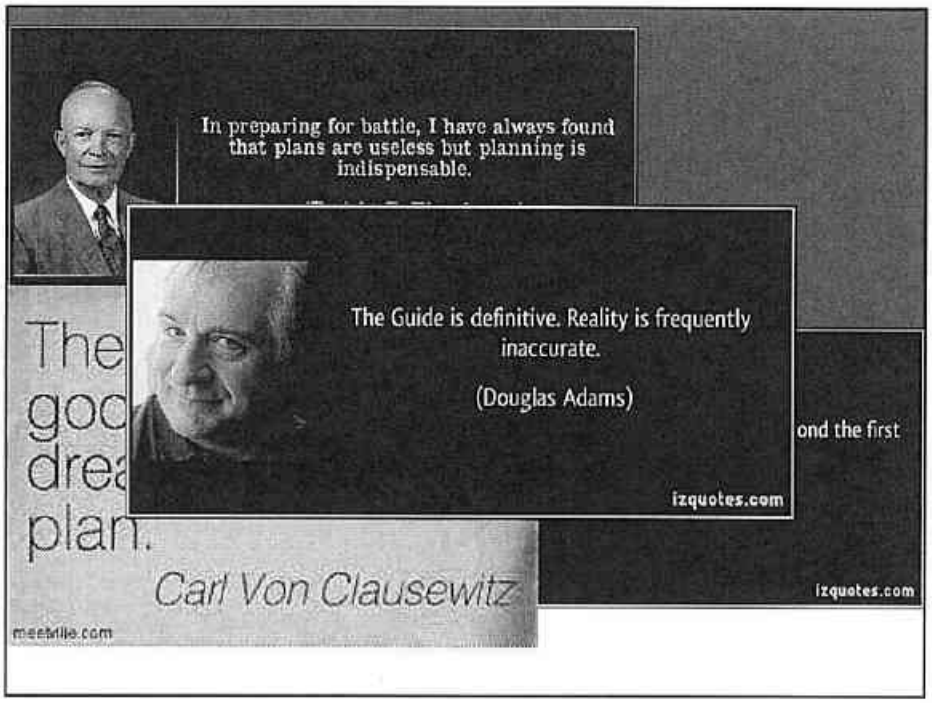
In preparing for battle, I have always found that plans are useless but planning is indispensable.

(Dwight D. Eisenhower)

izquotes.com



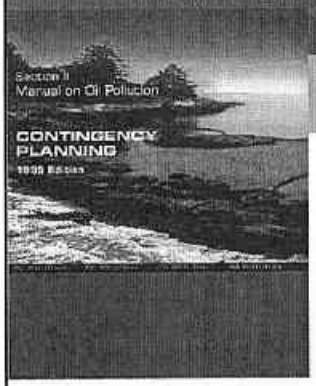




We will discuss …

- Emergency context
- Why plan?
- What is a plan?
- What is represents effective planning?
- What represents ineffective planning?
- Capability versus a plan
- Features of a response organization
- Features of a response system
- Planning process overview

What I won't really being discussing



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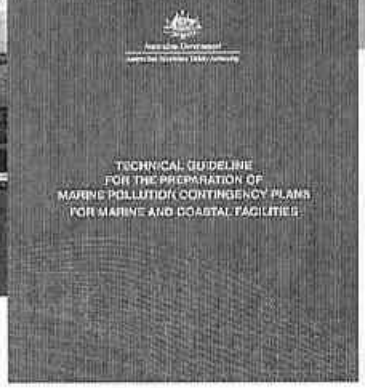
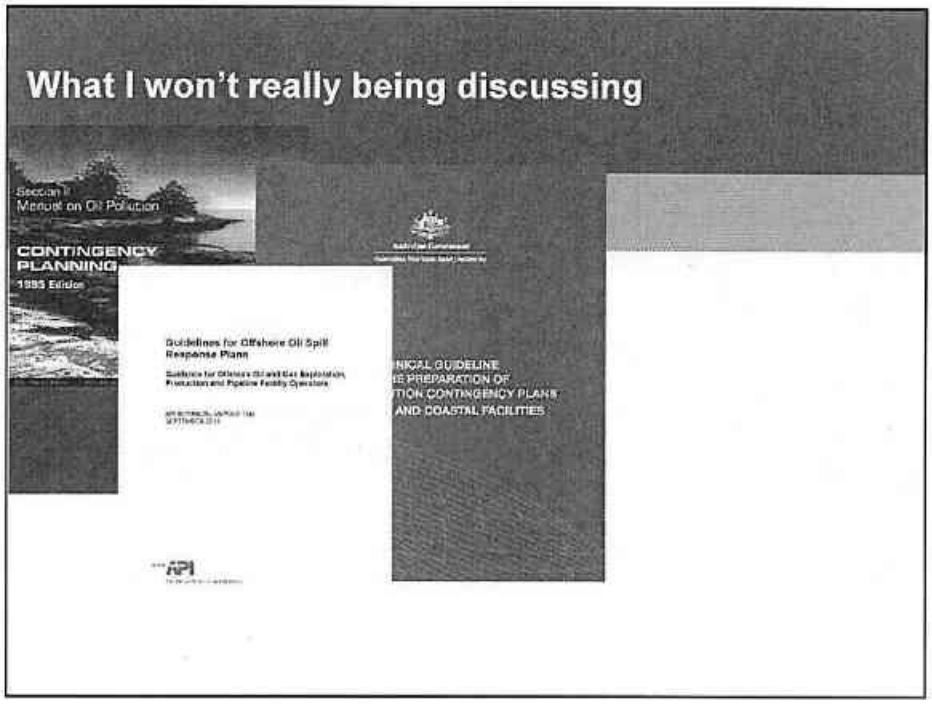
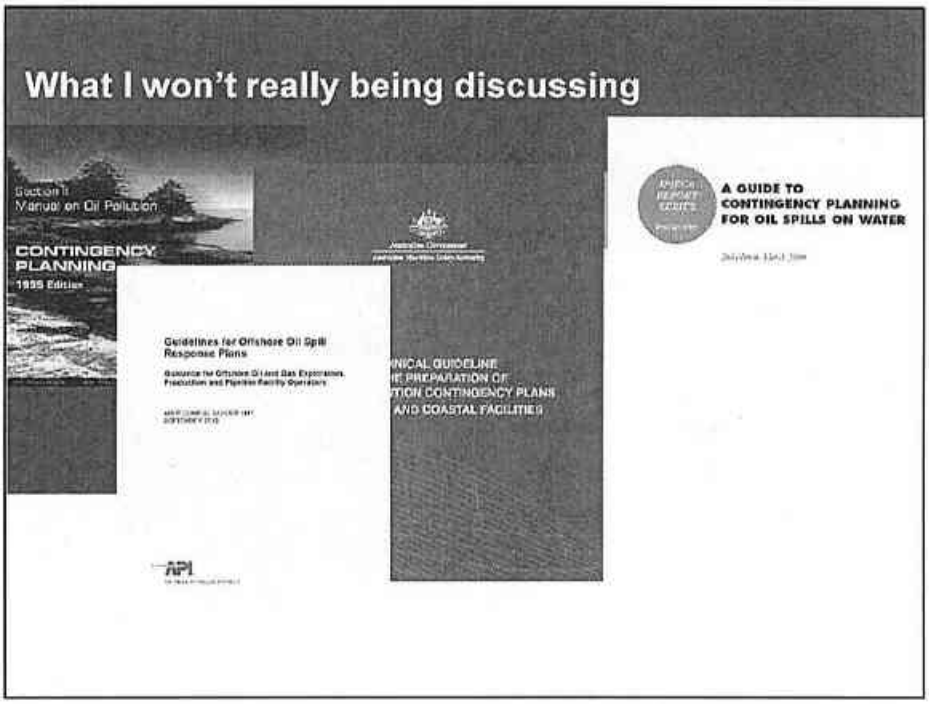
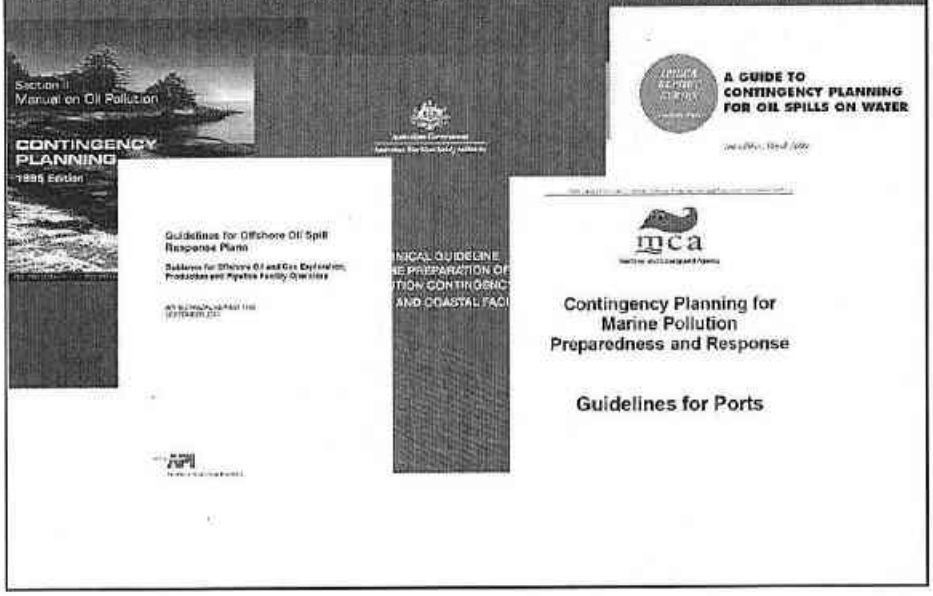






What I won't really being discussing



Major emergencies are characterized by …

- Threat
- Uncertainty
- Urgency

Different types of emergencies …

- Routine

Different types of emergencies …

- Routine
- Novel

Different types of emergencies …

- Routine
- Novel
- Emerging

Routine versus novel events

Routine

- High awareness
- Scripted
- Precise execution
- Well defined skills
- Command oriented
- Recognition primed decision making
- Expect success

Routine versus novel events

Routine	Novel
High awareness	Low awareness
Scripted	No script
Precise execution	Customisation
Well defined skills	Fault tolerant
Command oriented	Incompletely specified skills
Recognition primed decision making	Collaboration
Expect success	Cognitively driven decisions
	Expect best endeavours

Strategic versus operational tasks

Strategic

- Sense making
- Decision making
- Meaning making
- Circumscribing
- Coordinating
- Terminating
- Learning

Strategic versus operational tasks

Strategic

- Sense making
- Decision making
- Meaning making
- Circumscribing
- Coordinating
- Terminating
- Learning

Tactical/Operational

- Diagnosing and deciding
- Mobilising and organising
- Containing and mitigating
- Informing and empowering
- Coordinating and collaborating

This has crucial planning and operational implications ...

- Planning for both routine and novel events is essential
- Planning for strategic and operational levels is essential

BUT they require materially different approaches.

- Routine events can be anticipated and prepared for.
- Novel events exceed planning assumptions and require improvisation.

HOW do you plan for novelty?

Why plan?

- Create conditions that favour an effective response
- Create conditions that allow rapid development of an incident specific plan
- Establish an effective start-up and network
- Create (or make more likely) organizational coordination
- Explore contingencies
- Engage with partners

What is a plan?

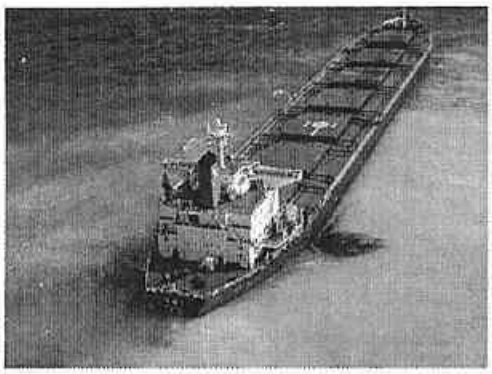
A plan is a strategic statement.

It needs to honestly acknowledge the issues we face and provide an approach for overcoming them.

It is a cohesive approach to an important challenge.

The basis of a good strategy…

- A diagnosis
- Guiding policy
- Coherent actions



Bad strategy is caused by …

- Failure to face the problem
- Mistaking goals for objectives
- Bad strategic options
- "Fluff"

Factors causing poor planning

- Fantasy planning
- Templates
- "Apparent affinities"
- Transforming uncertainty into risk
- Planning for the last emergency
- Overemphasizing 'hardware'
- Overemphasizing formal structures
- Over-engineering solutions/performance in advance

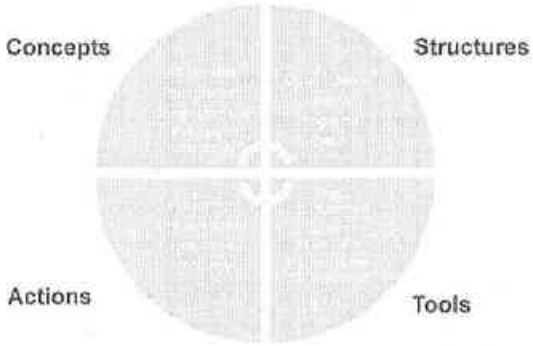
Good planning ...

- Recognizes differences between routine and novel events
- Continual planning process
- Multi-hazard, generic rather than agent specific
- Coordination of emergent resources
- Focuses on general principles rather than specific detail
- Assumes communities and/or victims will react well
- Emphasizes need for intra and inter organizational integration
- Encourages appropriate actions by anticipating problems and options
- Builds on systemic data and not war stories
- Addresses prevention, preparedness, response and recovery

Good response ...

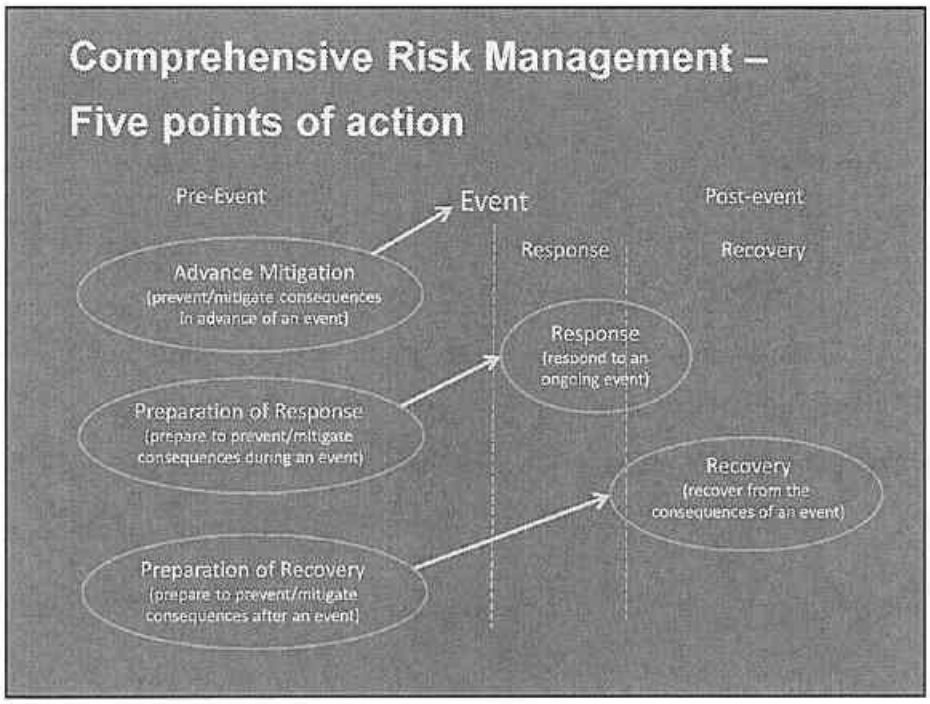
- Recognize the difference between agent (hazard) and response generated demands
- Carry out generic functions in an adequate way
- Mobilize personnel and resources effectively
- Involves the proper delegation and a division of labour
- Allow the adequate processing of information
- Permit the proper exercise of decision making
- Focus on coordination
- Blend emergent aspects with established ones
- Provide the mass communication system with appropriate information
- Have a well functioning emergency operations centre

Context for planning

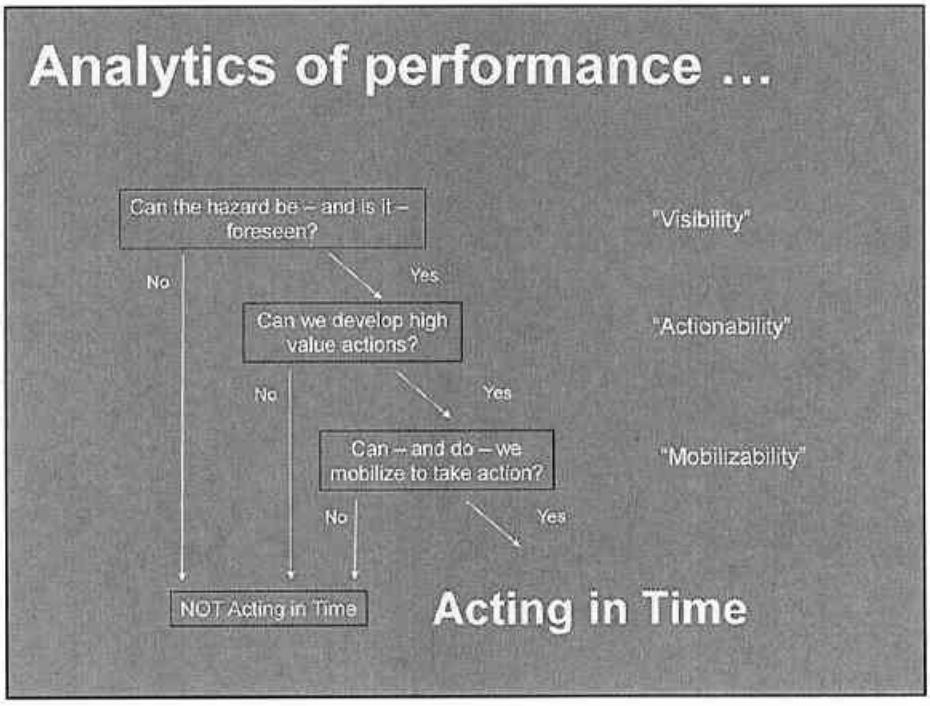


Emergency management context of planning

Comprehensive Risk Management – Five points of action



Analytics of performance …



Core challenges …

- Scalability and surge capacity
- Developing and maintaining situational awareness
- Integrated execution in real time
- Operational versus political leadership
- Handoffs and coordination across boundaries

Elements of a response capability

Key features of a response organization

There is no ideal response organization!!!

- Goals, values and priorities
- Decision making and authority
- Skills and resources
- Communication

Response organization is multi-agency

- Major emergencies are multi-agency/sectoral
- Each type of organization faces distinctive challenges
- Planning needs to reflect these challenges
- Can't assume mobilisation and performance will be the same

	Regular	Non-regular
Existing	Established (eg Fire, police, defence)	Extending (eg Housing, family services, schools, social services)
Extending	Expanding (eg Red cross)	Emerging (eg community groups)

An effective response network requires ...

- Organizations to perform their activities in a coordinated fashion
- An absence of political infighting
- That the right organizations are involved
- That there is inter-personal and inter-organizational trust

An effective response system requires ..

- Effective delivery of basic functions
- Training
- Frequent and rigorous exercises
- Forging of relationships
- Preparations for the post response phase (recovery)
- Audit
- Continuous development, involvement and commitment

Policy questions for planners…

- What is the appropriate level of investment when consider all three phases?
- What is the distribution of investment?
- What is the best set of investments?
- Is the current level correct or is likely to be systematically biased?

Challenges for planners

Organizations have trouble with:

- Balancing the future against the present
- Dealing with probabilistic events
- Thinking about dreadful and frightful events

Addressing large risks involves all of these challenges

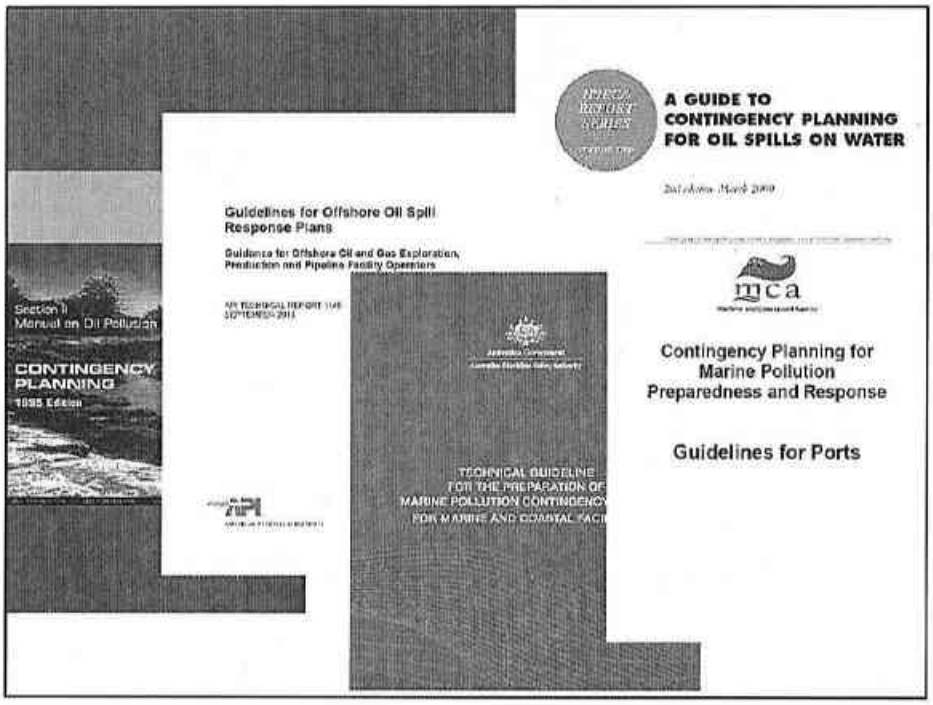
Traditionally ...

Pre-incident efforts are likely to be inadequate ...

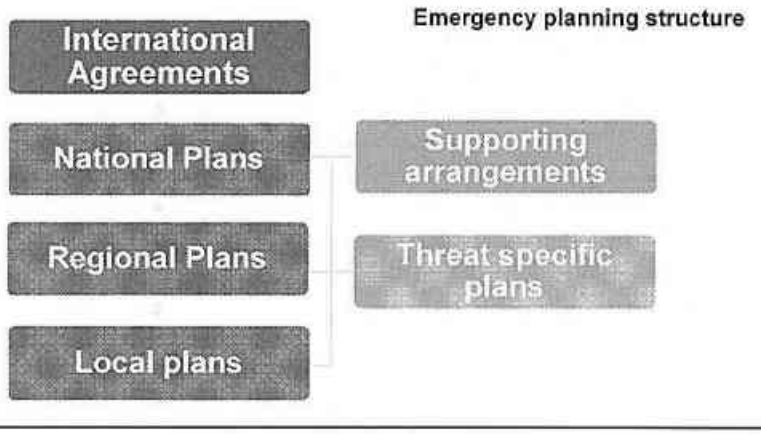
- Prevention and mitigation ⇨ variable
- Preparation and response ⇨ variable
- Preparation for recovery ⇨ virtually non-existent

Post incident - response and recovery are immediate, current, obvious and unavoidable

Policy makers need to get this mix right



Emergency planning structure ..



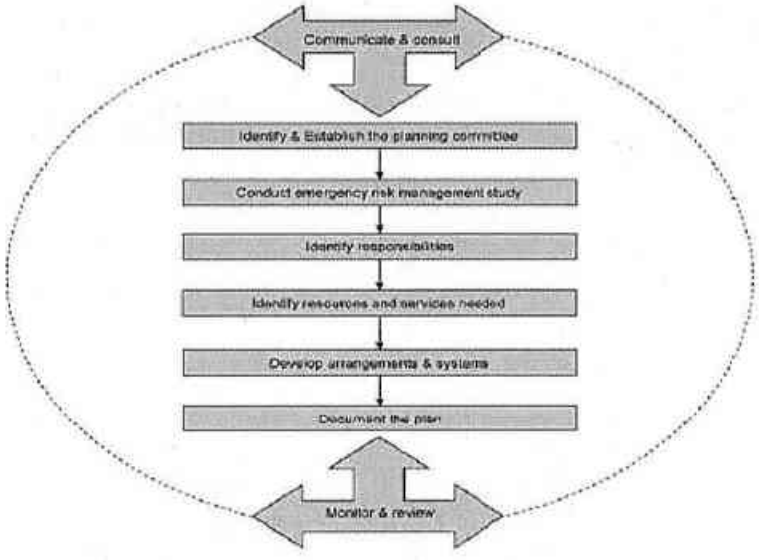


Figure 2:1oAn Emergency Planning Process

A few resources ...

http://www.em.gov.au/Documents/Manual43-EmergencyPlanning.pdf

http://www.ipieca.org/publication/guide-contingency-planning-oil-spills-water

http://www.oilspillprevention.org/~/media/Oil-Spill-Prevention/spillprevention/r-and-d/spill-response-planning/1145-e1-final.pdf

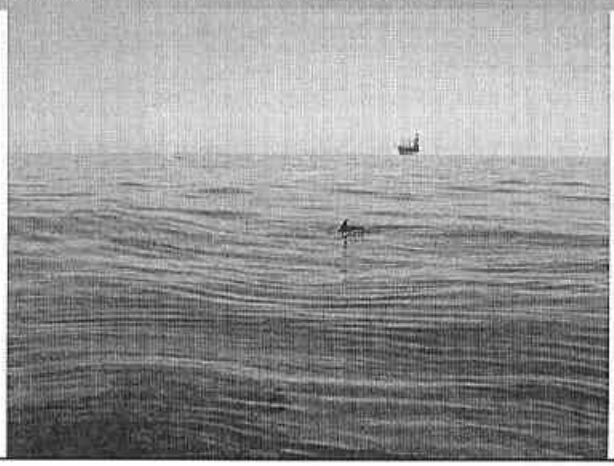
https://www.amsa.gov.au/forms-and-publications/Publications/AMSA413_Contingency_Planning_Guidelines.pdf

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/297954/oprc_guidelines_for_ports_-_final_03.02.2012-2.pdf

http://www.itopf.com/knowledge-resources/documents-guides/planning-operations/contingency-planning/

http://www.imo.org/OurWork/Environment/PollutionResponse/Inventory%20of%20information/Pages/Oil%20Spill%20Contingency%20Planning.aspx

Questions?



Preparedness, Response and Assessment of Oil Spill (PRAOS), Phase I

Shoreline cleanup

APEC
Asia-Pacific Economic Cooperation

Australian Government
Australian Maritime Safety Authority

Factors in considering a response

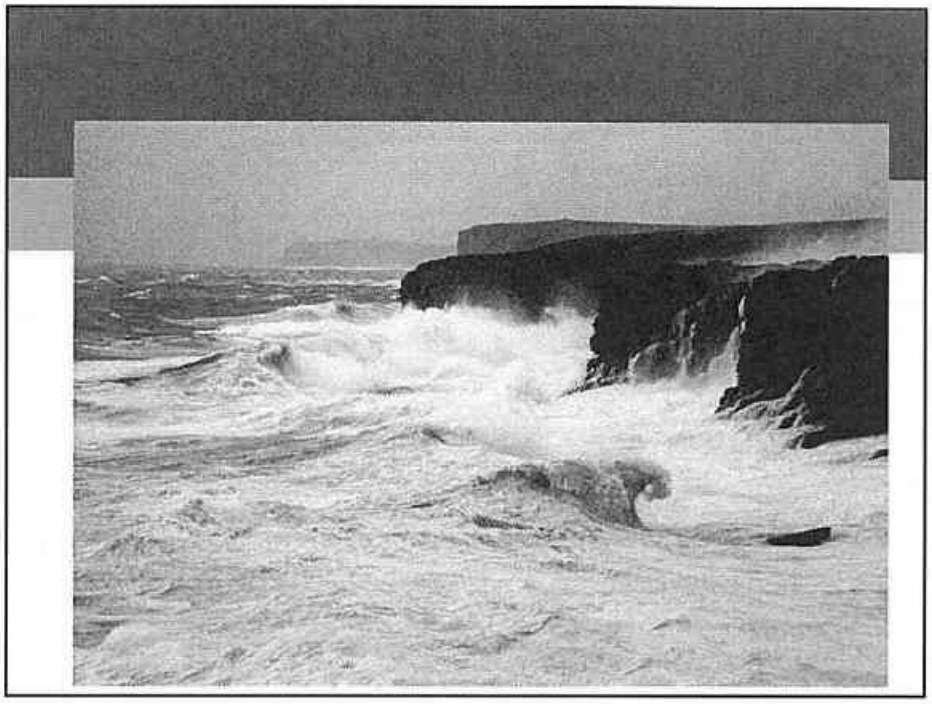
- Responder's safety
- Potential effects of a cleanup
- Feasibility of cleanup operations
- Political and public pressure
- Cultural factors

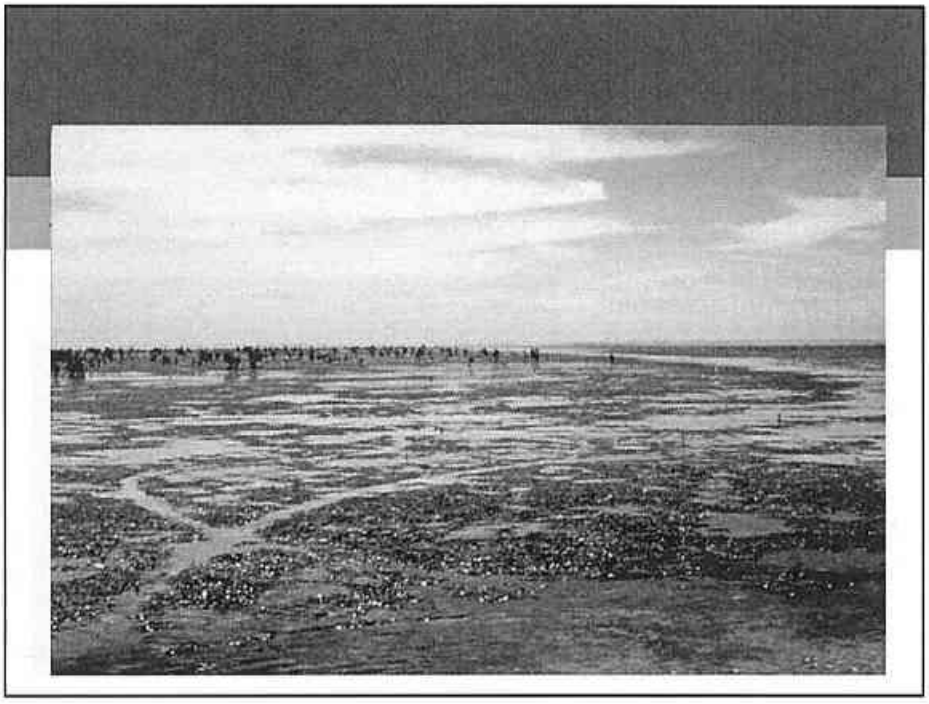
Selecting a cleanup method

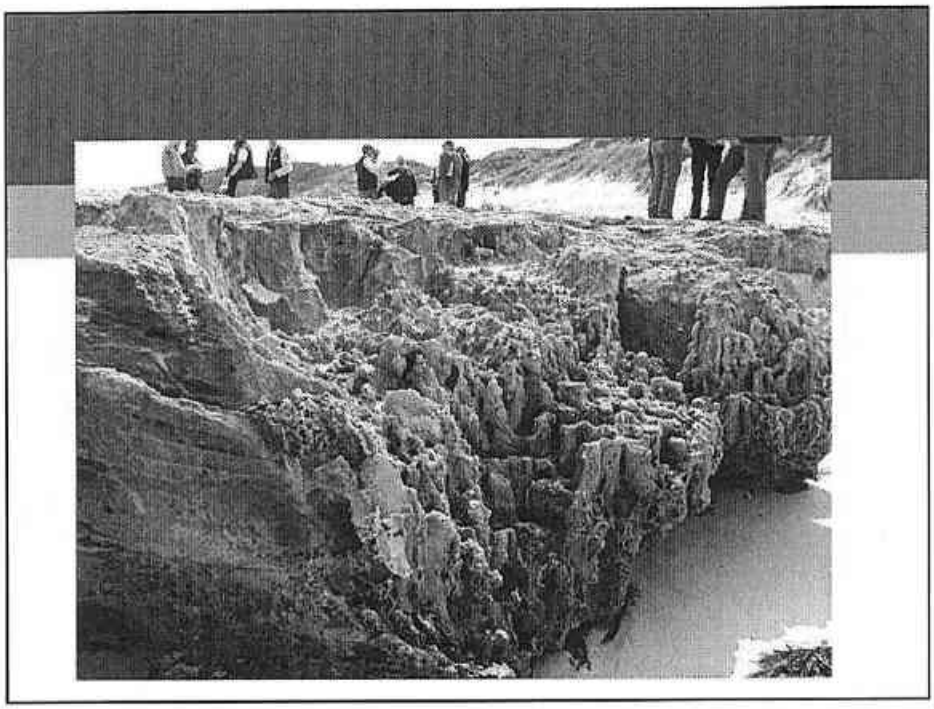
- Amount of oil
- Shoreline character
- Tidal range
- Weather conditions
- Availability of resources: Equipment & personnel

Method	Shoreline Substrate Type						
	Bedrock	Boulder	Cobble-Pebble	Grit/ Gravel	Sand	Mudflats	Coastal Wetlands
1. Natural Recovery	R	C	C	C	C	C	R
2. Manual Recovery	R	R	R	R	R	C	C
3. Mechanical Removal			C	C	R		C
4. Use of Loose Sorbents	C	C		C	C	C	C
5. Vacuum Recovery	R			C	C	C	C
6. Sediment Reworking			R	C			
7. Vegetation Cutting/ Removal							C
8. Flooding (deluge)		C	C	C	C	C	C
9. Low Pressure Washing	R	C	C	R	C	C	C
10. High Pressure Washing	C	C					
11. Hot Water Washing	C	C	C				
12. Use of Cleaning Agents	C	C	C				
13. Steam Cleaning/Sand Blasting	C	C					
14. Bioremediation/Aeration			C	C	C		
15. In-Situ Burning							C
16. Trenching			C	C	C	C	

R - Recommended
C - Conditional, Can be used on small areas or under restricted conditions (see text)
[ ] - Not recommended

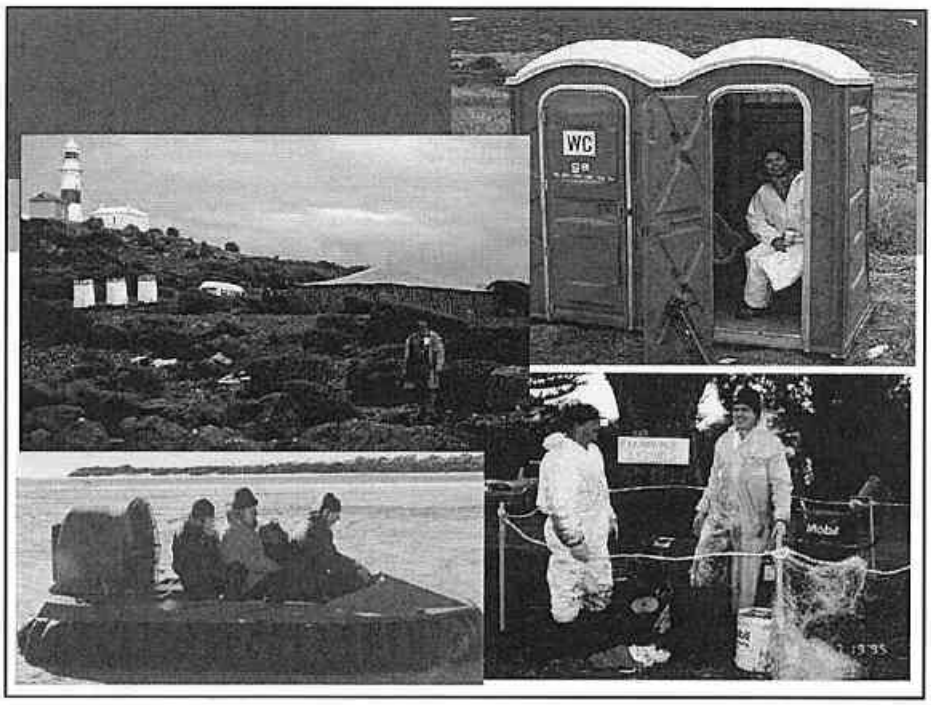






Workforce management

- Personnel screening
- Induction
- On the job training
- Management system



Cleanup stages

- Shoreline assessment
- Primary cleanup
- Secondary cleanup
- Site restoration

Shoreline character

- Substrate type
- Shoreline form
- Energy
- Biological character

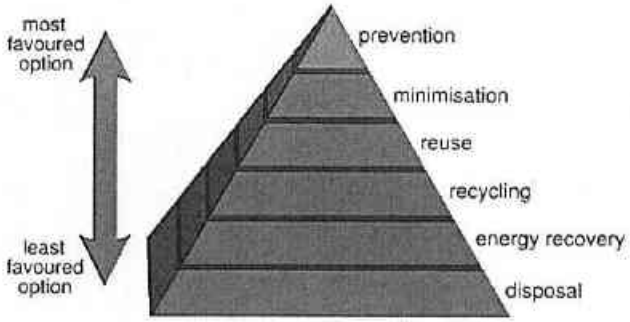
Cleanup methods

- Natural recovery
- Manual removal
- Use of sorbents
- Vacuum recovery

Cleanup methods

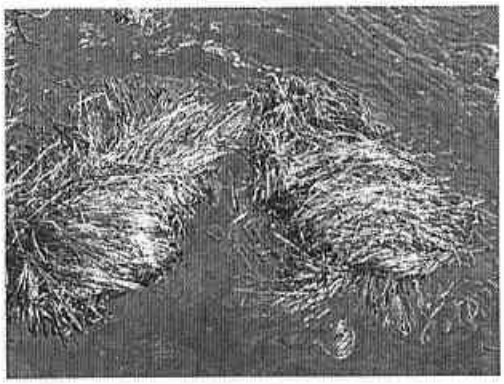
- Mechanical removal
- Flushing

Waste Management



Waste types

- Oil
- Oil spill by products
- Debris, organic & inorganic
- Sediments
- Sea water
- Used PPE*



•PPE: Personal Protective Equipment

Segregation of waste type

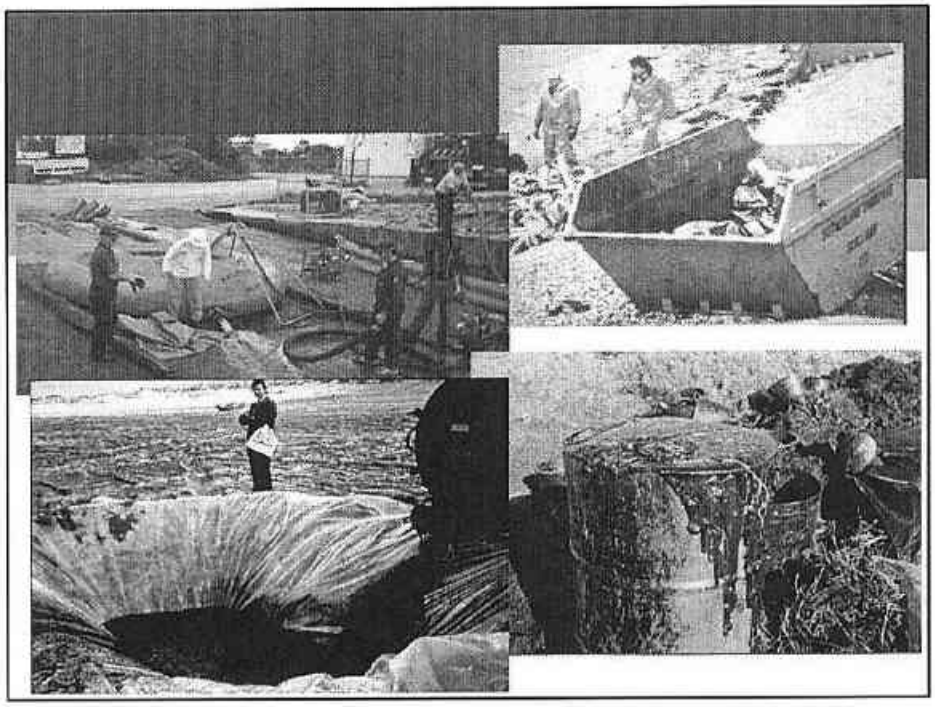
- Contaminated
- Uncontaminated

Temporary storage site considerations

- Appropriate access to site
- Location
- Secondary contamination
- Security

Temporary storage options

- Flexidams
- Skips
- Pillow tanks
- Lined pits
- Drums

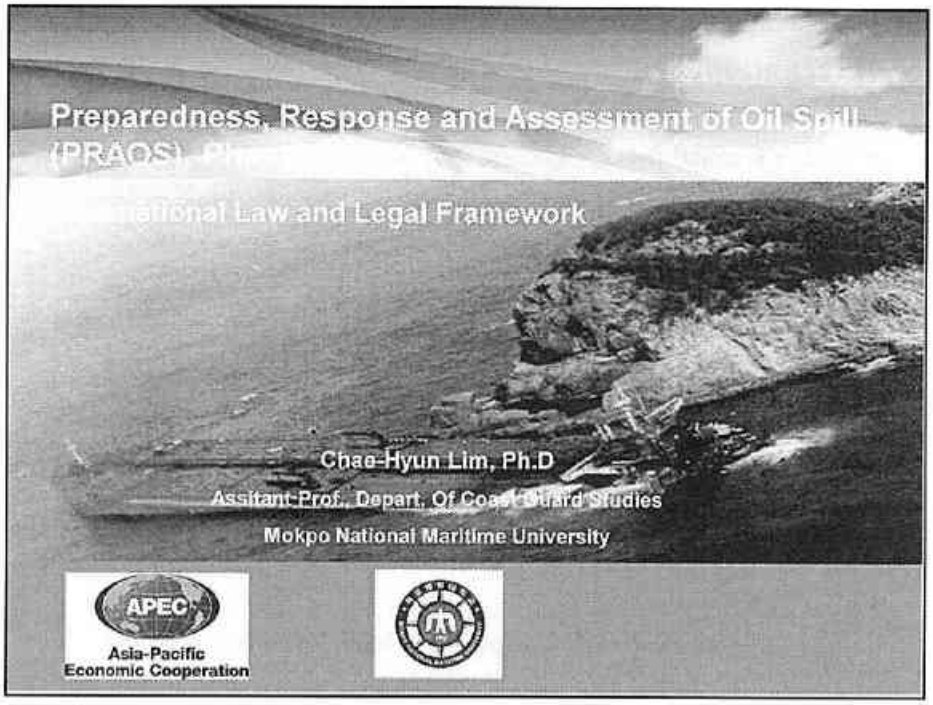


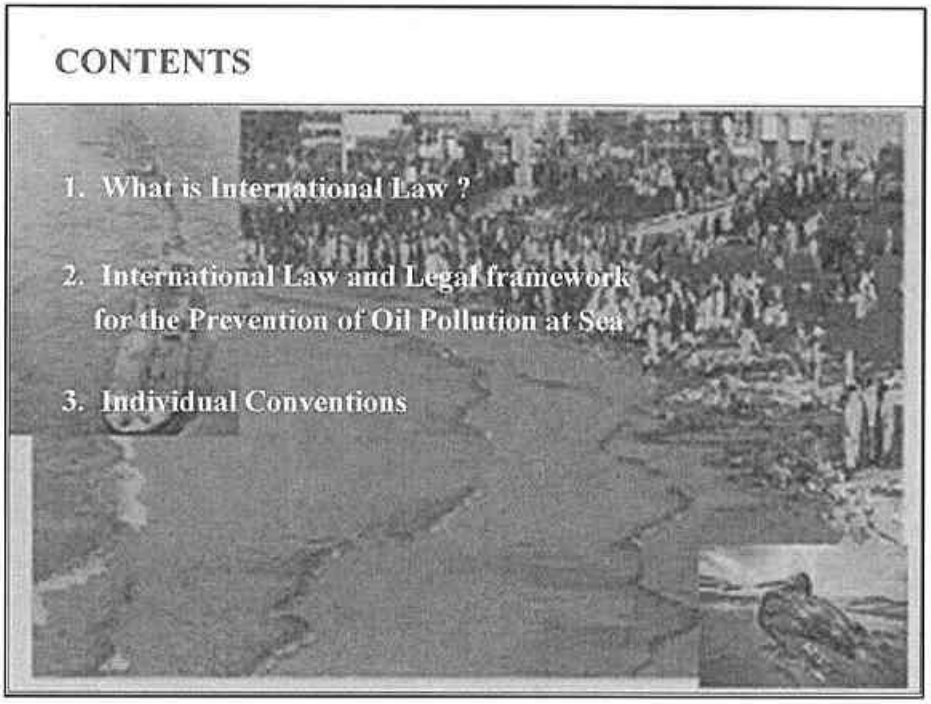
Disposal options

- Land fill
- Reprocessing
- Incineration
- Stabilization
- Bioremediation

Summary

- Considerations for conducting a shoreline cleanup
- Cleanup stages
- Shoreline character
- Cleanup methods
- Waste management





International Law

- What is International Law ?
  - International law might be defined as "the body of law that governs the legal relations between or among international communities"
  - Source of international law – formal sources or material sources
    - Formal sources : treaty, international customary law
    - Material sources : the general principles of law, decisions, teachings, equity(*aequo et bono*), resolutions of international organizations, etc.
  - Generally considering the laws included in Article 38 of Statute of the International Court of Justice (ICJ) as a source of international law, but not limited to the Article
    - Exhaustive ?
    - Possible additional sources would be suggested : many soft laws ?

International Law

- Statute of the ICJ, Article 38(1), (2)

Article 38

1. The Court, whose function is to decide in accordance with international law such disputes as are submitted to it, shall apply:
   a. international conventions, whether general or particular, establishing rules expressly recognized by the contesting states;
   b. international custom, as evidence of a general practice accepted as law;
   c. the general principles of law recognized by civilized nations;
   d. subject to the provisions of Article 59, judicial decisions and the teachings of the most highly qualified publicists of the various nations, as subsidiary means for the determination of rules of law.
2. This provision shall not prejudice the power of the Court to decide a case ex *aequo et bono*, if the parties agree thereto.

- International court is not willing to use "the general principles of law" as a source of international law for the reason of '*non liquet*'

International Law

- The Framework of International Law relating to Marine Pollution

Customary International Law

- "State must not permit their nationals to discharge into the sea matter that could cause harm to the nationals of other states"
  - Too vague to be effective
  - Incapable of developing into the detailed emission standards or liability regimes
- The customary rules on jurisdiction considered to be inadequate and incapable to develop for effective action against pollution

Treaty

- Given the deficiencies of customary international law, the international law relating to marine pollution is contained almost wholly in treaties
  - First work, OILPOL 1954*
  - Subsequently, little attention on marine environment during UNCLOS I*
  - Since1969, a steady stream of treaties has been followed with growing international concern over marine pollution

General International Legal Framework

- Most International marine environmental legal regimes adopted and implemented by the International Maritime Organization (IMO) and also with assistance of UN agencies
- In general, IMO Conventions are eventually connected with the protection of marine environment
  - example) The safety of merchant ships (regulated by mostly SOLAS 1974*) is not connected with only the safety of life, ship and property at sea but also protection of marine environment
- UN plays a major role in protection and preservation of marine environment
  - Adopted constitutional legal framework of UNCLOS 1958, UNCLOS 1982 for protection and preservation of marine environment
  - Role of the United Nations Environment Programme (UNEP) – The Regional Seas Programme (RSP)

"to provide leadership and encourage partnership in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations"

General International Legal Framework

- The Regional Seas Programme (RSP)
  - Launched in 1974 in the wake of 1972 United Nations Conference for Human Environment (UNCHE) is one of UNEP's most significant achievement
  - Programme covers 18 regions of the world, specially 143 countries participate in 13 RSP established under the auspices of UNEP
  - Role of RSP
    - "To address the accelerating degradation of the world's oceans and coastal areas through the sustainable management and use of the marine and coastal environment, by engaging neighboring countries in comprehensive and specific actions to protect their shared marine environment"
  - Method to achieve the goal : Action Plan (mostly underpinned with a strong legal framework)
    - "To establish a comprehensive strategy and framework for protecting the environment and promote sustainable development"

International Maritime Conventions for the Safety and Security of Shipping and the Prevention of Marine Pollution by Ships

IMO

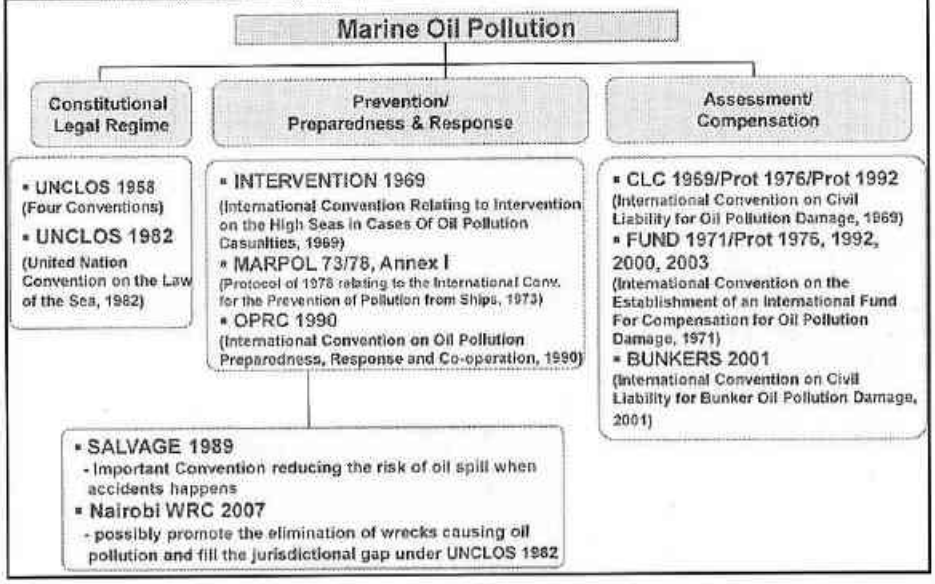
Environment/ Prevention of Marine Pollution	Liability and Compensation	Maritime Safety and Security	Others
• AFS 2001 • BWM 2004 • HONG KONG SRC 2009 • INTERVENTION 1969/ PORT 1973 • LC1972/PROT 1996 • MARPOL 73/78/PROT 1997 • OPRC 1990 • OPRC/HNS 2000	• BUNKERS 2001 • CLC 1969/PROT 1976/ PROT1992 • FUND 1971/PROT 1976/ PROT 1992/PROT 2000/ PROT 2003 • HNS 1996/PROT2010 • LLMC 1976/PROT 1996 • NAIROBI WRC 2007 • NUCLEAR 1971 • PAL 1974/PROT1976/ PROT 1990/PROT 2002	• CAPE TOWN AGREEMENT 2012 • COLREG 1972 • CSC 1972 • LL1966/PROT 1988 • SAR 1979 • SFV PROT 1993 • SOLAS 1974/AGR 1996/ PROT 1978/PROT 1988 • STP 1971/SPACE STP 1973 • STCW 1978/AMD 2010 • STCW-F 1995 • SUA 1988/SUA PROT 1988/ SUA 2005/SUA PROT 2005 • TONNAGE 1969	• DJIBOUTI CODE 2009 • FAL 1965 • IMO CONVENTION • INMARSAT OA 1976 • SALVAGE 1989 • COS-SAR 1988

The Regional Seas Programme for the Prevention of Marine Pollution

General International Legal Framework

- Thus, the international law and legal framework for preparedness, response and assessment of oil spill at sea generally include the conventions and legal regimes adopted by IMO and UN
- Four main sources of marine pollution : shipping, dumping, sea-bed activities, and land-based and atmospheric pollution
  - UN conventions give mainly jurisdictional right to states
  - IMO conventions stipulate mostly on marine pollution originated from shipping activities
  - International and regional conventions strive to regulate such pollution sources respectably
- Among such conventions, this session focuses on the International law and legal framework which is directly connected with preparedness, response and assessment of oil at sea, i.e. marine pollution from shipping activities

International Law and Legal Framework for preparedness, response and assessment of oil in general



UN Convention on the Law of the Sea (UNCLOS), 1982

- UNCLOS 1982 created partly a new norm of maritime jurisdiction and decided the breath of territorial sea
  - Internal waters, territorial sea, contiguous zone, Exclusive Economic Zone (EEZ), continental shelf, high seas, archipelagic zone etc.
  - Stipulates also the provisions on the protection and preservation of the marine environment (PART XII Protection and preservation of the marine environment) and marine scientific research
- UNCLOS 1982 vs. Customary International Law
  - UNCLOS 1982 is considered as a *Magna Carta* of the Sea including many provisions which is regarded as a customary international law, even though both are not perfectly match

UN Convention on the Law of the Sea (UNCLOS), 1982

➢ The Prescription and Enforcement of Marine Pollution Standards

Rules adopted prior to UNCLOS 1982		UNCLOS 1982	
Legislative	Enforcement	Legislative	Enforcement
▪ ICL, TSC 1958: Legislative jurisdiction to prescribe anti-pollution rules regardless of location belongs to flag state, And within territorial sea belongs to coastal state without hampering innocent passage ▪ MAPOL : flag state' s obligation to apply Convention' s standard and parties' obligation to prescribe the convention' s provisions for all vessels within its TS	▪ ICL : Flag state' s enforcement jurisdiction may be exercised to its vessels regardless their location. During their staying in another state' s port or TS, jurisdiction would be overlapped ▪ ICL, TSC 1958 : Coastal state' s jurisdiction for violation of foreign vessels within TS ▪ MARPOL : Party' s right to enforce for violation outside TS	▪ Article 21 (Laws and regulations of the coastal state relating to innocent) ▪ Article 24 (Duties of the coastal state) ▪ Article 42 (Laws and regulations of states bordering straits relating to transit passage) ▪ Article 56 (Rights, jurisdiction and duties of the coastal state in EEZ) ▪ Article 92 (Status of ships) ▪ Article 94 (Duties of the flag state) ▪ Article 211 (Pollution from vessels) : Including flag state, coastal state, port state	▪ Article 25 (Rights of protection of the coastal state) ▪ Article 56 (Rights, jurisdiction and duties of the coastal state in EEZ) ▪ Article 92 (Status of ships) ▪ Article 217, 218, 220 (Enforcement by flag states, port states, coastal states) ▪ Article 219 (Measures relating to seaworthiness of vessels to avoid pollution) ▪ Article 221 (Measures to avoid pollution arising from maritime casualties
		▪ Article 234 (Ice-covered areas) : Coastal state' s legislative and enforcement jurisdiction	

UN Convention on the Law of the Sea (UNCLOS), 1982

➢ Territorial Sea (TS)
- Territorial sovereignty confers on coastal state (Article 2)
- Coastal state may adopt laws relating to innocent passage in respect of the preservation of the environment and the prevention, reduction and control of pollution thereof (Article 21(1)(g))
- Restriction : "Such laws shall not apply to the design, construction, manning or equipment of foreign ships unless they are giving effect to generally accepted international rules or standards" (Article 21(2))
- Due publicity shall be given, and foreign ships exercising the right of innocent passage shall comply such law (Article 21(4))
- Coastal state may take the necessary steps in its territorial sea to prevent passage which is not innocent (Article 25(1))

➢ Exclusive Economic Zone (EEZ)
- Coastal state has the jurisdiction with regard to the protection and preservation of the marine environment (Article 56(1)(b)(iii)) under the condition of giving due regard to the rights and duties of other states

UN Convention on the Law of the Sea (UNCLOS), 1982

- Part XII of UNCLOS 1982 embodies the rules and regulations for the protection and preservation of marine environment which are stipulated in previous parts
  - "States have the obligation to protect and preserve the marine environment" (Article 192)
  - It is not only the right but also the obligation to all states
- Flag State;
  - Has prescription right for their vessels wherever they may be, but such pollution laws shall be adopted 'at least have same effect as that of generally accepted international rules and standards established through the competent international organization or general diplomatic conference' (Article 211(2))
  - Not only may enforce violations of pollution laws applying to their vessels wherever committed, but must do so (Article 217)

UN Convention on the Law of the Sea (UNCLOS), 1982

- Coastal State;
  - The legislative competence has been reduced by the Convention in respect of the kind of pollution regulations comparing with the previous laws under International Customary Law, even though the breath of territorial sea is increased and the new regime of EEZ has been adopted
  - The coastal state may prescribe pollution regulations for foreign vessels in innocent passage, provided such regulations do not apply to the design, construction, manning or equipment of foreign ships unless they are giving effect to generally accepted international rules or standards
  - Where these rules are considered inadequate to provide sufficient ecological protection for certain areas of the EEZ, State may adopt regulations implementing international rules and standards or navigational practices which the IMO has made applicable to special areas, or may adopt additional regulations of its own
  - In relation with enforcement, Article 220 prescribes such as physical inspection, arrest, and legal proceedings, etc.

UN Convention on the Law of the Sea (UNCLOS), 1982

- Port State;
  - May adopt anti-pollution legislation for foreign vessels in its ports, and even make observance of particular standards a condition of entry to its ports with due publicity (Article 211(3))
  - May arrest in one of its ports and prosecute a vessel which is alleged to have violated the state's pollution laws/or applicable international rules in its Territorial sea (TS), or EEZ (Article 220(1)) and in other state's TS or EEZ if that state or flag state so request
  - Port state enforcement(Article 218) vs. Port state control (Article 219)
    - ✓ Port state may take legal proceedings against a vessel in one of its ports that is alleged to have discharged polluting matter outside that state's TS or EEZ in violation relevant rules
    - ✓ Where a port state has ascertained that a vessel in one of its ports is 'in violation of applicable international rules and standards relating to seaworthiness of vessels and thereby threatens damage to the marine environment', it shall take administrative measures to prevent the vessel from sailing until the causes of the violation have been removed
    - ✓ Post control vs. Proactive control

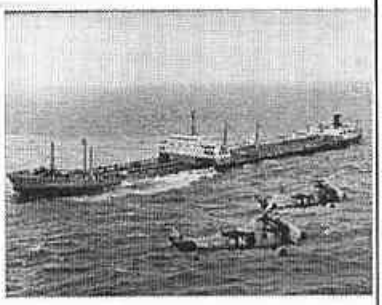
MARPOL Annex I

- Regulations for the Prevention of Pollutions by Oil
  - Since entered into force on 2 Oct. 1983, substantially amended, updated and re-formatted on several occasions
  - Applied to all ships to prevent of oil pollution from them
- Considered as main contributor to drastic decreasing of oil pollution, accidentally and operationally, over the last 30 years
- Main regulations
  - ✓ Issue or endorsement of certificate
  - ✓ Design and construction of oil tankers' cargo area and all ships' machinery space(SBT, slops, subdivision, double hull, ISC, etc)
  - ✓ Oil Record Book
  - ✓ Piping and pumping arrangement
  - ✓ Tank cleaning, COW
  - ✓ Oil filtering equip. and oil discharge monitoring system
  - ✓ Shipboard oil pollution emergency plan
  - ✓ Shore reception facilities
  - cial area, special requirement for Antarctic area

INTERVENTION 1969

rey Canyon and the Convention

- The legality of bombing to *Torrey Canyon* on the high sea was questioned by UK to IMO, and thus IMO adopted the Convention



➢ Intervention on the high seas

"Parties may take such measures on the high seas as may be necessary to prevent, mitigate or eliminate grave and imminent danger to their coastline or related interests from pollution or threat of pollution of the sea by oil, following upon a maritime casualty or acts related to such a casualty, which may reasonably be expected to result in major harmful consequences"(Article 1)

INTERVENTION 1969

Accident/ Oil Spill

- Obligation of the coastal state to consult with the affected states and persons physical or corporate, or possibly independent experts, before any measure taken
- Coastal state shall take into account any views persons may submit
- No consultation needed in case of urgency situation

Intervention

- Obligation to use its best endeavors to avoid any risk to human life before or during taking measures, and assist the persons in distress and help the repatriation of ships crews
- Any measures shall keep the principle of proportionality

Report/ Compensation

- Measures shall be notified without delay to the states, the known physical or corporate persons, and the Secretary General of the IMO
- Measures shall cease as soon as that end has been achieved
- Any party which has taken measures in contravention of the Convention causing damage to others shall be obliged to pay compensation to the extent of the damage caused by measures exceeding reasonably necessary means

INTERVENTION 1969

- Adoption of the Convention
  - Under ICL, the exclusive jurisdiction of flag state in relation to the ships on the high seas was only allowed at the time of *Torrey Canyon* accidents
  - Since then, UNCLOS 1982 Article 221 and ICL allow the jurisdiction of coastal state on the high seas in case of the actual or threatened damage to protect their coastline or related interest
- Proportionality and related interests
  - 'Related interests' include fisheries activities, tourist attractions, the health of the coastal population and the wellbeing of the area concerned, and conservation of living marine resources and of wildlife
  - Proportionality shall take into account 'the extent and probability of imminent damage if those measures are not taken', 'the likelihood of those measures being effective', and 'the extent of the damage which may be caused by such measures'

INTERVENTION 1969

- Application
  - This Convention applies 'on the high seas' which means the area beyond the territorial sea of coastal state
  - No EEZ regime was established at the time of adoption of the Convention
  - Then EEZ ?
  - Thus, it is reasonable to consider the application area of the Convention should be understood to mean 'beyond the territorial sea' including EEZ

OPRC 1990

- Even though prevention of oil pollution is of paramount importance, states still need a second tier of protection of marine environment like as :
  - Oil Pollution Preparedness, Response and Co-operation, OPRC, 1990(also OPRC-HNS 2000)
  - This regime was adopted after the *Exxon Valdez* incident occurred in Prince William Sound, Alaska, on March 24, 1989

OPRC 1990

- OPRC 1990 provides :
  - a framework for the development of national and regional capacity and system to prepare for and respond to oil pollution incidents
- OPRC 1990 facilitates :
  - international co-operation and mutual assistance in preparing for and responding to major oil pollution incidents

OPRC 1990

◈ Obligations of Flag State

- Oil pollution emergency plans required to : (Article 3)
  - Ships
  - Offshore units
- Reporting procedures (Article 4)
  - report without delay any event on the ship or offshore unit involving a discharge or probable discharge of oil(masters or a person in charge) to;
  - report without delay any observed event at sea involving a discharge of oil or the presence of oil to;
  - the nearest coastal state

OPRC 1990

◈ Obligations of Coastal State Received Report

- Action on receiving an oil pollution report (Article 5)
  - Assess the event whether it is an oil pollution incident and the nature, extent and possible consequences
  - Inform all states affected or likely to be affected and IMO if the event is severe directly or, as appropriate, through the relevant regional organization
  - Any other affected states inform the organization if the event is severe

OPRC 1990

◈ Obligations at National Level

➢ National and regional systems for preparedness and response: (Article 6)

1. National system
   - ❖ National contingency plan
   - ❖ Designated national authorities
   - ❖ National operational contact point

2. Individually or through bilateral/multilateral co-operation, and, as appropriate, in co-operation with the oil and shipping industries, port authorities
   - ❖ Pre-positioned oil spill combating equipment
   - ❖ Programme of exercises and training of personnel
   - ❖ Detailed plans and communication capabilities
   - ❖ Mechanism for coordinating the response

► Republic of Korea

➢ Marine Environment Management Act
- Enacted in 2007 in replacing of the forerunner of the Marine Pollution Prevention Act
- The act incorporated most international legal regimes adopted for the protection and preservation of marine environment

➢ 'The National Emergency Control Plan' (translation)
- This plan has been adopted and implemented since 2000, and amended after MT *Hebei Spirit*
- This plan was adopted based on the legal ground of the Marine Pollution Prevention Act, OPRC 1990 and OPRC-HNS 2000

➢ Korea Coast Guard is the designated authority

► Republic of Korea - continued

- Establishment of North-West Pacific Action Plan(NOWPAP) as a Regional Sea Programme
  - The MOU on Regional Cooperation regarding Preparedness and Response to Oil Spills in the Marine Environment of the Northwest Pacific Region, 2004/5
- Pre-positioned oil spill combating equipment in three different places of Dae San, Kwang Yang, Ulsan

OPRC 1990

◈ Obligations and Cooperation at International Level

- Inform neighboring countries (Article 5)
- Provide upon request advisory services, technical support and equipment (Article 7)
- Take necessary legal or administrative measures to facilitate Receiving assistance (of ships or aircraft engaged in responding to an oil pollution, or transporting personnel, cargoes, materials and equipment) (Article 7)
- Promote and exchange the results of Research and Development programmes (relating to the enhancement of the state-of-the-art of oil pollution preparedness and response) (Article 8)

OPRC 1990

◈ Obligations and Cooperation at International Level

- Provide Support to requesting Parties in, training, availability of technology, equipment and facilities, other measures and arrangements, joint R&D programmes (Article 9)
- Promote cooperation in preparedness and response through bilateral and multilateral Agreements (Article 10)

OPRC 1990

◈ Role of IMO

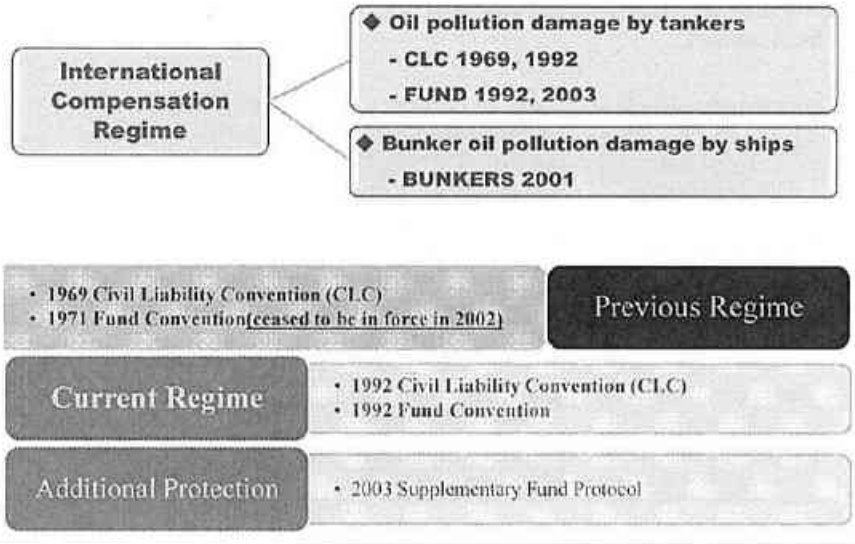
- Institutional arrangement is required to IMO (Article 12)
  - Parties designate the IMO to perform;
    - ❖ Information services
    - ❖ Education and training
    - ❖ Technical services
    - ❖ Technical assistance

OPRC 1990

◈ **Achievements**

- New regional agreements/regional sea programme have been developed in cooperation with UNEP
- Support to the existing regional action plan
- Regular organization of International R&D Forum, a meeting place for exchange of latest result of research in the field of spill response

International Compensation Regime for Oil pollution

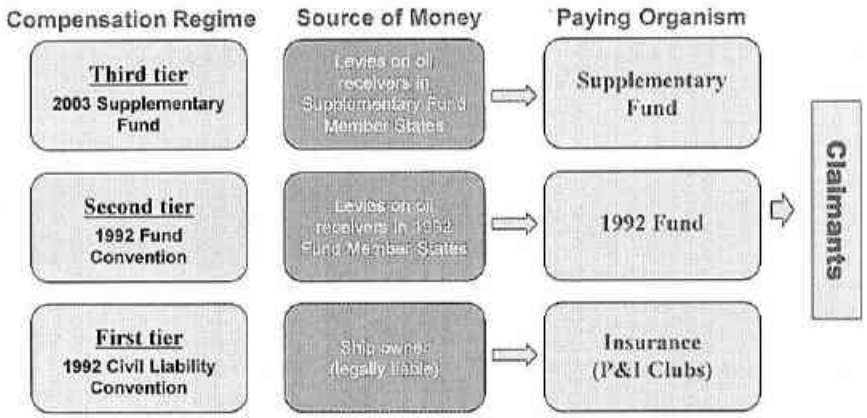


International Compensation Regime for Oil pollution

- Establishment of the Regimes
  - *Torrey Canyon* accident exposed a number of serious shortcomings, in particular the absence of an international agreement on liability and compensation in the event of such a spill
  - This situation led the establishment of the regimes for compensation for victims of oil pollution damage from tankers : CLC 1969, Fund 1971
  - Over time, the amount of compensation available for major incidents needed to be increased, and subsequently establish the CLC 1992, Fund 1992 & 2003
  - The Bunkers Convention was adopted in 2001 to ensure that adequate, prompt, and effective compensation is available to persons who suffer damage caused by spills of oil, when carried as fuel in ships' bunkers

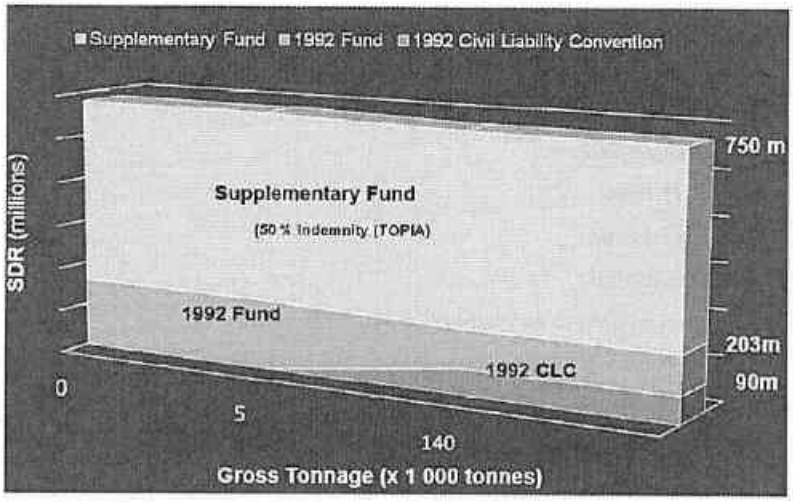
International Compensation Regime for Oil pollution

- Works of the regimes for oil pollution resulting from spills of persistent oil from tankers



International Compensation Regime for Oil pollution

- Maximum Limits of Compensation under the Regimes



International Compensation Regime for Oil pollution

- Bunker Oil Pollution
  - BUNKER 2001is modelled on the CLC 1969
  - Ships over 1,000 GRT required to maintain insurance or other financial security to cover the liability of the registered owner for pollution damage in an amount equal to the limits of liability under the applicable national or international limitation regime, but in all cases not exceeding the Convention on Limitation of Liability for Maritime Claims (LLMC) 1976, as amended
  - This convention shall not apply to pollution damage as defined in the CLC

International Compensation Regime for Oil pollution

- Application of the Regimes
  - Pollution damage
  - Spills of persistent oil from tankers
  - Territory, territorial sea and EEZ or equivalent
  - Preventive measures
  - 'Mystery spills'
- Main Types of Claim
  - Property damage
  - Clean-up operations and preventive measures
  - Losses in fishery, mariculture and tourism sectors (Consequential loss & Pure economic loss)
  - Environmental damage (limited to costs of reasonable measures of reinstatement actually undertaken or to be undertaken)

Pollution has no border !
It is a problem for all !

Thank you for your attention!

Glossary (Abbreviations of IMO Conventions)

Abbreviation	Title
AFS 2001	International Convention on the Control of Harmful Anti-Fouling Systems, 2001 (ANTI-FOULING)
ARREST CONVENTION 1999	International Convention on the Arrest of Ships, 1999 (ARREST 1999)
BUNKERS 2001	International Convention on Civil Liability for Bunker Oil Pollution Damage, 2001 (Bunkers Convention)
BWM 2004	International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004
CLC 1969	International Convention on Civil Liability for Oil Pollution Damage, 1969 (CLC 1969)
CLC PROT 1976	Protocol to the International Convention on Civil Liability for Oil Pollution Damage, 1969 (CLC PROT 1976)
CLC PROT 1985	Protocol of 1984 to amend the International Convention on Civil Liability for Oil Pollution Damage, 1969 (CLC PROT 1984)
CLC PROT 1992	Protocol of 1992 to amend the International Convention on Civil Liability for Oil Pollution Damage, 1969 (CLC PROT 1992)
COLREG 60	International Regulations for Preventing Collisions at Sea, 1960 (COLREG 1960)
COLREG 72	Convention on the International Regulations for Preventing Collisions at Sea (COLREG 72)
COS-SAR 1988	The International Cospas-Sarsat Programme Agreement (COS-SAR 1988)
CSC 1972	International Convention for Safe Containers, 1972, as amended (CSC 1972)
FAL 1965	Convention on Facilitation of International Maritime Traffic, 1965, as amended (FAL 1965)

Glossary (Abbreviations of IMO Conventions)

Abbreviation	Title
FUND 1971	International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, 1971 (FUND 1971)
FUND PROT 1976	Protocol to the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, 1971 (FUND PROT 1976)
FUND PROT 1984	Protocol of 1984 to amend the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, 1971 (FUND PROT 1984)*
FUND PROT 1992	Protocol of 1992 to amend the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, 1971 (FUND PROT 1992)
FUND PROT 2000	Protocol of 2000 to the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, 1971
FUND PROT 2003	Protocol of 2003 to amend the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, 1992
HONG KONG CONVENTION	International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009
HNS 1996	International Convention on Liability and Compensation for Damage in connection with the Carriage of Hazardous and Noxious Substances by Sea, 1996 (HNS 1996)
HNS-OPRC	Protocol on Preparedness, Response and Co-operation to Pollution Incidents by Hazardous and Noxious Substances, 2000 (HNS-OPRC)
HNS PROT 2010	Protocol of 2010 to amend the International Convention on Liability and Compensation fr Damage in connection with teh carriage of hazardous and noxious substances by sea, 1996

Glossary (Abbreviations of IMO Conventions)

Abbreviation	Title
INMARSAT OA	Operating Agreement on the International Maritime Satellite Organisation (INMARSAT), as amended (INMARSAT OA)
INMARSAT 1976	Convention on the International Maritime Satellite Organisation (INMARSAT) 1976, as amended (INMARSAT C)
INTERVENTION 1969	International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, 1969 (INTERVENTION 1969)
INTERVENTION PROT 1973	Protocol relating to Intervention on the High Seas in Cases of Pollution by Substances other than Oil, 1973, as amended (INTERVENTION PROT 1973)
LC 1972	Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972, as amended (LC (amended) 1972)
LC PROT 1996	Protocol of 1996 to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and other matter, 1972
LLMC 1976	Convention on Limitation of Liability for Maritime Claims, 1976 (LLMC 1976)
LLMC PROT 1996	Protocol of 1996 to amend the Convention on Limitation of Liability for Maritime Claims, 1976 (LLMC PROT 1996)
LLPROT 1988	Protocol of 1988 relating to the International Convention on Load Lines, 1966 (LLPROT 1988)
LOAD LINES 1966	International Convention on Load Lines, 1966 (LL 1966)

Glossary (Abbreviations of IMO Conventions)

Abbreviation	Title
MARPOL PROT	Protocol of 1978 relating to the International Convention for the Prevention of Pollution from ships, 1973, as amended (MARPOL PROT)
MARPOL PROT 1997	Protocol of 1997 to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL PROT 1997) (Annex VI on the prevention of air pollution from ships)
MARPOL 1973	International Convention for the Prevention of Pollution from Ships, 1973 (MARPOL, 1973)
MLM 1993	International Convention on Maritime Liens and Mortgages, 1993 (LIENS AND MORTGAGES)
NUCLEAR 1971	Convention relating to Civil Liability in the Field of Maritime Carriage of Nuclear Material, 1971 (NUCLEAR 1971)
OILPOL 1954	International Convention for the Prevention of Pollution of the Sea by Oil, 1954, as amended (OILPOL 1954)
OPRC 1990	International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990 (OPRC 1990)
PAL 1974	Athens Convention relating to the Carriage of Passengers and their Luggage by Sea, 1974 (PAL 1974)
PAL PROT 1976	Protocol to the Athens Convention relating to the Carriage of Passengers and their Luggage by Sea, 1974 (PAL PROT 1976)
PAL PROT 1990	Protocol of 1990 to amend the Athens Convention relating to the Carriage of Passengers and their Luggage by Sea, 1974 (PAL PROT 1990)

Glossary (Abbreviations of IMO Conventions)

Abbreviation	Title
PAL PROT 2002	Protocol of 2002 to amend the Athens Convention relating to the Carriage of Passengers and their Luggage by Sea, 1974 (PAL PROT 2002)
SALVAGE 1989	International Convention on Salvage, 1989 (SALVAGE 1989)
SAR 1979	International Convention on Maritime Search and Rescue, 1979 (SAR 1979)
SFV 1977	Torremolinos International Convention for the Safety of Fishing Vessels, 1977 (SFV 1977)
SFV PROT 1993	Torremolinos Protocol of 1993 relating to the Torremolinos International Convention for the Safety of Fishing Vessels, 1977 (SFV PROT 1993)
SOLAS 1960	International Convention for the Safety of Life at Sea, 1960 (SOLAS 1960)*
SOLAS 1974	International Convention for the Safety of Life at Sea, 1974, as amended (SOLAS 1974)
SOLAS PROT	Protocol of 1978 relating to the International Convention for the Safety of Life at Sea, 1974, as amended (SOLAS PROT)
SOLAS PROT (HSSC) 1988	Protocol of 1988 relating to the International Convention for the Safety of Life at Sea, 1974 (SOLAS PROT (HSSC) 1988)
SPACE STP 1973	Protocol on Space Requirements for Special Trade Passenger Ships, 1973 (SPACE STP 1973)
STCW 1978	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended (STCW 1978)

Glossary (Abbreviations of IMO Conventions)

Abbreviation	Title
2010 Manila STCW Amendments	2010 Manila amendments to the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978 and the Seafarers' Training, Certification and Watchkeeping (STCW) Code
STCW-F	International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel, 1995 (STCW-F)
STP 1971	Special Trade Passenger Ships Agreement, 1971 (STP 1971)
SUA 1988	Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation (SUA 1988)
SUA PROT 1988	Protocol for the Suppression of Unlawful Acts against the Safety of Fixed Platforms located on the Continental Shelf (SUA PROT 1988)
SUA PROT 2005	Protocol of 2005 to the Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation (SUA PROT 2005)
TONNAGE 1969	International Convention on Tonnage measurements of Ships, 1969 (TONNAGE 1969)
WRC 2007	Nairobi International Convention on the Removal of Wrecks, 2007 (WRC 2007)
2010 Manila STCW Amendments	2010 Manila amendments to the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978 and the Seafarers' Training, Certification and Watchkeeping (STCW) Code
STCW-F	International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel, 1995 (STCW-F)