

LECTURE

CONTROL OF MARINE POLLUTION

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LECTURE 4

PREVENTION AND RESPONDING TO MARINE POLLUTION INCIDENTS

CONTENT

- PREVENTION OF POLLUTION FROM LAND-BASED SOURCES
- PREVENTION OF POLLUTION FROM SHIP





THREATS TO CORAL REEFS LAND-BASED SOURCES OF POLLUTION



DEFINITION



ited Nations Convention on the Law of the Sea, article 207: "Pollution of the marine om land includes pollution arising from rivers, creeks, estuaries, pipelines and

a separate provision for the pollution of the marine environment caused by activities ler national jurisdiction, or derived from artificial islands and equipment works in the 208).

SOURCES OF MARINE POLLUTION

Defined source

 A source is considered to be identified if it can be exactly pinpointed where pollutants are released into the marine environment and can be categorized into metals, organics, hazardous compounds, etc.

Unidentified sources

- Unidentified sources are dispersed sources that reach the marine environment through indirect routes such as the atmosphere, precipitation falling into rivers and out...
- These unidentified sources can be divided into four categories related to urban, agricultural, industrial and construction development.





SOURCES OF MARINE POLLUTION

Agenda 21 of the Rio Conference on Environment and Development stated:

- Land-based source accounts for 80% of marine pollution, with marine transportation operations and sea submersion contributing 10% each.
- Pollutants pose a strong threat to the marine environment.
 - Wastewater, organic matter, synthetic organic components, sediments, waste
 - + Plastic, metal, radioactive, oil bags
 - + Aromatic Synthetic Petroleum Compounds (PAH)).



 Many of the pollutants that come from land-based are specifically related to the marine environment because they represent the same period of toxicity, stability, and the ability to accumulate toxic substances in the food chain.

SOURCES OF MARINE POLLUTION





- Up to two thirds of marine resources may be negatively impacted by pollution coming from the land-based, as the majority of marine resources take up nutrients either directly or indirectly from estuarine water sources.
- The destruction of marine facilities, which adversely affects tourism, contaminates beaches, prevents sea turtles from laying eggs, and decreases the productivity and biodiversity of the maritime environment.
- Human health and resource threats.
- Pollutant deposition gradually alters the quality of seawater and the physical features of the coastal marine environment, resulting in the deterioration of vital ecosystem habitats.



IMPACTS

- According to GESAMP figures, 10% of land waste is dumped into the sea and 90% is transported by other routes, with the two most significant sources of pollution entering coastal waters being domestic wastewater and agricultural waste from fertilized fields.
 - The most alarming part is how nonbiodegradable trash, such as plastic bags, water bottles, and fishing nets, is carelessly thrown on beaches and other coastal areas..
- If not effectively prevented, hot water that absorbs heat from nuclear power plant equipment will be dumped into rivers and estuaries and destroy marine ecosystems.





IMPACTS

 Oceans and coastal provide crucial ecological roles by maintaining food chains, controlling climate, and facilitating transportation. This ecosystem's functional value is estimated to be \$2.5 billion annually, ranking it as the seventh largest economy in the world (GEF,2018). With fisheries depletion, hurricane damage to the Gulf of Mexico, decreased tourism earnings, and other effects, it is estimated that environmental deterioration of coastlines and oceans costs \$350-940 billion yearly. other (GEF, 2018).

The restriction of this source of land-based pollution is tied to the problem of countries exploiting natural resources in accordance with their environmental policies. International environmental law has few specific provisions on this issue. The obligation to protect the marine environment from activities derived from land is established in article 207 by the 1982 United Nations Convention on the Law.

1. States shall adopt laws and regulations to prevent, reduce and control pollution of the marine environment from land-based sources, including rivers, estuaries, pipelines and outfall structures, taking into account internationally agreed rules, standards and recommended practices and procedures.

2. States shall take other measures as may be necessary to prevent, reduce and control such pollution

3. States shall endeavour to harmonize their policies in this connection at the appropriate regional level.

4. States, acting especially through competent international organizations or diplomatic conference, shall endeavour to establish global and regional rules, standards and recommended practices and procedures to prevent, reduce and control pollution of the marine environment from land-based sources, taking into account characteristic regional features, the economic capacity of developing States and their need for economic development. Such rules, standards and recommended practices and procedures shall be re-examined from time to time as necessary.

5. Laws, regulations, measures, rules, standards and recommended practices and procedures referred to in paragraphs 1, 2 and 4 shall include those designed to minimize, to the fullest extent possible, the release of toxic, harmful or noxious substances, especially those which are persistent, into the marine environment.

Montreal Guide 1985

The Montreal Guidelines on marine pollution of land origin were a non-binding document adopted by UNEP in 1985. In order to reduce marine pollution coming from land-based, this guideline urges for negotiations on global standards and principles. It offers advice on substance classification and control measures.

THE GLOBAL PROGRAMME OF ACTION FOR THE PROTECTION OF THE MARINE ENVIRONMENT FROM LAND-BASED ACTIVITIES (GPA)

> Through regional marine treaties, nations are urged to engage in regional cooperation on topics like harmonizing pollutant discharge rules and jointly protecting coastal habitats.

The GPA was adopted by 108 Governments, and the European Commission at an intergovernmental conference convened in Washington, D.C., in 1995.

The GPA's focus has gradually narrowed to three primary areas: wastewater, nutrient management, and marine litter (Kimball, 1995; Vanderzwaag and Powers, 2008; UNEP).

THE GLOBAL PROGRAMME OF ACTION FOR THE PROTECTION OF THE MARINE ENVIRONMENT FROM LAND-BASED ACTIVITIES (GPA)



Prevent the degradation of the marine environment from land-based activities by helping countries conserve and protect the marine environment.

> Assist countries in taking autonomous or appropriate steps that are compatible with their policies, objectives, and resources in order to progress toward preventing, minimizing, controlling, and/or eliminating deterioration of marine habitats, as well as restoring them from the consequences of land-based activities.

THE GLOBAL PROGRAMME OF ACTION FOR THE PROTECTION OF THE MARINE ENVIRONMENT FROM LAND-BASED ACTIVITIES (GPA)

Identify nine types of sources of marine and coastal pollution: wastewater, hard-to-decompose organic pollutants (POP), radioactive substances, heavy metals, oils (hydrocarbons), nutrients, sedimentary movement, waste, and physical changes and habitat destruction Propose a streamlined sequence of problem assessments, priority settings, management strategies, assessments, and finances to address these sources of pollution

Create a clearinghouse to increase access to information and expertise in each field.

GLOBAL PARTNERSHIPS

A five-year strategy for cooperation on wastewater pollution, fertilizer management, and ocean discharge operations was put into place by UNEP and GPA in January 2019. It emphasizes the various global partnerships the GPA has. Later that year, at the United Nations General Assembly, governments decided that operations in each of these three sectors should become part of UNEP's regular work schedule.



NUTRIENT MANAGEMENT



NUTRIENT MANAGEMENT

INDIA: Linking land-based activities to the ecosystem dynamics and nutrient management of the Pulicat Lagoon in India



CHINA: Linking land-based activities to the ecosystem dynamics and nutrient management of Chongming Island in China



SRI LANKA: Reduce the risk of degradation of Kayankerni and Paskudah reef ecosystems in Sri Lanka by addressing sources of nutrition, wastewater and other sources of landbased marine pollution in the Maduru Oya basin



WASTE MANAGEMENT



WASTE MANAGEMENT

AFRICA: SHARE YOUR STORY: 100 African Voices



Nestlé: <u>has committed</u> to making all its plastic packaging 100% recyclable or reusable by 2025. They want to encourage the use of plastics that allow for better recycling rates and eliminate or Changing complex combinations of plastics makes recycling difficult..

Unilever: committed to ensuring that all of their plastic packaging is fully reusable, recyclable or compostable by 2025.

<u>Volvo:</u> At least 25% of the plastics used in the company's new models from 2025 will be made from recycled materials..

Dell Set a goal of making its packaging 100% wastefree by 2020, using raw materials from sustainable sources.

FLIPFLOPI PROJECT: The Clean Sea campaign launched a traditional dhow boat on Lake Victoria in 2019 made entirely from recycled plastic, including discarded footwear. The boat is used for awarenessraising activities in Kenya, Tanzania and Uganda. (Photo by Mike Muzurakis, IISD/ENB)



WASTEWATER MANAGEMENT

INITIATIVES TO PROMOTE WASTEWATER MANAGEMENT PRACTICES

Is a voluntary network of stakeholders with the International Steering Committee and the Secretariat provided by UNEP/GPA

As a global multi-stakeholder platform comprised of UN agencies, international organizations, governments, scientists, the private sector, large groups and stakeholders to provide the foundation for partnerships to launch comprehensive programmes, Effective and sustainable to solve the problem of wastewater management.

As a space to work in thematic group on key issues, challenges and potentials of wastewater, such as wastewater reuse, nutrient removal, biogas production

WASTEWATER MANAGEMENT

THE INITIATIVE PROMOTES WASTEWATER MANAGEMENT PRACTICES.

Supportive Policies: Initiatives to assist countries in sharing information, developing and applying the right policies and guidelines for sustainable management of wastewater and sanitation. Appropriate technical technology: Operational initiatives aimed at reducing wastewater pollution through demonstration projects and technical support.

Innovation Finance: The initiative serves as a bridge between various stakeholders, including the private sector, to leverage additional resources, solutions, and opportunities for wastewater recovery and reuse. Raising awareness and building capacity: The initiative strives to produce and disseminate outreach materials to raise awareness of the challenges and opportunities associated with wastewater management. It requires addressing the capacity gap of target groups through special tools, publications, training materials and online

- Land-based sources of marine pollution are a complex and large-scale set of problems that no regulated approach or overall program can adequately address.
- Global governance responses have become more specialized over time, focusing on specific pollutants, such as the Stockholm Convention on POP substances and the Minamata Convention on Mercury.
- However, as a program of international cooperation and support for national actions, the GPA has created change. By 2018, 107 countries had relevant policy frameworks (UNEP, 2018). The GPA has advanced its knowledge of sources of land-based marine pollution through the implementation of scientific assessments and the publication of guidelines for countries.

In Viet Nam

Article 46 Law on natural resources and environment of Sea and Islands, 2015 Ministry of natural resources and environment

Controlling marine environmental pollution from the mainland, regulations:

- 1. Waste generated from production, business and daily life activities on land, before being discharged into the sea, must be treated up to environmental technical regulations.
- 2. The arrangement of points for discharging treated wastewater into the sea must be considered on the basis of natural conditions of the wastewater discharge area; dynamics, environment, ecology and biodiversity, resources and current status of exploitation and use of sea areas. Points for discharging wastewater into marine protected areas, beach areas, coastal scenic spots and landscapes must be assessed, considered and treated according to the provisions of the law on environmental protection.

3. Production, business and service establishments on coastal lands and on islands must have adequate means and equipment for waste treatment to ensure environmental technical standards are met; must periodically report to competent state management agencies on the current status of waste treatment and discharge into the sea according to regulations of the Minister of Natural Resources and Environment.

4. Pollution sources from river basins to the sea must be closely investigated, evaluated and controlled





PREVENT POLLUTION FROM SEABED ACTIVITIES

SOURCES OF POLLUTION

Activities related to the seabed may include:

- Oil and gas exploration and exploitation activities;
- Exploration and mining activities,
- Drilling, digging, explosion activities aimed at building tunnels, laying cables, ducts ...

Seismic surveys, discharges, drilling fluids, boat traffic, installation of equipment works, drilling rigs, as well as dumping and leaks or incidents during exploration, Oil and gas exploitation such as rig explosions or collisions, oil spills when ships are anchored at rigs, all affect the quality of the marine environment.



IMPACT

Drilling fluid concentration:

- Every year, about 0.08 million tons of oil are released into the marine environment from offshore exploitation, of which 0.06 million tons are due to incidents.
- According to research, drilling activities introduce 98-99% of substances other than oil into the marine environment.
- The toxins contained in the waste can cause many harmful effects to the ecosystem: destroying biological species, reducing fertility, causing genetic mutations...
- Offshore exploration and production facilities and equipment are also obstacles to traffic and are often connected to pipelines that are prone to breakage. Their proximity to coastal areas increases the potential for adverse effects on marine life and reduces other marine convenience values.

0.5-1.0 g/l: Sea water has had an adverse effect on juveniles.

5-7 g/l: The fry will all die and the invertebrates will be destroyed.



PREVENT POLLUTION FROM SEABED ACTIVITIES

Section 17.30 of Agenda 21 requires countries to assess the need for additional measures to address the degradation of the marine environment caused by activities emanating from offshore oil and gas rigs. existing waste and safety regulations, and outlines actions to be taken within the framework of IMO and other relevant international organisations, sub-regional, regional or global.

POLLUTION CAUSED BY DUMPING OF HAZARDOUS SUBSTANCES AND OTHER SUBSTANCES

Cause

- · Transporting hazardous waste across borders
- High radioactive waste is produced from nuclear energy production activities.
- The accidents of nuclear submarines carrying nuclear warheads can also turn them into major sources of sinking pollution

Effect

 Chemicals and hazardous substances containing chemicals often have an impact on the environment based on their toxicity and duration and concentration in seawater.

For example: Minamata disease in Japan in the 50s and 60s of the twentieth century was the result of the dumping of chemical plants into the sea, which contaminated fish with mercury.

• Radioactive wastes that are dumped at sea can have adverse effects on marine organisms, especially young marine organisms, which are in the adult stage, causing genetic changes, mutations, and development of bad genes.





POLLUTION CAUSED BY DUMPING OF HAZARDOUS SUBSTANCES AND OTHER SUBSTANCES

Control method

The Program advises States to ratify the 1972 London Convention and the 1996 Protocol in order to prevent the source of pollution from submergence, and to consider outright banning dumping rather than allowing controlled submergence in low concentrations of nuclear waste (clause 22.5b). State participation in and enforcement of the Code of Practice for the Transboundary Transport of Radioactive Waste should also be increased.

In the IMO's 1974 International Convention on the Safety of Life at Sea (SOLAS 1974), Chapter VIII also contains regulations governing the operation of nuclear-powered non-military vessels. In November 1981, the IMO adopted the Nuclear Safety Code for commercial vessels.







PREVENTION OF POLLUTION FROM SHIP

Pollution caused by boats accounts for 12% of marine pollution. Vessels can cause air pollution due to a variety of functional activities: burning fuel in engines; burning garbage at sea; the use of CFCs (chlorofluorocarbons) and halons in refrigeration equipment and fire protection equipment; volatilization of some special substances on board during transportation, import, dismantling and washing of hold tanks. Pollutants from these sources can enter and impact the marine environment through the atmosphere.

According to Egard Gold, marine pollution from ships can be divided into the following five groups:

- Discharge operations from oil tankers when washing ships;
- Blowdown operations from all types of ships
- Oil spills, hazardous substances...due to incidents at sea such as collision, sinking, explosion, fire...;
- Spilling oil, hazardous substances..., in the process of loading, unloading, transporting and putting into storage;
- Intentionally dumping garbage, domestic wastewater



- According to the IMO, 90% of marine pollution incidents are caused by human errors when operating ships, only 10% are due to technical and mechanical faults.
- The majority of pollution caused by ships comes from unintentional or intentional dumping of water, waste generated from the normal activities of ships at sea or ballast water, bringing unnatural plants, animals and pathogens into the marine environment. Accidents at sea causing oil spills account for only about a quarter of all pollution due to The boat caused it..



Sources of pollution

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Non-oil substances that are discharged into the sea are normally solid and liquid waste, garbage and ballast water, hazardous substances, radioactive substances and domestic wastewater.

- Due to accidents at sea such as collisions, sinkings, loss of cargo, a large amount of these substances can spill into the marine environment.
- Nuclear-powered vessels or carrying radioactive substances are also a potential source of marine pollution.
- Domestic wastewater from ships, plastic wastes and sustainable materials, discharges ballast water from ships.

EFFECT

- Creates risk to human health, damages marine life and biological resources, degrades sensory values, or obstructs other permitted uses of the sea.
- The environmental effects of dangerous or toxic substances are: bacterial accumulation; destruction of biological resources (by toxins); damage to human health (through the mouth); damages human health (through skin and breathing, excretion) and reduces the sensory value and other conveniences of the sea
- Domestic wastewater from ships can contain the types of bacteria that pollute fishing grounds near shore and beaches. They can also damage coral reefs, destroying the ecological environment.



(EFFECT)

- The activities of fish, seabird colonies, and marine animals are hampered by plastic garbage and sustainable materials. Garbage diminishes the aesthetic value and beauty of coastal environments, including coral reefs, beaches, and undersea scenery.
- The disposal of sediments can have a direct impact on the marine environment, in which case they are polluting toxins, or indirectly by degrading oxygen or depositing on the sea floor.
- Discharging contaminated ballast or sediment into the waters of the port country can lead to the introduction of unwanted samples, seriously harming the existing ecological balance.
- The fact that there are epidemics can also be the result of the port waters being poisoned by large amounts of ballast water containing bacteria or viruses.



MARINE POLLUTION CAUSED BY NON-OIL SUBSTANCES

Control method

- To control this source of pollution, all ships must be equipped with equipment that can significantly limit garbage and wastewater. The ability to incinerate waste on the deck, recycle, reuse and other systems also need to be studied advancedly, especially to raise the awareness of people on board.
- The control and prevention of marine pollution caused by ballast water is a content of MARPOL Convention 73/78.
- On November 4, 1993, the IMO again adopted Resolution A. 774 (18) "Guidelines for preventing the introduction of unwanted pathogens from the discharge of ballast water and ship sediment". The general principle is as follows:
- i. States Parties may adopt procedures for discharging ballast and sedimentary vessels to protect the health of their citizens from external infectious agents, in order to protect fisheries and aquaculture, against foreign threats and to protect the environment in general.
- ii. The application of procedures for discharging ballast water and ship sediments in order to minimize the risk of importing unwanted seafood and pathogens, one can include in the provisions of quarantine laws to guidelines, recommend measures to control and limit the problem.
- iii. In any case, the authorities have the port of phầi considering the general impact of ballast discharge procedures and ship sediments on the safety of the ship and those on the deck.
- iv. The procedures for discharging ballast water and ship sediments need to be practical, efficient, designed so that the cost and storage time are lowest.

V.

MARINE POLLUTION CAUSED BY NON-OIL SUBSTANCES

Control method

The specific measures are as follows:

- **1.** For the normal operation of the vessel:
- i. Not discharging ballast water;
- Ballast water exchange and ship descaling shall be carried out at sea or in such areas as may be acceptable to the port State Government for that purpose;
- iii. Ballast water management aims to prevent or minimize contaminated water or sediment during ballast water intake and discharge operations;
- iv. Discharge of ballast water to onshore facilities for treatment and control.

Ô NHIỄM BIỂN DO CÁC CHẤT KHÔNG PHẢI DẦU

Control method

2. For training activities, awareness raising and management plansMARINE POLLUTION CAUSED BY NON-OIL SUBSTANCES

, it is necessary to:

Educating ship crews to be aware of the ecological and health hazards resulting from the improper entry and discharge of ballast water as well as the need to maintain cargo holds, equipment, anchors, cables, pipes from mud, sediment;

- i. Internship, short-term training on regulations on discharge of ballast water and sediment. The instructions shall include keeping the ship's logbook showing the date and time of entry, change and discharge of ballast water, salinity and geographical location of such operations;
- ii. Vessels shall have a ballast water management plan with the necessary information.
- iii. There should be an operating manual on the ship on the basis of this Guidance Resolution and should be in accordance with the ship's ballast water and sediment

Cause

According to the general assessment, every year about 600,000 tons of oil is released into the marine environment, the normal operation of ships, accidents and



Figure 3. Oil spills over 700 tons and caused between 1974 and 1999.





Another 206,000 tons of oil (16.54%) is released each year due to regular discharge; 186,000 tons (14.94%) of which is fuel sludge from ships. Other sources of marine oil input include the deliberate dumping of waste oil.

THE BIGGEST SHIPACCIDENTS AND OIL POLLUTION IN THE WORLD

Name of ship	Year	Location	Oil loss (tons)
Atlantic Empress	1979	Tobago Coast, Dong An	287.000
ABT Summer	1991	700 nautical miles from Angola	260.000
Castillo de Bellver	1983	Saldanha Bay, South Africa	252.000
Amoco Cadiz	1978	értagne Coast - France	223.000
Haven	1991	Genoa, Italia	144.000
		700 nautical miles from Nova Scotia,	
Odyssey	1988	Canada	132.000
Torrey Canon	1967	Scilly Island, England	119.000
Urquiola	1976	La Coruna, Spain	100.000
Hawaiian Patriot	1977	300 nautical miles from Honolulu	95.000
Independenta	1979	Boxpho, Turkey	95.000
Jakob Maersk	1975	Oporto, Portugal	88.000
Braer	1993	Shetland Islands, England	85.000
Khark 5	1989	120 nautical miles off the Atlantic coast of	80.000
		Morocco	
Agean Sea	1992	La Coruna, Spain	74.000
Sea Empress	1996	Milford Haven, England	72.000
Katina p	1992	Maputo Coast, Módhambich	72.000
Nova	1985	Gulf region, 20 nautical miles off Iran	70.000
Assimi	1983	55 nautical miles off Muscat, oman	53.000
Metuia	1974	Isthmus of Magellan, Chile	50.000
Wafra	1971	Cape Agulhas Coast, South Africa	40.000
Exxon Valdez	1989	Alaska, USA	37.000

Effect

- Oil spills can have a serious economic impact on coastal operations and for marine users.
- Marine life is heavily affected not only by mechanical contamination but also by the toxic components in the oil. Every year, on the coast of England, about 250,000 birds die. The Sinking of the Torrey Canon alone killed 25,000 submersibles of 17 different species.
- Oil scares away marine fish herds as it has disappeared herring in the Hokaido Island region (Japan).
- The oil enters the body of fish and krill species with poor resistance, accumulates in the layers of fat, potentially causing cancer.



Effect

- Marine zooplankton also died as an oil patch prevented oxygen from entering seawater..
- When oil enters the coasts, it has formed patches and deposits on beaches, damaging beaches, salt-producing areas, industrial production, irritating marine users.
- Oil can kill coral reefs, leading to the erosion of islands and coastal areas.
 The oil damages mangrove forests, deprives habitat and provides food to marine life.
- Plants that use cooled seawater can also be damaged by oil, causing congestion, reducing machine productivity.



Effect

- Oil can directly damage vessels, fishing nets, aquaculture tools as well as indirectly reduce fishing and farming productivity due to concerns about not consuming products produced in the contaminated area.
- In addition, the effects of chemical breakdowns when cleaning contaminated areas also have an indirect and direct impact on animals and plants and human activities in contaminated areas such as oil.

OIL SPILL RESPONSE

Reducing an oil spill's effects on the environment, human health, and daily activities are the "main goals" of the response. A thorough and continual evaluation of the spill conditions is essential to choosing the best course of action. Such are the size of the spill, its course, and its expected outcome.



The first measure to take is to try to retain as much oil in the barrels of the vessel in distress as possible before the oil spills into the sea. For this purpose, the ship is stabilized and the remaining oil is pumped into another tanker.

> Once discharged into the sea, the spilled oil must be constantly monitored. Under normal circumstances (i.e. if weather conditions permit), this is done by helicopter. Every effort is made to collect oil as close to the spill source as possible. Once the spill begins to spread and heavy parts sink, the oil will be difficult to remove.

OIL SPILL RESPONSE

If additional risks to humans and the environment can be eliminated or at least reduced to a minimum, then burning pollutants may be another option. Absorbers or coatings can help reduce the spread and thinness of the oil film before physical removal from the water surface.



Another option is to use a chemical dispersant. When the conditions for the use of dispersants are suitable, their application has been shown to be effective and balanced, ecologically acceptable (note that the alternative may be oiled yards). Dispersants can be used by spraying ships and/or aircraft. The more widespread the spill (due to the influence of wind and flow), the thinner the membrane. When the membrane thickness drops below 1 mm, the removal of the physical oil is almost impossible (see Figure below). When the paint film thickness is less than 0.1 mm, the oil is usually not processed.

POLLUTION OF THE MARINE ENVIRONMENT FROM THE ATMOSPHERE



- In the South Pacific, the amount of contamination introduced into the atmosphere can be 5 to 10 times lower than the amount of contamination in the North Pacific region.
- According to preliminary assessments on a global scale, 98% of the lead introduced into the sea is derived from the atmosphere..

POLLUTION OF THE MARINE ENVIRONMENT FROM THE ATMOSPHERE

Control method

- In 1990, the U.S. revised the Clean Air Act to include provisions governing aspects of air pollution caused by the related activities of tankers and tanker importing equipment.
- In 1991, the IMO adopted a strategy to combat pollution from the atmosphere. The use of CFCs (Chlorofluoron-Carbons) in refrigeration devices and other structures was banned from November 6, 1992, and the use of halons in ship-based firefighting equipment was also banned from July 6, 1992. The IMO also added to MARPOL 73/78 a new annex Appendix VI air pollution from ships.



ASSIGNMENT

[1] Presenting methods to prevent marine pollution from land-based activities?

[2] Overview of the Global Action Plan to Protect the Marine Environment from Land-Based Operations (GPA)?

THANK YOU FOR YOUR LISTENING