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— MMS3623 —  
MARINE RESOURCES MANAGEMENT

# MARINE RESOURCES MANAGEMENT

-  These lecture material are for the **Marine Coastal and Delta Sustainability for Southeast Asia (MARE)** (Project No 610327-EPP-1-2019-1-DE-EPPKA2-CBHE-JP)
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MARINE RESOURCES MANAGEMENT  
CHAPTER 1  
INTRODUCTION TO MARINE RESOURCES

# LECTURE OUTLINE

-  Defining marine resources
-  Type of marine resources
-  Marine resources use overview and history
-  Human association with marine resources

# What is MARINE RESOURCES?

Components/materials that exist in marine environment and have economic value to the country.

Example: oil and gas, minerals (gold, REEs, metals, etc.), fish and seafood supplies, sand and gravel, corals, etc.

[Sustainable Oceans: Marine Biodiversity for the Future We Want - YouTube](#)



# Type of marine resource

## Living marine resources

- Biological diversity
- Fish
- Seashells (Oyster, crab, bivalve, etc)
- Seaweed
- Coral
- Etc.



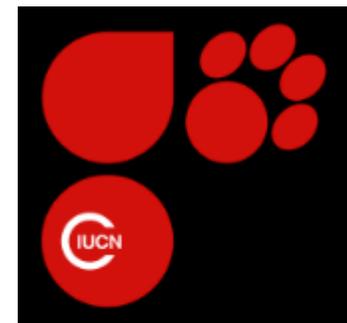
## Non-living marine resources

- Petroleum
- Natural gas
- Sand
- Minerals
- Water
- Etc.



# Biological Diversity?

- Variety/diversity of life on earth, millions of plants, animal and microorganisms
- Malaysia is known as one of the 12 mega-diversity countries in the world, based on species richness and high degree of endemic species
  - \*Endemic spp: confined entirely to that area.
- Based on the IUCN Red List, Malaysia is home to **MORE THAN 1,141** threatened species including plants and animals.



The International Union for Conservation of Nature (IUCN) Red List of Threatened Species (also known as the IUCN Red List or Red Data Book), founded in 1964, is the world's most comprehensive inventory of the global conservation status of biological species.

## IUCN Red List of Threatened Species



# Marine Protected Area (MPA)



- An essentially a space in the ocean where human activities are more strictly regulated than the surrounding waters – similar to the parks we have on land.
- These places are given special protections for natural or historic marine resources by local, state, territorial, native, regional, or national authorities.
- Authorities differ substantially from nation to nation.
- Focus:
  - Limiting human-caused damage to marine ecosystems.
  - Restoring damaged marine ecosystems.
  - Preserving vulnerable marine species.



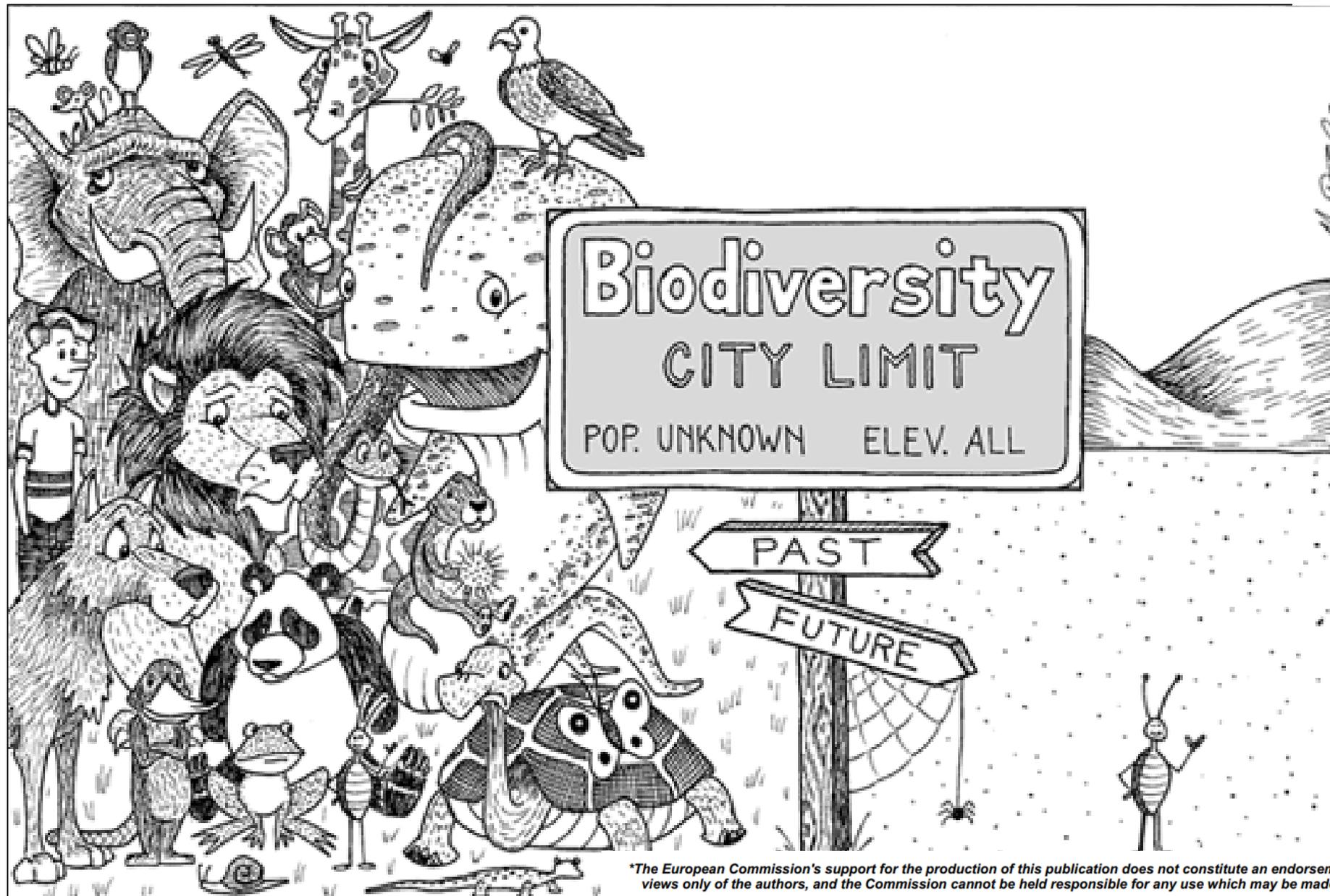
**Why do we need to manage our maritime areas, resources, industries, etc???**

**Who has the right to manage/exploit or claim ownership???**  
**Individual?? Agencies?? Public??**

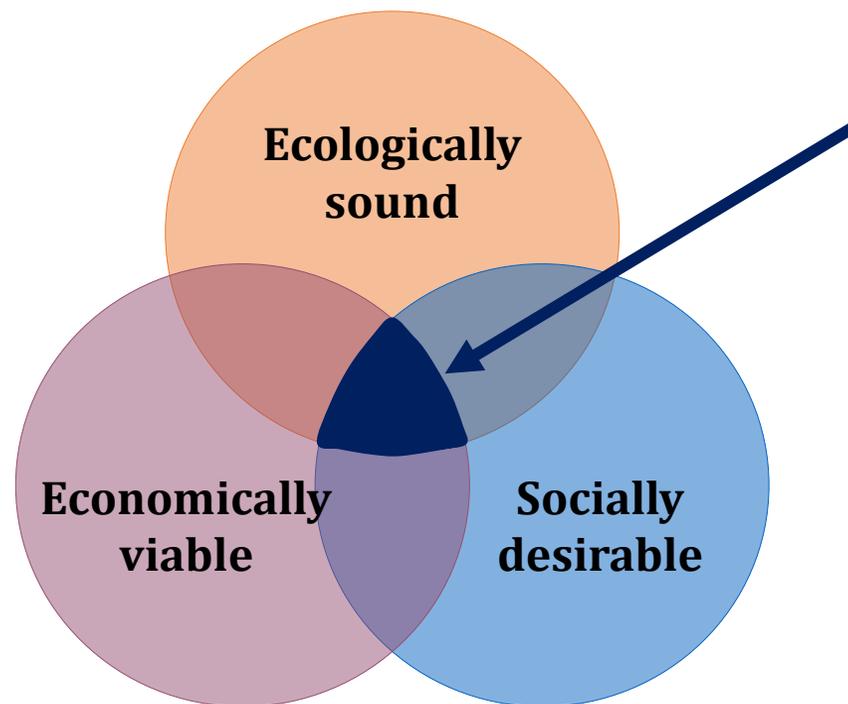
**Whose responsibility for any mishap such as oil spill, pollution, etc???**

**How are we going to manage and protect our marine resources???**

**The sea** in the post-industrial stage has profoundly **affected by human presence** and involved in increasing **exploitation of marine resources**. The advances in technology in sea uses has played important role for the evolution of the post-industrial stage.

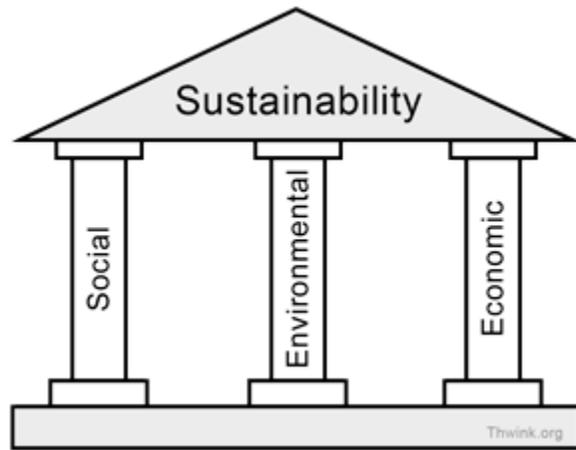


# Marine resources sustainable management



**Sustainable  
Management**

The "**three pillars**" of sustainability.



## The goal of The Three Pillars of Sustainability.

1. **Environmental sustainability** is the ability to maintain rates of renewable resource harvest, pollution creation, and non-renewable resource depletion that can be continued indefinitely.
2. **Economic sustainability** is the ability to support a defined level of economic production indefinitely.
3. **Social sustainability** is the ability of a social system, such as a country, to function at a defined level of social well being indefinitely.

# Three distinct ideas about “sustainability” are in use today:

1. Sustained yield of a resource
2. Sustained abundance and diversity of species and ecosystems
- 3. Sustained economic and social development, without compromising existing resources for future generations**



# OUR WORLD OCEAN provides

## THE AIR WE BREATHE



**>50%** The ocean produces over half of the world's oxygen and stores 50 times more carbon dioxide than our atmosphere.

## CLIMATE REGULATION

**70%** Covering 70% of the Earth's surface, the ocean transports heat from the equator to the poles, regulating our climate and weather patterns.



## TRANSPORTATION



**76%** Percent of all U.S. trade involving some form of marine transportation.

## RECREATION



From fishing to boating to kayaking and whale watching, the ocean provides us with so many unique activities.

## ECONOMY



**\$282 billion** Amount the U.S. ocean economy produces in goods and services. Ocean-dependent businesses employ almost 3 million people.

## FOOD

The ocean provides much more than just seafood. Ingredients from the sea are found in surprising foods such as peanut butter and soymilk.



## MEDICINE

Many medicinal products come from the ocean, including ingredients that help fight cancer, arthritis, Alzheimer's disease, and heart disease.



# PLASTIC OCEAN

192 COUNTRIES BORDERING THE ATLANTIC, PACIFIC, INDIAN OCEANS AND MEDITERRANEAN AND BLACK SEAS PRODUCED **2.5 BILLION METRIC TONS OF SOLID WASTE IN 2010**.  
AN ESTIMATED **8 MILLION METRIC TONS** OF PLASTIC ENTERED THE OCEAN THAT SAME YEAR.



Ocean Conservancy



*Open access peer-reviewed chapter*

# Human History of Maritime Exploitation and Adaptation Process to Coastal and Marine Environments – A View from the Case of Wallacea and the Pacific

By Rintaro Ono

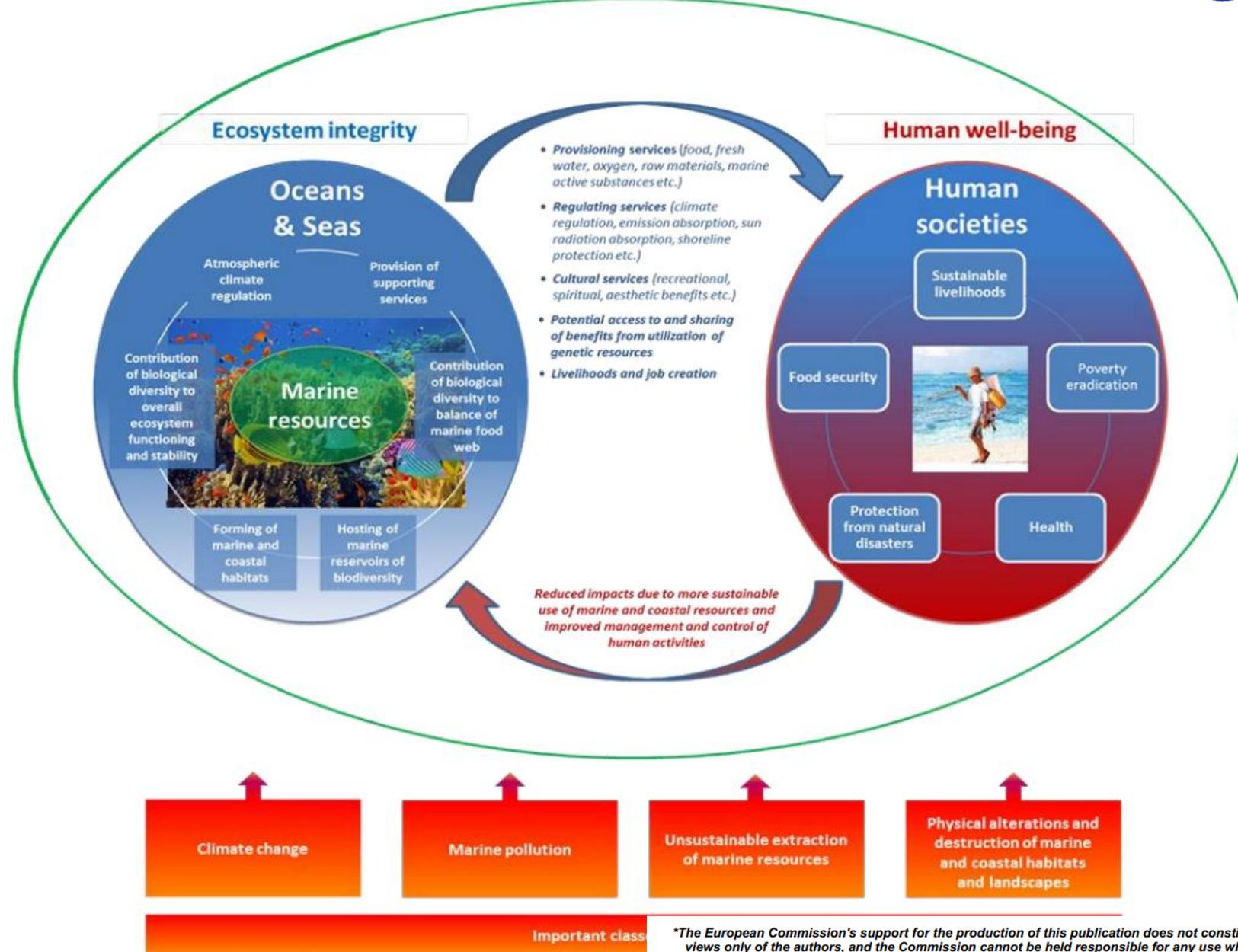
Submitted: June 3rd 2015 Reviewed: November 19th 2015 Published: September 14th 2016

DOI: 10.5772/62013

[Human History of Maritime Exploitation and Adaptation Process to Coastal and Marine Environments – A View from the Case of Wallacea and the Pacific | IntechOpen](#)

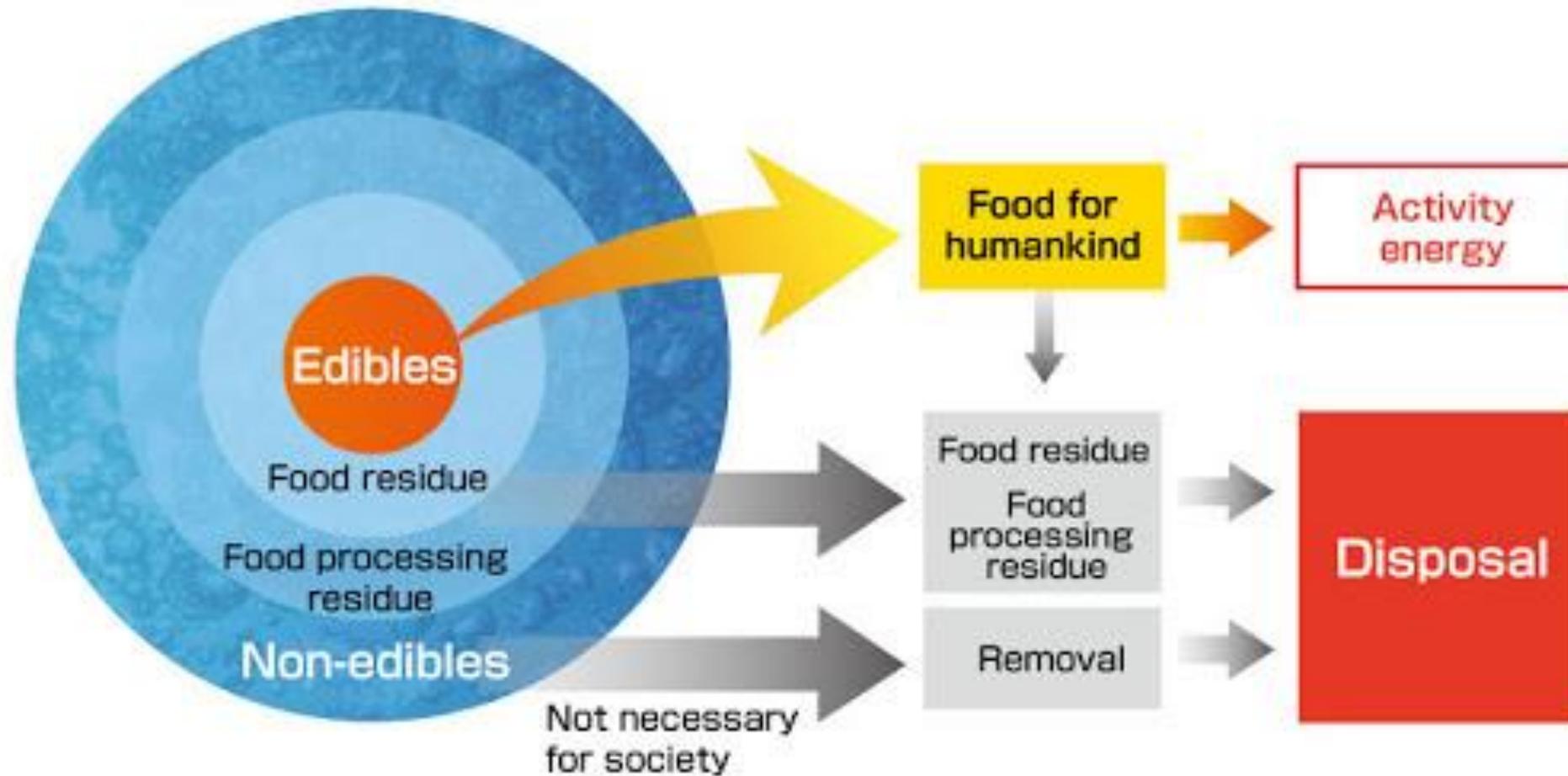
This chapter introduces the archaeological new findings and current outcomes for the past human marine exploitation and maritime or coastal adaptation particularly in the Wallacea region where I have studied for long time. One of the oldest and important data I discuss here is from Jerimalai Cave site from East Timor and Leang Sarru site from Talaud Islands. The finds from East Timor demonstrate the high level of maritime skills and technology possessed by the modern humans who colonized Wallacea. These skills would have made possible the occupation of the faunally depauperate islands of Wallacea and facilitated the early maritime colonization of Australia and Near Oceania. On the other hand, Leang Sarru site dated back to 35,000 years ago on Talaud Islands where located over 100 km away from neighbour islands. The site also produced large number of marine shells from the late Pleistocene via Last Glacial Maximum (LGM) to the early Holocene, then we can also discuss the past maritime exploitation and adaptation from the late Pleistocene to the early Holocene in the Talaud Islands, where located in Northern part of Wallacea. During the Holocene after 12,000 years ago, various capture technology invented, and great variety of fish and shellfish species had been exploited by modern human. Especially the fishing technology and Ocean navigation technology were developed after the Neolithic times in Wallacea to the Pacific. Most famous archaeological records related them are the Lapita migration and colonization to many islands in Melanesia to Western Polynesia where were mostly uninhabited islands before them. After the Lapita colonization, the Polynesians who are the descendant of Lapita people succeeded to colonize Hawaii, Easter Island, and New Zealand by the 12th to 13th centuries. The distance to these islands from their neighbour islands or continent is over 4000 km, hence the success of migration by the Polynesian clearly indicate their maritime adaption and navigation technology were highly developed. In fact, it is a dramatic event that modern human succeeded to migrate to all over the world except North and South Pole when the colonization to New Zealand was done by the Polynesians. It also shows that marine environment were our last target for migration and colonization in this world after the human birthed in and around inner forest environment over 600 million years ago. This chapter also discuss such developments of marine exploitation and maritime adaptation after the Holocene or Neolithic to modern times, then reviewing the human adaptation history to coastal and marine environments.

## Enabling environment



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## Marine resources

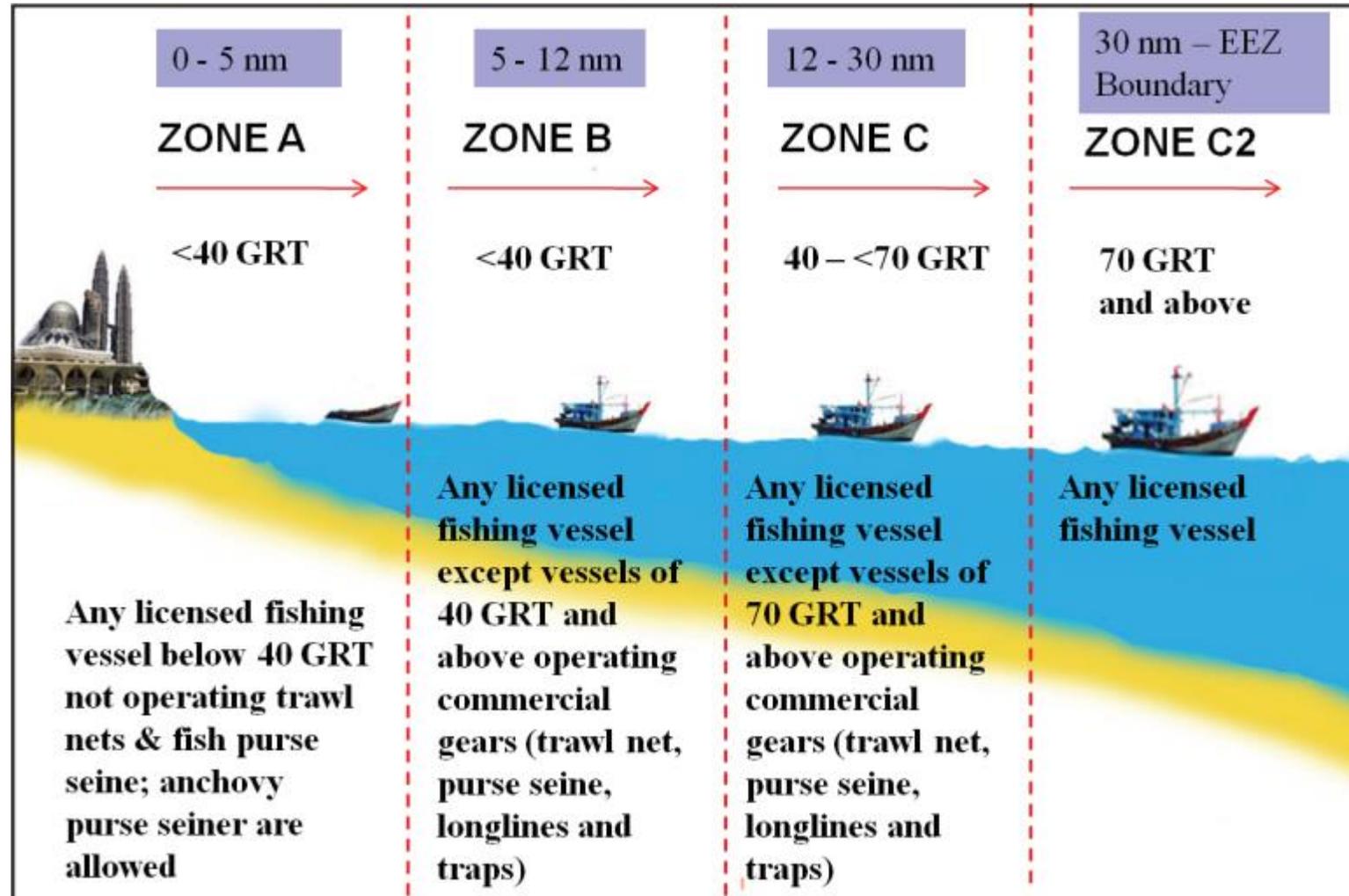


# Fisheries management in Malaysia

Malaysia manages the fisheries resources through an area zoning system. The system divides the areas into four fishing zones based on the distance from the shoreline.

GRT (gross registered tonnage) of a fishing vessel in Malaysia is calculated by the formula :

$$[ L \text{ (Length overall)} \times B \text{ (breadth)} \times D \text{ (depth)}] \text{ metres} \times 0.02827$$



# Institutional Arrangements for Monitoring, Control & Surveillance of fisheries in Malaysia

**M**onitoring as the collection, measurement and analysis of fishing activity including, but not limited to catch, species composition, fishing effort, by-catch, discards, area of operations, etc.

**C**ontrol involves the specification of the terms and conditions under which resources can be harvested.

**S**urveillance involves the regulation and supervision of fishing activity to ensure that national legislation and terms, conditions of access and management measures are observed.





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MARINE RESOURCES MANAGEMENT  
CHAPTER 2  
CONSERVATION OF MARINE RESOURCES

# LECTURE OUTLINE

-  Importance of marine resources to human and environment.
-  IUCN Redlist organisms.
-  Marine protected area.
-  How to protect the resources.

# SEAFLOOR RESOURCES

## Today's lecture:

 Natural resources, ocean resources

 Oil, coal and gas resources

 Seafloor mineral resources

 Deep sea mining

 Law of the Sea

# NATURAL RESOURCE

- 

A natural resource is anything humans can use which comes from nature. Humans do not make natural resources, but gather them from the earth's environment. They include natural substances (e.g., sediment, water) and energy supplies (e.g., coal, wind) that serve to satisfy human needs and wants.
- 

Natural materials occurring in the environment are 'neutral matter' until humans develop means to capitalize on them.

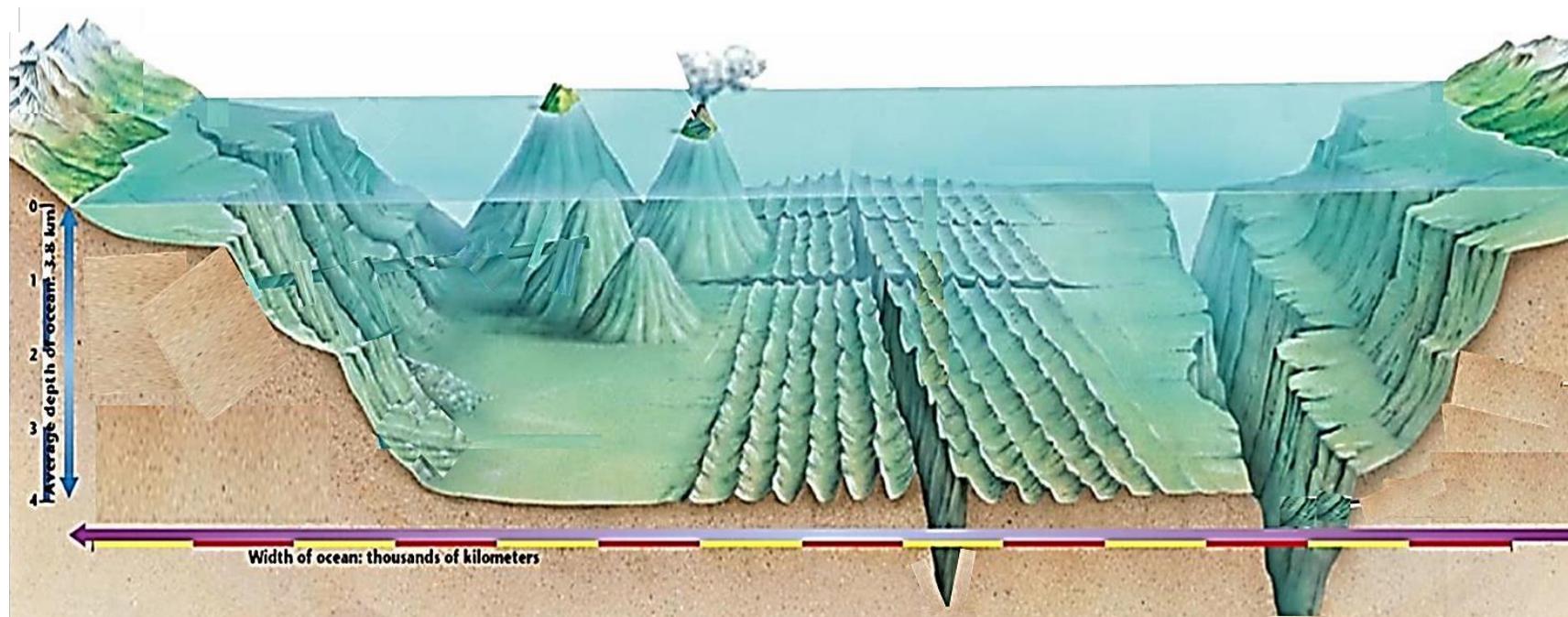


# OCEAN FLOOR RESOURCES

-  An ocean resource is anything humans can use for their benefits which comes from the ocean. It includes natural substances and energy supplies that serve to satisfy human needs.
-  Humans are dependent on oceans, coasts, reefs, estuaries and mangroves for food, health, recreation and jobs.

# OCEAN FLOOR RESOURCES

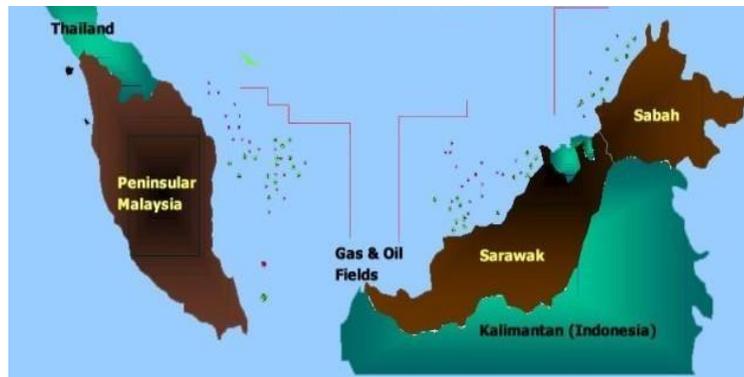
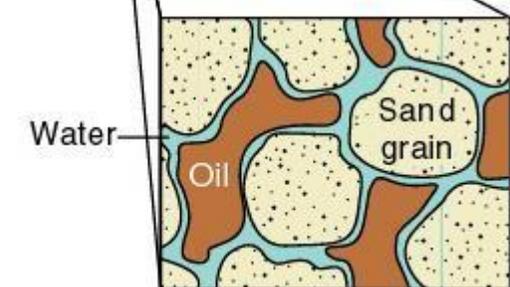
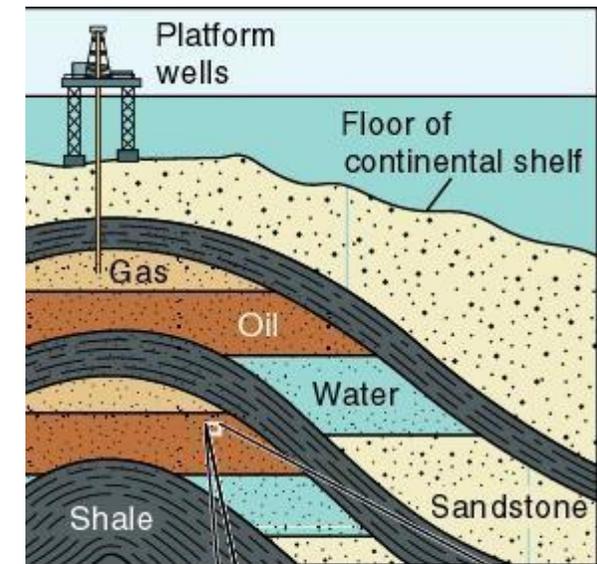
 The ocean floor (seafloor, sea floor, or seabed) is the bottom of the ocean. The ocean floor is one of Earth's most valuable natural resource. It provides food, minerals, energy and biodiversity.



Ocean floor topography of Pacific Ocean Basin. Ocean floor sediments are rich in minerals that can be exploited for economic use.

# SEAFLOOR RESOURCES: PETROLEUM & NATURAL GAS

-  Oil and natural gas are found together and are produced from the burial and aging of ancient marine phytoplankton.
-  Oil and natural gas are non-renewable resource— often used faster than they can be replenished naturally.
-  Must drill through rock to reach it.
-  About 25 – 30% of world’s supply comes from off coast oil rigs.



# SEAFLOOR RESOURCES: PETROLEUM & NATURAL GAS

Factors contributing to the formation of crude oil (petroleum)



**Temperature**  
High temperature initiate the chemical transformation of organic chemical into oil and gas

01



**Pressure**  
The elevated pressure causes the sediment to be compressed and initiate upward migration of oil and gas

02



**Type of rocks and sediment**

1. Source rock
2. Reservoir rock
3. Cap rock

03

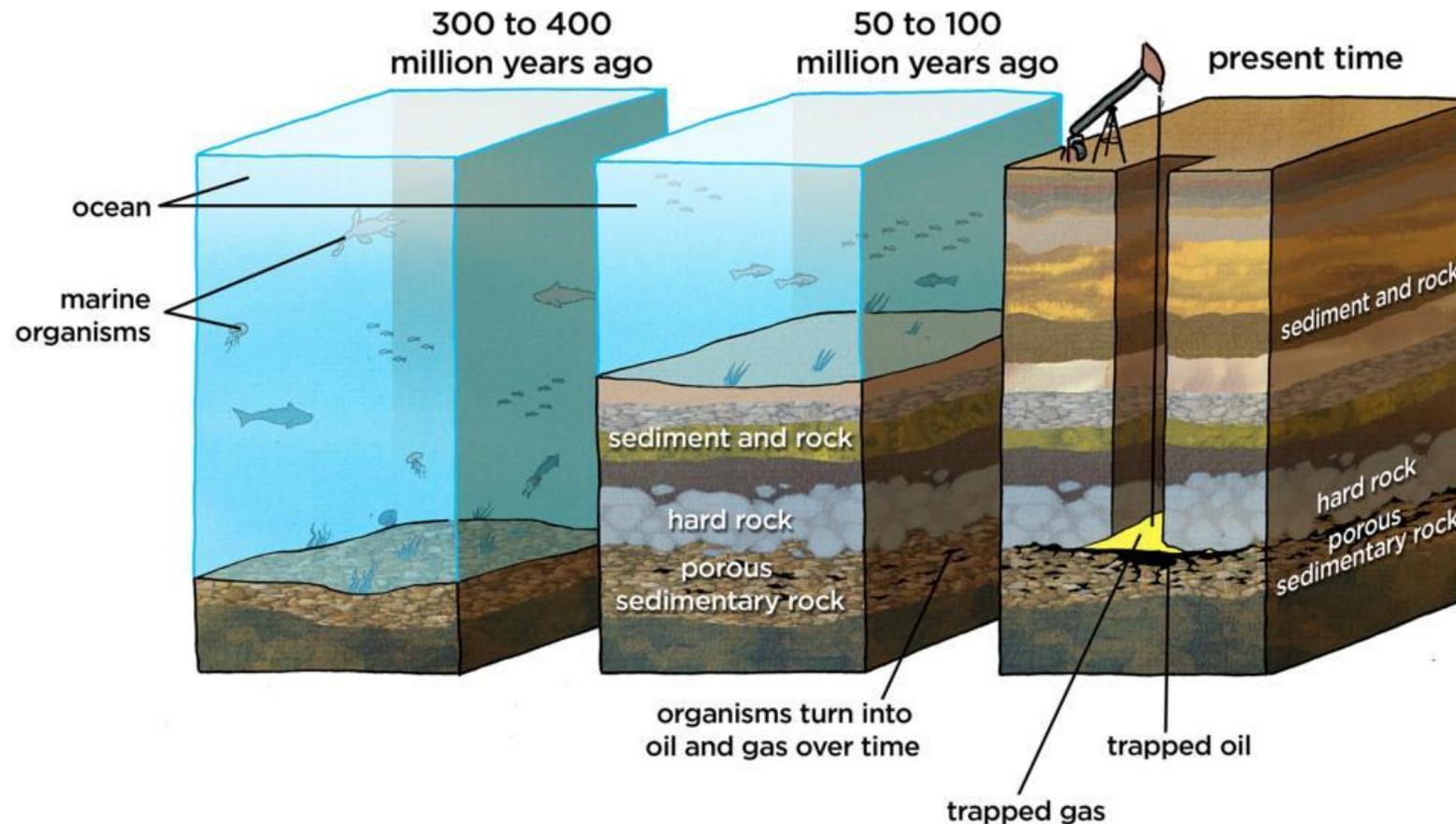
# SEAFLOOR RESOURCES: PETROLEUM & NATURAL GAS

Factors contributing to the formation of crude oil (petroleum)

## Types of rocks

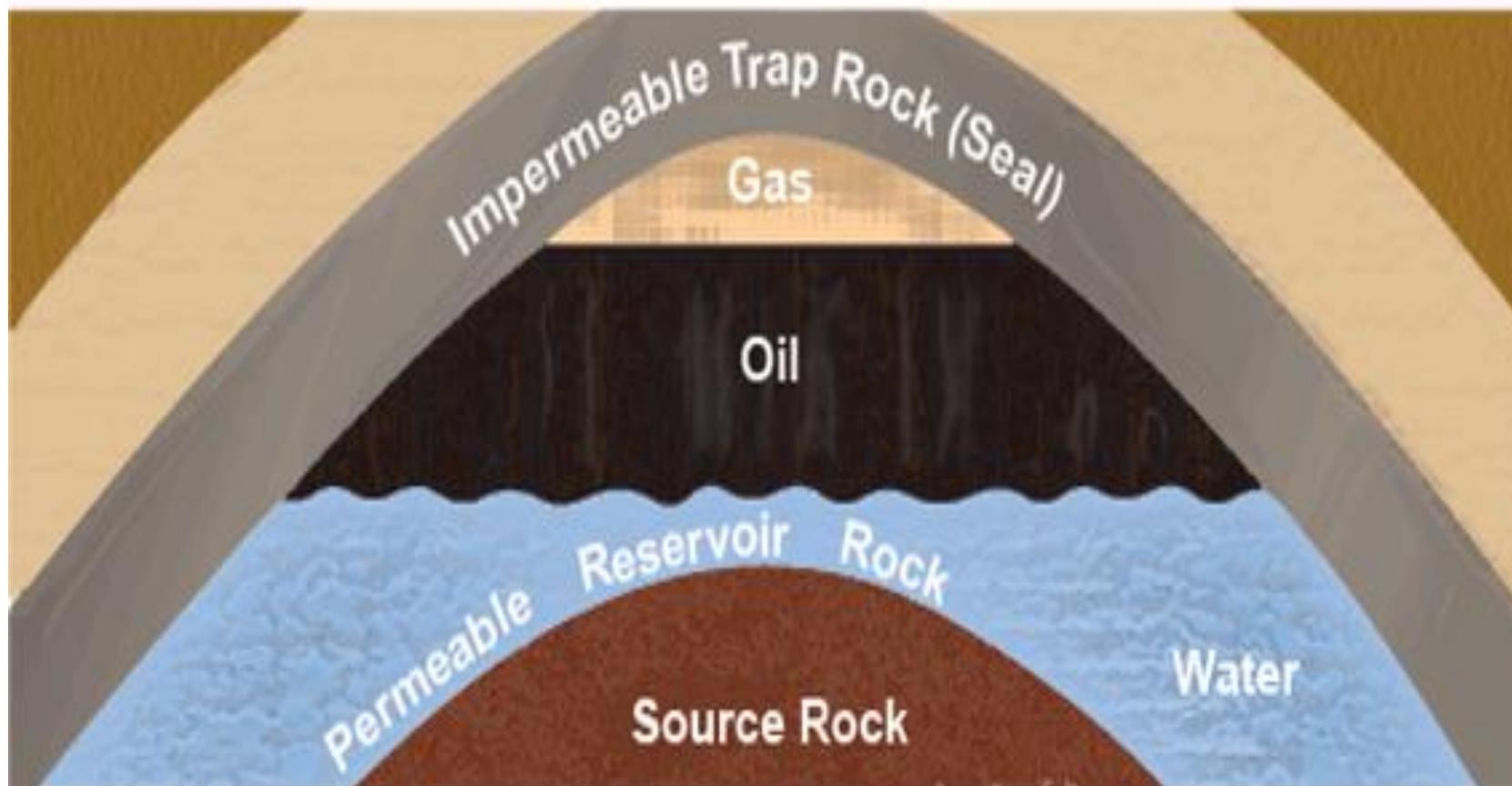
-  Source rock- source material, fine grained sediments, organic rich sediment, buried to a depth of at least 500 m
-  Reservoir rock- coarser grained, relatively porous (larger open spaces between sediment grain), store oil and gas (e.g. sandstone and porous limestone)
-  Cap rock- very fine-grained sedimentary rock (shale), form traps that block oil and gas from escaping into the atmosphere.

# SEAFLOOR RESOURCES: PETROLEUM & NATURAL GAS

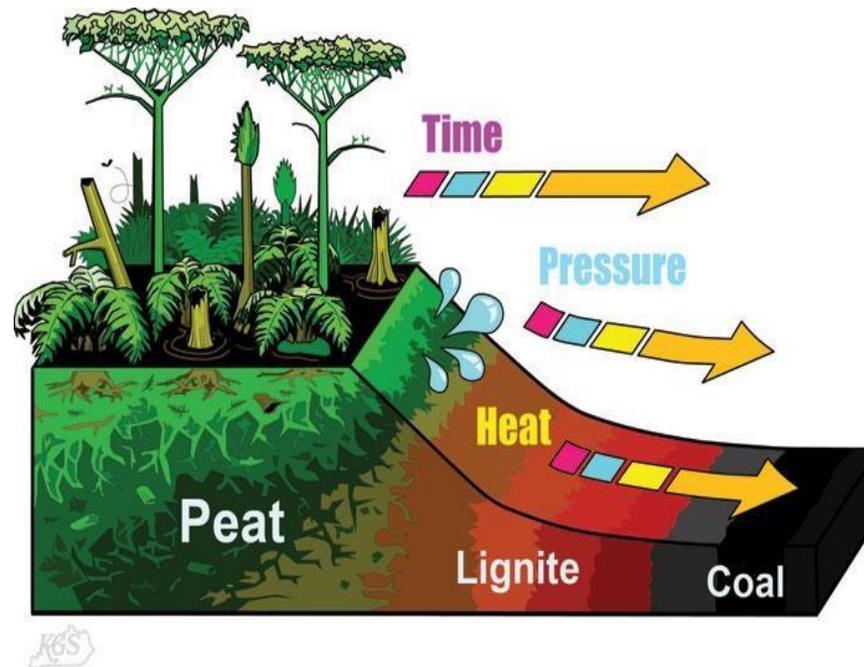


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# SEAFLOOR RESOURCES: PETROLEUM & NATURAL GAS



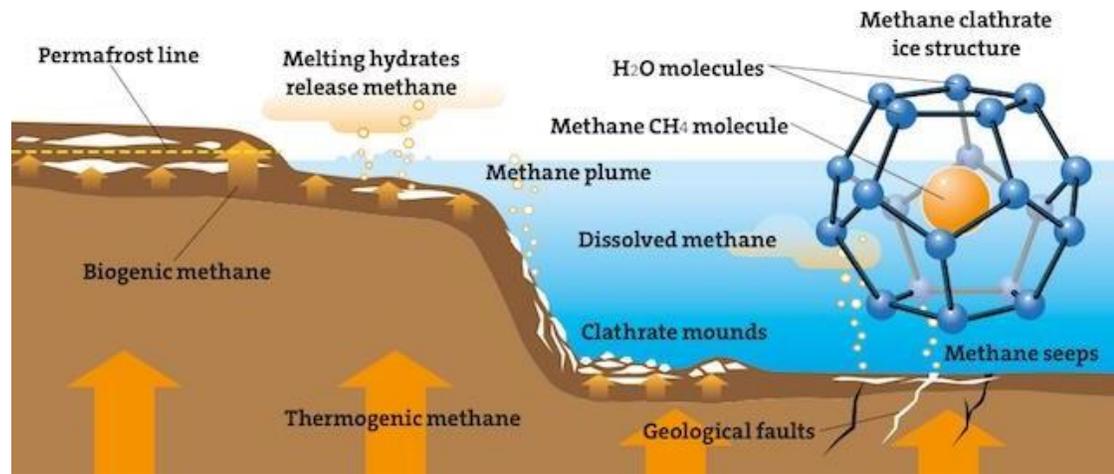
# COAL, OIL AND GAS FORMATION



When organisms (animal, plants, etc.) died, they formed layers at the bottom of the swamps. Sediment began to pile up on top of the dead organisms remains and altered physically and chemically to form coal, oil and gas. It is considered biotic resources because they were formed from decayed organic matter.

# SEAFLOOR RESOURCES: METHANE HYDRATE

-  A potential fuel source currently undergoing research is “methane hydrate”, located beneath the seafloor in the form of hydrocarbon ice.
-  It is estimated that more carbon is contained in methane hydrates than in all current fossil fuel deposits combined. It is also called methane clathrate.



# SEAFLOOR RESOURCES: SALT, HEAVY MINERALS & MUD

-  Ocean water is processed to extract commercially valuable minerals such as salt and gypsum.
-  Heavy mineral beach sand is resource of economic value.
-  Sea mineral mud and mining for precious metals.



# SEAFLOOR RESOURCES: GYPSUM AND LIME STONE

 A soft white or gray mineral consisting of hydrated calcium sulfate ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ). It occurs chiefly in sedimentary deposits and is used to make plaster of Paris and fertilizers, and in the building industry. Coral reefs (limestone) is used as construction material.

 For general use as fertilisers for agriculture, animal feed supplements, food preservatives, anti-corrosion agents, cosmetics, fungicides, ceramics, water treatment and metallurgy.



**White Cliffs of Dover, UK, are made of chalk**

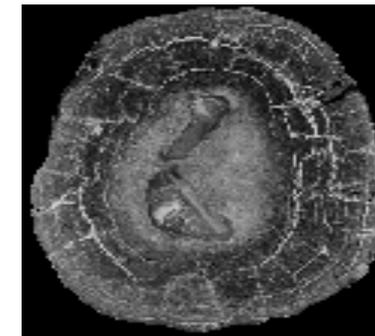
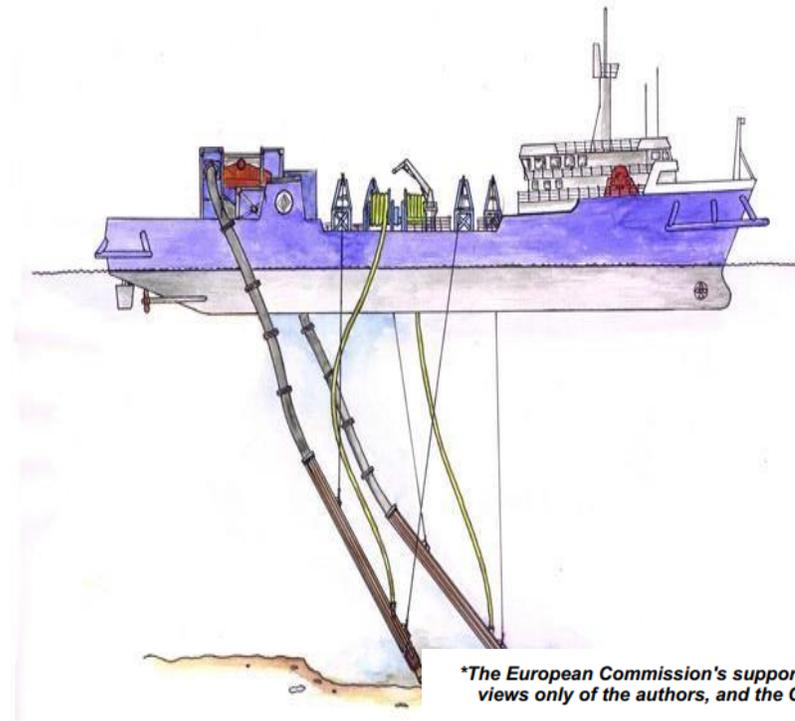
# OCEAN FLOOR: SAND AND GRAVEL

-  The world's beaches are being mined for sand for a variety of uses in concrete, fill, construction, etc.
-  Sand and gravel is the second most income-producing physical resource. Sand rich in quartz is used in glass making industry.
-  The practice is often very destructive for marine ecosystems.

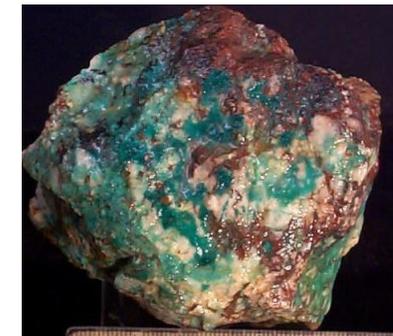


# OCEAN FLOOR: METAL NODULES

- Deep sea nodules are mined for manganese, iron and phosphorite production. Aragonite from the Bahamas is mined for cement.
- Minerals from the Sea-Floor such as copper, iron and other precious metals used to make electronics.



Mn Nodule

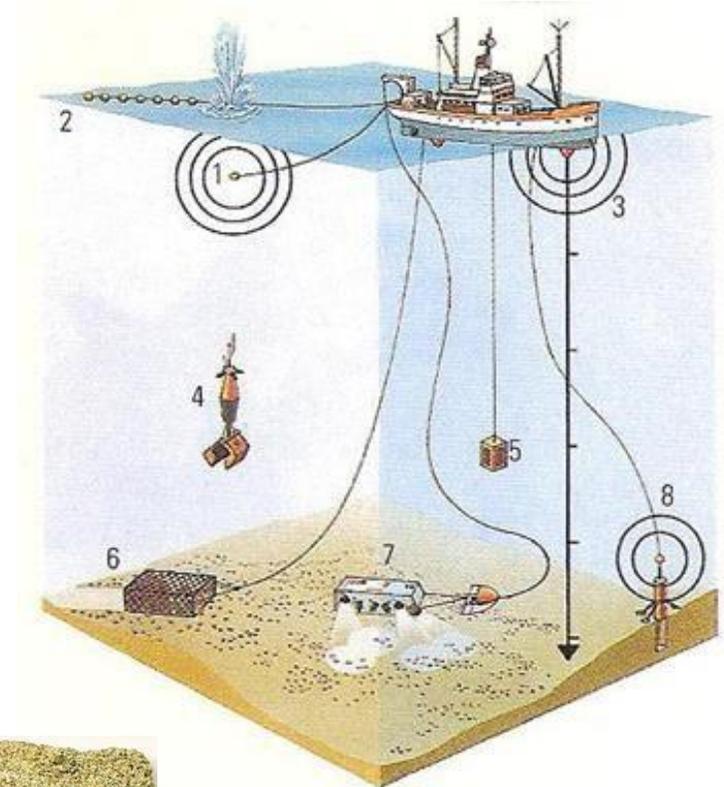


Cu Mineral ore

# OCEAN FLOOR: PHOSPHORITE

 Phosphorite is a sedimentary rock which contains high amounts of phosphate bearing minerals. The phosphate content of phosphorite is at least 15 to 20%. Normally phosphates are deposited in shallow, near shore marine or low energy environments. This includes environments such as intertidal zones, estuarine and coasts.

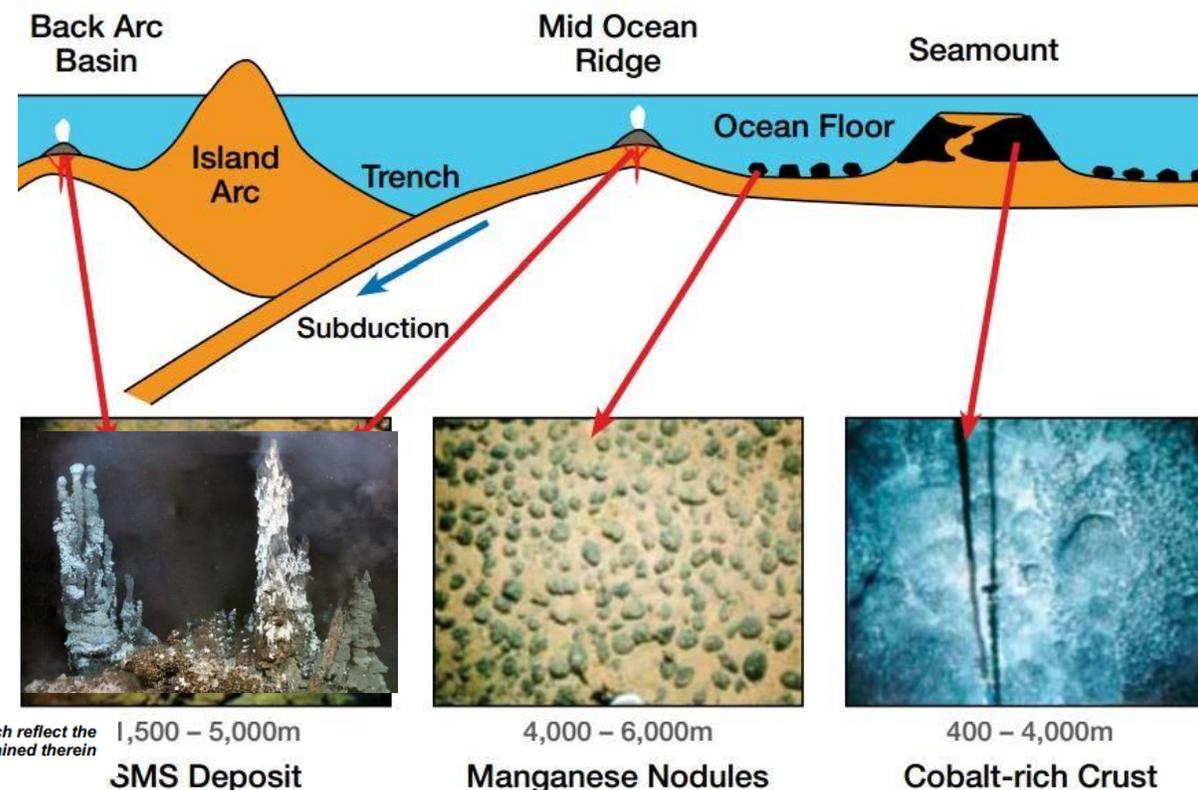
 For general use as fertilisers for agriculture, etc



Phosphorite

# DEEP SEA MINERALS: METALS AND REES

 Deep sea minerals are deposited on the surface or sub-surface of the deep seafloor by natural processes. There are different types of deep sea mineral deposits such as nodules, massive sulphides, phosphates and metalliferous (rare earth elements (REEs)) sediments.

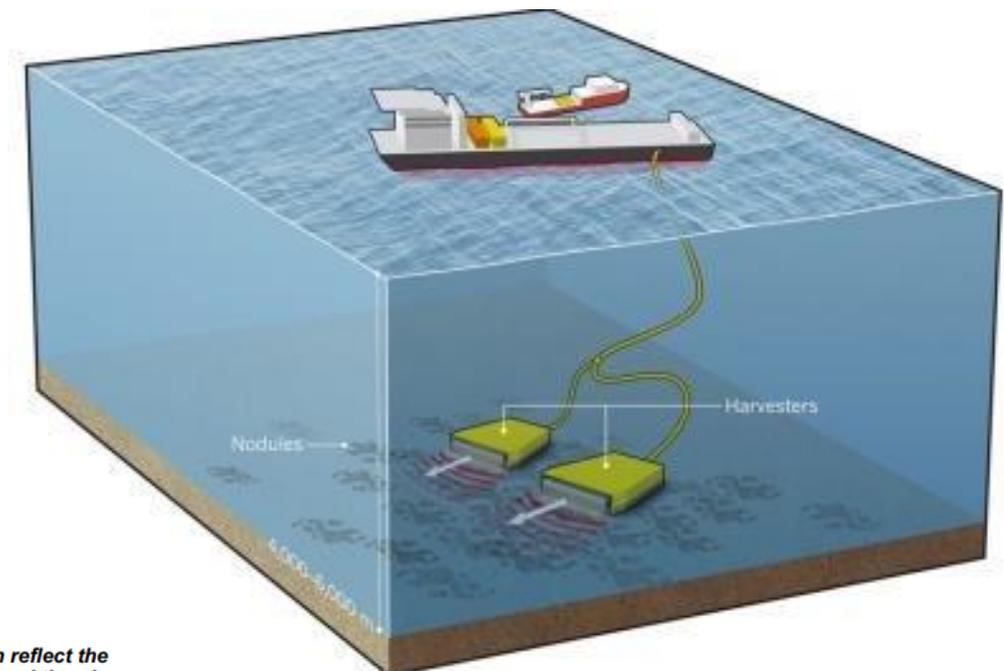


# DEEP SEAFLOOR MINING

 Systems are being developed to harvest mineral-rich nodules from the deep seafloor (>2 km depth). At present it is expensive but as the technology develops there is a great wealth waiting to be exploited for industrial use. However, there are serious environmental concerns to the deep sea mining.



Massive sulfide chimney  
collected from the seafloor



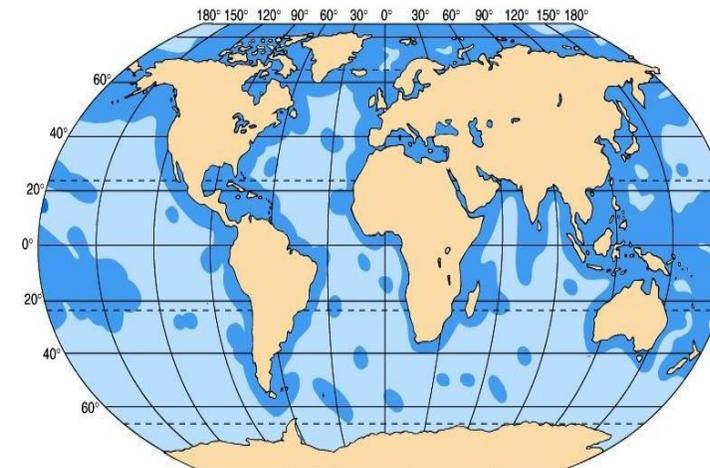
# UN CONVENTION ON THE LAW OF THE SEA (UNCLOS)

 The Law of the Sea Convention defines the rights and responsibilities of nations in their use of the world's oceans, establishing guidelines for businesses, the environment, and the management of marine natural resources.

 Coastal jurisdiction 12 n. miles

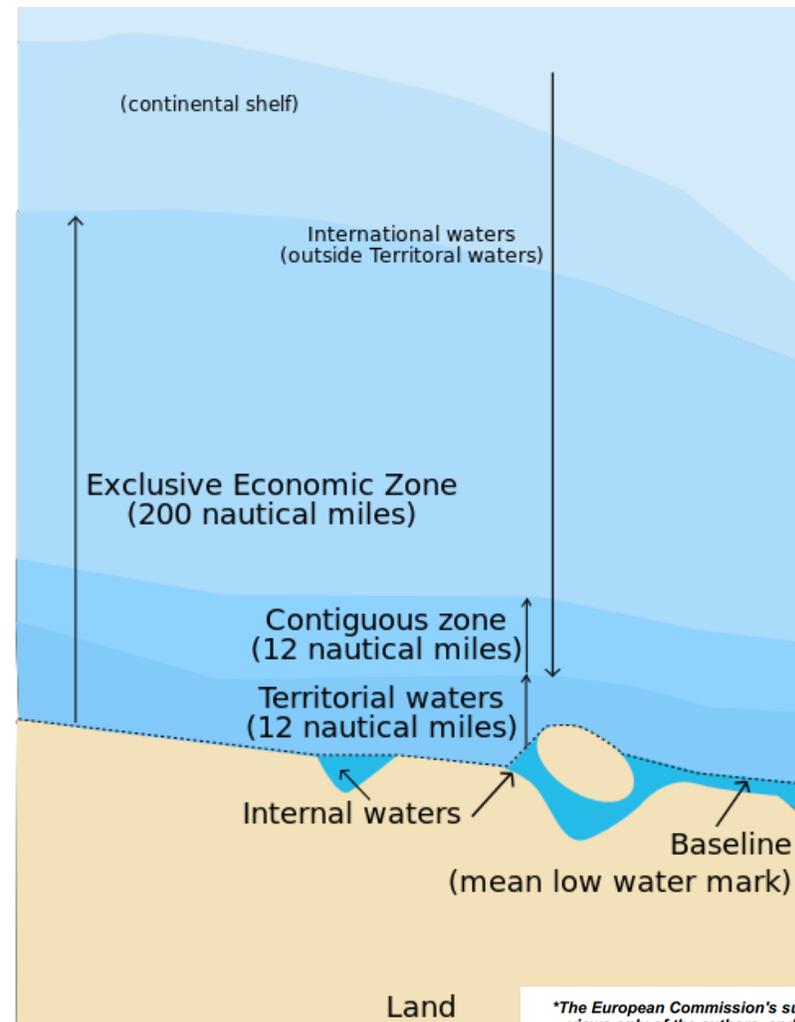
 Exclusive Economic Zone (EEZ) 200 n. miles

- Mineral & fishing rights
- Pollution regulation responsibility



EEZs of the world

# UN CONVENTION ON THE LAW OF THE SEA (UNCLOS)



# BIODIVERSITY CONSERVATION

-  Fisheries resources
-  Coral reefs ecosystem
-  Mangrove ecosystem

## Discussion

Status of the living resources? The values? How we can conserve the resources?

# MARINE PROTECTED AREA

-  A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.
-  Any area of the marine environment that has been reserved by federal, state, tribal, territorial, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein.
-  Any defined area within or adjacent to the marine environment, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by legislation or other effective means, including custom, with the effect that its marine and/or coastal biodiversity enjoys a higher level of protection than its surroundings.

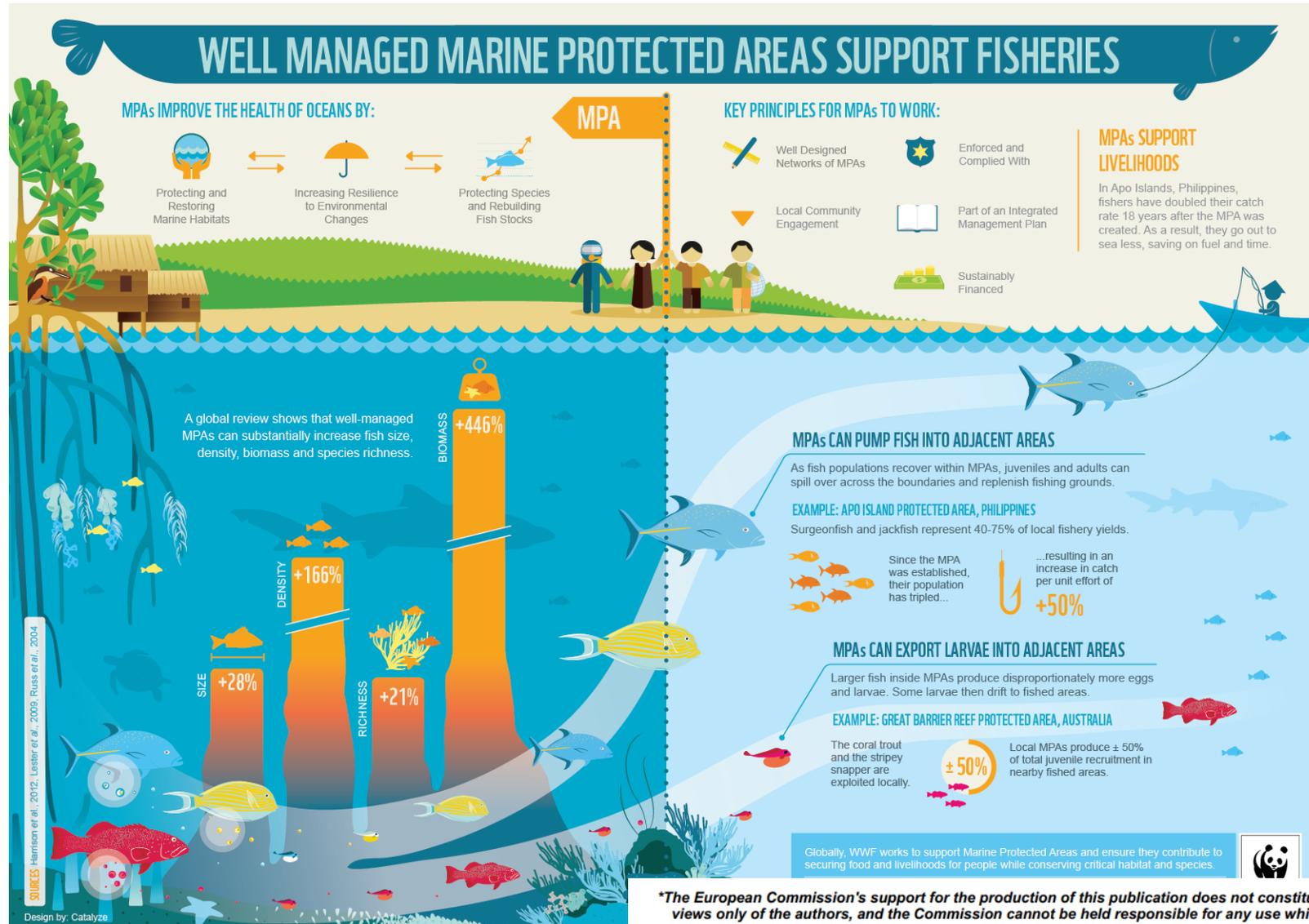
# MARINE PROTECTED AREA

-  Marine protected areas (MPA) are protected areas of seas, oceans, estuaries or in the US, the Great Lakes.
-  These marine areas can come in many forms ranging from wildlife refuges to research facilities.
-  MPAs restrict human activity for a conservation purpose, typically to protect natural or cultural resources.
-  Such marine resources are protected by local, state, territorial, native, regional, national, or international authorities and differ substantially among and between nations.
-  This variation includes different limitations on development, fishing practices, fishing seasons and catch limits, moorings and bans on removing or disrupting marine life.

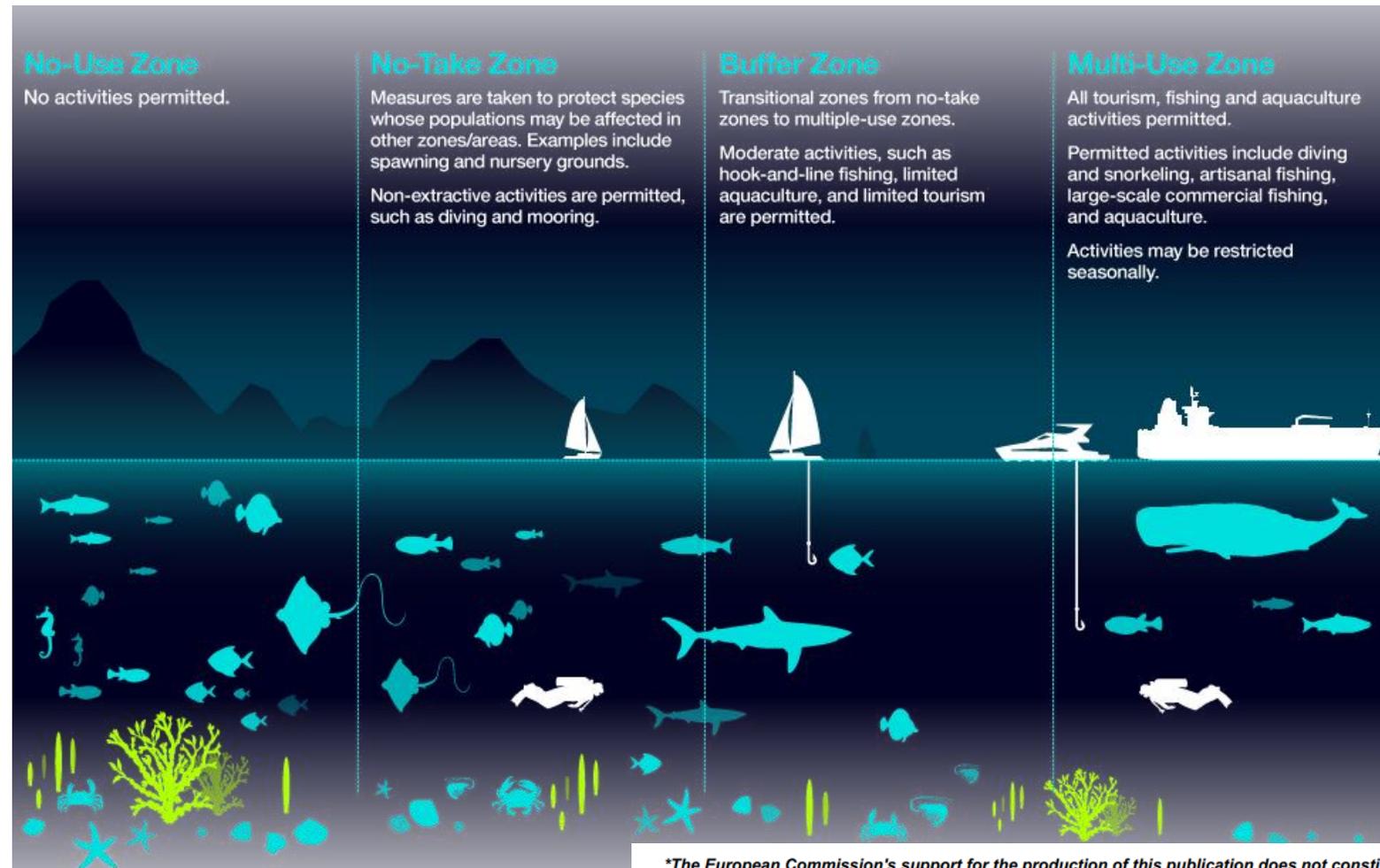
# MARINE PROTECTED AREA

-  MPAs involve the protective management of natural areas according to pre-defined management objectives.
-  MPAs can be conserved for a number of reasons including economic resources, biodiversity conservation, and species protection.
-  They are created by delineating zones with permitted and non-permitted uses within that zone.

# MARINE PROTECTED AREA

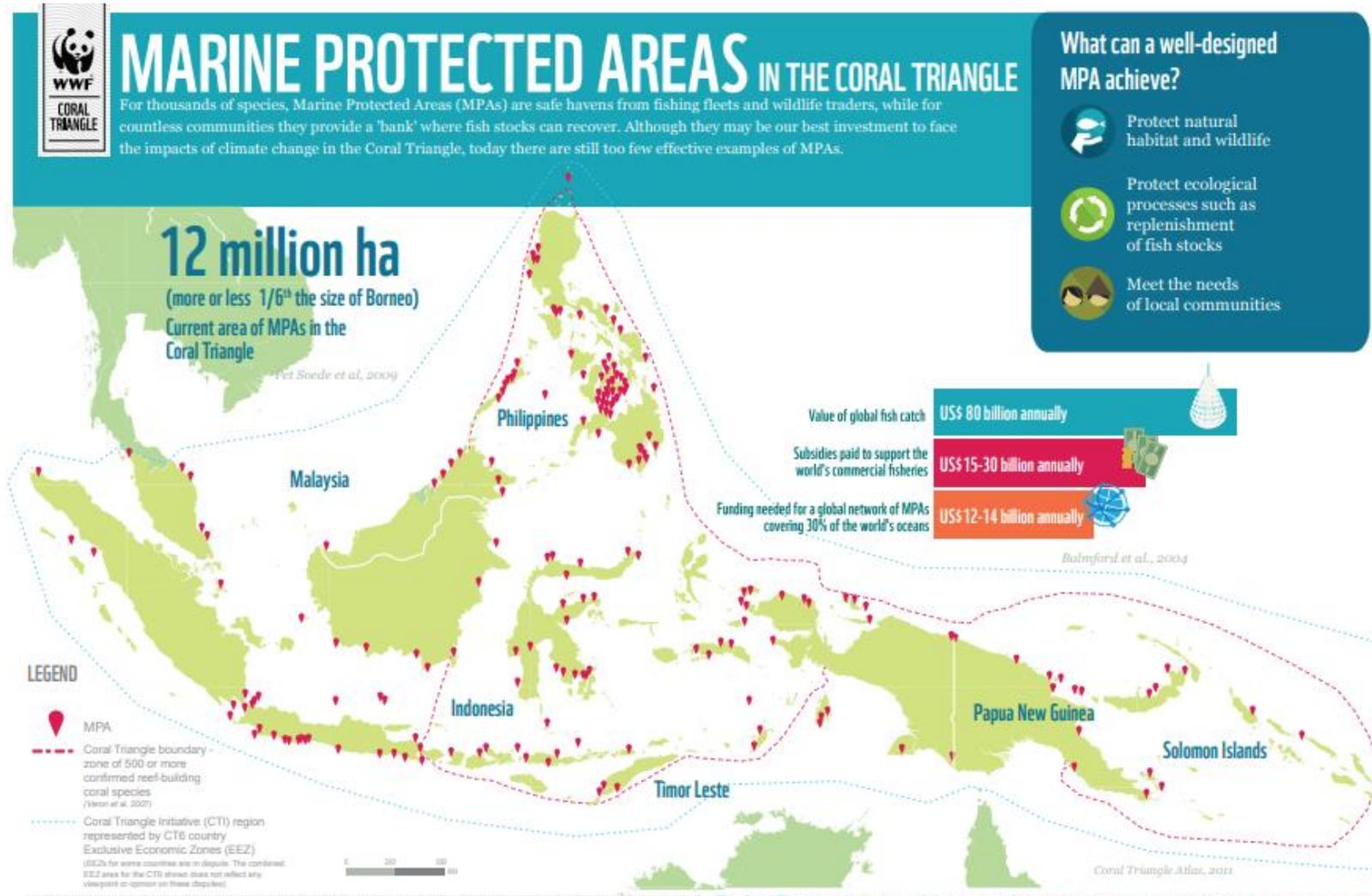


# MARINE PROTECTED AREA



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# MARINE PROTECTED AREA

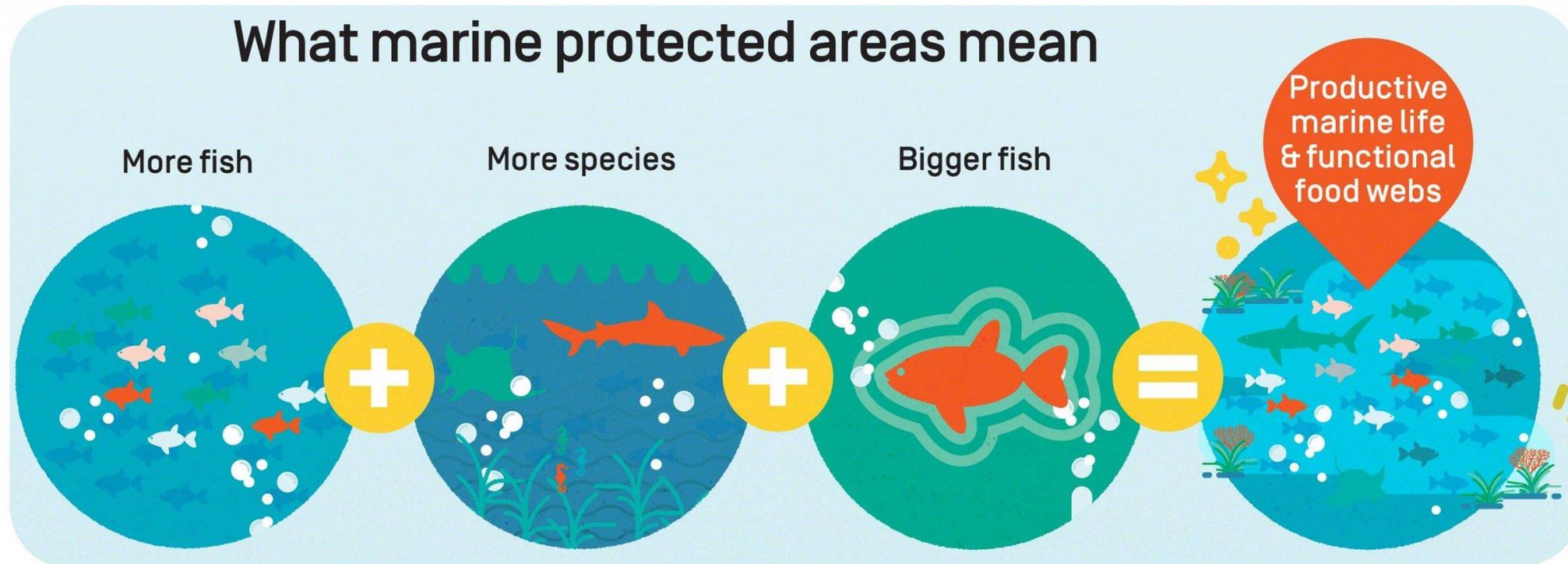


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The Coral Triangle - the nursery of the seas - is the most diverse marine region on the planet, covering some 6 million km<sup>2</sup> of ocean across 6 countries in the Asia-Pacific region. This ecological wonder is home to 76% of the world's reef-building coral species and 6 out of the 7 known species of marine turtles.

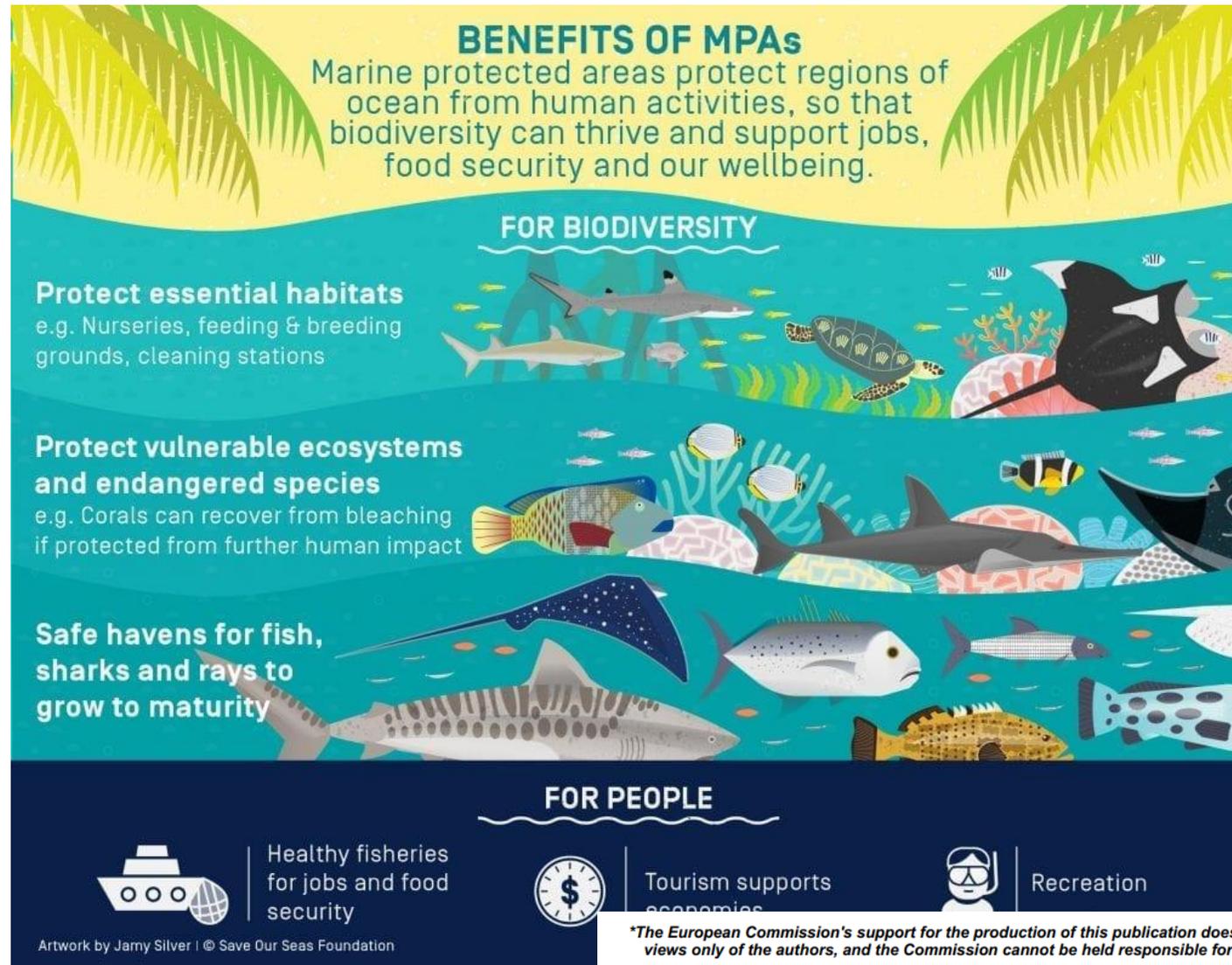
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# MARINE PROTECTED AREA



Inside well-managed marine protected areas, there are more animals and plants, a greater diversity of species and bigger individuals. Together these mean more marine life, higher productivity, functional food webs and healthier ecosystems.

# MARINE PROTECTED AREA



**BENEFITS OF MPAs**  
Marine protected areas protect regions of ocean from human activities, so that biodiversity can thrive and support jobs, food security and our wellbeing.

**FOR BIODIVERSITY**

- Protect essential habitats**  
e.g. Nurseries, feeding & breeding grounds, cleaning stations
- Protect vulnerable ecosystems and endangered species**  
e.g. Corals can recover from bleaching if protected from further human impact
- Safe havens for fish, sharks and rays to grow to maturity**

**FOR PEOPLE**

- Healthy fisheries for jobs and food security
- Tourism supports economies
- Recreation

Artwork by Jarny Silver | © Save Our Seas Foundation

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# THE IUCN RED LIST?

 Established in 1964, The International Union for Conservation of Nature's Red List of Threatened Species has evolved to become the world's most comprehensive information source on the global conservation status of animal, fungi and plant species.

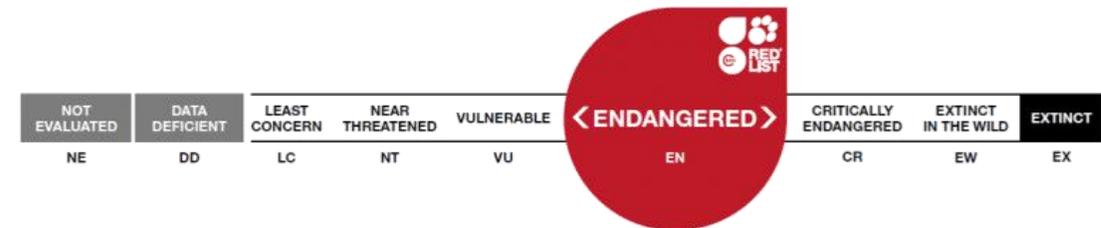
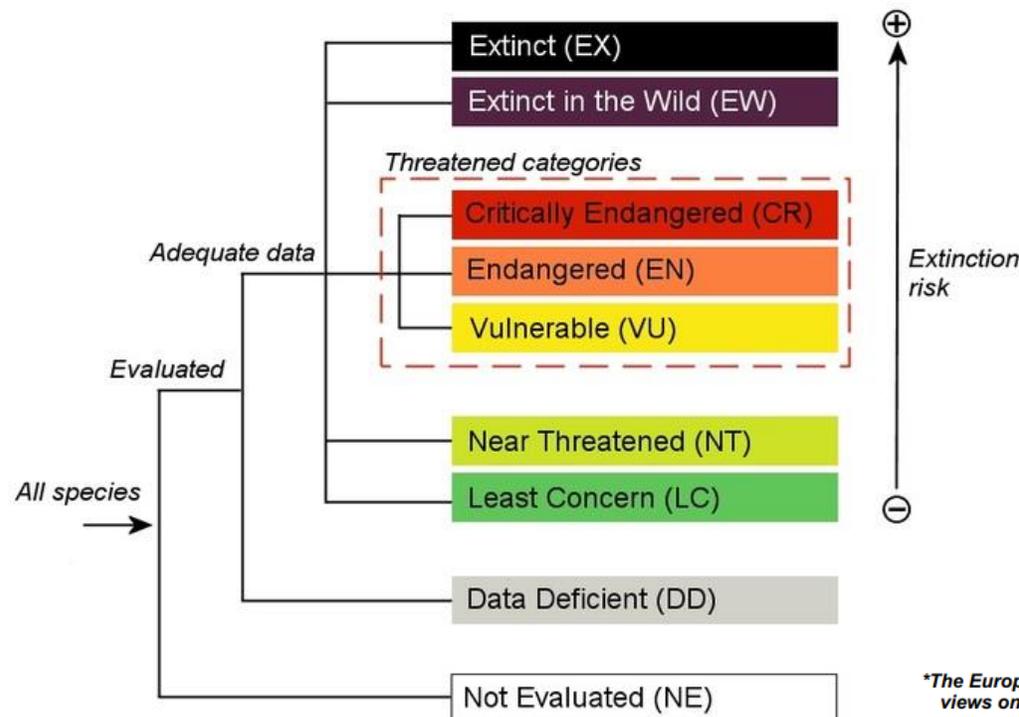
 The IUCN Red List is a critical indicator of the health of the world's biodiversity. Far more than a list of species and their status, it is a powerful tool to inform and catalyze action for biodiversity conservation and policy change, critical to protecting the natural resources we need to survive. It provides information about range, population size, habitat and ecology, use and/or trade, threats, and conservation actions that will help inform necessary conservation decisions.



# THE IUCN RED LIST CATEGORIES AND CRITERIA

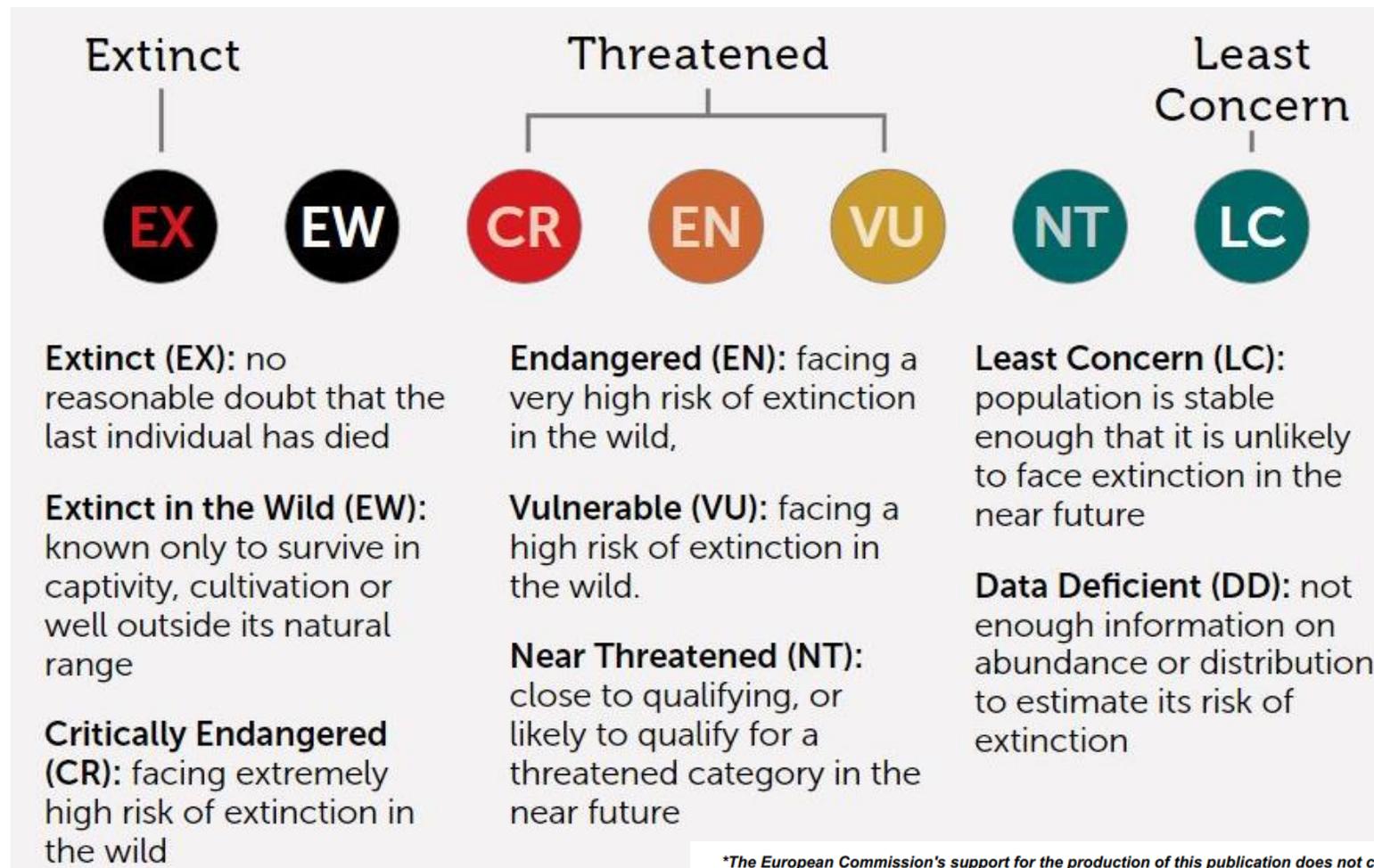
The IUCN Red List Categories and Criteria are intended to be an easily and widely understood system for classifying species at high risk of global extinction.

It divides species into nine categories:



Can you explain each of the categories?

# THE IUCN RED LIST CATEGORIES AND CRITERIA



# THE IUCN RED LIST CATEGORIES AND CRITERIA

More than **37,400 species**  
are threatened with extinction



That is still **28%** of all assessed species

AMPHIBIANS

**41%**



MAMMALS

**26%**



CONIFERS

**34%**



BIRDS

**14%**



SHARKS & RAYS

**36%**



REEF CORALS

**33%**



SELECTED CRUSTACEANS

**28%**







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MARINE RESOURCES MANAGEMENT  
CHAPTER 3  
POLLUTION OF MARINE RESOURCES

# LECTURE OUTLINE

-  Type of marine resources pollution
-  Effect to the resources
-  Prevention / Control the pollution

# TYPE OF POLLUTION

-  Non-persistent organic pollution.
-  Non-persistent inorganic pollution.
-  Microbial pollution
-  Plastic and other solid wastes
-  Hydrocarbons and oil spills
-  Persistent organic pollutants (POPs)
-  Trace metals and Organometallic compounds

# MAJOR SOURCES OF NUTRIENT POLLUTION

## Municipal Sewage

Human sewage is the most common source of nutrient pollution, particularly in South America, Asia, and Africa.



## Agricultural Fertilizers

Often applied to crops in excess, chemical fertilizers containing nitrogen and phosphorus seep into groundwater or are washed away as runoff.



## Livestock Waste

Manure from animal production, which is often used as fertilizer, contributes additional nitrogen and phosphorus.



## Stormwater Drainage

Stormwater runoff washes nutrients from residential lawns and impervious surfaces into nearby rivers and streams.



## Aquaculture

Direct discharge of excrement, uneaten food, and other organic waste generates concentrated amounts of nitrogen and phosphorus in the waters surrounding fish farms.



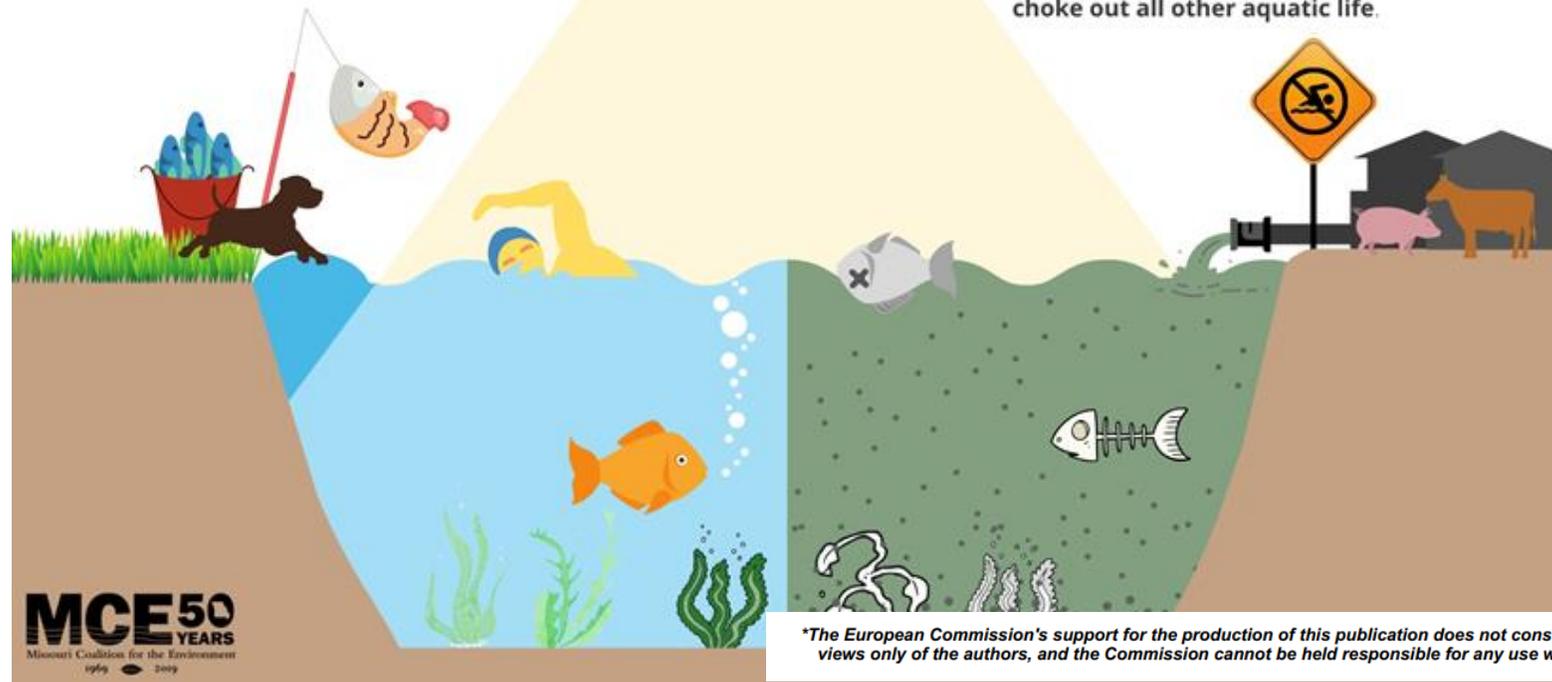
# MAJOR SOURCES OF NUTRIENT POLLUTION

## A HEALTHY MISSOURI LAKE...

...has natural levels of nitrogen and phosphorus that are safe for our families and pets to swim and recreate in.

...has **low levels of chlorophyll-a** in the water so it is clear...

...and allows **sunlight and oxygen reach even the lowest levels of the lake** and create habitats for fish and other aquatic life.



## A POLLUTED MISSOURI LAKE...

...is closed for fishing, swimming, and other recreational activities.

...has increased **nutrient pollution** from excess fertilizer runoff, animal manure, sewage treatment plant discharges, and storm water that trigger **out-of-control algal growth**.

...poisons pets and causes respiratory issues in humans due to **potent toxins** in algal blooms that **choke out all other aquatic life**.

# MICROBIAL POLLUTION

## Untreated Municipal Sewage

Human sewage is the most common source of pathogen pollution, particularly in South America, Asia, and Africa.



## Sewage From Ships

Waste from recreational and commercial vessels, particularly cruise ships, also introduces pathogens to ocean waters.

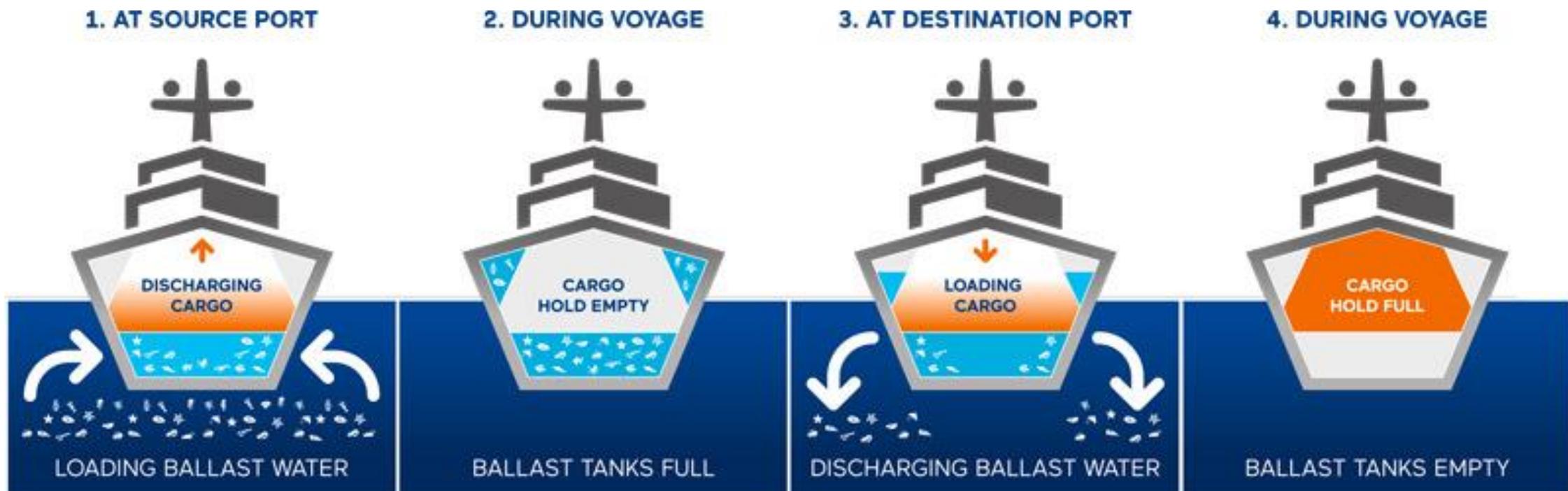


## Livestock and Animal Waste

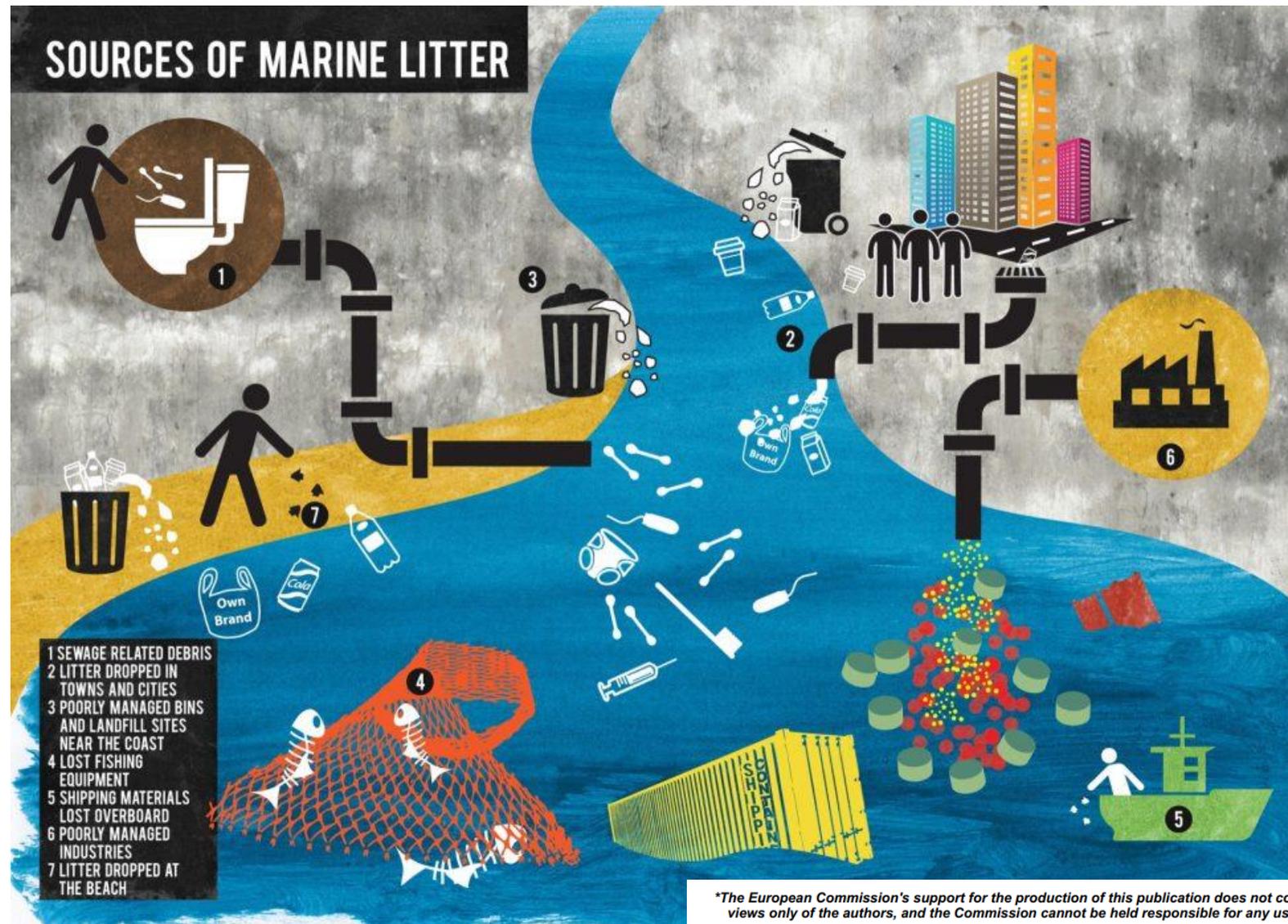
Discharge of waste from farm, domestic or wild animals can introduce bacteria, viruses and parasites into local water systems and coastal waters.



# BALLAST WATER



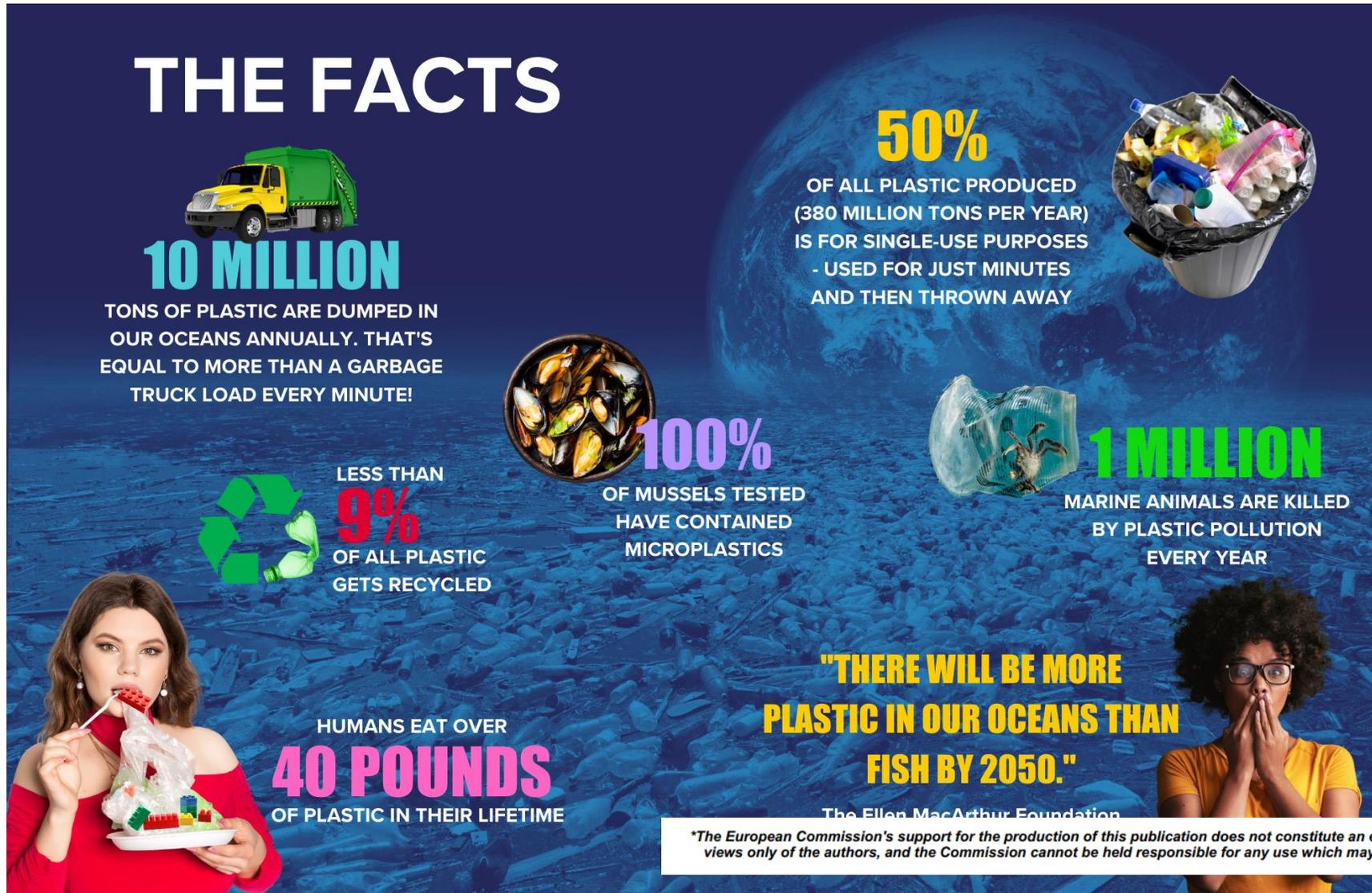
# PLASTIC POLLUTION



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# PLASTIC POLLUTION

## THE FACTS



The infographic features a dark blue background with a large image of Earth in the upper right. It includes several icons: a yellow and green garbage truck, a recycling symbol, a bowl of mussels, a plastic bottle, a trash can full of plastic waste, a woman eating a lollipop, and a woman with her hands to her mouth in shock. The text is presented in various colors and sizes to emphasize the statistics.

**10 MILLION**  
TONS OF PLASTIC ARE DUMPED IN  
OUR OCEANS ANNUALLY. THAT'S  
EQUAL TO MORE THAN A GARBAGE  
TRUCK LOAD EVERY MINUTE!

**50%**  
OF ALL PLASTIC PRODUCED  
(380 MILLION TONS PER YEAR)  
IS FOR SINGLE-USE PURPOSES  
- USED FOR JUST MINUTES  
AND THEN THROWN AWAY

**100%**  
OF MUSSELS TESTED  
HAVE CONTAINED  
MICROPLASTICS

**1 MILLION**  
MARINE ANIMALS ARE KILLED  
BY PLASTIC POLLUTION  
EVERY YEAR

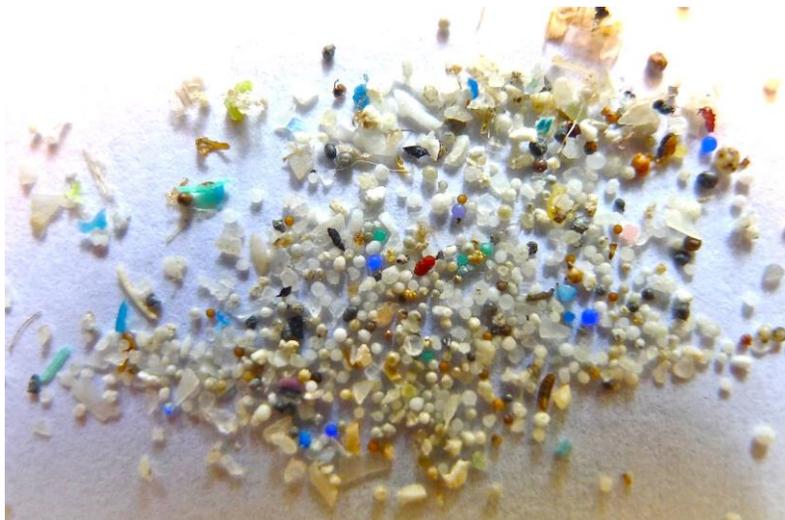
**LESS THAN 9%**  
OF ALL PLASTIC  
GETS RECYCLED

HUMANS EAT OVER  
**40 POUNDS**  
OF PLASTIC IN THEIR LIFETIME

**"THERE WILL BE MORE  
PLASTIC IN OUR OCEANS THAN  
FISH BY 2050."**  
The Ellen MacArthur Foundation

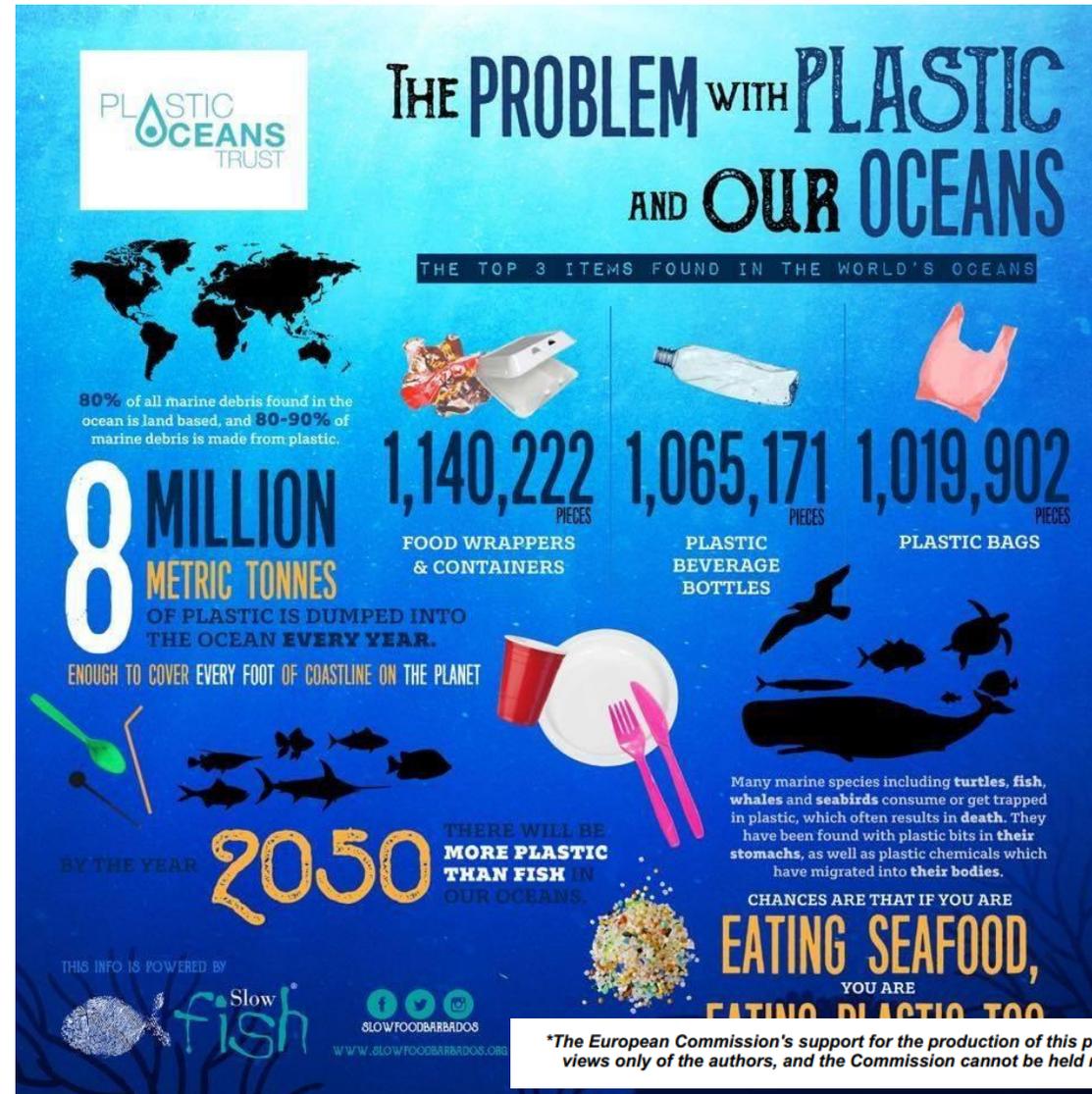
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# MICROPLASTICS



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# PLASTIC POLLUTION



**PLASTIC OCEANS TRUST**

## THE PROBLEM WITH PLASTIC AND OUR OCEANS

THE TOP 3 ITEMS FOUND IN THE WORLD'S OCEANS

Item	Quantity
Food Wrappers & Containers	1,140,222 Pieces
Plastic Beverage Bottles	1,065,171 Pieces
Plastic Bags	1,019,902 Pieces

80% of all marine debris found in the ocean is land based, and 80-90% of marine debris is made from plastic.

**8 MILLION METRIC TONNES** OF PLASTIC IS DUMPED INTO THE OCEAN EVERY YEAR.  
ENOUGH TO COVER EVERY FOOT OF COASTLINE ON THE PLANET

BY THE YEAR **2050** THERE WILL BE MORE PLASTIC THAN FISH IN OUR OCEANS.

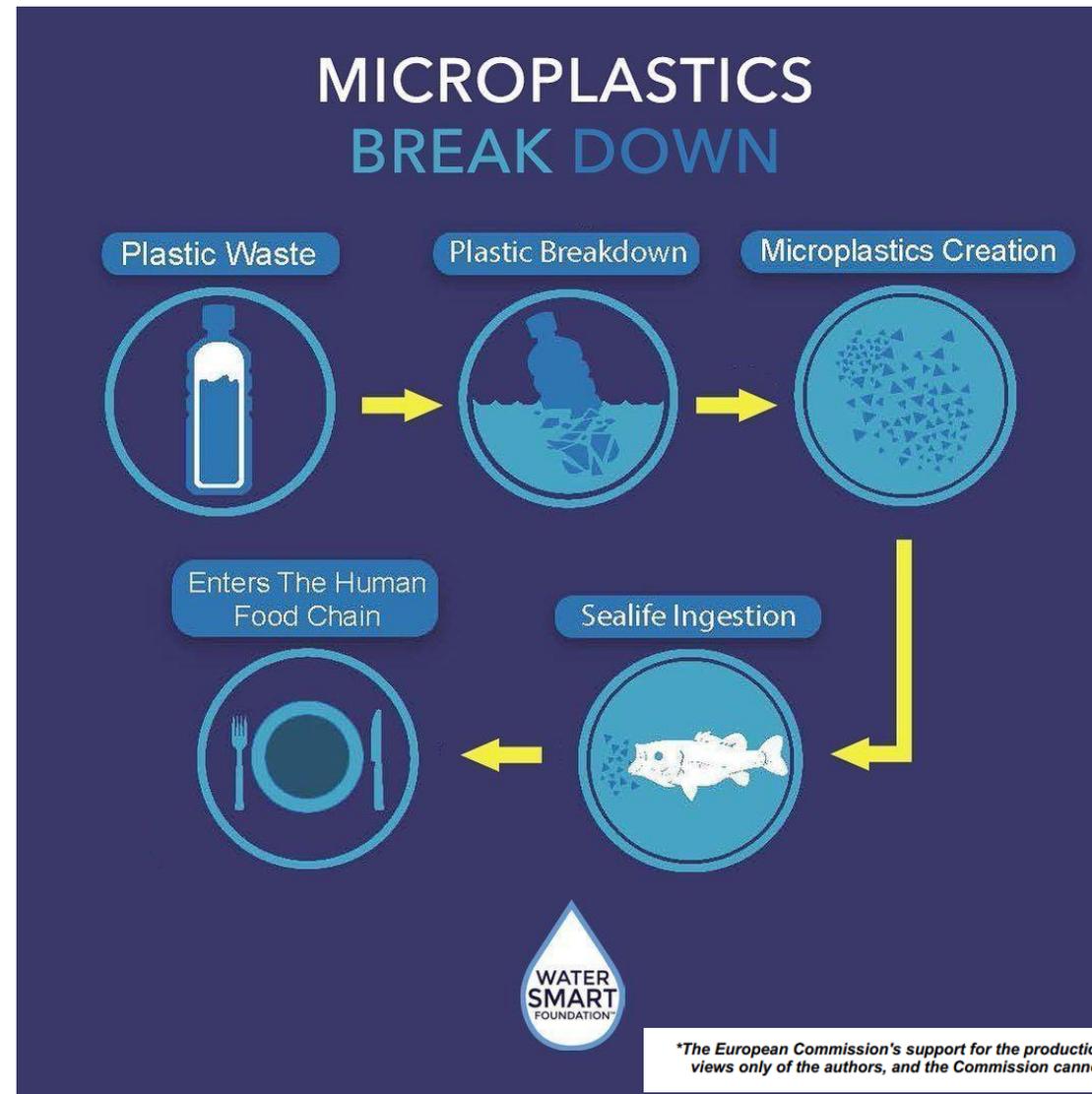
Many marine species including turtles, fish, whales and seabirds consume or get trapped in plastic, which often results in death. They have been found with plastic bits in their stomachs, as well as plastic chemicals which have migrated into their bodies.

CHANCES ARE THAT IF YOU ARE EATING SEAFOOD, YOU ARE EATING PLASTIC TOO.

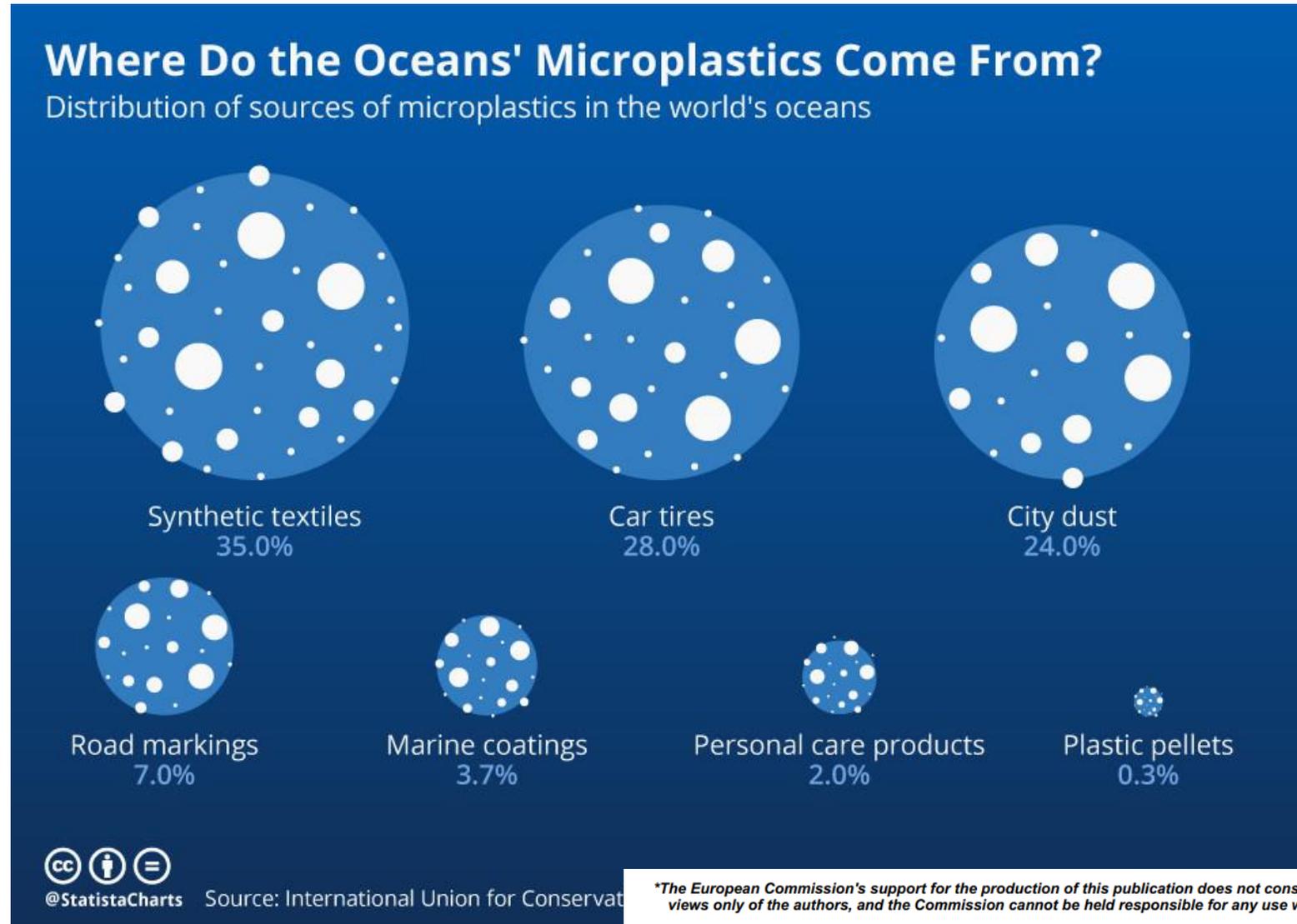
THIS INFO IS POWERED BY **Slow fish**  
SLOWFOODBARBADOS  
WWW.SLOWFOODBARBADOS.ORG

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# MICROPLASTICS



# MICROPLASTICS



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# MICROPLASTICS

## MICROPLASTICS

- Micro plastics are tiny pieces of plastic accumulating in our oceans.


- 280 million tons of plastic every year enter our oceans.


- The plastic degrades and transforms into microplastic.


- They come from large manufacturing or beauty products.

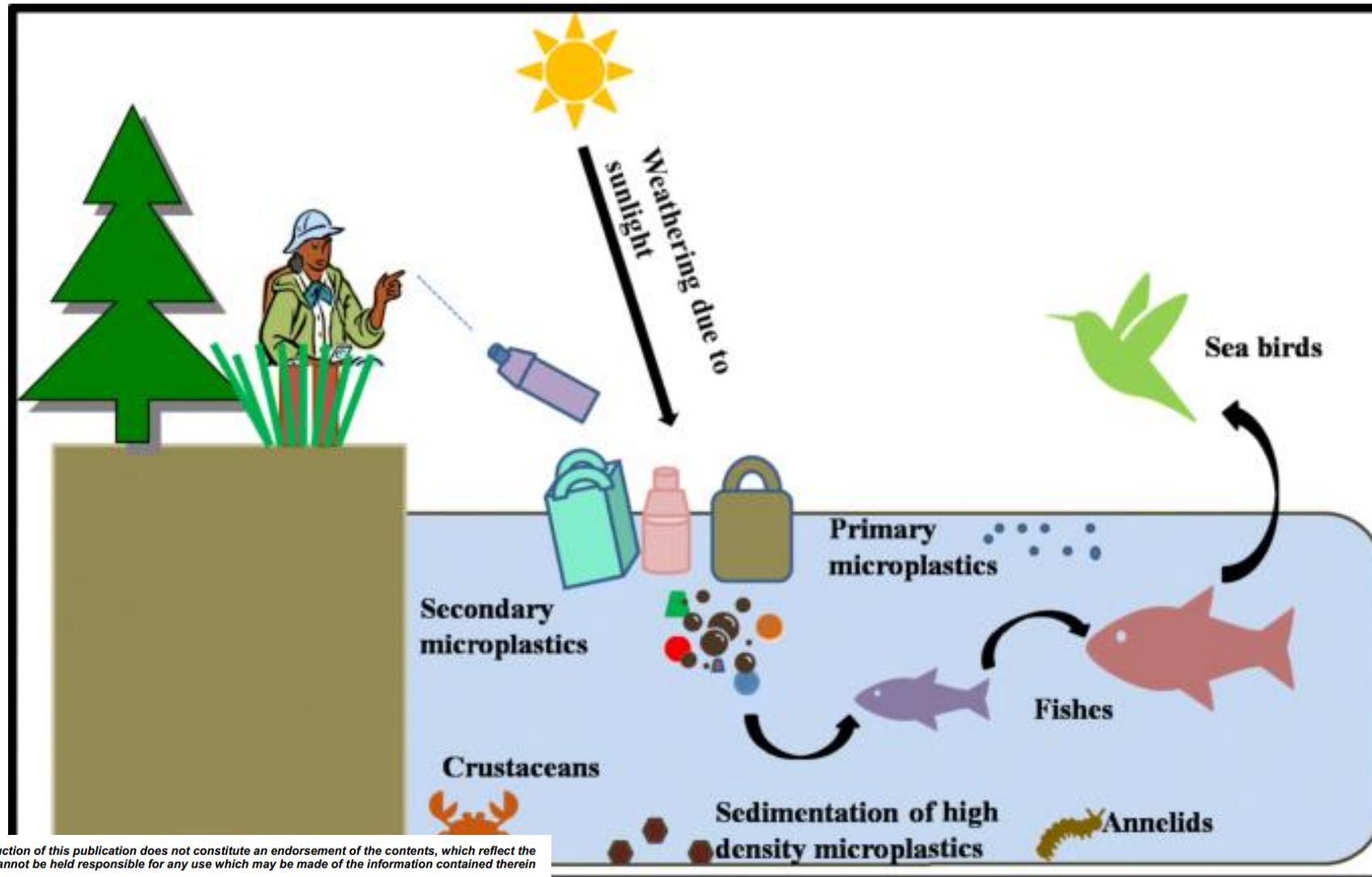

- Micro plastics are now on the food chain.


- Marine animals eat the plastic and it cause a blockage of the digestive system.



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# MICROPLASTICS



# MARINE DEBRIS



<https://www.youtube.com/watch?v=xmnz-8p0AB0>



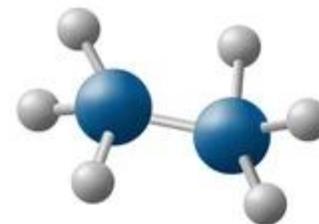
<https://www.youtube.com/watch?v=Yomf5pBN8dY&t=78s>

# HYDROCARBON

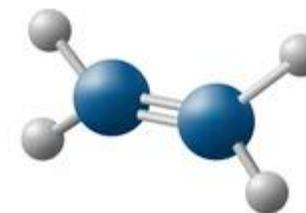
 The major components of oil are nonpolar organic molecules constituted of H and C called hydrocarbon.

## Types

- Alkanes
- Alkenes and alkynes
- Aromatic HC
- Polyaromatic HC



Alkane



Alkene



Alkyne

# OIL SPILL



## Top 10 largest oil spills in history

<https://www.youtube.com/watch?v=PU06GuQ7svA>

## Why birds are so affected by oil spills

<https://www.youtube.com/watch?v=hWmOA8XlrQE>



## How do we clean up oil spills

<https://www.youtube.com/watch?v=3DbSIAG3F3A>



# PERSISTENT ORGANIC POLLUTANTS

-  POPs are organic (carbon based) compounds which do not break down easily in the environment.
-  They accumulate through the food web, reaching peak concentrations in species at the top of the web, and pose a risk of harm to human health and wild animals.
-  POPs remain in the environment for many years, mainly due to their persistence but also due to inappropriate management of decommissioned products, such as old electrical equipment containing polychlorinated biphenyls (PCBs).

# PERSISTENT ORGANIC POLLUTANTS



## Characteristic:

1. Synthetic (man-made) organic chemicals
2. Persistent in the environment
3. Long-range transport
4. Lipophilic
5. Accumulate in food chain
6. Acute, high-level toxicity is well characterized

# PERSISTENT ORGANIC POLLUTANTS

Substance	Main uses
Polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF)	PCDDs and PCDFs are produced unintentionally during the manufacture of pesticides, emitted through the burning of waste and in all incomplete combustion, e.g. in car engines.
Hexachlorobenzene (HCB)	Used to kill fungi that affect food crops.
Polychlorinated biphenyls (PCB)	Range of compounds used in industry as heat exchange fluids, in electric transformers and capacitors, and as additives in paint, carbonless copy paper, and plastics.
Polycyclic aromatic hydrocarbons (PAHs) <sup>3</sup>	Range of compounds released from the combustion of organic substances. For example, exhaust emissions, coal and industrial activities such as aluminium, iron and steel production and from burning tobacco.
Pentachlorobenzene	Used in PCB products, in dyestuff carriers, as a fungicide, a flame retardant and as a chemical intermediate e.g. for the production of quintozone. Also produced unintentionally during combustion, thermal and industrial processes and present as impurities in products such as solvents or pesticides.

# PERSISTENT ORGANIC POLLUTANTS

## PESTICIDES

Aldrin  
Dieldrin  
Chlordane  
DDT  
Endrin  
Heptachlor  
Mirex  
Toxaphene

## INDUSTRIAL CHEMICALS

PCBs  
HCB

## UNINTENDED BYPRODUCTS

Dibenzodioxins  
Dibenzofurans

**Stockholm Convention: a global treaty ratified by the international community lead by UNEP – calls for the elimination and/or phasing out of 12 POPs**

# PERSISTENT ORGANIC POLLUTANTS

## THE CONVERSATION

Academic rigour, journalistic flair

### Agent Orange, exposed: How U.S. chemical warfare in Vietnam unleashed a slow-moving disaster

October 4, 2017 12:12pm AEDT



Unlike napalm, which immediately scalded its victims, Agent Orange kills and maims slowly over time, its effects passed down through generations. U.S. Army Operations in Vietnam R.W. Trewyn, Ph.D/Wikimedia

In the end, the military campaign was called Operation Ranch Hand, but it originally went by a more appropriately hellish appellation: Operation Hades. As part of this Vietnam War effort, from 1961 to 1971, the United States sprayed over 73 million liters of chemical agents on the country to strip away the vegetation that provided cover for Vietcong troops in “enemy territory.”

Using a variety of defoliants, the U.S. military also intentionally targeted cultivated land, destroying crops and disrupting rice production and distribution by the largely communist National Liberation Front, a party devoted to reunification of North and South Vietnam.

Some 45 million liters of the poisoned spray was Agent Orange, which contains the toxic compound dioxin. It has unleashed in Vietnam a slow-onset disaster whose devastating economic, health and ecological impacts that are still being felt today.

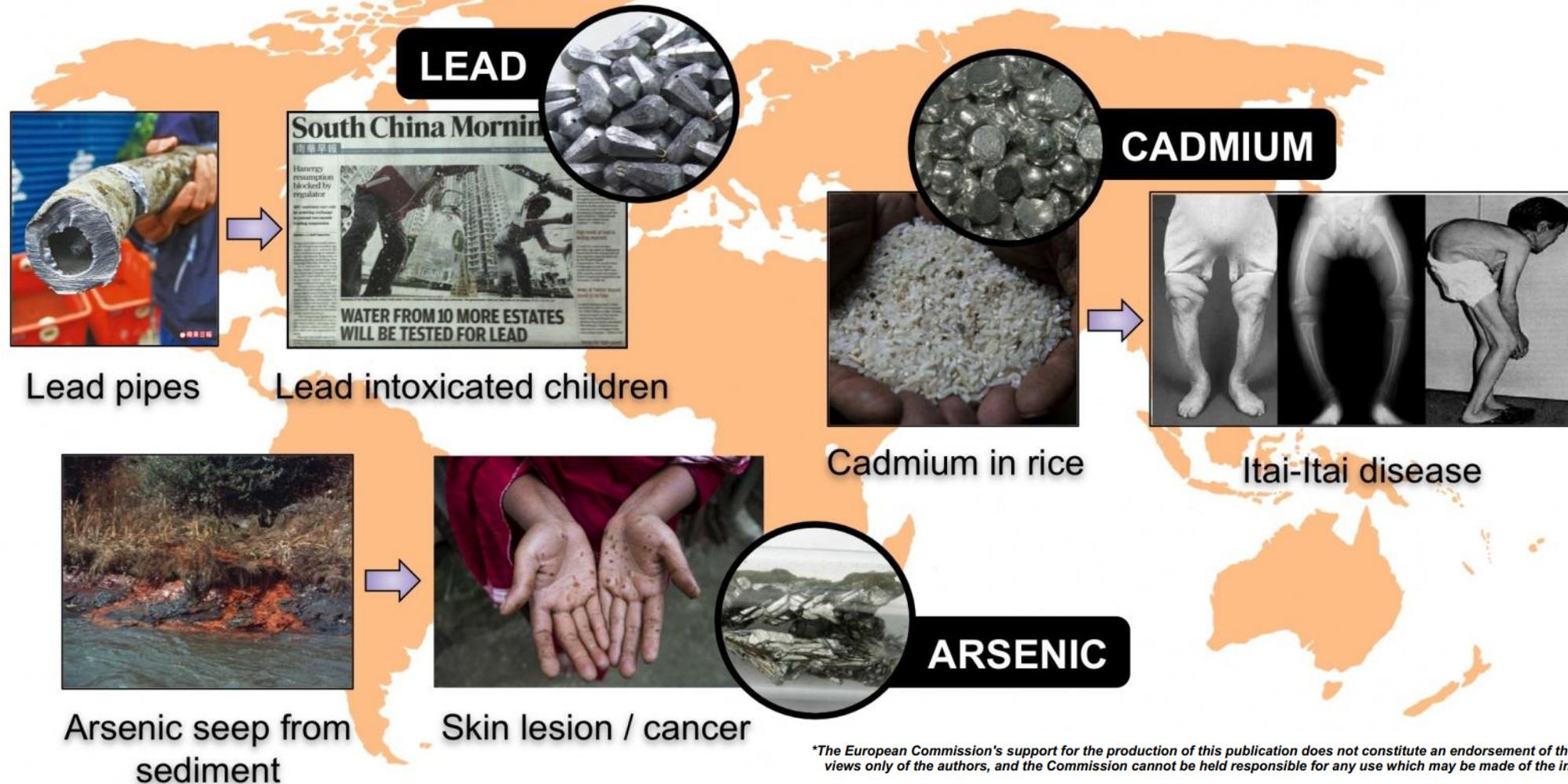
This is one of the greatest legacies of the country’s 20-year war, but is yet to be honestly confronted. Even Ken Burns and Lynn Novick seem to gloss over this contentious issue, both in their supposedly exhaustive “Vietnam War” documentary series and in subsequent interviews about the horrors of Vietnam.

# TRACE METALS

-  Heavy metals are defined as metallic elements that have a relatively high density compared to water.
-  There has been an increasing ecological and global public health concern associated with environmental contamination by these metals.
-  Human exposure has risen dramatically as a result of an exponential increase of their use in several industrial, agricultural, domestic and technological applications.
-  The sources of heavy metals in the environment include geogenic, industrial, agricultural, pharmaceutical, domestic effluents, and atmospheric sources. Environmental pollution is very prominent in point source areas such as mining, foundries and smelters, and other metal-based industrial operations .

# TRACE METALS

## Heavy Metal Pollution is a Global Issue



# TRACE METALS

## Mercury: The Tragedy of Minamata Disease

### Lessons Learned: Looking Back to Go Forward

*A series of articles exploring historical events that provide an important lesson for ensuring a more sustainable and healthy environment. Originally published as a bulletin feature for the newsletter of CHE-WA (Collaborative on Health and the Environment, Washington State chapter); produced by Steven G. Gilbert.*

On May 1, 1956, a doctor in Japan reported an "epidemic of an unknown disease of the central nervous system," marking the official discovery of Minamata disease.

In the late 1950s Minamata Bay, Japan became contaminated with mercury from a nearby factory manufacturing the chemical acetaldehyde (Chisso Corporation's chemical waste pipe). The mercury was biotransformed by bacteria in the water into methylmercury, or organic mercury, that bioaccumulated and biomagnified in the muscle of fish. First, local cats that ate the fish began to stagger about and die. Then, the local population of people that depended on fish were affected, particularly developing fetuses and children. Over two thousand people died, and thousands more experienced c



# TRACE METALS

## Itai-Itai disease

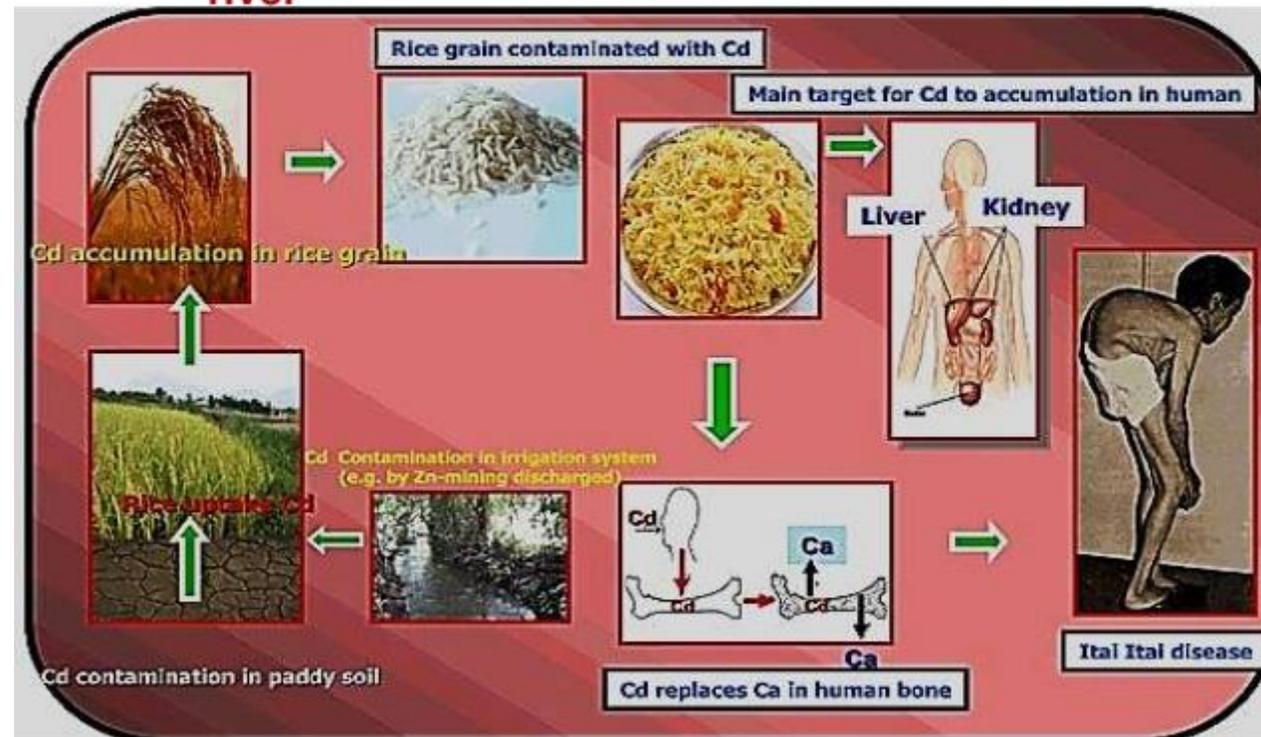
- ❑ Caused from cadmium mining waste dumped in rivers and then used for irrigation of crops
- ❑ Japan, 1950
- ❑ “Ouch-ouch” disease; extremely painful; attacks bones



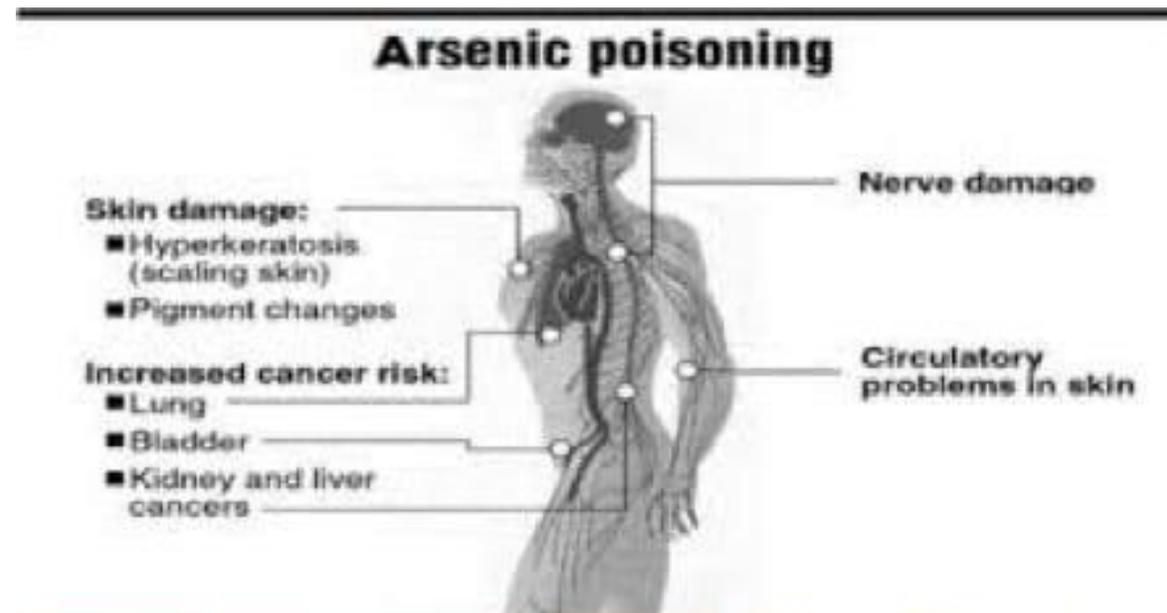
# TRACE METALS

**Itai-itai disease :Toyama, Japan, starting around 1912**

**Mitsui Mining & Smelting Co., Ltd, Jinzu river**



# TRACE METALS







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# MARINE RESOURCES MANAGEMENT

## CHAPTER 4

# FISHERIES AND RESOURCES SUSTAINABILITY

# LECTURE OUTLINE

-  Fish population and stock in our ocean
-  Sustainable use of the fisheries resources
-  How to protect the resources

# FISHERY RESOURCES

-  Fishery resources have a comprehensive definition and, in general, refer to all animals that predominantly inhabit aquatic habitats and are captured by humans.
-  Therefore, invertebrates (e.g., mollusks, crustaceans, echinoderms, and even sponges) and vertebrates (fishes, amphibians, reptiles, mammals) are considered fishery resources, although only fishes and crustaceans (i.e., marine lobsters, shrimps, and crabs) are quantified in fisheries statistics.

# FISHERY RESOURCES

 Despite several types of fishing resources, fishes (Chondrichthyes, Actinopterygii, and Sarcopterygii) have been by far the most targeted group.



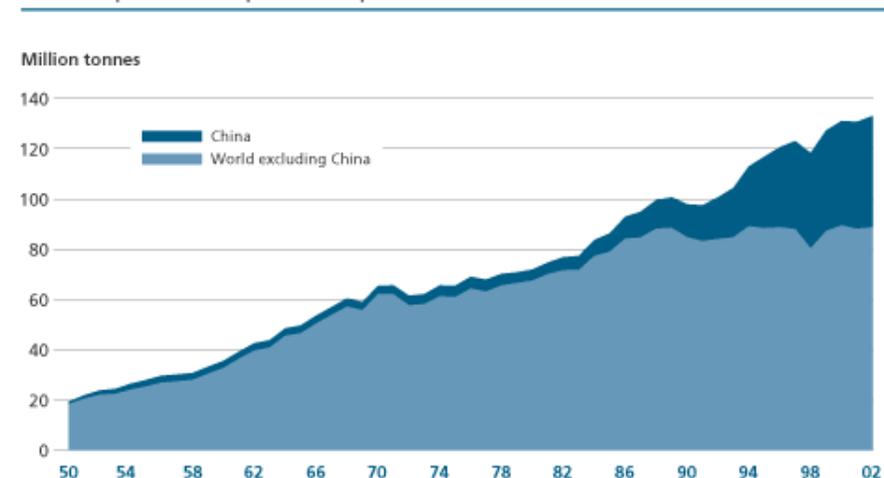
# FISHERY RESOURCES

 Fisheries production has grown throughout decades responding to an increase in demand and in the number of fishers, as well as the improvement of fisheries technologies.

 In 1950, fishing production comprised 20 million tonnes; in 2014, production has been estimated at 167.2 million tonnes, 87.5% of which (146.3 million tonnes) was destined to human consumption (FAO, 2016).

 2020?

World capture and aquaculture production



# FISHERY – VICTIM OF ENVIRONMENTAL DEGRADATION

-  The exploitation of natural resources and habitats is a function of human population size and development, and the trends towards accelerating urbanization, more powerful technology, greater affluence and faster transport are expected to continue throughout the world.
-  Fisheries are, in fact, generally not the culprit but rather the victim of environmental degradation.
-  Controlling coastal development and protecting habitats will, however, often involve painful social and political choices.

# FISHERY – VICTIM OF ENVIRONMENTAL DEGRADATION

-  The magnitude and pace of the anticipated global climate changes are still not clear, and it is therefore difficult to forecast their effects on fisheries and aquaculture. Large changes in total marine fish production are not expected, although particular stocks will be affected.
-  Changes in rainfall patterns and river runoff, as well as sea-level rise, will affect life in coastal nursery areas.
-  Tropical upwelling zones, which produce large amounts of fish, might shift polewards by 200 to 700 kilometres and increase in strength.

# FISHERY – VICTIM OF ENVIRONMENTAL DEGRADATION

-  The year-to-year variability of the resources they support may also increase. However, the increased plankton productivity may reduce oxygen levels and lead to anoxic conditions.
-  Financial consequences are hard to- predict and it is difficult to initiate major interventions until better forecasts are available.
-  Premature, ill-informed decisions could be costly and dangerous, although there is also a risk in taking no action at all.

# FISHERY – VICTIM OF ENVIRONMENTAL DEGRADATION

- 

Chemical pollution, even at low levels, may influence fish production in numerous ways.
- 

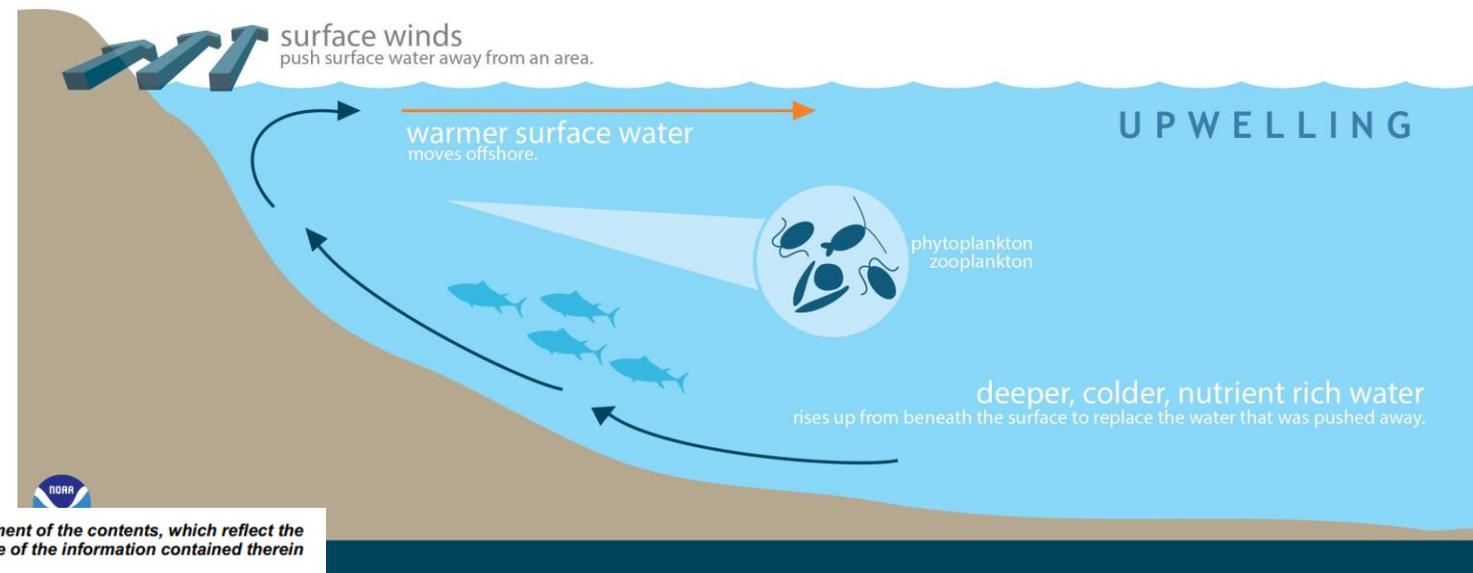
They include: reduction of stocks by mass mortality; gradual decline or change in species composition, of fish populations or entire ecosystems; increased occurrence of disease; deterioration of the food quality of fish and reduced growth rates.
- 

Seas and land-locked water bodies receive a significant proportion of polluting chemicals via the atmosphere so that effects far distant from the source cannot be discounted.



# FISHERY – VICTIM OF ENVIRONMENTAL DEGRADATION

-  Nutrient-rich wastes boost primary-production in otherwise nutrient-poor seas.
-  They may even enhance fishery resources, although they tend to favour the production of small pelagic fish of low economic value.
-  Such wastes may lead to eutrophication, subsequent oxygen depletion and anoxic conditions in the deeper layers of lakes and stratified seas.



# FISHERY – VICTIM OF ENVIRONMENTAL DEGRADATION

-  Fish production has grown rapidly and has put tremendous pressure on resources. Almost all bottom-dwelling species are already either fully exploited, overfished or depleted.
-  The uncontrolled cutting of mangroves and the clearing of mangrove swamps for various purposes, including coastal shrimp farming, will destroy the nursery grounds of a number of commercially important marine species and adversely affect those living resources inhabiting the ecosystem.
-  Furthermore, shorelines will be deprived of natural protection from winds and waves, with a consequent increase in coastal erosion.

# FISHERY – VICTIM OF ENVIRONMENTAL DEGRADATION

-  Fishing modifies the structure, species composition and reproduction rates of both targeted and non-targeted fish stocks.
-  Moderate levels of exploitation remove old, slow-growing individuals and reduce the abundance of large predators, thereby increasing the productivity of the remaining stocks and the sustainable yields.
-  High levels of exploitation reduce large, slow-growing species to 'commercial extinction'.
-  Although few cases of biological extinction by fishing alone have been documented, uncontrolled fishing can have serious ecological consequences, such as the destruction of coral reefs or sea-grass beds.

# FISHERY – VICTIM OF ENVIRONMENTAL DEGRADATION

-  About 13 percent of the world catch of aquatic resources comes from inland waters, half of it from fresh-water aquaculture.
-  Most fisheries are small-scale subsistence or commercial operations. They exploit lakes, rivers, reservoirs and flood-plains in competition with other human activities, and nearly all major enclosed water bodies are now seriously affected by these competing uses.
-  As major controls on inland water environments are exercised by non-fishery users, fishery managers must participate to a much greater extent than at present in the planning of the integrated use of river basins.

# FISHERY – VICTIM OF ENVIRONMENTAL DEGRADATION

- 

About 10 percent of global fish production comes from aquaculture: approximately 7 million tons from freshwater aquaculture and 5 million tons from mariculture.
- 

At present growth rates, production by the end of the century should have almost doubled.
- 

In areas of high production, environmental problems are already apparent and will affect further growth in the sector.
- 

To avoid this situation, planning should cover areas such as environment, social interests and economic policies (including credits and incentives).



# FISHERY – VICTIM OF ENVIRONMENTAL DEGRADATION

Shrimp farming, Oyster farming, Fish farming:

**A Success for Aquaculture?**



# SUSTAINABLE USE OF THE FISHERIES RESOURCES

-  Sustainable development is particularly relevant to fisheries since it implies increasing the benefits from aquatic resources without decreasing the resource or stock beyond some optimal and sustainable level.
-  The concept of sustainability has always been the basis of fisheries management. It includes the sustainability of the biological resource, its value and the social benefits deriving from it.
-  It also implies an assumption of reversibility. Exploitation will inevitably affect the abundance, spawning biomass and species composition of a fishery resource, and the need to conserve options for future generations implies that such effects should be reversible within some practical time-frame.

# SUSTAINABLE USE OF THE FISHERIES RESOURCES



Conservation of aquatic biodiversity poses problems at two main levels.

- In wild stocks, the loss of species (and more especially local races) through bad fishing practices, environmental change or species introduction (including escapes of cultured species), is a real and persistent danger.
- In cultured species, the need to develop new strains and conserve favourable ones is increasing.

# PROTECT THE FISHERIES RESOURCES

**How we can protect the resources?**



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CHAPTER 5  
SEAFOOD SAFETY AND SECURITY

# LECTURE OUTLINE

-  Seafood contamination by biological and chemical hazard.
-  Safety guidelines and quality control in the resources.
-  How to ensure safety and quality of the seafood.

# SEAFOOD SAFETY & SECURITY

-  Seafood Safety - An essential component of seafood marketing is maintaining safe, high quality products.
-  Seafood Security - When people have an access to sufficient quantity of seafood products anytime and anywhere.

**Can you differentiate it?**

# SEAFOOD CONTAMINATION

 Despite the many health benefits of seafood, frequent consumption of contaminated fish can pose considerable health risks.

 Some notable seafood contaminants may include:

- metals such as mercury and lead,
- industrial chemicals such as PCBs, and
- pesticides such as DDT and dieldrin.

# SEAFOOD CONTAMINATION

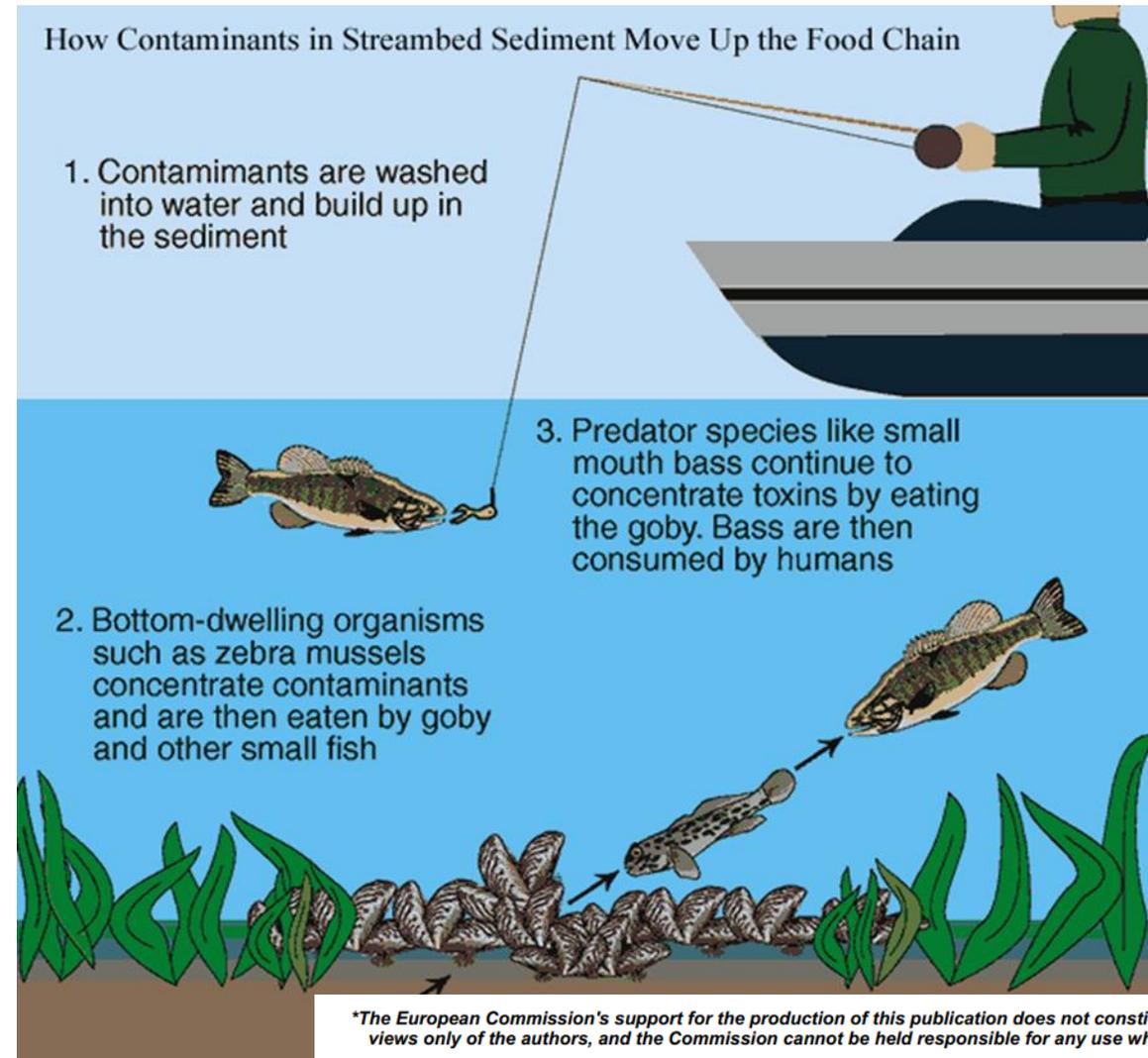
 Contaminants end up in water in a variety of ways:

- Industrial and municipal discharges, agricultural practices, and storm water runoff can all deposit harmful substances directly into the water.
- Rain can wash chemicals from the land or air into streams and rivers. These contaminants are then carried downstream into lakes, reservoirs and estuaries.

 Fish take in these substances in several ways, and their contaminant levels depend on factors like species, size, age and location.

# SEAFOOD CONTAMINATION

 Example: Mercury



# SEAFOOD CONTAMINATION



Contaminants such as mercury and PCBs build up in your body over time and may lead to health problems, ranging from small, hard-to-detect changes to birth defects and cancer.

- It can take 5 years or more for women in their childbearing years to rid their bodies of PCBs, and 12-18 months to significantly reduce their mercury levels.
- Mothers who eat contaminated fish before becoming pregnant may have children who are slower to develop and learn. Developing fetuses are exposed to stored toxins through the placenta.
- Women beyond their childbearing years and men face fewer health risks from contaminants than children do. Eating a variety of seafood and focusing on low contaminant species will minimize your exposure and reduce any associated health risks.

# BIOLOGICAL CONTAMINATION

- 
 can affect the condition of fish and shellfish—especially shellfish.
- 
 Eating shellfish contaminated with pathogens from human and animal fecal waste can cause gastrointestinal illness and even death in people with compromised immune systems.
- 
 Sources of fecal contamination include urban runoff, wildlife, wastewater treatment plants, agricultural runoff, and boating and marinas.



# BIOLOGICAL CONTAMINATION

-  Marine biotoxins produced by certain types of algae can also contaminate fish and shellfish.
-  These toxins can cause massive fish kills and can affect seabirds, marine mammals, and humans.
-  Consuming seafood contaminated with biotoxins can cause gastrointestinal illness, amnesia, memory loss, paralysis, and even death.



# SEAFOOD SAFETY GUIDELINES

**Look for the seafood safety guidelines. Example, Malaysia, Singapore, Thailand, China, Hong Kong and others countries from Europe.**

**Then compare the data in next discussion**

# HOW TO ENSURE SAFETY

## How we can ensure the seafood safety?

**Individual?**

**Communities?**

**Researchers?**

**Policy makers?**





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## CHAPTER 6 POLICIES AND ACTS TO MANAGE MARINE RESOURCES

# LECTURE OUTLINE

-  Laws and policies related to the marine resources management.
-  How to apply these policies as policy maker





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# — MMS3623 —

# MARINE RESOURCES MANAGEMENT

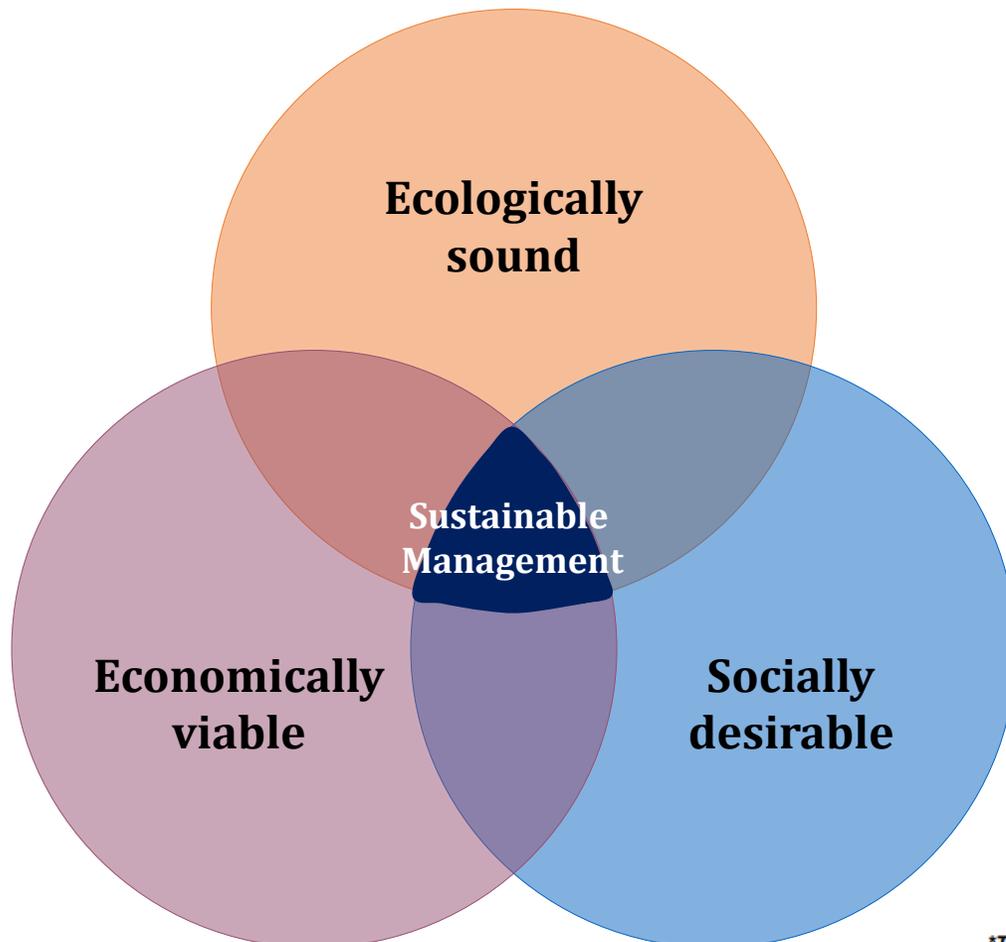
## CHAPTER 6

## POLICIES & ACTS TO MANAGE MARINE RESOURCES

# LECTURE OUTLINE

-  Introduction to policies and acts
-  National policies and acts on marine resources
-  International policies and acts on marine resources
-  Application/adaptation of policies and acts in marine resources related issues.

# The Three Pillars of Sustainability.



Three distinct ideas about “sustainability” are in use today:

1. Sustained yield of a resource
2. Sustained abundance and diversity of species and ecosystems
3. **Sustained economic and social development, *without* compromising existing resources for future generations**

# Sustainable development for marine resources

The 1998 International Year of the Ocean, the Commission emphasizes the importance of international cooperation, within the framework of **UNCLOS and Agenda 21**, in ensuring that the oceans and seas remain sustainable through integrated management, and that while respecting the sovereignty, jurisdiction and sovereign rights of coastal States and recalling their rights and obligations in relation to the protection of the marine environment, all States can benefit from the sustainable use of the oceans and seas.

## PROTECTION OF THE OCEANS, ALL KINDS OF SEAS, INCLUDING ENCLOSED AND SEMI-ENCLOSED SEAS, AND COASTAL AREAS AND THE PROTECTION, RATIONAL USE AND DEVELOPMENT OF THEIR LIVING RESOURCES

### Programme areas:

- Integrated management and sustainable development of coastal areas, including exclusive economic zones;
- Marine environmental protection.
- **Sustainable** use and conservation of marine living resources of the high seas.
- **Sustainable** use and conservation of marine living resources under national jurisdiction.
- Addressing critical uncertainties for the management of the marine environment and climate change.
- Strengthening international, including regional, cooperation and coordination.
- **Sustainable** development of small islands.

# **Sustainable Management Concept**

**Do we need policies, regulations???**  
**WHY???**

**Why do we need to manage our maritime areas, resources, industries, etc???**

**Who has the right to manage/exploit or claim ownership???**  
**Individual?? Agencies?? Public??**

**Whose responsibility for any mishap such as oil spill, pollution, etc???**

**How are we going to manage and protect our marine resources???**

## Policy

- A policy is a statement of intent and is implemented as a procedure or protocol.

## Law

- Law is a set of rules created by state institutions which make laws through the authority of the state (Example: act, ordinance, etc).

## Convention

- A written document adopted by international organizations for their own regulations. A treaty with a foreign power.

## Treaty

- A negotiation, a compact between nations;
- An international agreement in writing between two States (a bilateral treaty) or a number of States (a multilateral treaty). Such agreements can also be known as conventions, pacts, protocol, final acts, arrangements and general acts. Treaties are binding in international law and constitute the equivalent of the municipal law contract, conveyance or legislation. Some treaties create law only for those States that are parties to them, some codify pre-existing customary international law, and some propound rules that eventually develop into customary international law, binding upon all States.

- A policy is an informal rule / deliberate plan of action to guide decisions and achieve a goal, made by ..... (anybody can make policies!)
  - Politicians
  - Government public administrators
  - The publics
  - The related interest group

## How is a policy created?

- Usually created in response to issues brought before decision makers, these policies come in the form of laws and regulations.
- They may be created by any governing body, from the head of the state down to city council members.
- The goal of public policy cannot entirely be separated from its source.

## National Policies Related to Marine Resources

- National Fisheries Plan
- National Policy on Biological Diversity
- National Water Resources Policy
- National Mineral Policy
- National Energy Policy
- National Biodiversity Policy
- National Green Technology Policy



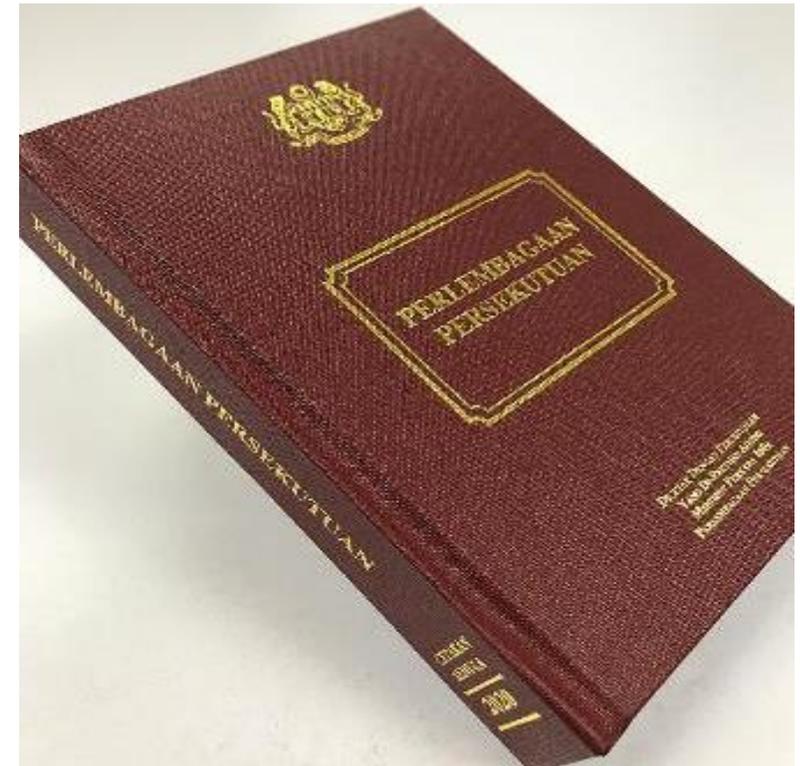
## Exercise 1

Review, discuss and map out the content of listed policies:

- National Fisheries Plan
- National Policy on Biological Diversity
- National Water Resources Policy
  - National Mineral Policy
  - National Energy Policy
- National Biodiversity Policy
- National Green Technology Policy

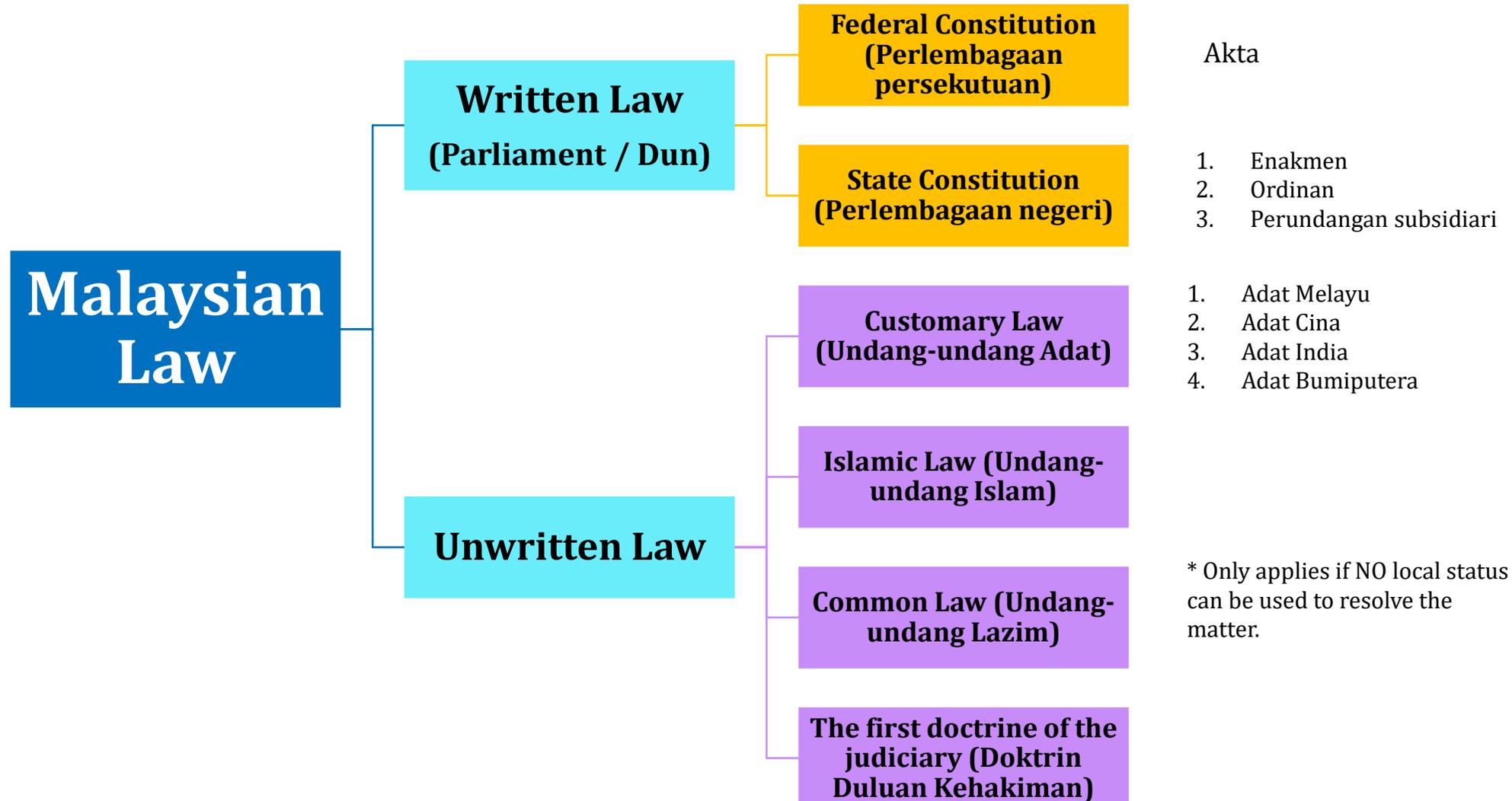
# Laws in Malaysia

- Laws in Malaysia consist of Federal and State law.
- Federal laws are made in the Parliament and applies nationwide.
- State laws are made by assemblymen sitting in the State Legislative Assembly (Dewan Undangan Negeri) and only applies in the particular state.
- The Constitution under the Ninth Schedule clearly defined the powers and functions of the Federal and State government.



# National law

- National environmental legislation is the outcome of parliamentary process.
- Parliaments in some countries like in UK and Malaysia are *bicameral* (i.e. consists of two chambers). In Malaysia, its *bicameral* Parliament consists of “Dewan Rakyat” (The House of Representative) and “Dewan Negara” (The Senate).



## Example



- Continental Shelf Act 1966 (Act 83)
- Environmental Quality Act 1974 (Act 127)
- National Park Act 1980 (Act 226)
- Exclusive Economic Zone Act 1984 (Act 311)
- National Forestry Act 1984 (Act 313)
- Wildlife Conservation Act 2010 (Act 716)

## Exercise 2

Identify, assess and pitch out which National Acts is important in managing, protecting and preserving the marine resources in Malaysian waters.

# CONVENTION

- A UN major event to cater the development issue after the Cold War (1947 – 1991: geopolitical tension between Soviet Union and United States).
- It is a collaboration platform for the member states to produce a broad agenda and a new blueprint for international action on environmental and development issues that would help guide international cooperation and development policy in the twenty-first century.
- Results of Earth Summit (documents):
  - Agenda 21
  - Rio Declaration on Environment & Development
  - Declaration on the Principles of Forest Management
- Important legally binding agreements (open for signature):
  - United Nations Framework Convention on Climate Change (UNFCCC)
  - Convention on Biological Diversity
  - Commission on Sustainable Development

## EARTH SUMMIT

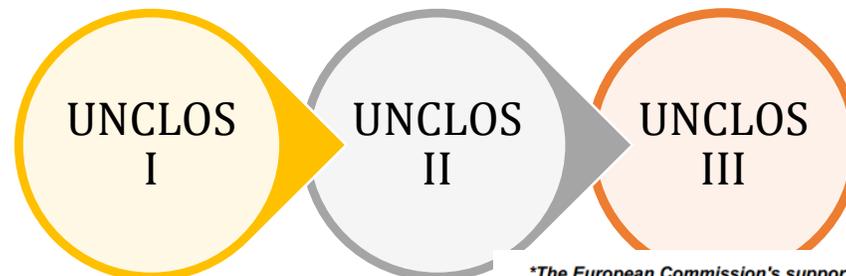


- United Nations Conference on Environment and Development (UNCED).
- Participants: Political leaders, diplomats, scientists, representatives of the media and non-governmental organizations (NGOs) from 179 countries.

United Nations Conference on Environment and Development, Rio de Janeiro, Brazil, 3-14 June 1992 | United Nations

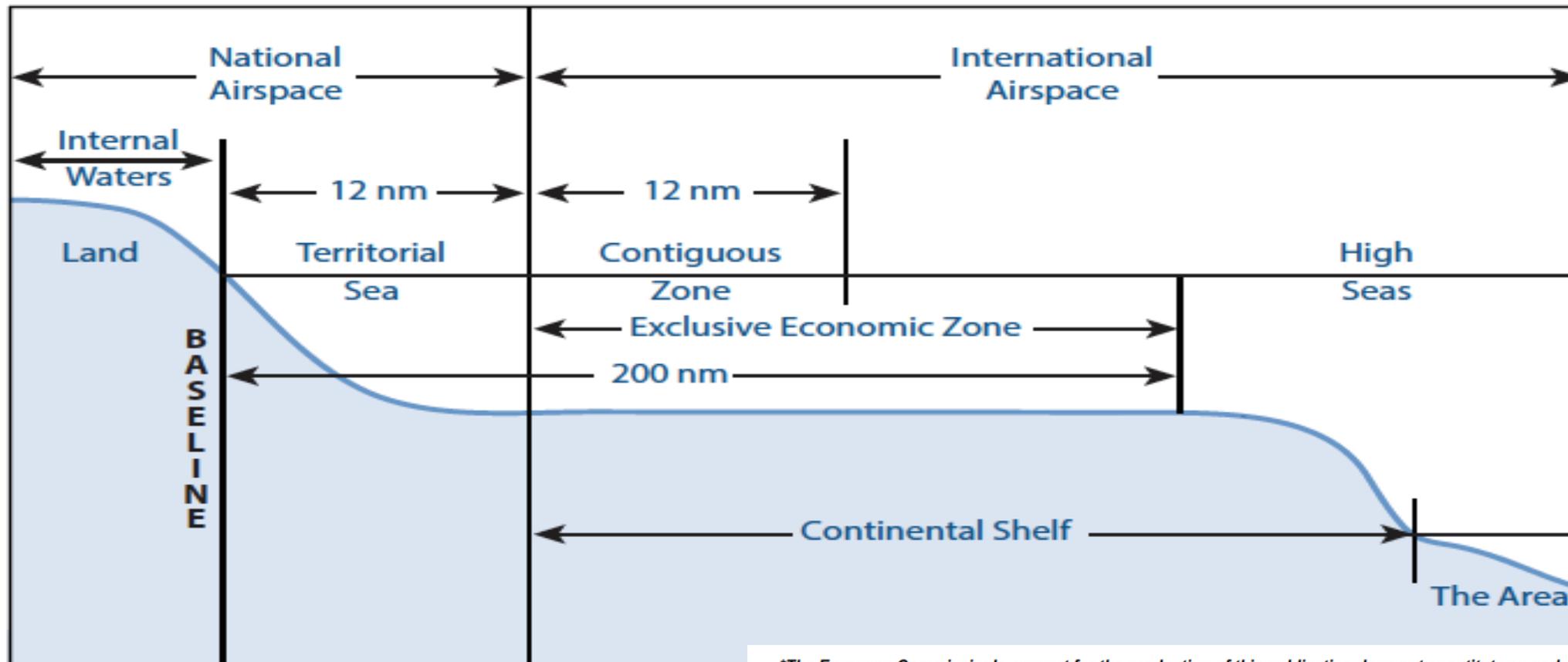
## United Nations Convention on the Law of the Sea (UNCLOS)

- A convention to pursue the protection and sustainable development of the marine and coastal environment, and its resources.
- It also serves as a firm international legal basis for some recent instruments which have no legally binding character (e.g., The Global Programme of Action on Protection of the Marine Environment from Land-Based Activities).
- The chronology of events of UNCLOS formulation consists of:



## UNCLOS III

### Maritime jurisdictional zone



**Legal  
Boundaries of  
the Oceans and  
Airspace**

nm – nautical mile

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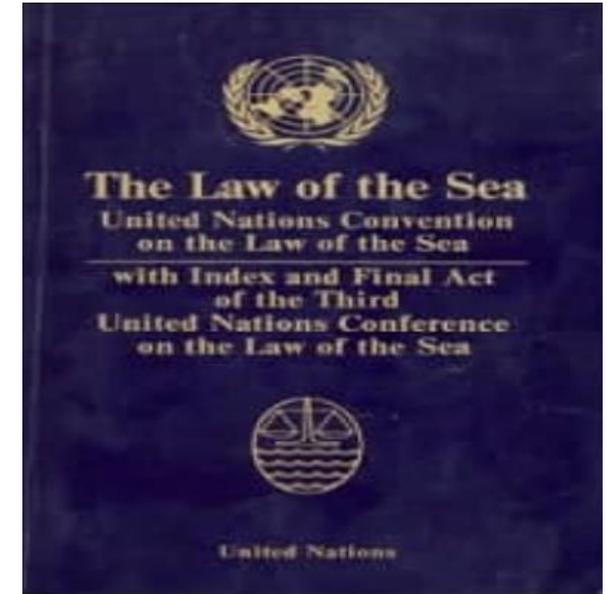
## Sovereign Rights

- Refers to **legal right** possessed by state (or its agencies).
- Enables a state to carry out its **official functions** for **public benefit**.
- **Distinct** from certain **propriety rights** – that may be possessed by private persons.
- International law attributes sovereign rights to Coastal States **beyond their territorial seas**:
  - EEZs
  - Continental Shelves

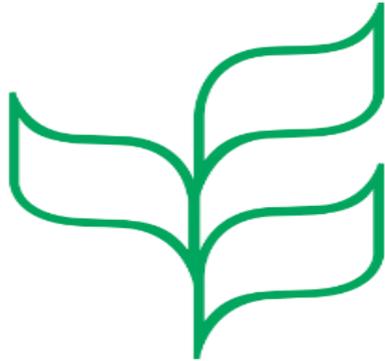


**Exclusive right to exploit or conserve any resources (Living & Non-living):**

- Within the water column
- On the sea floor
- Under the sea floor's subsoil



## The Convention on Biological Diversity (CBD)



Informally known as Biodiversity Convention

Type: Multilateral environment agreement

Membership: 196 states

\*Biological diversity = Biodiversity

- Conceived as a practical tool for translating the principles of Agenda 21 into reality, the Convention recognizes that biological diversity is about more than plants, animals and micro-organisms and their ecosystems – it is about people and our need for food security, medicines, fresh air and water, shelter, and a clean and healthy environment in which to live.
- Open for signature: 1992 (Earth Summit – Agenda 21)
- Enter into force / Worldwide implementation of CBD – 29 Dec 1993 (International Day of BD)
- Objective: to develop national strategies for the conservation and sustainable use of biological diversity.
- Goals:
  - the conservation of biological diversity
  - the sustainable use of its components
  - the fair and equitable sharing of benefits arising from genetic resources

## AICHI BIODIVERSITY TARGETS

 Public awareness	 Sustainable fisheries	 Protected areas	 Nagoya ABS Protocol
 Value of biodiversity understood	 Sustainable agriculture	 Species	 NBSAP revision
 Removal of perverse incentives	 Pollution	 Genetic diversity	 Traditional environmental
 Sustainable production / consumption	 Invasive alien species	 Ecosystem services	 Knowledge transfer
 Loss of natural habitats	 Climate change / ocean acidification	 Ecosystem-based carbon sequestration	 Resource mobilisation

There are 20 targets being listed under CBD Strategic Plan for Biodiversity 2011 – 2020 that need to be achieved by the year of 2020, however, not all targets are achieved.

[Aichi Biodiversity Targets \(cbd.int\)](http://cbd.int)

## Convention on International Trade in Endangered Species on Wild Fauna and Flora 1973 (CITES)

To accord direct protection on wildlife trade, Malaysia acceded to the convention in 1977. Malaysia subsequently amended the Protection of Wildlife Act 1972 into the Wildlife Conservation Act, 2010 and enacted the International Trade in Endangered Species Act (INTESA), 2008. Consequently, the Malaysian wildlife is categorised into Appendices I, II, and III in accordance with their population status. Considering that there is special allowance under the Federal Constitution for Sabah and Sarawak in certain areas including the wildlife protection, Sarawak has enacted the Natural Resources Ordinance, 1954 and Wildlife Protection Ordinance, 1990 and Sabah enacted the Fauna Conservation Ordinance (1963). However, given that CITES was ratified much later than both the Sabah and Sarawak legislations, the uniformity between the Federal and state laws is subject to examination.

### What is CITES? | CITES

## Exercise 3

Identify and discuss which International Conventions ratified by Malaysian government in managing, protecting and preserving the marine resources in Malaysian waters.

# Institutional Framework in Malaysia

- 14 ministries – responsible for the management of maritime related industries in Malaysia (sometimes the function & objectives – overlaps: applies to enforcement as more than one agency is involved).
- To date, Malaysia has enforced 94 maritime related laws & regulations.
- The Maritime Institute of Malaysia (MIMA) has categorized the enacted laws and regulations into 21 categories.
- Each category consists of an average of five to 11 regulations.

Port	Shipping	Light House	Non Living Resources	Mining
Living Resources / Fisheries	Natural Resources	Pollution	Jurisdiction	Enforcement
Drugs	Explosion	Tourism	Financial	Heritage & Antiquity
Nuclear	Telecommunication	Dispute Settlement	Employment	Education
		Forestry / Wildlife		

# Exercise 4

Based on the discussed national policies (in Exercise 1) and enacted laws and regulations in 21 categories by MIMA, suggest and deliberate how are you going to apply or adapt these laws and policies in managing the marine resources.





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THANK YOU