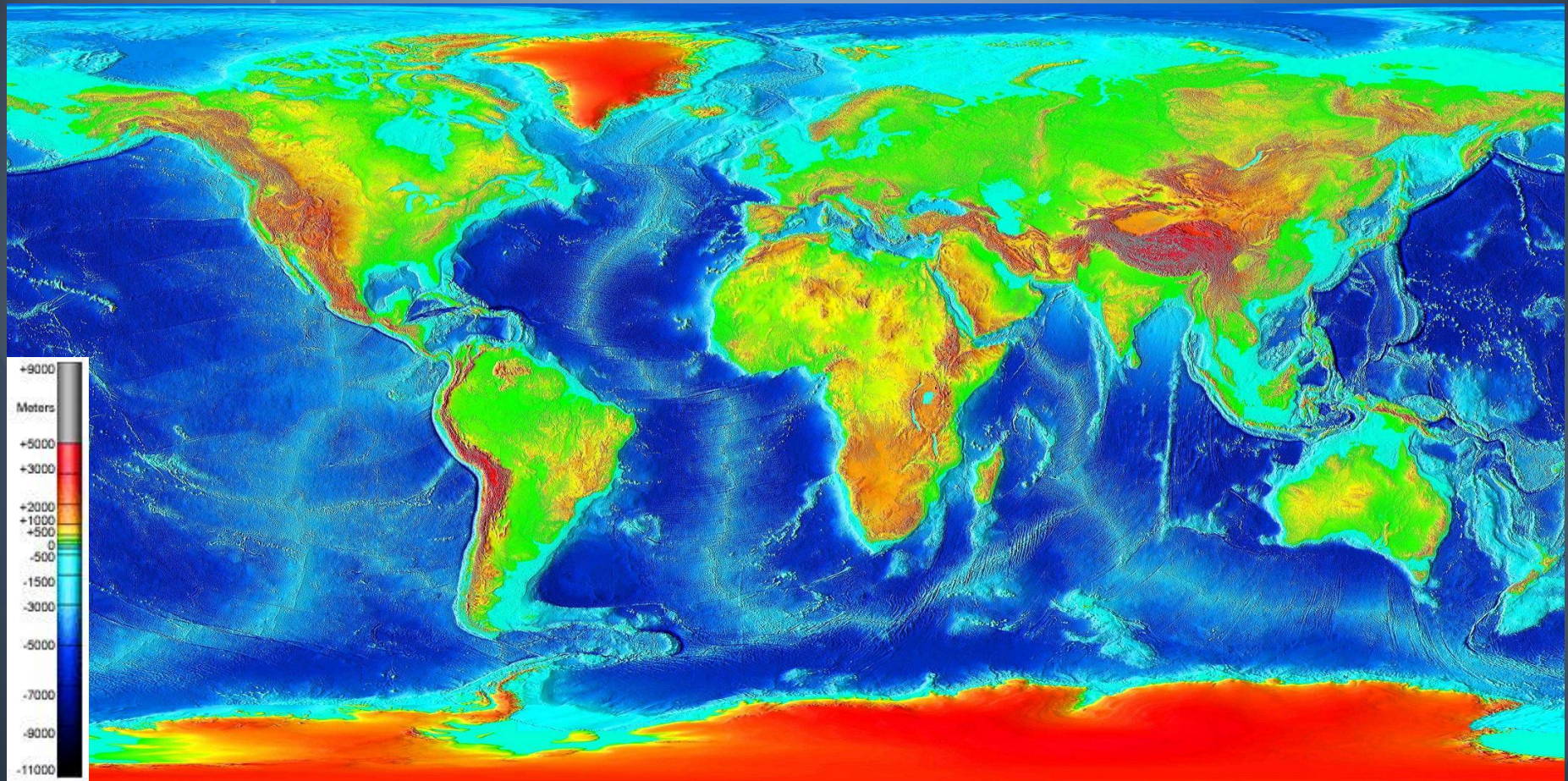


Coastal and Marine Ecology

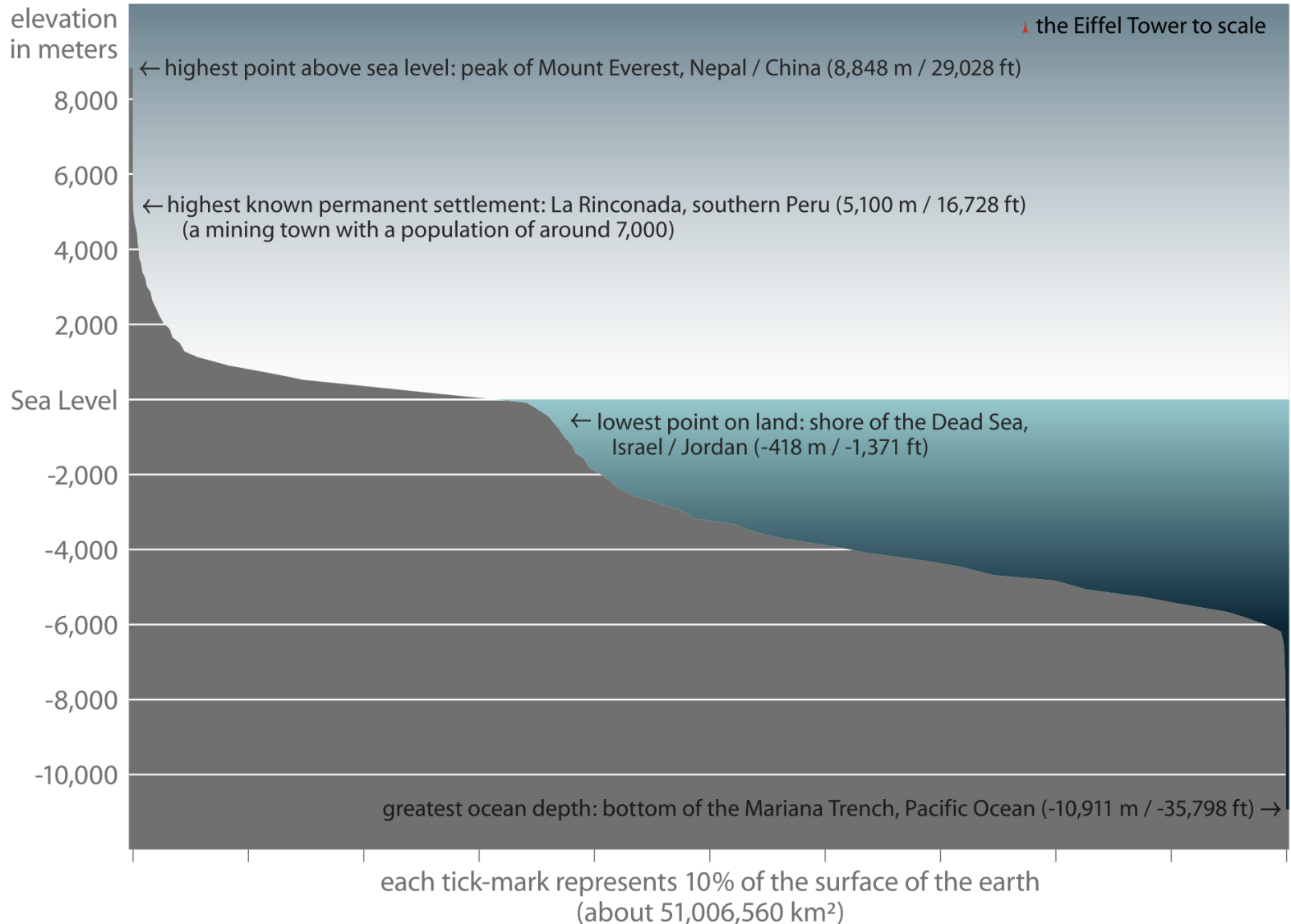
by
Nimit Kumar (Scientist, INCOIS)

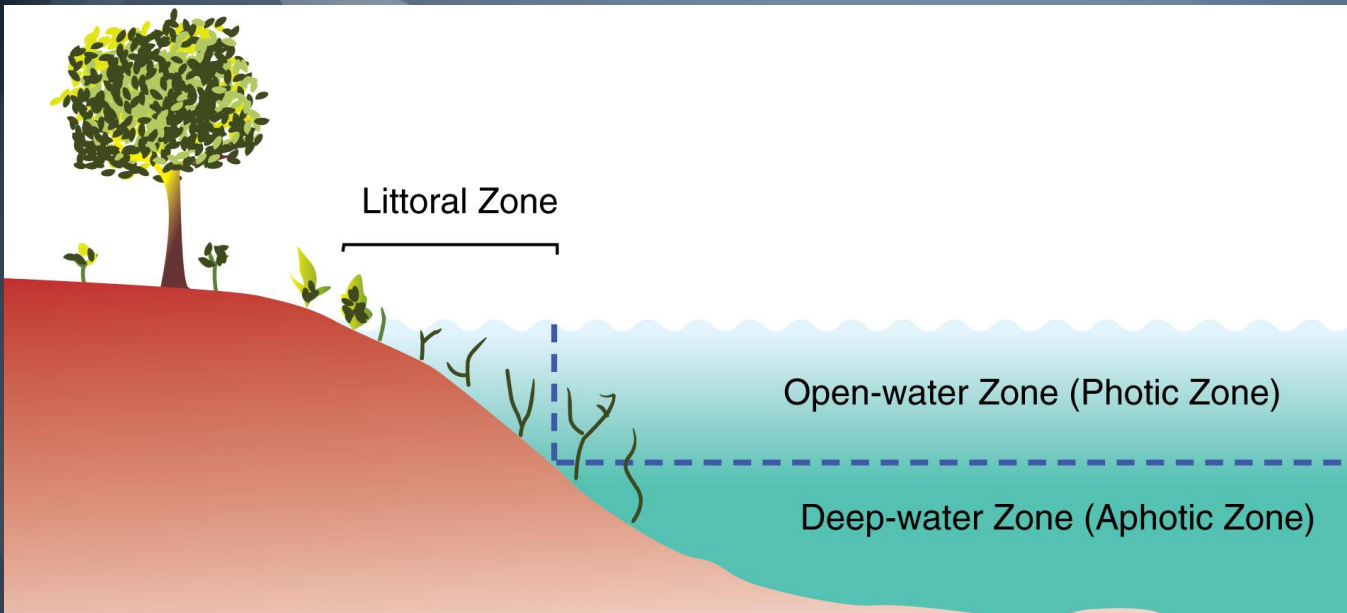
25 March, 2014

for
ITCOO Short Course On
Remote Sensing of Potential Fishing Zones and Ocean State Forecast

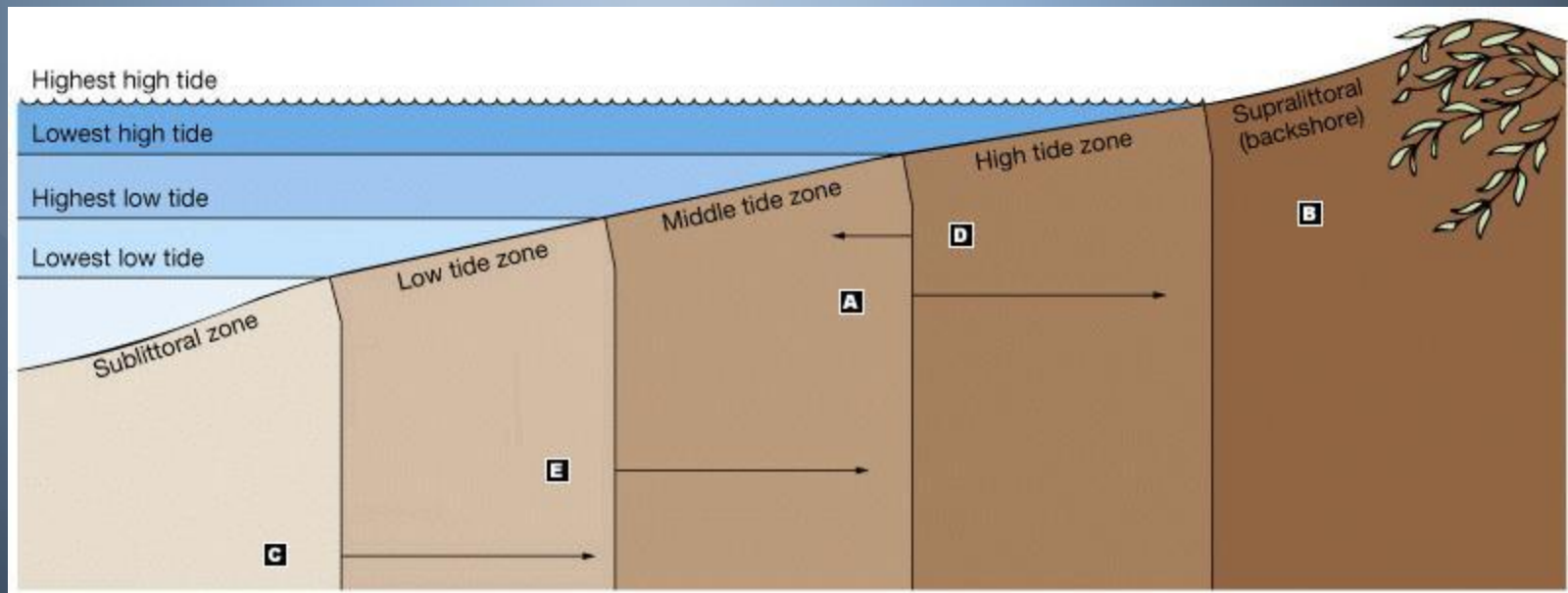


Elevation Histogram of the Earth's Crust

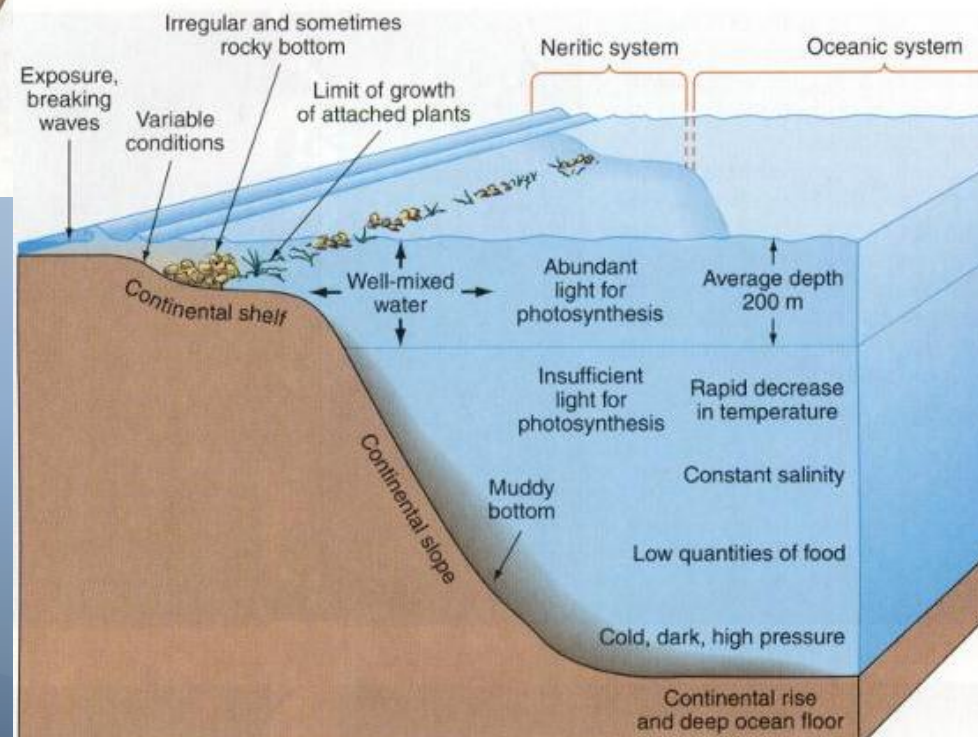
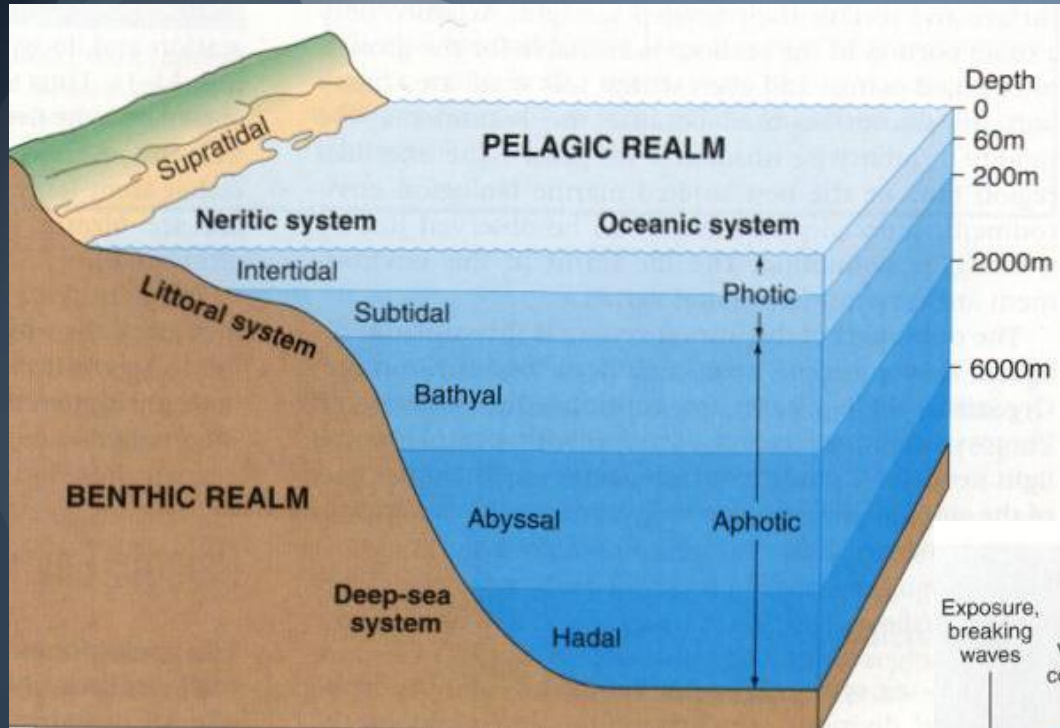


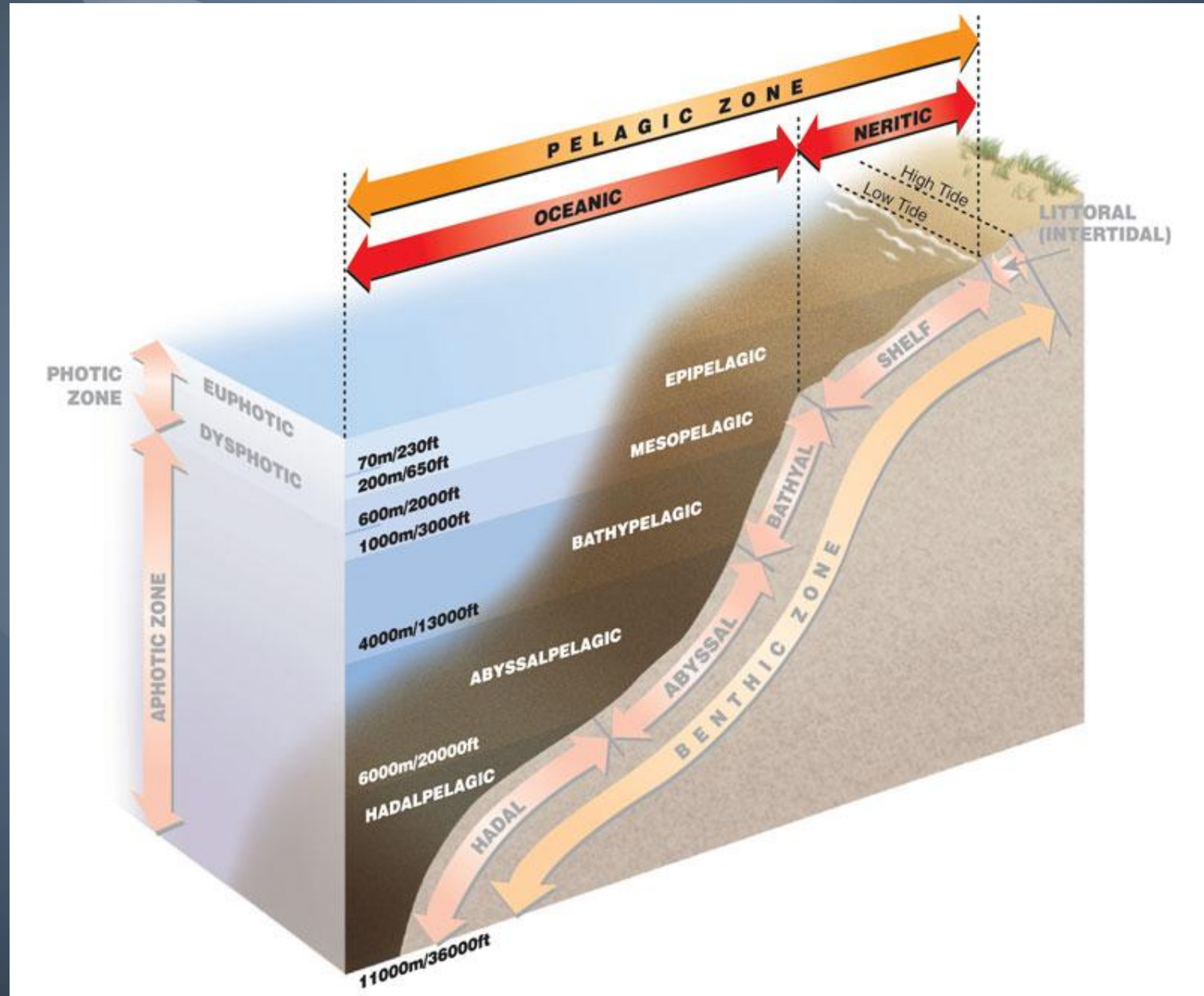


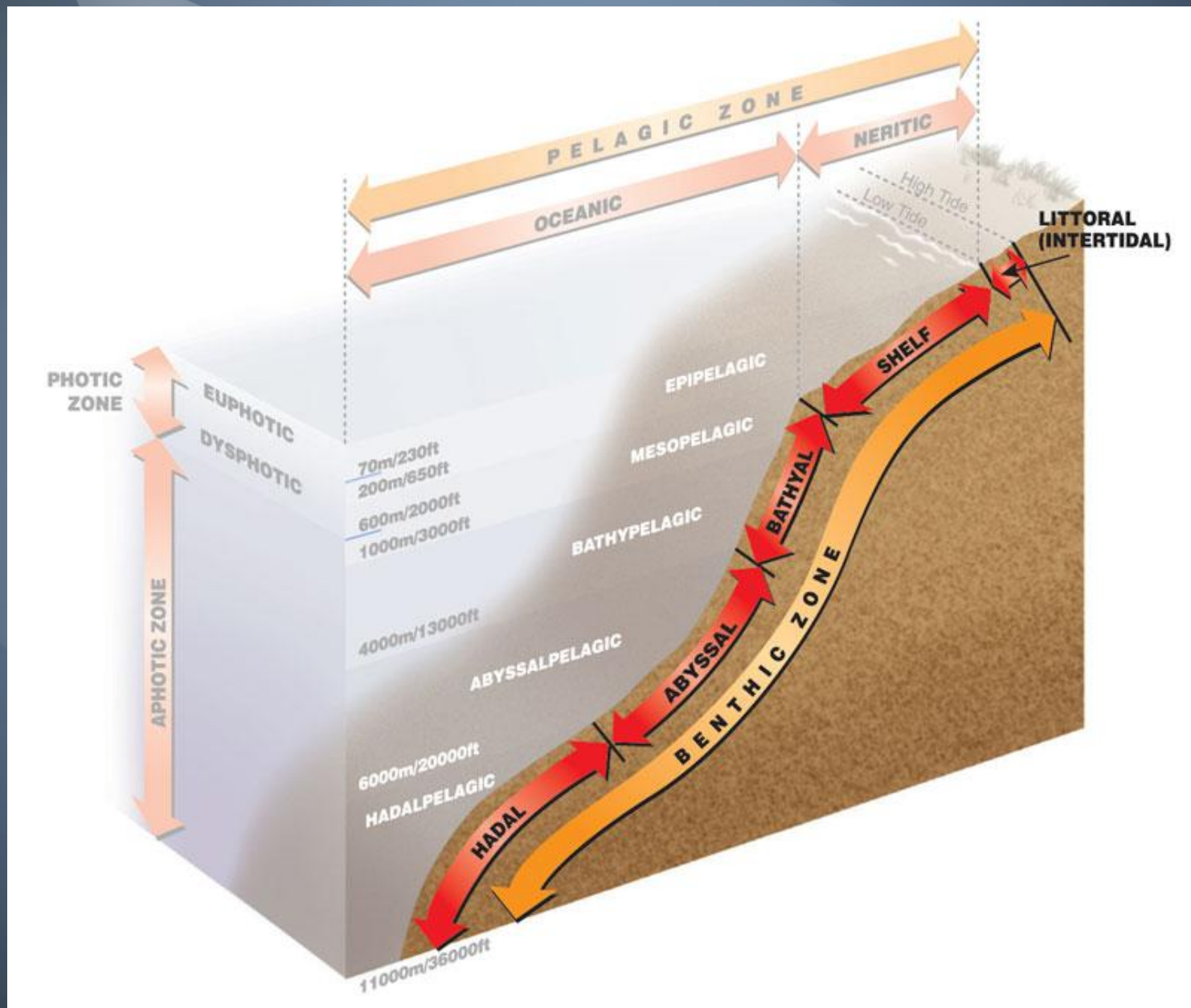
Source: Wikipedia

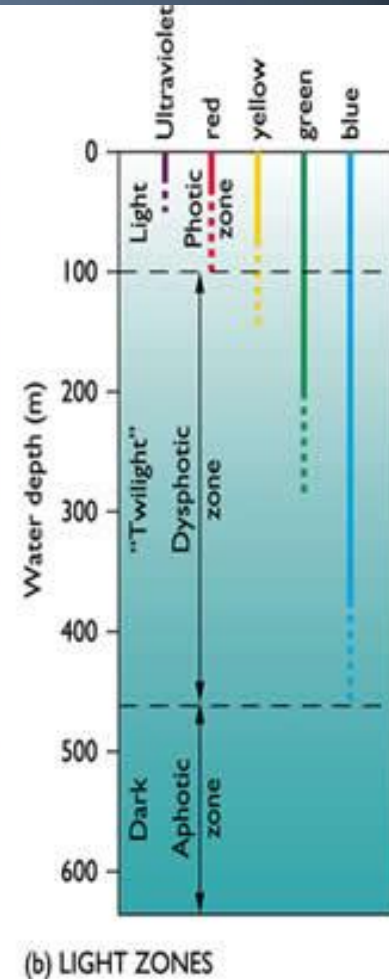
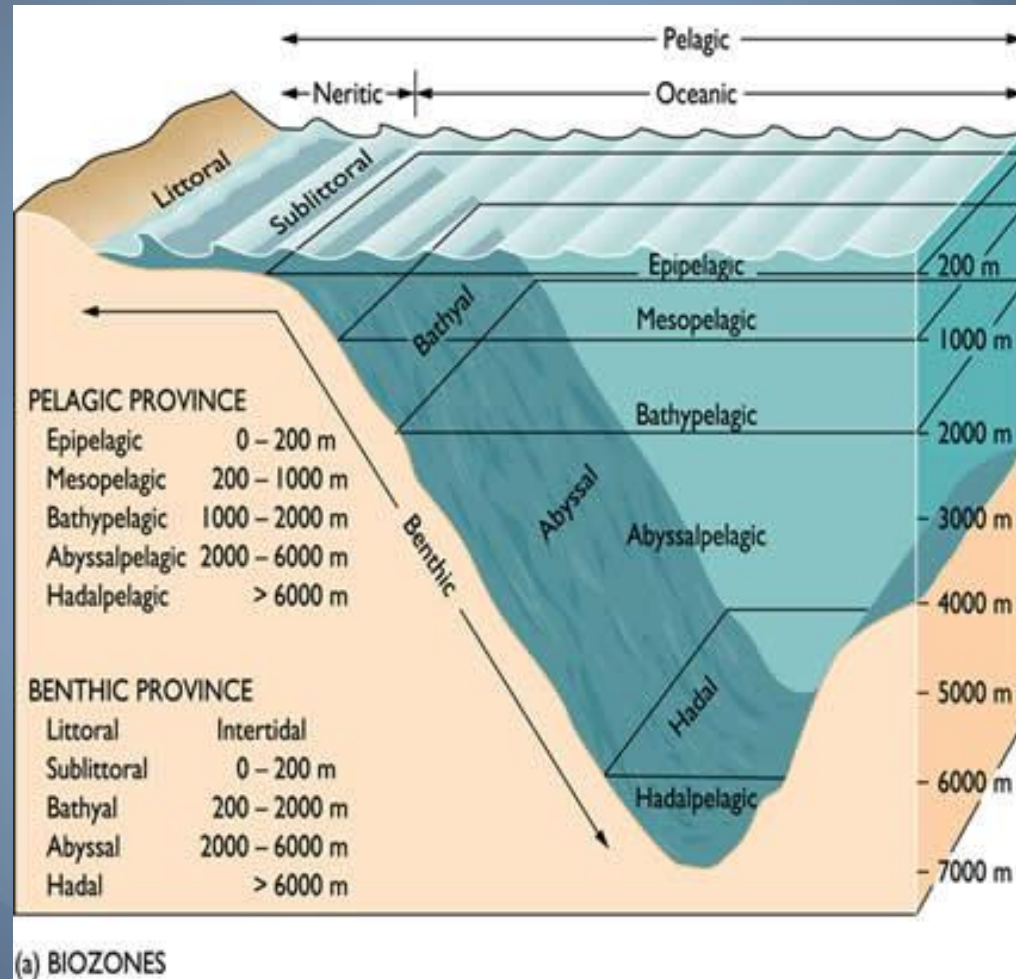
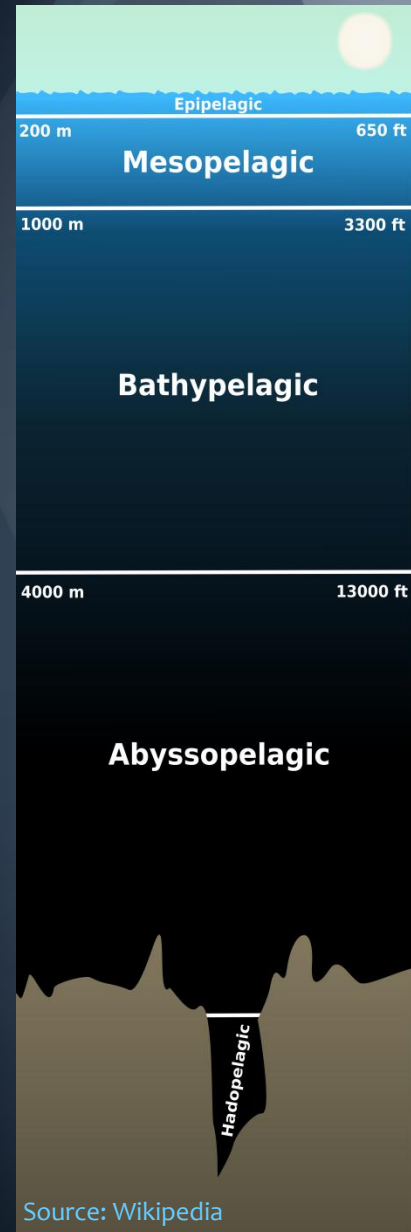


Source: http://wps.prenhall.com/esm_thurman_essofocean_8/22/5778/1479289.cw/content/



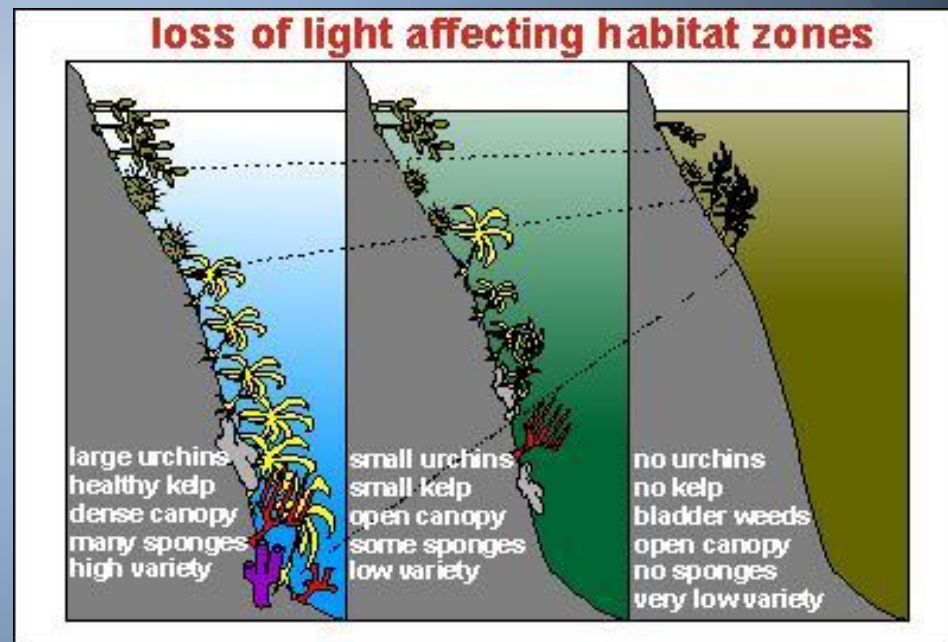
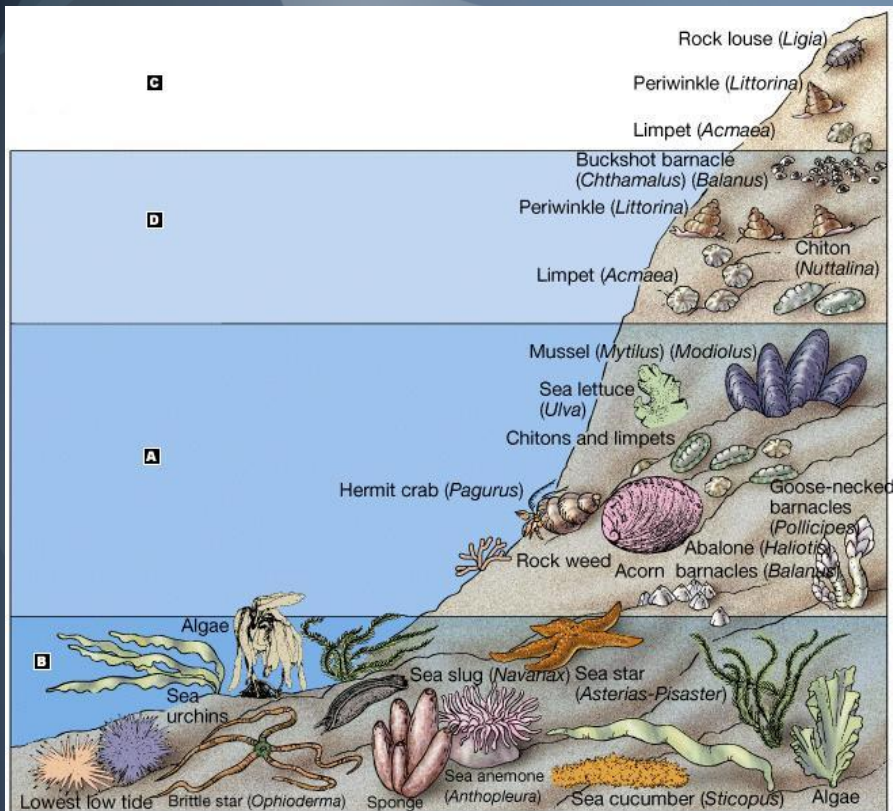






(a) BIOZONES

(b) LIGHT ZONES



Conceptual Model of Arctic Oil Spill Exposure and Injuries

Wetlands, low coastal tundra, lagoons:
Provide refuge, nesting, and spawning areas. Highly productive.

OIL IMPACT

Oiled, degraded or eroding habitat reduces productivity.

Pelagic Zone
Productive area for food web.

OIL IMPACT

Surface and dispersed oil affects food web. Fish eggs and larvae are especially sensitive.

Benthos

Can be highly productive, important in cycling nutrients.

OIL IMPACT

Oil in sediments reduces productivity and affects food web.

Top Predators

Marine mammal and bird populations are of global significance.

OIL IMPACT

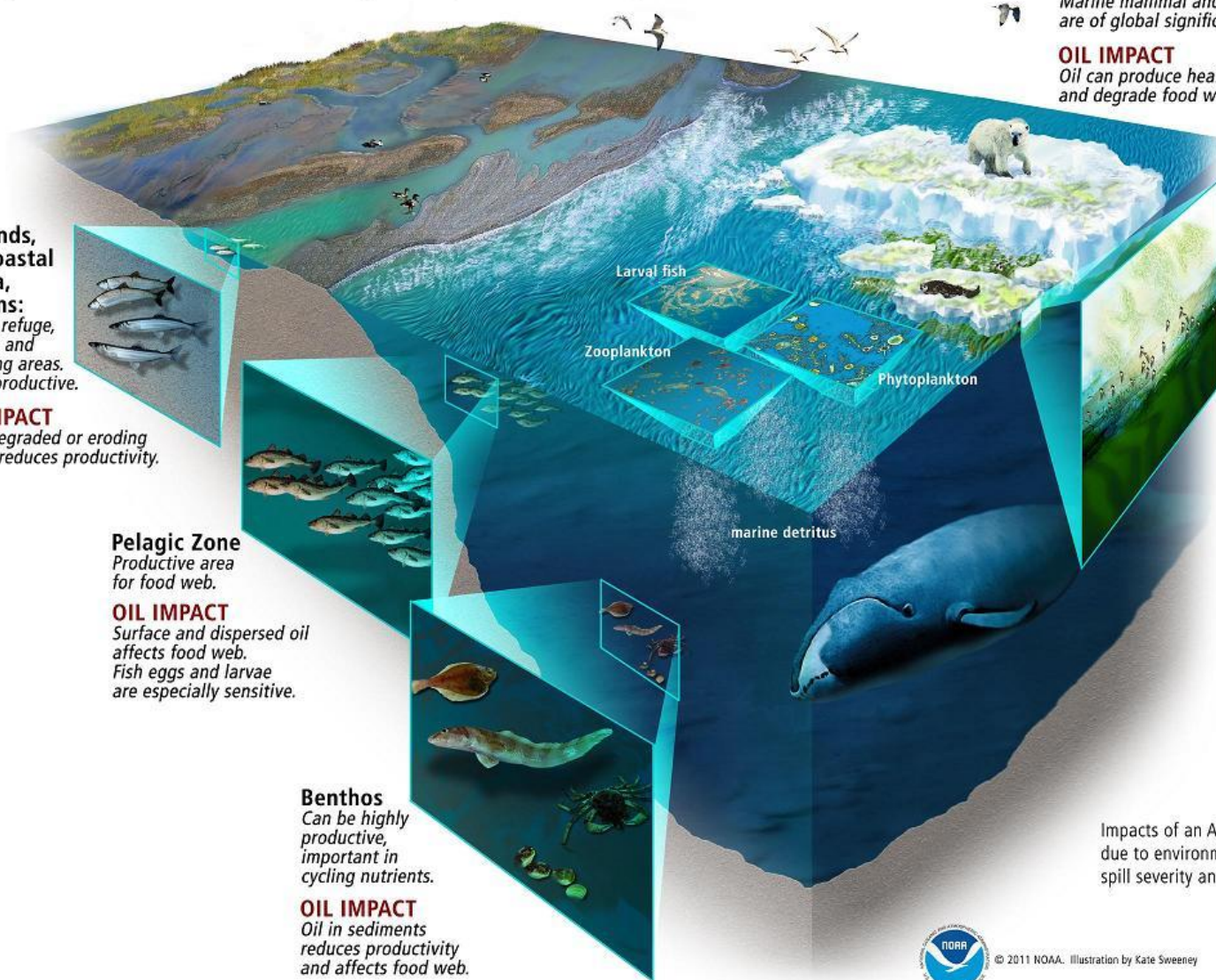
Oil can produce health effects and degrade food web.

Ice Habitat

Seasonally important source of production, habitat for marine mammals.

OIL IMPACT

Sensitivity to oiling is poorly studied.



Impacts of an Arctic oil spill will vary due to environmental conditions, spill severity and response capacity.



© 2011 NOAA. Illustration by Katie Sweeney

MARINE HABITAT:

THE BEAUTIFUL WORLD UNDERNEATH



The oceans contain **99%** of the living space on the planet.

Less than **10%** of that space has been explored by humans.

90% of the volume constitutes the dark, cold environment we call the deep sea.



A crab's teeth are in its **STOMACH**.



An octopus has **3 HEARTS**.



Seahorses consume **3,000** or more brine shrimp per day.



Sea turtles seem as though they're crying because the salt absorbed from the sea is **EXCRETED THROUGH THEIR EYES**.



The swordfish and marlin are the fastest fish in the ocean reaching speeds up to **75 MPH** in quick bursts.



Jellyfish have been around for more than **650 MILLION YEARS**, meaning they outdate both sharks and dinosaurs.



Sharks attack about 50-75 people each year worldwide, with 8-12 fatalities. Whereas, **HUMANS KILL SOMEWHERE BETWEEN 20-100 MILLION SHARKS** every year.

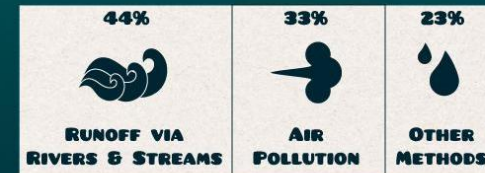


The blue whale is the largest animal on our planet ever (exceeding the size of the greatest known dinosaurs) and has a **HEART THE SIZE OF A VOLKSWAGEN**.

SCIENTISTS HAVE NAMED AND CLASSIFIED AROUND 1.5 MILLION SPECIES.

About **44%** of the toxic contaminants come from runoff via rivers and streams.

Air pollution is responsible for **33%** of the toxic contaminants that end up in oceans and coastal waters.



More oil reaches the oceans each year as a result of **LEAKING AUTOMOBILES AND OTHER NON-POINT SOURCES** than the oil spilled in Prince William Sound by the Exxon Valdez or even in the Gulf of Mexico during the Deepwater Horizon/BP oil spill.



Each year, two times as much garbage is dumped into the world's oceans as the weight of fish caught.

MOST ENDANGERED SEA CREATURES



BLUEFIN TUNA

The greatest enemy of tuna is overfishing, overfishing, overfishing.



SEA TURTLES

Fishing gear is the sea turtles' worst enemy, as well as loss of habitat and climate change.



GRAY WHALE

Centuries of overfishing have left one population extinct and one critically endangered.



CORAL

Ocean acidification and bottom trawling commercial fishing are its major threats.



VAQUITA

Threatened by the gill nets used to catch fish, they are often killed unintentionally as bycatch.

SOURCES:

<http://aquaviews.net/explore-the-blue/amazing-marine-animal-facts/>
<http://aquaviews.net/explore-the-blue/amazing-facts-about-our-oceans/>
<http://marinebio.org/marinebio/facts/>
<http://www.thedailygreen.com/weird-weather/weather-categories/endangered-sea-creatures-pictures-03112>

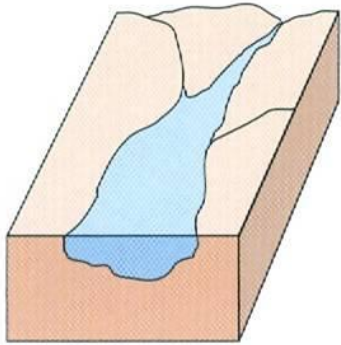
Designed by Samantha Sanders



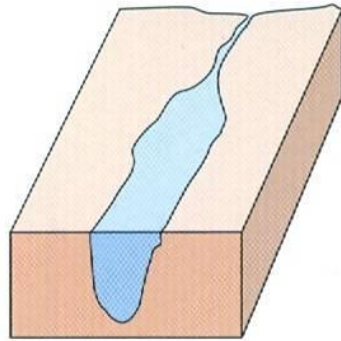
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ReuseThisBag.com

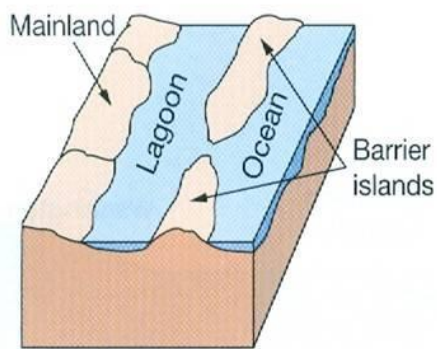
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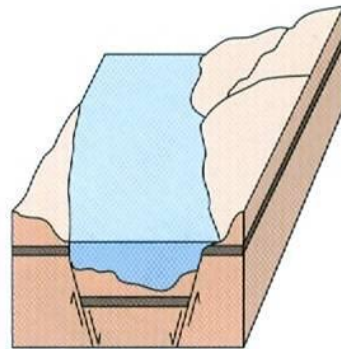
(a) Coastal plain



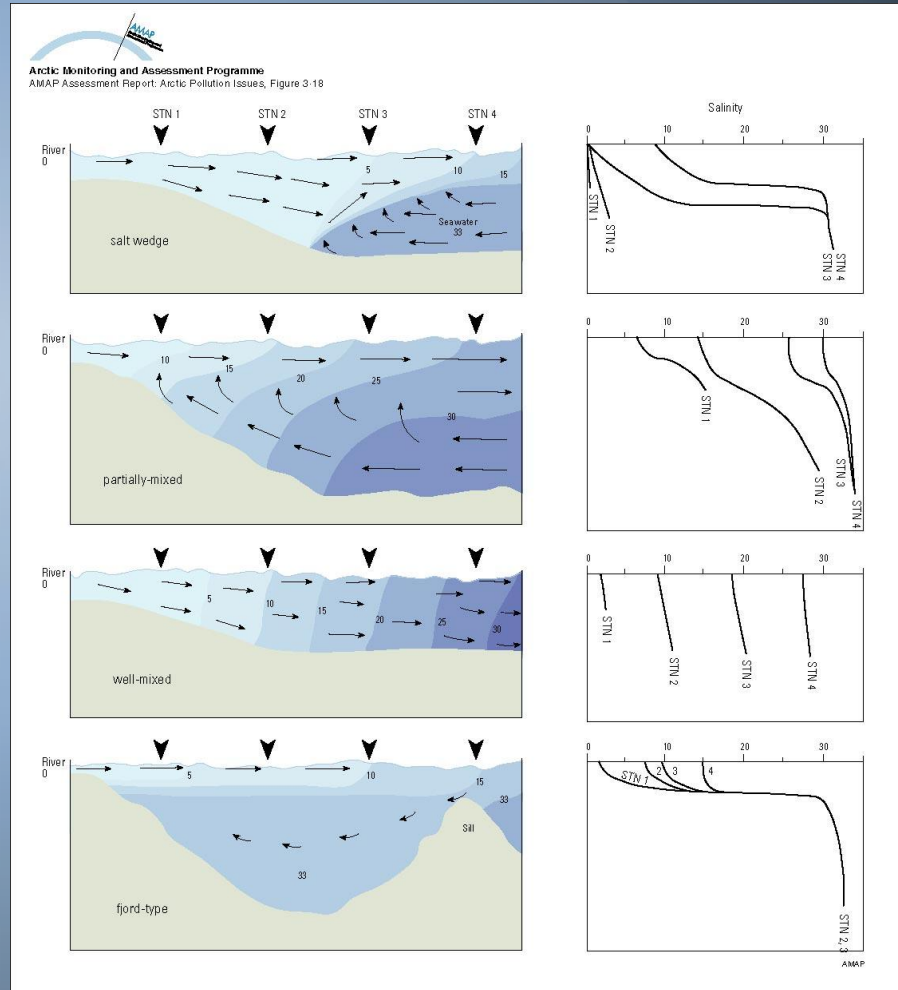
(b) Fjord



(c) Bar-built



(d) Tectonic



- ✓ Coral Reefs
- ✓ Mangroves
- ✓ Sea Mounts
- ✓ Kelp Forests
- ✓ Sea-grass beds
- ✓ Hydrothermal Vents / Cold Seeps

Various types of coral reefs.

Coral reefs can be categorized into several types according to their shape.

Fringing reefs



Coral reefs occur adjacent to the coast. Most of the reefs in Japan are fringing reefs.

Barrier reefs



These reefs are similar to the fringing reefs, but much larger at distant offshore forming deepening (called a lagoon) between the land and reefs.

Atolls



Reefs occur in circular shape where land is absent in the middle of the circle. This type of reefs can be commonly seen in the South Pacific islands.

Outer reefs



Reefs are isolated from the land. Small ones can be seen in Japan.

Fringing		Barrier		Atoll
Tahiti (18° S 149° W)	O'ahu (22° N 158° W)	Mayotte (13° S 45° E)	Truk (7° N 152° E)	Bikini (12° N 165° E)
Hawai'i (20° N 156° W)	Rarotonga (21° S 160° W)	Santa Cruz (11° S 166° E)	Clipperton (10° N 109° W)	Eniwetok (12° N 162° E)
Grand Comoro (12° S 44° E)		Bora Bora (16° S 151° W)	Aitutaki (19° S 160° W)	Kwajalein (9° N 167° E)

Why Are Living Marine Habitats Important to Coastal Communities?

Coastal habitats absorb wave energy and help to protect shoreline areas from storm damage, inundation and erosion.

Mangrove forests provided protection from storm damage, flooding and erosion for many people during the 2004 tsunami in the Indian Ocean.

At present, mangroves, along with other coastal habitats, are threatened both directly and indirectly by human activities, resulting in a significant loss of natural coastal protection worldwide.

Coastal Habitats Protect Against Storm Damage, Flooding and Erosion

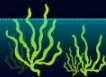
Mangrove Forests



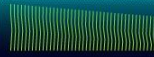
Tropical Coral Reefs



Seagrass Beds



Salt Marshes



Sea Ice



Coastal Habitats Play a Critical Role in Protecting Human Lives and Property

Following the 2004 Indian Ocean tsunami, coastal forests were recognized as an important factor in the mitigation of potentially destructive impacts.

- Mangrove Forest Areas
- Tsunami Epicenter



Mangrove Forests Absorb Impact Forces and Mitigate the Energy of Tsunami Waves

During a large storm event, water can be reflected, and energy progressively absorbed, as it passes through the permeable structure of coastal forests. Water depth, velocity and force can be reduced, and waves may not achieve maximum height.



Mangrove Populations Are Declining Worldwide

Between 1980 and 2005 there has been a total loss of 3.6 million hectares of mangroves worldwide.

1980

18.8
Million Hectares

20%

Loss of Total Mangroves Worldwide

2005

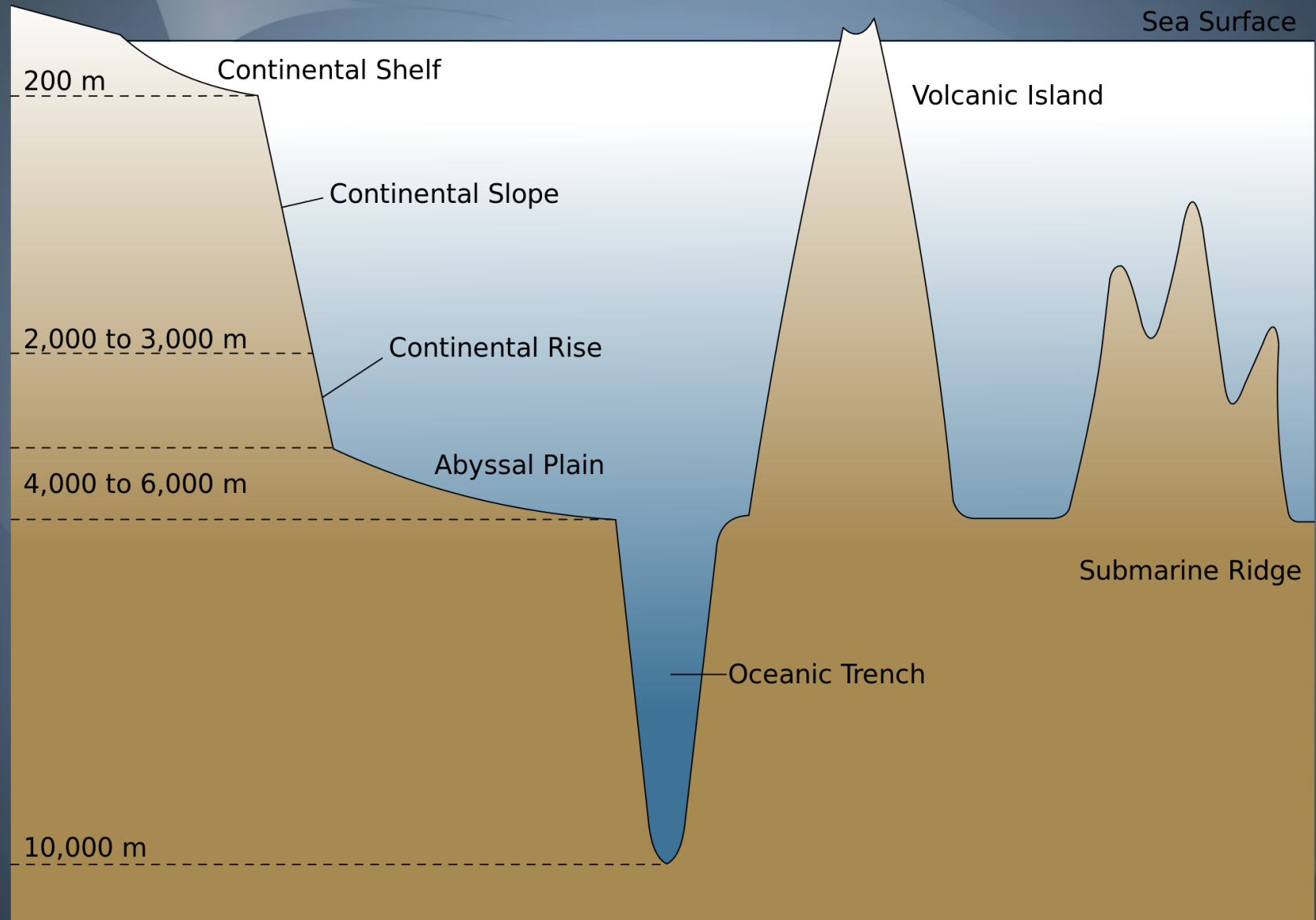
15.2
Million Hectares

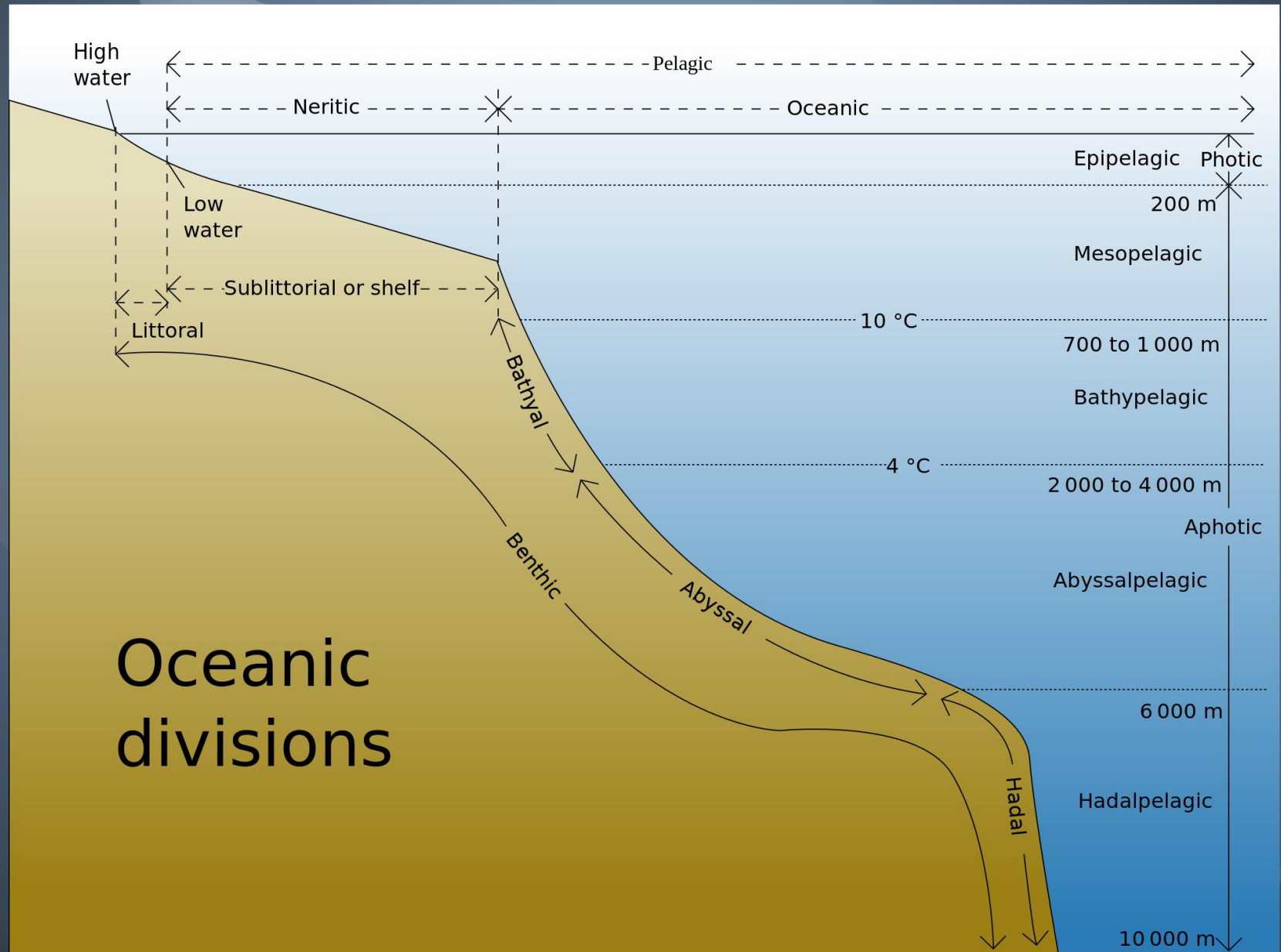


SOURCE:

FAO, "The World's Mangroves 1980-2005", Global Forest Resource Assessment, 2007.
FAO, "The Role of Coastal Forests in the Mitigation of Tsunami Impacts", RAP, Bangkok, 2007.

- Pollution
- Marine Debris
- Eutrophication
- Overexploitation
- Destructive practices
- Temperature, pH and Radiation





The background is a solid blue color with a subtle gradient. Overlaid on this are several large, semi-transparent, organic shapes in lighter shades of blue. These shapes resemble stylized leaves or petals, with some having pointed tips and others being more rounded. They are positioned in the upper left and lower right corners, creating a sense of depth and movement.

Food or Food for thought?