Coral Reefs in India is an important topic in Environment & Biodiversity. It has been coming in news for many years continuously due to coral bleaching issue along the east coast of Australia i.e. Great Barrier Reef. To help them in the upcoming exam, we are providing you with "Coral Reefs in India: Introduction, Types, Formation, Locations".

Coral Reefs in India: Introduction, Types, Formation, Locations

Coral Reef

Coral Reefs are elementary sedimentary rocks which are located above the sea and oceanic bed of continental shelf and mid-oceanic ridges. These organic sedimentary rocks are formed on the platform of shelf and ridges through a combined process which includes sedimentation, compaction, cementation and solidification of the skeleton of coral polyps.

Coral Polyps are marine animals of tropical and subtropical seas and oceans (tiny fleshy sea anemones polyps) living in shallow water by maintaining a symbiotic relationship with the microscopic plant (algae)- Zooxanthellae. Zooxanthellae have photosynthetic capabilities, they provide food to corals and in return, the polyps provide protection to the zooxanthellae.

Since evolution and development of Coral reefs is connected with marine ecology of Coral Polyps, the marine ecology of coral polyps describes the conditioned associated with the coral reefs.

Suitable environmental conditions required for Coral Reefs

1. **Hard Surface**: Presence of hard surface of sub-marine platform of the continental shelf or mid-oceanic ridges. This hard surface is a precondition for compaction, cementation and solidification of unconsolidated skeletons of Coral Polyps.
2. **Depth**: Depth of sub-marine platform should not be more than 80m from sea level as algae require a sufficient amount of sunlight for the process of photosynthesis.
3. **Warm Oceanic water**: Coral Polyps are connected with warm oceanic water with a narrow range of temperature. The temperature should be around 20^0
   Thus, coral reefs are most extensive on the east coast of continents but not in case India as the East coast of India has a high amount of sediments in water and sediments prevent the growth of Coral Reefs.
4. **Sediment free water**: Water should be relatively sediment free. The high amount of sediments in water is responsible for choking respiration of Coral Polyps and their early death. Because of this reason, Coral reefs dominate the west coast of India.
5. **Nutrients Supply**: Supply of nutrients ensure the healthy development of Polyps. So, the rate of growth of Polyps is faster on the seaward side as oceanic waves support the supply of nutrients.
6. **Mild salinity**: Salinity ensures the healthy development of skeletons of Polyps. Coral Polyps extract calcium from seawater for their skeleton to protect their bodies. So, mild salinity is also required for the growth of coral polyps.

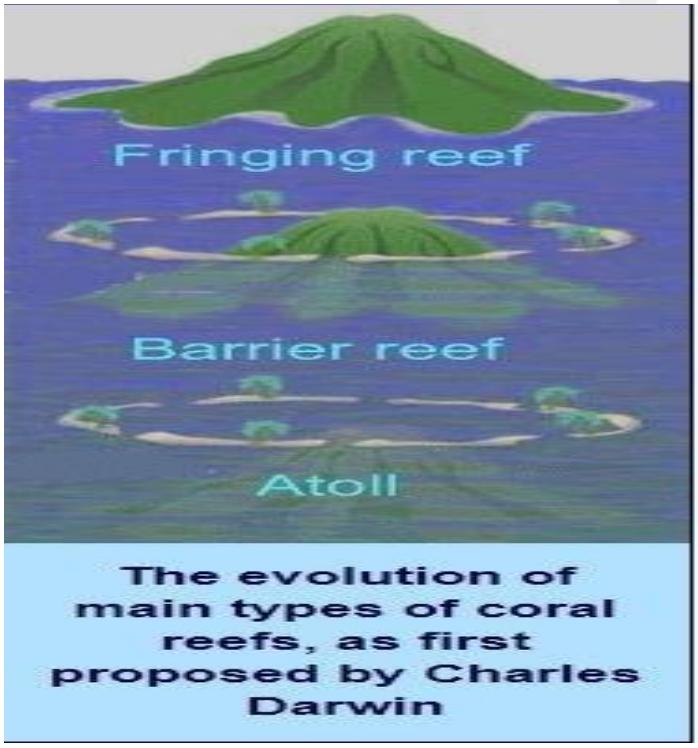
Origin of Coral Reefs

Theories which describe and explain the evolution and development of coral reefs are broadly classified under three categories which are briefly mentioned as follows:

1. Subsidence Theory (it was propounded by Charles Darwin).
2. Glacial Control Theory (it was given by Daly).
3. Standstill Theory (it was proposed by Murray).

Types of Coral Reefs and their distribution

1. **Fringing Reef**: These reefs evolve and develop on the continental shelf and are connected to the coastline.
   Location: Gulf of Mannar, Gulf of Kutchchh, the coastline of Andaman and Nicobar Islands are covered with fringing reefs.
2. **Barrier Reef**: Barrier reefs are located offshore on the continental shelf. They are away and parallel to the coastline. A lagoon is located between the coastline and the barrier reef.
   Location: Great Barrier reef along the North Eastern coast of Australia is an example.
3. **Atoll Reef**: Atolls are located on mid-oceanic ridges. These are circular or elliptical reefs surrounded by sea from all sides with a shallow lagoon in the centre.
   Location: Maldives, Lakshadweep represent Atolls



Importance of Coral reefs

1. These are indicative of the health of marine ecology.
2. These are the source of the primary food chain in the marine ecosystem.

3. Coral Reefs support a wide network of biodiversity. Thus, they are also known as rainforests of the marine ecosystem.
4. They are also important for the tourism industry and are a source of raw material for construction and handicrafts work.

Andaman and Nicobar island group and Lakshadweep island group have been declared as Hope islands (HOPE SPOT) by IUCN since these are important for conservation and preservation of marine ecosystem in the Bay of Bengal and Arabian sea.

Coral Bleaching

When corals are in stress, they expel zooxanthellae and that why to appear white. Ultimately, due to lack of food, corals also die.

Discolouration of Coral Reefs due to the disturbed symbiotic relationship between coral polyps and algae and adverse changes in the marine ecosystem and ecology due to human interferences is known as coral bleaching.

Factors responsible for Coral Bleaching

1. Global Warming: Rising temperature of oceanic water due to global warming.
2. Ocean Acidification: Adverse changes in pH value of oceanic water due to acid rain and atmospheric absorption of CO_2 by oceans.
3. Marine Pollution: rising marine pollution and oil spills.
4. Use of explosives for the mining.
5. Ozone depletion resulting in an increase in solar radiation.
6. Algal bloom.
7. Increase in sedimentation in seas and oceans from rivers due to deforestation.
8. Diseases outbreak in Coral Reefs also affect the chances of their survival.

Brief analysis of Marine pollution

Marine Pollution is dangerous for marine biodiversity which is the real wealth of earth. Some of the causes and their effects are described as follows:

Cause	Effect
Runoff from agriculture, domestic sewage, etc.	Excess supply of nutrients in water bodies cause eutrophication and thus, algal bloom.
Oil Spills	Marine life becomes devoid of sunlight and oxygen causing direct death and destruction.
Dumping of toxic elements from refineries, oil reservoirs, etc.	Toxicity in a marine organism which leads to biomagnification and early death.
Atmospheric inputs of gases like CO_2	Oceanic acidification

Ballistic Water issue (explained underneath)	It is dangerous for Biodiversity (very likely causes foreign species invasion)

Ballistic Water issue

During import and export of items from one country to another via ship, some water is carried along with the ship for loading and reloading related activities. This water is known as ballast water. It contains many microscopic organisms and sediments.

Environmental concern: This water is discharged irresponsibly at the destination site which contains organisms that are not native to the place and thereby, causing the introduction of alien invasive species. For example, loading at Bombay port and unloading at New York port would lead to the introduction of Arabian sea water organism into a new environment of New York waters which may cause serious harm to that ecosystem.