

Besides these, there are many associated submerged features like—mid-oceanic ridges, hills, seamounts, guyots, trenches, canyons, submerged volcanoes and sea-scarps etc.

This great variety of relief is largely a result of the interaction of tectonic, volcanic, erosional and depositional processes.

Mid-oceanic ridges

Submarine ridges are mountain ranges, a few hundred kilometres wide and hundreds and often thousands of kilometres in length on the floors of oceans. Running for a total length of 75,000 km, these ridges form the largest mountain systems on earth. They are of tectonic origin and provide evidence in support of Plate Tectonics Theory.

Formation of mid-oceanic ridges (MORs)

- Seafloor spreading is the mechanism for the formation of MORs. It is a geologic process in which tectonic plates—large slabs of Earth's lithosphere—split apart from each other.
- Seafloor spreading and other tectonic activity processes are the result of mantle convection and occurs at divergent plate boundaries. As tectonic plates slowly move away from each other, heat from the mantle's convection currents makes the crust more plastic and less dense. The less-dense material rises to form MORs.
- The Mid-Atlantic Ridge, for instance, separates the North American plate from the Eurasian plate, and the South American plate from the African plate.

12. What is the impact of rising ocean temperature on biosphere? Provide an account of the measures that can be taken to address its causes as well as effects.

Approach:

- Introduce by substantiating with contemporary findings related to ocean warming.
- Discuss its impact on biosphere.
- Suggest some measures to address both its causes and effects.

Answer:

The Fifth Assessment Report published by the Intergovernmental Panel on Climate Change (IPCC) in 2013 revealed that the ocean had absorbed more than 93% of the excess heat from greenhouse gas emissions since the 1970s. This is causing ocean temperatures to rise.

Impact of ocean warming on various components of Biosphere

- **Marine:** Ocean warming leads to de-oxygenation – a reduction in the amount of oxygen dissolved in the ocean and acidification- decrease in pH of the ocean due to its uptake of CO₂. This causes coral bleaching, loss of breeding grounds for marine organisms, transmission of diseases in marine species and high levels of mortalities.
- **Land:** It puts pressure on the life on land threatening food security, increases the prevalence of diseases; destruction of fish species affects livelihoods of coastal communities and causes economic losses to the GDP. Rising sea levels resulting from the thermal expansion of sea water and continental ice melting also affect habitations in low-lying island countries. Damage to coastal vegetation such as mangroves and coral reefs (which protect coastlines from erosion and sea-level rise) renders coastal communities and wildlife vulnerable.
- **Atmosphere-** Without oceanic buffer, global temperatures would have risen much more than they have done to date; rising oceanic temperatures will increase severity of hurricanes; intensification of El Niño events will further intensify droughts and floods.