1. With the help of suitable examples, examine the pattern of losses of ice bodies in different parts of the world.

Demand of the question:
It expects students to put clear data about the pattern of losses of ice bodies in different parts of the world.

Introduction:
As a consequence of industrial revolution and technological developments aftermath the phenomenon of loss of ice bodies in different parts of the world has gained pace. The impact that this event is having on earth is really dangerous and is increasing every day.

Body:
Pattern of losses of ice bodies in different parts of the world:

Himalayan Region: Melting of glaciers

- The Himalayas is considered as the Third Pole. Within it, the core area is known as the Hindu Kush Himalaya (HKH) region.
- According to an international study on the world's glaciers published in journal Nature Geo-science, glaciers are melting and receding at an alarming rate in the Himalayas and glaciers in the HKH might contain 27 per cent less ice than previously suggested.

Antarctica: Retreating of glaciers

- Antarctica encompasses land, island and oceans south of 60° latitude. This region stores about 70% of the world's fresh water in the form of snow and ice.
- The World Meteorological Organisation (WMO) has confirmed that the region is one of the fastest warming regions of the planet. Over the past 50 years, it has warmed over 3°C.
- The annual ice loss in the Antarctic region has increased at least six folds between 1979 and 2017.
- 87% of glaciers along the West Coast of the Antarctic Peninsula have retreated in the last 50 years with most of these showing accelerated retreats in the past 12 years.

Arctic and Antarctic region: Glaciers Melting from the Bottom

- Glaciers in Greenland and Antarctica are losing ice at alarming rates, and warmer air isn't the only cause.
- Scientists increasingly agree that warm ocean water is seeping beneath the ice and melting it from the bottom up.
- Breaking of Larsen C ice shelf in Antarctica and several smaller ice shelves in the Arctic are a result of global warming.

Ice mass loss in the Russian Arctic:

- Ice mass loss in the Russian Arctic has nearly doubled over the last decade according to Cornell University research published in the journal Remote Sensing of Environment.
- Glaciers there are shrinking by area and by height. We are seeing an increase in the recent speed of ice loss, when compared to the long-term ice-loss rate.

South America:

- The 18,000-year-old Chacaltaya glacier in the Bolivian Andes disappeared.
- In Ecuador, an avalanche at the base of the Cayambe glacier occured. Also, an avalanche caused serious damage in the area of Pampa Linda.
- These isolated avalanches confirm the trend towards the collapse of the Andean glaciers.

This kind of varied pattern of loss of ice bodies is being observed over the world. Global climate change has already brought about immediate observable effects on the planet. Glaciers have shrunk, ice is melting world wide – especially at the North and the South Poles. This includes mountain glaciers, ice sheets covering Antarctica, Greenland and the Arctic sea ice. Hence, this issue needs a serious attention to save our planet earth.

Following necessary steps can be taken to contain the ice bodies loss:

- In order to stop the temperature from rising, the only solution is to cool the planet as advised by the scientists. For this, the world not only needs to slow down greenhouse gas emissions but also reverse them.
- In this direction a step is taken to prevent the severe effects of climate change, the UN signed the Paris agreement in 2016, an international treaty designed to keep the average global temperature well below 2°C above pre-industrial levels until greenhouse gas emissions are reduced.
- There are 1,98,000 glaciers in the world and India alone has about 9,000 of them. However, all of these glaciers are mostly unexplored. More detailed research is required to fully understand the state of glaciers and the risk their loss poses.

Conclusion:

While immediate action is needed to save the earth, it is not too late to do something about it either. It may be important to revisit the commitments of global climate change before it is too late, as the changes that have already set in due to climate change might continue to cause damage for a several decades, even if solid measures are taken to contain the changes.

2. What is Mascarene High? How does it impact the weather pattern in the Indian subcontinent? Explain.

Demand of the question:

It expects a candidate to give a clear account of Mascarene high and its importance in the weather pattern of Indian subcontinent.

Introduction:

This high-pressure region located between 25°S-35°S and 40°E-90°E near the Mascarene Islands in the southern Indian Ocean is a source of Southwest monsoon in India. Since, it is a high pressure are, it is also known as Mascarene high.

Body:

Normally, the high-pressure region starts forming by mid-April and its strength is an important factor which determines the intensity of monsoon in India. its impact on the weather pattern in India is as follows:

- A stronger high pressure will produce stronger winds or monsoon current.
- If there is a delay in the formation of Mascarene High, there is also the possibility of a delay in the onset of monsoon in India.
- Most research says that its strength is determined by the happenings in the Antarctic region.
- The position and intensity of this high are considered to be closely linked to the south summer monsoon activity.
- But overall, this factor is not often held responsible for delays and poor performance of the monsoon in India. Following figure 1 represents the region of Mascarene high.

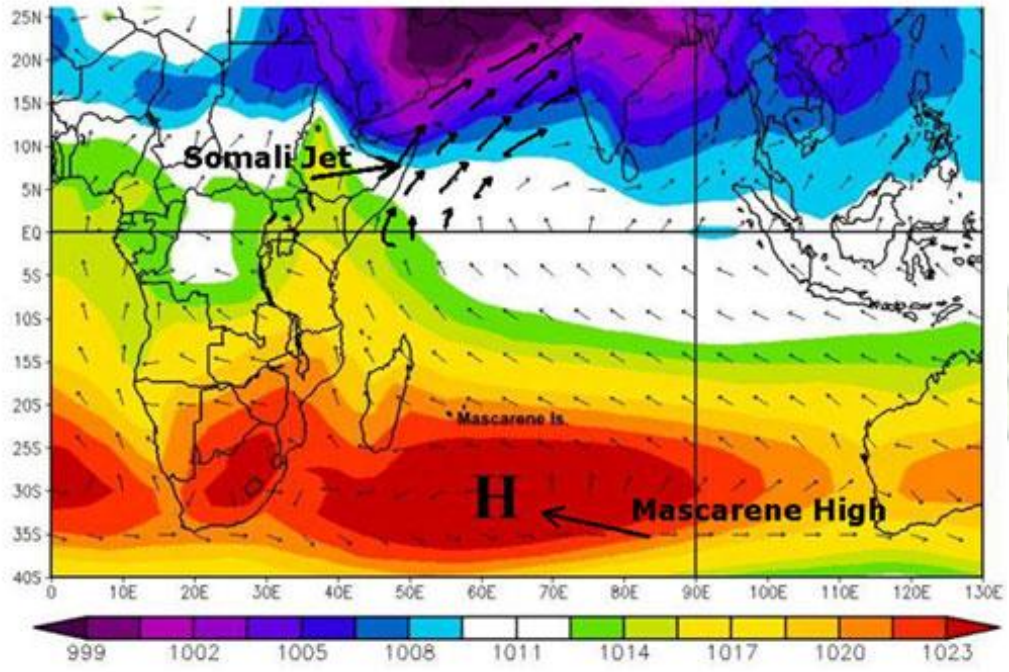


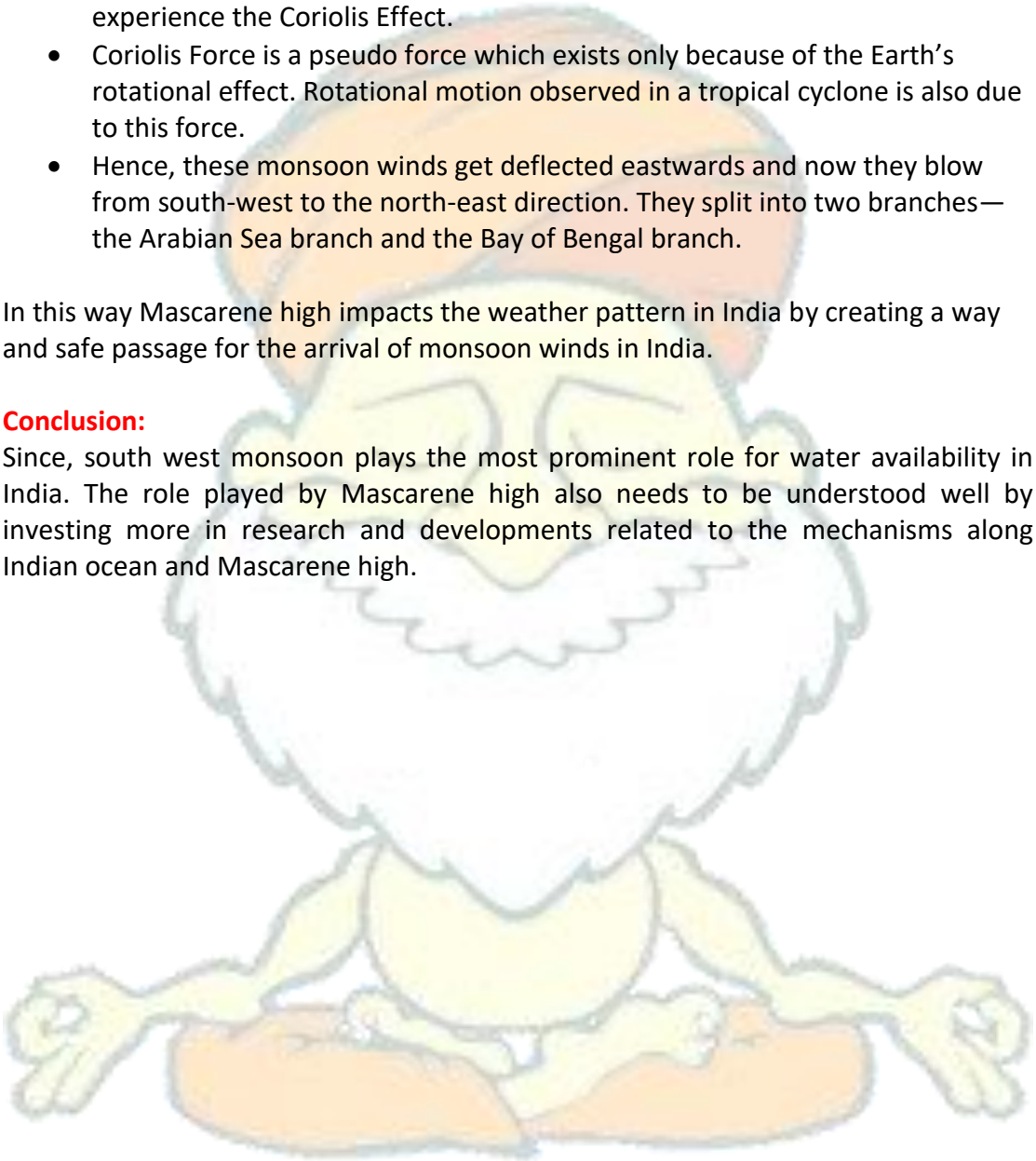
Figure 1

- According to scientists, the broad belt of high pressure around the Mascarene Islands generates a cross-equatorial flow known as the Somali Jet which brings heavy rain to India's west coast. A strong, low level jet usually means a strong monsoon over peninsular India.
- Winds from Mascarene High head in a north-westerly direction towards the east coast of Africa (Somalia). Here, the topography of Somalia deflects the winds towards the east. Also, after crossing the equator, these winds experience the Coriolis Effect.
- Coriolis Force is a pseudo force which exists only because of the Earth's rotational effect. Rotational motion observed in a tropical cyclone is also due to this force.
- Hence, these monsoon winds get deflected eastwards and now they blow from south-west to the north-east direction. They split into two branches—the Arabian Sea branch and the Bay of Bengal branch.

In this way Mascarene high impacts the weather pattern in India by creating a way and safe passage for the arrival of monsoon winds in India.

Conclusion:

Since, south west monsoon plays the most prominent role for water availability in India. The role played by Mascarene high also needs to be understood well by investing more in research and developments related to the mechanisms along Indian ocean and Mascarene high.



3. Examine the impacts of global sea level rise on the costal flora and fauna.

Demand of the question:

It expects candidates to probe deeper into the impacts of global sea level rise on the coastal flora and fauna.

Introduction:

As per the fifth assessment report of the United Nations Intergovernmental Panel on Climate Change (UNIPCC), the global sea level is rising at an average rate of 8 mm per year over the last century.

Body:

The impacts of sea level rise are numerous. The most worrying aspect of the report, however, is not this increasing figure, but its foresight: "Sea level is rising faster than 50 years ago and is likely to worsen in the future." Hence, it becomes imperative to understand its impact on the coastal flora and fauna to tackle it.

Impacts of global sea level rise on the costal flora and fauna:

- Water is increasingly invading coastal areas, causing soil erosion and threatening farmland, housing or recreation areas.
- The flooding of wetlands and pollution of aquifers also occur, affecting the flora and fauna of each place, causing the loss of habitat for fish, birds, plants and many other species.
- Low-lying islands would be swallowed by the oceans, leading to the disappearance of large land areas and even some countries.
- As a consequence of loss of habitat, the Earth could witness a dramatic decline in fish stocks.
- It is also going to impact the breeding season and pattern of the coastal flora and fauna.
- Most of the oceanic creatures travel long distances to reach for a suitable breeding ground. Due to sea level rise these breeding grounds may start to disappear and submerged under the ocean. e.g. Ollive ridley turtles breeding ground off the coast of Odisha and west Bengal.
- Plantation agriculture across the oceans are going to be hampered. e.g. Coconut plantation, palm plantation across the oceans.
- Animals are facing the threat of extinction due to melting of ice over the glacial regions. e.g. Polar bears home in Arctic regions may disappear as a result it might face extinction due to loss of habitat and no adaptability of body type in melted glacier region.
- Due to constant rising sea level, many small atolls (circular coral colonies) of Indian archipelago are sinking. Parali I Island of Lakshadweep has already sunk and Parali II has sunk almost 80% of its total area.
- Rising sea levels can exacerbate the impacts of coastal hazards such as storm surge, tsunami, coastal floods, high waves and coastal erosion in the low lying coastal areas in addition to causing gradual loss of coastal land to sea.

- UNIPCC in its fifth report has stated that sea level in Lakshadweep has risen up to 0.6 m in last 20 years. This will not only cause loss in livelihood to the native people but also loss of biodiversity as large number of flora and fauna inhibit these Islands along with Particularly Vulnerable Tribal groups (PVTGs).
- Mangrove forests across the shore which acts a barrier against devastating high levels of tides also face threat of submergence under coastal water rise. It might aggravate the tsunami like disasters impact on the coastal population.
- It's not just about the sea level rise affecting coastal areas flora and fauna, the rising sea level is going to increase the amount of rainfall over the earth, due to which the flora and fauna in the forested regions also face threat of extinction due to tremendous amount of rainfall over the region making plants and animals hard to survive.
- Rising sea level in coastal regions is also going to hamper the food availability for the fauna in the nearby areas.
- Also due to impact on the fauna, insects which are necessary for the pollination might get extinct. It will in turn affect the life cycle of flora too.

Ways to tackle impact of sea level rise on the coastal flora and fauna:

- Greenhouse gasses are a major contributor to sea level rise. By reducing the amount of greenhouse gases produced every year and formulating measures to contain it will be useful to minimize the sea level rise.
- Protect wetlands: Wetlands act as natural buffers for coastal areas during rainstorms and hurricanes. They absorb precipitation and storm surge waters.
- Plant more plants and save trees. Plants clean the air and soak up rain. Reduce paper use to prevent trees from being cut down.
- Reduce energy use. Reducing energy usage is good for the environment.
- Push for a Climate Action Plan. Many cities and states do not have plans to address climate change, which is the primary cause of current sea level rise. Hence, preparing a climate action plan for the city to international level will synchronize the efforts to tackle the sea level rise.
- The Sunrise Movement in USA is pressuring candidates to adopt a Green New Deal. There are 500 candidates who have vowed not to accept campaign contributions from the oil industry.
- Also there is need for an international level alliance and agreement like Paris climate deal that specifically dedicated to look in to matter of sea level rise.

Conclusion:

The threat of sea level rise is near and real. If necessary steps are not taken at this moment then it might result in the destruction of the not only the coastal environment and surrounding but the domino like effect will follow which will affect whole the planet earth. Hence, it become our responsibility to take a step forward to save our mother earth.