



Competitive Exams: Science and Technology Sea Level Rising

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Sea Level Rising Concern for Islands

1. The world's first underwater cabinet meeting organised by the Maldivian president on 17 October 2009 was a symbolic cry for help over rising sea levels that threaten the tropical archipelago's existence. This island archipelago nation off the tip of India, best known for its mesmerizing beauty and sparkling beaches, represented by 1, 200 atolls, 80% of which are no more than a metre above sea level, is among the most threatened by rising seas.
2. In 2007, the United Nation's Intergovernmental Panel on Climate Change (IPCC) warned that a rise in sea levels of between 18 and 59 centimetres by 2100 would be enough to make the Maldives virtually uninhabitable. The economy of this Indian Ocean island nation is supported by climate-sensitive activities like fishing and tourism.
3. The Alarm bell is ticking not just for the Maldives but also for many islands across the globe. The New Moore Island of India in the Sunderbans has been consumed recently by the rising sea. The New Moore is not the first island to be submerged in the Sunderbans. The first inhabited island to have been submerged by the rising sea level was Lohachara. Once home to about 10, 000 people, the island was submerged under the sea in 1996. The submerging of islands also results in migration of people making them environmental refugees.
4. The first uninhabited island to vanish from the map due to sea level rise was the Pacific atoll nation of Kiribati. The people of low-lying islands in Vanuatu, also in the Pacific, have been evacuated as a precaution, though the island still remains above the sea.
5. The islands are much more vulnerable to the impacts of climate change and subsequent sea level rise.

Defining Islands

1. An islands, strictly speaking, is a piece of land surrounded by water. The Millennium Ecosystem Assessment (MA), a research programme supported by the United Nations, defines islands as lands isolated by surrounding water and with a high proportion of coast to hinterland. This definition stipulates that they must be populated, separated from the mainland by a distance of at least two kilometres, and measure between 0.15 square kilometres and the size of Greenland (two & onefifth million square kilometres).
2. By a combination of the size of the land area, and political and demographic criteria, islands are grouped into the Small Island Developing States. Countries known collectively as Small Island Developing States (SIDS) have in common their smallness and insularity

that often also indicates their vulnerability. These small island and low-lying coastal countries are subject to structural vulnerability that affects their productivity, development and cooperation policies. Since SIDS were identified as a special group during the 1992 Earth Summit, a number of internationally agreed development goals have been formulated to address SIDS vulnerabilities and to build resistance and sustainability. Currently 52 states in the Caribbean, the Pacific, and Africa, Indian Ocean, Mediterranean and South China Sea are included in this category.

3. An archipelago is a chain or cluster of islands that are formed tectonically. It is now used to generally refer to any island group or, sometimes, to a sea containing a large number of scattered islands. Archipelagos are usually found isolated in bodies of water; less commonly, a large land mass may neighbour them. The five largest modern countries that are mainly archipelagos are Japan, the Philippines, New Zealand, the United Kingdom and Indonesia. The largest archipelago in the world, by size, is Indonesia. Australia is geographically considered a continent, not an island, although in the past it was considered an island country for tourism purposes. It is sometimes still considered an island country.

Importance of Islands

1. Islands encompass a diverse range of territories, differing in landform, climate and biogeography. With the legacy of a unique evolutionary history, islands are treasure troves of biodiversity. The species may become island dwellers either by drifting or by dispersal. Once they reach the islands, they are confined to small, isolated pockets, much away from the mainland. The formation of new islands and their isolation from the mainland provides many unoccupied riches for species to adapt to:
2. In the absence of many predators and competitors, the newly arrived species may easily get established in the new niches available. As the chances of breeding with mainland species are limited, through isolation (and with restricted gene pool), they develop into distinct species, some with highly specialized characteristics. This results in a high rate of endemism, with species restricting their distribution to localized areas.
3. Compared to the mainland, islands have a disproportionately high number of endemic species.
4. Islands are rich in ecosystem diversity too, as within islands we may come across mountain forests to coastal wetlands. These ecosystems provide food, fresh water, wood, fibre, medicines, fuel, tools and other important raw materials, in addition to aesthetic, spiritual, educational and recreational values. In fact, the livelihood and economic stability of the islands depend on its biodiversity.
5. Think about corals and mangroves that border island ecosystems. These unique ecosystems provide a wide array of ecosystem services, including defence against natural disasters, support to recycling of nutrients, and regulation of microclimate. They also act

as homes and nursery grounds of hundreds of marine species. Above all, biodiversity of islands not only supports the economy and food security of the islands but also determines the livelihood and cultural identity of 600 million island-dwelling people across the world.

6. Coral reefs provide an estimated US\$375 billion per year in goods and services to the world. This includes support for marine fisheries, which provide the principal protein source for many island populations. The Lakshadweep is a coral island. Coral reef ecosystems around Indian islands are home to hundreds of marine ornamental fishes.

Vulnerability of Islands

1. Each island ecosystem is unique in its biological character and therefore even slight changes in environmental conditions may drastically impact biodiversity and life of human species inhabiting there. These ecosystems are fragile, often comprising species that have evolved in the absence of aggressive competitors, diseases or predators. Though they are more biodiverse than mainland regions and the degree of endemism is high, the small size of populations and separation restricts movement and gene flow, limiting the ability for recolonization following catastrophic events. Many of the islands are thickly populated and there are pressures from human developmental activities, including tourism.
2. The impacts of climate change and related events are much more effervescent in islands than any other ecosystem in the world. The most significant impacts of climate change are sea level and sea-surface temperature (SST) rise. Because most small islands are low lying and have a large exposure of coasts in relation to landmass, high concentration population in coastal zones, islands are extremely vulnerable to sea-level rise.
3. Sea-level rise will also cause increased salinity due to encroachment of the sea and saltwater intrusion into freshwater lenses, contributing to an increasing shortage of water supply and loss of agricultural land. Water stresses caused by climate change will have terrific impacts on poor rural people reliant on water resources for their livelihoods. Ocean warming, frequent tropical cyclones, flash floods and droughts are likely to have dramatic impact on food production system in islands.
4. As fishing is the major occupation of many island people, the socio-economic implications of fisheries loss would be severe and this may trigger other anthropogenic stresses such as overfishing. Not all effects of climate change on agriculture are expected to be negative. For example, increased temperatures in high-latitude islands are likely to make conditions more suitable for agriculture and provide opportunities to enhance resilience of local food systems.
5. The rise in sea temperature causes coral bleaching, which negatively affects fishes, sponges, giant clams, molluscs and other sea creatures, whose survival depends on reefs. The coral bleaching events are now frequently reported from seas around Lakshadweep & Andaman and Nicobar islands due to increase in SST. The food security of the

Lakshadweep islands is not hit because of this phenomenon primarily due to dependence of people on tuna, a pelagic fish caught abundantly in waters around the islands.

6. A report issued by the World Wide Fund for Nature (WWF) argues that Australia's Great Barrier Reef, the largest of its kind in the world, could lose 95% of its living coral by 2050 should ocean temperatures increase by the 1.5 degrees Celsius projected by climate scientists. This is due to the phenomena of coral bleaching and ocean acidification. As oceans absorb more amount of carbon dioxide, more carbonic acid is formed, resulting in ocean acidification.
7. The majority of the world's turtles have environmental sex determination, which means the sex of sea turtle hatchlings is temperature dependent. Warmer temperatures increase the number of female sea turtles at the expense of males.
8. Some scientists are now suggesting that global climate change has to potential to eliminate the production of male turtle offspring if mean global temperatures increase by 4°C, and increases of less than 2°C may dramatically skew the male-female sex ratios. Global warming, therefore, will have impacts on sea turtle populations, majority of which prefer calm and pristine beaches around islands to nest.
9. The islands are also well known for their human diversity and cultural diversity. For example, the Andaman group of islands are inhabited by four Negrito tribes, viz. the Great Andamanese, Onge, Jarawa and Sentinalese and the Nicobar group of islands by two Mongoloid tribes, viz.

Nicobarese and Shompens. As life of these island people depends fully on the health of the forest ecosystems and fishing, climate change events could make their lives more miserable.

Courtesy: Science Reporter

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