



## Be Mains Ready

**What are the Hypoxic Zones? List the causes and impact of its formation in oceans. (250 words)**

29 Jul 2019 | GS Paper 1 | Geography

### Approach / Explanation / Answer

#### Approach

- Briefly describe the Hypoxic zones.
- Gives some underlying reasons for its formation.
- Mention the impact of formation of dead zones
- Any reports or data for value addition.
- Give some suggestions to reverse the present scenario
- Futuristic way forward.

#### Introduction

- **The National Science Foundation (USA)** reports that Earth currently has more than 400 oceanic dead zones, with the count doubling every decade.
- **Hypoxic zones** are **oxygen-starved** areas in the ocean or lakes are areas where very few or no organism survive. The regions facing such a situation essentially become biological desert.
- According to the recent report, **“Dead Zones: Devil in the Deep Blue Sea”**, a massive dead zone is located in the Arabian Sea, which is expected to be the world’s largest.

#### Causes

- Hypoxic zones can occur naturally, but the major cause of concern among the world community are the anthropogenic sources. There are many physical, chemical, and biological factors that combine to create dead zones.
- **Natural Cause:** In the summer, northerly summer winds work together with the Earth's rotation to push oxygenated surface water offshore and this coastal water is replaced by low-oxygen but nutrient-rich waters from the depths of the continental shelf by a process known as **upwelling**. Once this nutrient-rich water reaches the ocean's sunlit layers, it fertilizes blooms of phytoplankton.
- **Eutrophication** i.e the process by which extra nutrients are added to the water bodies, stimulating an overgrowth of algae, which then sinks and decomposes in the water. The decomposition process consumes oxygen and depletes the supply available to healthy marine life

- The sources of nutrient overloading are as follows

- Fertilizers run-offs
- Domestic Sewage
- Industry
- Burning of Fossil Fuel etc.

- **Global warming** increases the temperature of the ocean water which in-turn affects the oceans in the following manner:

- Exacerbates the occurrence of harmful algal bloom
- Lowers the solubility of oxygen.
- Enhances **stratification** by heating surface waters, which in turn will promote hypoxia by preventing oxygenated surface waters from mixing to the bottom.

## Impact

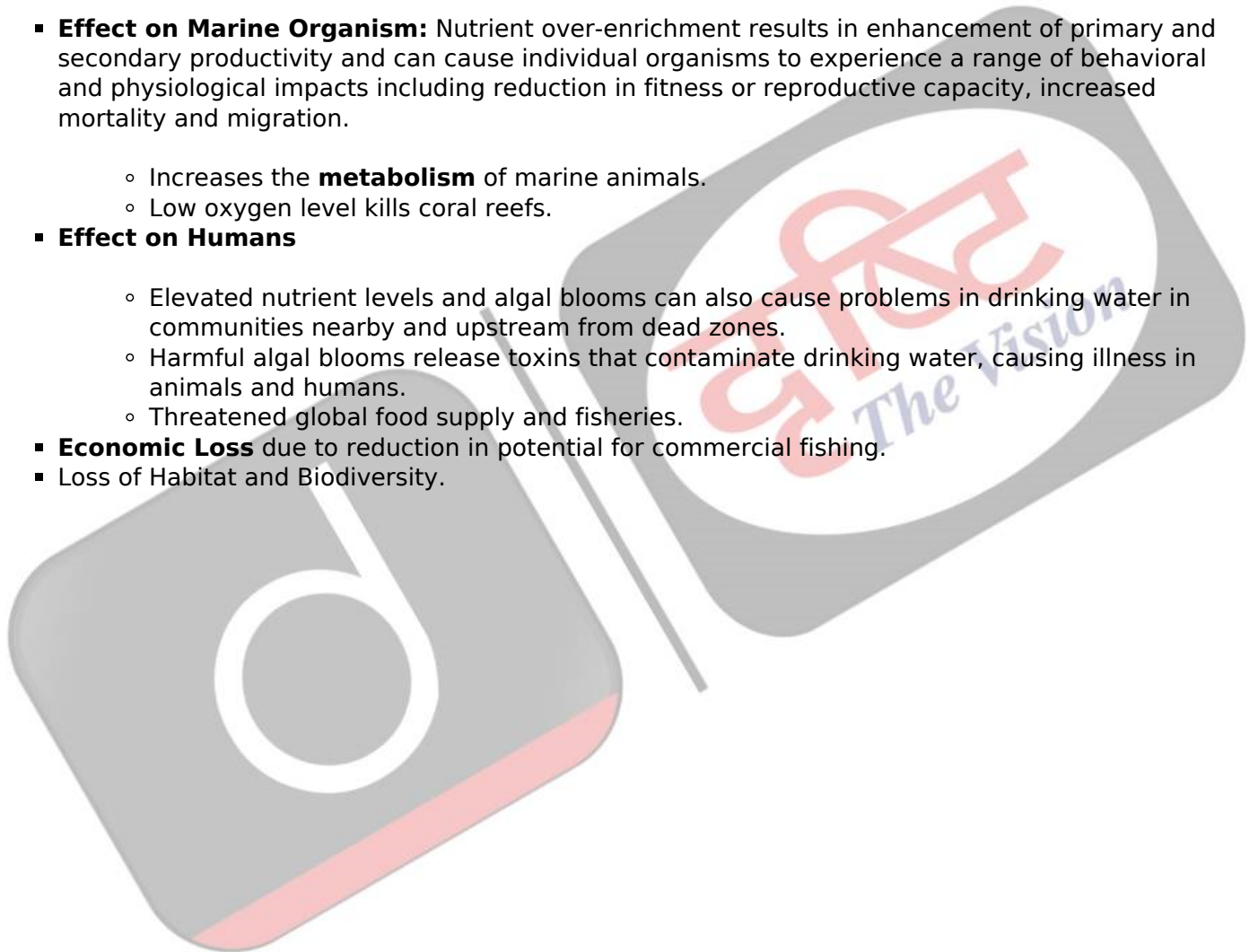
- **Effect on Marine Organism:** Nutrient over-enrichment results in enhancement of primary and secondary productivity and can cause individual organisms to experience a range of behavioral and physiological impacts including reduction in fitness or reproductive capacity, increased mortality and migration.

- Increases the **metabolism** of marine animals.
- Low oxygen level kills coral reefs.

- **Effect on Humans**

- Elevated nutrient levels and algal blooms can also cause problems in drinking water in communities nearby and upstream from dead zones.
- Harmful algal blooms release toxins that contaminate drinking water, causing illness in animals and humans.
- Threatened global food supply and fisheries.

- **Economic Loss** due to reduction in potential for commercial fishing.
- Loss of Habitat and Biodiversity.



## Remedial Measures

- Eliminate human-related nutrient pollution at their main sources.
- Better practices and accountability must be put in place to protect the ocean.
- Raising awareness about the importance of keeping the ocean clean to encourage positive habits and sustainable lifestyle.
- Funding research initiatives to understand the role of nutrients in formation of dead zones and to document the historical changes in nutrient loading.

The prevention and mitigation of dead zones needs a better knowledge base, using a quantification of nutrient inputs and modelling of future scenarios. Therefore investment in research and collective effort of world community are essential to reverse the present scenario.

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