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Summary:

- Red Tide Alert: The recent red coloration of the Puducherry sea, attributed to a plankton crash (decline in Noctiluca scintillans), highlights the vulnerability of marine ecosystems.
- Ecological Impact: Plankton crashes can have severe consequences, including oxygen depletion (“dead zones”), disruption of the food chain impacting fish populations, and overall marine biodiversity loss.
- Action Needed: Stricter pollution control, climate action (mitigating greenhouse gas emissions), and promoting sustainable practices like responsible fishing are crucial for long-term ocean health.

What is the news?

- The recent phenomenon of the Puducherry sea turning red has sent ripples of concern across the environmental landscape.
- A National Green Tribunal (NGT) panel attributed this alarming discoloration to a plankton crash, highlighting the delicate balance of our marine ecosystems.

What Panel found?

- The panel ruled out algal bloom and contamination from a nearby paper manufacturing unit, stating that the unit's operations did not coincide with the discolouration incidents.
- Instead, the panel identified high iron concentration as a potential factor favouring plankton bloom.
- Environmental parameters such as sea surface temperature, salinity, pH, and dissolved oxygen were found conducive to the proliferation of this species.

What Caused the Red Tide?

Plankton are microscopic organisms that form the base of the marine food chain. A sudden and massive decline in a specific type of phytoplankton, Noctiluca scintillans, is believed to be the culprit behind the red coloration. This phenomenon, often referred to as a "red tide," can be triggered by various factors, including:

- Nutrient pollution: Excessive nutrient runoff from agricultural lands or sewage can create an environment conducive to explosive phytoplankton growth. When this growth becomes unsustainable and crashes, it leads to a depletion of oxygen, suffocating other marine life.
- Climate change: Rising sea temperatures and changes in ocean currents can disrupt the delicate balance of marine ecosystems, impacting plankton life cycles and contributing to red tides.

Ecological Implications of a Plankton Crash

The consequences of a red tide can be far-reaching. Here are some of the potential impacts:

- Reduced oxygen levels: Dead and decaying plankton deplete oxygen in the water, creating hypoxic zones where other marine organisms struggle to survive.
- Disruption of the food chain: Plankton depletion affects the entire food chain, impacting fish populations and ultimately affecting human food security.
- Marine biodiversity loss: Red tides can lead to mass die-offs of fish, invertebrates, and other marine life, causing significant biodiversity loss.

Learning from the Red Tide

The Puducherry incident serves as a stark reminder of the interconnectedness of our environment. It underscores the urgent need for:

- Pollution control: Implementing stricter regulations and practices to minimize nutrient

runoff from agricultural lands and sewage systems.

- Climate action: Addressing climate change by mitigating greenhouse gas emissions is crucial to prevent further disruptions to marine ecosystems.
- Sustainable practices: Promoting sustainable fishing practices and protecting coastal ecosystems are vital for the long-term health of our oceans.
- The red tide in Puducherry is a wake-up call. It’s time to adopt a more responsible approach towards our oceans to ensure their health and the well-being of the countless species that depend on them.

What is Plankton Crash?

- A plankton crash is a sudden and dramatic decline in the population of plankton within a body of water, like an ocean, lake, or pond. Plankton are microscopic organisms that play a vital role in the marine ecosystem, forming the base of the food chain for many fish and other aquatic creatures.

Here’s a breakdown of what happens during a plankton crash:

- Normal Scenario: Plankton populations typically fluctuate naturally, with growth and decline occurring in a balanced cycle.

- Triggering Factors: Various factors can trigger a

plankton crash, including:

- Nutrient Pollution: Excessive nutrients like nitrogen and phosphorus from agricultural runoff or sewage can cause an initial boom in plankton growth. However, when these nutrients become depleted, it leads to a crash as the phytoplankton population can no longer sustain itself.
- Climate Change: Rising water temperatures and changes in ocean currents can disrupt the delicate balance required for healthy plankton growth.
- Overfishing: When large numbers of fish are removed from the ecosystem, it can disrupt the food chain and indirectly affect plankton populations.

Consequences: A plankton crash can have significant ecological consequences:

- Reduced Oxygen Levels: As dead plankton decompose, they consume oxygen in the water. This can create “dead zones” where oxygen levels are too low to support other marine life.
- Disrupted Food Chain: A decline in plankton affects the entire food chain. Fish populations feeding on plankton decline, impacting fisheries and potentially human food security.
- Biodiversity Loss: Plankton crashes can lead to mass die- offs of fish, invertebrates, and other marine life, causing a loss of biodiversity.

Examples:

- The recent red tide phenomenon in Puducherry, India, is an example of a plankton crash. In this case, a specific type of phytoplankton called Noctiluca scintillans experienced a rapid decline, leading to the red coloration of the water.

Importance:

- Understanding plankton crashes is crucial for protecting our oceans and maintaining healthy marine ecosystems. By addressing issues like pollution control, sustainable fishing practices, and mitigating climate change, we can work towards preventing such events and ensuring the health of our planet's vital marine life.

QuizTime:

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Are you Ready!

Thank you, Time Out !

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General Studies

CURRENT AFFAIRS QUIZ

Read the Below Instructions Carefully:

- Click on - Start Quiz
- Attempt all questions (You can attempt or leave)
- After Attempting Last Question.
- Enter Name & Email
- Click on - Check Result
- Scroll down - Check out Solutions too.

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Category: **General Studies**

A key strategy for mitigating the negative effects of plankton crashes includes:

○ Introducing genetically modified fish species

○ Encouraging unregulated coastal development projects

○ Establishing marine protected areas for ecosystem conservation

○ Delaying research on plankton population dynamics

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Category: **General Studies**

Consider the following statements about plankton crashes:

(a) They are caused by a sudden decline in the population of microscopic organisms in water bodies.
(b) They can lead to the formation of "dead zones" with very low oxygen levels.
(c) They can disrupt the food chain and impact fish populations.

Choose the correct answer:

○ Only (a) and (b)

○ Only (b) and (c)

○ Only (a) and (c)

○ All of the above

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Category: **General Studies**

The red coloration observed in the Puducherry incident is a potential indicator of:

○ Increased productivity and health of the marine ecosystem

○ Disruption in the balance of a specific type of plankton

○ Successful implementation of pollution control measures

○ Abundance of commercially valuable fish stocks

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Category: **General Studies**

A recent phenomenon observed in Puducherry, where the sea turned red, is most likely associated with:

- ○ Extensive coral bleaching
- ○ A decline in a specific type of phytoplankton
- ○ Introduction of an invasive fish species
- ○ Increase in salinity levels

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Category: **General Studies**

A major factor contributing to plankton crashes can be:

- ○ Stringent regulations on agricultural practices
- ○ Increased investment in sustainable fishing techniques
- ○ Excessive nutrient runoff from agricultural lands
- ○ Reduced greenhouse gas emissions

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Category: **General Studies**

Plankton crashes can disrupt the marine ecosystem by:

- ○ Increasing the overall oxygen levels in the water
- ○ Creating "dead zones" with very low oxygen levels

○ Introducing new nutrients into the food chain

○ Enhancing the growth of coral reefs

Prev Finish

Check Rank, Result Now and enter correct email as you will get Solutions in the email as well for future use!

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UPSC History Mains Questions:

Question 1:

The recent red tide phenomenon in Puducherry highlights the vulnerability of marine ecosystems. Discuss the causes and ecological consequences of plankton crashes. Suggest measures to ensure the long-term health of our oceans.(250 words)

Model Answer:

Causes of Plankton Crashes:

- Nutrient Pollution: Excessive nutrient runoff from agricultural lands and sewage systems can create conditions for explosive phytoplankton growth. When these nutrients become depleted, a crash occurs as the phytoplankton population can no longer sustain itself.
- Climate Change: Rising sea temperatures and changes in ocean currents can disrupt the delicate balance required for healthy plankton growth.
- Overfishing: Disruption of the food chain through overfishing can indirectly affect plankton populations.

Ecological Consequences of Plankton Crashes:

- Reduced Oxygen Levels: Decomposition of dead plankton depletes oxygen in the water, creating hypoxic zones where other marine life struggles to survive.

- Disrupted Food Chain: Decline in plankton impacts the entire food chain, affecting fish populations and human food security.
- Marine Biodiversity Loss: Mass die-offs of fish, invertebrates, and other marine life can occur, leading to significant biodiversity loss.

Measures for Ocean Health:

- Pollution Control: Implementing stricter regulations and practices to minimize nutrient runoff from agriculture and sewage systems.
- Climate Action: Addressing climate change by mitigating greenhouse gas emissions is crucial to prevent further disruptions to marine ecosystems.
- Sustainable Practices: Promoting sustainable fishing practices and protecting coastal ecosystems are vital for long-term ocean health.
- Marine Protected Areas: Establishing and enforcing marine protected areas can help conserve marine biodiversity and promote ecosystem resilience.
- Monitoring and Research: Continued monitoring of marine ecosystems and research on plankton dynamics is crucial for early warnings and better management strategies.

Question 2:

A panel attributed the red coloration of the Puducherry sea to a specific type of phytoplankton, Noctiluca scintillans. Briefly

explain the role of plankton in the marine ecosystem and the potential impact of their decline.(250 words)

Model Answer:

Role of Plankton:

Plankton are microscopic organisms that drift in the water column and form the base of the marine food chain. They are broadly categorized into phytoplankton (plant-like) and zooplankton (animal-like).

- Phytoplankton: Phytoplankton play a vital role in the marine ecosystem by performing photosynthesis, converting sunlight and carbon dioxide into organic matter and oxygen. They are the primary producers in the ocean, similar to plants on land.
- Zooplankton: Zooplankton feed on phytoplankton and other organic matter, transferring energy up the food chain to fish and other marine animals.

Potential Impact of Plankton Decline:

A decline in plankton populations can have significant consequences:

- Reduced Oxygen Levels: Decomposition of dead plankton depletes oxygen in the water, impacting the survival of other marine life.
- Disruption of the Food Chain: A decline in plankton affects the entire food chain, impacting fish populations and potentially human food security.
- Loss of Biodiversity: Reduced food availability

due to plankton decline can lead to population declines of fish and other marine life, affecting overall biodiversity.

- These answers provide a framework for addressing UPSC Mains questions on the topic of plankton crashes. Remember to support your responses with relevant examples and data points whenever possible.

Remember: These are just sample answers. It's important to further research and refine your responses based on your own understanding and perspective. Read entire UPSC Current Affairs.

Relevance to the UPSC Prelims and Mains syllabus under the following topics:

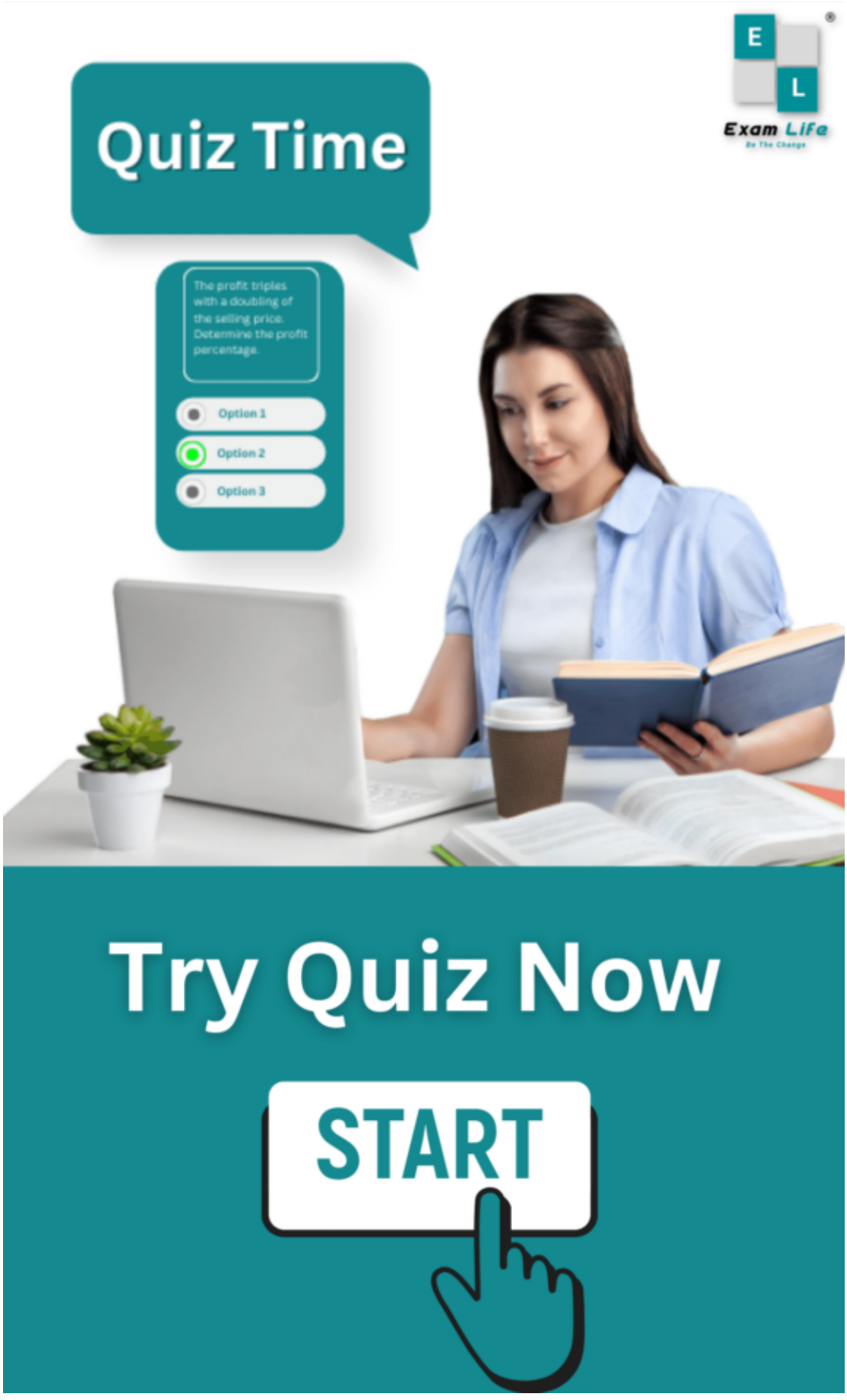
Prelims:

- **General Studies Paper I (GS):** The "Environment" section in General Studies Paper I (GS) might briefly touch upon the historical significance of maritime trade and the need for healthy

oceans. However, there’s no specific focus on plankton crashes.

Mains:

- **Environment:**
- Biodiversity: Understanding the importance of biodiversity in marine ecosystems and the threats they face. Plankton crashes are a potential threat to marine biodiversity.
  Pollution Control: Studying the effects of various pollutants on ecosystems, including nutrient pollution’s role in plankton crashes.
  Climate Change: Analyzing the impact of climate change on marine ecosystems, including its potential to disrupt plankton populations.
  Conservation Strategies: Exploring various marine conservation strategies like establishing protected areas, which can help maintain healthy plankton populations.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