Environment & Ecology · GS - III

Explain how specialised adaptations enable deep-sea organisms to survive in extreme marine environments. Discuss the importance of deep-sea exploration for marine biodiversity research and conservation.

EXAM YEAR	PAPER	SUBJECT
DAILY PRACTICE 01/11/2026	GS - III	Environment & Ecology

MARKS	WORD LIMIT
10	~150 words

Answer Hint

Deep-sea biodiversity; transparent head and tubular eyes; adaptation to darkness and pressure; marine food webs; scientific exploration; conservation challenges

Model Answer

Introduction:

The deep sea is an extreme environment characterised by darkness, high pressure, low temperatures and limited food availability. Organisms such as the barreleye fish demonstrate how specialised adaptations support survival under these conditions.

Adaptations of deep-sea organisms

- **Visual adaptations:** Some species possess highly specialised eyes to detect faint light and identify prey.
- **Structural adaptations:** Distinctive body structures, including the barreleye fish’s transparent head, support specialised sensory functions.
- **Energy efficiency:** Many deep-sea organisms conserve energy because food resources are often scarce.

- **Pressure tolerance:** Physiological and cellular adaptations enable species to survive under high hydrostatic pressure.

Importance of deep-sea exploration

- **Biodiversity research:** Exploration helps identify poorly understood species and their ecological roles.
- **Marine food webs:** Studying deep-sea organisms improves understanding of ocean ecosystems and nutrient cycling.
- **Scientific innovation:** Research can reveal biological mechanisms useful in biotechnology and other scientific fields.
- **Conservation:** Baseline data help assess threats from deep-sea mining, pollution, climate change and habitat disturbance.

Conclusion:

Deep-sea exploration expands our understanding of marine life and ecological processes. Scientific research, responsible exploration and evidence-based conservation are essential to protect these fragile ecosystems.

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