



**KAMARAJ IAS ACADEMY**  
Only IAS Academy by Grandson of "Per. unthalaivar Kamarajar"

# UNESCO Environmental DNA (eDNA) Expeditions in World Heritage Marine Sites (WHMS)

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## Context:

UNESCO's recent report, "*Engaging Communities to Safeguard Ocean Life*," highlights the vulnerability of marine species as ocean temperatures rise, based on findings from environmental DNA (eDNA) expeditions conducted across UNESCO's World Heritage Marine Sites (WHMS).

## About eDNA Expeditions:

eDNA sampling was part of a global citizen science initiative aimed at measuring marine biodiversity and assessing the impact of climate change on species distribution across UNESCO's WHMS. Between September 2022 and July 2023, eDNA campaigns took place in 21 out of 51 WHMS worldwide.

## What is eDNA?

Environmental DNA refers to genetic material shed by organisms into their environment, including DNA from cells, tissues, fluids, and excrement. This DNA can be collected from environmental samples such as water, soil, or air.

## Significance of eDNA:

- **Large Scale:** eDNA sampling is effective for large, geographically distant areas, making it ideal for monitoring vast marine environments.
- **Robust Technology:** Compared to traditional bio-monitoring methods, eDNA is highly sensitive and offers rapid results.
- **Sustainability:** It is a non-invasive method, reducing the environmental impact of the monitoring process.
- **Cost-effective and Versatile:** The method is relatively inexpensive and capable of detecting rare, transient, or invasive species, such as the invasive lionfish in Belize.

## Limitations of eDNA:

- **Limited Data:** eDNA provides information on the presence of species but does not indicate their population size, sex, or developmental stage.
- **Identification Issues:** Many species are not represented in existing DNA reference databases, leading to challenges in identification.
- **Contamination and High Costs:** eDNA is susceptible to contamination, and the analysis of samples can be expensive.

## UNESCO World Heritage Marine Sites:

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These sites are crucial for global biodiversity and climate regulation, covering over one-fifth of the world's blue carbon ecosystems and storing carbon assets equivalent to 10% of global greenhouse gas emissions. Over 70% of these sites are threatened by climate change, with about 35% hosting species that are at risk of extinction.

In India, the **Sundarbans National Park** is one of the UNESCO WHMS, and India hosts 132 Marine Protected Areas (MPAs), with 26 located in the peninsular region and 106 in the islands.

eDNA expeditions offer a powerful tool for monitoring marine life, helping to identify biodiversity threats and track changes in species distribution, crucial for the protection of the world's oceans and marine species in the face of climate change.