

Study on Keralam ELSA-3 shipwreck

Prelims: Current events of national and international importance | Science and Technology

Why in News?

A recent study by researchers highlighted the long-term, evolving environmental impacts of marine resin pellet spill following the sinking of the container vessel MSC ELSA-3 off the Keralam coast.

- **Incident** - The ship carried hundreds of metric tonnes of plastic resin pellets (nurdles), industrial materials, hazardous calcium carbide, and substantial quantities of heavy fuel oil.
- **Impact** - Ocean currents and monsoon winds transported the spilled **nurdles** across state boundaries, washing them ashore along the coastlines of **Keralam** and **Tamil Nadu**.

Nurdles

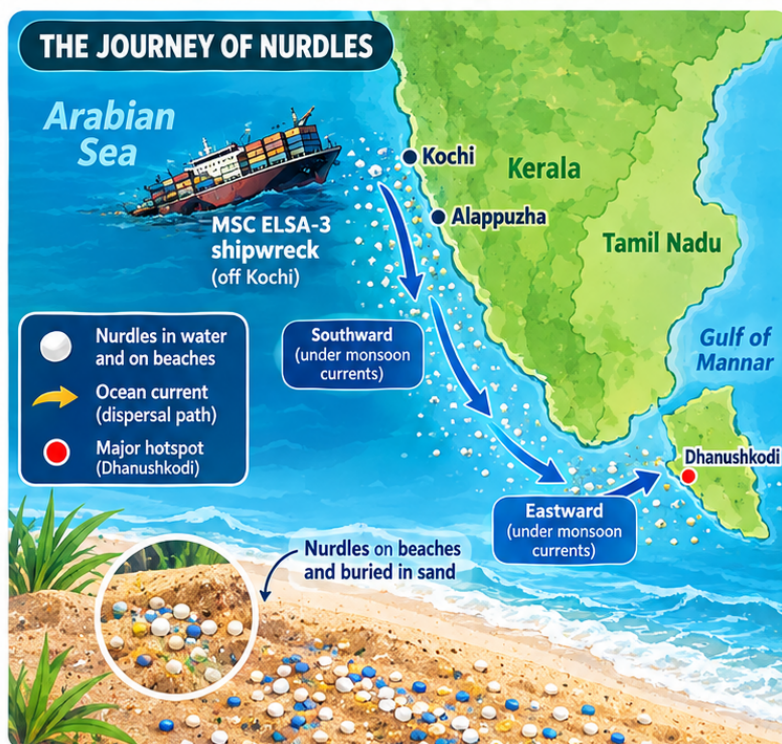
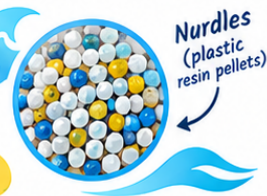
- **Definition** - Tiny, lentil-sized pre-production plastic resin pellets (typically 2 to 5mm in size) used as raw material in the manufacturing of commercial plastic products.
- **Classification** - It is categorized as a primary source of **microplastic pollution** due to their small initial size.
- **Ecological Danger** - It has a buoyant nature and it resembles like fish eggs.
- Thus, they are easily mistaken for food by marine life, while acting as persistent chemical sponges in aquatic ecosystems.

Key Scientific Findings of the Study

- **Sediment Burial** - While surface abundance on beaches declined by >80% in initial months, nurdles became deeply buried **up to 20 cm into beach sediments**.
- Buried pellets act as a long-term secondary pollution source, susceptible to re-mobilization during monsoonal storms, coastal erosion, and sediment reworking.
- **Chemical Weathering** - Spectroscopic analysis (FTIR and SEM) revealed physical surface degradation, yellowing, and photo-oxidation.
- Weathered nurdles adsorb toxic persistent organic pollutants (POPs).
- It includes
 - Polycyclic Aromatic Hydrocarbons (PAHs),
 - Polychlorinated Biphenyls (PCBs),
 - Petroleum hydrocarbons, and
 - Toxic heavy metals concentrating them on pellet surfaces.
 - Weathered pellets developed a dense, specialized microbial ecosystem called a **plastisphere**.
- Bacterial loads on aged nurdles reached 10^5 " to 10^6 " colony-forming units per gram" ("CFU/g"), harboring potential opportunistic marine pathogens.
- **Trophic Impact** - Demonstrated evidence of gastrointestinal ingestion and gill entrapment across multiple marine fish species.
- Fish ingesting weathered, contaminant-laden nurdles exhibited elevated **oxidative stress** and histopathological tissue damage compared to those exposed to pristine pellets.

MSC ELSA-3 SHIPWRECK: PERSISTENT NURDLE POLLUTION

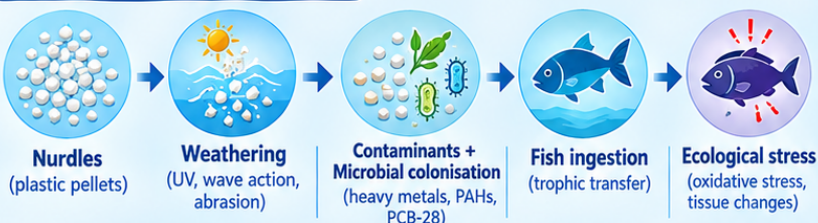
From a shipwreck off Kochi to long-lasting coastal and ecological impacts



KEY FINDINGS (Sept 2026 Study)

- 93** coastal sites monitored over 1 year
- 31,230** nurdles/m² peak shoreline abundance
- >80%** decline within 3 months at impact sites, but new hotspots emerged
- Nurdles persisted and were **buried up to 20 cm** by May 2026
- Weathering + contaminant accumulation: heavy metals, PAHs and PCB-28
- 26 of 2,413** fish contained nurdles (1.08%)
- Weathered contaminant-enriched nurdles associated with oxidative stress and tissue changes

ECOLOGICAL PATHWAY



EARLIER RAPID-RESPONSE FINDING

- Distinct hotspots, including Dhanushkodi,** showed non-linear dispersal of nurdles.

Based on 2026 Marine Pollution Bulletin study on spill-derived nurdles following MSC ELSA-3.

Reference

[The Hindu | Study on Keralam ELSA-3 shipwreck](#)



SHANKAR
IAS PARLIAMENT
Information is Empowering