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Overview of Remediation Measures of X-Press Pearl Incident

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Abstract— Environmental and Socio-Economic Impacts of the X-Press Pearl Marine Disaster Off the Coast of Colombo, Sri Lanka. On May 20, 2021, a fire broke out on board the container ship X-Press Pearl, which resulted in the release of hazardous materials into the marine environment. The review shows the spread of pollutants, including oil, chemicals and plastics, after and after the fire, which significantly affected marine life and coastal communities. It also discusses the comprehensive remedial measures taken by domestic and international agencies, highlighting the cooperative efforts required for disaster management. The findings underscore the need for improved maritime security protocols, better preparedness for handling hazardous materials, and stronger international cooperation to mitigate the effects of such incidents in the future.

Index Terms— Environmental impact, maritime disaster, pollution, remediation, X-Press Pearl

1. INTRODUCTION

Sri Lanka is a significant player in the shipping industry due to its strategic location in the Indian Ocean. It serves as a vital maritime hub for the transshipment of goods between Asia, Europe, and Africa, with major ports like Colombo Port playing a crucial role in global trade and commerce. When it comes to X-Press Pearl is the largest container ship in the world Table 1 shows details of the X-Press Pearl Ship. X-Press Pearl is owned by X-Press Feeders, one of the 20 largest container ship operators in the world. [1]

Table 1: Details of the X- Press Pearl Ship [1]

Flag	Singapore
Built	2021
Capacity	2 756 TEU1
Draught	11.4 m
Length	186 m
Beam	34m

On May 20, 2021, a fire broke out on the X-Press Pearl, a container ship anchored off the coast of Colombo, Sri Lanka's largest city and commercial hub. As the world witnessed the ship burning for 13 days, Sri Lanka prepared for the expected environmental catastrophe, which has since been labeled as the worst in the country's history. The vessel, which was only three months old at the time [2], was carrying

1,486 shipping containers, including 81 classified as hazardous materials [3], such as nitric acid and caustic soda. The rest of the containers were reported to contain a mix of potentially harmful substances, including epoxy resin, plastics, oil, and metals like lead and copper (Fig 1) [4].

In the case of X-Press Pearl it is thought that the fire was caused by a leaking container of nitric acid. On May 11, in Port Hamad, Qatar, the ship's crew knew about a leaking container of nitric acid in the hold, but the port authorities didn't allow them to remove it. When the ship arrived in Hazira, the port also refused to accept the container. Sri Lanka received an emergency call about the fire on May 20. Two days later, there were explosions, and by May 25, the ship was completely on fire. Firefighting ships from Sri Lanka and India worked together to put out the fire using foam, water, and dry chemical powder from the air. During this time, containers fell into the sea. By May 31, they reported that the fire was under control, and they tried to tow the ship to port to minimize the impact on shipping and the environment. However, on June 2, the ship's back part started sinking, and by June 17, it had settled on the seabed. [3]

Because this happened during the monsoon season, it was decided to wait until September, when the monsoon season ends, to try to remove the ship safely. Sri Lankan authorities, following advice from the Attorney General Department, chose not to take custody of the ship. Instead, the responsibility for the shipwreck was given to the insurance company P&I Club. They hired the American company RESOLVE and Oil Spill Response Limited (OSRL) to manage the ship and handle potential oil spills. The MEPA (Marine Environment Protection Authority) also asked the International Tanker Owners Pollution Federation (ITOPF) to assist with managing the damage [5].

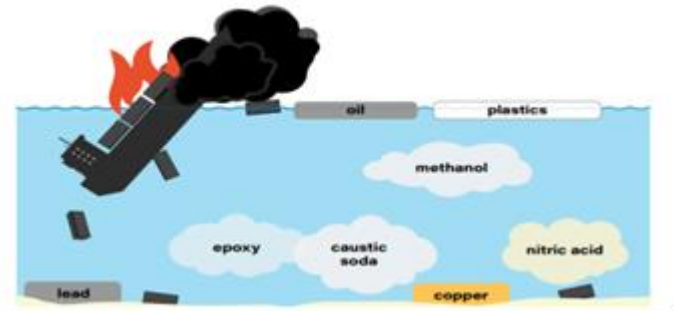

Fig 1: How pollution may have been released from the ship during and after the fire and how it could spread through the water. [7]

2.THE SOCIAL AND ENVIRONMENTAL IMPACT

The main impacts of this disaster are grouped in the following. Oil pollution, Chemical pollution, Risks arising from the shipwreck and lost containers, Plastic pollution, Air Pollution, impacts on wildlife and sensitive environments, impacts on fishery resources the X-Press Pearl disaster caused significant harm to Sri Lanka's environment and people. There was an oil spill that covered a large area, and the ship's cargo included tiny plastic pellets that washed upon the shores, harming the marine life and tourism. Additionally, many containers on the ship held hazardous materials, like nitric acid, which can be dangerous.

The fishing industry in Sri Lanka was also hit hard (Fig 2), affecting many families and fishermen. The spill of chemicals into the sea led to the death of over 300 marine animals, including turtles, dolphins, and

whales. This disaster highlighted the need for better rules and preparedness for transporting hazardous materials, especially in crowded areas. It also showed that there is a need for better training and resources to handle emergencies like this. The SFDRR is a framework that can help address these issues and make communities [6]

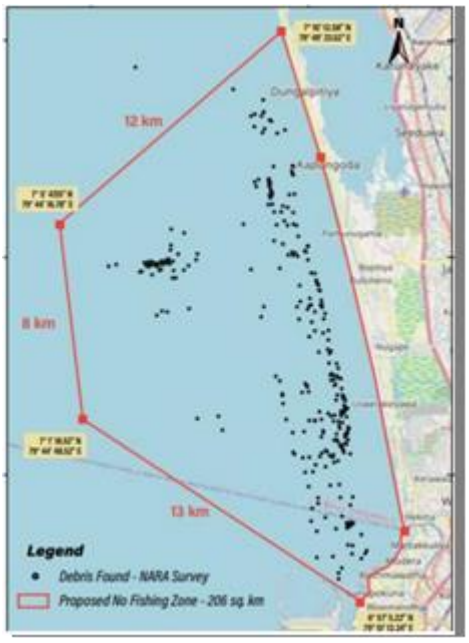

Fig 2: No fishing zone revised and in place from 1st of December 2021[7].

3.THE REMEDIATION MEASURES TAKEN BY THE RESPONSIBLE PARTIES TO MANAGE THE SITUATION

According to the Marine Environment Protection Authority (MEPA) in Sri Lanka, a massive cleaning effort has been underway, involving volunteers, the Sri Lankan Tri-Forces, and government officials. By June 25th, they had cleaned up around 250 locations from Manner to Kirinda. During the initial clean-up phase, there were 500 to 1,000 people working each day. By June 14th, nearly 19,000 individuals had taken part in these clean-ups. They managed to remove a substantial amount of litter from the beaches.

The most polluted beaches were found in the Gampaha and Colombo districts, likely because they were close to the accident site, and ocean currents transported the pollutants northward along the coastline. Puttalam and Kalutara districts had less pollution. In this situation, it's suggested that the environmental assessment plan should be adapted to a phased approach, which includes:

1. Snapshot Assessment - This involves a one-time campaign of measurements to quickly check a wide range of factors. It helps to get a general idea of the environmental situation and create a starting point.

2. Pollution Hotspot Assessment - This focuses on specific areas, such as the wreck, the vicinity of lost containers, and shorelines with high levels of plastic and debris pollution.

3.Longer-Term Environmental Monitoring - This stage includes ongoing monitoring of the entire affected

shoreline, particularly in sensitive areas like lagoons, mangroves, estuaries, coral reefs, and turtle nesting sites. This helps to establish a solid baseline for future scientific assessments and remediation efforts.

For this process to work effectively, it requires a collaborative effort from various relevant agencies, including NARA, MEPA, Navy, Coast Conservation and Coastal Resource Management, Dept. of Wildlife Conservation, Coast Guard, and Central Environment Authority. The Marine Environment Protection Authority, responsible for managing marine pollution, has a pivotal role in executing the proposed recommendations. Collaboration with other government agencies and important stakeholders is crucial. To enhance its capacity to respond to maritime disasters, safeguard ocean health, protect fishery resources, and support global trade, Sri Lanka will require technical and financial support from international partners and allies. [7]

The recommendations from the UN team can be categorized into four main areas:

1. Mitigating and eliminating risks from the incident
2. Plastic pollution clean-up
3. Environmental assessment and monitoring
4. Strengthening maritime disaster management capacity

The case is asking the Honorary Attorney General to take legal steps to get compensation under specific laws for the damage caused by the X-Press Pearl incident. It also wants the proper disposal of the plastic pellets and debris from the ship and the creation of a plan to improve safety at sea. Another case, filed on behalf of fishing communities, seeks fairness and protection for their rights under the law. It asks for a fair investigation into the damage caused to the fishing industry and the communities, compensation for their losses, and reports on the harm caused by the ship incident. It also wants a plan to make the seas safer. [7]

CONCLUSION

The X-Press Pearl incident significantly affected Sri Lanka's marine environment, causing widespread pollution and severe environmental damage. The spread of hazardous materials, including oil, chemicals and plastics, posed a significant threat to marine life and the livelihoods of coastal communities. Comprehensive response and recovery efforts involving both domestic and international agencies have underscored the need for robust marine disaster management and effective international cooperation. The incident highlighted critical gaps in maritime security protocols and the urgent need for better preparedness and response mechanisms for handling hazardous materials. Moving forward, it is essential to improve regulatory frameworks, enhance response capabilities and develop international partnerships to protect marine ecosystems and prevent such disasters in the future.

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