"MV X-press Pearl", the world's largest nurdle spill incident response: Case study, lesson learned for the future

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ABSTRACT

The MV X-press Pearl ship incident occurred on May 20th May 2021 due to a fire onboard the ship, owned and operated by a Singaporean company, 9.5 nautical miles away from the Colombo port of Sri Lanka, which carried 1486 containers. The containers include highly hazardous noxious substances, 81 containers, and 439 plastic pellets containers. The incident led to the world's largest nurdle spill incident, and more than 750 km of coastal stretch was polluted due to the contamination of nurdles. The response to the pollution incident was initiated by adopting the same procedures laid down in the National Oil Spill Contingency plan and, accordingly, a similar pattern of command structure was established, and the shoreline cleanup operation was activated. A few factors created unique challenges for the management of these response actions. The shoreline cleanup operation was conducted with numerous difficulties using different types of shoreline cleanup strategies.

This paper analyzes the nurdle pollution response in four primary focus areas including, identify the ways in which this shoreline cleanup operation was unique and required innovative and novel solutions; identify the ways in which this response strategies benefited in carrying out cleaning in different areas of shoreline, provide a summary of response evaluation methods with specific focus on how the lessons learned and best practices will inform future planning efforts.

Nurdle, Shoreline clean up, Hazardous Noxious substances, Preparedness, Plastic

Introduction

The Singapore-flagged Mv X-Press Pearl containership was anchored 9 nautical miles from Colombo, Sri Lanka, on May 20, 2021, when a fire started out in the vessel's yellowish colour fumes as it waited to unload a damaged nitric acid container. The vessel contained 1486 containers, including 81 containers transporting highly dangerous noxious substances and 439 containers containing plastic pellets. The fire lasted four days on board the ship. On May 25th, there was an explosion on board the ship, and an unknown number of containers, comprising hazardous chemicals and plastic pellets, fell into the water. Despite considerable firefighting efforts, the fire on board the ship continues to burn. When the fire was suppressed,

The containers released from the vessel as a result of the explosion released huge amounts of plastic felt and other chemicals, and finally these plastic pellets, burned pellets, and partially burnt pellets, reached the shoreline areas in Negombo and Puttalam, and later these pellets also reached other coastal areas. More than 750 felt accumulated in the coastal areas of Negombo and Colombo, and within two days, these pellets reached other coastal areas and polluted areas between Kirinda and Mannar, covering more than 750 km. The vessel contains 350 bunkers of oil and 50 tons of marine gas oil and some lubricant oil. The oil slick was visible on August 8th around the vessel.

Due to the risk of an oil and chemical spill, MEPA activated NOSCOP and gathered an incident management team after the incident was reported to them, due to the risk of an oil and chemical spill. The incident action plan was developed, and the entire response team and response equipment were placed on standby. An unprecedented and unexpected plastic needle pollution incident occurred on May 25th. The explosion on board the ship resulted in the world's largest plastic nurdle incident. Specially burnt plastic and plastic nurdles contaminated with several types of chemicals pose an unidentified challenge for the cleanup and monitoring of this spill (de Vos, Lihini, Youngs, DiBenedetto, & Ward, 2022). The plastic pellets and burnt plastic agglomerate were tested and result shows that there were several contaminants especially in burnt plastic agglomerate (Rubesinghe,, Brosché, Withanage, Pathragoda, & Karlsson, 2021)

However as Mandated agency MEPA initiated NOSCOP and cleanup operation to minimize further damage to the coastal marine environment as well as coastal population. The coastal areas with different characteristics and use of different socio-economic activities are polluted, and the cleanup of these polluted areas during the COVID epidemic period and country lockdown period has become a huge challenge (United Nations Environment Programme, 2021). The cleanup strategies of plastic nurdles are not familiar and, in some cases, in earlier incidents, the cleanup used some sort of cleanup tools like handheld sieves, dustpan and brushes, rotating sand/pellet sieves, nets, and industrial vacuums (Caliendo , 2012).

Initially, response strategies were implemented using manual methods. As cleanup reached an advanced stage, the quantity of collected nurdles decreased, whereas the sand and other materials increased (United Nations Environment Programme, 2021). The international community will benefit greatly from the sharing of experience and lessons learned from the largest plastic needle spill (United Nations Environment Programme, 2021).

This paper analyzes the pollution response in four primary focus areas, including identifying the ways in which this response operation and shoreline cleanup operations were unique and required innovative and novel solutions; identifying the ways in which these response strategies benefited in carrying out cleaning in different areas of the shoreline; and providing a summary of response evaluation methods with a specific focus on how the lessons learned and best practices will inform future planning efforts. The response organization was established as per the procedures laid down in the national oil spill contingency plan and the incident action plan was formulated and implemented. It is understood that more effective cleanup strategies can be developed through the evaluation and managing of cleanup effort.

Methodology

The response organization and the effectiveness of response strategies were evaluated based on the collection of information for the response personnel as well as the incident management team in a qualitative manner. The strength and weaknesses of the various types of response strategies and their effectiveness were evaluated, especially focused on response actions and logistic resource availability. The shoreline cleanup strategies were evaluated using the cleanup response strategy effective index. This index was formulated based on four response strategies' suitability for different shoreline types; the efficiency of the strategy; the cost of the cleanup strategy, availability of equipment; and the possibility of damage to the shoreline ecosystem.

The result and discussion

When the incident happened, the possible oil and chemical spill risks were identified, and they took some measures to deal with the oil and chemical spill. The response method at sea was not possible due to the sea conditions and the effectiveness of available equipment in the relevant sea conditions. Due to the above, the response at sea has been considered impossible. However, the unexpected plastic nurdle spill created a new challenge, especially for the movement and drifting areas of nurdles and other partially burned debris; protection of sensitive areas; impact on the marine environment and socio-economic activities. The response action taken to protect sensitive areas was not as efficient as expected. The oil boom used was not highly effective in the containment of plastic nurdles. The response operation was organized by the Marine Environment Protection Authority with the assistance of ITOPF and OSRL. That becomes a new experience for the officers engaged in the unique nature of response, and the response organization becomes a challenge to the involved officers. The response organization and response cooperation among agencies became successful lessons learnt from the incident. The shoreline survey and site level shoreline clean plan were developed based on the survey data and information. The COVID 19 epidemic and the country's lockdown situation require the provision of logistical support and protection of the cleanup team. COVID has become an excessively enormous challenge. However, the management team was able to overcome it to a certain level.

The cleanup response strategies used were like the oil shoreline clean up in its initial phase. After that, novel cleanup strategies were used based on the two physical properties of plastic nurdles, density and the size of the nurdles. Based on these facts, several manual and mechanical cleanup strategies were used. The analysis shows that most primary level cleanup strategies were more highly effective than the mechanical cleanup strategies. The cleanup team must receive basic training and understand the cleanup strategy and process for the cleanup strategy to be successful.

The lessons learned from this incident can be extremely useful in developing effective cleanup strategies for future incidents of similar nature. The unique challenges they faced were the chemical contamination of nurdles and the hazards posed by the cleanup team when they came contact with contaminated nurdles. The chemical analysis of contaminants and their harmful effects, as well as further health and safety issues, need to be addressed. when some strategies' cleanup response strategy effective index is higher than the other strategies.

Conclusion

Hence, this paper focused on the effectiveness of the response, and it can be concluded that the effectiveness of the cleanup strategies and tactics deployed was effective even with COVID epidemic conditions. Even though the plastic nurdle spill cleanup became a challengeable event, the collaborative approach conducted to cleanup with diverse types of cleanup strategies became an effective one. Some cleanup strategies are more effective than others when used in different areas of shoreline types.

The response to the plastic nurdle spill has become a challengeable issue. However, the implemented mechanism was successful in several areas, while in some areas, response issues have increased and need to be overcome. The lesson learned from this incident can be used to enhance the level of preparedness and response capability of similar incidents

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