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Dimitrios Dalaklis

Anastasia Christodoulou

Momoko Kitada

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OIL SPILL RESPONSE TRAINING IN THE SOUTH BALTIC SEA REGION

Dimitrios Dalaklis¹, Anastasia Christodoulou^{1,2}, Momoko Kitada¹

¹World Maritime University (SWEDEN)

²University of Gothenburg (SWEDEN)

Abstract

Spills of petroleum oil always create severe negative effects on the environment, such as smothering and poisoning flora and fauna. Minimizing the risk of oil spills and their negative impacts is a priority under the United Nations Sustainable Development Goals (SDGs), and especially SDG 14, concerning the conservation and sustainable use of the oceans, seas and marine resources. It is also a self-explanatory fact that in order to deal effectively with oil spill incidents, close and effective international cooperation -especially between neighbouring countries that usually “share the burden” of oil pollution- is a vital necessity. On this basis, the South Baltic Oil Spill Response (SBOIL) project aims to strengthen the existing oil spill response capacities in the South Baltic region, introducing a cross-border spill response tool based on the new “green technology” of biodegradable oil binders (BioBinders). Within the framework of that project, a Table Top Training Activity was conducted by the World Maritime University (WMU), along with the help of Oil Spill Response Ltd. (OSRL). The specific event was based on a realistic oil spill scenario taking place in the region under discussion and the main aim was to test the preparedness and implementation of the BioBinders as a response option to support the existing oil spill response capacities. The overall impression of the participants was that the specific exercise served well the intended purpose and that the use of BioBinders is a rather promising concept. On the other hand, there was a consensus that the use of these biodegradable wood-based oil binders on the field is for the time being associated with challenges difficult to overcome, with the quantity and time needed to deploy the required amount of binders to successfully absorb a large volume of oil standing out.

Keywords: South Baltic region, SDG 14, oil spills, biodegradable oil binders.

1 INTRODUCTION

The United Nations Sustainable Development Goal 14 (SDG 14) -which concerns the conservation and sustainable use of the oceans, seas and marine resources- is also covering the issue of abatement of oil spills risks and their negative impacts. It is crystal clear that oil spills have large environmental and social impact on the areas where they occur, in various parts of the world. To begin with, they can poison flora and fauna in the affected areas; they also exercise very negative influence on certain very important socioeconomic interests, such as fisheries, aquaculture and tourism. Large oil spills are most likely to occur in areas with dense shipping traffic, like the Baltic Sea region. This region (comprised of Denmark, Finland, Estonia, Germany, Latvia, Lithuania, Norway, Sweden, Poland and Russia) is committed to being a leader of the world when it comes to high innovation and advanced technological achievements; countries around the Baltic Sea are also highly committed to the pressing issue of environmental protection. It is indicative the fact that strict regulation and the establishment/further improvement of oil spill response techniques, have turned the region under discussion into one of the safest seas globally, despite being one of the busiest sea-transportation areas of the world [1], [2].

However, the existing techniques focus on national contingency plans that deal with oil spill incidents in isolation, without factoring in capabilities already available in neighbouring countries that are also usually affected by that same incident [3]. In order to enhance international cooperation and strengthen the existing oil spill response capacities in the wider region, a cross-border spill response tool was introduced through the South Baltic Oil Spill Response (SBOIL) Project. The BioBind approach forms the basis for the SBOIL that builds on the development of a fast and effective oil spill recovery system for coastal shallow water areas even in adverse weather conditions. Under this approach, biodegradable wood-based oil binders (BioBinders) are deployed by plane/helicopter and removed by a specially designed net boom -a combination of fishery nets and conventional oil containment booms (Figure 1 and 2). The SBOIL project aims to enhance existing cross-border spill

response capacities in the South Baltic region with the use of this innovative green technology and examines the feasibility of using biodegradable binders to mitigate the consequences of oil spills. These products have the advantages of low production costs, small environmental impact, and potential use in adverse weather conditions and in shallow waters [4].



Figure 1: Biodegradable wood-based oil binders (BioBinders)
Source: Rostock University

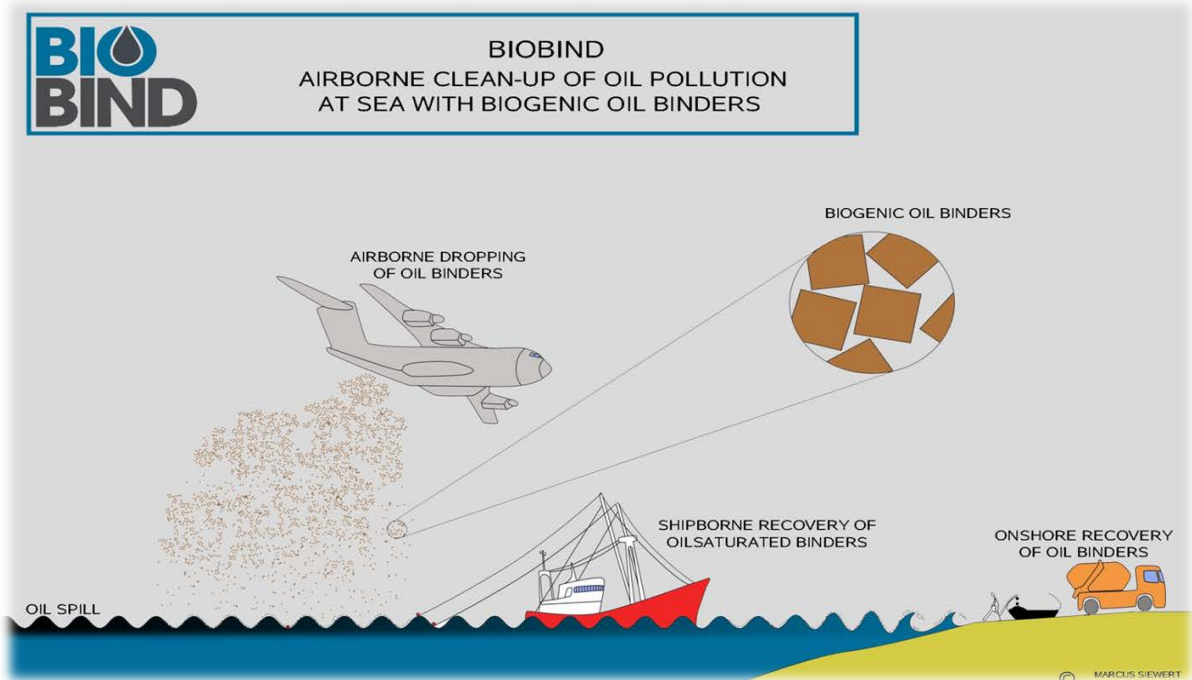


Figure 2: BioBinders and their removal by the specially designed net boom
Source: Rostock University

It is important to highlight here that effects of oil spills may remain for several years, depending on, for example, which exactly type of environment is impacted, the type and amount of oil (spilled), and off course the prevailing weather conditions. The SBOIL project aims to strengthen the existing response capacities in the South Baltic region by utilising the BioBind material and to improve the protection of the marine environment from all sources of pollution, also contributing to the improvement and enhancement of cross-border oil spill response capacities [5]. The main aim of this analysis is to discuss the outcomes of a Table Top Training Activity that was based on a realistic oil spill scenario and tested the preparedness and implementation of the BioBinders as a response option to support existing oil spill response capacities in the area under discussion.

2 METHODOLOGY

The contemporary world still relies heavily on oil to cover its energy needs. Unfortunately, oil spills at the locations of production, or during the associated transport endeavors continue to be one of the major threats to both society and the environment at the global level. Under the SBOIL project, the World Maritime University (WMU), along with the help of Oil Spill Response Ltd. (OSRL) conducted a Table Top Training Activity that was based on a realistic oil spill scenario in the South Baltic Sea region and tested the preparedness and implementation of the BioBinders as a response option to support the existing oil spill response capacities in the area [6]. This training activity took place on 8th November 2018 in Swinoujście, Poland and was attended by representatives from Poland, Germany and Sweden. The objectives of the event were to:

- Test the mobilization and management of the BioBind system as a cross-border oil spill response tool, along with existing oil spill response cooperation arrangements.
- Test the compatibility between different oil spill contingency plans in the South Baltic Sea region.
- Strengthen awareness and knowledge of oil spill response and contingency planning among key organizations involved in preparedness and response to oil spills.

The attendees were divided into two different groups in order to work around the “given problem” and identify the most appropriate solution in this “facilitated training activity”. The activity was made feasible via a pre-planned scenario that also involved the exchange of oil spill pollution equipment across all the project related countries. The main target group of the training activity were the organizations involved/designated in the national oil spill response operations of these countries, specifically those that are responsible for requesting and accepting oil spill equipment from neighboring countries. Cutting a rather long way short, the scenario was based on a maritime accident that involved a “medium spill” of oil at sea (two vessels colliding within Polish waters, a container ship and a tanker, very close to the Exclusive Economic Zone (EEZ) of Germany). The prevailing weather conditions were set up in advance intentionally to ensure the impact of oil on the coastlines of the various countries in the region, but at different point of time (Figure 3).



Figure 3. Incident site with the likely impacted coasts of Poland, Germany and Sweden depending on prevailing conditions. Source: World Maritime University (WMU) and Oil Spill Response Ltd. (OSRL)

As the groups would only consider the tactical operations that they are familiar with and would rule out aerial delivery of BioBinders as their preferred offshore response option for this incident, the use of BioBinders as a complementary response option in conjunction with other response options was introduced as a method to manage multiple operations in response to the same incident [7].

3 RESULTS

The Table Top Training Activity examined the operational aspects of using BioBinders as an oil spill response option and as expected raised many crucial issues, especially considering preparedness for the employment of this new technology. Addressing, though, all these challenges is essential in order to proceed with the next step of the mobilisation, deployment and recovery of BioBinders. The main outcomes of the activity can be defined as:

- Although the opinion of the participants was relatively negative, Biobinders should remain an option due to their ability to retain oil without leaching. For this response option to move forward as a technique and for governments to believe this method is viable, there is further work to be done. Sorbents do not have a great reputation as the perception is that dealing with the oiled waste is more problematic and costly than using conventional methods of clean-up.
- Fixed-wing aircraft deployment of BioBinders is unlikely to happen due to the lack of aircraft, regulations and other considerations. It was felt by all parties that the effort required to implement this as an option outweighed the benefits.
- Helicopter deployment of BioBinds would be more efficient and effective (especially on small slicks) and for use in hard-to-access areas where standard equipment is difficult to use. This may be a far more efficient use of BioBinders offshore and gain more traction with governmental implementation. Helicopters are more readily available; they can treat smaller slicks (targeted deployment), do not use existing response resources, can be used closer to shore and are not hindered by sea depth. Therefore, they can be deployed just prior to shoreline impact, minimising shoreline contamination.
- Vessel deployment is a far better option; however, until it is tested and integrated into contingency plans, there will always be a reluctance to use this over conventional tried and tested methods. As containment and recovery is, at present, the primary offshore response option in the Baltic region, there would be a reluctance to use vessels for an unproven technology. Therefore, sourcing additional vessels and using them for the deployment and recovery near-shore would not diminish offshore operations, but add a complementary response using the 'cone of response' concept.
- Waste was BioBind's biggest disadvantage. Like all sorbents, it produces a vast amount of contaminated waste that must be disposed of upon conclusion of the operations.
- Ways that waste can be reduced, reused or become part of the circular economy need to be addressed so it does not become a burden to the governments. Options for reuse of oiled binders can be examined and, once an option is defined, an agreement in principle can be sought. At this point, implementing BioBinders can become a viable response option, which would be easier to pass through legislation and gain approval within the South Baltic Sea Region.
- BioBinders are a "loose" sorbent (i.e. not confined like a sorbent boom or pad) that contains the oil without leaching. This material has the ability to be deployed very quickly without the need for immediate containment, as the oiled binders will not cause any additional contamination to non-oiled surrounding areas.

Before the end of the activity, the two different groups of participants were asked if they would consider any additional uses of the BioBinders and, after some fruitful deliberations, a certain number of ideas were put forward, with the most interesting of them listed below:

- Removing the difficulties associated with the use of waste water treatment plants: It was highlighted that most plants have filtration systems that could be affected if impacted with oil and hence have permanent booming in place. As an interim solution, it was decided that BioBinds could provide a fast "First Strike" capability to contain the oil within the binders before those recovery operations take place.
- Utilization of the BioBinders in Port & Harbour incidents: Within a port or harbour, many minor spills can become a common occurrence from various reasons, with equipment failure or human error standing out. If the BioBinders were used immediately when the oil enters the water, the oil would migrate to a collection point where flotsam and jetsam congregate. If the oil was contained within the BioBinders, it would not adhere or get mixed with the flotsam and jetsam increasing the contaminated waste.

- Use in inland pipelines: A spill from a pipeline situated ashore will pool in the local vicinity of the incident and, if the substrate is permeable, begin to impregnate the soil. The use of BioBinders will substantially reduce the amount of oil entering the substrate, thus reducing the amount of soil that would need to be removed for disposal/bioremediation.
- “Defending” salt marshes and mangroves: These two categories are very environmentally sensitive and oil spill response options are very limited due to the diversity of the habitat and the need to carefully treat these types of shorelines. If BioBinders were used on the impacted areas, any free-floating oil would impregnate the binders and not the shorelines, thus reducing the overall damage.

4 CONCLUSIONS

Maritime accidents are often associated with loss of human life; another very well-known devastating effect of accidents at sea is pollution of the marine environment, because of varying in size oil spills [8] [9]. These occurrences of oil spills are responsible for very significant environmental degradation; they are more likely to happen in areas with dense shipping traffic, or in close vicinity of transport pipelines and/or other infrastructures used for production of petroleum oil and the associated processing purposes. The training activity under discussion was focused on an in-depth look at the operational aspects of using BioBinds as a response option and in doing so was always likely to raise more questions than answers, especially considering preparedness for a new technology. However, raising questions at every step in the mobilisation, deployment and recovery would lead the project into specific areas that require further consideration for the next stage of the program. The activity involved participants from Germany, Poland and Sweden came with differing levels of knowledge and backgrounds. Some knew about the project and were already aware of the capabilities of the BioBinders, while others knew less about the specific technology application, but had available a very deep knowledge of their roles in an oil spill response effort. This led to varied and good discussions, along with open dialogue between the two groups, which helped to ensure that the training activity’s objectives were met. It also helped to identify several areas that will need considerable effort to ensure the project continues to move forward.

In any case, throughout the conduct of the training activity under discussion, the feasibility of using BioBinders as a response option for the mitigation of the consequences of spilled oil was investigated, including the logistical and procedural arrangements for the exchange of BioBind equipment across the project countries. Furthermore, the mobilisation and management of the BioBind system in a transnational setting and the compatibility between different oil spill contingency plans in the South Baltic at international, national, regional and local levels were tested. The consensus from the participants was that BioBinders is a very interesting concept but it would be very difficult to implement, partly due to the required amount of binders to absorb a large volume of oil, which would increase the waste volume, and partly due to the ability to source suitable aircraft at short notice to deploy the BioBinders. Despite the identified challenges, the participants became more open to ideas on how to use the BioBinders and explored opportunities for their use. If these challenges, which are not insurmountable, could be alleviated and the issues that were raised, solved, then the implementation of the BioBinders in the Baltic Sea region could become an additional ‘response tool’ in the toolbox of the organisations involved in the national oil spill response operations in these countries. The use of BioBinders remains a realistic option due to the ability of the binders to retain the oil without leaching. They can be used by the relevant authorities if they are willing to prepare themselves for that scenario.

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