Government and local stakeholders working together in oil spill preparedness in the Dutch Wadden Sea

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Introduction
The Wadden Sea is an unique landscape in Denmark, Germany and the Netherlands. As UNESCO World Heritage Site, it possesses unique nature values and its protection must be guaranteed. Due to a mix of fresh river water and salty seawater and the effect of tides, wind and deposition of sand and mud, plants and animals show continuous adaptation to these daily changeable circumstances. But, this ecological sensitive area is also used for activities such as shipping and fisheries. Recently, a strategic location for oil storage was located in Eemshaven and the shipping lane North Sea – Eems was opened, thereby increasing the volumes of transport.

As responsible governmental agency, Rijkswaterstaat, is the competent authority in the Dutch Wadden Sea for preparedness and response to nautical incidents and related spills. In practise, this means that Rijkswaterstaat conducts risk analysis, drafts spill response plans, organises exercises and contracts commercial parties to assist in spill response.
Since 2015 a new type of oil spill combat plans was developed. Not only the plans itself were new, but also the process was changed. The new plans were written in cooperation with several stakeholders, like municipalities, safety regions, NGO's and nature conservation organizations. Together we determined possible threats and the sensitive ecological and economic values. On September 4-6, 2017, these plans were tested during the largest oil spill response exercise ever in the Dutch Wadden Sea.

Main Results
Approximately 5 years ago, a literature review was done to determine the possible oil spill response techniques for the Dutch Wadden Sea. This document, translated in English called Ecological Guide for Oil Spill Response on the Wadden Sea, determined 10 area types:

1. Open water and permanent swales
2. Sea grass areas
3. Shell banks
4. Mud flats
5. Salt marshes
6. Estuary shores
7. Green beaches
8. Beaches and sand banks
9. Dikes and dams
10. Harbours and civil engineering works

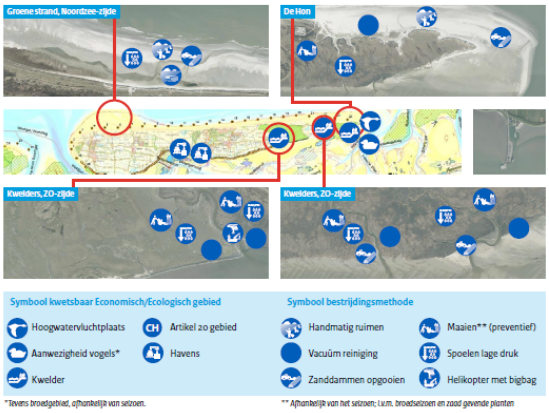
For these area types, the following response techniques were scored for their potential use in these areas considering the ecological impact and effectiveness:

- Doing nothing, natural recovery
- Use of oil booms
- Closing of areas
- Preventive clean-up
- Mechanical recovery from water (skimming)
- Mechanical recovery from shores
- Manual recovery from shores

- Use of ad- and absorbing booms
- Mowing of vegetation
- Low pressure flushing
- High pressure flushing
- Vacuum cleaning
- Raking of sediment

This cross reference resulted in an overview of which response techniques in general could be used in the Dutch Wadden Sea. The following step was to determine per island and part of the Wadden Sea Coast the appropriate use of these techniques in that specific part and in what way it could be mobilized. For every island and part of the coast, round table discussions were organized with municipalities, nature conservation organizations and NGO's. Using a geographical map, first the ecological and economical sensitive areas were plotted, followed by plotting the appropriate response technique (if possible). New icons were developed, on basis of the NOAA icons for sensitivity and response techniques.

Last, but maybe even more important, was the list of organizations and people which can be contacted 24/7 in case of an oil spill.



Maatregelen per gebiedstypen

Gebiedstypen	Locatie	Beheerder	Maatregel
Droogvallende slikplaten	Feugelpolle, De Hon, Oost Ameland, Robbenplaten, Rif		Spoelen, vacuümreiniging, ab-en adsorberende middelen, schepen met geringe diepgang.
Kwelders/brakke moerassen	Zuidoostzijde . De Vennoot (ca. 400 ha).		Zanddijken, schotten in openingen rijsthoutendammen, spoelen, olie geleidende schermen, vacuümreiniging, ab-en adsorberende middelen, schepen met geringe diepgang.
Oevers/Estuaria			Spoelen, vacuümreiniging, ab-en adsorberende middelen, schepen met geringe diepgang.
Groene stranden	Noordzeezijde (30 ha), Oostzijde (200-300 ha)		Spoelen, vacuümreiniging, ab-en adsorberende middelen, spaden.
Stranden/droogvallende zandplaten	Zandplaten Oost Ameland (ca. 100 ha)		Laadschoppen, lepelkraan, backhoes,kranen,dumpers,beachcleaners, strandcontainers.
Dijken/Dammen	Dijk Waddenkant met open breuksteen		Olie geleidende schermen, coupures afsluiten, spuiten +/- druk (koud, heet water of stoom), schrapers, skimmers, ab-en adsorberende middelen.
Havens/Kunstwerken	Havens Ameland	Gemeente Ameland	Havendelen afschermen met olie geleidende schermen, spuiten +/- druk (koud, heet water of stoom), schrapers, skimmers, ab-en adsorberende middelen.

In total, 9 response plans have been adopted to protect islands and coastline from a large oil spill. Also, 6 response plan have been adopted for the Wadden Sea harbours to be prepared to an oil spill leakage in the harbour itself. These plans were also drafted in cooperation between Rijkswaterstaat and stakeholders, such as harbour authorities and industry.

Because plans only are not sufficient to be prepared, on September 4-6, 2017, a large scale oil spill exercise was organized to test the plans and to train involved responders. Also, for the first time, use was made of a group of volunteers to clean the sandy beach and catch oiled birds.
Since the risk for a large oil spill threatening the Wadden Sea is actually on the North Sea, Rijkswaterstaat's strategy is to try to prevent oil entering the sensitive Wadden Sea. However, due to bad weather or other conditions, the scenario followed the oil spill from the North Sea into the Wadden Sea. Therefore, on Day 2 the exercise was on the North Sea and between the islands. At both locations we exercised the first line approach in oil spills, namely mechanical recovery with dynamic systems such as the sweeping arm and the Current Buster. At 5-6 Bft, the operation worked on its limits. Above 6 Bft the efficiency of these systems drops dramatically. Involved personnel was trained well to operate in these kind of circumstances.
On Day 3, the operation was moved to more shallow parts of the Wadden Sea, near the isle of Schiermonnikoog. For the first time a new invention, called the Wadcrawler, was deployed. This amphibious system is able to move from the water to banks in the Wadden Sea to remove oil there using a vacuum system or a small skimmer, called the Foru F-70. Unfortunately, just after deployment the wind speed increased from 4 Bft – 7 Bft coming from the Nort-East. Due to the wind, the water level increased at low tide and the responders on the bank were forced to evacuate. On another location, sweeping arms were used to operate in shallow, fast running parts of the Wadden Sea. This

operation had to be cancelled as well, because it was no longer safe and there was a high chance on severe damage to ships and sweeping arms.
The exercise on the beach, however, was very successful. Approximately seventy volunteers worked together with the national reserves of the ministry of Defence and Rijkswaterstaat. In small teams, the ‘oil’ was collected manually using rakes and shovels. Also, volunteers were trained to catch oiled birds using a so-called Roboduck. This Roboduck acts like a stressed oiled bird and volunteers learn how to approach the animals.

Supporting Images or Graphs


Strategic crisis management team of governments and stakeholders (photo: Sem van de Wal/Rijkswaterstaat)


The MS Arca using sweeping arms and aerial surveillance (photo: Sem van de Wal/Rijkswaterstaat)


Ships with sweeping arms exercised in various formations (photo: Sem van de Wal/Rijkswaterstaat)


Volunteers training to catch oiled birds (photo: Sem van de Wal/Rijkswaterstaat)


Volunteers working in teams collecting oil from the beach (photo: Sem van de Wal/Rijkswaterstaat)

Conclusion

In case of an oil spill, the strategy at Rijkswaterstaat is to prevent oil entering the sensitive Wadden Sea. However, due to bad weather or other circumstances this can not always be prevented. When oil enters the Wadden Sea it makes it much more difficult to remove the oil from the environment, due to the ecological sensitivity, bioturbation, low tide and high currents and obviously the spreading of the oil.

Since there are several stakeholders in the Dutch Wadden Sea, cooperation with these municipalities, nature conservation organizations and NGO's is necessary. These parties have a high knowledge of the area they are responsible for. The use of this knowledge improves not only effectiveness of the oil response operation, but it also increases support. The relationship with these stakeholders must be sustainable and actual, since the moment of an oil spill can not be predicted.

The exercise showed that the use of volunteers can attribute to an effective beach cleaning operation and response to oiled wildlife, using a standardized protocol. This protocol will be drafted in the nearby future.

We also concluded that an effective response organization is flexible with experienced personnel and several tools in the toolbox. Only highly trained personnel with knowledge of the behaviour of oil and the geographical area can adjust quickly when circumstances rapidly change. One thing is for sure in the Dutch Wadden Sea, these circumstances change on hourly basis. Due to the tidal system, the ecology such as migrating birds and the weather.

References

Ecologisch spoorboekje voor oliebestrijding Waddenzee. 2017. Rijkswaterstaat/Waddenvereniging.