



Predictive modelling: a useful yet often overlooked tool for underwater cultural heritage management

Most countries in the world follow certain policies and laws related to the protection of cultural heritage and the practice of its management, both on land and underwater. Each country usually has its own system in place but sometimes such practices involve the ratification of international conventions. The Netherlands, for example, is in the process of ratifying the *UNESCO convention on the Protection of Underwater Cultural Heritage (Paris, 2001)*.



Figure 1 This is what can usually be seen when looking at the sea – the water surface and what lies above, but not below (photo: Martijn Manders)

The protection and preservation of cultural heritage is often based on what is visible. Cultural heritage sites that are known to exist but whose precise location is unknown, are understandably very difficult to manage. This is particularly the case of underwater heritage sites or objects (figure 1), which can be problematic, since these may be threatened by numerous natural and/or human factors. Damage to underwater heritage sites or materials may be

caused, for example, by erosion, infrastructure projects (such as the construction of new harbours and the dredging of waterways), pollution and the activities of certain living creatures, such as the shipworm (figure 2).

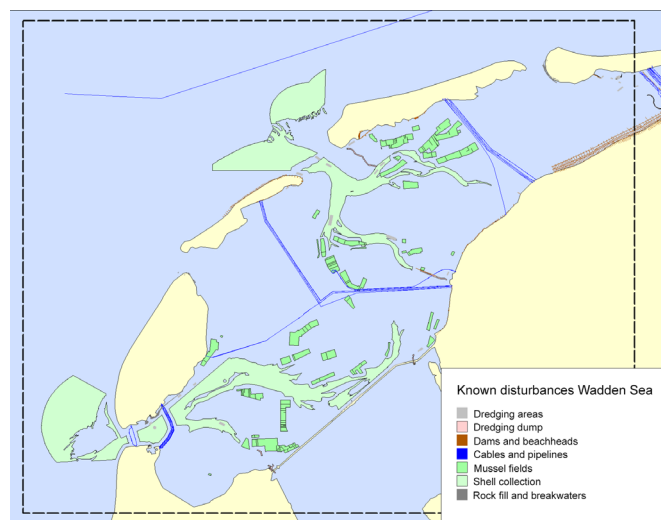


Figure 2 Known disturbances in the Wadden Sea area (the Netherlands) (image: Periplus Archeomare/Cultural Heritage Agency of the Netherlands)

This is where *predictive modelling* comes in, as a useful tool to help manage underwater cultural heritage sites that are neither visible nor located with certainty, but which are possibly or likely located in a certain area, and which may be threatened. It can be defined as a tool that allows one to predict the location of cultural heritage objects or sites within a given area or landscape, based on circumstantial evidence. Predictive modelling is based on the assumption that these sites, including archaeological remains, are not located randomly in the landscape, but rather, are dependent on specific characteristics of the natural environment.

Nowadays, this predictive method is associated with the use of technology (as an example, see figure 3) but it has in fact been used by archaeologists for many years, who make use of their intuition and experience when surveying and prospecting a landscape in order to locate archaeological sites.

How does predictive modelling work in practice?

The first step involves collecting all available information about an area, from many different sources, in order to understand how it was used in the past and how it has come to be used in the present. The information collected will include aspects related to the natural changes in the landscape through time and the geological build-up, as well as human past and present activities.

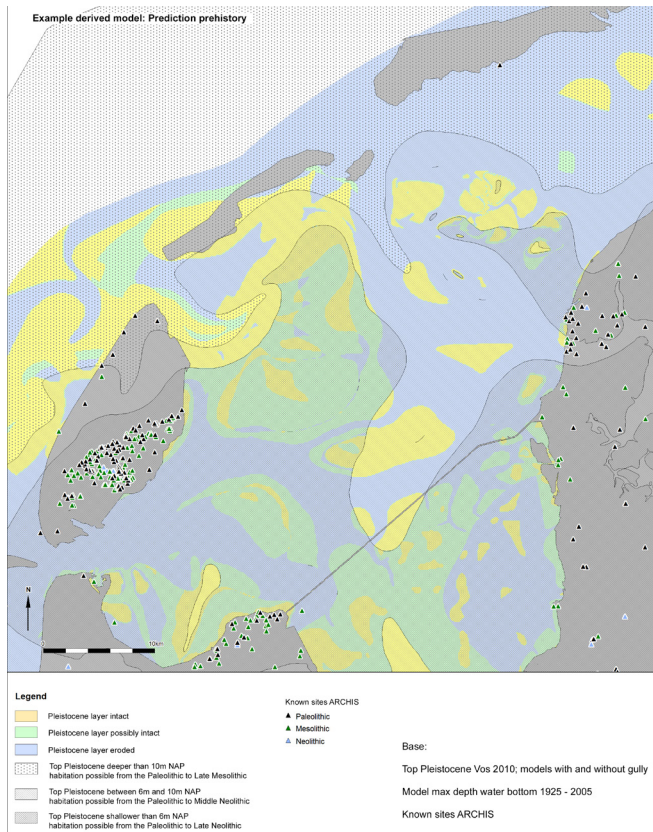


Figure 3 An example of predictive mapping, in this case of the Wadden Sea (the Netherlands) in the prehistoric period, based on the preservation of the Pleistocene layers (image: Periplus Archeomare/Cultural Heritage Agency of the Netherlands).

Sources of information about the human activity in a specific area include archival documentation, historic drawings and maps (figures 4 and 6), contemporary accounts in local news outlets and the already known heritage sites or objects within the area (figure 5). This predictive method also takes into account the cognitive landscape, meaning, the idea that people have of a landscape in their minds, the way they connect to it and possibly want(ed) to change it according to these ideas.

All the information collected about a given area will often be combined in interpretive maps, which contribute to the spatial understanding of the area. One can then start to understand the character of a place, and thus identify what may be missing or hidden from view, and thus what can be explored, identified and protected.

Because predictive modelling assesses an area as a whole, it enables an analysis of the value of different heritage elements from a comparative perspective. Not all elements have the same value and thus, with the information collected, it is possible to identify which area or element requires further research and/or



Figure 4 A 1666 map of the former Zuiderzee (a portion of which is today part of the Wadden Sea), by Pieter Goos (image: Wikimedia Commons/CCo).

protection, and whether such actions are a matter of urgency or not. Predictive modelling is thus not only important as a scientific tool, but is equally important for the management of heritage sites.

It should be noted that nowadays, mainly due to exponential growth of urban and industrial areas, it is becoming increasingly important to integrate cultural heritage management into new development projects. And predictive modelling can become a very useful tool in such context. Ultimately, within the context of economic growth, safety and cultural heritage management, it all comes down to making choices.

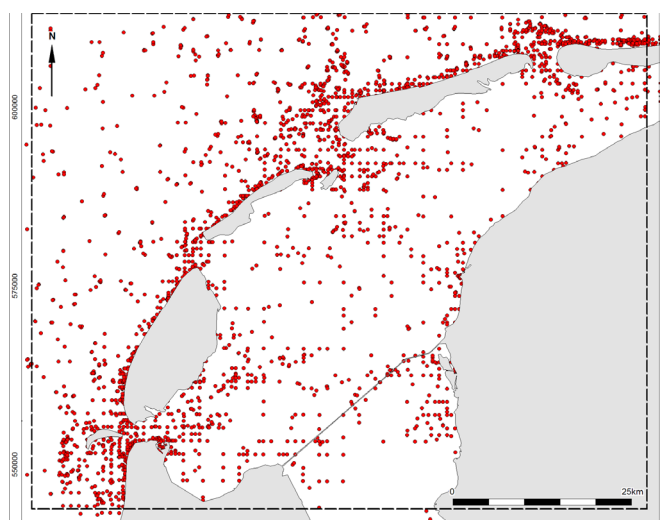


Figure 5 Map of the Wadden Sea area (white areas correspond to water and grey areas to land) showing the known locations of heritage sites or objects, from combined databases of amateur archaeologists (image: Periplus Archeomare/Cultural Heritage Agency of the Netherlands).

Sharing knowledge and expertise

Despite it being employed for several years, predictive modelling is still not very well known, especially in the field of underwater archaeology and underwater heritage management. Underwater archaeology is often focused on a specific site or object, rather than on the relation between the site and its surrounding area.

It is, however, an expertise that the Cultural Heritage Agency of the Netherlands (RCE) has been developing and employing for some years. Several RCE professionals from different fields of expertise have been contributing to the development of this tool. Martijn Manders, coordinator of the Maritime Archaeology theme of the Shared Cultural Heritage programme, is renowned for his ground-breaking work on this subject. Through his PhD research project - *Preserving a layered history of the Western Wadden Sea* – Manders has developed a landscape approach to underwater cultural heritage management in the Netherlands, and in doing so, he was able to advance the knowledge on and the practice of predictive modelling as an important tool for underwater heritage management.

The Wadden Sea is listed as a UNESCO World Heritage Site; however, it is a very busy area, actively used by people. For centuries, its Western part has been one of the key places for maritime trade in the Netherlands. Hundreds of ships wrecked on and near the Texel Roads and were covered and protected by moving sand for a long period of time. The sand, however, moves, and thus wrecks are being exposed due to erosion, others covered due to sedimentation. These sites are often not discovered or are discovered too late. By then, natural or human activities may have disturbed the site to such an extent that important information about the past is lost.

With the predictions made for the Wadden Sea, the RCE was able to identify the areas in need of extensive monitoring and the stable areas that currently do not require active management. To focus on one specific region also means to apply effort, time and money in a more efficient way. By connecting the knowledge

acquired with the management of an area, it is possible to make well-founded choices. This is not only the case in the Netherlands but may be equally important for other countries, such as those that the RCE is working with through its Shared Cultural Heritage Programme.



Figure 6 – View over the bay of Nagasaki (Japan). On the left, the island of Deshima and in the bay, two Dutch ships. Painting dated to 1825 (image: Dutch National Archives)

The Shared Cultural Heritage programme of the RCE is eager to share this expertise towards the sustainable conservation of shared heritage, by promoting international cooperation and by means of knowledge exchange. This can be done, for example, through workshops and training courses aimed at learning about and applying predictive modelling to specific areas.

Predictive modelling specifically has not yet been part of a training course organised by the Shared Cultural Heritage programme in one of its 10 partner countries, however, there is much interest and willingness to do so. Professionals and institutions that could benefit from learning about and implementing predictive modelling, are encouraged to contact the RCE to request trainings in this field and to support the application of this tool in practice.

Questions?

Please send an email to maritime-heritage@cultureelerfgoed.nl or have a look at our website www.cultureelerfgoed.nl

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Images: Cultural Heritage Agency, unless noted otherwise.

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Through knowledge and consultancy, the Cultural Heritage Agency of the Netherlands offers the future a past.