

Ecological restoration in the Belgian part of the North Sea

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Abstract

Goods and services provided by marine ecosystems are based on natural processes. Ecological restoration is limited to reducing existing human pressure. 'Pressure reduction' will be an important factor in the 'ecosystems approach' in the European seas. Within the Natura2000-network, different habitat-types have been described that deserve protection. Current presentation provides insights in how habitat-types are described in the EU habitats directive and discusses this for the Belgian Part of the North Sea (BPNS) from an ecological point of view. Annex I Habitat-type 1110 ('sandbanks which are slightly covered by sea water all the time') is of importance for the BPNS. The interpretation manual provides a broad definition that does not allow defining a 'healthy sandbank system' but indicates that association with several other habitats is possible. Habitat-type 1170 ('reefs') is one of the habitat-types that might occur in the shallow sandbank system of the BPNS. Although biogenic reefs have largely disappeared, reefs build up by tube building polychaetes still exist in the BPNS. Current presentation shows that dense aggregations of *Lanice conchilega* classify as reefs. We therefore advocate to classify the SAC as a sandbank habitat-type (1110), associated with the reef habitat-type (1170). This would also allow for better criteria for the ecological restoration in the area as the reefs represent a higher biological value. Moreover, the impact of fisheries on these systems has been quantified. We speak out for a fishing ban in SACs. This might however lead to difficulties both on political and social level (cf. presentation Cliquet).

Keywords

Sandbanks, Reefs, Invertebrates, Fisheries, Restoration of wilderness areas, ecosystem services, Belgian Part of the North Sea, *Lanice conchilega*, Marine Protected Areas (MPAs), ecosystems approach

Introduction

Ecological restoration in the marine environment is a relatively recent concept and is clearly related to the specific features of this less accessible environment. This is even more pronounced in turbid marine areas that consist largely of sand banks and swales. Management measures at sea are restricted to the management of the human activities as active restoration measures are impossible to apply. Therefore, marine management is largely focused on the maintenance of the benefits that come from exploitation of resources, i.e. the use of goods that are provided by the sea (Beaumont *et al.*, 2007). The idea of viewing the environment as a producer of goods and services is relatively new, especially for the marine environment (Beaumont *et al.*, 2007). The same authors state that if environmental, social and economic concerns are to be integrated into an ecosystems approach, policy makers need to be able to quantify the provision of goods and services, on a before and after, site specific basis to get a true idea of the impact of a development or human activity. One problem that occurs is that provision of goods is often given priority over services, as services cannot be seen or held, often do not yield immediate market value, and are generally more difficult to quantify. Ecosystem services are a summary of complex interrelations of functions performed by a large variety of organisms at a range of spatial and temporal scales.

In the heavily used European seas, it is clear that pressure reduction will play a key role if one aims to reach sustainability through the application of the ecosystems approach to environmental management. Within the European context it is therefore important to analyze how habitat-types have been described and how environmental managers should apply the ecosystems approach for the different marine habitats they need to restore or to protect. This study aims at describing the habitat types that occur in the Belgian part of the North Sea (BPNS) and at providing insight in how the interpretation manual (EUR27) makes it possible to include associated habitats that need to be in a so-called 'favorable conservation status'. With this study we advocate a direct and flexible use of new scientific insights to reach a sustainable management of the marine environment; this is, *in casu*, the classification of the Belgian SAC as a sandbank habitat-type (1110), associated with the reef habitat-type (1170).

Belgian habitat types

Within the NATURA2000 network, we focus for this study on the protection of marine habitats, which are implemented in European legislation through the Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (the habitats directive). This directive aims to contribute towards ensuring biodiversity through the conservation of natural habitats and of wild fauna and flora in the European territory of the Member States to which the Treaty applies (Article 2); a coherent European ecological network of special areas of conservation shall be set up under the title NATURA2000. This network, composed of sites hosting the natural habitat types listed in Annex I and habitats of the species listed in Annex II, shall enable the natural habitat types and the species' habitats concerned to be maintained or, where appropriate, restored at a favorable conservation status in their natural range (Article 3). The habitat's directive states that on the basis of relevant scientific information and on the basis of the criteria set out in Annex III, each Member State should propose a list of sites indicating which natural habitat types in Annex I and which species in Annex II are native to its territory the sites host. For animal species ranging over wide areas these sites shall correspond to the places within the natural range of such species which present the physical or biological factors essential to their life and reproduction (Article 4).

For a good interpretation of the habitats that are listed under Annex I of the habitats directive, the European Commission has provided an interpretation manual of European Union habitats, of which the last version was published in July 2007 (EUR 27). In present case for the BPNS, we focus on the habitats that fall under the 'coastal and halophytic habitats – Open sea and tidal areas'. For the Belgian marine areas, three different habitat types occur:

1110 Sandbanks which are slightly covered by sea water all the time

Sandbanks are elevated, elongated, rounded or irregular topographic features, permanently submerged and predominantly surrounded by deeper water. They consist mainly of sandy sediments, but larger grain sizes, including boulders and cobbles, or smaller grain sizes including mud may also be present on a sandbank. Banks where sandy sediments occur in a layer over hard substrata are classed as sandbanks if the associated biota are dependent on the sand rather than on the underlying hard substrata. "Slightly covered by sea water all the time" means that above a sandbank the water depth is seldom more than 20m below chart datum. Sandbanks can, however, extend beneath 20m below chart datum. It can, therefore, be appropriate to include in designations such areas where they are part of the feature and host its biological assemblages. Besides, the guidelines indicate that for the North Atlantic and North Sea invertebrate and demersal fish communities of sandy sublittoral should be included. It is clear that the current SAC Trapegeer-Stroombank in the BPNS was designated for the occurrence of habitat 1110 (as well as for the occurrence of high diversity of Bivalves and for the importance for seals). However, more scientific research will be necessary to define the favourable conservation status of this specific area as the current definition is too generic for direct application.

1140 Mudflats and sandflats not covered by seawater at low tide

Sands and muds of the coasts of the oceans, their connected seas and associated lagoons, not covered by sea water at low tide, devoid of vascular plants, usually coated by blue algae and diatoms. They are of particular importance as feeding grounds for wildfowl and waders. The BPNS has areas that fall under this definition.

1170 Reefs

Reefs can be either biogenic concretions or of geogenic origin. They are hard compact substrata on solid and soft bottoms, which arise from the sea floor in the sublittoral and littoral zone. Reefs may support a zonation of benthic communities of algae and animal species as well as concretions and corallogenic concretions. Reef forming animal species in the North Atlantic and North Sea include polychaetes, bivalves and cold water corals. For each species group some examples are provided which should be taken into account when deciding whether a certain habitat type is present or not, but such lists of examples should not be considered as being exhaustive (pers. comm. F. Kremer, European Commission, DG Environment, Nature and Biodiversity Unit). A recent scientific study (Rabaut *et al.*, in press) studied the habitat modifying effects of the tube dwelling polychaete *Lanice conchilega*, a species that was earlier described as an ecosystem engineer (Rabaut *et al.*, 2007). To classify as reefs however, bio-engineering activities need to significantly alter several habitat characteristics: elevation, sediment consolidation, spatial extent, patchiness, reef builder density, biodiversity, community structure, longevity and stability (guidelines to apply the mentioned definition are provided by Hendrick and Foster-Smith (2006)). Rabaut *et al.*, in press, show that the elevation and sediment consolidation of the biogenic mounds was significantly higher compared to the surrounding unstructured sediment. Areas with *L. conchilega* aggregations tend to be extensive and patchiness is high. Their study combines these results with previous studies on the biological implications of this species. The impact of *L. conchilega* on the biodiversity was demonstrated by Zühlke (2001), Rabaut *et al.* (2007) and Van Hoey *et al.* (2008). The authors evaluate the different physical and biological aspects of the tube worm aggregation and conclude that *L. conchilega* qualifies as a reef builder (Rabaut *et al.*, in press).

Associations

The interpretation manual (EUR27) provides also in lists of the habitat types that can be associated in the field. Sandbanks (1110) can be found in association with the two other habitats that can be found in the BPNS: mudflats and sandflats not covered by seawater at low tide (1140) and reefs (1170). Reefs (1170) can be found in association with sandbanks (1110).

Because of only recent scientific appreciation of *L. conchilega* as reef builder, 'reefs' (1170) are not considered, at this moment, as Special Area of Conservation in the Belgian coastal waters. It is, however, clear that the reef builder *L. conchilega* will be important for the evaluation of the favourable conservation status of the habitats in the SAC.

As (1) Member States have to propose a list of sites indicating which natural habitat types in Annex I are native to its territory the sites host on the basis of relevant scientific information and (2) reefs are mentioned as a possible associated habitat to that of sandbanks (1110), there is a clear need to integrate these biogenic reefs in formal regulation and measures. Moreover, the species is a proxy for biodiversity and for the provision of goods and services. The ecological restoration of the particular sandbank habitats in the BPNS will also be related to reducing existing human pressure. There is general scientific evidence that beam trawl fisheries have a far reaching impact on sandbank systems and more specifically, there is evidence of decreasing biodiversity of the polychaete reefs after fishing disturbance (Rabaut *et al.*, 2008).

Annex III of the habitats directive provides criteria for selecting sites eligible for identification as sites of community importance and designation as SAC. We evaluate the site assessment criteria for the polychaete reef habitat that occurs in the BPNS (as an association of the habitat type sandbank):

- (a) Degree of representativity of the natural habitat type on the site: it is known from literature that the tube building polychaete is a key species for the rich macrobenthic sandbank community in which it occurs and the biological implications of the species are far reaching.
- (b) Area of the site covered by the natural habitat type in relation to the total area covered by that natural habitat type within national territory. The exact percentage of reefs that occur within the SAC is difficult to estimate, which relates to the specific characteristics of the marine environment. A modeling approach of Willems et al (2008) shows that the occurrence is strongly related with the sediment grain size. It will be possible in the future to make more accurate estimations of the total area that is covered, because remote sensing can be used to visualize reefs (Degraer *et al.*, 2008).
- (c) Degree of conservation of the structure and functions of the natural habitat type concerned and restoration possibilities. Research showed that beam trawl fisheries affect the ecological function of the reefs. The ecological restoration possibilities lies in a ban on bottom fisheries within the SAC.
- (d) Global assessment of the value of the site for conservation of the natural habitat type concerned. The ecological implications of this reef building polychaete have been described above. Besides, ecological restoration and protection of the reefs will support the goods and services and will help managers to reach sustainability through the application of the ecosystems approach.

Conclusion

The application of the ecosystems approach in the marine environment is particularly difficult. For the European seas, a clear framework exists: NATURA2000. Current case study for the BPNS evaluates the different habitat types that are listed in the habitats directive and described in the interpretation manual of European Union habitats (EUR27). Scientific research classifies *L. conchilega* as a reef builder and is occurring in the BPNS, especially in the shallow sandbank areas. Article 4 of the habitats directive indicates that Member States should use relevant scientific information as well as criteria set out in Annex III to propose a list of sites indicating which natural habitat types in Annex I are native to its territory the sites host. This study shows that the reef habitat type can easily be assessed as important using the criteria of Annex III of the habitats directive. Moreover, the interpretation manual describes reefs (1170) as possible associated habitat type to that of sandbanks (1110). Besides, the impact of beam trawl fisheries on these reefs is known. We therefore speak out to classify the allocated SAC as a sandbank habitat type (1110), associated with the reef habitat type (1170) and suggest a ban of bottom fisheries in this area. This comes down to the application of the ecosystems approach and will lead to ecological restoration and protection of this marine area.

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