Conservation of Sandy Beaches as a Natural Environment Along The Flemish Coast

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Abstract

Touristic development and recreational use prevent coastal birdspecies such as Terns and Plovers to breed on the beaches along the Flemish coast. The formation of floodmark-vegetations and embryonic dunes is obstructed by mechanical beach-cleaning. Recreational fisheries put benthos, marine mammals and birds under unnecessary pressure. The physical environment of sandy beaches is altered by constructions and coastal defence measures. Two sandy beach sites have been designated as nature reserves: 'The Bay of Heist' near Zeebrugge in 1997 (54 hectares) and the beach in front of the Yzer Rivermouth at Nieuwpoort in 1999 (61 hectares). In implementation of the European 'Habitat-directive' six areas of sandy beach, with a total superficies of 380 hectares, have been proposed as candidate - SAC. Until now only in the nature reserve 'The Bay of Heist' some access-regulation has been enforced with growing success. To be able to enforce some regulatory measures on other protected beach areas, a lot of public awareness-building is still needed.

1. INTRODUCTION:

1.1 Flemish beaches: a natural environment

The Flemish coast (Belgium) is situated along the southern shore of the North Sea and has a total length of 65 kilometers. It is a sedimentary coast with sandbanks in the shallow sea, sandy beaches, coastal sand dunes and a couple of salt marsh areas. The mean level-difference between high and low tides amounts to 4.08 meters. The sandy beaches form a rather narrow strip along the coastline and have a total superficies of 2000 hectares. Their width varies between 200 meters and 600 meters. Only on both sides of the outport of Zeebrugge the beaches have a width of at least 1200 meter, initially due to artificial beach nourishment and later to increased accumulation of sediment along both groynes. The tidal part of the beaches has a rather outspoken topography that is characterised by numerous tidal gullies. Coastal erosion is present along the largest part of the Flemish coastline. This means that in these erosive areas, without artificial beach nourishment, at high tide the sea reaches up to the foot of the dunes or the dikes. At some places natural coastal increase (accretion) is taking place, which results in a strip of dry beach between the highest tidal flood-mark and the dunes.

The lower parts of the tidal beaches have an own invertebrate fauna that attracts wading birds at low tide and fish at high tide. On their turn, the fish attract seabirds, porpoises and eventually seals. The tidal beaches are nurseries for Common Shrimp (*Crangon crangon*), Flounder (*Platichthys flessus*), Plaice (*Pleuronectes platessa*) and Sandeel (*Ammodytes tobianus*). Until the second half of the 20th Century Little Tern (*Sterna albifrons*), Kentish Plover (*Charadrius alexandrinus*) and Great Ringed Plover (*Charadrius hiaticula*) were regular breeding bird-species of the Flemish beaches. Along the high tide mark pioneer vegetation, consisting of mainly Sea Rocket (*Cakile maritima*), Prickly Saltwort (*Salsola kali* ssp. kali), Sea Sandwort (*Honckenya peploides*) and Sand Couch (*Elytrigia juncea* ssp. boreoatlantica), can initiate the formation of embryonic dunes. In winter respectable numbers of Sanderling (*Calidris alba*), Dunlin (*Calidris alpina*), Grey Plover (*Pluvialis squatarola*) and Oystercatcher (*Haematopus ostralegus*) are foraging in the surf. In spring and fall, these wading birds are joined in by migrating Red Knot (*Calidris canutus*), Bartailed Godwit (*Limosa lapponica*) and Whimbrel (*Numenius phaeopus*).

1.2 Natural beaches under threat

From the start of the 20th century on, the increasing development of coastal tourism and coastal resorts has led to the construction of 'hard' protective infrastructures such as stony or concrete dikes and breakwaters. The presence of hard dikes interrupts the natural continuity between beaches and dunes, leads often to an increased deficit of sand on the beach and to the scouring out of erosive gullies at the foot of the dikes. Since the 1970's 'hard' devices were gradually replaced by 'soft' coastal protection methods, consisting mainly of beach nourishment. Nearly the whole area of the Flemish coast between Oos-

tende and the Dutch border was artificially replenished with sand extracted from the maritime fairways. Until now most of the beaches between Oostende and the French border were not replenished. The sediment that is used for beach nourishment is coarser than the original sand of the natural beaches. The coarseness of the used sediment causes beach nourishment to lead to an at least temporary decrease in density of soil - organisms in the replenished tidal beaches.

Because nearly the totality of the Flemish coast has been urbanised by the development of seaside resorts, nearly no strip of beach escapes massive recreation during the main holiday-periods. Especially from Easter to the end of summer the beaches are very crowded. This makes it impossible for coastal bird species to nest on the beach. In order to meet the demands of the tourists for "clean" beaches, the make use of a beach cleaning machine. The mechanical beach-cleaning removes systematically natural wash up materials (e.g. seaweed, shells, crustacean carapaces) as well as artificial garbage from the beach and in doing so, obstructs the development of flood-mark-vegetation and embryonic dunes. Lack of organic flood-mark material and intensive trampling of the beach-soil by the seaside visitors has caused for example the disappearance of the Sand hopper (*Talitrus saltator*) on most of Flanders' beaches.

A form of recreational fishery that is much practised uses bottom set gillnets and sometimes leads to a real wall of nets along the low tide line. That wall of vertically set nets often prevents marine mammals and diving-birds to reach the beach unharmed. Especially the Harbour Porpoise (*Phocoena phocoena*), the Common Seal (*Phoca vitulina*) and the Great Crested Grebe (*Podiceps cristatus*) often get caught in the gillnets and drown.

Finally the increasing diversity and intensity of sport activities on the beach and at sea has led to a proliferation of permanent constructions on the dry parts of the beaches, and to an intensive use of the beach during longer periods of the year.

2. METHODOLOGY

In order to restore particular parts of the beach, especially the once in front of and connecting with protected dune areas, several conservation measures are being taken to honour the beach ecosystem. These conservation measures are discussed below.

Several tools are used to take conservation measures on the beach:

(1) Designation of beach nature-reserves under the environmental protection legislation.

(2) International protection under the European Habitat directive

(3) Spatial planning within a legal framework

(4) Awareness raising

3. RESULTS AND DISCUSSION

3.1 Beach – Nature Reserves

In Flanders, most people consider sandy beaches as freely accessible recreational areas and open space. The sandy beach is not generally considered as a natural environment with its typical fauna and flora. The first beach area that was to be protected as a nature reserve was then also a rather untypical beach. 'The Bay of Heist' is situated in the area formed by the dike of the sea resort of Heist and the eastern groyne of the out-port of Zeebrugge, and, thanks to its location, benefits of a neap-tide environment (Figure 2 & Figure 3). This, to Flemish standards wide, beach plain presents tidal sand and mud flats, tidal gullies, but also a vegetated tidal salt marsh behind a sandy ridge upon which embryonic dunes are still growing (Figure 1).

Figure 1: Embryonic dunes in 'The Bay of Heist'

The rather sandy salt marsh is dominated by Annual Sea-blite (*Suaeda maritima*) and Glassworts (*Salicornia div.* spp.) on its lowest zones, Hard-grass (*Parapholis strigosa*), Seaside centaury (*Centaurium littorale*), Saltmarsh-grasses (*Puccinellia* div. spp.) and Sea Aster (*Aster tripolium*) on its higher zones. The vegetation of the embryonic dunes consists of Sand Couch accompanied by Sea Sandwort and Sea Spurge (Euphorbia paralias). Scientists call the whole complex of salt marsh and embryonic dunes of 'The Bay of Heist' a 'green beach'. Its vegetation and geomorphology could develop thanks to the relatively low attractiveness for beach-recreation caused by the 'great' distance to the sea at low tide and the slightly muddy sediment of the tidal beach. 'The Bay of Heist', that has a superficies of 54 hectares, received the legal status of Flemish Nature Reserve by ministerial order of 22 October 1997. Since 1998 main management issues are:

- prohibit any fishing – activity;

- making the nature reserve inaccessible to the public during the breeding – season of the birds (from 1 April tot 31 July);

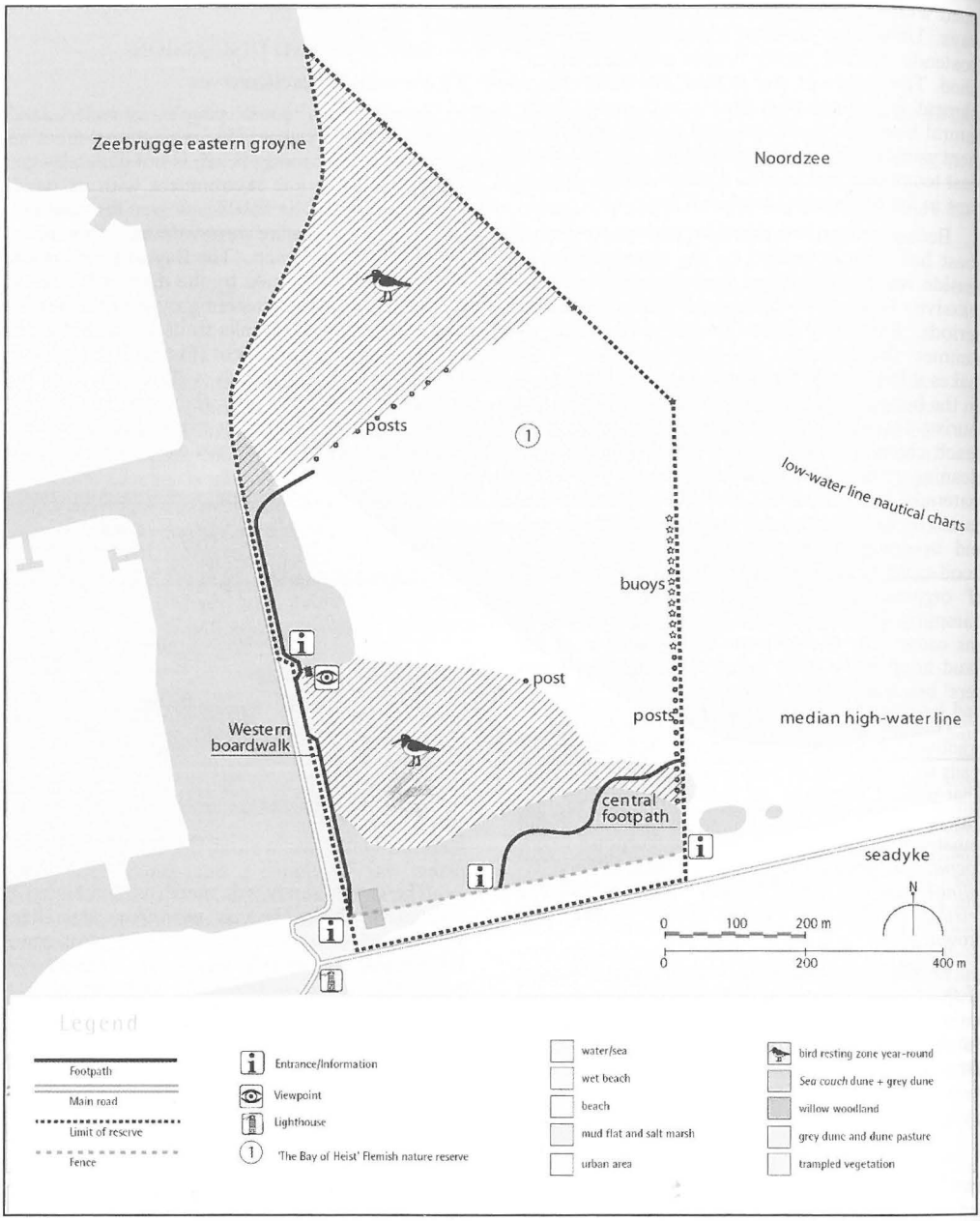

Figure 2: Map of 'The Bay of Heist'

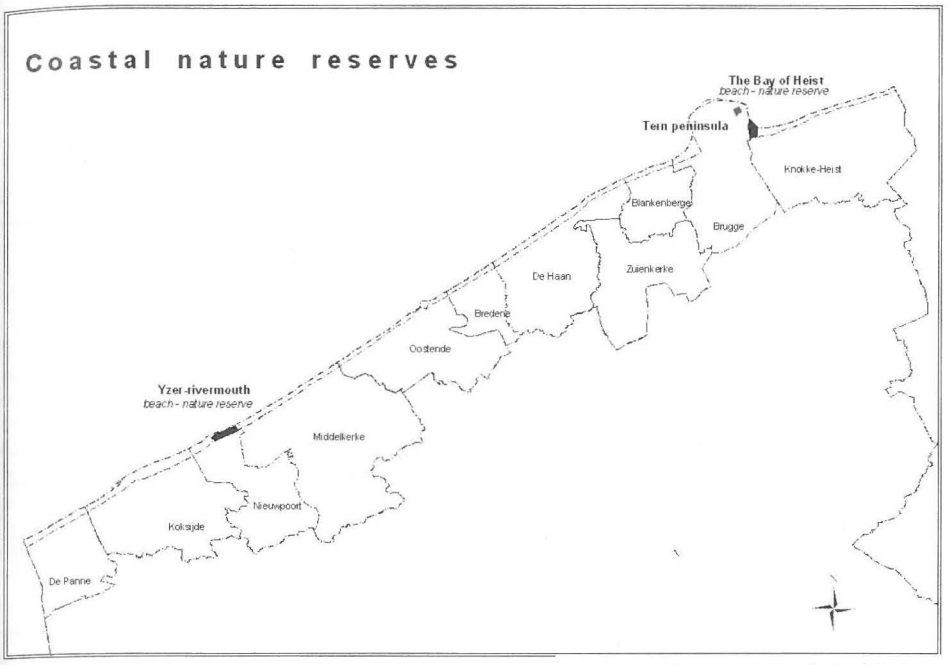

Figure 3: Map of Flemish Coast

- keeping the two most important foraging and resting areas for wading birds in the reserve permanently inaccessible to the public;

- manual removal of (half-) exotic invasive plant species like Tree Groundsel (Baccharis halimiifolia), Narrow-leaved Ragwort (Senecio inaequidens) and White Melilot (Melilotus albus);

- manually removing the artificial litter.

The inaccessibility of the nature reserve during the breeding season and partial inaccessibility during other periods is enforced by surveillance by the warden of the Nature Division of the Ministry of the Flemish Community. Considering the nature reserve is only symbolically fenced off, the regulatory inaccessibility is rather well accepted en respected by the largest part of the public, although sometimes tensions with 'die-hards', especially surfers, beach-sailors and recreational fishers, do occur. From the first year on (1998), periodic inaccessibility resulted in nesting success of Little Tern, Kentish Plover, Great Ringed Plover and Crested Lark (Galerida cristata) and a spectacular further development of the salt marsh- and dune- vegetation. The management of the nature reserve has been formalised in a management-plan that was drawn up by the University of Ghent and subsequently approved by ministerial order of 13 July 2000. Nearby the nature reserve 'The Bay of Heist', an artificial beach was created between 1999 and 2001 within the out-port of Zeebrugge, in order to offer new nesting opportunity to the Tern- colonies that since the 1980's were nesting on previously unfinished wharves along the western groyne of that out-port. That artificial beach within the eastern groyne of the out-port is called the 'Tern-peninsula' (Figure 3). Its superficies was expanded by artificial beach-nourishment in February 2004 from 5 hectares to 7 hectares. During the spring of 2004 no less than 3100 pairs of Sandwich Tern (Sterna sandvicencis), 1832 pairs of Common Tern (Sterna hirundo), 128 pairs of Little Tern, 500 pairs of Black-headed Gull (Larus ridibundus) and 3 pairs of Mediterranean Gull (Larus melanocephalus) established themselves on this 'Tern-peninsula' (oral communication of G. De Putter, E. Stienen and W. Courtens, 24 May 2004). The present number of breeding pairs of Little Tern in Zeebrugge and Heist however is lower than in the years 1997-2002. The Flemish regional authority is considering designating 'The Bay of Heist' and the breeding-sites of Terns situated in the out-port of Zeebrugge as a Special Protection Area in execution of the 'European Bird Directive' 79/409/EEC. Also the possibility of a further expansion of the 'Tern-peninsula' to a superficies of 22 hectares is at the moment examined by the Flemish administration and the Port-authority of Zeebrugge. The aims of the management of 'The Bay of Heist' and of the 'Tern-peninsula' are quite different. 'The Bay of Heist' is a nature reserve in which natural processes such as sedimentation, dune-formation and vegetation-succession have priority. The 'Tern peninsula' on the contrary is meant as a coastal bird-sanctuary, an ecological infrastructure of the harbour of Zeebrugge, where management aims to keep the conditions for nesting of Terns and Plovers optimal, eventually by controlling predators, preventing the formation of too high dunes and a too opulent dune-vegetation.

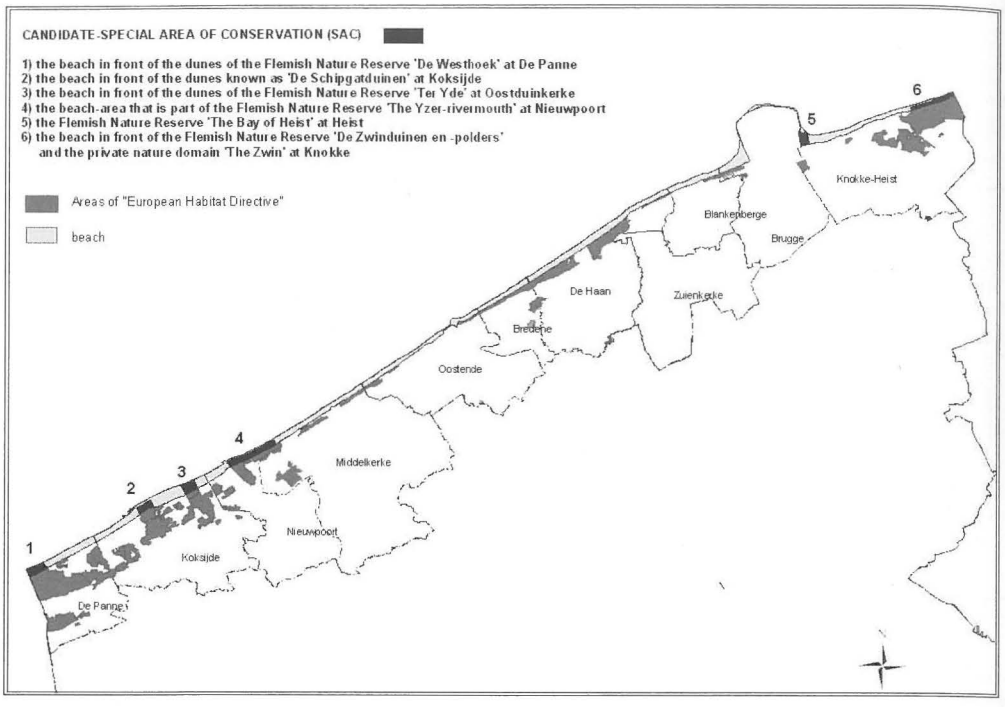

Figure 4: Map of Flemish Coast

The second sandy beach area that was designated as a nature reserve is a quite different site. It is the beach in front of the dunes of the 'Yzer-rivermouth' and the military shooting range of Lombardsijde (figure 3). It is a part (60 hectares) of the Flemish Nature Reserve 'The Yzer-rivermouth' (130 hectares) that was designated by ministerial order of the 1 March 1999. This area suffers from a severe sediment-deficit caused by the regular dredging out of the adjacent fairway of the yachting harbour of Nieuwpoort. In 1994 a concrete dike was built to protect the foot of the dunes against further marine erosion. Only at its eastern extremity, past a stone breakwater, some accretion is taking place and flood-mark – vegetation and embryonic dune formation occur. Nevertheless this beach area has a certain ornithological importance as a foraging ground for wading birds because of the proximity of the tidal mudflats and salt marshes along the eastern bank of the Yzer-rivermouth. The quasi-absence of dry beach prevents coastal birds to nest here. Only in the limited accretion-zone at the eastern extremity of the reserve nesting of Great Ringed Plover and Kentish Plover has been observed. The management consists of excluding any fishery-activity or sports in the reserve. As the importance for breeding birds is very limited, this beach-reserve is the whole year freely accessible for pedestrians. Only when military shooting exercises are taking place access to the beach is totally prohibited. Plans are being elaborated for the removal of the concrete dike and the replenishing of the beach in order to restore the continuity between dune and beach and to create dry beach and embryonic dune habitat as well as nesting opportunity for coastal birds.

Paradoxically the two existing sandy beach – nature reserves of the Flemish coast are situated in an environment that is strongly influenced by human (harbour or military) activities. The proposal to create a third beach-reserve partially failed. I The beach in front of the Flemish Nature Reserve 'Ter Yde' at Oostduinkerke was considered as a possible nature reserve. Until now, this beach has never been artificially replenished and has been spared from breakwaters. It still possesses a rich natural geomorphology and sediment and, above all, is situated in a zone where natural accretion occurs. The natural continuity between dunes and beach is also still preserved on this site. The municipality of Koksijde firmly opposed against the integration of the lower tidal beach into the Flemish Nature Reserve 'Ter Yde', because the authority wanted to keep recreational use of the beach possible without limitations. Finally in 2001 all parties agreed to only banish recreational use from the embryonic dunes around the highest flood-mark. Only the 'embryonic dune with Sand Couch – area' has been symbolically fenced off, with a strong growth of the enclosed embryonic dunes to 'white' foredunes with Mar-

ram-grass (Ammophila arenaria) and successfully breeding of Great Ringed Plover as a result.

3.2 Special protection by the European Habitat – directive

From the total superficies of 2000 hectares of sandy beach, six separate beach-areas with a total superficies of 380 hectares have been proposed by decision of the Flemish government of 24 May 2002, as candidate-Special Area of Conservation (SAC), accordingly article 4 of the European Habitat – directive 92/43/EEC. These six candidates – SAC are (Figure 4):

- the beach in front of the dunes of the Flemish Nature Reserve 'De Westhoek' at De Panne;
- the beach in front of the dunes known as 'De Schipgatduinen' at Koksijde;
- the beach in front of the dunes of the Flemish Nature Reserve 'Ter Yde' at Oostduinkerke;
- the beach-area that is part of the Flemish Nature Reserve 'The Yzer-rivermouth' at Nieuwpoort;
- the Flemish Nature Reserve 'The Bay of Heist' at Heist;
- the beach in front of the Flemish Nature Reserve 'De Zwinduinen en –polders' and the private nature domain 'The Zwin', at Knokke.

The natural habitats of the annex 1 of the European Habitat-directive that are present in these candidate-SAC's are:

- 1140 (14) 'Mudflats and sandflats not covered by seawater at low tide';
- 2110 (16.211) Embryonic shifting dunes;
- 2120 (16.212) Shifting dunes along the shoreline with Ammophila arenaria (white dunes).

From the above mentioned beaches only the green beach of 'The Bay of Heist' harbours the natural habitats 1310 (15.11) Salicornia and other annuals colonising mud and sand, 1320 (15.12) Spartina swards (Spartinion) and 1330 (15.13) Atlantic salt meadows (Glauco-Puccinellietalia). The last mentioned habitats are also to be found in estuarine and inland salt marshes along the Yzer-rivermouth, in the sea-inlet of the Zwin and in some polder-areas.

3.3 Working with the municipalities towards sustainable beach management

Since 2002 the Co-ordination Centre for Integrated Coastal Zone Management in Belgium (co-operation between the Province of Western Flanders,the Nature Division of the Flemish Region and Flanders Marine Institute) have started 'an action to raise the awareness of local authorities and the public for the environmental problems caused by mechanical beach cleaning (see also paper: "About "clean" beaches and beach cleaning in Belgium. Belpaeme K. et al, Littoral 2004). The mechanical beach cleaner does not only remove most of the man-produced waste but unfortunately also takes away organic material. The organic material in the drift-line has numerous natural functions in the coastal ecosystem, in terms of coastal defence, as feeding ground for birds and other animals, as a biotope for pioneer plants, etc. It is also a rich exploring ground and provides educational material for tourists and children. With this action the ICZM Co-ordination centre wants to emphasize the positive effects of manual cleaning: less waste is produced, less cost for the treatment of the waste, less fuel cost as the cleaner is used less, bigger chance for the beach visitor to explore the natural material, and, moreover, the profit the natural ecosystem will take of it.

A brochure has been published and distributed, a workshop has been organised and a practical exercise of manual beach cleaning took place with participation of the public and all coastal municipalities on 27 March 2004.

As a direct results from these awareness raising efforts two municipalities have already agreed to start a pilot project during the summer of 2004 in which the beaches in front of the nature reserve 'De Westhoek' at De Panne and the nature reserve 'Ter Yde' at Oostduinkerke will no longer be mechanically cleaned. During the summer of 2004 information concerning the time needed for manual cleaning of these zones and the volume of waste gathered will be monitored. A throughout evaluation of this pilot project will take place after the summer season, and if positive this will hopefully be a stimulants for more municipalities to join the manual cleaning practice.

3.4 Regulating Recreational Fishery

In the federal political structure of Belgium, the competence for the environment and nature conservation 'on land', which means above the Low-waterline, belongs to the Flemish Region, while the same competence in the territorial sea, that is below the Low-waterline, belongs to the federal State. Recreational fishing with bottom set gillnets is prohibited in the territorial sea by the Royal Decree of 21 December 2001 about the protection of species at sea. Within the competence - boundary of the Flemish Region, this is above the Low-waterline, using bottom set gillnets for recreational fishery is still authorised. The lack of sufficient police surveillance on the territorial sea and the difficulty to distinguish on the field the border between Flemish tidal beach and territorial sea make that the Low-waterline of the coast is still nearly fenced off by multiple walls of bottom set gillnets. This situation result in still increasing numbers of drowned porpoises, seals and diving birds. A legal regulation from the Flemish Regional authority to prohibit the use of standing nets on the beaches and a better policing of the territorial sea are urgent to stop these useless 'catches' of sea-mammals and birds.

3.5 Spatial Planning

On the town and country – planning maps most beaches are left "white", which means they have no spatial planning status. The increasing number of permanent constructions on the beaches and the lack of a clear juridical framework for spatial planning of constructions on the beach has led the Flemish Region to order to the lower authority level, the Province of Western Flanders to elaborate a 'provincial spatial plan for constructions on beaches and dikes'. This spatial planning tool should regulate more efficiently the building of permanent and temporal constructions on the beaches. The rather controversial final draft of this spatial planning instrument has still to be approved by the Flemish regional authority. However it concerns only the beach-areas that are situated in or nearby seaside-resorts and have an essentially recreational function. In principle three types of beachzones have been proposed:

- "Centre areas": these area situated in front of the touristic centra and are reserved for clustering of tourism-supporting infrastructures and constructions.

- "Transition areas": these are connecting the very busy centre areas and the natural areas. They are reserved for bigger sport-supporting infrastructures such as surfclubs. These constructions can not be combined with the touristic centre areas, and they need good access.

- "Solitary zones": these are zones reserved for specific exceptions where limited construction facilities are created in natural beach zones. These solitary zones were requested by the municipalities.

Importantly, for the beaches that have a higher conservation priority, the regional and provincial administrations have proposed to the Flemish Government to draw a 'regional spatial plan' to secure the natural values and not build upon – character of these areas. For these areas with environmental value specific spatial plans and management plans will be drawn up.

3.6 Awareness raising campaign: beaches as unique ecosystem

The difficult discussions with the actors on the beach (e.g. local authorities, wind-surfers, beach-sailors and recreational fishers) following the designation of nature reserves on tidal beaches demonstrate that the need and sense of conservation measures in the marine and tidal beach-environments still lack of understanding and support from an important part of the public. Most people understand that in nature reserves that are situated in woods, mores, meadows or marshes hunting, fishing and the practice of sports are prohibited and access is regulated in order to protect the wildlife and secure the quietness. On the beaches and at sea, regulations are more difficult to enforce, because of the perception by the public that does not experience sandy beaches as a natural environment. The need to protect some species of marine crustaceans, shellfish and fish or their reproductive areas is not as well understood by the public as the already existing legal protection of some species of more esthetical butterflies or dragonflies and their more picturesque habitats as heaths and ponds. Since 2002, an inventory of the biological values of eleven beach-areas along the Flemish coast ordered by the Nature Division of the Flemish regional authority is being executed by the Marine Biology Section of the University of Ghent. Hopefully the report of this scientific research program (expected for 2005) will allow the Nature Division to start a campaign to raise the public awareness for the importance of conservation in the sandy beach environment. An educational brochure, guided visits to the beach-reserves at Low Tide Day and on other occasions and even a documentary film could all be useful instruments.

4. CONCLUSIONS

Beaches are rich coastal ecosystems, but they are rarely recognised as such by the broad public. The beach is mainly seen as freely accessible open space, for recreational use. In order to enhance the natural character some carefully selected beach zones along the Belgian coast, the Flemish Region and the Province of West-Flanders have taken several management measures for the beach:

(1) Legal protection, using European or regional environmental legislation.

(2) Spatial planning, in order to create a clear and legal framework for permanent and temporal infrastructure on the beach.

(3) Awareness raising and active ("real") participation of all stakeholders, including the public and schools.

In order to book successes in natural beach management, these three measures should be used in combination. A nature management on pure voluntary basis will be difficult, if not impossible, to achieve. The local actor asks for clear guidelines, which are the same for all. Legislation and spatial planning will deliver these guidelines.

It is advisable that new conservation or protection measures are well communicated to the broad public and all stakeholders. It is when stakeholders understand the need, and realise the importance, that they can be more willing to support the option taken.

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