****

**Item: Single Integrated Management Plan (SIMP)**

**Subject: Coastal Flood defence and Protection**

**Version Log**

|  |  |  |  |
| --- | --- | --- | --- |
| **Issue Date** | **Version** | **Author** | **Change** |
| 2020-04-29 | v0.2 | JB, RZ, SL | First draft of the document |
| 2020-05-25 | v0.2 | SHK | Amendments to text |
| 2020-05-29 | v0.2 | JH | Amendments to text & tables |
| 2020-06-04 | v0.2 | WWF | Amendments |
| 2020-07-31 | v0.3 | JB | Compilation of amendments |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

# Single Integrated Management Plan (SIMP) – Draft: 5.5 Coastal flood defence and protection (Note: change title to: coastal flood and erosion management?)

The Wadden Sea World Heritage property stretches along about 500 km of coastline, with a multitude of transitional zones between the land, the sea and freshwater environment. About 3.5 million inhabitants live in the Wadden Sea region and are dependent on effective and reliable coastal flood and erosion management (CPSL, 2010). Major features representing the OUV of the Property are determined by a dynamic exchange of sediments, determined by tidal asymmetry and wave action, settling lag and overwash. Therefore, availability of sand and mud and its re-distribution determines stability and integrity of the Wadden Sea region (CPSL; 2010).

**Inventory**

In all three countries, dikes generally protect the coastal lowlands from flooding. To safeguard socio-economic functions on the inhabited islands, all three countries intend to generally maintain the coastline in its present position. A large variety of coastal flood and erosion measures are applied in the Wadden Sea region, including dike building and strengthening, sand nourishments, dune management and salt marsh management techniques (CPSL 2001, note: add Gydersen et al 2009?).

The main dikes are generally managed as rather strict and “secure” lines. They form the basis for coastal flood defence (Figure 5.5-1). Additionally, dams, revetments and bed protections are present. The Wadden Sea islands are protected by – more or less - natural dune systems on the North Sea side. These systems are, in the Netherlands and Germany, sometimes supported by sand nourishments originating from outside the Wadden Sea sediment system. On some island locations, besides sand nourishments, additional hard construction works are used to prevent erosion as well as sand nourishments originating from inside the Wadden Sea sediment system (Zijlstra et al 2017).

In Germany and the Netherlands, continuous dike-reinforcements are undertaken. This is necessary to meet the safety standards including new technical insights and to prepare for sea level rise.

Although safety of inhabitants and significant economic functions has priority, necessary CFEM measures must, in compliance with national and EU-legislation, always consider the values and integrity of landscape and nature. In conformance, the Guiding Principle of the Trilateral Wadden Sea Cooperation, “to achieve, as far as possible, a natural and sustainable ecosystem in which natural processes proceed in an undisturbed way” is of particular importance in in CFEM. Following the philosophy: “as much natural dynamics as possible, as little CFEM as necessary”, good efforts have been made to integrate coastal flood and erosion management with nature conservation and other interests, including development of techniques and measures which are better suited to the “soft coast” of the Wadden Sea. However, interests are sometimes conflicting; for instance, when space within the World Heritage property is requested to take the required measures. In these cases, unavoidable disturbances must be minimized and coherence or compensation secured.

|  |  |
| --- | --- |
|  | *Figure 5.5-1: Coastal flood defences and coastal protection works (map: CWSS). Photos: Upper left: groins / hard construction and sand nourishment in Denmark (Photo: Hunderup Luftfoto/ DKI); Lower left: typical ‘green’ Wadden Sea dike (Photos: Wetterskip Fryslân). Source: Zijlstra et al 2017. Note: figure will be updated and adapted* |

Note: A detailed inventory per country may be developed and included in an online version (example see Table 1 next page).

*Table 1. First draft of facts on Coastal flood and erosion management measures in the Wadden Sea.*

*Note: this table is open for suggestions and a fact check. Note SH: Hamburg “owes” only a tiny fraction of the Wadden Sea with a few inhabitants on Neuwerk. I would not consider Hamburg in this table (confusing data)*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Denmark** | **Schleswig-Holstein** | **Hamburg** | **Lower Saxony** | **Netherlands** |
| Surface area (< +5m above mean sea level) in the coastal flood-prone lowlands in the Wadden Sea region [km²] (CPSL, 2010) | 600 | 3404 | 270 | 6,600 | 6,294 |
| number of inhabitants in the coastal flood-prone lowlands in the Wadden Sea region CPSL, 2010 | 100,000 | 250,000 | 180,000 | 1,200,000 | 1,250,000 |
| Total length of dikes [km]  QSR 2017 | 80 (mainland) | 263 (State dikes, first dike line) | ?? none? | 645 (primary dikes) | About 430 |
| Sand nourishment [m³/year] | <100.000 (Skallingen only) | ~1.4 million  (figures 2009-2015) | ?? none? | ~300.000 (figures 2009-2016) | ~ 3.5 million  (figures 2009-2015) |
| Responsibility dikes | Municipalities, local dike boards | Mostly state government, in some cases also Water boards Municipalities | State government? Water boards? Municipalities? | State government? Water boards? Municipalities? | Rijkswaterstaat, water boards |
| Responsibility coastline | Coastal authority, municipalities | State government  municipalities | State government? Water boards? Municipalities? | State government? Water boards? Municipalities? | Rijkswaterstaat |

**Common ground and legislation**

The basis of coastal flood and erosion management lies in national and EU laws and policies. Depending on the legal situation in the different countries, responsibilities are delegated to regional or local authorities such as regional governments and their administration, to water boards or municipalities. All national legislation has to comply with the EU Floods directive that is effective since 2007. The EU Flood Directive gives a frame for assessment and management of flood risks.

As far as Natura 2000 or other nature legislation is concerned, which usually is the case for coastal flood defence and coastal protection measures, these need also to be taken into account.

Within the trilateral cooperation, the focus is on ensuring that CFEM-measures have minimal negative impact on the goals for the World Heritage site, and if possible strengthen or support these goals. In three trilateral agreements this is described:

* The Wadden Sea Plan 2010:

*7.1 Trilateral policies will be based on an integrated approach to coastal flood defence and protection and nature protection on the mainland coast, the islands and the offshore zone.*

*7.2 In view of accelerating sea level rise, increased attention will be given to the role of the offshore zone in the total Wadden Sea sand balance. In this respect sand will only be extracted from outside the Wadden Sea Area. Exemptions for local coastal flood defence and protection measures may be granted, provided it is the Best Environmental Practice for coastal protection (e.g. taking the sand from below the wave base).*

* Statement from the WH Nomination Dossier 2008 (page 105).

The current level of protection will not be compromised under any foreseeable circumstances.

The current line and system of coastal flood defence and protection will be maintained and no further embankment will be undertaken in any parts of the nominated property in the foreseeable future. Aim is to keep the local impacts within a temporary timescale. The current and future flood defence standards demand, however, continuous reinforcement and adaptation of future coastal protection measures to rising sea level. This cannot be done without impacting the nominated property.

Reinforcement of the existing dikes will be carried out on the dikes. The use of sand for sea defence purposes will be combined as far as possible with the maintenance dredging of the shipping lanes. Coastal protection on the islands within the nominated property will be done by sand nourishment for the offshore area, which is the most environmentally friendly and most efficient solution for stabilizing eroding coasts.

* Climate Change Adaptation Strategy (CCAS) (Tønder Declaration, 2014).  
  The overall aim of climate change adaptation in the Wadden Sea region is to safeguard and promote the qualities and the integrity of the area as a natural and sustainable ecosystem whilst ensuring the safety of the inhabitants and visitors, as well as the cultural heritage and landscape assets and sustainable human use. The aim of the climate adaptation strategy is enhance and promote policies and measures necessary for increasing the resilience of the Wadden Sea to impacts of climate change. The strategy focuses on the Wadden Sea Area and the adjacent offshore and mainland areas as far as directly relevant for the implementation of seven the basic elements of the strategy. The strategy introduces seven principles for working on climate change adaptation in / near the Wadden Sea.

These agreements are backed up by law in the three countries (Table 2).

Note: Collect and document different management approaches in more detail. Part of the added value of the SIMP is to collect those different management approaches to implement the trilateral agreements. Managers as well as organisations on the policy level from the three countries want to have an exchange of experiences, preliminary results and lessons learned from the different ways of management.

*Table 2. Overview of laws and main policy documents for coastal defence, spatial planning and nature protection (include?) which backs up trilateral agreements in Denmark, in the three German Federal States and the Netherlands. Sources Zijlstra 2017 (QSR), CPSL 2010. Note: include other (non-water) laws, as these have influence on how coastal protection is implemented.*

|  |  |  |  |
| --- | --- | --- | --- |
| **Wadden Sea World Heritage property in…** | **CFEM** | **Spatial planning** | **??Nature protection??** |
| All | EU Floods Directive\* | European Spatial Development Perspective (ESDP) (not legally binding); | EU Habitat-,& Birds Directives (Natura2000), EU Water framework |
| …the Netherlands | Water Law 2009, National Water Plan, Deltalaw and Deltaprogramme, | Structure vision for the Wadden Sea (former PKB); Nationale omgevingsvisie (NOVI), Provinciale omgevingsvisies (POVI) | Natura 2000 management plans |
| Germany | Federal Water Resources Act | Federal Spatial Planning Act;  Federal Building Act. | Federal Nature Protection Law; |
| Lower Saxony | Lower Saxony Dike Act | State Planning Programme (SPP); egional Planning Programmes (RPP) (both no legal frameworks?) | Lower Saxon Nature Conservation Act and the State National Park Act |
| Hamburg | ? | ? | National Park Act |
| Schleswig-Holstein | State Water Act | State Planning Act of Schleswig-Holstein | State Nature Conservation Act and the National Park Act |
| Denmark | Coastal Protection Act | National Planning Directives | Nature and Wildlife Reserve Executive Order; Executive Order on the Demarcation and Administration of International Nature Protection Areas;  Federal Nature Conservation Act,  Danish Statutory Order? |

\*defined potential significant flood risk areas and that flood risk management plans be established. Flood hazards maps must delineate risk areas that can be potentially flooded with low, medium and high probability. This information helps spatial planners to take flood risk into consideration in spatial plans.

**Challenges**

**Climate change and sea level rise**

Due to anthropogenic climate change, sea level rise will significantly accelerate and storm surges will reach higher levels (see IPCC-SROCC). This will lead to an increase of activities in the field of CFEM, such as dike strengthening and sand nourishments. In consequence, pressures on the Wadden sea ecosystem and conflicts of interest (e.g., space for necessary CFEM) may increase. Alternative CFEM approaches as well as win-win-situations (e.g., nourishing sand to maintain island coastlines will also reduce the drowning effect in the Wadden Sea) should be investigated.

**Integral approach and cooperation**

CFEM can conflict with goals of the World Heritage site. However, it can also offer opportunities. Activities like dike strengthening require major investments at the edge of the site. It is the challenge to cooperate between organisations either in managing the protected areas or managing CFEM. By working via an integral approach, the need for CFEM and their major investments may also lead to an improved situation for nature or other functions. For instance by combining dike improvements with nature development, also in the hinterland outside the Property. In general a principle of always using those techniques and measures which have the least possible impact on nature and which allows for the best win-win-solution for the protection of people, for adaptation to sea level rise, and for keeping nature as undisturbed as possible, need to be applied. Note: add more examples?

**Awareness of World Heritage**

Although many CFEM-activities formally take place outside the Property, the bigger picture is that the quality of the ecological system of the Wadden Sea depends also very much on the link to the hinterland and the well-being of the people there. It is the challenge to continue to raise awareness of working close to the World Heritage site with parties working there. They are able to minimise the impact of their activities and sometime can even contribute to the quality of Wadden Sea protection. If these parties, such as municipalities and water boards are well aware of what they can do and are stimulated to further integrate the interests of the World Heritage site into their daily work (Note: link to means to support management in section 7 of SIMP), also outside their formal responsibilities, opportunities for the Property can be seized.

.

**The way forward**

The trilateral cooperation is facing quite some challenges for the Property such as climate change and sea level rise, as well as extreme temperature events (Note: refer to CVI). Climate change, together with other anthropogenic effects, such as large human-made infrastructures, (reduced) eutrophication, fisheries, pollutants and invasive species, lead to cumulative effects (Philippart et al. 2017) which form part of the challenges Wadden Sea World Heritage property.

Via the present trilateral agreements, by “living” and implementing them, by close cooperation with and among the stakeholders, but also by more resources made available for the Wadden Sea, and in particular also by successful global climate protection, the future of the Wadden Sea can be ensured.

# References

CPSL, 2010. CPSL Third Report. The role of spatial planning and sediment in coastal risk management. Wadden Sea Ecosystem No. 28. Common Wadden Sea Secretariat, Trilateral Working Group on Coastal Protection and Sea Level Rise (CPSL), Wilhelmshaven, Germany

CPSL, 2005. Coastal Protection and Sea Level Rise - Solutions for sustainable coastal protection in the Wadden Sea region. Wadden Sea Ecosystem No. 21. Common Wadden Sea Secretariat, Trilateral Working Group on Coastal Protection and Sea Level Rise (CPSL), Wilhelmshaven, Germany

Gydersen, Aan and Klaus Wagner (2009) Coastal Defense Strategies in the Wadden Sea Region: Coping with Climate Change , Natural Hazards Review , Volume 10 Issue 4 - November 2009WH Nomination Dossiers http://whc.unesco.org/uploads/nominations/1314ter.pdf

Zijlstra R., Hofstede J.L.A., Piontkowitz T. & Thorenz F. (2017) Coastal Risk Management. In: Wadden Sea Quality Status Report 2017. Eds.: Kloepper S. et al., Common Wadden Sea Secretariat, Wilhelmshaven, Germany. Last updated 21.12.2017. Downloaded 202016. qsr.waddensea-worldheritage.org/reports/coastal-risk-management