MEETING DOCUMENT

**Expert group Climate Change Adaptation (EG-C 11)**

8 December 2021

Online meeting

**Agenda Item: 2. Summary record**

**Subject: Draft summary record**

**Document No.:** EG-C 11/2

**Date:** 6 December 2021

**Submitted by: CWSS**

This document contains the draft summary record of the EG-C 10 meeting.

**Proposal:** The group is invited to adopt the draft summary record

**Version Log (will be deleted, this is for my personal overview)**

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| --- | --- | --- | --- |
| **Issue Date** | **Version** | **Author** | **Change** |
| 2021-10-22 | v0.1 | CWSS | First draft of the document |
| 2021-10-27 | v0.1 | RZ | Approval of chair |
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DRAFT SUMMARY RECORD v0.1

 Meeting of the

**Expert Group Climate Change Adaptation (EG-C 10)**

21 October 2021

Online meeting

1. **Opening of the Meeting and adoption of the Agenda**

The meeting was opened by the chairperson Robert Zijlstra at 14:30 on 21 October 2021 by MS Teams.

Robert Zijlstra welcomed Ester Kuppen as new member of the group and excused Frank Ahlhorn and Andreas Wurpts. Jannes Fröhlich joined the meeting at agenda item 4. A list of participants is at Annex 1.

The meeting started with a brief tour de table.

The EG-C **adopted** the draft agenda of the meeting (Annex 2).

1. **Adoption of the draft summary record**

*Document: EG-C10-2-SR-EG-C9*

All actions of the previous meeting were completed. Open items of previous meetings were either taken or are part of this agenda.

The EG-C **noted** the information and **adopted** the draft summary record of EG-C9.

1. **Announcements**

**WWF, Waddenvereniging**

No announcements

**Schleswig-Holstein,**

The updated State Master Plan for Coastal Flood Defense and Coastal Protection has undergone a first public hearing. Responses are being evaluated. The updated plan is expected to be adopted in parliament and then published. Main focus is climate change adaptation and nature-based climate change adaptation;

**Denmark**

* A climate action plan was initiated by the Danish government. For the Danish Coastal Authority this will lead to economic decision-making in climate actions in future.
* The Environmental Protection Agency has organized an exchange meeting for all Danish embers involved in Trilateral Wadden Sea Cooperation (TWSC). This is also in scope of preparing the chairmanship of Denmark starting end 2022;
* On a conference in November, first results from two pilot projects for sea level rise and impacts on salt marshes (coastal squeeze) and biodiversity in the municipalities Varde and Esbjerg will be presented.

**Lower Saxony**

* There was a coastal protection and adaptation session at the LAWA-conference in Stuttgart at 4 -5 October 2021;
* On 27 – 28 October 2021, the Coast Prevention will take place in Husum, Germany. The first day there will also deal with climate change and adaptation with focus on the Wadden Sea (but more or less from a coastal protection perspective) <https://coast-prevention.de/>

**Netherlands**

* A Quality Status Report for the OSPAR region is being prepared, including the impact of climate change on ecosystem components. Effects of sea level rise, temperature and heat are being treated. The objective of QSR 2023 is to assess the environmental status of the North East Atlantic against the objectives of the North East Atlantic Environmental Strategy 2010-2020 (NEAES 2020), evaluate any updated or additional objectives from NEAES 2020-2030, and identify the priority elements for actions to achieve OSPAR’s vision for a clean, healthy, biologically diverse sea, used sustainably; <https://www.ospar.org/work-areas/cross-cutting-issues/qsr2023>
* The programme of a Rich Waddensea (PRW) has organised an excursion to sites in Germany and the Netherlands from 7-9 October 2021 within the Wadden Sea ‘Sediment solutions‘ Community of Understanding (CoU). About 30 participants visited sites at the rivers Elbe, Weser and Ems, as well as at the Jade bay. The purpose of the excursion was twofold: Firstly, meeting each other, building a stronger network around the Community of Understanding, better understanding who knows what and exchange of ideas, knowhow and knowledge. And secondly; we have to deal with one Wadden Sea, one trilateral World Heritage Site and its Outstanding Universal Values. Sediment is important for the functioning of the Wadden Sea. The Wadden Sea is important for nature (biodiversity) and for humans. Everywhere in the Wadden Sea region we struggle with sediment management, for nature management and improvement, and for managing human functions. In the community we raise awareness on this aspect, consciously learn from each other, using participants views, knowhow and knowledge.

**WWF**

The project „Sandküste St. Peter-Ording“ has started: <https://sandkueste-spo.de>

**CWSS**

* The Interreg Building with Nature end meet was held online on 27 May 2021. The project has now been completed. CWSS is in contact with organisers of a follow-up project with the working title MAinstreaming Nature Based Solutions through COASTal systems (MANABAS COAST). The overall project objective is to contribute to the ambition formulated in the EU Adaptation Strategy, to fasten the process of climate change adaptation in a systemic way. We develop a framework for Integrated system-based asset management which will be tested and improved with projects carried out in 6 NSR countries. This way capacity is built to mainstream NBS and contribute to a climate resilient and biodiverse North Sea Region coastline;
* Coastal Communities Adapting Together (CCAT) 2021: Exchanging Knowledge and Best Practice Across Borders 2021 was held from 19 – 20 October 2021. <https://www.ccatproject.eu/event/ccat-2021-exchanging-knowledge-and-best-practice-across-borders-2021>
* The position of CWSS Partnerhsip Hub officer Cristina Nazzari has been prolonged until 31 December 2022 thanks to the extension fothe Interreg Prowad Link project and the contribution of the Netherlands;
* Ms Amelie Banke is supporting CWSS from August 2021- August 2022 within her Freies Ökologisches Jahr (FÖJ);
* The Wadden Sea Day Global Cooperation in a Changing World Wadden Sea Flyway Initiative was held in Wilhelmshaven in August 2021;

The group **noted** the information and **thanked** Jacobus Hofstede for offering to present the State Master Plan for Coastal Flood Defense and Coastal Protection at the next EG-C meeting.

1. **Trilateral information**

*Document: EG-C10-4-WSB-climate-presentation,* [*WSB 33/5.3 EG Climate adaptation*](https://www.waddensea-worldheritage.org/system/files/WSB-33-5-3%20Cimate%20Adaptation.pdf)

Robert Zijlstra informed on his presentation of progress in the implementation of the trilateral Climate Change Adaptation Strategy in the Wadden Sea, including lessons learnt from the use of the Climate Vulnerability Index method in the Wadden Sea at the Wadden Sea Board meeting 33 on 27 August 2021 in Wilhelmshaven, Germany.

The WSB noted the information and thanked Robert Zijlstra for the presentation and EG-C for their progress in climate change adaptation. The Board agreed on the importance of climate change for the work of TWSC and the need to fill knowledge gaps in system understanding by research and at the same time to define and take actions with support of EG-C. It was mentioned that EG-C may review the trilateral Climate Change Adaptation Strategy (CCAS) and to make proposals for an adjustment if necessary. Robert Zijlstra also underlined to the Board that high ambitions require resources, which are limited in EG-C.

Klaus Bertram Fries announced that the presentation was very well received and acknowledged by Danish Board members.

Julia Busch added that the WSB discussed to not only focus on filling knowledge gaps, but to act now in response to the high vulnerability of the Wadden Sea World Heritage property. In the Wadden Sea Board, the term no-regret measures was taken up, with a view that such measures would not imply any down-side, such as reduced agricultural area. Jacobus Hofstede clarified that no-regret measures from a coastal protection perspective means that measures would also work if the effects of climate change would not reach projections. Robert Zijlstra added that monitoring the system would be a no regret measure.

Jannes Fröhlich reminded the view that effects of climate change are anthropogenic and therefore the system dynamics under climate change conditions are not “natural” but contain a man-made fraction. Therefore, alterations of the system may support natural dynamics. Jacobus Hofstede reflected that in the view that climate change is anthropogenic, also coastal squeeze is man made and may require compensation measures, as practiced in the US.

EG-C **noted** the information and **agreed** to taking up the WSB discussion for development of a SMART work plan for the upcoming presidency, including a discussion on the dilemma depicted in the CWSS annual report 2020 by Philippart et al – main goal natural dynamics vs conservation obligations, e.g., by Natura 2000 objectives. <https://waddensea-worldheritage.org/news/common-wadden-sea-secretariat-publishes-annual-report-trilateral-activities>

EG-C **noted** that the Climate Vulnerability Index workshop report on Community Vulnerability, issued to the CVI developers, is still pending.

1. **Single Integrated Management Plan (SIMP)**

*Document: EG-C10-5-SIMP*

Julia Busch introduced the updated assessment of impact of coastal flood defense and protection on the Outstanding Universal Value (OUV) of the World Heritage by a consultant. The update was based on further contributions by EG-C in written form and by phone interviews. Julia Busch thanked EG-C for their contributions.

EG-C **thanked** the consultant and **agreed** to review the updated expert assessment and get back to CWSS with smart recommendations and textual changes by 28 October 2021.

EG-C **reminded** that the assessment is no product of their group.

1. **Work plan**

*Document: EG-C10-6-work plan*

The group discussed activities of EG-C in the light of the upcoming Trilateral Governmental Conference (TGC). Robert Zijlstra included that external feedback on key issues the group should address with respect to climate change, and on dilemmas to deal with would be advantageous.

EG-C **agreed** to start their contribution to the Policy Assessment Review (PAR) Ministerial Declaration (MD) and possible activities at the TGC before the next meeting, and to continue discussion at the next meeting. Visual products to present at the TGC may include EG-C contributions to the SIMP and synthesis of the CVI.

EG-C further **agreed** to review EG-C achievements of 2021 and to plan activities for the next presidency, which include review of the CCAS and possible new lean and mean priorities.

1. **Trilateral Monitoring and Assessment Programme (TMAP) & Quality Status Report (QSR)**
	1. **QSR**

The chair informed on the Quality Status Report thematic report process, which is still pending due to (his) lack of resources for trilateral work. He will contact Katja Philippart and suggest to her to take the lead in this report.

EG-C **noted** the information and agreed to invite Katja Philippart taking lead authorship of the QSR thematic report on climate change.

* 1. **TMAP**

The chair reported on the status of integration of climate change to the Trilateral Monitoring and Assessment Programme (TMAP). Multiple parameters are available, such as sea level rise (SLR) and temperature, and parameters on Wadden Sea flora and fauna. Missing is the linkage between basic data and the influence on habitats and species. Also for geomorphology, parameters are being monitored but there is no assessment of tidal flats and gullies in a systematic way in the Wadden Sea. Recently, Robert Zijlstra received a mail from Adi Kellermann, chair of the Task Group Monitoring and Assessment (TG-MA), with the proposal to organise a workshop to come up with advice on climate change monitoring in TMAP. Focus may be on geomorphology, but also impacts on the ecosystem are of importance.

Jacobus Hofstede reported on the development of a climate change adaptation monitoring in Schleswig-Holstein, which is part of the updated Master plan (see 3, Announcements). A contractor is currently finalising a proposal for such a monitoring. Draft fact sheets on SLR and storm surges have been prepared (Annex 4).

EG-C **noted** the information and **agreed** that the chair will be in contact about the timeline with the chair of TG-MA, and to inform him. EG-C further agreed to identify persons for such a workshop. The work done within the Master Plan in Schleswig-Holstein will be very helpful as a basis for this workshop and aim of the workshop could include preparing such information also for Denmark, Lower Saxony and the Netherlands.

The group **agreed** to receiving information on the Schleswig-Holstein situation climate monitoring in December 2021, and to feed this information to the workshop. The chair will pass this information and timeline to Adi Kellermann, EG-C will compile a list of experts for the workshop.

The group **noted** that parameters for ecology may include new species or loss of species in the Wadden Sea and that important information is contained in Philippart et al 2017 (QSR thematic report climate ecology).

The group further **noted** that a TMAP recommendation for climate change may include a recommendation as in the pending action item *9/9 9/8 Recommend to TG-MA/QSR editorial board taking up climate change effects on a “smaller scale” in each QSR thematic report in future.*

1. **Any Other Business and next meeting**

Robert Zijlstra informed on his doubts to act as chair for the next working period, as proper chairing would need more time than he can offer. He also suggested bringing in more members to the group to share the work load.

Jannes Fröhlich informed on his parental leave from x to June 2022.

The group **noted** the information.

The next meeting will be on 7-8 December in Bremen, Germany, from 11:00 on 7 December to 12:00 on 8 December, if possible for all EG-C members. Jacobus Hofstede will give a presentation on the State Master Plan for Coastal Flood Defense and Coastal Protection Schleswig-Holstein, which will include an overview on the climate change adaptation monitoring/parameters. In addition, Saa Kabuta will give a quick overview on new species in the Wadden Sea from the recent update of the QSR report Alien Species.

The group **agreed** to plan two in-person meetings per year, of which one should be coupled with an excursion. Additional meetings will be held online (approx. 2 – 4 meetings). -

1. **Closing**

The Chairperson closed the meeting 16:45 hours on 21 October 2021. and thanked participants for a fruitful discussion.

**ANNEX 1: List of participants**

LIST OF PARTICIPANTS

10th Meeting of the

**Expert Group Climate Change Adaptation (EG-C 9)**

21 October 2021

Online meeting

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| **Chair** |
| **Mr Robert Zijlstra**Ministry of Infrastructure and Water ManagementNoord NederlandLeeuwardenphone: +31 (0) 6 224 818 36EMail: robert.zijlstra@rws.nl  |
| **Denmark** |
| **Mr Thomas Larsen**Ministry of Environment Danish Coastal AuthorityHøjbovej 1, DK - 7620 Lemvigphone: +45 99 63 63 63EMail: tla@kyst.dk  | **Mr Klaus Bertram Fries**Varde Municipality Bytoften 2 , DK - 6800 Vardephone: +45 (0) 79 94 71 10EMail: klbf@varde.dk |
| **Germany (Hamburg, Lower Saxony, Schleswig-Holstein)** |
| **Mr Claus von Hoerschelmann**Schleswig-Holstein Agency for Coastal Defense, National Park and Marine ConservationNational Park Authority Schleswig-Holstein Nationalpark-Zentrum Multimar Wattforum Dithmarscher Straße 6a 25832 TönningPhone +49 (0)4861 9620-15EMail: Claus.vonHoerschelmann@lkn.landsh.de | **Mr Jacobus Hofstede**Ministry of Energy, Agriculture, the Environment, Nature and Digitalization Schleswig Holstein,Mercatorstraße 3, D-24106 KielPostfach 71 51, D-24171 KielPhone: +49(0) 431 988 4984Mobile: +49 160 5350219E-Mail: jacobus.hofstede@mlur.landsh.de |
| **Netherlands** |
| **Mr Saa Kabuta**Ministry of Infrastructure and Water ManagementDirectorate of Water AffairsPostbus 61 NL 8200 AB Lelystad phone: +31 (0)6 29 38 23 19 E-Mail: saahenry.kabuta@rws.nl |  |
| **Participants from advisors to WSB and external experts** |
| **Mr Jannes Fröhlich**WWF, Wadden Sea OfficeHafenstraße 3D - 25813 Husum phone: +49 (0)4841 66 85 58 mobile: +49 (0)151 18854818jannes.froehlich@wwf.de  | Ms Ester Kuppen |
| **Secretary** |  |
| **Ms Julia A Busch**Common Wadden Sea Secretariat |  |

**ANNEX 2: Final agenda**

FINAL AGENDA

**Expert group Climate Change Adaptation**

**(EG-C 10)**

21 October 2021

Online meeting

1. **Opening of the Meeting and adoption of the Agenda**

The meeting will be opened by the Chairperson at 14:30 on 21 October 2021.

Proposal: Adopt the draft agenda of the meeting

1. **Adoption of the draft summary record**

Document: EG-C10-2-SR-EG-C9

Proposal: Adopt the draft Summary Record of EG-C 9.

1. **Announcements**

*Document: EG-C10-3-Announcements*

Meeting participants are invited to hand in their information to the CWSS before the meeting. Individual announcements will not be repeated, but time given for questions [all].

Proposal: Note the information

1. **Trilateral information**

*Document: EG-C10-4-WSB-cliamte-presentations*

Presentation of EG-C chair at the 32th meeting of the Wadden Sea Board [Robert].

Proposal: Note the information

1. **Single Integrated Management Plan (SIMP)**

*Document: EG-C10-5-SIMP*

Information on assessment of impact of coastal flood defense and protection on the Outstanding Universal Value (OUV) of the World Heritage [Julia].

Proposal: Note the document and review the updated expert assessment and send written comments by 28 October 2021

1. **Work plan**

*Document: EG-C10-6-work plan*

Review EG-C achievements 2021 and plan activities in 2021, including follow-up proposal of Interreg Building with Nature. [Robert, Julia]

Proposal: Plan future activities

1. **Trilateral Monitoring and Assessment Programme (TMAP) & Quality Status Report (QSR)**

Inform on progress in TMAP & QSR [Robert].

Proposal: Note the information

1. **Any Other Business and next meeting**

Discuss any other business and meetings in 2022 (excursion and online meetings).

The next meeting will take place in Bremen, Germany as noon-to-noon meeting on 7 – 8 December 2021.

1. **Closing**

The meeting will be closed no later than 16:30 on 21 October 2021.

**ANNEX 3: Action items arising from EG-C 10**

ACTION ITEMS

**Expert Group Climate Change Adaptation**

**(EG-C 10)**

19 May 2021

Online meeting

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| --- | --- | --- | --- | --- |
| **Action #** | **Agenda item** | **Actions agreed upon** | **Person responsible** | **Deadline** |
| 1 | 4 | Taking up the WSB discussion for development of a SMART work plan for the upcoming presidency, including a discussion on the dilemma depicted in the CWSS annual report 2020 by Philippart et al | all | Next meeting |
| 2 | 5 | Review the updated expert assessment and get back to CWSS with smart recommendations and textual changes  | all | 2021-10-28 |
| 3 | 6 | Start EG-C contribution to the Policy Assessment Review (PAR) Ministerial Declaration (MD) and possible activities at the TGC, and to continue discussion at the next meeting | CWSSall | Before next meeting |
| 4 | 6 | Review EG-C achievements of 2021 and to plan activities for the next presidency, which include review of the CCAS and possible new lean and mean priorities | all | Next meeting |
| 5 | 7.1 | Contact Katja Philippart for lead authorship of QSR thematic report climate change | chair | ASAP |
| 6 | 7.2 | Contact chair of TG-MA | chair | ASAP |
| 7 | 7.2 | Compile list of experts for climate TMAP workskhop | all |  |
| 8 | 8 | Present the State Master Plan for Coastal Flood Defense and Coastal Protection at the next EG-C meeting & list of new Alien Species | JacobusSaa | Next meeting |
| REVIOUS MEETINGS |
| 9/1 | 9/2 | Prepare a trilateral documentation on what kind climate related monitoring is being performed on regional level. | all | ? |
| 9/3 | 9/5 | Discuss implications on EG-C work upon availability of the second workshop CVI report. | all | 2021-05-19 |
| 9/7 | 9/7 | Update of the work plan | all | Next meeting |
| 9/9 | 9/8 | Recommend to TG-MA/QSR editorial board taking up climate change effects on a “smaller scale” in each QSR thematic report in future. | CWSS | ASAP |
|  | EG-C7/5 | Hand in workshop reports, on OUV vulnerability and Community Vulnerability, as well as recommendations to the Wadden Sea Board (WSB) in November 2021 | all | 2021-10 (for WSB November 21) |
|  | EG-C7/5 | Summarise CVI main conclusion and turn those to recommendations for the next trilateral working period/review the Climate Change Adaptation Strategy (CCAS) and to communicate results | all | 2021-10 (for WSB November 21) |

**ANNEX 4: Indicator fact sheets**

Annex 4 a) Indicator sea level rise (German). Distributed separately as pdf file. Translation to English below.

Annex 4 b) Indicator storm flood intensity (German). Distributed separately as pdf file

**Indicator-Factsheet: Sea level rise**

**(translated by Deep, free online version)**

|  |  |
| --- | --- |
| Author: | Previous version: Ecologic Institute (Jenny Tröltzsch, Evelyn Lukat) i. A. des Umweltbundesamtes / KomPass, FKZ 3711 41 106 New version: Federal Institute of Hydrology (Dr. Hartmut Hein) |
| Collaboration | Bundesanstalt für Gewässerkunde (Dr. Hartmut Hein)  |
| Last update  | 05.10.2014 | Ecologic Institut (Jenny Tröltzsch, Evelyn Lukat) |
|  | 04.07.2018 | Bundesanstalt für Gewässerkunde (Dr. Hartmut Hein) Grundlegende Überarbeitung und Fortschreibung, Änderung der Datengrundlage  |
|  | 09.01.2018 | Bosch & Partner GmbH (Konstanze Schönthaler) Kleinere redaktionelle Anpassung  |
| Next update: | 2019 |  |

**I Description**

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| **InternalNr. WW-I-8**  | **Title: Sea Level**  |
| Unit: Teil A: cm Teil B: cm  | Brief description of the indicator: Part A: Mean annual tidal mean sea level (MTmw) at selected individual tide gauges in the North Sea low-pass filtered using SSA with a 19-year time window; roughly equivalent to a 19-year moving average. Part B: Mean annual mean water (MW) at selected individual gauges of the Baltic Sea low-pass filtered by SSA with a time window of 19 years; roughly corresponds to a moving average over 19 years.  |
|  | Calculation rule: Data are taken directly from the BfG. The following tide gauges are used: - for the North Sea: Borkum, Cuxhaven, Wittdün - for the Baltic Sea: Kiel, Travemünde, SaßnitzIn time series analysis, singular spectral analysis (SSA) is a nonpara-metric spectral estimation method. The method combines elements of classical time series analysis, multivariate statistics, multivariate geometry, dynamical systems and signal processing. The values are related to the respective gauge datum (about NHN + 500 cm). For methodological details of the BfG calculation see Hein et al. 2014.  |
| Interpretation of indicator value:  | Part A: The higher the indicator value, the higher the mean tidal water levels at the North Sea gauges under consideration. Part B: The higher the indicator value, the higher the mean |

**II Categorisation**

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| --- | --- |
| Field of actvity:  | Water balance, water management, coastal and marine protection |
| Topic  | Sea level and ocean currents |
| Thematic sub-aspect: | Sea level rise |
| DPSIR:  | Impact  |

**III Derivation and rationale**

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| References to other indicator systems: | EEA: Climate change, impacts and vulnerability in Europe 2012 – An indicator based report.  |
| Justification: | Due to climate change, sea levels are predicted to rise along the German coasts. Global warming leads to two different effects that promote a rising sea level. First, a higher water temperature leads to a lower density and thus to a volume expansion of the water. Second, the higher air temperature causes glaciers and ice sheets to melt, and more melt water enters the oceans (UBA 2009). Even if considerable climate protection efforts are made, i.e. if the lowest emission scenario is used as a basis for the projections, according to the IPCC an increase of a further 26 to 55 cm is to be expected by the end of the 21st century. Without emission restrictions, sea levels will rise between 45 and 82 cm by the end of the century. The IPCC does not rule out the possibility that sea level rise could be significantly higher. The indicator represents in its part A the annual Mean Tidal Water (MTmw) of the North Sea levels of the North Sea levels (MTnw) and in part B the annual Mean Water Levels at the Baltic Sea (MW). The averaging over 19 years corresponds to the definition of the Mean Sea Level of the International Hydrographic Organization. The presentation of a mean rise for the entire coastal area is not useful due to regional differences. For the indicator presentation, meaningful individual sea levels were selected that were not too strongly influenced by changes in recent years or not very strongly influenced by local conditions. Furthermore, a regional distribution of the gauges between the North Sea and the Baltic Sea, but also at the respective coast was aimed at. The selected gauges are located in different federal states. |
| Weaknesses  | The representation is based on individual levels, which are characterized by local framework conditions. The determination of local land subsidence seems to be difficult at the moment. |
| Legal foundations, strategies: | Deutsche Anpassungsstrategie an den Klimawandel 2008 (DAS) German Strategy for Adaptation to Climate Change 2008 (DAS) . |
| Climate change consequences described in the DAS  | DAS, Ch. 3.2.5: In addition, integrated development strategies are needed for coastal ecosystems, including estuaries, that allow for the establishment of alternative habitats for communities affected by sea-level rise where necessary. and exploit synergies between nature conservation and coastal protection. DAS, Section 3.2.11: Maritime vessels and navigation depend on oceanographic, hydrological and meteorological conditions in the open sea and in the coastal zone, as do the development, maintenance and operation of shipping lanes. Projected sea level rise will affect ports and other maritime infrastructure, among other things. There will also be changes in currents, erosion, and sedimentation in estuaries and marine shipping lanes that will require further study. DAS, chap. 3.2.12: For existing or planned industrial sites, the effects of climate change must be taken into account, both nationally and internationally, for example the consequences of an expected rise in sea level in areas close to the coast. DAS, Section 3.2.14: Sea level rise and the associated rise in groundwater levels, as well as the increase in coastal erosion tendencies, require additional efforts to protect coastal areas and establish significant new considerations for the development of coastal landscapes.  |
| Aims  | DAS, Ch. 3.2.5: Develop integrated development strategies for coastal ecosystems including estuarine channels. Establish alternative habitats for communities affected by sea level rise. Develop synergies between nature conservation and coastal protection. DAS, Section 3.2.11: Investigate and document changes in currents, erosion, and sedimentation in estuaries and marine navigation channels resulting from projected sea level rise. DAS, Ch. 3.2.12: For existing or planned industrial sites, consider nationally and internationally the impacts of climate change, for example, the consequences of expected sea level rise in nearshore areas. DAS, Section 3.2.14: Sea level rise and the associated rise in groundwater levels, as well as the increase in coastal erosion tendencies, require additional efforts to protect coastal areas and establish significant new considerations for the development of coastal landscapes. |
| Reporting obligations | none  |

**IV Technical information**

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| Data source:  | Bundesanstalt für Gewässerkunde (BfG): Pegeldatenbank der Wasser- und Schifffahrtsverwaltung des Bundes (WSV) Main table water levels of selected individual gauges |
| Spatial resolution:  | Point data | NUTS: Not relevant  |
| Geographical coverage:  | North Sea and Baltic Sea on the basis of three single gauges at the North Sea (Borkum, Cuxhaven, Wittdün) and three single gauges at the Baltic Sea (Kiel, Travemünde, Saßnitz) |
| Temporal resolution  | yearly, Cuxhaven (North Sea) since 1843 Travemünde (Baltic Sea) since 1853 Kiel (Baltic Sea) since 1901 Wittdün (North Sea) since 1936 Saßnitz (Baltic Sea) since 1953 Borkum (North Sea) since 1963 |
| Limitations:  | none |
| Reference to data fact sheet | WW-I-8\_Daten\_Meeresspiegel.xlsx  |

**V Additional information**

|  |  |
| --- | --- |
| Glossary:  | DIN definition MTmw (mean tidal mean water): arithmetic mean value of the water level of the horizontal gravity line of a tidal curve (DIN 4049) over a period of time (here 1 year). MW (mean tide): arithmetic mean of the water levels (DIN 4049) over a period of time (here 1 year). |
| Additional information: | Church JA, Clark PU, Cazenave A, Gregory JM and others 2013: Sea level change. In: Climate change 2013: the physical science basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge. Dangendorf S., Wahl T., Hein H., Jensen J., Mai S., Mudersbach C. 2012: Mean sea level variability and influence of the North Atlantic Oscillation on long-term trends in the German Bight. Water, 4(1), 170-195. Hein H, Mai S., Barjenbruch U. 2014: Klimabedingt veränderte Tidekennwerte und Seegangsstatistik in den Küstengewässern. BfG, Koblenz. http://doi.bafg.de/KLIWAS/2014/Kliwas\_33\_2014\_2.03.pdf. Jensen J., Dangendorf S., Wahl T., Steffen H. 2014: Meeresspiegeländerungen in der Nordsee: Vergangene Entwicklungen und zukünftige Herausforderungen mit einem Fokus auf die Deutsche Bucht. – Hydrologie und Wasserbewirtschaf-tung 58 (4), 304–323; DOI: 10.5675/HyWa\_2014,6\_1. UBA – Umweltbundesamt 2009: Klimawandel und marine Ökosysteme. Mee-resschutz ist Klimaschutz. Dessau-Roßlau. 62 S.  |

**VI Implementation - effort and responsibilities**

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| --- | --- | --- | --- |
| Effort estimation: | Data acquisition | 1  | only one data holding institution  |
|  | Data processing | 1 | direct data transfer |
|  | Explanation: The indicator values are provided by the BfG. The data are collected and checked by the various water and navigation authorities operating the gauges, but are provided centrally by the BfG. The processing of the data is necessary to a small extent. An additional check of the data is necessary. The calculation of the tidal mean water as well as the consideration of land subsidence are connected with noticeable time expenditure. The transfer of the indicator values supplied by the BfG into the DAS indicator system does not involve a significant additional effort. For the transfer of the respective current data into the data fact sheet, approx. 1 hour is to be calculated. |
| Data costs: | none |
| Responsibility: | Bundesanstalt für Gewässerkunde (BfG), Ref. M1, Dr. Hartmut Hein  |
|  | Explanation: In the BfG project KLIWAS 2.03, methodologies for averaged values over different gauges were developed and trends for individual gauges and areas were calculated. At present, it is only possible to a limited extent to use the KLWAS methods for the DAS indicator system.. |

**VII Presentation proposal**

Hint: For the display in the monitoring report, the vertical axis must be marked so that it does not start at the value "0".

