MEETING DOCUMENT

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Agenda Item:	**5.7 Science Cooperation**
Subject:	**Wadden Sea Research 1st Approach on Prioritisation**
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Submitted by:	**Chair of the TRA-Road Map Committee**

Pursuant to the former Declarations (Sylt, 2010 and Toender, 2014), also in the last Declaration (Leeuwarden, 2018) the issue of fostering research on issues relevant to the Wadden Sea World Heritage is raised. To this end, reference is made to the Trilateral Research Agenda (TRA), as well as to the need to develop a trilateral research platform.

In preparing the Trilateral Programming Committee – Wadden Sea Research, the ad-hoc Road Map Committee - TRA attempts to come forward with a prioritisation of research themes for Wadden Sea Research. (See task 3-3 in the ToR of the TPC-WSR).

As stated before, the TRA gives a comprehensive overall picture on three common future challenges and opportunities for which a multidisciplinary approach is requested:

- The Wadden Sea Region as living lab for human-nature interactions
- The Wadden Sea Region coping with climate change and relative sea level rise
- The Wadden Sea Region towards a sustainable maritime region

Recognising this approach may lead to rather abstract formulations of research questions, the TRA gives a more detailed elaboration along 4 thematic lines. These 4 thematic lines are:

- Climate, water, sediment and subsurface
- Ecology, biodiversity and spatial processes
- Cultural heritage, identity and historical embedding
- Economy, society and sustainable development

A recent overview for the period 2008-2018 initiated by the Waddenacademie showed that annually 600-700 scientific articles are published related to the first two themes, where for the last two themes this was only 50-100.

Especially for the first 2 thematic lines in the regular QSR future research questions are well specified. To position and to value the work of the scientific community in preparing the QSR`s, in the meeting of the RMC on January 23, 2020 the research recommendations of the last QSR were discussed with the members of the Editorial Board QSR 2016.

The many research recommendations of the QSR were assessed against a set of criteria set by the RMC. The criteria used ranged from the relevance of the research demands towards OUV importance, the trilateral added value, policy relevance, the urgency/threat aspect, to the existing level of research on the specific topic and how it fits with the priorities and challenges of the TRA. This has resulted in a condensed list of recommendations.

In addition, for some identified research lines considered most suitable for the start of a joint research programme, a short description is given in the appendices to substantiate the research recommendation.
At the end, some general conclusions are given, which again reflect the essence of incorporating the broader perspective of the TRA in the overall picture for Wadden Sea research.
See this document WSB 31/5.5/4

Proposal: The WSB is requested to note this 1st approach on Wadden Sea research prioritisation and to comment as appropriate as guideline for the envisaged work by the Trilateral Programming Committee Wadden Sea Research

Wadden Sea Research
1st Prioritisation Approach derived from QSR 2016

It was signalled at the start of the discussion between the RMC and the members of the Editorial Board QSR 2016, that the chapter on chemical substances is still missing in the QSR.
It was also noted that research questions on cultural aspects (like identity, history, heritage), demography (population decline, aging, migration and gentrification) and economic aspects (agriculture developments related to salination, value of ecosystem services, harbours, tourism;) are not properly addressed in the QSR.

Finally, there was also the general reservation made that throughout the QSR it was not consistent whether there was an explicit distinction made in the recommendations between research, monitoring and management.

Taking into account these reservations the following general recommendations were listed. All are supplied by a minimum of two numbers referring to chapter and most central bullet number from the original Trilateral Research Agenda Report, which was acknowledged and linked to in the Leeuwarden Declaration:

1st recommendation: There is a lot of monitoring (TMAP a.o.) going on in all three countries, but management and research are in need of the availability of trilateral harmonised data over all disciplines. A research project to obtain a harmonised methodology for data availability is advisable, following upon and supporting the existing work on TMAP. (4.2/1)

2nd recommendation: Ecosystem-functioning (system-understanding, understanding the connections and pressures). It was remarked that some species interactions, f.i. blue mussels – oysters, are already quite well investigated, and there are also rather well running programmes on seagrass. It was recommended that for now less efforts are needed on further ecosystem descriptions. (3.2/4)

> *It was stated that an evaluation might be needed, as we are changing now from ecosystem description to understanding ecosystem functioning, with the aim whether predicting the functioning of the systems is possible*.

3rd recommendation: Research on Blue-Carbon-Storage Function (salt marshes, seagrass, blue mussel beds,..), which allows for predictions on changing environmental conditions with impact on carbon storage. It should focus especially at edge-conditions (sea-land; subtidal-tidal), the ones most sensitive to Sea Level Rise. (3.2/3)

4th recommendation: Review on sediment handling (dredging/dumping) and the impact on the ecosystem, including new technologies (f.i. use of dredged material) and furthering trilateral approaches. (3.1 and 3.2 in general)

> *This should be approached in an interdisciplinary way, including socio-economic aspects including f.i. the issue of the sustainability of the ferry connections from the mainland to the islands and harbours.*

5th recommendation: Domain of geomorphology, research the question of the sediment-turnover. Focus as 1st prioritisation on the ebb-tidal deltas in relation to the protection of the islands also in relation to climate change. (3.1/4)

A workshop in April was envisaged to formulate a combined trilateral application to submit for funding. If possible, this research could be enlarged with the macrozoobenthos research.

6th recommendation: Fish, there is a knowledge-deficit regarding the non-commercial species, in general there is a bias to commercial fish only. Research is recommended on functional relationships; species-habitat connectivity, as well as the role of fish in the system and the changes due to climate change. (3.2/2)

See Appendix for more detailed information on this research line.

7th recommendation: The impact of alien species on the food web and communities, directed on its functional aspects. Not investigating specific species, but what might be potential function-changes (f.i. increasing number of filter feeding species, incorporating vegetation on dunes)? (3.2/1)

It was concluded to start with a synthesis report with a clear eye on feasible management options. The EG-AS is checking if this is an interesting and appropriate subject for research.

8th recommendation: For beaches and dunes a knowledge deficit is reported with regard to the integrative approach needed to relate to sediment dynamics, tourism development, coastal protection, sea level rise etc. (3.1/4 and 3.2/3)

See Appendix for more detailed information on this research line.

9th recommendation: Birds. Research on the causes of decline of breeding birds, with a focus on the predator issue as main pressure factor (With respect to the migratory birds: via the WSFI and the IKI proposal (in development) to enlarge the connectivity to other habitats along the flyway in an international perspective).(3.2/4)

See Appendix for more detailed information on this research line also including the societal aspect.

10th recommendation: Tourism. Changes in tourism patterns and their impact, and what are the limitations for sustainable tourism. (3.4/2)

See Appendix for more detailed information on this research line.

11th recommendation: Effects of energy transition on conservation measures and in relation to the acceptance of the inhabitants. (3.4/3)
This issue is important for management.

As there are many diverse aspects to be tackled, transmission-lines, social issues, landscape, technical measures to reduce impact of windmills on birds etc. a suggestion is to start with a think-tank.

12th recommendation: The issue of research in the effectiveness of measures, of evidence-based conservation measures was raised several times. The issue is also closely linked to monitoring and it was concluded that the contribution of research to this topic should be sorted out. (3.4/1)

It was concluded to start with a desk study with an inventory of ongoing projects and practices to get a first idea where and how such projects have contributed to and/or influenced management options. This topic is also interesting for other World Heritage sites.

The above recommendations are for specific research questions and fit within the four thematic lines. However, there is also a need to understand the complex interactions and cumulative effects

occurring in the Wadden Sea Sea Region with regard to climate change, the ecosystem in the Wadden Sea and cultural and economic developments in the Wadden Sea Region. To address this type of issues the joint scientific community of the three Wadden Sea countries identified in the TRA three major, broadly inter-disciplinary, challenges for the future with the aim to maintain natural and cultural values and to find a sustainable course for natural, societal and economic development. All of them are complex by nature and call for multi-, inter- and transdisciplinary approaches. natural and socio-economic variables. This requires comprehensive trilateral inter-disciplinary, multi-facetted research combined with committed interactions between scientists, policy makers, regional managers, educators and the civil society. Such broad approach will be required to inform future measures for safeguarding the Outstanding Universal Value of the World Heritage Site while promoting the sustainable use of the Wadden Sea Region and the wellbeing of its inhabitants.

See the TRA itself for more details on the three challenges.

Additional remarks.

As a general conclusion it was pointed out that the focus should not only be at new research, but also synthesis reports are very helpful. However, also for the production of synthesis reports, funding is needed.

The issue of diseases was discussed, coming up predominantly from the marine mammals chapter, but it is also of importance for other taxonomic groups such as molluscs. It was concluded there is a link to several pressures, like climate change, pollution. Although there is a knowledge gap, but when looking into mass-mortality aspect this goes beyond the Wadden Sea scale. In addition, given the difficulty for treatment, relevance to management is an issue and relevance to monitoring.

As a first step, it was concluded that this is not an item to the 1st prioritisation category.

Regarding the issue of harbours and shipping, it was concluded to wait for the outcome of the round table, which will be set-up by the Wadden Sea Forum in 2020

The social, cultural, demographic and economic aspects are not covered by the QSR, however, are taken up by the TRA. It was suggested that a workshop could be appropriate to come forward with a prioritisation. The TRA Thematic lines 3 and 4 above and the three challenges formulated in the TRA can be used as starting point for this because of the need to understand the complex interactions and cumulative effects occurring in the Wadden Sea Region with regard to climate changes, the ecosystem in the Wadden Sea and cultural and economic developments in the whole Wadden Sea Region.

It was also concluded that it should be checked what kind of research is already done on these topics/research lines. Some inventories on current research projects are already produced by the RMC.
The recommendation was made to depict these topics according to the science-policy matrix developed in former times, to get an indication how important the topics are in respect to the policy level and the level of knowledge already available.

Finally, it was noted at the combined meeting of the RMC with the scientists of the EB QSR 2016, that the scientists launched an appeal to be more pro-active and they should come up with new emerging issues which are not (yet) covered by management. To foster this position, a science-platform to stimulate exchanges was embraced and should be promoted, with a specific call upon the new generation of scientists. This TRA-approach can give it a boost, but at the same time a more structural approach is needed which could become a part of the Partnership Hub. It was acknowledged that this fits well in the agreement as laid down in the trilateral Leeuwarden Declaration 2018.

Appendix.

Background on several research lines.

Fish.
(by Niels Jepsen)

Worldwide, estuarine and coastal fish populations are declining. Thus, coastal fish in the North Sea have been in decline since the mid-1900s, with some species biomass decreasing as much as 80% over the last 10-15 years. The very productive, shallow Wadden Sea now holds only a small fraction of the fish it used to, with severe consequences for commercial, recreational and cultural activity as well as species diversity and ecological function. Notably this decline has happened despite a major decrease in fishing efforts and a slight increase in water quality. Several hypotheses have been suggested, including climate change, overfishing, eutrophication, overabundance of predators, but so far studies have not been able to elucidate the causal factors fully. We recommend a multifaceted approach to understand the ecological processes influencing the growth and abundance of fish in the Wadden Sea. We do have data series on the commercial species, but we need more studies on the non-commercial species.
In the Danish part of the WS, fishing has been terminated since 1997, so here the impact of commercial fishing can be tested by comparing with data from the German and Dutch parts. We need data on interaction between prey abundance, predation, abiotic, and land-influence in survival of post-settlement flatfish and other stationary fish species. The only endemic fish species in the Wadden Sea, the houting, is at a very critical level of abundance and only one viable population remains in River Vidå. More studies are needed to safeguard the last part of the once widespread species from risk of extinction. The houting rely on free migration through the Wadden Sea as do salmon, sea-trout, eel, lamprey and shad. The man-made obstacles and human habitat modifications may play a role in the decline in migrating fish species and studies of the migration of these species should be promoted.
A new line of research focus on the so-called Oceanic Heat Waves, the presence and effect of which should be studied as they may explain much of the decline in coastal fish stocks.

Beaches and Dunes.
(by Christian Buschbaum and Kai Jensen)
Potential research on beaches and dunes.

In comparison to tidal flat and salt marsh research in the Wadden Sea ecosystem, the number of studies dealing with beaches and dunes was and is quite low despite the important ecological and cultural role of these habitats. Furthermore, the monitoring activities are also limited and mainly focus on dunes, whereas beaches are only monitored for their sediment budget.
Sedimentary shallow coasts with adjacent dune complexes belong to the same geomorphological system, the littoral active zone, which consists of the nearshore areas, surf zones, beaches, dunes, and dune slacks. This system is a highly dynamic transitional zone with multiple fluxes from sea to land and vice versa. Whereas beaches, surf zones and nearshore areas are mainly inhabited by marine organisms (apart from some important visitors such as birds and seals), dune systems provide habitat for terrestrial plants and animals, many showing specific adaptations to severe environmental conditions. Besides their ecological functions, beaches and dunes are also of high importance for coastal defense, recreation and drinking-water extraction. In terms of expected accelerated sea level rise, beaches and dunes and their dynamics will be particularly affected and under certain conditions dunes may become the beaches of tomorrow. Therefore, foreshore areas, wet and dry beaches and dunes form a natural, integrated unit and should be studied and managed as such. The interlinkage between ecological function, food web, habitat for marine and terrestrial

species and human needs (including its traditional use and cultural value) makes this entity to a key focus for overarching and interdisciplinary research approaches.
Following topics of research on beaches and dunes in the Wadden Sea region are suggested:

A) Potential research with focus on ecological and recreational aspects:

1. Are sand beach biota uniform throughout the Wadden Sea? How does biodiversity vary from exposed to sheltered, from brackish to marine, from fine to coarse grained, from nourished to unnourished, from touristic to protected beaches? And which drivers are most responsible for the specific species composition?
Previous investigations indicate that beaches are poor in macrobenthic diversity but epipsammic microflora and interstitial fauna tend to be highly diverse. Is this diversity pattern true for the entire Wadden Sea region?

2. Beaches are important resting and breeding sites for coastal birds. How could bird and human needs of beaches find compromises?

3. Beaches provide a filter function for coastal waters. How important is this process in comparison to filter processes occurring in other habitats (such as tidal flats and salt marshes)?

4. How are beaches and dunes interlinked in terms of material fluxes, sand transport and use of organisms? How will these processes be affected by sea level rise?

5. How is climate warming with more dry, hot summers and more wet, mild winters alter dune biodiversity and how will single key species be affected (e.g. the natterjack toad *Bufo calamita*)? How would the competitive outcome between native and non-native species be affected? What are the indirect effects by, for example, increasing groundwater extractions and saltwater intrusions?

6. Sandy beaches are well-known attractions for coastal tourism, but the adjoining coastal dunes play a comparative minor role, because humans are mainly excluded from the area. What are the reasons, and could dunes become more attractive when humans are not excluded from dune areas and are better informed about their ecological values and uniqueness? Could moderate coastal tourism within dunes even contribute to increase dynamics and biodiversity in dunes?

7. Waves predominantly deposit sediments on the beach during summer while they are more erosive during winter. How does this interaction change in terms of an accelerated sea level rise?

B) Potential research with focus on beach and dune dynamics and management measures:

1. Beaches and dunes represent a barrier against the sea, especially in times of accelerating sea level rise. To remain or enhance their protective function, sand nourishment is a widely accepted measure, but it is not clear whether the current strategy is the most effective in terms of costs and continuity. Currently, most sand nourishment occurs directly on the beaches, but is this the best site? Should sand additions be applied in the foreshore area, at the beach slope or better to the backshore (dunes) or at all locations and what are the ecological consequences? What would be ecological and economic consequences of different sand nourishment scenarios (varying in location and quantitiy)?

2. How do human activities (such as stabilization measures) change natural dune landscapes and should dune mobility (e.g. by removal of vegetation) be initiated to enable dune adaptation to a rising sea?

3. What are effects of atmospheric nutrient deposition, the invasion of non-native plants, livestock grazing as well as coastal tourism on dune dynamics?

4. Dune slacks are known as a hotspot of plant species diversity. How are these habitats affected by interactions of warming, sea level rise and groundwater extractions?

4. Dune islands were originally free from mammalian predators and, thus, rich in ground-breeding coastal bird colonies. This situation has changed completely, but there is no assessment of mammal species composition and abundances on Wadden Sea dune islands available. Could feral island mammals be managed or even removed?

Birds
(by Peter Südbeck)

Birds play a prominent role in the ecological functioning of the Wadden Sea, they are of utmost importance concerning the justification of the world heritage site Wadden Sea and are important elements of biodiversity in their role in engaging and addressing people to nature related attitudes and measures.
The role of the Wadden Sea for birds is especially focused on the position along the East-Atlantic Flyway on which more than 10 million birds migrate twice a year from arctic breeding areas to (West-)African wintering grounds with the Wadden Sea as central (and often only) stepping stone on the whole pathway. About 2 million birds have their breeding grounds in the Wadden Sea and form an integral part of the year-round biodiversity. The functions of the Wadden Sea in terms of birds´ ecology can be thus roughly divided in two sub-groups: breeding birds and migratory birds with different research and conservation issues.
The successful trilateral Bird (migratory, breeding) monitoring program (part of TMAP) aims to assess the status of birds in the Wadden Sea and monitor changes in numbers, phenology and distribution including breeding success. Hence, the monitoring program cannot always identify detailed causes and backgrounds that have driven the observed changes. Those aspects do request further detailed research.
The conservation status of most bird species in the Wadden Sea birds is actually not favorable. Lots of populations of typical Wadden Seas birds are declining, their distribution areas alter or the population dynamics have changed. In spite of a long history of Wadden Sea bird research with outstanding results and knowledge gain, ecological bird research with a strong emphasis on conservation is still irreplaceable and essential since many ongoing processes (reasons for decline) are not well understood.
For breeding birds in the Wadden Sea the Trilateral Breeding Bird Action plan points out some of the main drivers for declining populations and results in a recommendation of a number of actions to improve their conservation status (https://www.waddensea-worldheritage.org/resources/breeding-birds-trouble-framework-action-plan-wadden-sea).
Restoration and management of breeding habitats (e.g. saltmarshes, grasslands) or predation management are considered to be key measures in this action plan.
A research agenda for birds aims to fill the gap between monitoring and conservation.
Following topics could be i.a. important for future bird research:
Breeding Birds:

- Population dynamics and population modelling of characteristic breeding bird species, this is extremely important to understand actual population trends and to direct and underpin conservation measures on a sound basis
- Research on predator issues (spatio-temporal habitat use of predators in coastal habitats, feeding ecology, interaction predator-prey, mitigation measures)
- Feeding ecology of beach-breeding species

- The role of feeding ecology for explaining the decline breeding bird populations of the Wadden Sea (e.g. Eurasian Oystercatcher, Common Tern)
- Migration ecology (tracking and connectivity studies, Wadden Sea – wintering areas, under changing conditions)
- Interdisciplinary approach to evaluate conservation actions, like habitat restoration

Migratory Birds (see IKI application of WSFI as well)

- Connectivity and carry over studies on individual basis (tracking, colour marking and population oriented analysis) along the flyway
- Feeding ecology at Wadden Sea stopover sites and consequences on individual condition, esp. under changing and dynamic conditions like climate change
- Population dynamics and modelling
- Distribution processes, i.a. under conditions of climate change
- Effects of changes in habitat availability and quality (e.g. loss of resting sites) on bird behaviour and populations
- New monitoring approaches to improve bird surveys, population size analysis a.s.o. under dynamic conditions
- New data analysis methods on migratory bird monitoring data and environmental parameters to reveal underlying causes for trends Interaction between bird population development and change of land/coastal/marine habitats on landscape basis

Tourism.
(by Jouke van Dijk)

Changes in tourism patterns and their impact, and what are the limitations for sustainable tourism by Jouke van Dijk, Waddenacademie

The Wadden Sea World Heritage Destination is one of the most popular tourism destinations in Northern Europe. On many of the islands and some mainland locations tourism is the main source of income and contributes significantly to sustaining local employment. The Wadden Sea Region is an economically peripheral, predominantly rural region with few interspersed urban centers. The population in the entire Wadden Sea Region is shrinking and the age-structure of residents is biased towards elderly people and the level of education of the labour force is below average. Several of the services originally provided by the Wadden Sea Region (e.g., food, water quality, coastal protection, recreation) are in transition and many economic opportunities for coastal people have been lost. Worldwide tourism is seen as one of the few sectors where growth is almost guaranteed in terms of number of tourists, expenditures, and job creation. In the Wadden Region the structure and spatial distribution of tourism is very different. While foreign tourists account for almost 70% of all overnights in the Danish Wadden Sea region, they account for less than 4% in the German Wadden Sea region and about 20% in the Dutch region. However, in the Dutch region the share of foreigners is mainly high on the islands of Texel and Ameland and much lower on the other islands and close to zero on the mainland. Now the tourism sector suffers from the corona-crisis, but in the next years this might lead to a switch from less tourism from abroad and more from close by. In general, the islands are well-developed for tourism year around and in some respects close to the maximum carrying capacity. They are mature destinations, but face the challenge of constant renewal, finding new niches as older segments decline. Tourism in the mainland coast area is especially in the Netherlands and Denmark relatively underdeveloped and limited in numbers and therefore also quite limited in its importance to the regional labour market and its contribution to liveability. Here might be room for improvement, maybe in combination with tourism to the islands and/of the nearby bigger cities.

While tourism in the Wadden Sea Region is already of great importance for the regional and local economies, there is a need to ensure that tourism activities respect the environmental and conservation requirements to retain the Wadden Sea's rich ecological value and biodiversity and its Outstanding Universal Value (as outlined in the tourism strategy). UNESCO defines sustainable tourism as "tourism that respects both local people and the traveller, cultural heritage and the environment". Sustainable tourism should:
• Make optimal use of environmental resources that constitute a key element in tourism development, maintaining essential ecological processes and helping to conserve natural heritage and biodiversity.
• Respect the socio-cultural authenticity of host communities, conserve their built and living cultural heritage and traditional values, and contribute to inter-cultural understanding and tolerance.
• Ensure viable, long-term economic operations, providing socio-economic benefits to all stakeholders that are fairly distributed, including stable employment and income-earning opportunities and social services to host communities, and contributing to poverty alleviation.

This requires deliberate and informed choices for new and sustainable economic activities that offer new opportunities for creating jobs and for building sustainable livelihoods through tourism and producing high-quality regional products (e.g. foods) in the agricultural and fisheries sector that match with the locational characteristics and the skill of the people in the Wadden Sea Region. An important question is, how an economically sustainable Wadden Sea Region can make use of local and regional assets, services and products embedded in attractive, healthy ecosystems. Maybe radically new, creative concepts with respect to nature conservation, active aging, sustainable tourism, agriculture and fisheries with local products could be stimulated in order to make the Wadden Sea Region a true 'living lab' for socio-economic transitions. In order to avoid negative impacts of tourism on the Wadden Sea ecosystems, specific management frameworks need to be developed in all three states to manage recreational activities, e.g. visitor information and guidance to experience the area, zoning, closure of sensitive areas. Sustainable tourism for the Wadden, within the wider search for sustainability is confronted with several pressing questions that need to be addressed by solid scientific research. Pressing research questions are:

• The international Wadden Sea Region has developed to a mature tourism destination, but where to should it sustainably be heading in the future? How to benefit effectively from the UNESCO World Heritage status towards more sustainable tourism without damage for the Outstanding Universal Value? What can we learn from a comparison with other touristic WHS sites? How to safeguard or improve ecological quality and the identity and liveability of the inhabitants while allowing valuable enjoyment of ecology, landscape and cultural heritage in combination with creating more jobs and income?

• Increased sustainability is a key issue in many policy documents and among many entrepreneurs, but what exactly is sustainable tourism, how can we measure this, and which policy measures can be employed to achieve it? What type of growth would be viable and logical, or is thinking in terms of growth outdated and possibly unsustainable and should the focus be towards enhancing specific qualities and specific experiences regardless of the number of visitors?

• What is tourism's contribution to well-being and inclusive growth and how fair is the distribution of benefit over various groups in society? Can a strong liveability of the area for the local community be combined with the attractiveness of the area as a touristic destination? How to strengthen the liveability of the small island and rural mainland communities in the face of the lack of minimum scale to keep up amenities and in the light of crowding out by (super) rich tourists? Is it about small scale nature-based activities? Can it be combined with serving bigger masses of people, for instance, Chinese tourists? What is the impact of the corona crisis for future tourism and destinations choice of tourists?

• What is the impact of and interaction with other economic activities on tourism attractiveness and vice versa? For instance, what is the impact of wind and solar energy large scale agriculture on the valuation of the landscape for tourists?

• What policies are needed to spread the benefits of tourism more equal over regions and local communities? How can governments develop innovative tourism policies to encourage innovative product development, integrate SME's into global value chains and support local communities to benefit and engage with tourism.

In order to answer these questions adequate comparable longitudinal data are needed. However, due to different administrative regulations and laws in the three neighbouring countries, transnational statistics on tourism lack a common, uniform data basis, although Eurostat has developed methodological guidelines. Therefore, there is a need to revisit which tourism activities to monitor, and how to assess their respective impacts, and the methodologies of monitoring, including indicators for over-tourism. This implies improving the collection and dissemination of tourism statistics in the Wadden Region to include:
• Conduct regular trilateral visitor surveys with sufficient geographical detail in the Wadden region to identity trends and changing preferences in the demand of visitors; identify new target groups who are now not coming to the Wadden Region but might be interested.
• Conduct regular cross-national surveys of the local tourism industry to identity gaps in the quantity and quality of the supply of tourist products; identify innovations, cooperation and sustainability strategies of tourist firms; conduct regular cross-national survey among the local population to monitor the attitude to tourism and the (perceived) impact on liveability;
• Identify and implement the best ways to monitor the impact of tourism activities on the local and regional economy and communities, including indicators for over-tourism and comparisons with other tourist areas.