WADDEN SEA FORUM

Developments in the Wadden Sea Region Reflecting the Role and Achievements of the Wadden Sea Forum

WSF, March 2018

Foreword

The Wadden Sea Region (WSR) is a unique cultural landscape and the Wadden Sea itself an outstanding nature reserve on a global scale, recognized by UNESCO as World Heritage Site. Everyone is convinced that natural and cultural values must be protected. A substantial contribution is a sustainable socio-economic development of the Wadden Sea Region, an area where people live and work.

The Wadden Sea Forum (WSF) is an independent platform of stakeholder organizations in the WSR of Denmark, Germany and The Netherlands and was established in 2002 following a decision by the 9th Governmental Conference of the Trilateral Wadden Sea Cooperation. The Forum works towards an advanced and sustainable development, taking into account the interests of the Wadden society with its various stakeholders.

In the past years the WSF successfully continued the work on Integrated Coastal Management on the basis of the ICZM Strategy for the Wadden Sea Region (December 2013). The presented report comprises three parts, an assessment of the developments of relevant sectors in the Wadden Sea Region and two status reports on compelling issues as identified by the WSF. These are demographic change as one of the main challenges for the Wadden society and the sustainability indicator instrument to measure the success of sustainable development.

With this present report, the WSF intends to provide a broader picture about developments in the Wadden Sea Region and to give insights in debates and instruments, providing support in working towards a sustainable Wadden Sea Region.

We hope this contribution stimulates the debate about a sustainable coastal region and a vivid Wadden society. It also enhances the close cooperation between stakeholders and political decision makers and raises the awareness for sincere commitment to sustainably further develop the Wadden Sea Region.

Haarlem and Wilhelmshaven March 29, 2018

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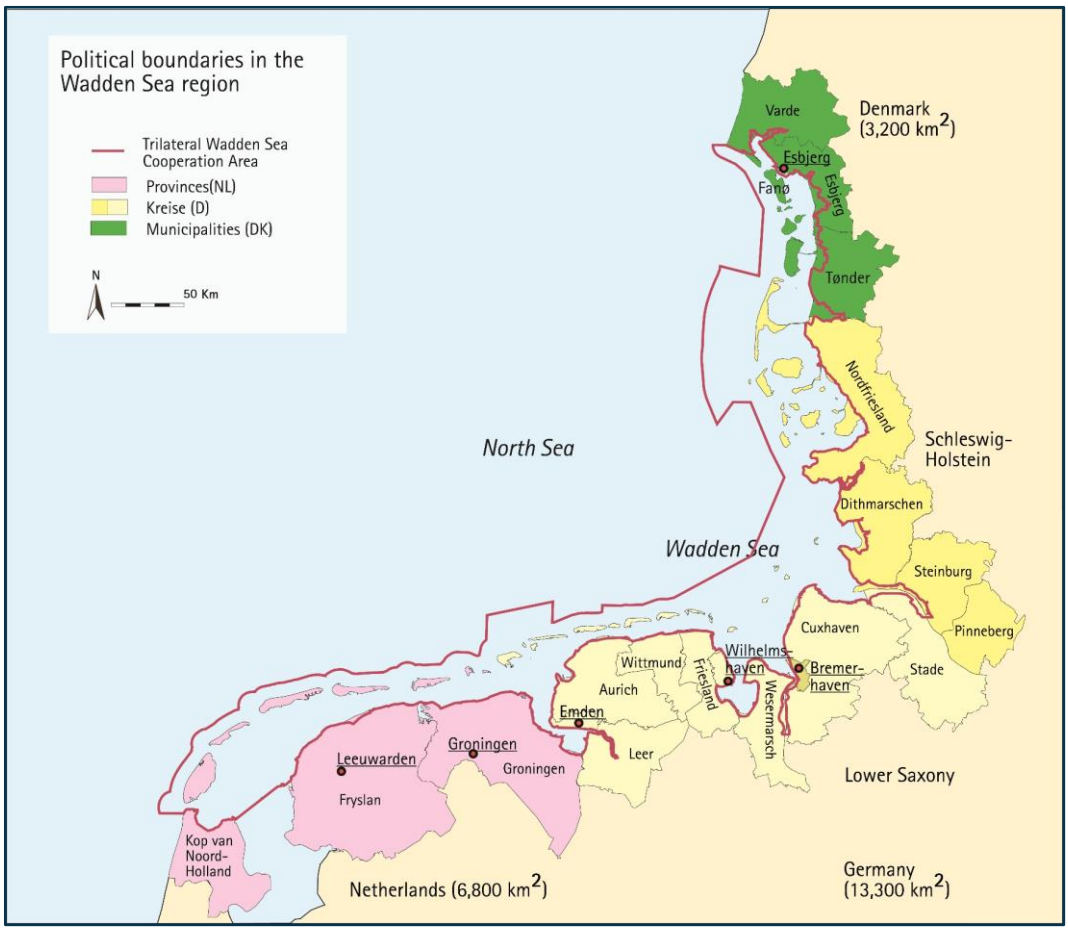


March 2018

1. Executive Summary and Recommendations

This report reflects the WSF's assessment of recent socio-economic developments in the light of political statements made at the Governmental Wadden Sea Conference 2014 in Tønder, Denmark. The focus is laid on coastal zone management themes on the agenda of the Wadden Sea Forum (WSF), namely fisheries, energy, climate as well as shipping and ports. Furthermore, science cooperation and the performance of the WSF are briefly assessed.

The fishery sector was remarkably successful with the certification of mussel and shrimp fisheries. With additional agreements and specific conditions within these certifications as well as with the trilateral swimway initiative, progress was also made in the ecological sector. Still, overcapacities, problematic methods of fishing and the lack of a level playing field still have negative impacts on stocks and habitats.

Greater focus on energy saving, the continued transition to renewable energy production and alternative fuels as well as many best practice initiatives on the regional and local level underline the positive developments in the energy sector.

Climate change and resulting impacts played a dominant role in the political agenda and across sectors. Many initiatives were taken by municipalities and authorities. Also the Trilateral Cooperation took on responsibility for this issue. Nevertheless, mitigation efforts and adaptation measures need to be strengthened to meet the needs for a sustainable society in the future.

The shipping and harbour business is slowly changing towards greater sustainability and the WSF was quite active in this issue. While some progress is being made in emission reduction and green ports development, there is little progress with respect to shipping safety measures. Lack of cooperation, communication gaps and insufficient control mechanisms require regulatory actions.

With the Dutch Wadden Academy and the Trilateral Research Agenda, science cooperation has progressed quite well. The WSF has developed a sound network of scientists from various institutions, who cooperate with and support the WSF on topical issues. With the implementation of the projected World Heritage Partnership Centre such cooperation can be further enhanced.

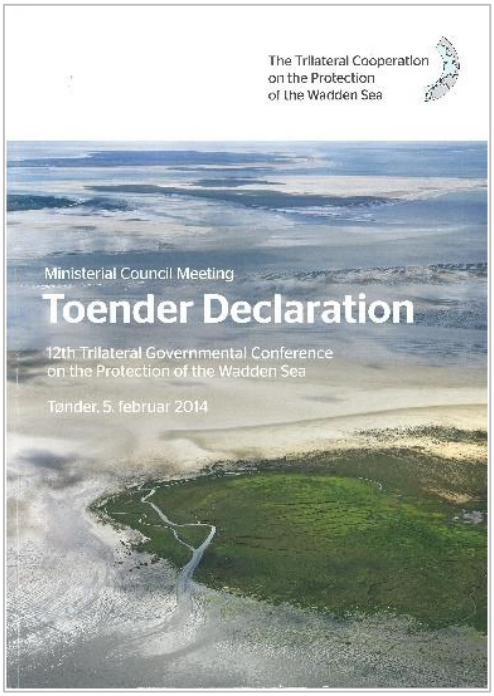
The Wadden Sea Forum can look back on a whole range of achievements regarding the work on sustainable developments in the Wadden Sea Region. Good cooperation on the local, regional and international level as well as the involvement in various projects clearly show the value of the existing stakeholder forum. However, its degree of awareness in the WSR and its contribution on the political level needs improvement. The WSF will clearly define its position regarding developments in the WSR and will deliver advice accordingly. Furthermore, the Forum is prepared to take a responsible role in the World Heritage Partnership Centre and to facilitate the network in the partner-hub.

Reflecting these developments in the Wadden Sea Region, the WSF recommends:

- to broadly acknowledge the efforts of the fishery sector working towards more sustainabilty, recognizing that still much needs to be done;
- to provide research funding to better understand the mutual impacts and interactions between fisheries and the ecosystem;
- to further invest in decentralized energy production to avoid impacts of large scale energy transportation systems and spatial conflicts;
- to support smart energy initiatives on the local level;
- to increase the TWSC efforts to develop the Wadden Sea Region into a CO_2 neutral region by 2030;
- to politically support local and regional initiatives for climate friendly developments;
- to start pilote climate change adaptation measures, and give adequate consideration to cultural heritage values in this context;
- to foster shipping safety measures and the development of green port concepts along the Wadden Sea coast;
- to trilaterally approach the IMO to implement additional measures in the North Sea;
- to establish a joint shipping and habour working group with stakeholders and responsible authorities;
- to improve cooperation between governments and the scientific community also in order to meet research needs related to society;
- to improve and support the implementation of the Trilateral Research Agenda;
- to strive for better visibility of the WSF in the region as well as on the political level;
- to integrate the WSF in the World Heritage Partnership Centre as valuable partner and facilitator of its network.

2. Introduction

The approach for this report was to consider the objectives and statements of the political level, expressed in the Ministerial Declaration of Trilateral Governmental Conference 2014 in Tønder, Denmark. In our view, a successful sustainable development integrates the political roadmap, sector developments and societal characteristics and needs. An emphasis is laid on themes that are linked to socio-economic developments in the Wadden Sea Region. These corresponding themes are constituent elements of the WSF's agenda, and include sustainable fisheries, energy, climate, maritime safety and pollution prevention of shipping, science cooperation as well as the Wadden Sea Forum itself.



In each of the following chapters, we first repeat the corresponding paragraphs of the Tønder Declaration in order to recall the aims and recommendations put forward by the national governments that form the Trilateral Wadden Sea Cooperation (TWSC). Subsequently, we briefly describe and assess developments since the 2014 Trilateral Governmental Conference from the perspective of the WSF. We then present an outlook directed towards the Trilateral Governmental Conference in May 2018 in Leeuwarden, taking into account the goals of the planned World Heritage Partnership Centre and the contents of the draft Leeuwarden Declaration.

3. Socio-economic Developments in the Wadden Sea Region

3.1 Sustainable Fisheries

36. **Stress** the importance of the implementation of their ambitions (from the Sylt Declaration) to develop Wadden Sea wide trilateral policy principles for a further development of sustainable fisheries and support the Framework for Sustainable Fisheries, as in Annex 3.

37. **Strive** to incorporate and implement the Framework for Sustainable Fisheries in national fisheries policies by taking into account the EU Common Fisheries Policy (CFP) and relevant EU legislation, in order to improve the sustainability of fisheries in the Wadden Sea as well as aiming for a level playing field for the fishery sector in the Wadden Sea.
    Unreasonable impairments of the interests of the local population and its traditional uses in the Wadden Sea have to be avoided. Any user interests have to be weighted on a fair and equitable basis in the light of the purpose of protection in general, and the particular case concerned.

38. **Strive** to minimize the possible negative impacts of the diverse fisheries on the natural features of the Wadden Sea. A reduction of possible impacts of the diverse fisheries on the natural features of the Wadden Sea can be achieved in different ways, such as a combination of areas with sustainable fisheries and areas where all fisheries are excluded, innovative environmentally sound fisheries techniques, areas without bottom-contact-fisheries, bycatch reduction programs and reduced fishing pressure. In line with CFP, sustainable fisheries are characterized by the use of best available fishing techniques and practices.

39. **Confirm** their wish, in line with the CFP and other relevant EU legislation, to improve the sustainability of fisheries by negotiations and stakeholder participation. The aim is to realize an economically sound fisheries sector, meeting consumer expectations and respecting the sustainability-limits of the trilaterally protected Wadden Sea.

40. Therefore **instruct** the Wadden Sea Board to arrange an operating schedule including the negotiation phase and the implementation process, in close cooperation with responsible authorities and relevant stakeholders and initiatives, which are required within the framework of the EU legislation and the CFP.

The **Wadden Sea Forum** acknowledges that over the past four years the fishery sector has made good progress in working towards sustainable fisheries, often based on regional initiatives or agreements, and taking into account also the EU Common Fisheries Policy (CFP) and relevant EU legislation. The main fisheries operating in the Wadden Sea area have meanwhile been certified against the MSC standard. This standard is approved worldwide and in the opinion of the fishery sector there is no need to impose other standards. However, the green NGOs consider the present MSC standard being too weak from an ecological point of view, in particular when it comes to compliance with the specific goals of protected areas. The MSC standard also requires the fishery sector to closely cooperate with stakeholders such as environmental NGOs, and we saw for some fisheries and some regions good progress with this.

December 2017: The North Sea brown shrimp fishery celebrated the receipt of the MSC certificate for sustainability in Brussels.

Over the last years, electric pulse gear was introduced on a few shrimp vessels as a new method. However, this has not become part of the MSC certification and there would also be risks involved with the technique, as catching efficiency would increase, which would put even more pressure on the stock. Additional investigations and, if the technique would be introduced, clear regulations would be necessary.

From the perspective of the WSF, cooperation between the fishery sector and the TWSC at the trilateral level is weak if not lacking entirely. In our view, a joint working group should foster coordination across the three countries. This could be crucial for improving the good environmental status of the Wadden Sea Region whilst also encouraging sustainability of fisheries. Also overcapacities should be addressed and a level playing field should be debated in the cooperation. On an ecological level, good cooperation led to the elaboration of a swim-way vision and action plan. Research institutions, governments and stakeholders were involved in this initiative.

The WSF welcomes active collaboration with the TWSC to jointly progress this matter. Furthermore, it is our understanding that improved interdisciplinary research is needed in order to understand the mutual impacts and interactions between fisheries and the ecosystem. Sound scientific analysis can help to establish and implement measures that reduce the impact of fisheries on the Wadden Sea ecosystem.

3.2 Energy

41. Recognize that the construction of offshore wind parks and increasing offshore energy production contributing to the more sustainable energy supply, has impacts, on parts of the Wadden Sea, such as electric transport cables and servicing traffic.

42. Are aware of the regional concerns regarding the potential storage of carbon dioxide (CCS) and the exploitation of hydrocarbons from non-conventional deposits using the fracking technology within the Wadden Sea Area and bordering coastal and sea areas including connected exploration activities because of the potential damage to the ecosystem, and intend to avoid possible negative impacts on the Wadden Sea in line with the Guiding Principle.

43. Recognize also that recently a substantial number of electric power stations has been built or planned directly adjacent to the Wadden Sea and that the intake of cooling water accumulatively may have a significant impact on fish and that enhanced emissions of CO_2 are in discrepancy to limiting global warming and enhancing sea level rise cf §24 of the Sylt Declaration.

44. Instruct the WSB to review therefore the impacts ensuing from such constructions on the Wadden Sea ecosystem and to consider measures to avoid or mitigate possible negative impacts, including looking for best practices with the aim of developing a common code of conduct for the Wadden Sea Area in close consultation with the responsible bodies and stakeholders.

The **Wadden Sea Forum** and its collective stakeholders are in general supportive of further developing and implementing offshore wind farms, supporting the Paris agreement of 2015. The support of national, regional and local governments for this is acknowledged. However, the expected impacts as well as proper mitigation measures of this development still need to be scrutinised in more detail. A newly introduced method that can be highlighted as a positive example of minimizing the impacts of turbines on birds is the switch-off of wind turbines in the province of Groningen during bird migration.

Many voices in society continue to emphasize the impact of offshore wind farming on the landscape and quality of life. For a sustainable Wadden Sea Region a comprehensive energy concept is needed that takes into account the interests and concerns of all members of society as well as the need to overcome fossil energy sources. Politicians, stakeholders and representatives of wider society should work together to strive for a holistic and sustainable energy concept in the Wadden Sea Region. With regard to CCS and fracking in the Wadden Sea Region, we acknowledge and support that no activities are being planned.

The TWSC recognizes the ecosystem impacts of electricity-producing power plants along the Wadden Sea coast, particularly the increase of CO_2 emissions caused by coal-fired power plants. No measures and initiatives have so far been launched at a trilateral level to reduce these impacts though there is some progress on the national level and less coal power plants were constructed then planned. Also initiatives have been taken on a local and regional level to work towards a more sustainable energy supply, like the "Smart Island Initiative". An example is the partly self-sufficient energy supply of some Wadden Sea islands. In order to reach the overall aim of a common code of conduct for the Wadden Sea Region, the WSF suggests to initiate better cooperation with stakeholders. We believe that constructive and fruitful collaboration with stakeholders, as well working towards best practices, could help in our work towards climate-neutral energy supply in the WSR.

3.3 Climate

CO_2 Neutral Wadden Sea Region

45. Welcome the progress realized at the local level on achieving a CO_2 neutral Wadden Sea region.

46. Continue to support the global and national efforts to mitigate causes of climate change at the regional level.

47. Appreciate the ongoing efforts, especially at the local and regional levels, to work towards developing the Wadden Sea region into a CO_2-neutral area, and reconfirm the Sylt Declaration §24.

Climate Change Adaptation

48. Acknowledge that the overall goal of climate change adaptation in the Wadden Sea Area is to safeguard and promote the qualities and 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.

49. Adopt the trilateral Climate Adaptation Strategy as in Annex 4 on increasing resilience to climate change that is based upon the recognition that dealing with climate change requires the integration of many sectors, activities and fields of expertise and strive to implement the priority issues from the Strategy.

50. Recognise that spatial planning is an important instrument that can be used to achieve the objectives of climate change adaptation and for safeguarding a good interplay between different layers of governments and non-governmental organisations, and between different sectoral interests.

51. Express the intention to implement the trilateral climate change adaptation principles and objectives in spatial planning processes as far as possible, in particular at the local and regional level, also focusing on the integration of land- and sea-based activities.

52. Monitor the implementation of the climate change adaptation strategy and embed the results in long-term trilateral climate change policies, including best practices for adapting to climate change.

53. Recognize that the morphological development under sea level rise is a critical element of the natural resilience of the Wadden Sea and that trilateral cooperation on the exchange of knowledge on this subject is essential.

54. Welcome the successful initiation of a trilateral study on sedimentation behaviour in different tidal basins and acknowledge that the study has already in its first year delivered an exchange of knowledge and expertise between institutions and agencies in the Wadden Sea countries, and support its further continuation.

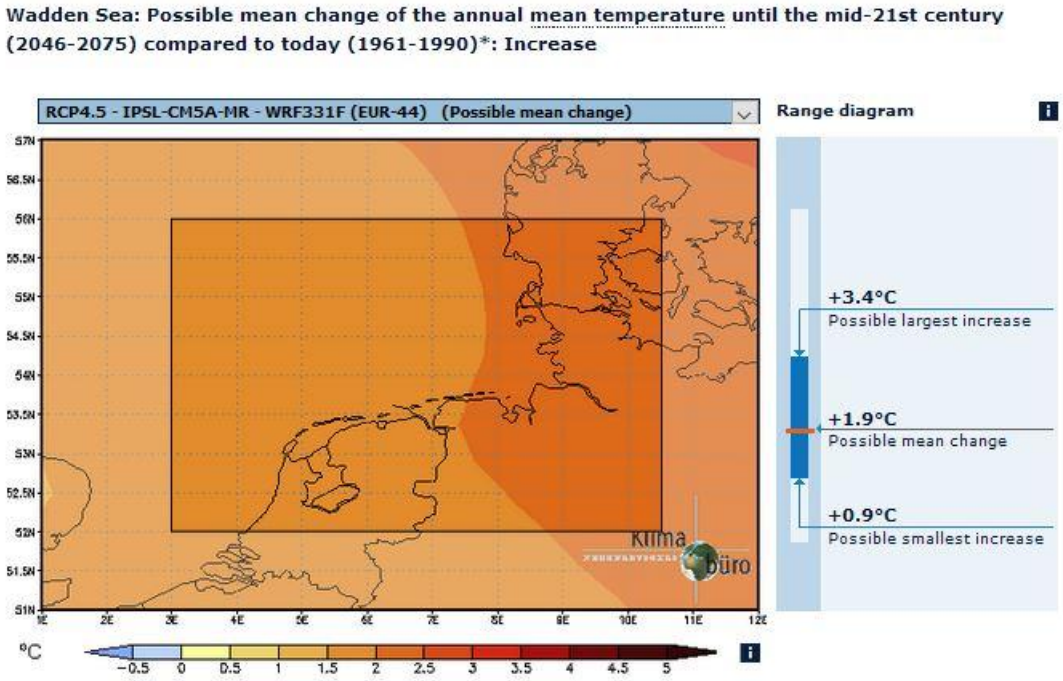


Fig. 1: Example of a climate scenario (www.coastalatlas.org)

The **Wadden Sea Forum** acknowledges the outcome of the climate conference 2015 in Paris as a general aim to minimize global warming, but concrete agreements and measures still have to be implemented on national and regional level, also in the Wadden Sea Region. We also welcome the political statement from the Wadden Sea countries in 2010 to develop a CO_2 neutral Wadden Sea Region. However, greater emphasis could be given to basic studies to understand the status quo and climate related developments in the region. Unfortunately, no joint efforts have yet been undertaken to come closer to the stated goals.

Nevertheless, on the local and regional level many initiatives and measures have been implemented to reduce CO_2 emissions. Municipalities and counties have launched programmes in order to make energy and transport more sustainable. An increasing number of best practices demonstrate the feasibility of CO_2 reduction measures while maintaining existing living standards.

The WSF is of the opinion that solid support and commitment by the Trilateral Cooperation would stimulate climate friendly developments in this respect. The collaboration of the Wadden Sea Board and the WSF to carry out an inventory of CO_2 policies on the national, regional and local level was a good starting point. The report is available on the WSF website:
https://waddensea-forum.org/images/archive/co2/Inventory-CO2-climate-friendly-WSR.pdf (as of March 2018).

The WSF recommends to use this knowledge base for discussing and agreeing further actions so as not to lose sight of the goal of a CO_2 neutral Wadden Sea Region.

With respect to climate change adaptation, a task group was set up by the Wadden Sea Board to work on the climate change adaptation strategy. Representatives of the countries as well as WWF and WSF were involved. A monitoring report and a study on morphodynamic changes were published, and a workshop was held to discuss results and include further expertise.

The WSF stakeholders very much welcomed the work of this group as results contribute to implementing the necessary adaptation measures.

As the trilateral adaptation strategy decided upon in 2014 is focussing on the Wadden Sea itself and does not include endangered parts of the area behind the dikes, the WSF recommends to more strongly consider also land-sea interactions in the future. Sea level rise as well as changes in temperature and precipitation patterns will have impacts on the low lying marsh areas in the hinterland. Therefore, a comprehensive climate adaptation strategy is needed that also focuses on adequate living conditions as well as a healthy economy. For the Wadden Sea itself, the strategy for the Wadden Sea 2100 of Schleswig-Holstein can deliver impulses for other regions to take into account developments in the more distant future. The WSF recommends to broaden the composition of a possible future Climate Task Group to ensure adaptation needs in the entire Wadden Sea Region can be adequately covered. In this respect, the possible impacts and changes on the cultural landscape and heritage values must also be taken into consideration.

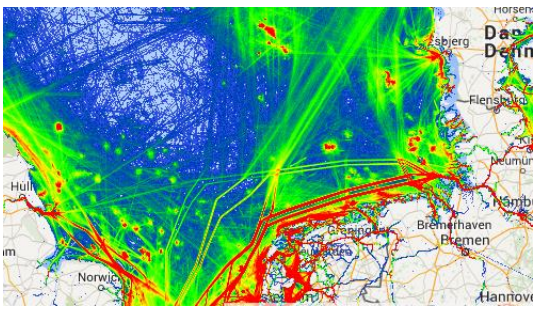
3.4 Maritime Safety and Pollution Prevention of Shipping

55. Emphasize the importance of the maritime activities and safety of the Wadden Sea Particularly Sensitive Sea Area (PSSA) and welcome the engagement of the stakeholders in implementing the agreements of the Sylt Declaration and recognize the developed operational plans relevant for the Wadden Sea PSSA.

56. Encourage the national competent authorities to use the operational plans as in Annex 5 as the basis for reviewing and accordingly implementing the measures of the operational plans, e.g. stimulate where reasonable and feasible, the accelerated implementation of (bio)-LNG as transition fuel, in order to achieve its objectives.

57. Continue the dialogue between the competent shipping and nature conservation authorities and stakeholders in order to achieve an even higher level of safety and cooperation.

58. Welcome and stimulate the further development and application of the Green Port concept.



The **Wadden Sea Forum** emphasizes that the Wadden Sea is one of the most highly frequented shipping areas of the world. Maritime safety is thus of paramount importance, while sustainable shipping plays a crucial role in sustainable development. Increasing container shipping, the pressure for cheap global transport and the distinct tendency for bigger container vessels could have severe impacts on the ecosystem as well as cause conflicts with other sectors such as offshore wind farming.

Still, some achievements should be acknowledged. IMO resolutions on e.g. anti-fouling, ballast water management and on sulphur emissions were implemented and "DenGerNeth", a trilateral cooperation about preventing pollution by ship accidents in the Wadden Sea and the southern North Sea is still in place. Also the establishment of the "Havariekommando" in Cuxhaven to coordinate and manage activities with regard to accidents is welcomed.

The WSF deeply regrets that the original idea to establish a joint TWSC and WSF working group was not supported by the shipping authorities. The Wadden Sea Board, the Wadden Sea Forum and green NGOs have attempted several times to get a sound trilateral network established, capable of working on important shipping issues.

A small group of governmental representatives from the three countries was founded to discuss the implementation of the operational plans referred to and published in the Tønder Declaration. The envisaged cooperation with stakeholders, unfortunately, did not come to pass. The WSF proposes that the WSB, WSF and green NGOs once more attempt to establish a joint work group on shipping and ports, and that this group should not only focus on operational plans for the PSSA Wadden Sea. The agenda of this joint group should also include vessel traffic management, implementation of joint monitoring systems, emergency towing capacity, ballast water control and pollution. Many problems have to be solved as recently the case of the "Glory Amsterdam" has shown. Due to cost pressure, little qualified crews are working on international vessels. Insufficient container lashing control leads to many lost containers in the adjacent waters of the Wadden Sea and the use of heavy crude oil contributes to increased air pollution. Adequate and sustainable solutions can only be found if governments and stakeholders collaborate.

Apart from shipping issues, there are also port-related issues and developments that concern the Wadden Sea and its hinterland. The WSF emphasizes that positive initiatives for green shipping and green ports were taken at a regional and stakeholder level, supported by the Dutch government. A good practical starting point was the symposium on green port concepts that took place in 2016 in The Netherlands. This initiative was taken forward by the WSF who organised a symposium on green ports and shipping in cooperation with the Maritime Competence Center Leer in April 2017. The green port concept encompasses the introduction of LNG and fuel cells as alternative fuels in shipping, the provision of electricity from land, waste management, cooperation in logistics and further important issues. Green NGOs suggest to also include the issue of emission free shipping and more emphasis on reducing impacts on habitats both on land and in the Wadden Sea.

The WSF is looking forward to cooperating with the TWSC on these topics through a joint agenda. This will not least increase awareness of, and commitment to the Wadden Sea World Heritage Site.

3.5 Science Cooperation

62. Welcome the findings of the 13th scientific Wadden Sea symposium, which focused on the themes climate and water, biodiversity, science for management and policy and sustainability and ecosystem services.

63. Encourage discussions by the scientific community and policy makers on the major policy issues and related knowledge as a basis for further developing a trilateral research agenda and a trilateral research platform.

64. Instruct the WSB to strengthen the cooperation with the scientific community in focusing on the main world heritage issues.

The **Wadden Sea Forum** welcomes the intention of the Trilateral Cooperation to strengthen its cooperation with the scientific community.

The traditional Scientific Wadden Sea Symposia, taking place around a year prior to the Governmental Conferences, play an important role in exchanging and developing scientific knowledge about the Wadden Sea ecosystem, its society and potential strategies for sustainable development. There is still room for improvement in disseminating and opening up the Symposia to the public, possibly by way of one public open day at the end of the meeting where the public at large and regional administrations and other stakeholders are invited to discuss new developments.

In this respect, the WSF considers the development of a common Trilateral Research Agenda a step forward. The Research Agenda was developed in a broadly participatory approach, initially with the involvement of many different scientists from all three countries and then in an intensive discussion at the 14th ISWSS (International Scientific Wadden Sea Symposium) in May 2017 which added further expertise.

It is our understanding that some themes that have not been sufficiently included, as well as political perspectives, will be integrated in the next round. In conclusion, the draft research agenda should be further improved and amended according to the contributions delivered by the scientific thematic groups; it should also reflect and assess political management aims, in particular the needs of the Wadden Sea World Heritage site.

The WSF supports this interdisciplinary and transnational initiative which appears to be fairly unique in the global scientific world. We suggest that adequate political support should be given to the research agenda, not least financial support, and that the appropriate dissemination of insights and recommendations should be encouraged to improve actions and strategies for a sustainable future in the WSR.

The WSF itself has established a healthy exchange with the scientific community to jointly work on specific issues. The planning portal, climate atlas, indicator tool and the work on risk management have received tremendous support from research colleagues and the WSF envisages to deepen this network.

3.6 Wadden Sea Forum

65. **Take into account** the activities and recommendations by the Wadden Sea Forum on sustainable development and participatory processes, in particular with regard to:

    - The WSF Integrated Coastal Zone Management (ICZM) Strategy for the Wadden Sea Region as an independent stakeholder concept of the WSF, aiming at sustainability objectives on ecology, economy and society, to achieve that economic activities take great social responsibility and safeguard natural ecosystems and cultural historic landscapes. In this respect it is **appreciated** that the WSF will further elaborate on the sustainability indicators and its assessment as well as promote the Wadden Sea Region Planning Portal with the visualisation of economic uses and protection schemes on transnational level.

    - The efforts and recommendations of the WSF to contribute working towards a CO_2 neutral Wadden Sea Region as envisaged by the governments.

    - The work of the Forum on clean shipping and shipping safety

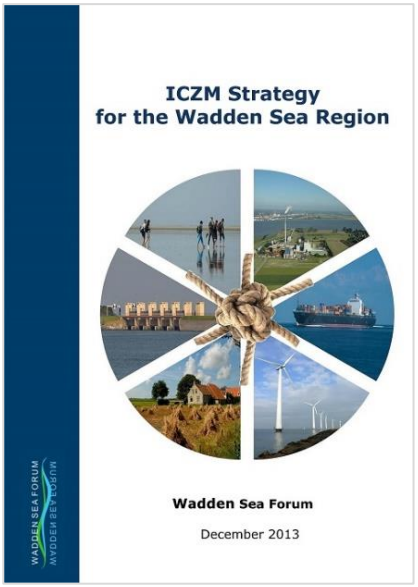
66. **Continue to support** the cooperation with WSF as an independent stakeholder organization in working towards a sustainable, environmental friendly Wadden Sea Region.

67. **Acknowledge** the work of the Wadden Sea Goose Management group and **note** the recommendations for future goose management within the trilateral Cooperation Area.

68. **Observe** that many of the recommendations relate to conditions which are outside the trilateral Cooperation Area.

69. **Encourage** the responsible authorities to evaluate and where appropriate implement the recommendations.

The **Wadden Sea Forum** has delivered an ICZM strategy for the Wadden Sea Region in December 2013 with recommendations on policy and planning integration, integrated management, partnership and monitoring. The strategy was welcomed by the TWSC, and the WSF was encouraged to further elaborate on key topics (§65). Responsible local and regional governments and stakeholders were encouraged to implement the recommendations.



Hence, the Forum continued its efforts to work towards greater sustainability in the Wadden Sea Region, with specific activities in the following fields:

Climate change and CO_2 reduction measures were important topics and are described earlier in this report. The Wadden Sea Region Climate Atlas, elaborated and provided by research colleagues from the "Norddeutsches Klimabüro" of the HZG builds a sound basis for a climate related debate within the WSF.

Shipping safety, clean shipping and green ports concept play a substantial role in sustainable developments along the Wadden Sea coast. Developments in this fields are described earlier in this report too.

Emphasis was given to **sustainability indicators** as an instrument for measuring success in environmentally friendly developments, and to encouraging local and regional governments as well as stakeholders to strengthen their work in this field. In cooperation with universities, the WSF compiled local and regional sustainability data from more than 570 municipalities in the Wadden Sea Region and analysed 9 municipalities in detail. Results were analysed in close cooperation with the municipalities, reflecting local characteristics and knowledge. A more detailed description is given in a separate report (see part 3).

Goose management and the task of minimising conflicts between the agricultural sector and nature conservation has been a focus of WSF's work over the years. The WSF has delivered a comprehensive **trilateral goose management scheme** for the WSR, but it turned out that implementation in the entire region caused many difficulties.

As a consequence, the WSF supported the implementation of a goose management platform on AEWA level to aim at solutions on the international flyway level. The

Netherlands, Denmark and the state governments of Schleswig-Holstein and Lower Saxony supported the AEWA approach and invested in the implementation of the management platform. Presently, a goose management plan for the two goose species with most conflicts in the WSR, barnacle and graylag geese, is under development. The WSF strongly recommends to proceed with the implementation of the plan being supported by the Wadden Sea governments.

Regional identity in the Wadden Sea Region was and still is on the WSF agenda as it is highly valued by the Wadden Sea society. The WSR has a rich cultural history and outstanding natural values. These are tremendous assets which can be used to keep the region a living region and its society sustainable. At the same time the region has to face up severe demographic changes, avoiding negative impacts and meeting upcoming challenges.

The WSF has worked on the issue of **demographic change** for some years now, and has recently carried out an online survey on perceived threats to the development of the region. Deficits in development and decision-making are analysed together with local and regional representatives in order to find workable solutions. A first report on demographic change (see part 2) highlights the status of discussion within the WSF.

In cooperation with the Helmholtz-Zentrum Geesthacht (HZG), the WSF was part of the European research project ENHANCE with focus on "enhancing risk management partnerships for catastrophic natural hazards in Europe". Cooperative activities were concentrated in a case study on **Risk Management** in the Wadden Sea Region. The aim was to foster broad discussions and to sensitise stakeholders across sectors towards different risks in the WSR. Another aim was to enhance the transnational exchange of knowledge and experiences. Three stakeholder workshops on risk management were held. The WSF plenary identified its role as ambassador and communicator of best practice examples in risk management in the WSR. Detailed results are available on the WSF website: https://www.waddensea-forum.org/topics/projects/enhance-project-2014-2016 (as of March 2018).

Reflecting all achievements of the last years, the WSF is continuously working on its **self-conception** to enhance its portfolio and to increase its visibility in the WSR. It is obvious that focus on the most relevant issues and the elaboration of a clear mission statement and WSF position will increase commitment within the WSF and its influence on decision-making.

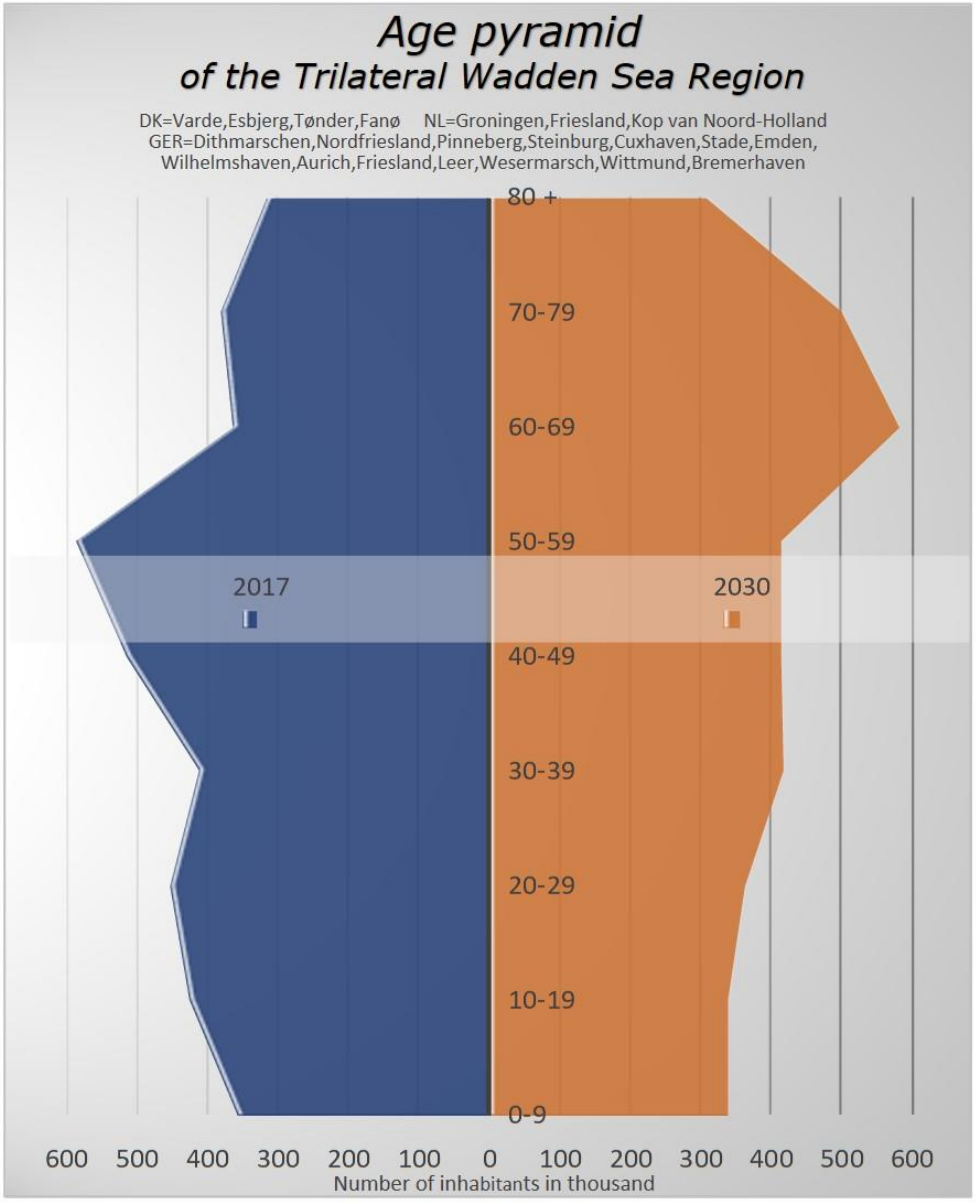
4. Leeuwarden Declaration and Future Outlook

The Trilateral Cooperation is aware of the need for more sustainable developments in the Wadden Sea Region in order to meet the objective of safeguarding natural and cultural assets in the region. This is highlighted in an extensive chapter on sustainable development in the Leeuwarden Ministerial Declaration. There is also a recommendation to cooperate with the scientific community and stakeholders to increase the sustainability of the Wadden Sea Region. The Wadden Sea Forum welcomes these political aims and is ready to engage in close collaboration in order to sustainably develop our coastal region.

For the future development of the Wadden Sea a World Heritage Partnership Centre is envisaged, with a Partner hub as a network to complement the governmental level. The Partner hub intends to initially include representatives of environmental NGOs, science, education, tourism sector and the WSF.

The WSF offers its full support to the TWSC. In our understanding, the WSF can play a substantial role in the planned World Heritage Partnership Centre. There is mutual understanding of the importance of sound development in the WSR, based on sustainability principles and supported by the public at large. As a representative of many stakeholder groups, the WSF can act as a multiplier of ideas and engage constructively in implementing and fostering the stated political goals. We understand ourselves as a facilitator and a point of contact to many stakeholders in the WSR; this is where we invest our time and resources. The WSF strives for appreciation at the governmental level and recognition of the advice it delivers regarding sustainable development. We hope that for the future, our passionate engagement will be acknowledged and appreciated, and that a suitable and sustainable institutional and organizational frame will be provided.

Demographic Change in the Wadden Sea Region



Working Group
„Integrated Coastal Zone Management"

March 2018

1. Executive Summary

Based on the conduction of several workshops the Wadden Sea Forum identified different risks and challenges in the Wadden Sea Region. Besides the threats of natural hazards such as storm surges and fluvial floods demographic change was identified as another major challenge in the Wadden Sea Region (WSR).

Demographic Change is a cross-sectoral and multifaceted challenge for all communities, especially in the Wadden Sea Region. It touches all parts of human live in the coastal area such as employment (quality and quantity regarding both employees and employers), public services (e.g. infrastructure for public transport, drinking water and energy supply), neighbourhood and cultural identity of communities and, of course, the health and care sector. Hence, the basic processes of demographic change pose risks to the most communities in the WSR. But, the effects of demographic change are not showing the same characteristics in all the communities.

To adequately deal with the processes, implications and characteristics of demographic change in the WSR have to acknowledge that, on the one hand, there is sparse knowledge about the full range of characteristics of demographic developments and their implications in the region. On the other hand, demographic change is slowly but continuously emerging as new political topic. Therefore, the Working Group "Integrated Coastal Zone Management", ICZM of the Wadden Sea Forum embraces this topic in order to initiate a comprehensive and attentive treatment of this topic.

The Working Group ICZM of the WSF is not able to adequately deal with the topic of demographic change on its own, but likes to encourage the plenary of the Wadden Sea Forum and the Wadden Sea Board to seriously take the topic of demographic change on board and initiate further steps in a short period of time.

Important recommendations of the Working Group ICZM in the light of demographic change in the Wadden Sea Region are

- to **consider** that the characteristics of demographic change differs within each community of the Wadden Sea Region and, hence, there is no "one-size-fits-it-all" solution but tailor-made approaches are required;
- to **actively support** the initiation of trilateral basic research projects within a short time of period to better understand the implications of demographic change on the Wadden Sea communities;
- to **encourage** that research insights and findings are adequately transformed into the societal environment, especially to be considered in political decision-making.

2. Introduction

Widening the perspective in risk management towards broader and more people-centred approaches has been, and still is, a general endeavour - underlined amongst others by the recently published Sendai Framework for Disaster Risk Reduction 2015-2030 (UN-General Assembly 2015). The complex and dynamic nature of environmental as well as socio-economic problems and risks resulting from natural hazards, requires flexible and transparent decision-making that embraces a diversity of knowledge and values in order to successfully deal with the effects and impacts of these problems and risks on the society. In order to facilitate such processes, enhanced stakeholder involvement is required (BBSR 2009, 2010), as much as the understanding that participation and societal support have to be understood as crucial for successful risk management processes (Young 1998; Höhn, Mai, und Micheel 2008; Wehn u.a. 2015; Sarzynski 2015; Gerkensmeier und Ratter 2016).

In several workshops, the WSF defined the Wadden Sea Region as multi-risk area, considering natural hazards, spatial conflicts, climate change and demographic change. The latter has been taken as the most serious uncertainty; the society has to deal with it in the future.

Regarding demographic change, no management processes are in place across the national borders, even though risks appear on a trilateral scale and affect all three countries in a comparable way (van Dijk, Broersma, und Mehnen 2016). Based on this situation, the need for enhanced coastal risk management processes in the WSR becomes apparent, especially according to demographic change. In this spirit, it is appropriate to question whether the current understanding and structures of risk management are sufficiently encompassing the implementation of risk management processes in the form of cross-national and more integrative approaches.

3. Coastal Risk Management in a Broader Sense

Today's understanding of coastal risk management is mainly concentrated on fighting against natural hazards such as storm surges and river flooding's, especially in the trilateral WSR. But, the WSR is a populated area and also a living and working environment for people. Therefore, risk management in coastal areas, and especially in the WSR, has to consider further risks, which are, for example, linked to demographic change. In general, steps for a successful (coastal) risk management include:

- Identification of risk scenarios
- Risk assessment – impacts
- Evaluation of causes and consequences
- Adaptation to causes
- Mitigation of consequences
- Definition of responsibilities
- Recommendations and advice to political level

4. The Role of the WSF in Coastal Risk Management

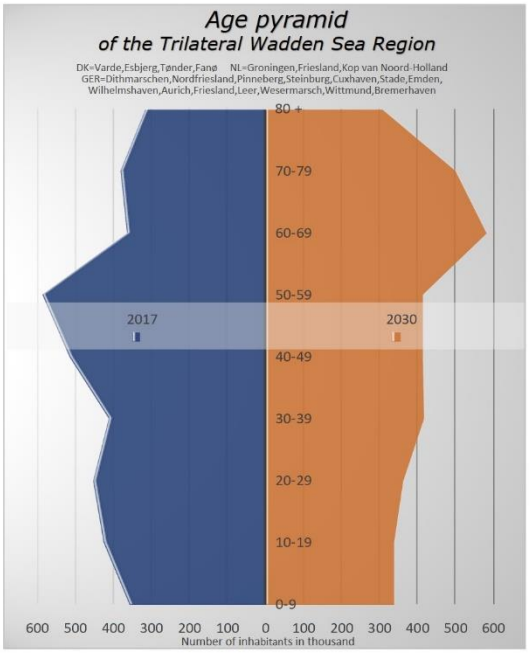
Within a series of workshops introducing (coastal) risk management in a broader sense in the WSR, the WSF members in this respect clearly assigned a substantial role for the WSF in the future. The members assumed to have sufficient capacity in defining relevant questions to the responsible policy makers in the WSR. Emphasizing on this aim, activities of the WSF in (coastal) risk management should

- deduce urgent issues which need to be addressed by risk management activities by discussing and reflecting ongoing processes in the WSR;
- raise awareness to these urgent risk management issues within stakeholder organizations and administrative bodies by using the WSF network and contacts. Also the political weight and role of the WSF should be used;
- formulate policy advice or statements which highlight the position, concern, request of the WSF;
- act as a communicator, ambassador and multiplier to forward the advice to the responsible recipients.

The WSF's work on risk management will be facilitated and guided by the ICZM working group. As a first step, it is agreed to elaborate on demographic change as a major uncertainty in the Wadden Sea Region.

5. What is Demographic Change?

Demography is the science of populations[1]. Therein three processes constitute the main focus of investigation I) the rate of birth, II) the ageing and III) migration. These processes provoke changes in the composition of societies. Changes per se are neither bad nor good, but given a certain status changes might demand for adaptation to new circumstances.



If the rate of population growth is positive, investments in infrastructure and services are required to enable adequate living and working. Population growth, e.g., coincides with a higher birth rate than rate of death. Today, due to increasing insights and innovation in medicine and sanitation people's life span is growing, e.g. approx. 100 years ago the life span was 45 years, nowadays life span ranges between 76 (man) and 82 (woman)[2]. For example, in 1950 approx. 8,000 people were older than 100 years, for 2050 it is forecasted that approx. 760,000 people will be older than 100 years[3] with a constant population number. Consequently, due to decreasing rate of birth and an increasing life span the western society is getting less, older and multi-coloured[4]. The latter aspect is caused by (im)migration. The reasons for migration are multifaceted and won't be in the focus of this paper. Nevertheless, migration encompasses the movement of people within their own country as well as the emigration (moving to other countries) and immigration (moving into a foreign country). To conclude, the composition of the society is under change and the task of politics and administration is to find and implement adequate solutions. Insights and relevant conclusions for sound political decision-making should be backed by scientific research.

[1] See www.demogr.mpg.de (access: 17 Feb 2017)
[2] See Niedersächsischer Landtag [Nds LT] (2007)
[3] See www.bpb.de (access: 17 Feb 2017)
[4] See Niedersächsischer Landtag [Nds LT] (2007)

6. General Characteristics of Demographic Change

In this part we depict some spotlights to show how variable and diverse the change of characteristics of the above mentioned processes might be. Higher birth rates after World War II led to an increasing population in Europe and, thus, demanded for investments and extension in e.g. education facilities. Nowadays, the birth rate is decreasing, in some municipalities primary schools have to be consolidated which, e.g., led to long distance travel and demands probably for new public transport concepts. The prolongation of life span demands for adapted services and new health-care facilities in municipalities and cities. On the one hand, people are getting older and some of them need support and outpatient care. On the other hand, wealthy and healthy older people like to move to different places, e.g. to the Wadden Sea coast, to spend their twilight years and enjoy their retirement. Thus, demographic change might create chances for municipalities to enliven the community by adapting to these developments. Negative consequences should not be concealed. Permissive movement of people show advantages as well as disadvantages. For example, young people looking for attractive jobs move from remote rural areas into cities. Consequently, employers in more rural areas are facing the problem of finding adequate and enough employees. To conclude, many challenges occur with changes in demography. The consequences and effects generated by the above mentioned (main) processes are multifaceted. Therefore, demographic change is a cross-cutting task which emanates and affects various sectors and demands for reaction on each level of administration (including different units such as spatial planning, health care, public transport) and politics.

For the WSR some of the above mentioned, generally, described aspects are valid. The characteristics of demographic change will be different in each Wadden Sea municipality and city (van Dijk, Broersma, und Mehnen 2016). To start a discussion on the main causes and consequences (either negative or positive) and their specific characteristics in the WSR an example will highlight the possibility on how to deal with these challenges. The permanent WSF working group ICZM will be responsible for risk management with the emphasis on demographic change and invites all members of the WSF to contribute to the joint task of adequately adapting to the challenges of demographic change.

7. Methodological Approach

From a methodological perspective, the analysis of risks could be supported by the structure of a bow-tie analysis. The bow-tie analysis is a commonly used risk assessment technique of the International Organisation for Standardisation IEC/ISO 31010. It is used to analyse causes and effect pathways of risk and enables the users to develop a common, sound understanding of the differentiation of risks, their causes and consequences (IEC/ISO 2009). Moreover, it facilitates the identification and analysis of the system of management controls which is necessary to adapt to the causes and to mitigate the consequences.

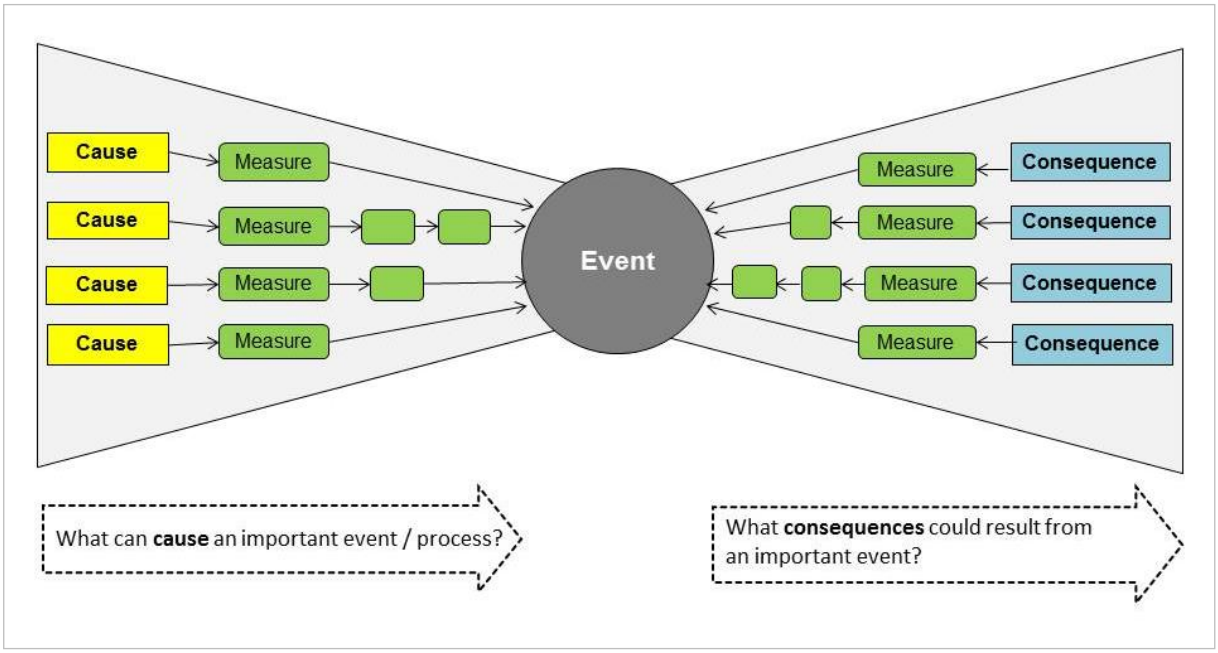


Fig. 1: Schematic overview of the essential elements of the bow-tie diagram (based on IEC/ISO 2009*). The centre represents the event/challenge (e.g. demographic change) society has to cope with and which has the potential to cause damage to society or the environment. Causes of the event are described in the yellow boxes on the left side of the diagram; measures to adapt to these causes are included in a 'barrier-position' (green box) between the cause and the event. The right side of the diagram depicts the consequences of the event (blue boxes), mitigating measures minimizing or preventing the consequences from occurring are included as a 'barrier' between the event and the consequences. Source: Gerkensmeier and Ratter (2016).*

In practice, the bow-tie analysis is particularly beneficial due to its capability to structure and visualize the essential elements of risk and to show the complexity of risks in a schematic, clearly structured manner (Fig.1). Figure 2 indicates that the WSR is suffering the causes of demographic change.

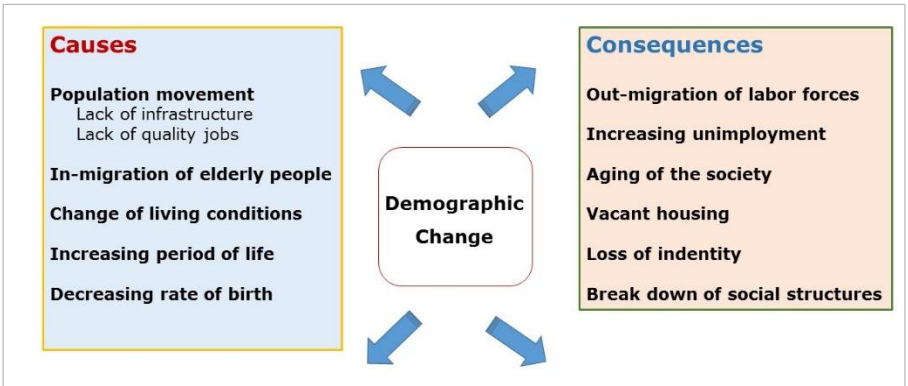


Fig. 2: Possible causes and consequences of demographic change

Figure 3 shows the population growth in the WSR between 2002 and 2013. The perceived causes and consequences discussed by the WSF members and displayed in the figure below represent a starting point of the discussion. First discussions started in the IZCM working group followed by a debate in the WSF plenary.

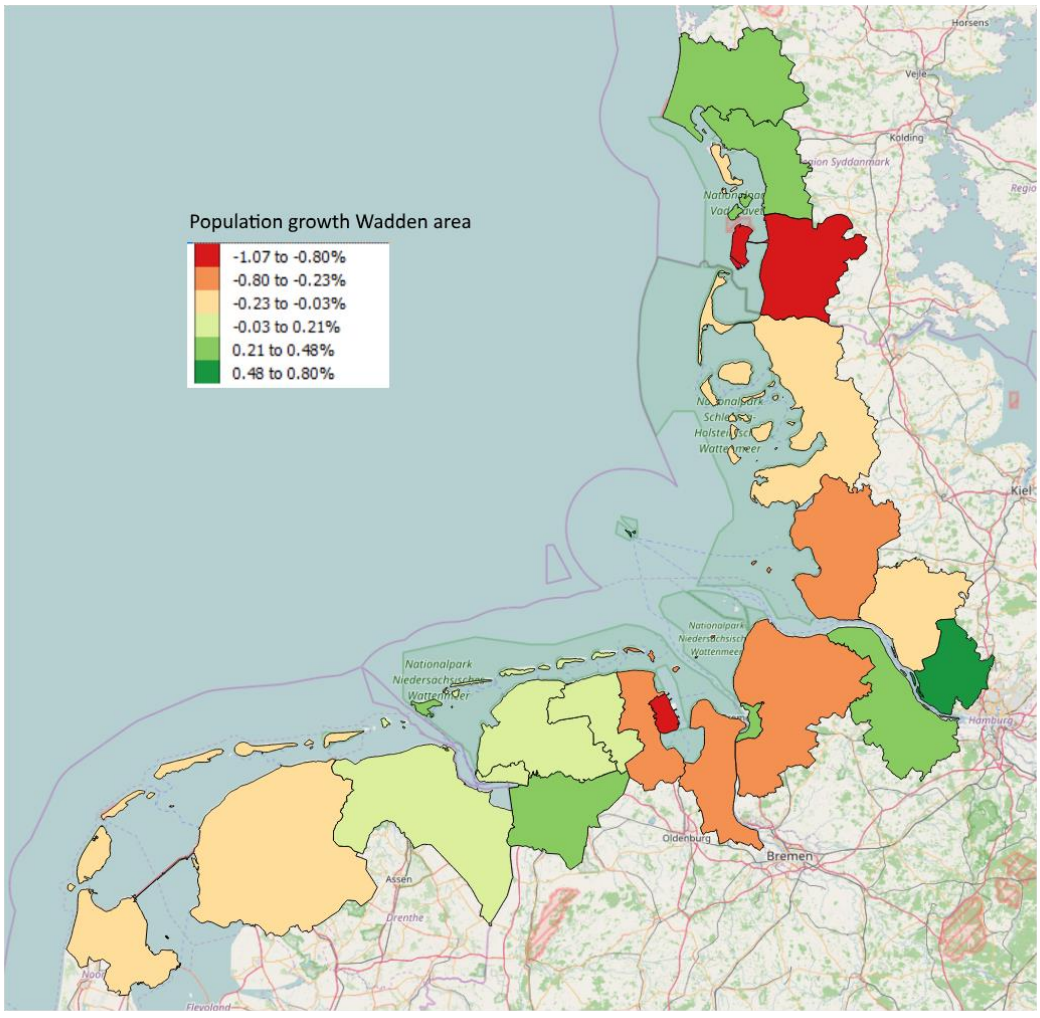


Fig. 3: Average annual percentage population growth between 2002-2013 in the Wadden Sea Region; Analysis by WADDENACADEMIE, Frans J. Sijtsma & Minne Oostra

8. Characteristics of Demographic Change in the Wadden Sea Region

Applying the Sustainable Indicator Tool

The WSF has implemented a sustainability indicator tool to measure the progress in sustainable development within the trilateral WSR. The data sets of the indicators can measure and evaluate the development of the ecological, economic and social conditions in the WSR. The indicator tool contains data sets of 17 main indicators and 33 sub-indicators from 2003 to 2014.

The Wadden Academy, in cooperation with Telos, has developed an indicator tool for the Dutch coastal region (i.e. Waddenbarometer). Telos carried out an assessment which delivers results about causes and interdependencies between different indicators. The Dutch approach has been transformed to the WSF indicator tool and in a first phase, data for more than 60 indicators have been collected for some 570 municipalities in the German Wadden Sea Region.

Relevant data for demographic change can be extracted from the indicator tool data base to provide a basic snap shot of the situation on local level. Indicators for, e.g., economic and social structure, labour, health and education can be used to work on causes for changes in demography. For a sound analysis a time series of relevant information is required. In the following paragraphs selected indicators such as population number, the share of older people and the assessment of the sustainability of a community[5] will be used to describe the current situation in selected municipalities in north-western Lower Saxony (East Frisia). To exemplify the practicality of this tool two cities (Norden and Wittmund), one municipality (Krummhörn) and two East Frisian Islands (Norderney and Spiekeroog) were selected.

[5] For detailed explanation see www.waddensea-forum.org

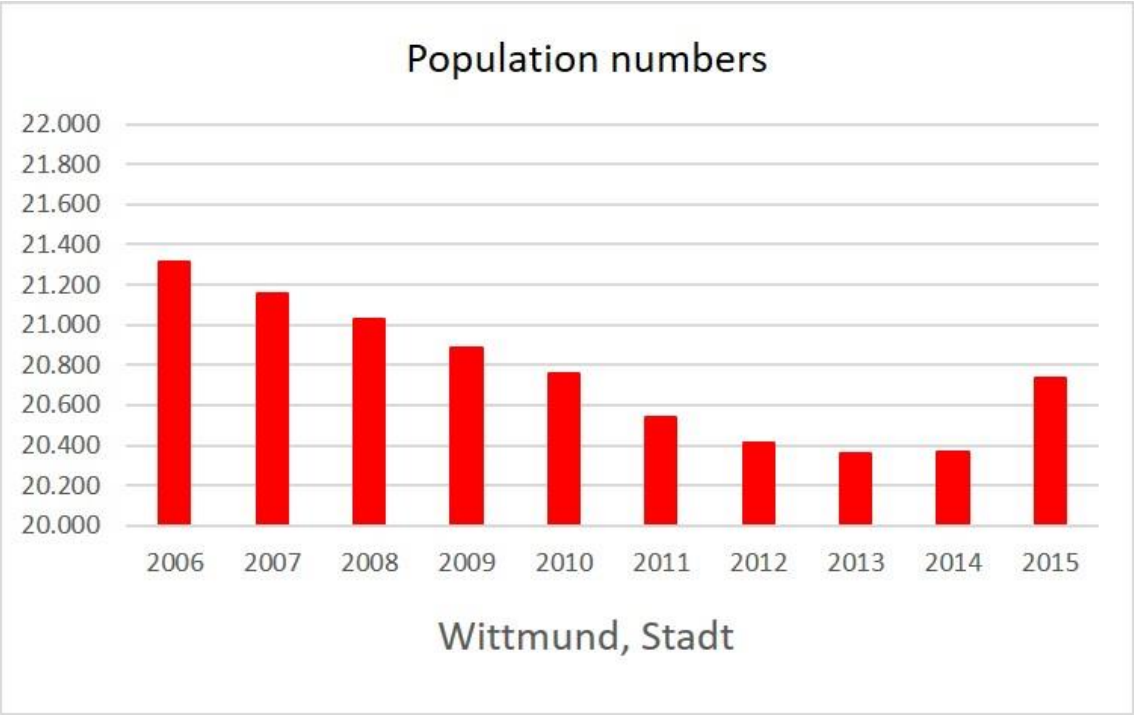


Fig. 4: Development of the opulation in Wittmund (city) from 2006 to 2015

The number of inhabitants for the city of Wittmund is declining from 2006 to 2014, almost 1,000 people left the city. In 2015 the number of inhabitants increased about 400 people.

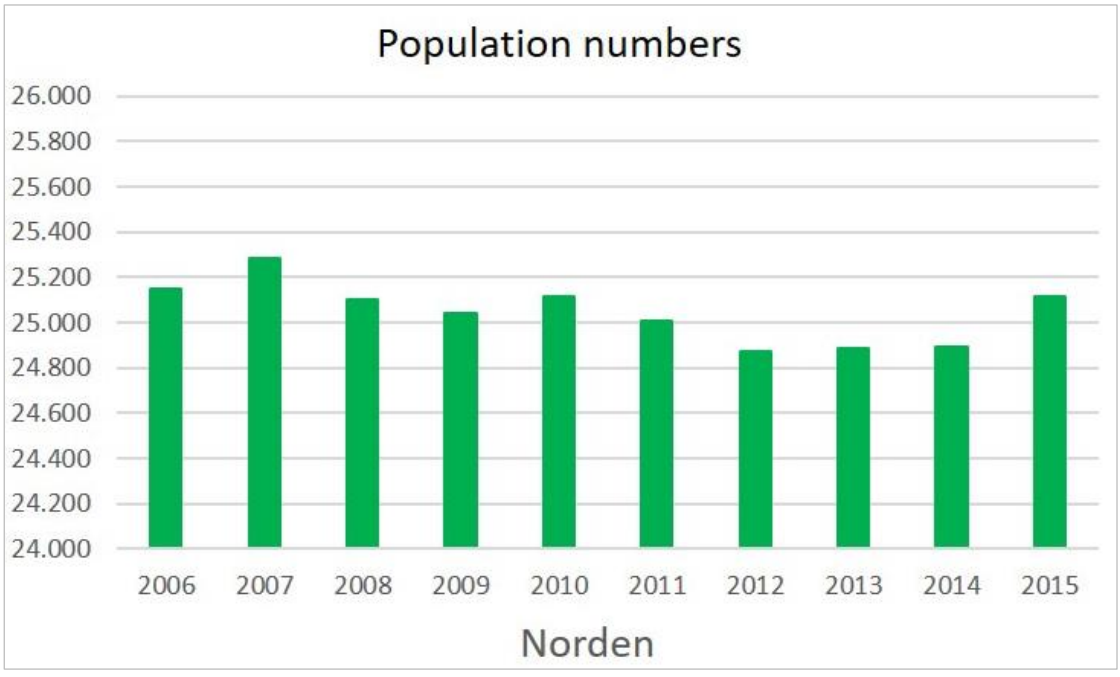


Fig. 5: Development of the population in Norden (city) from 2006 to 2015

The development of the number of inhabitants in Norden (Figure 5) neither shows a decreasing nor an increasing trend. Between 2006 and 2015 the amount almost stays the same. A clear declining trend could be observed for the municipality of Krummhörn, the number of inhabitants almost decreases by 1,000 people between 2006 and 2015 (Figure 6). In comparison, the loss of inhabitants for the municipality Krummhörn increases for the decade (2006 – 2015) approx. 7%, which is in line with the findings indicated in Figure 3.

Hence, it is important to investigate and understand the triggers and the reasons for a continuous declining population in this municipality. For example, on the one hand, the city of Emden in the vicinity offers jobs in different sectors, such as automotive industry. On the other hand, the number of inhabitants in the city of Norden is varying but not decreasing in the respective decade. What are the reasons of this development? Are people from the adjacent municipality of Krummhörn moving to Norden? If so, why? These questions are the reasons why the working group ICZM of the WSF is going to conduct meetings with these municipalities to hopefully get a much clearer picture.

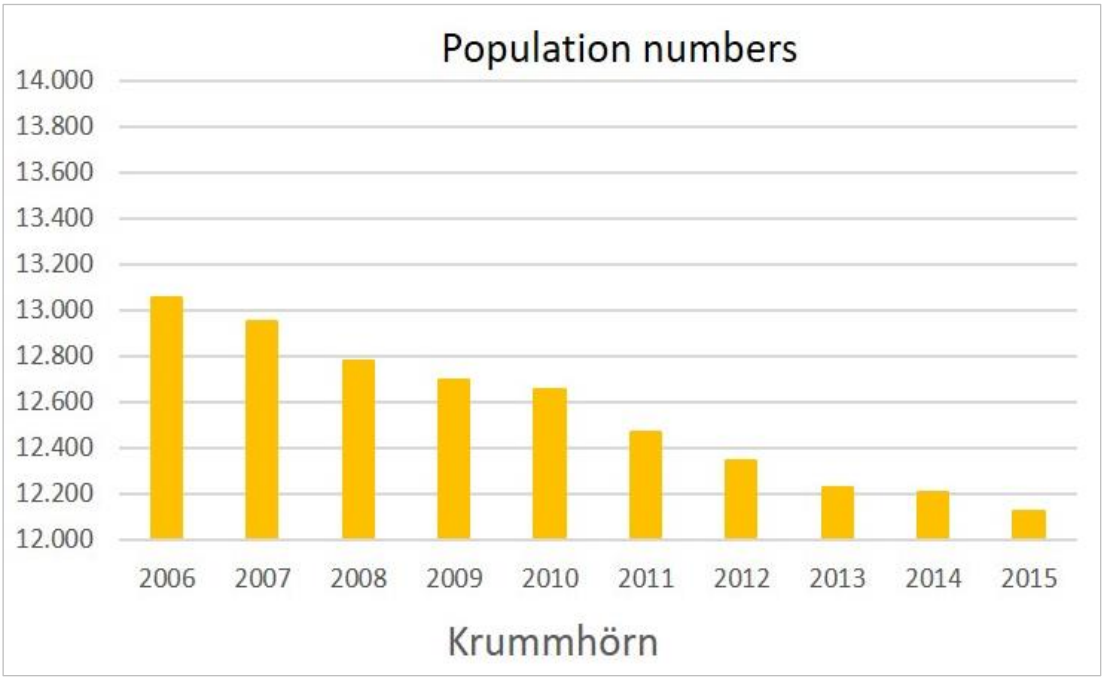


Fig 6: Development of the population in Krummhörn from 2006 to 2015

The developments on the East Frisian Islands also show a different picture. While the number of inhabitants on the island of Norderney almost stays the same between 2006 and 2015, the amount of inhabitants on the island of Spiekeroog grew approx. 150%. Besides that, it is important to acknowledge that the amount of inhabitants on Norderney is almost ten times higher than on Spiekeroog. Therefore, both islands show a different characteristic, which might be a reason for population growth on Spiekeroog.

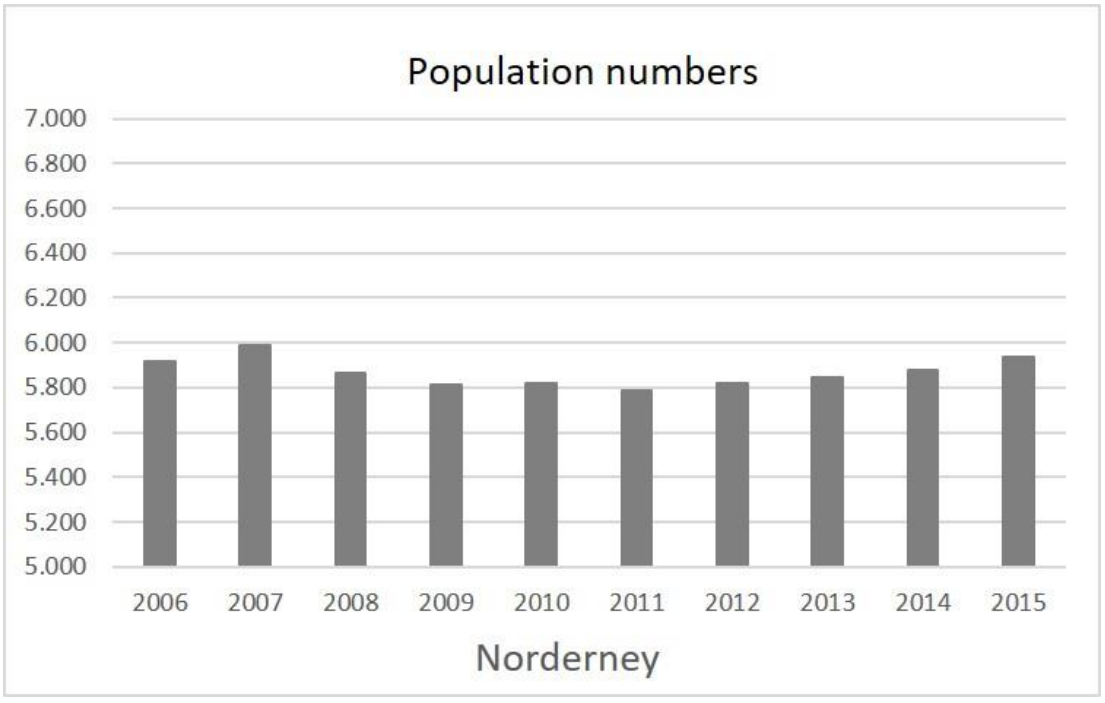


Fig. 7: Development of the population on the East Frisian Island Norderney from 2006 to 2015

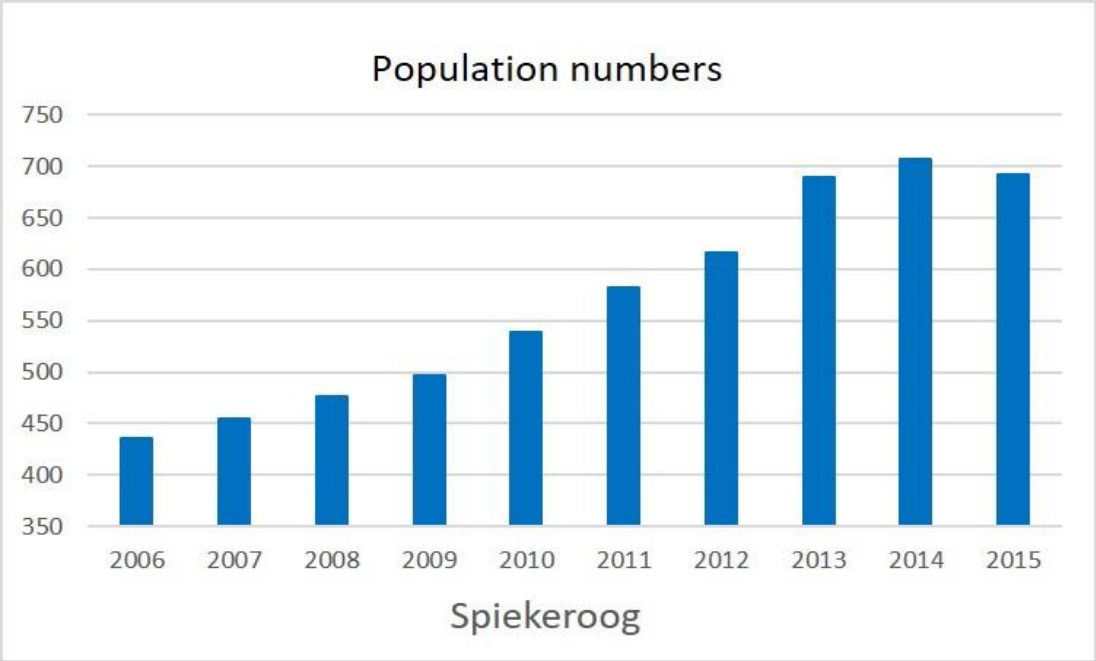


Fig. 8: Development of the population on the East Frisian Island Spiekeroog from 2006 to 2015

Figure 9 shows the share of inhabitants older than 65 years in the respective municipalities. All graphs indicate a clear increase except the graphs of the East Frisian Islands Norderney and Spiekeroog. If we take the diagrams of number of population and the development of the share of people older than 65, a clear difference is shown. The mainland communities are getting older and the amount of elderly people on the islands are decreasing. One could think that not only young people have to leave the islands for (higher) education facilities or apprenticeship; these figures suggest that older people are moving to mainland communities or cities. For the case of Krummhörn, the reasons for the increasing share of older people might be that younger people are moving away, because of the limited offers on the local labour market or other reasons.

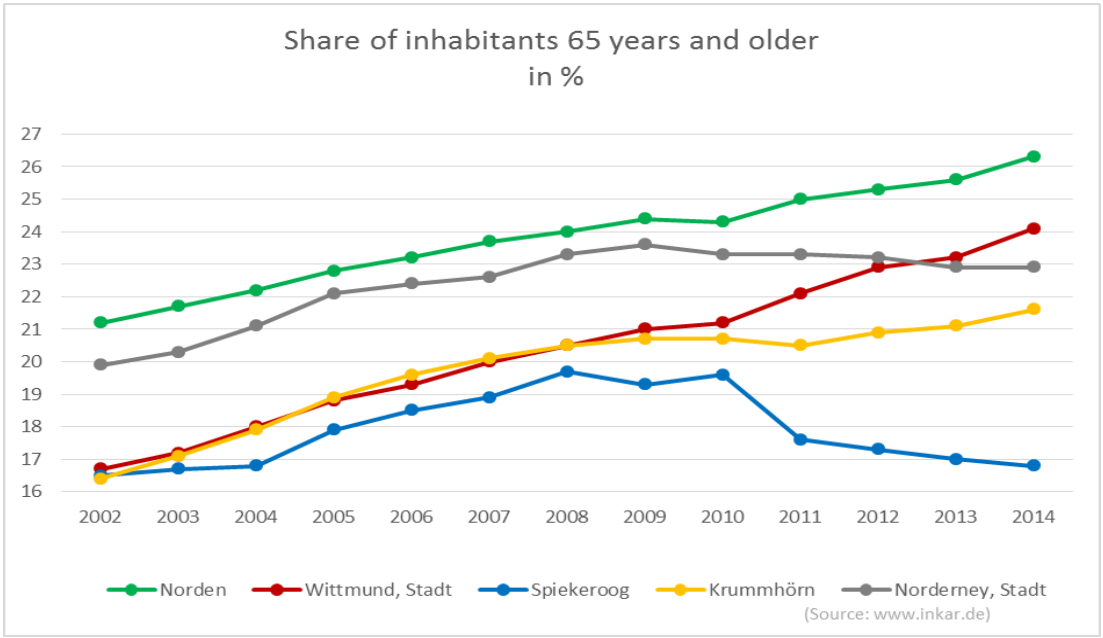


Fig. 9: Aging society, the share of inhabitants older than 65 years

9. Step-wise Approach

The stakeholders and sector representatives of the WSF will discuss perceived risks within the Wadden Sea Region as well as analyse the meaning with regard to future developments. The permanent working group ICZM of the WSF has agreed to conduct a step wise approach in dealing with the topic of demographic change in the WSR.

1. Appoint responsible members of the ICZM working group to take the topic of demographic change further.

2. Get in contact with relevant research institutions:
   Within the last months three different research institutions were approached which are already working on this issue or are strongly interested.

   a. ***University of Groningen***: Meetings with Prof. van Dijk have taken place in 2017

   b. ***University of Oldenburg***: Meetings have taken place with the working group "Applied Geography and Environmental Planning" (Prof. Mose) to foster the cooperation with students and the German research project on demographic change in the WSR "WatNu?"

   c. ***University of Kiel***: Discussions have been conducted with the working group "Social Dynamics in Coastal and Marine Areas", Prof. Klepp strongly holds interest in the topic of demographic change in the WSR

3. Invite local/regional experts from out administration:
   In this respect we invited experts to give presentations on demographic change in WSF meetings.

4. Conducting meetings with selected municipalities.

The ICZM working group likes to encourage the WSF plenary in getting further support and backing in order to adequately deal with the risks and chances of demographic change in the WSR.

10. Recommendations

Based on the previous elaborations the Working Group "Integrated Coastal Zone Management" of the Wadden Sea Forum recommends:

- to **recognize** that demographic change is a cross-cutting and multifaceted challenge for the entire Wadden Sea Region;
- to **realize** that demographic change is a development process whichs effects are linked to both risks and challenges for Wadden Sea communities;
- to **be aware of** that the characteristics of demographic change differs within each community of the Wadden Sea Region and, hence, there is no "one-size-fits-it-all" solution but tailor-made approaches are required;
- to **actively support** the initiation of trilateral basic research projects within a short time of period to better understand the implications of demographic change on the Wadden Sea communities;
- to **encourage** that research insights and findings are adequately transformed into the societal environment, especially to be considered in political decision-making.

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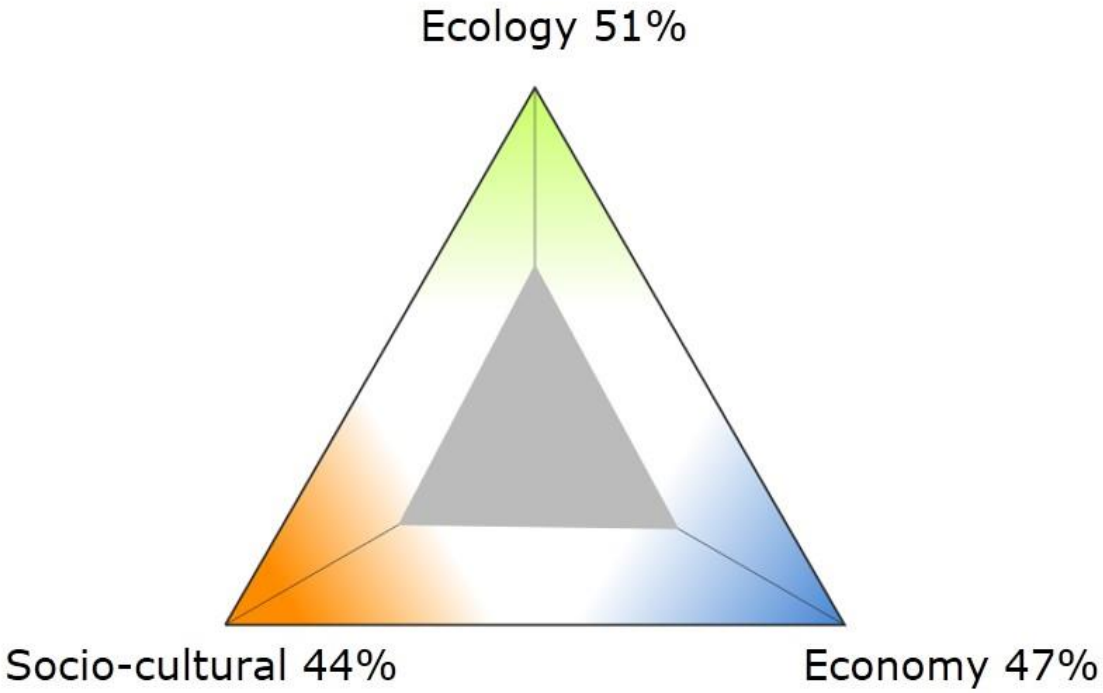
Many publications can be found in respective scientific journals. Further reports, guidelines and other documents can be found on the websites mentioned below.

Information on Internet (excerpt, example Germany)

www.demogr.mpg.de
www.bpb.de
www.wegweise-kommune.de
www.demografieagentur.de
www.bbsr.de

Sustainability Indicator Instrument



March 2018

1. Introduction

Monitoring is necessary to determine whether society is developing in a sustainable way. Sustainable development is a multi-layered and complex issue which is not only about the development of the three distinguished capitals (Ecology, Socio-cultural, Economy), but refers also to changing timescales and spatial dimensions.

The sustainability indicator tool is a valuable instrument to analyze developments and to communicate status and trends in sustainability to stakeholders, politicians and other interested organizations. The degree to which the sustainability requirements are met is measured by using defined indicators. The development of the indicator values over time gives an insight into the direction of the development. The data sets of the indicators measure and evaluate the development of the ecological, economic and social condition in the Wadden Sea Region. Basically, sustainability objectives or norms have to be specified for all chosen indicators and the selection of indicators and their norms have to be discussed on the level the indicators are valid for. Following, an analysis will provide best information about the degree of sustainability.

2. Background

Already in 2002 the WSF has identified a set of trilaterally applicable indicators to measure the status of sustainable development and the progress in achieving the objectives formulated by the WSF stakeholders. For most of the objectives, indicators were defined on trilateral level and the results delivered annual information about the progress or regress of sustainability of the defined regions, including information about specific weaknesses and strengths.

The WSF has assessed data from 2003 until 2014 to show the overall temperature of sustainability over the years in the Wadden Sea Region.

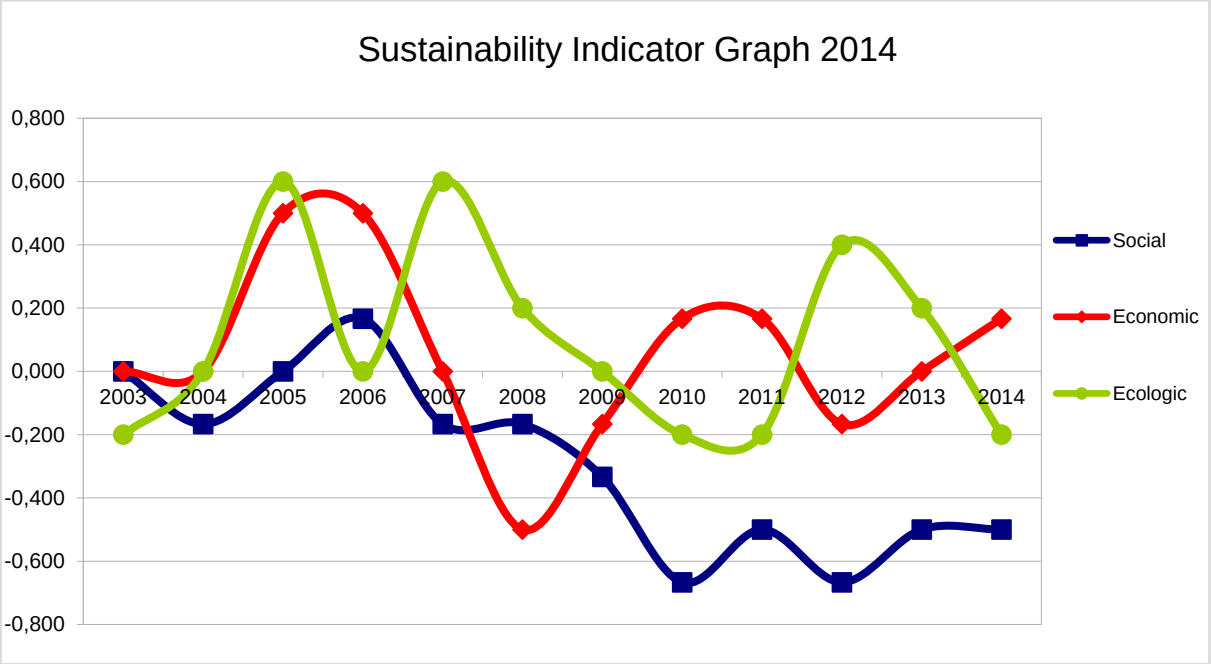


Fig. 1: Development of the three sustainability dimensions over years

The defined 33 indicators were assessed on NUTS-3 level and aggregated to specific themes or so-called stocks, which are given in the table below.

Ecological Indicators	Social Indicators	Economical Indicators
Breeding birds	Demography	Economic resilience
Migratory birds	Education, R&D	Harbour
Mammals	Employment	Infrastructure
Water quality	Local engagement	Rural development
Contaminants in bird eggs	Welfare	Sea traffic
		Tourism

The indicator tool contains data sets of 17 main indicators and 33 sub-indicators from 2003 onwards and was continuously updated and improved according to statistical changes. The data sets were preprocessed in a way that different weights of indicators are considered at the depiction of sustainable development changes. Therefore, indexes and scores were given to the values of the indicators, based on agreements within the WSF. For a further and detailed analysis of the indicator tool highlighting the causes of developments and the interdependencies of indicators on the different levels more specific data and information of developments on the local level would have been taken into account, which was not undertaken for the mentioned period.

3. Adaptive Analysis of Sustainability Indicators

In 2015 the stakeholders of the WSF intensively discussed relevance and value of the indicator tool and agreed to improve the instrument by in-depth analyses to make it more valuable and useful for stakeholders and policy makers on local and regional level. The data should be analyzed taking characteristics of the regions and specific circumstances into account.

Further, the improved instrument should provide an analysis of the different sustainability trends and their causes on regional and local level. This analysis could provide assistance in decision and policy making to strive for more sustainability.

To get the necessary support to elaborate on the new approach, the WSF cooperated with Telos from the University of Tilburg and the institute for geography of the University Kiel. The aim was to use the analysis approach of Telos, who analyzed more than 100 indicators for all Dutch municipalities, also for

the German coastal municipalities. Following, in a first phase data sets for some 65 indicators for 570 municipalities were compiled.

In a second step, analyses for 9 municipalities were carried out. Eight out of nine municipalities are located in Lower Saxony. The reason for this selection was due to a cooperative approach with the Lower Saxony Wadden Sea National Park Authority, who elaborates on development zones of the Biosphere Reserve. The approach of the MAB development zone is similar to the aims of the WSF, to foster sustainable socio-economic development in the coastal region.

4. Methods

The indicator instrument refers to the three pillars of sustainability:

Ecology **Socio-Cultural** **Economy**

The WSF partner Telos describes this as follows:

"*Sustainable development is conceived as a development process that aims to foster balanced growth in the resilience and quality of nature ('ecological capital'), in the physical and spiritual wellbeing of people ('socio-cultural capital') and healthy economic development ('economic capital').*"

These capitals were broken down to themes to accurately measure the developments. For the Wadden Sea Region, 17 themes or so-called stocks have been defined. For these stocks the WSF has formulated objectives or goals, how the stocks should develop to reach more sustainability. The degree to which the sustainability objectives are met is measured by using specific indicators.

The following stocks have been selected for the WSR indicator tool:

Ecological Capital
- Air
- Water
- Waste & raw material
- Nature & Landscape

Socio-Cultural Capital
- Social Participation
- Economic Participation
- Education
- Living Environment
- Safety
- Health
- Art and Culture

Economical Capital
- Labour
- Economic Structure
- Energy & Climate
- Infrastructure
- Competitiveness

For each stock, indicators were defined, in total 67. These are further described below in this report. The whole process of assessing sustainability with indicators has to be and was carefully undertaken through different steps. In general, the capitals have to be sufficiently described by a number of stocks. Experts from the scientific community can support this process to get a full picture, taking into account limiting factors of the analyzed region. In a second step, goals have to be defined for each stock. In most cases, these are long term goals, defined by policymakers and stakeholders, being implemented in 10-20 years' time. Finally, a set of indicators for each stock measure the degree of sustainability of the stock as status quo and preferably in changes over time.

For the indicators, norms have to be defined being able to measure the degree of sustainability. In this process, it has to be discussed whether available national norms would suit the local and regional level too. Health resorts will probably have stronger requirements in air pollution than agglomeration areas and also norms regarding living conditions will differ between national and local level. It is recommended to discuss and reach agreements about the norms with the representatives of the society and stakeholders to have a measureable tool to hand, which can be use in practice. The picture below illustrates the described approach.

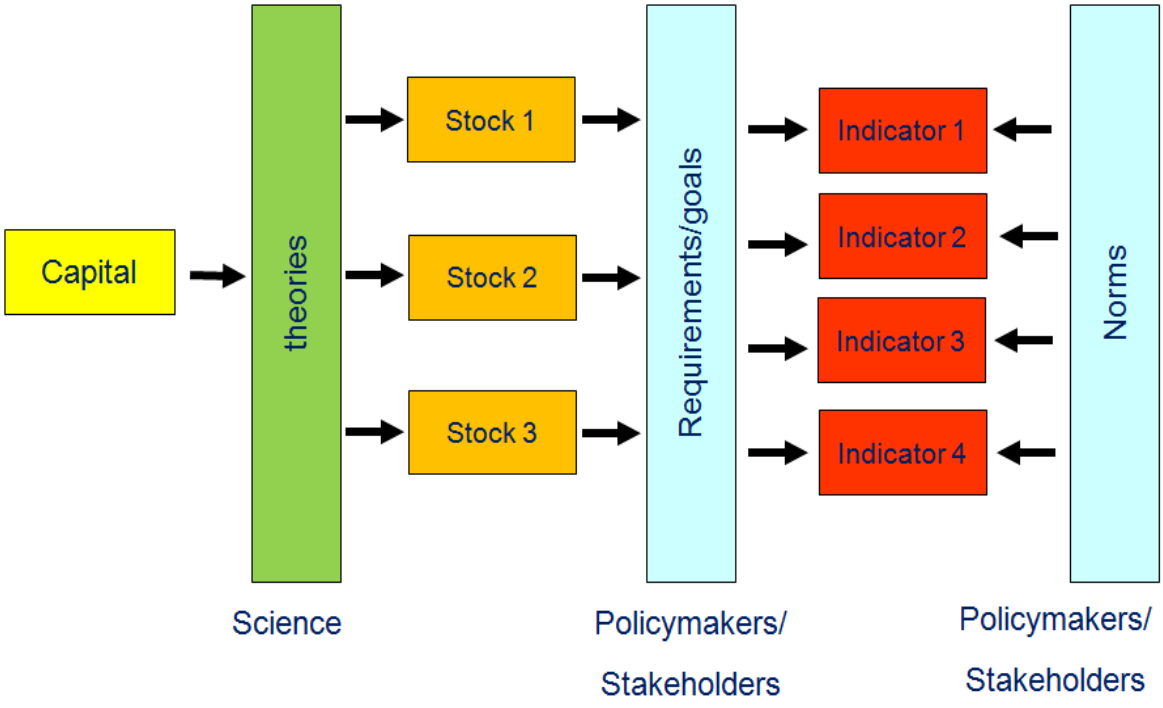


Fig.2: Scheme of indicator analysis

5. Defined Indicators

Working towards the described approach to best measure sustainability on regional and local level, a set of indicators have been chosen, which are region specific and for which public data is available to allow an comparable analysis. The following table lists the chosen indicators of the different stocks.

Ecology		Socio-Cultural		Economy	
Stock	***Indicator***	***Stock***	***Indicator***	***Stock***	***Indicator***
Air	NOx emissions	Social participation	Turnout local elections	Labour	Unemployment
	NMVOC emissions		Turnout nationwide elections		Tertiary education
	GCN O3	Economic participation	Disposable income		Aging of population
	GCN particulates		Social welfare benefits	Economic structure	Agriculture, fishery, forestry
Water	Public water supply		Long-term unemployment		Tourism accommodation
	Sewage treatment	Education	Offer primary schools		Tourist stays
Waste and raw materials	Total amount of waste		Offer secondary schools		Medium and high tech jobs
	Household waste		Early school leavers		Creative industry
	Organic waste		Youth unemployment	Energy and climate	Wind energy
	Recycling material	Living environment	Housing shortage		Solar energy
Nature and landscape	Open area		Recreational area		Gas consumption of households
	Natural terrain		Real estate value		Electricity consumption of households
			Natural population development		Biogas production
			Migration		CO_2 emissions
		Safety	Intentional homicides	Infrastructure and accessibility	Distance to the nearest intercity train station
			Vehicle theft		Distance to the nearest highway
			Robbery		Distance to the nearest airport
			Burglary of private residential premises		Distance to the nearest agglomeration
			Traffic insecurity	Competitiveness	Share starters
		Health	Persons in need of care		Bankruptcies
			General practitioners		Green economy performance
			Distance to hospitals		GDP per capita
			Life expectancy		Capacity universities
		Art and culture	Cultural participation		
			Museums and exhibitions		

6. Introduction to the Assessment

Basis:
Several indicators build a stock (theme) and a number of stocks are added to one of the three capitals. The three capitals are combined to the overall sustainability, e.g. for a municipality.

Example:
Capital is Economy
Stock is Competitiveness
Indicators are GDP, share starters, bankruptcies, capacity universities

First, a scale for indicators is defined. In the WSF approach, this resulted in 4 categories with indicator scores between 0 and 100% of the long term achievable goal:

Desirable (75- 100%)

Acceptable (50 – 75%)

Alarming (25 – 50%)

Unacceptable (0 - 25%)

In a second step values or norms were attached to the individual indicators. In general, norms can be given by national or regional policies but also by agreements within e.g. a municipality, deviating from national standards.

Example of the indicator "persons in need of care":
If more than 300 people per 10,000 inhabitants need care, it is scored as unacceptable on national standard. But if a municipality decided to invest in health care to attract people in need of care, also to provide jobs, a high number of these people is wished. In such a case the norms have to be changed. Another possibility would be to put a low weight on this indicator not to falsify sustainability achievements (see also further below).

Applying this assessment method, each actual indicator score is expressed as a percentage of the sustainability goal achieved.

Following, a total score for each stock is determined by adding the weighted scores from the indicators involved. If there are 4 indicators of a stock and all are weighted equally, which was done in the WSF assessment, each indicator has a weight of 25%. Depending on the agreements, strengths and weaknesses of a municipality, one indicator can be weighted with 40% and the 3 others with 20% each. Important is that the weighting of the indicators of a stock sums up to 100%.

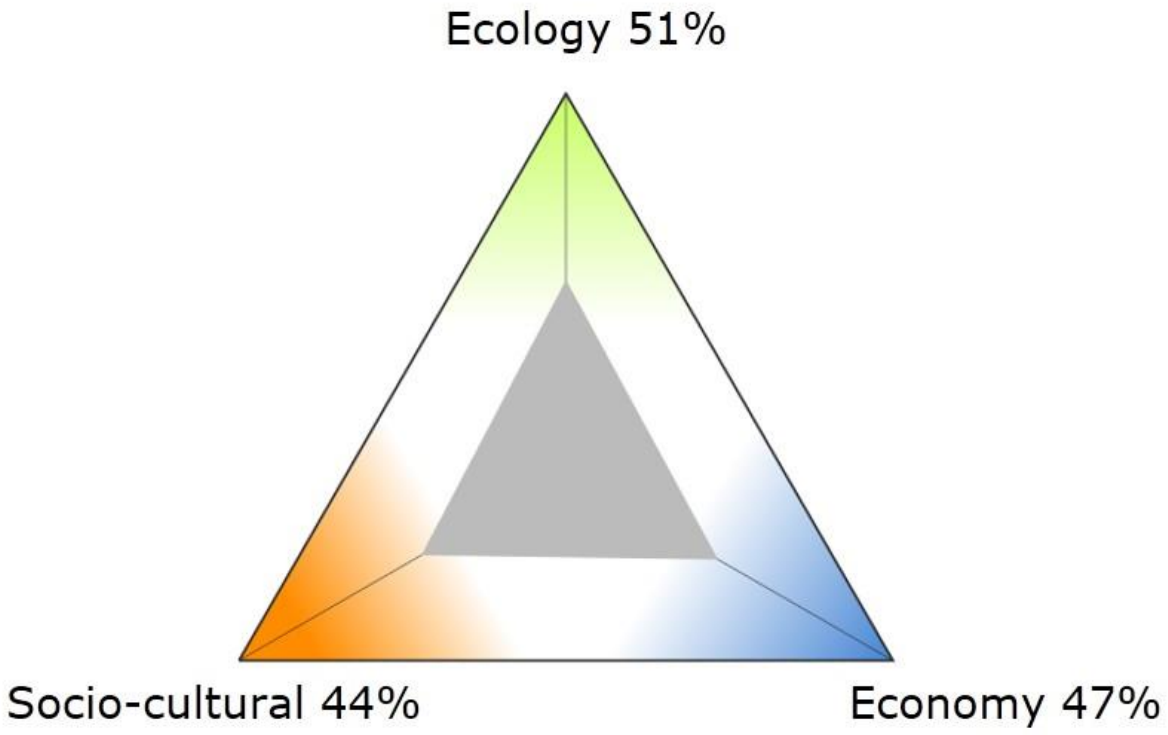
Example of the indicator NOx emissions: The data is collected on NUTS-2 level and a single municipality has almost no influence to control the emissions on this NUTS-2 level. A Wadden Sea island or a municipality along the coast does have clean air conditions and region wide measured emissions does not mirror the real conditions. In this case, the weight of this indicator within the stock air will be calculated lower.

In a further step, the results of the stocks of a capital are added with equal weight to calculate the capital score. (Adding the results and then divided by the number of stocks)

Finally, the three capitals are weighted equally to calculate the overall sustainability score for a municipality, expressed as the average percentage of the overall sustainability goal achievements (Adding the results of the capitals divided by three).

7. First Results of the Analysis of some Municipalities

For a first overview, the degree of sustainability was defined for the entire German Wadden Sea Region. This was done by averaging over the results of all 570 municipalities. The results are shown in the triangle below. The bigger the inner triangle, the better the degree of sustainability (the edges of the outer triangle sum up to 100%). As conclusion, it can be stated that the Wadden Sea Region scores best within the ecological dimension and that sustainable development in economy and social-cultural aspects is lacking. There will be room for improvements and the WSF recommends to assess the causes of lacking sustainability and to discuss the challenges with representatives of the region.



In order to get a step further the WSF has analyzed the status of sustainability of eight municipalities in Lower Saxony. For this exercise, the available data of 2014 until 2016 have been used to get a basis for further discussions about norms and indicator weight with the municipalities itself (see also chapter 6).

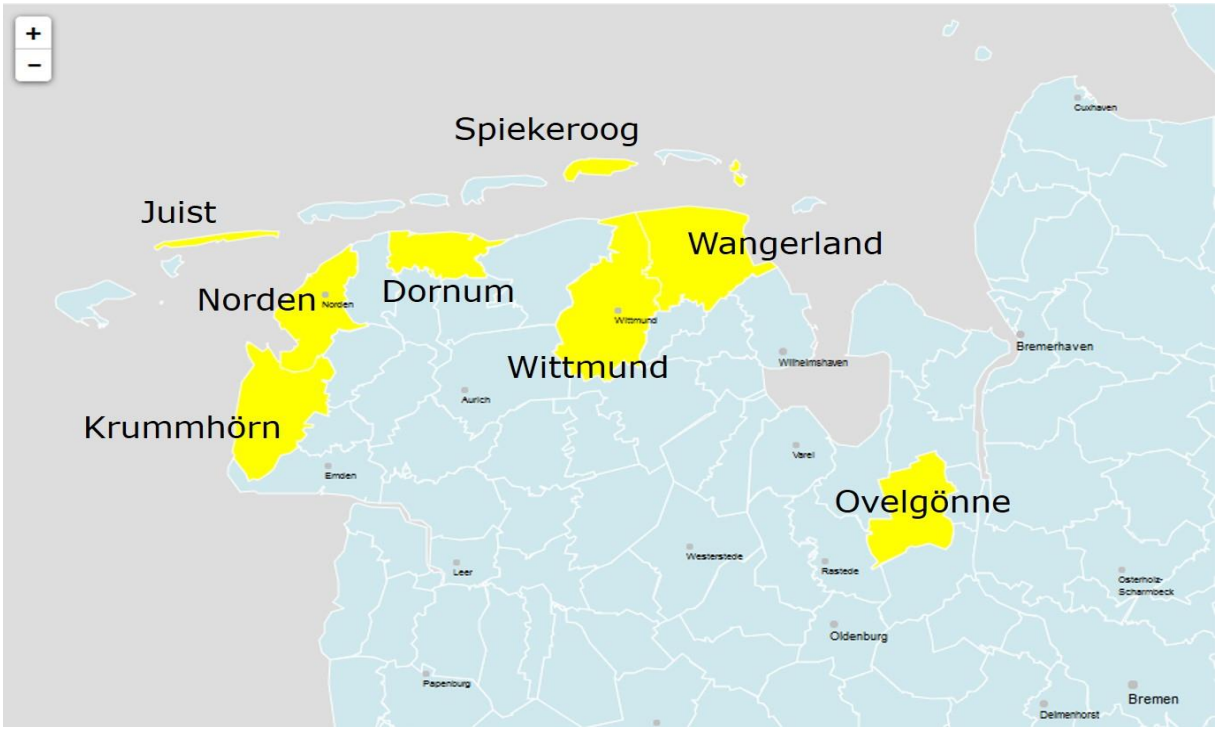
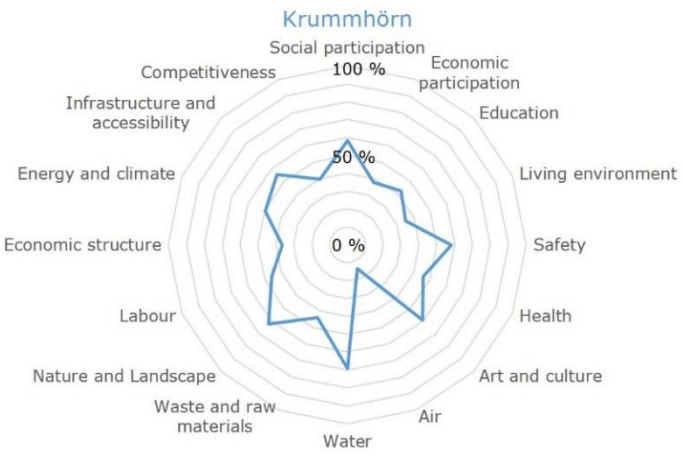
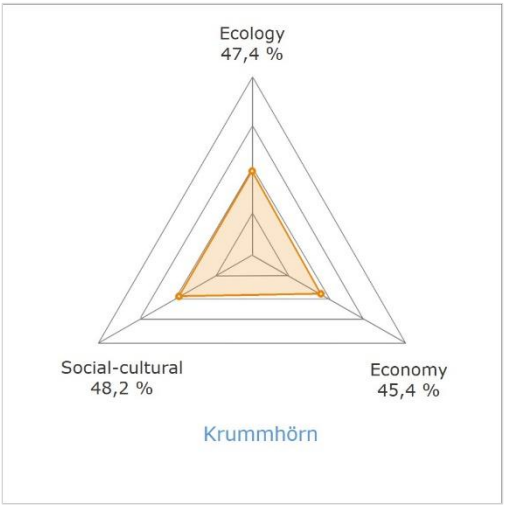
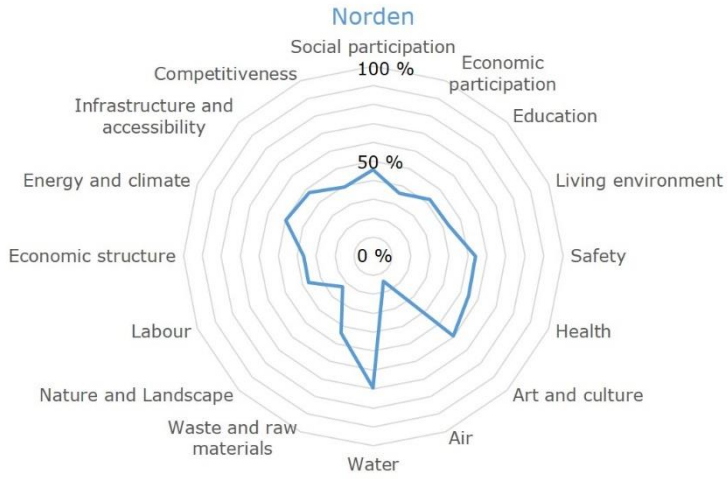


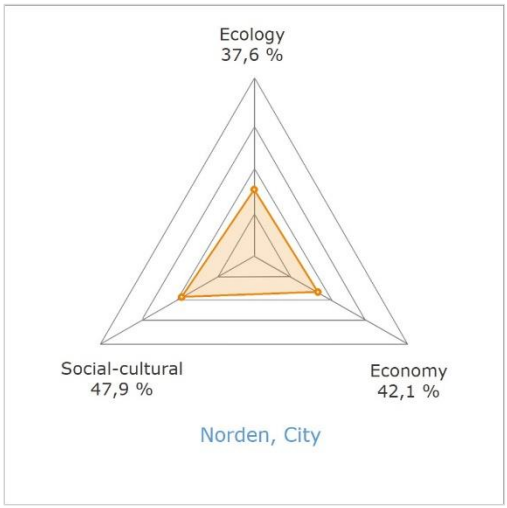
Fig. 3: Overview of the location of the analyzed municipalities

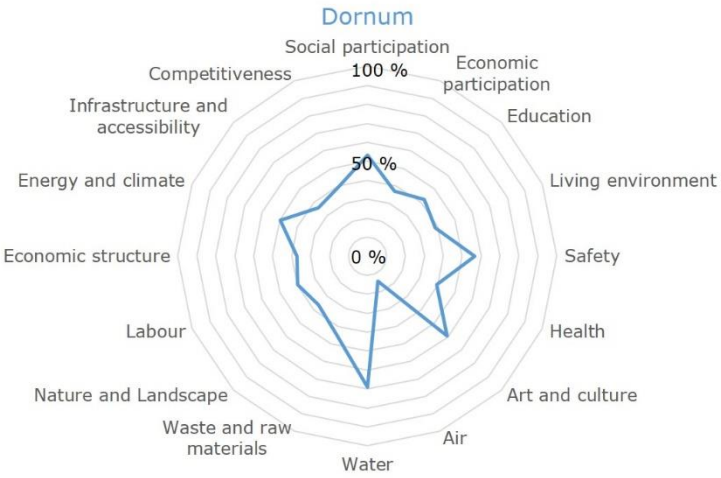
The results about the degree of sustainability of the described municipalities are depicted in different diagrams. The spider net diagrams show the agglomerated values of the indicators for each stock and the triangles show the summarized values for each capital or sustainability dimension.

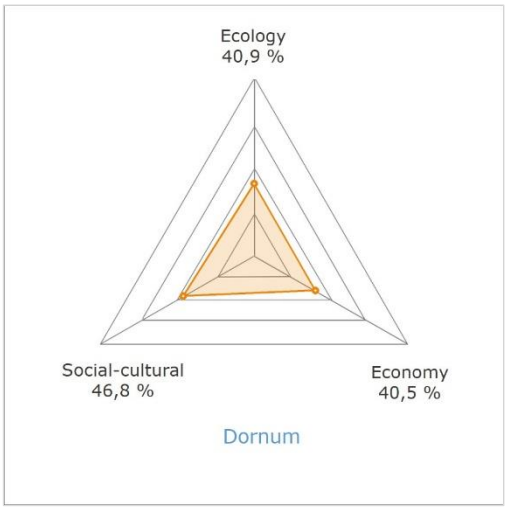


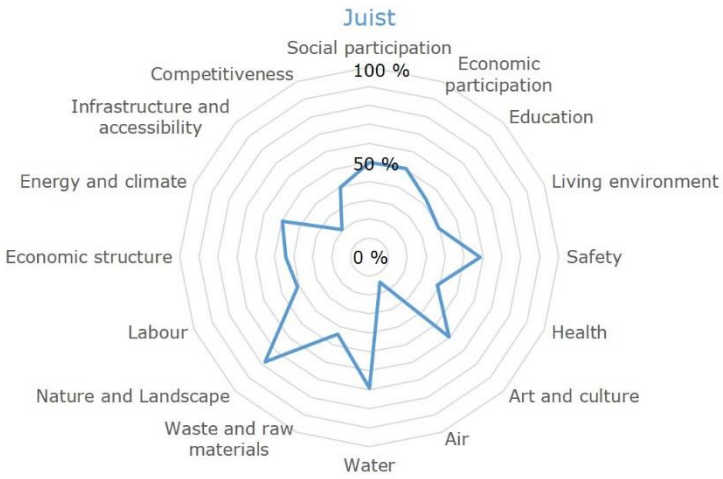


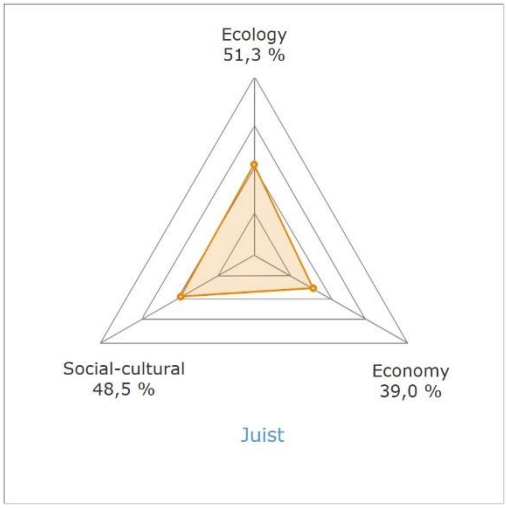

Norden
Social participation
100 %
Economic participation
Education
Living environment
Safety
Health
Art and culture
Air
Water
Waste and raw materials
Nature and Landscape
Labour
Economic structure
Energy and climate
Infrastructure and accessibility
Competitiveness
50 %
0 %

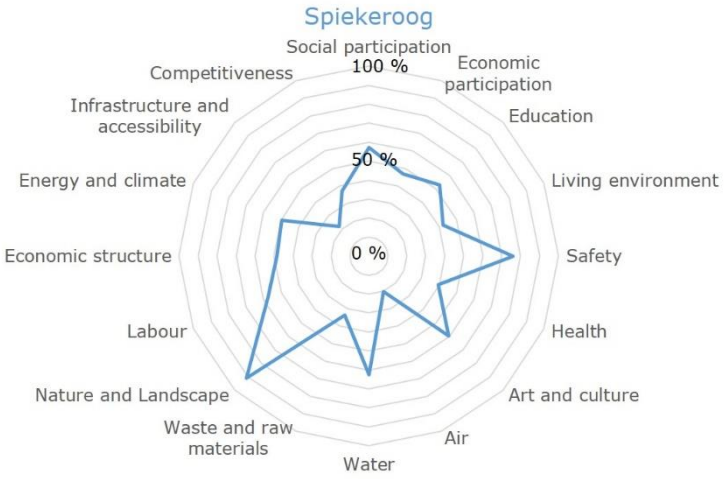

Ecology
37,6 %
Social-cultural
47,9 %
Economy
42,1 %
Norden, City

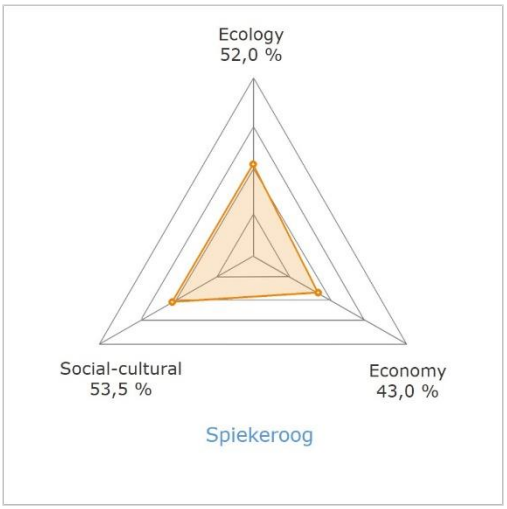

Dornum
Social participation
100 %
Economic participation
Education
Living environment
Safety
Health
Art and culture
Air
Water
Waste and raw materials
Nature and Landscape
Labour
Economic structure
Energy and climate
Infrastructure and accessibility
Competitiveness
50 %
0 %

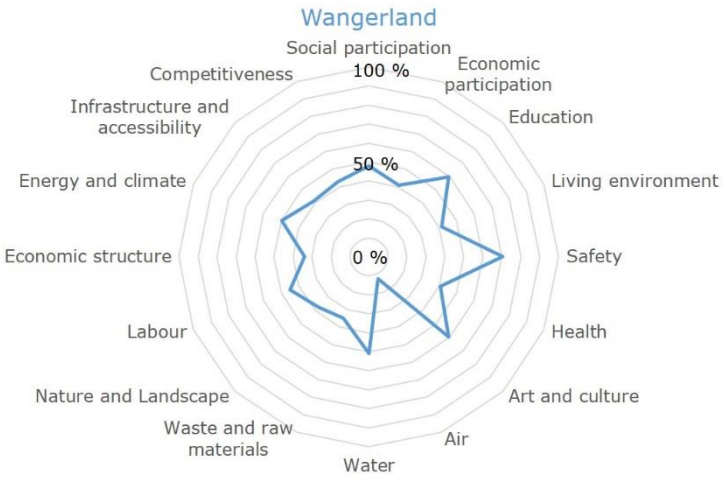

Ecology
40,9 %
Social-cultural
46,8 %
Economy
40,5 %
Dornum

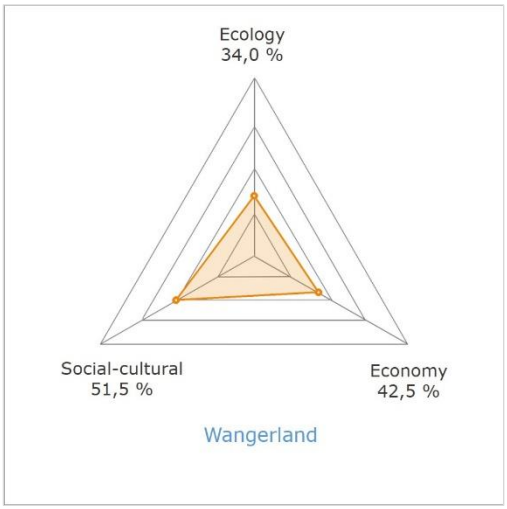

Juist
Social participation
100 %
Economic participation
Education
Living environment
Safety
Health
Art and culture
Air
Water
Waste and raw materials
Nature and Landscape
Labour
Economic structure
Energy and climate
Infrastructure and accessibility
Competitiveness
50 %
0 %

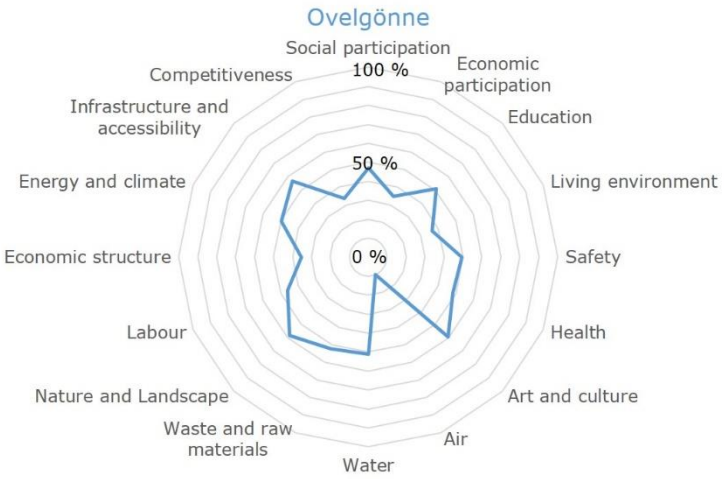

Ecology
51,3 %
Social-cultural
48,5 %
Economy
39,0 %
Juist

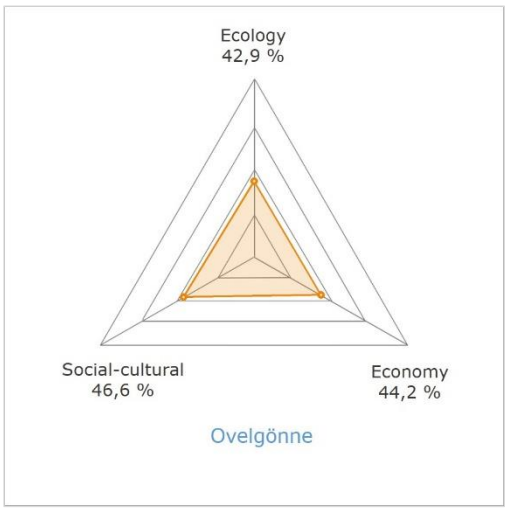

Spiekeroog
Social participation
100 %
Economic participation
Education
Living environment
Safety
Health
Art and culture
Air
Water
Waste and raw materials
Nature and Landscape
Labour
Economic structure
Energy and climate
Infrastructure and accessibility
Competitiveness
50 %
0 %

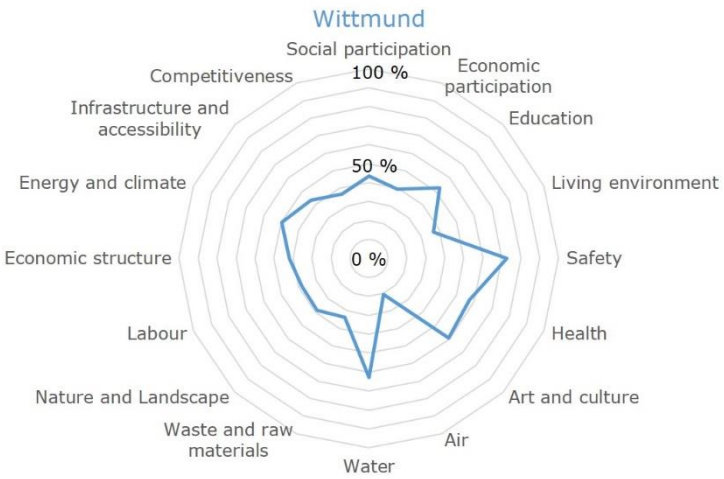

Ecology
52,0 %
Social-cultural
53,5 %
Economy
43,0 %
Spiekeroog

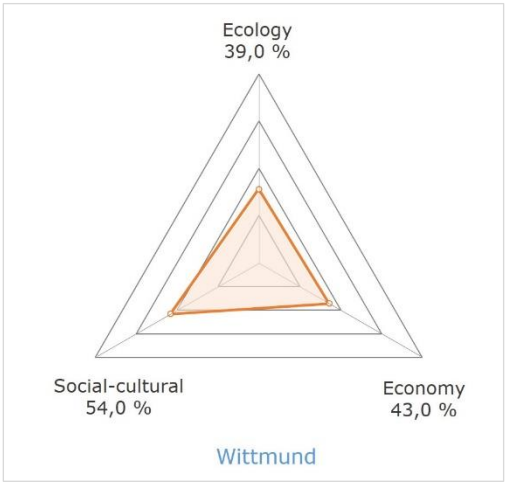

Wangerland
Social participation
100 %
Economic participation
Education
Living environment
Safety
Health
Art and culture
Air
Water
Waste and raw materials
Nature and Landscape
Labour
Economic structure
Energy and climate
Infrastructure and accessibility
Competitiveness
50 %
0 %


Ecology
34,0 %
Social-cultural
51,5 %
Economy
42,5 %
Wangerland


Ovelgönne
Social participation
100 %
Economic participation
Education
Living environment
Safety
Health
Art and culture
Air
Water
Waste and raw materials
Nature and Landscape
Labour
Economic structure
Energy and climate
Infrastructure and accessibility
Competitiveness
50 %
0 %


Ecology
42,9 %
Social-cultural
46,6 %
Economy
44,2 %
Ovelgönne





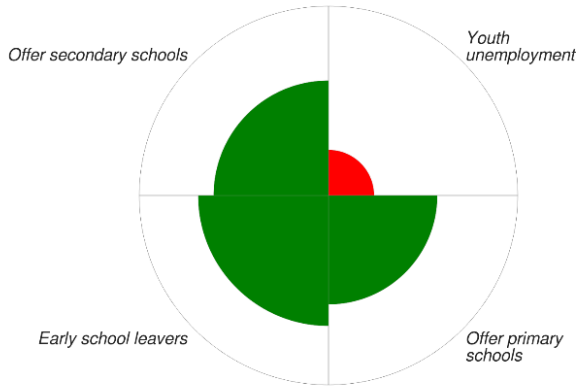
The results show a divers picture with some unexpected negative trends. The analysis is at its beginning but it is obvious that the interpretation of the results can only be done if characteristics of the municipalities as well as the level of the underlying data sets are taken seriously into consideration. Some examples will explain the challenges of interpretation:

Looking at the values of infrastructure, a clear difference appears among the mainland municipalities and the islands. This is due to the fact that the defined indicators of the stock infrastructure and accessibility measure the distances to highways, railway stations, airports and cities. If the norms are the same for all municipalities and/or the indicators do have the same values as it is in this basic assessment, some municipalities score worse than others only on the basis of its remote island location.

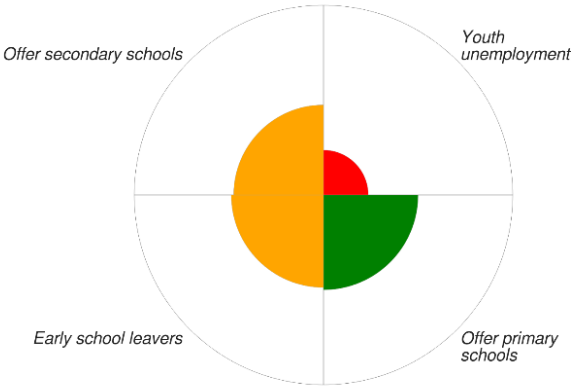
Another example of possible misinterpretation is given by the stock air. All municipalities score with a very bad value, even though the municipalities are located along the coast with clean, fresh air. In this case, the pollution parameters are measured on county level (NUTS-3) and the measuring station are located in the biggest towns with heavy car traffic and industry agglomeration.

These circumstances have been discussed in the WSF and the stakeholders are aware of these difficulties in measuring sustainability. Nevertheless, the instrument with its various indicators is a valuable tool, but for a serious assessment and data interpretation differences in data sets, characteristics of regions and communities and significance of chosen indicators have to be taken into account. Furthermore, norms and weights of indicators have to be discussed and finally agreed on with representatives of the municipalities to integrate strengths and weaknesses in the assessment. Having this in mind, the developed indicator tool will be a valuable instrument to measure sustainability.

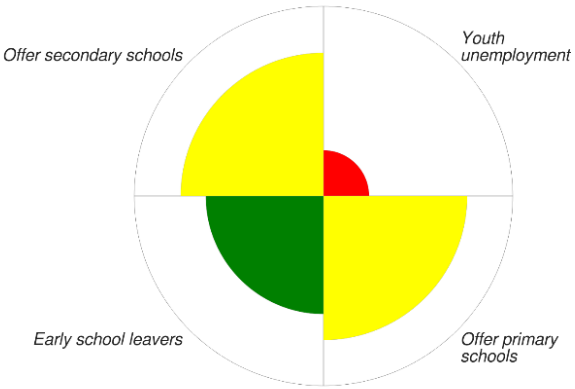
Besides the assessment of the various stocks, the WSF has analyzed the degree of sustainability of the individual indicators too. This is demonstrated with the example of the stock **EDUCATION** for three counties. The results are shown with the pie charts below.



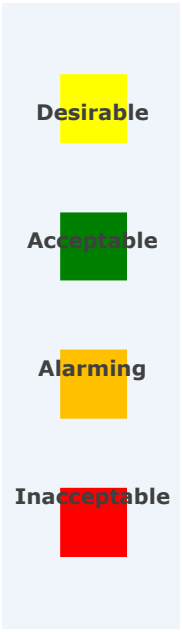
Wittmund



Aurich



Friesland



The analyzed data was available only on NUTS-3 level, which means for counties. The charts clearly show differences among the neighboring counties Aurich, Wittmund and Friesland regarding education.

Youth unemployment is a big problem in all counties and reaches about 24%.

Friesland scores very well with the other analyzed indicators. The situation in the county of Wittmund seems to be acceptable while in Aurich an alarming situation with regard to offers of secondary schools as well as regarding the number of early school leavers can be noted.

8. Discussion and Conclusion

Experiences with the WSF indicator tool clearly show some limits to assess the degree of sustainability on the local level, at least for German municipalities. The available data sets do have several gaps in information. Most of the indicator data is gathered on NUTS-3 level and not on LAU 2 (former NUTS-5) level, which are the municipalities. Also an intensive research in some municipalities itself could not deliver the data needed for an in-depth assessment. This is very much different to the Netherlands, where data on municipality level is almost fully available.

As debated already above, an assessment of municipalities with data valid for the whole county, would not mirror the status quo and developments of the municipalities.

Representatives of the WSF have had several meetings with some of the selected municipalities and discussed possibilities to evaluate sustainable development. This process is not finished yet but it turned out that a general approach as described in sustainability reports of e.g. Lower Saxony and Schleswig-Holstein cannot be applied.

On municipality level an individual approach has to be carried out together with representatives of the municipalities and the support of the scientific community.

This process has just started and will be continued in the coming months.

Recalling the basic investigations for the WSF indicator tool, the WSF will discuss the option to use the available data to assess the degree of sustainability on county level. This would encompass 11 counties and 3 urban districts along the German Wadden Sea coast. As the data is quite easily accessible, a time series could be part of this approach.

The indicator instrument is also a valid tool to work on demographic change, a serious risk for the Wadden Sea Region in the future. As the WSF feels responsible for an integrated management of the WSR and a vivid society with an environmentally friendly economic development, the WSF will continue its efforts to evaluate sustainability and to support the decision making levels with information, knowledge and advice.