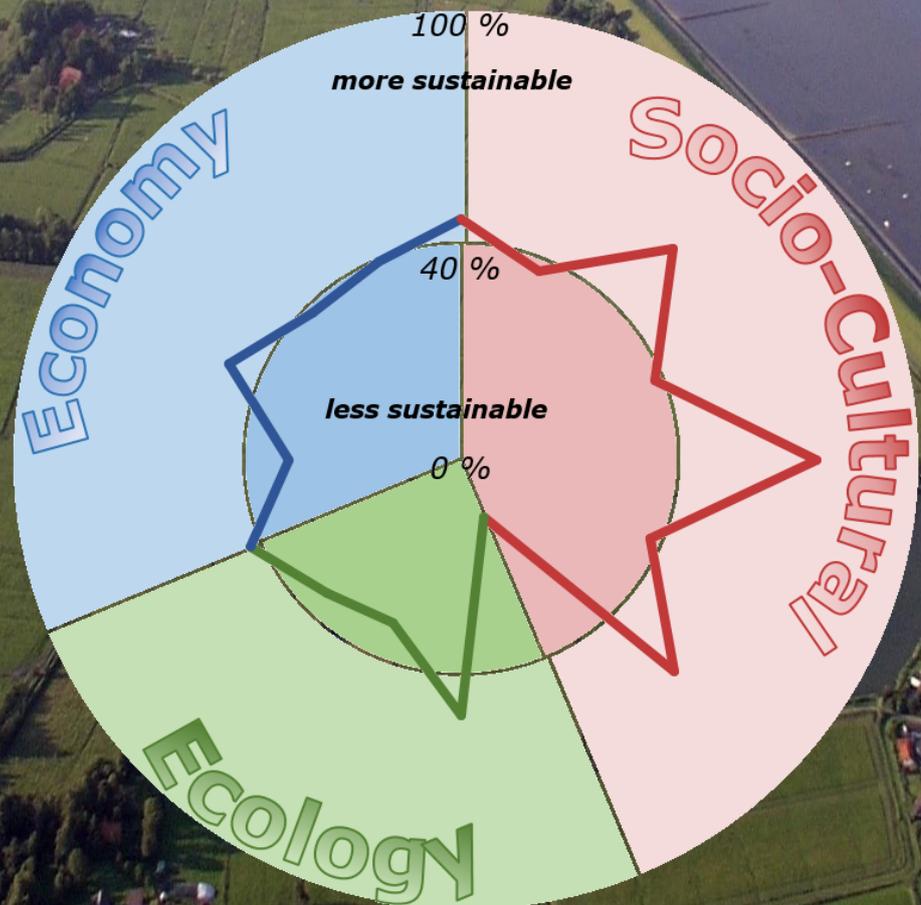


Development and Analysis of Sustainability Indicators

Final Report 2018





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Final Report

December 2018

The project was financially supported by:



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Development and Analysis of Sustainability Indicators

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Development and Analysis of Sustainability Indicators

1. Introduction

Background of the project

Since its founding in 2002, the WSF has been committed to improving the sustainable development of the Wadden Sea Region, making the coastal region of Esbjerg in Denmark to Den Helder in the Netherlands more environmentally friendly. To this end, the WSF has discussed goals for the three pillars of sustainability and finally defined specific aims to be achieved in the medium term. In order to measure and assess the development and progress of sustainability, indicators have been developed, which show development trends in society, economy and ecology since 2003. These trends were communicated in the forum to regional stakeholders, politicians and other organisations to discuss possible measures for greener developments.

It became clear that more specific indicators would be needed for concrete measures at local and regional level than those previously defined and evaluated. However, this would also mean abandoning the approach of working with comparative indicators for the entire coastal region of Denmark, Germany and the Netherlands. Based on experiences with local indicators in the Netherlands, a project was initiated in 2015 to collect and analyse data of specific indicators on municipality level.

Basis of the project

In 2016, the WSF in cooperation with the Dutch Wadden Academy and the University of Kiel, collected data on indicators for all German coastal municipalities. Now there was a data set of about 60 indicators, which should make detailed statements on the social, economic and ecological situation in coastal municipalities.

Project, co-financed by Niedersächsische Wattenmeer-Stiftung

As explained in the interim report of December 2017, seven municipalities in Lower Saxony were analysed with regard to sustainable development. In consultation with the Lower Saxony Wadden Sea National Park Administration, the municipalities of Krummhörn, Norden, Dornum, Juist, Spiekeroog, Wangerland and Ovelgönne were selected. The municipality of Wittmund was already analysed in the project with the University of Kiel.

2. First results from the project

The first results of the assessments of the present data set, collected by the University of Kiel, were compiled in 2017 and described in detail in the interim report. The most important statements and graphics are summarized in this chapter and completed with a validation.

a) Method

For the Wadden Sea Region, the three pillars of sustainability have been divided into the following categories:

Ecology

Air

Water

Nature & Landscape

Waste and Raw
Materials

Socio-Cultural

Social Participation

Economic Participation

Safety

Living Environment

Health

Education

Art and Culture

Economy

Labour

Competitiveness

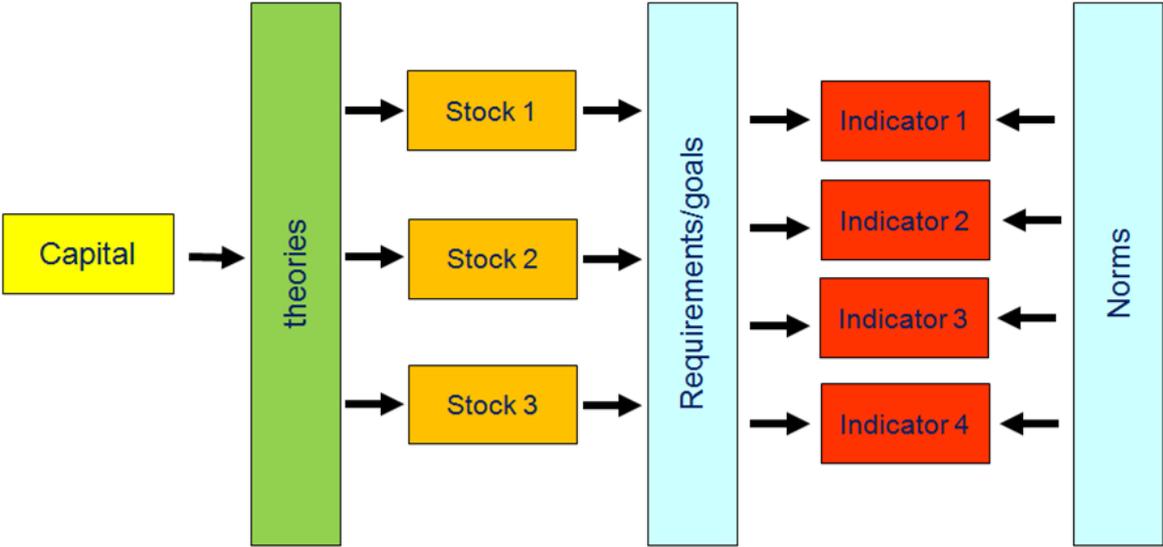
Economic Structure

Infrastructure

Energy

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 analysed 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.



b) Indicators

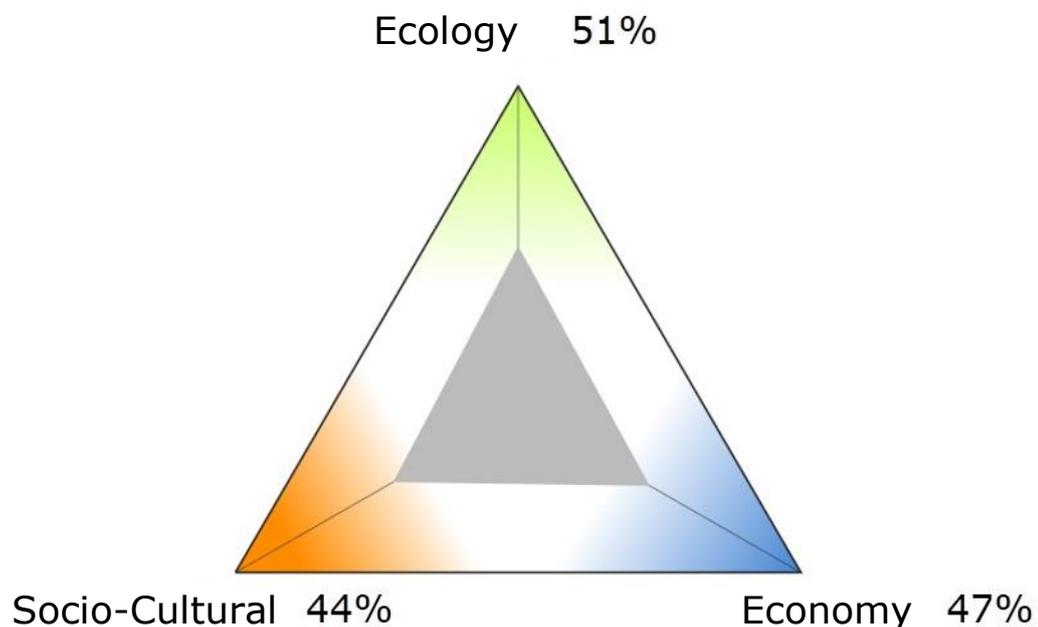
Working towards the described approach to best measure sustainability on regional and local level, a set of indicators have been chosen, which are region specific and for which public data is available to allow an comparable analysis. The following table lists the indicators for the different levels, which also had been listed as table in the interim report of December 2017.

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	Agriculture, fishery, forestry		
Water	Public water supply	Education	Long-term unemployment	Economic structure	Tourism accommodation	
	Sewage treatment		Offer primary schools		Tourist stays	
Waste and raw materials	Total amount of waste	Living environment	Offer secondary schools		Energy and climate	Medium and high tech jobs
	Household waste		Early school leavers			Creative industry
	Organic waste		Youth unemployment	Wind energy		
Nature and landscape	Open area	Safety	Housing shortage	Infrastructure and accessibility		Solar energy
	Natural terrain		Recreational area			Gas consumption of households
			Real estate value			Electricity consumption of households
			Natural population development		Biogas production	
			Migration		CO ₂ emissions	
			Intentional homicides		Health	Competitiveness
		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	Share starters			
		Persons in need of care	Art and culture		Bankruptcies	
		General practitioners			Green economy performance	
		Distance to hospitals			GDP per capita	
		Life expectancy			Capacity universities	
		Cultural participation				
		Museums and exhibitions				

c) Evaluation

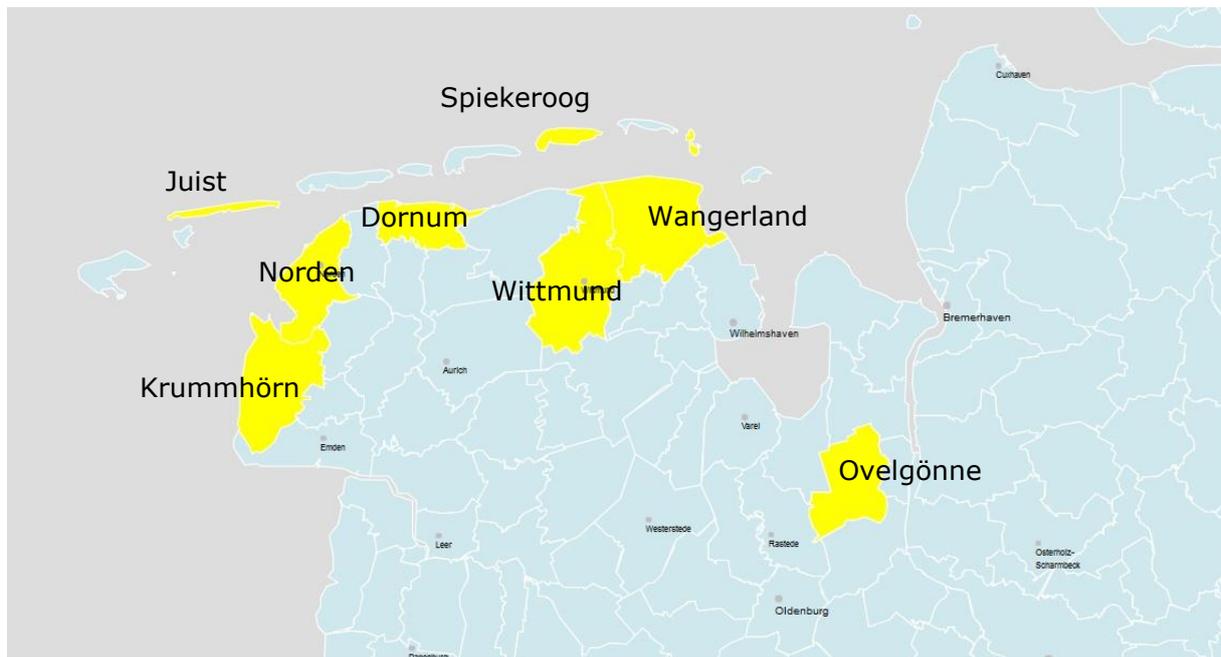
To obtain an initial assessment of the degree of sustainability for the entire German Wadden Sea Region (Lower Saxony and Schleswig-Holstein), the results were summarized and presented in the sustainability triangle. This was done by averaging the results of all 570 municipalities. After evaluating the available data from 2014 to 2016, the status of sustainability in the eight surveyed municipalities varied significantly, although many data was collected at a higher level and transferred to municipalities. The transformation of data from NUTS-3 (counties) to the municipalities will be discussed later in the report.

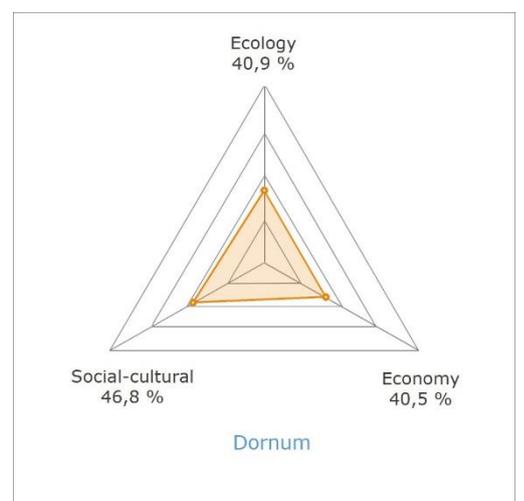
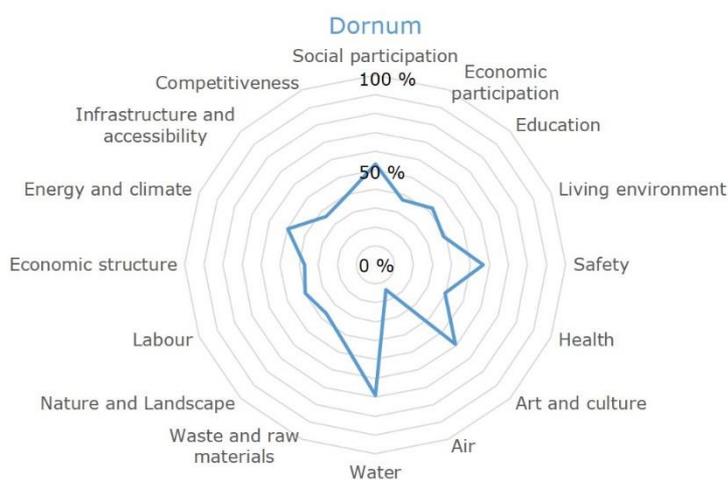
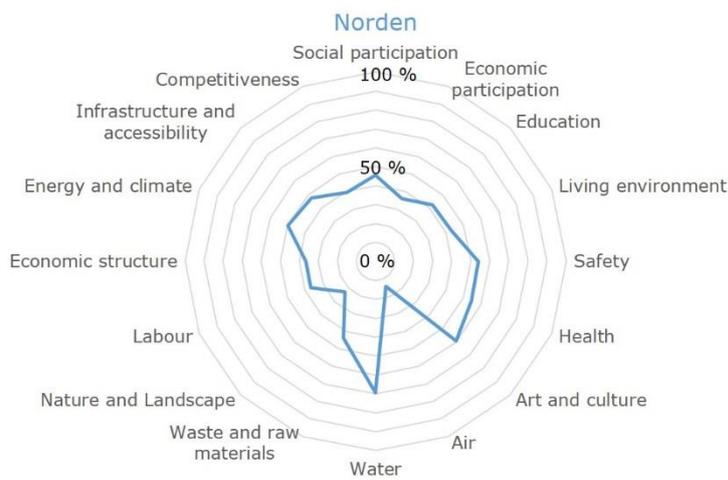
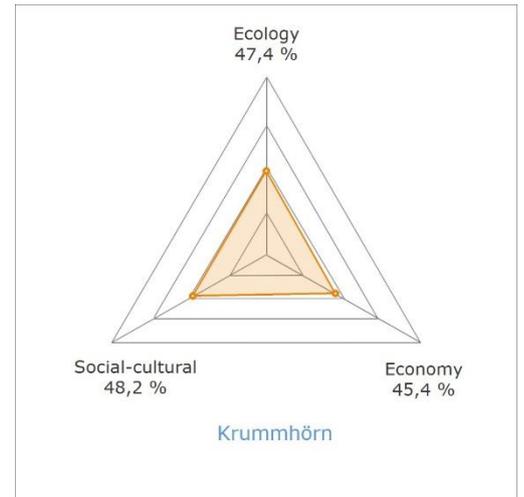
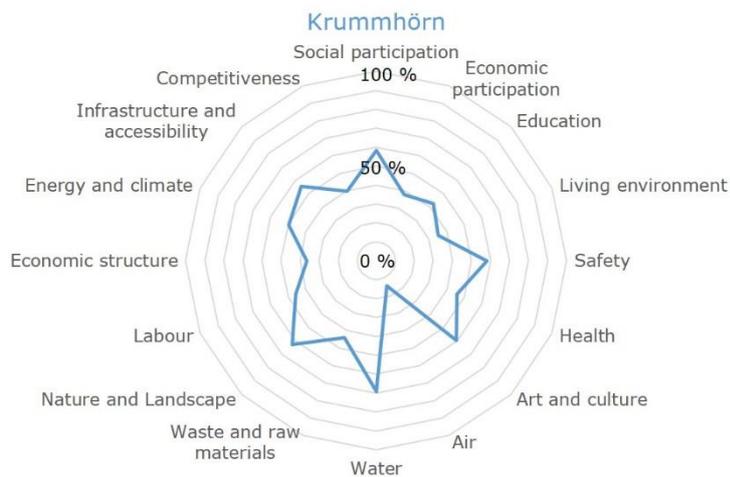
The result about the degree of sustainability for the entire region is shown in the triangle below. The larger the inner triangle, the better the degree of sustainability (the edges of the outer triangle add up to 100%). In conclusion, the first series of data has shown that the Wadden Sea Region is best performing in the ecological dimension and that there are gaps in sustainable economic and social development. Thus, there is room for improvement and the WSF recommends analysing the causes regarding the lack of sustainability and discussing the challenges with representatives of the region.

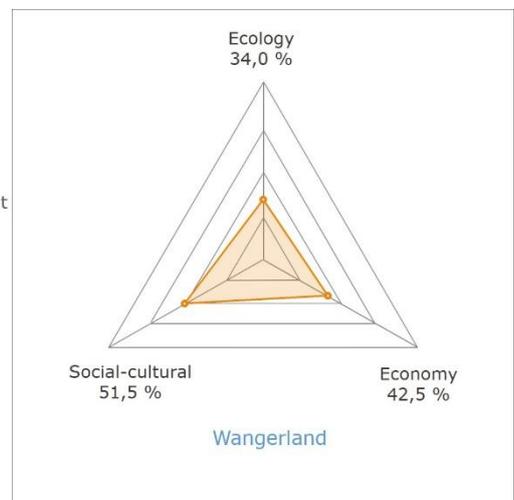
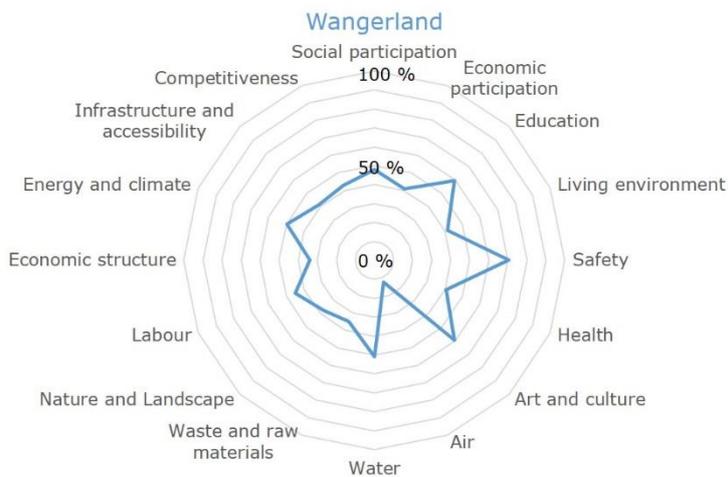
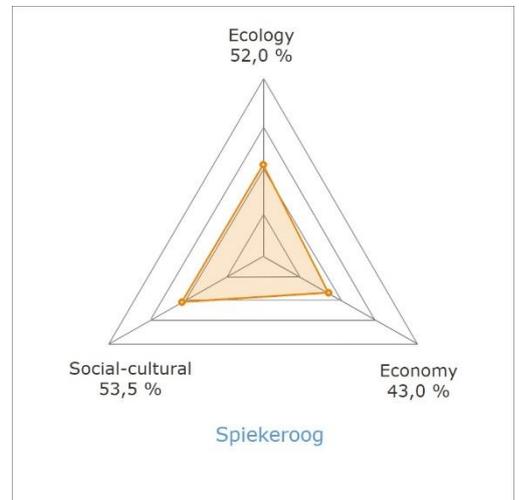
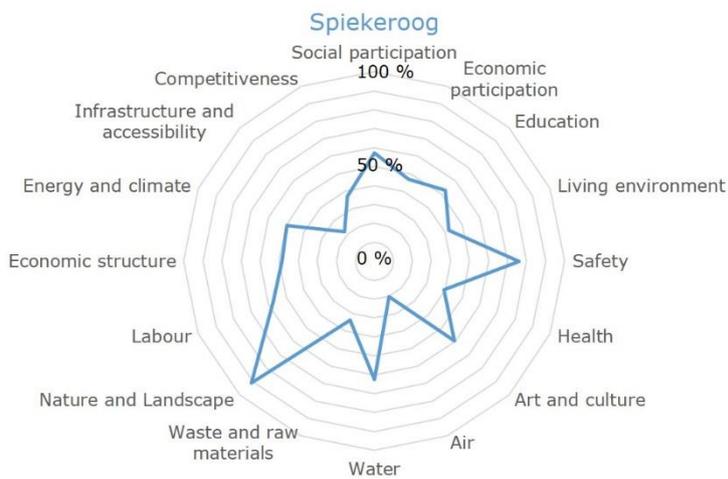
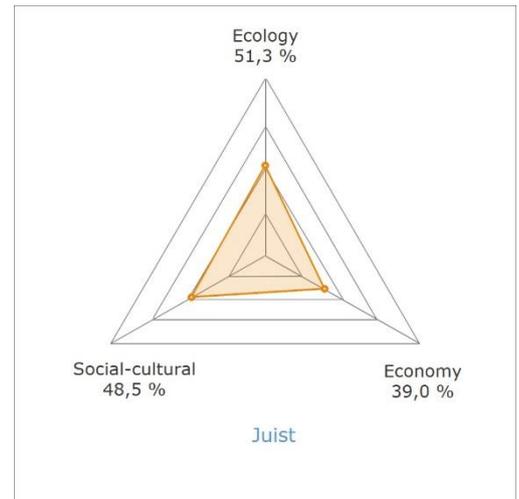
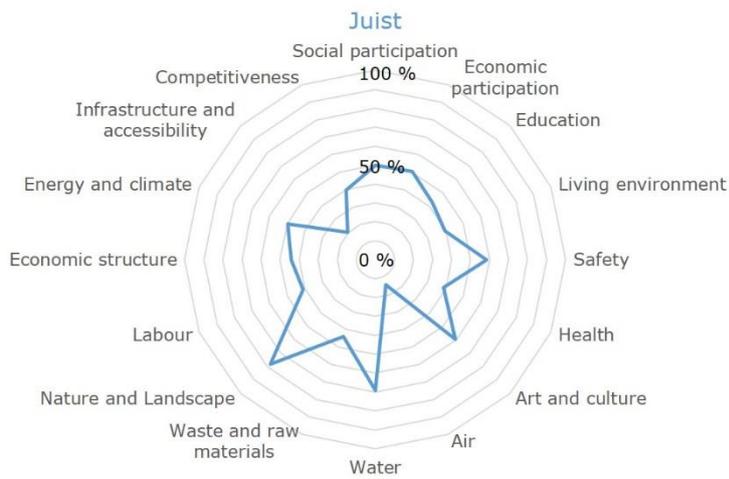


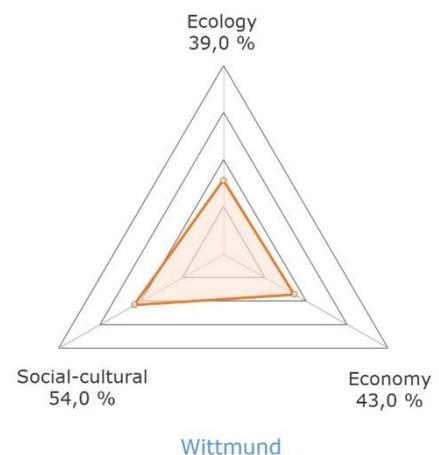
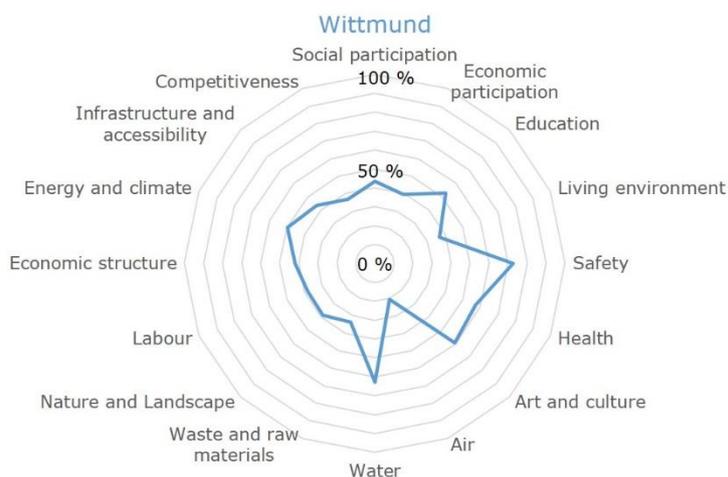
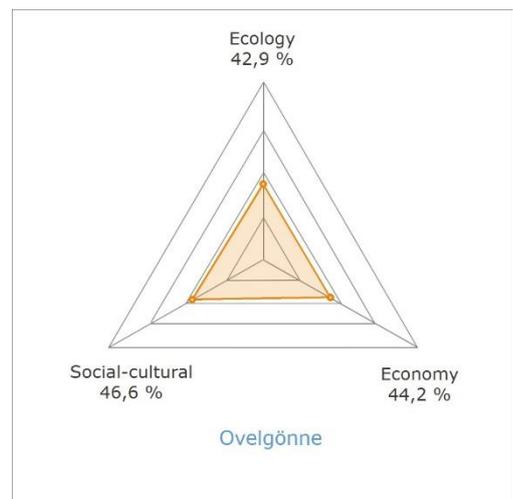
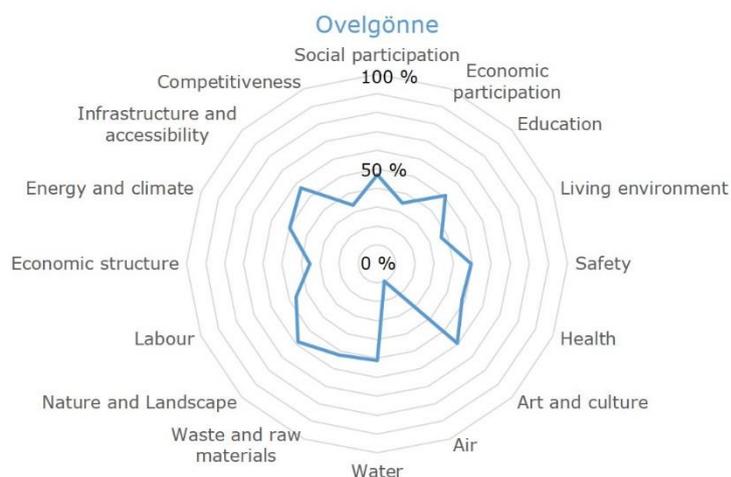
In the interim report for 2017, the results of the evaluation were presented in detail for each municipality (see map below) in different diagrams. Here again the summarizing diagrams are presented and explained.

The spider web diagrams show the agglomerated values of the indicators for each category and the triangles show the summarized values for each of the three sustainability pillars.









The results show a diverse 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.

d) Discussion

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 already held several meetings with the selected municipalities and discussed ways to assess sustainable development. As the search in the municipalities for meaningful indicator data was not promising, it became clear that a more detailed analysis at the municipalities level would require an individual approach carried out together with representatives of the municipalities and the support of the scientific community. A general approach (e.g. as described in sustainability reports from Saxony and Schleswig-Holstein) can hardly be applied at the local level.

Recalling the basic investigations for the WSF indicator tool, the WSF discussed 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 further implementation of this project was finally adapted to the given real conditions and its data situation in order to meet the requirements to the stated goals (see application under chapter "Development and objectives"). Hence, new data from 2016 for newly defined indicators were evaluated on two levels:

Selected indicators at county level along the German Wadden Sea coast (see chapter 4)

Selected indicators for 8 municipalities in the coastal region of Lower Saxony (see chapter 5)

The evaluation of indicators on county level has a clear relation to the sustainability indicators of the state of Lower Saxony (see Chapter 3) and will be continued in the following years so that a reliable time series of analyses can be presented. This will result in a long-lasting success of the project funded by Wattenmeer-Stiftung.

The analysis of municipality-related data has already led to an intensive debate with several communities. It became clear that individual approaches are required for a measurable, sustainable development. The results of this project have already led to the initiation of a new project, namely the development of a sustainable development model for the Wangerland municipality. First of all, a "mission statement 2030" should be elaborated. In a next step the progress will be examined with defined indicators to achieve the goals. For this purpose, a cooperation team has already been formed with the universities of Tilburg, Vechta and Oldenburg, the Wadden Academy, the municipality of Wangerland and the Wadden Sea Forum.

The indicator tool is also an appropriate tool to work on demographic change, which will pose a serious risk to the Wadden Sea Region in the future. As the WSF is committed to integrated management of the Wadden Sea Region and a vibrant society with green economic development, the WSF will continue its efforts to assess sustainability and provide information, knowledge and advice for decision makers.

3. Sustainability Indicators Lower Saxony

In May 2017, the Lower Saxony state government passed a sustainability strategy for Lower Saxony. The strategy comprises 26 action fields with a total number of 60 indicators. Sustainability strategies act as important coordination instruments, which is clearly expressed in the strategy of Lower Saxony: "Sustainability strategies serve - generally speaking - to transform a mission statement of sustainable development into concrete, long-term and transparent political action by defining concrete goals and taking actions in order to gradually close discrepancies between the mission statement and the actual development. This meanwhile applies to all political levels: the international, the national and the municipal, as well as in Germany also the level of the federal states."

As part of this project, the objectives and fields of action of the state strategy regarding implementation and control mechanisms in the Wadden Sea Region, were discussed and analysed.

The indicators of the Lower Saxony Sustainability Strategy are listed further below. The exact accordance with the indicators of the German coastal counties analysed in this project are highlighted in color. For the majority of indicators, data is available only at state level, so that alternative indicators have been evaluated for the counties.

Fields of action and indicators from the Lower Saxony Sustainability Strategy:

1 Economic efficiency

1.1 Financial situation

- 1.1.1 Financing balance of state and municipalities
- 1.1.2 Debt level of public finances
- 1.1.3 Annual interest burden quota of state and municipalities

1.2 Economic situation

- 1.2.1 Gross domestic product (GDP)
- 1.2.2 Research and development
- 1.2.3 Relation of gross fixed capital formation to GDP
- 1.2.4 Business start-ups and closures
- 1.2.5 Business insolvencies
- 1.2.6 Regional income differentials

- 1.3 Labour market situation
 - 1.3.1 Employment rate
 - 1.3.2 Part-time employment rate
 - 1.3.3 Bargain coverage rate of working population
 - 1.3.4 Unemployment rate
 - 1.3.5 Unemployed by immigration history

2 Social participation

- 2.1 Education
 - 2.1.1 Full day-care of children
 - 2.1.2 Educational level of population
 - 2.1.3 Early school leavers
 - 2.1.4 Foreign students with school leaving certificate
 - 2.1.5 Education young people with immigration history
 - 2.1.6 Dual vocational training
 - 2.1.7 Freshman rate
 - 2.1.8 Promotions
- 2.2 Gender equality
 - 2.2.1 Payment gap between men and women
 - 2.2.2 Share of women in parliaments
 - 2.2.3 Share of women in high level positions within the Lower Saxonian government
- 2.3 Health and social benefit
 - 2.3.1 General practitioners in Lower Saxony
 - 2.3.2 Premature death rate
 - 2.3.3 Non smoking rate
 - 2.3.4 Overweight
 - 2.3.5 Vaccination at school beginners
 - 2.3.6 Social minimum income
 - 2.3.7 Poverty rate
 - 2.3.8 Consumer insolvencies
- 2.4 Social solidarity and honorary position
 - 2.4.1 Voluntary commitment
 - 2.4.2 Naturalization

2.5 Prevention for children and young persons

2.5.1 Pupils safety

2.5.2 Pupils mobbing

3 Protection of natural resources

3.1 Resource consumption

3.1.1 Resource productivity

3.1.2 Primary energy consumption

3.1.3 Energy productivity

3.1.4 Share of renewable energies

3.2 Emissions

3.2.1 Greenhouse gas emissions

3.2.2 Air quality

3.2.3 Freight transport by rail and inland waterways

3.2.4 Intensity of goods transport

3.2.5 Local public transportation

3.2.6 Noise pollution

3.3 Land use and nature conservation

3.3.1 Land use

3.3.2 Conservation areas

3.3.3 Ecological agriculture

3.3.4 Biodiversity and landscape quality

3.3.5 Forest condition

3.3.6 Wood storage construction and wood stock

3.3.7 Forest conversion and mixed forest reproduction

3.3.8 Nitrate content of groundwater

3.3.9 Nitrogen and phosphorus excess

3.4 Marine protection

3.4.1 Garbage on beaches

3.4.2 Oily seabirds

3.4.3 Green algae deposits

4 Development Cooperation

4.1 Share of public development expenditure in gross national income

Explanation of the common and different indicators at state and county level:

There is a big discrepancy among the ecological indicators, which is explained by the fact that many data is collected only on the basis of the state initiatives. In particular, data with regard to water pollution and emissions of pollutants such as SO_x and NO_x are only available at state level, as there is no comprehensive monitoring network available.

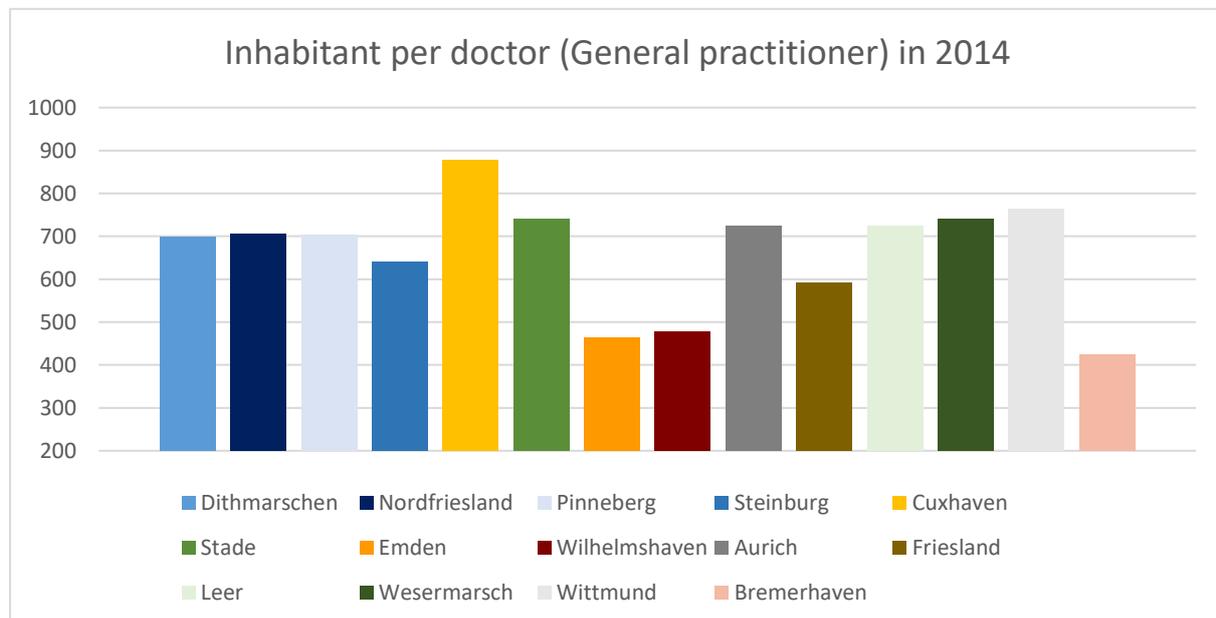
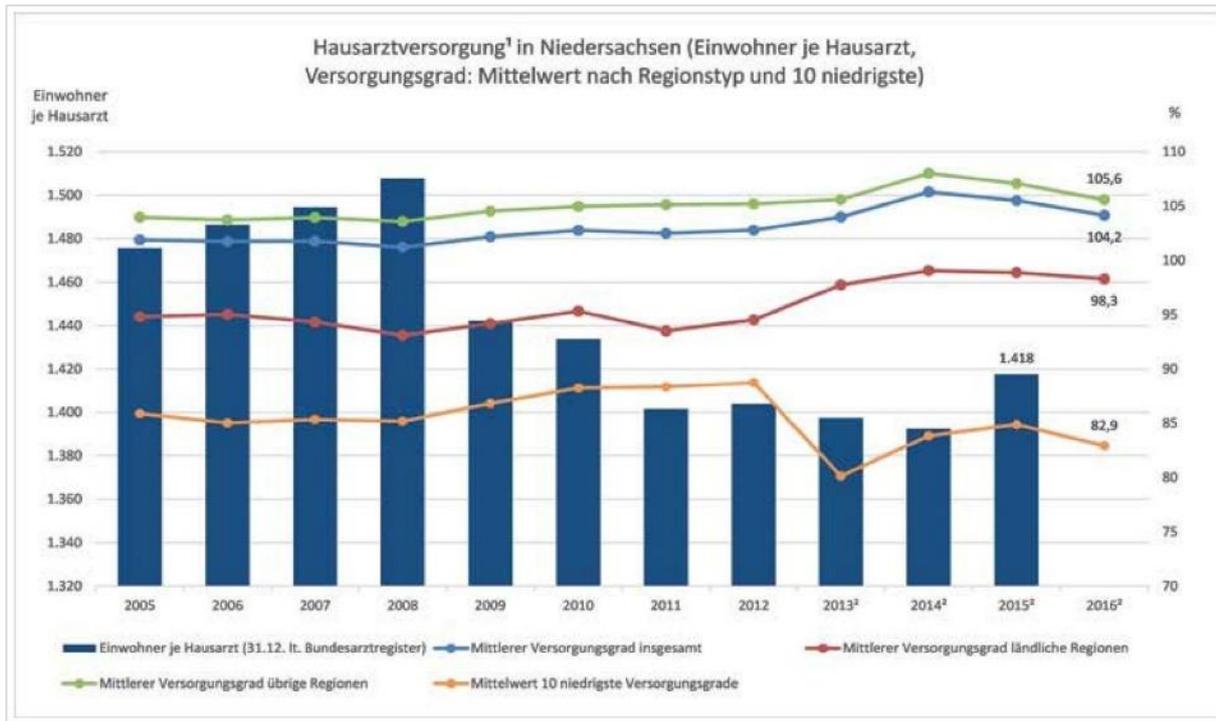
For the economic indicators, important data from the state strategy is also available at county level, so that a more detailed comparable analysis was possible. However, it is important that the selection of topics/fields of action such as work, economic structure and competition are well correlated on both levels. In contrast, energy production indicators are well analysed at the regional level and reflect regional climate change efforts. Infrastructure is also more important at the county level rather than at the state level, so that indicators of this category are used in the project as well.

Similarly, the socio-cultural pillar should be considered. Social participation, social cohesion and health are focal points in both indicator systems. Additionally, education and security were also of great importance at regional level to assess sustainable development.

The Lower Saxony state strategy for sustainable development describes many incentives that have also been taken up at regional and local level. Especially for the development zone of the "Biosphärenreservat Niedersächsisches Wattenmeer", the regionalization of the indicators is of great importance. For this, the assessments made in this project can provide valuable basics.

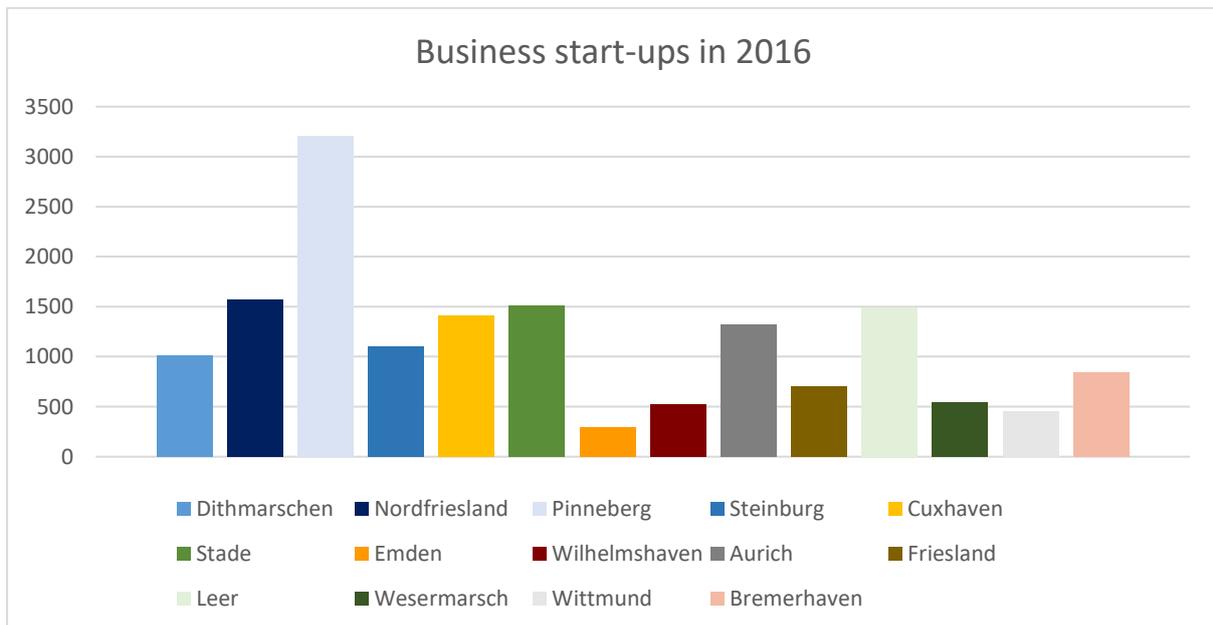
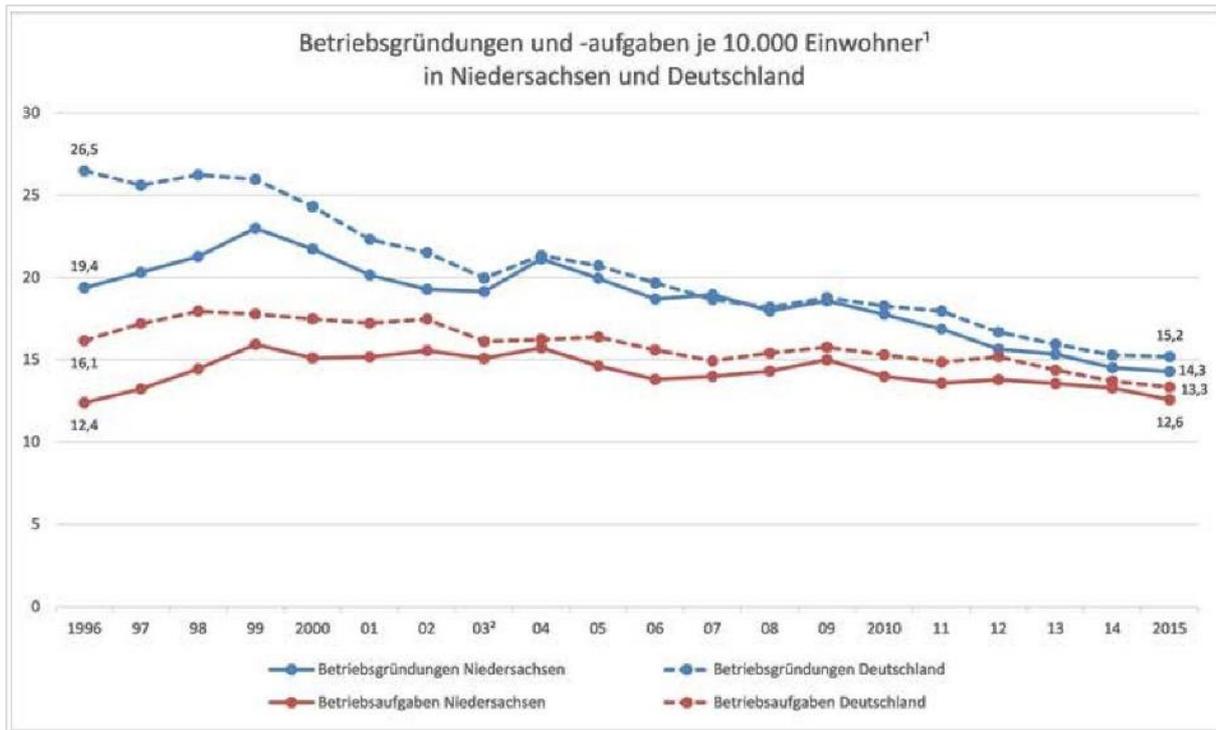
In the following, just a few examples are given that highlight the good complement of the Lower Saxony state strategy for sustainable development and the indicator analysis of the Wadden Sea Forum. The respective upper diagrams are taken from the "Sustainability Strategy for Lower Saxony".

"General practitioners in Lower Saxony (doctor per inhabitant, Degree of care: Average according to region type and 10 lowest)"



The degree of care of the population with physicians over the measured period is relatively constant in Lower Saxony, considering the average degree of care. Looking at the number of inhabitants per general practitioners, the situation improves significantly from 2009. The WSF evaluation gives a more detailed picture as it looks at smaller regions. It becomes clear that medical care is better in cities like Emden, Wilhelmshaven and Bremerhaven than in rural areas.

"Business start-ups and closures per 10,000 inhabitants in Lower Saxony and Germany"



Also with the example of business start-ups, the small-scale evaluation shows a more differentiated picture than at the state level. The difference between Pinneberg within the ring of wealthy suburbs of Hamburg and Emden is very significant. The counties of Friesland / Ostfriesland come in last.

4. Sustainability Indicators of the 14 North Sea counties

Selection of indicators

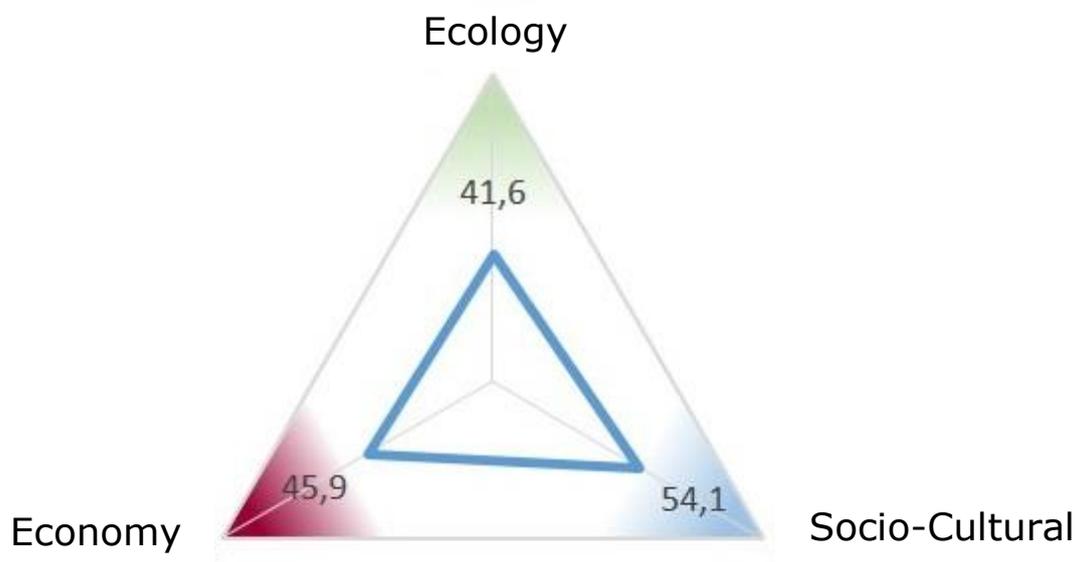
Regarding the described approach to best measure sustainability at regional level, a number of indicators were selected that are specific enough and publicly available for the regions to allow comparative analyses. The following table shows the indicators for the different pillars.

Ecology		Socio-Cultural		Economy	
Stock	Indicator	Stock	Indicator	Stock	Indicator
Waste and raw materials	Total amount of waste	Social participation	Turnout local elections	Labour	Unemployment
	Household waste		Turnout nationwide elections		Tertiary education
	Organic waste	Economic participation	Disposable income		Aging of population
	Recycling material		Social welfare benefits	Agriculture, fishery, forestry	
Nature and Landscape	Open area	Education	Long-term unemployment	Economic structure	Tourism accommodations
	Natural terrain		Offer primary schools		Tourist stays
			Offer secondary schools		Medium and high tech jobs
			Early school leavers		Creative industry
		Living environment	Youth unemployment	Energy	Wind energy
			Price building land		Solar energy
			Natural population development		Biogas production
			Migration		Sewer gas production
		Safety	Intentional homicides	Infrastructure	Distance to nearest intercity train stations
			Robberies		Distance to nearest motorway
			Thefts		Distance to nearest airport
		Health	Persons in need of care		Distance to nearest agglomeration
			General Practitioners	Business registration	
			Distance to hospitals	Business cancellation	
		Art and Culture	Museums and exhibitions	Competitiveness	GDP per capita

The 44 indicators of the 14 categories were evaluated as described in the interim report of December 2017. This method allowed a comparison of the counties with each other. Chapter 2 presented a sustainability diagram for the entire Wadden Sea Region. The data was from 2014-2015, including state-level data, in particular on "air".

The water data was related to the availability of drinking and waste water supply, which had a very positive impact on the overall ecology analysis. The following chart shows the results of the analysis of coastal counties with adjusted data from 2016.

14 North Sea Counties

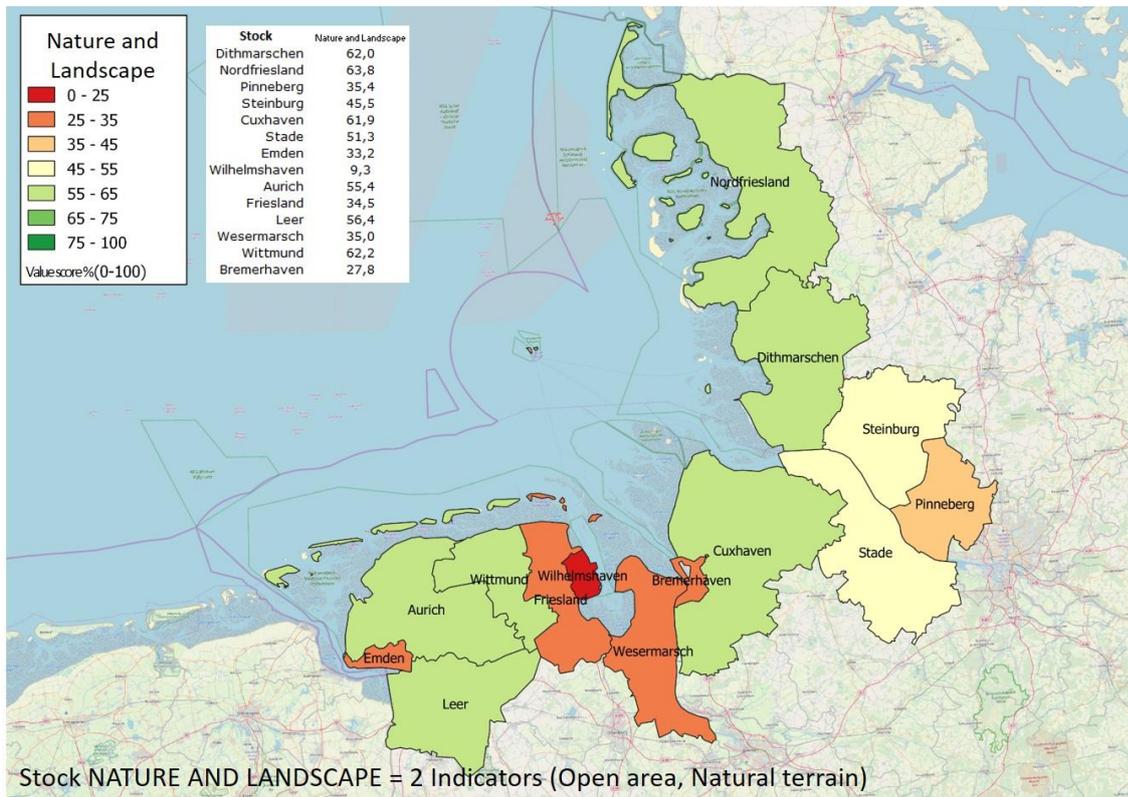


While the economic and socio-cultural data well reflect the state of sustainability in these pillars, it is necessary to strive for improvements of data availability in the field of ecology in order to deliver a better picture of the real situation. The rural areas of the Wadden Sea Region are certainly ecologically more positive to consider than shown here in the diagram. Relatively good water quality, clean air and many natural areas should enhance the sustainability of the ecological dimension. The inclusion of these facts in an indicator system is under discussion and needs further investigation.

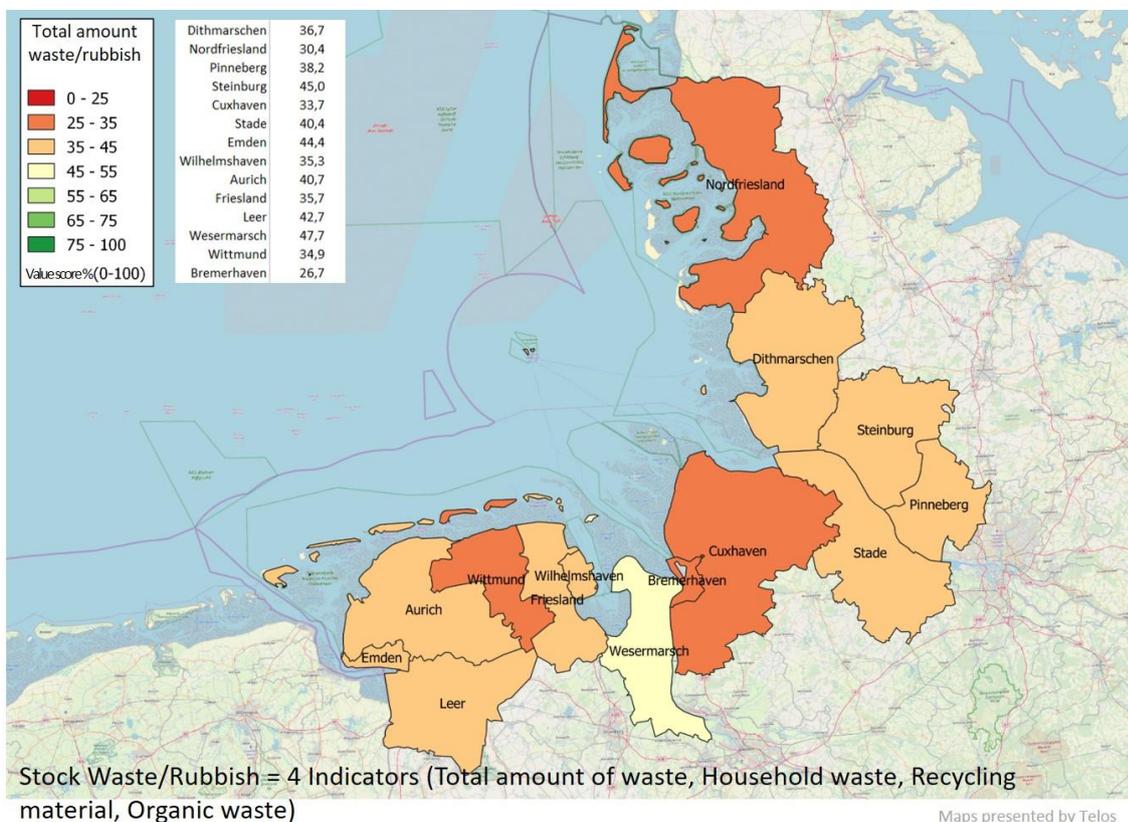
In the following, the results of the analyses of the individual categories are spatially displayed in maps. The indicators of these categories are listed in the illustration itself. This presentation allows a direct comparison of the individual counties and cities. It should be noted that no priorities and characteristics of the counties were taken into account, but standards and weighting were the same for all counties. The evaluation in this project was for comparative analyses. Targeted governance mechanisms need to be debated in each region.

Additionally to the spatial maps, spider web diagrams with the agglomerated values of the indicators are presented for each category further below. The values vary from the inside with 0%-sustainability to the outside with 100%-sustainability in the category concerned. The presentation allows a quick assessment, where the strengths and weaknesses of the individual county lie. Furthermore, the overall results for the counties are shown in sustainability triangles. The triangles show the summarised values for each of the three sustainability pillars.

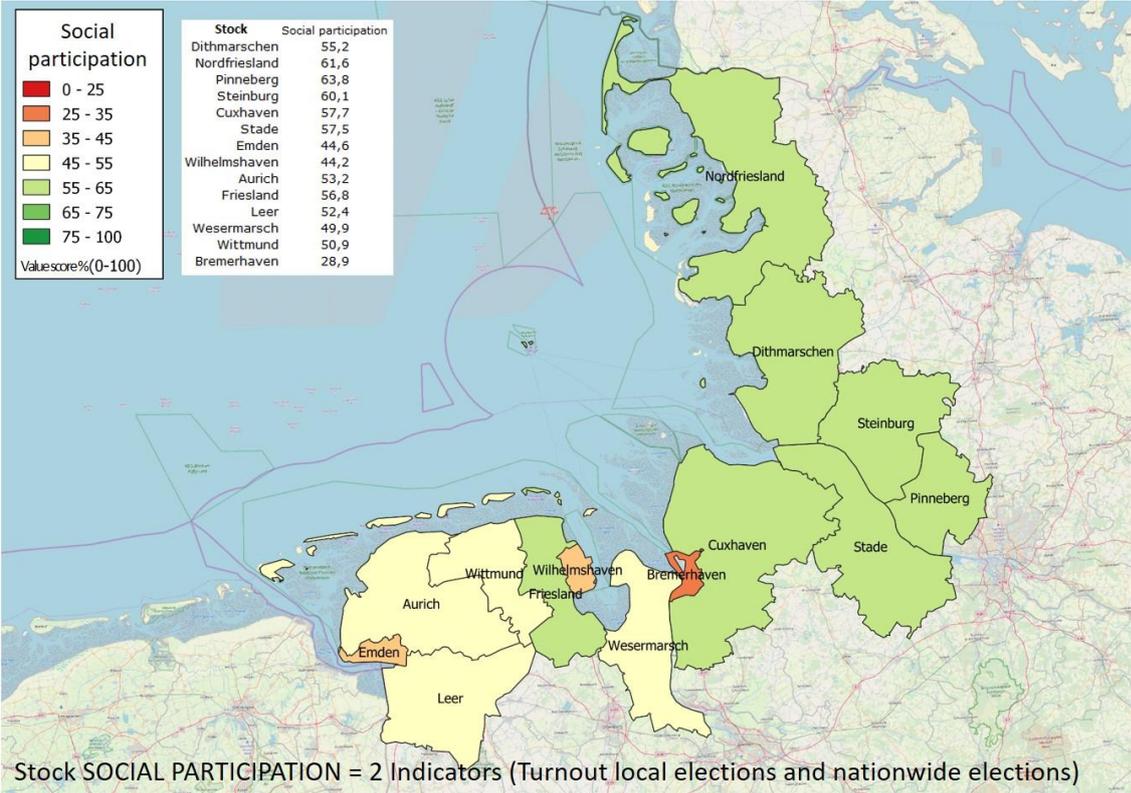
a) Spatial maps



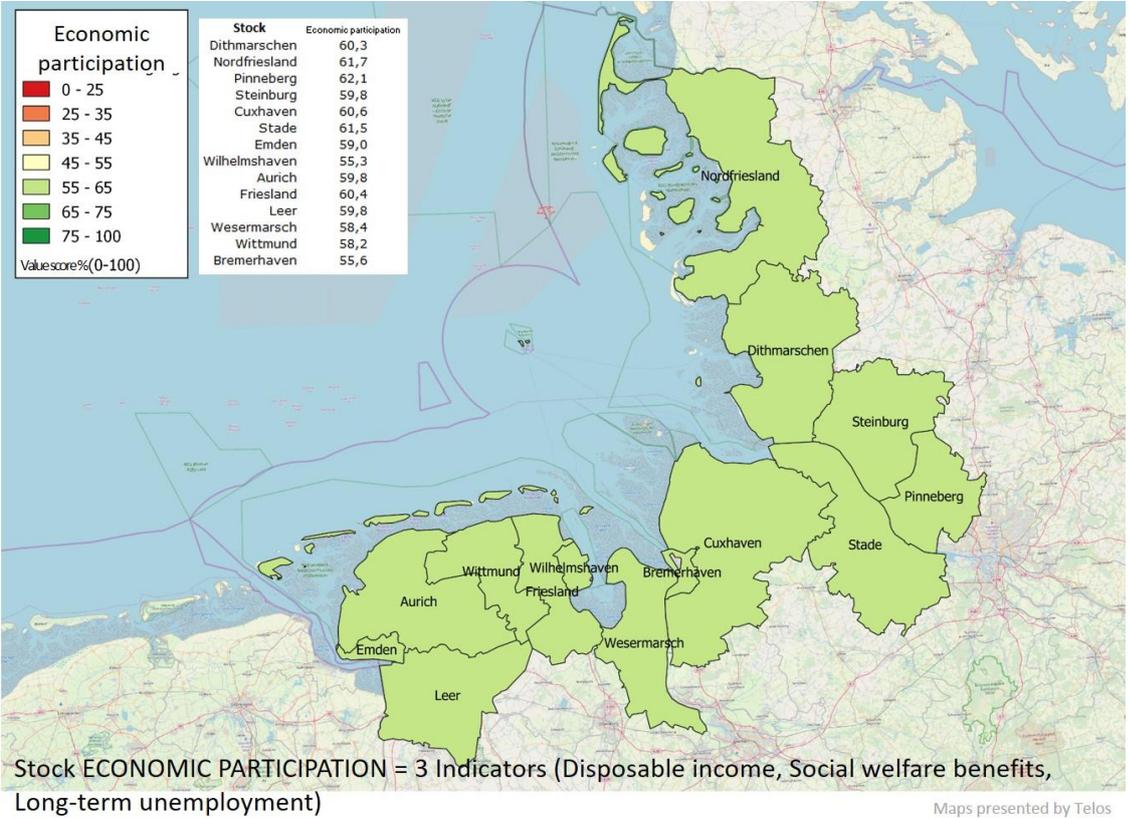
Maps presented by Telos



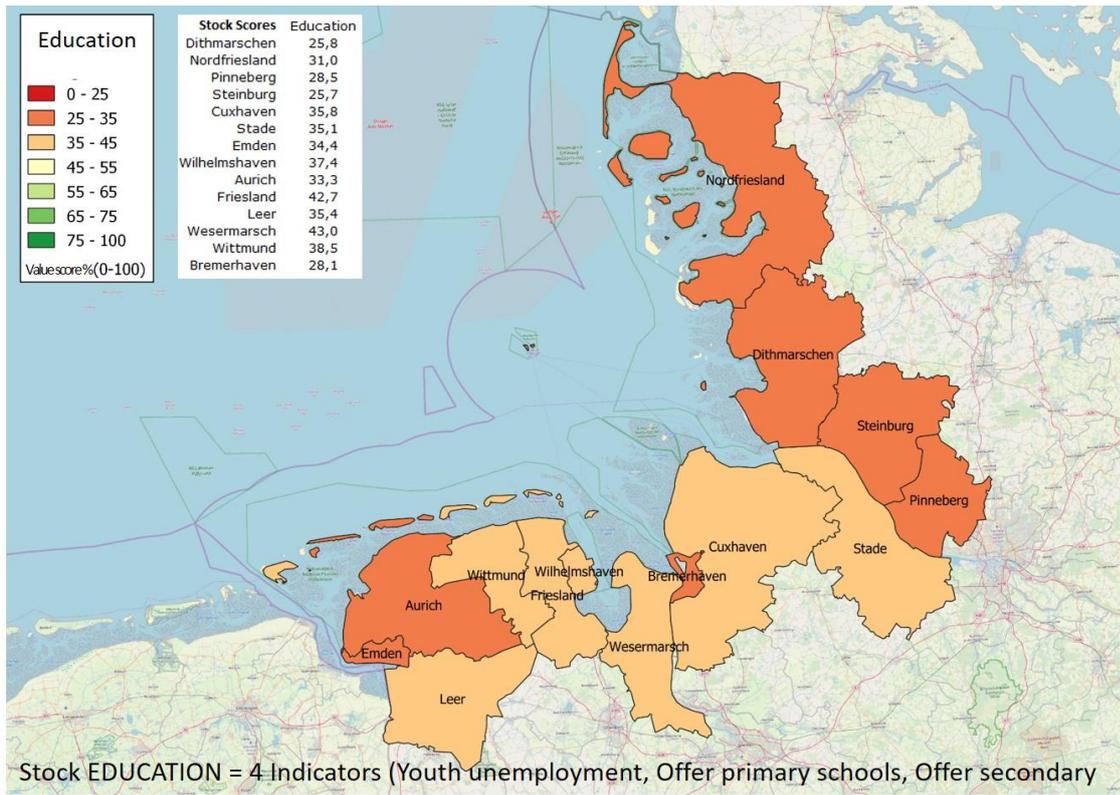
Maps presented by Telos



Maps presented by Telos

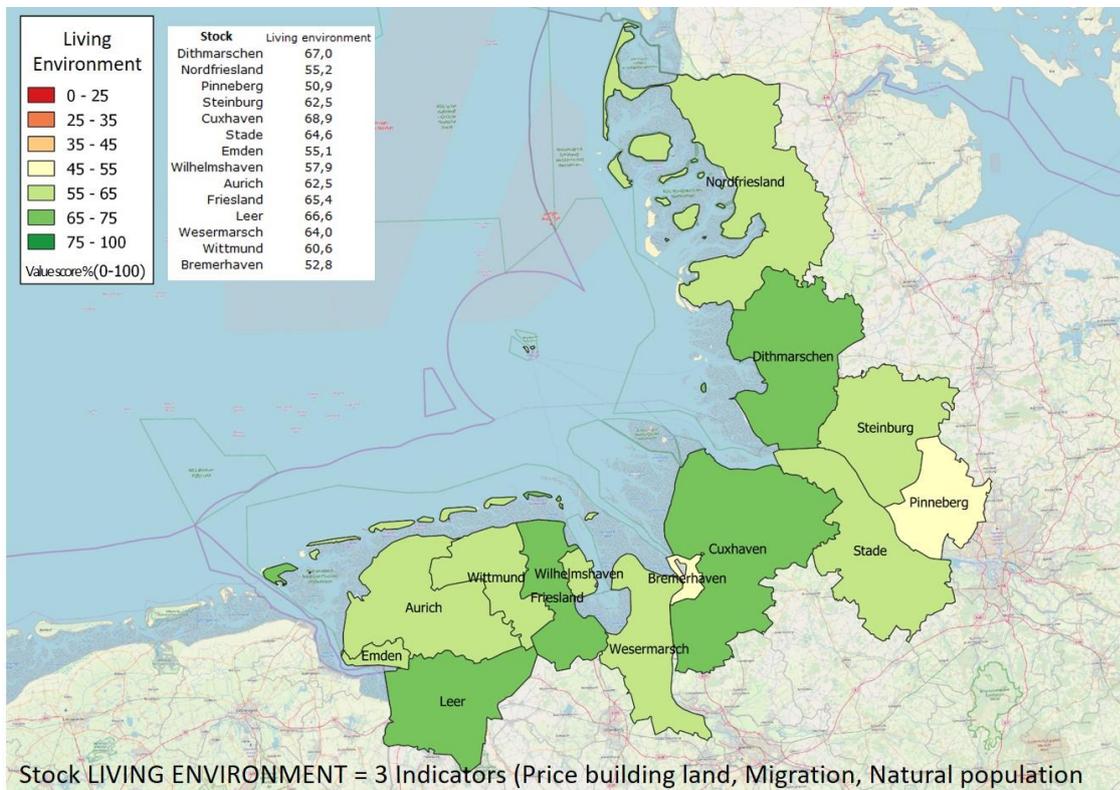


Maps presented by Telos



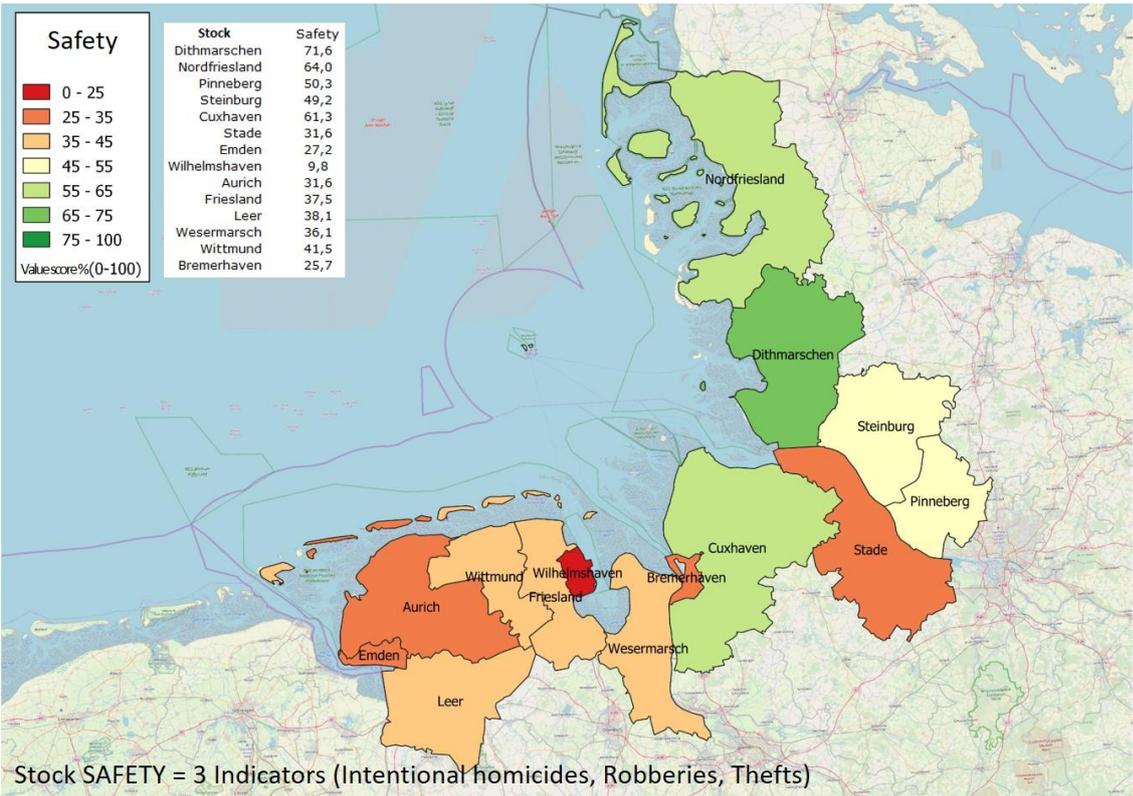
Stock EDUCATION = 4 Indicators (Youth unemployment, Offer primary schools, Offer secondary schools, Early school leavers)

Maps presented by Telos

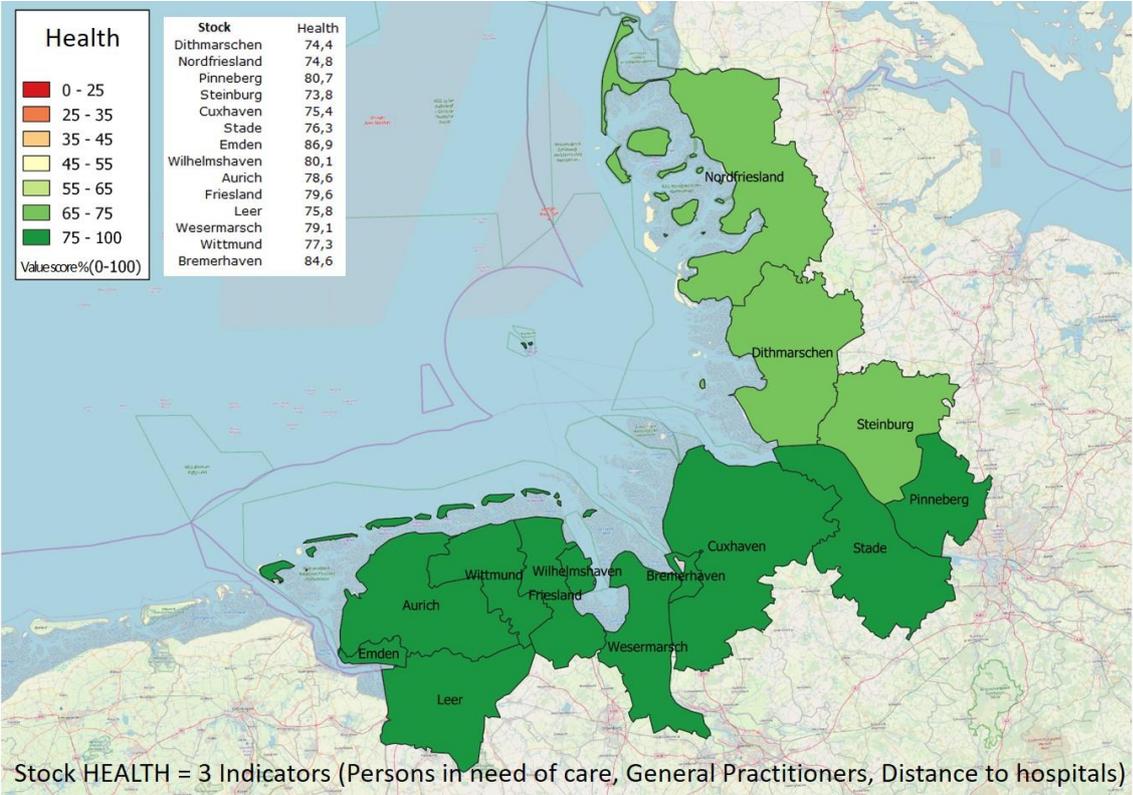


Stock LIVING ENVIRONMENT = 3 Indicators (Price building land, Migration, Natural population development)

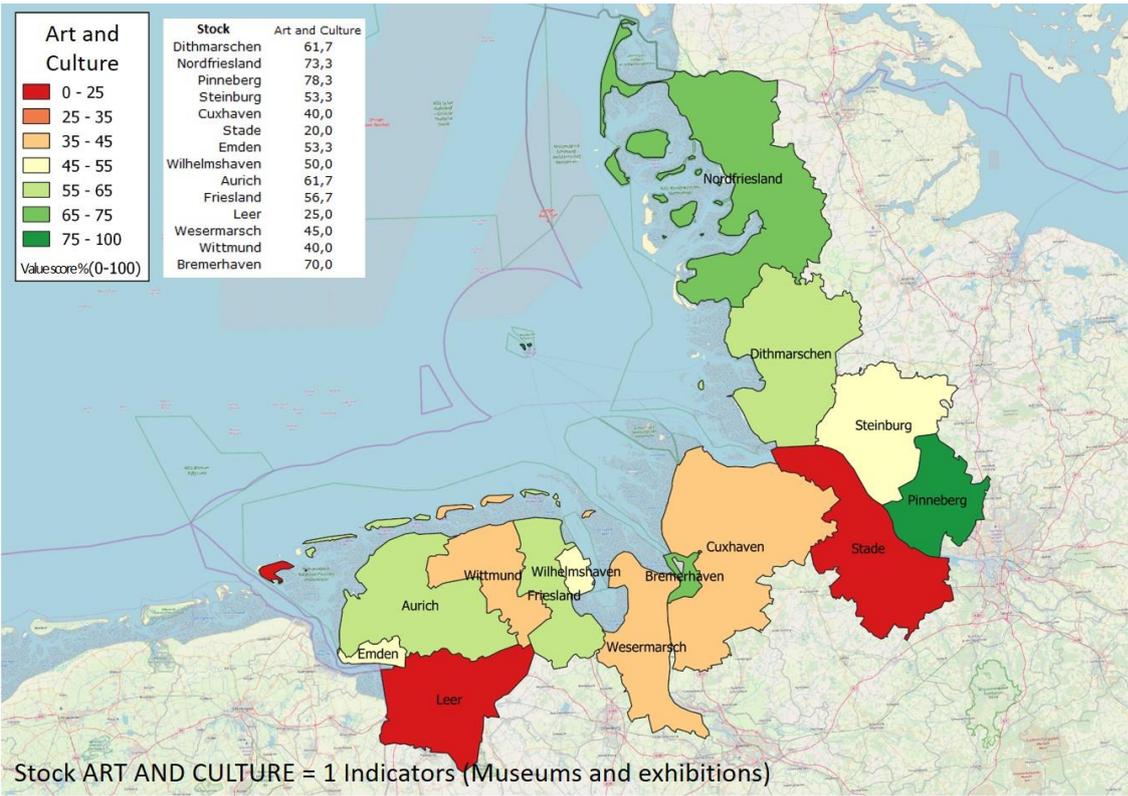
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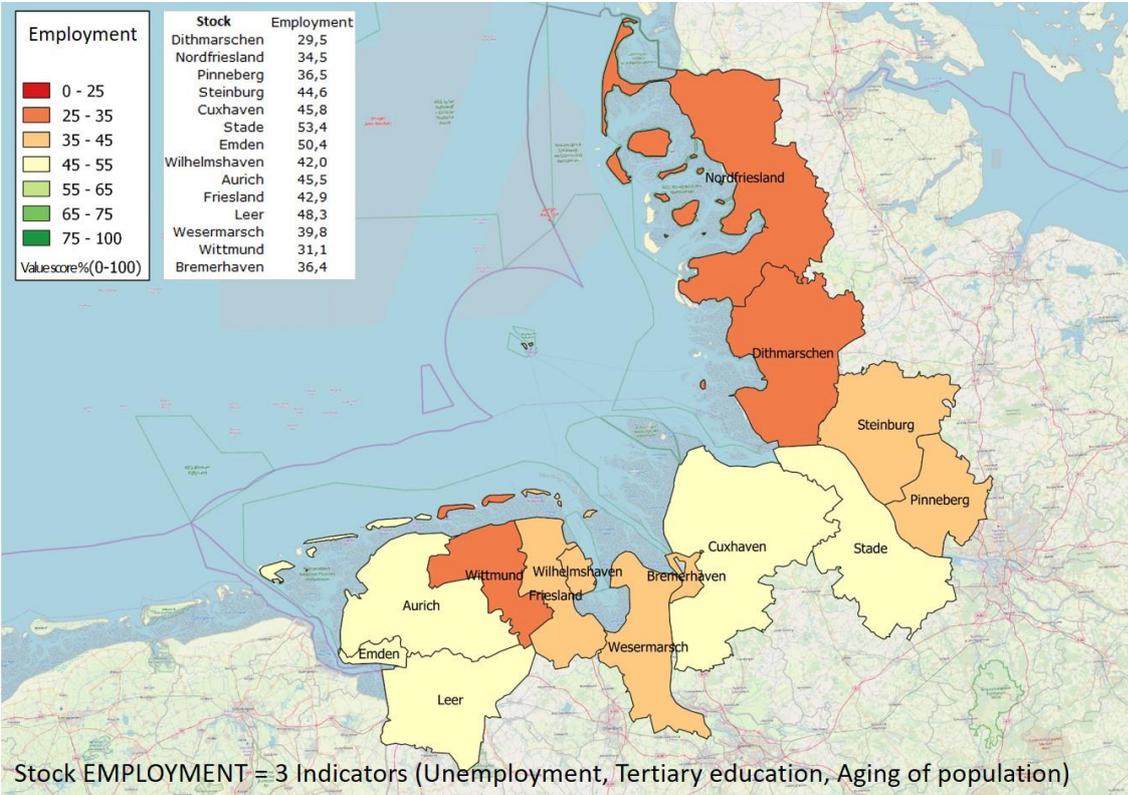
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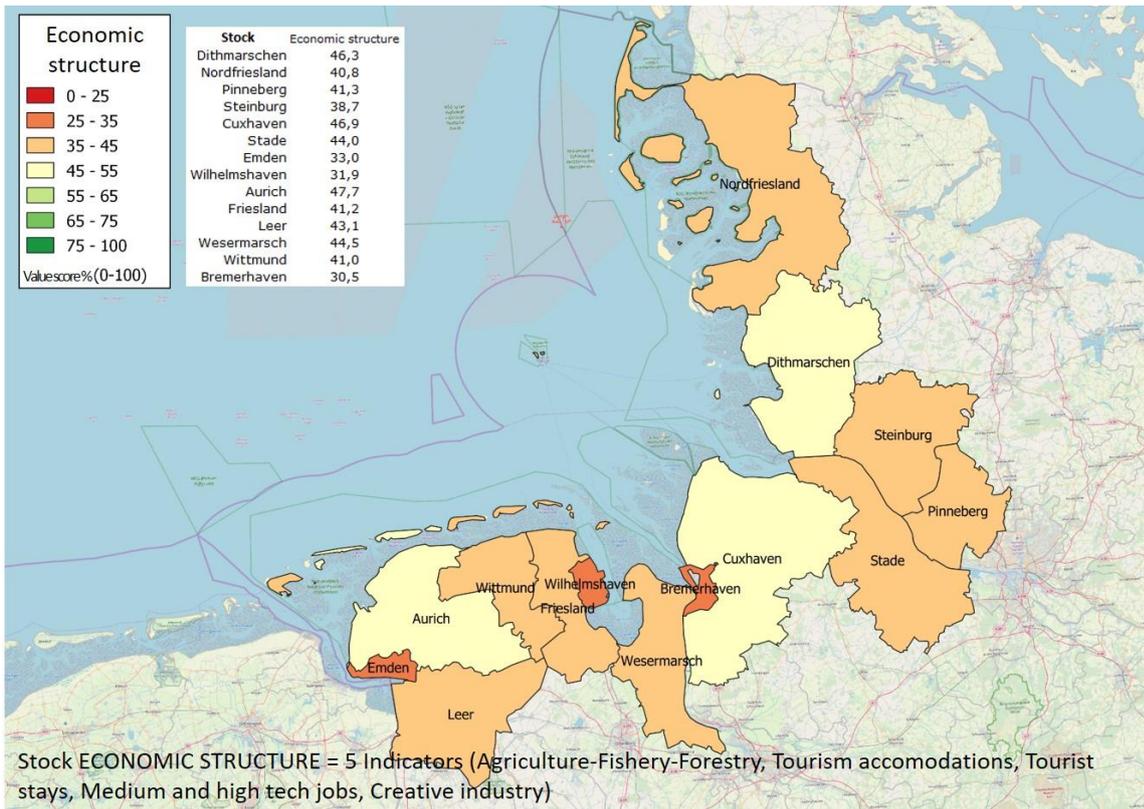
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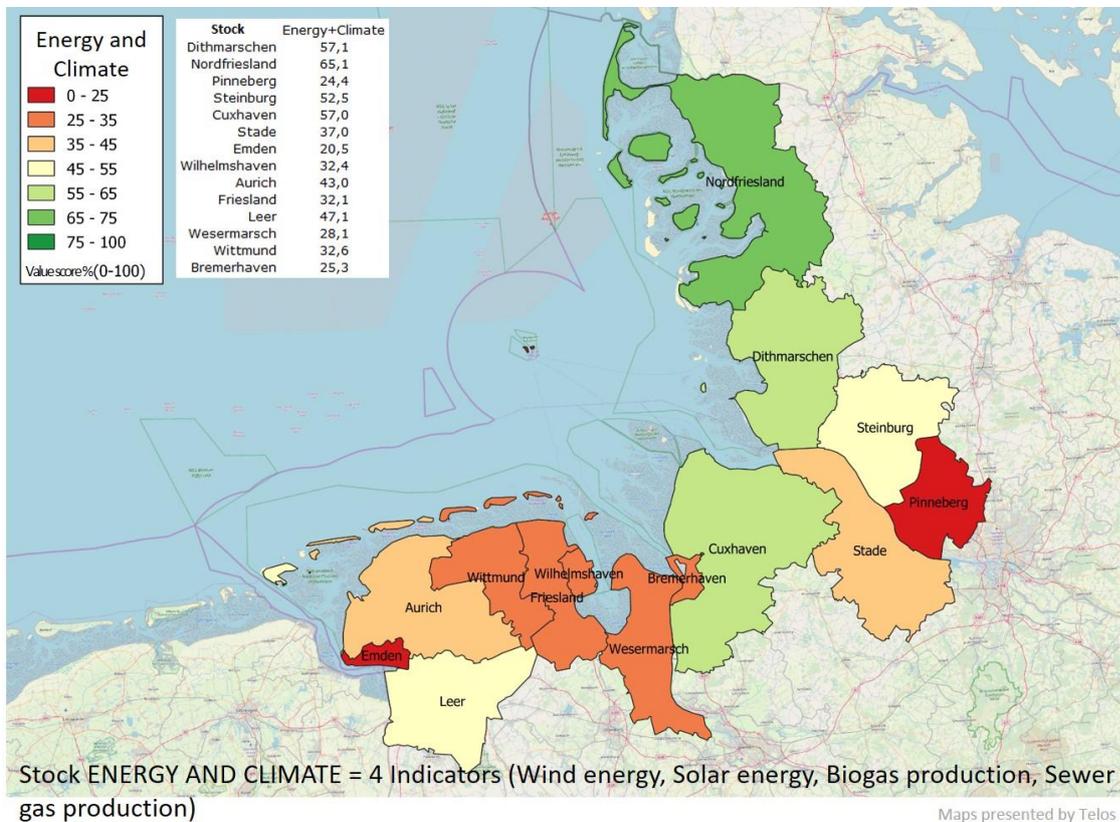
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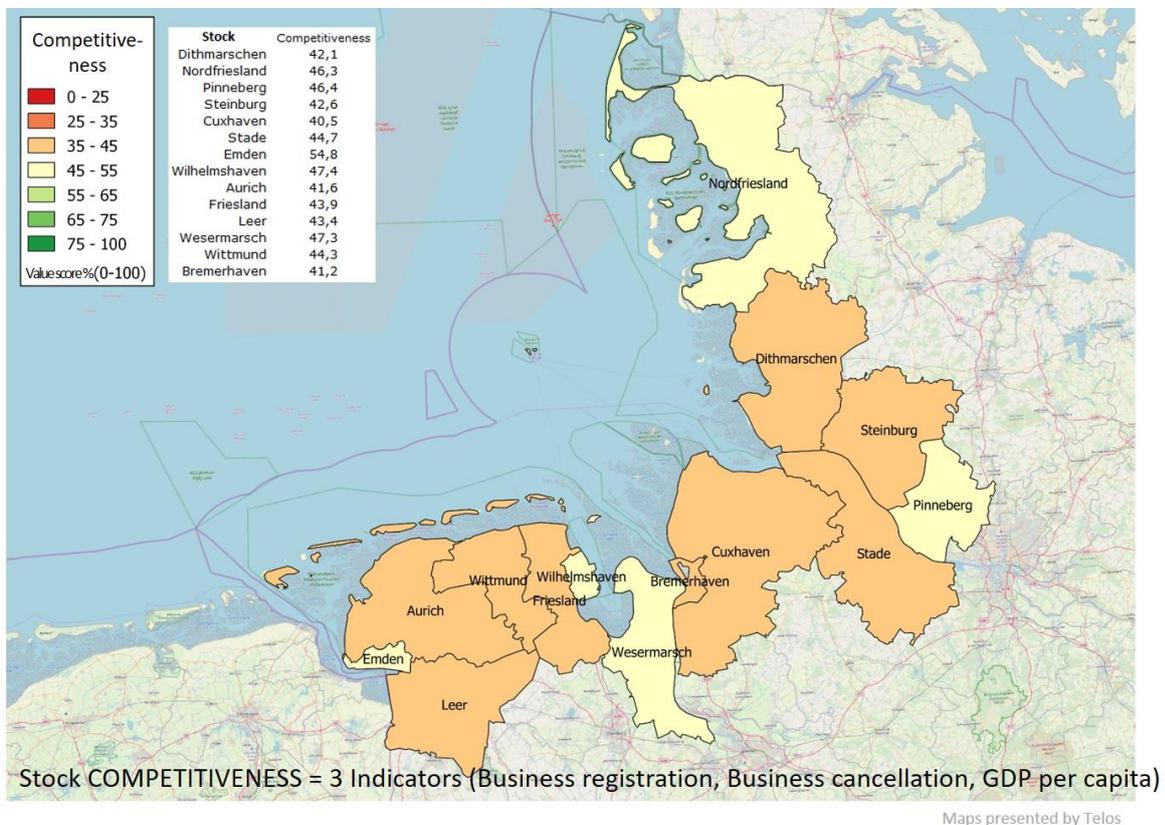
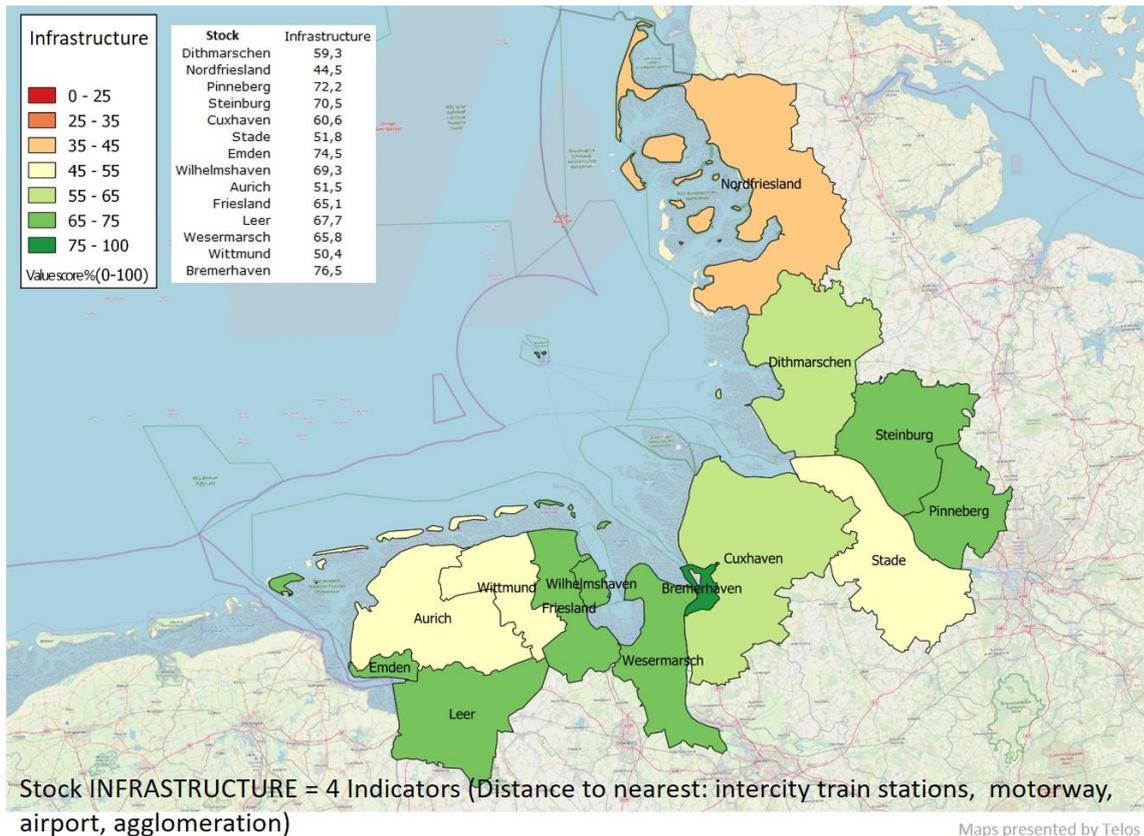
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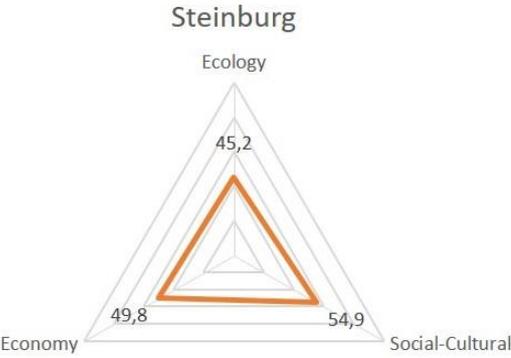
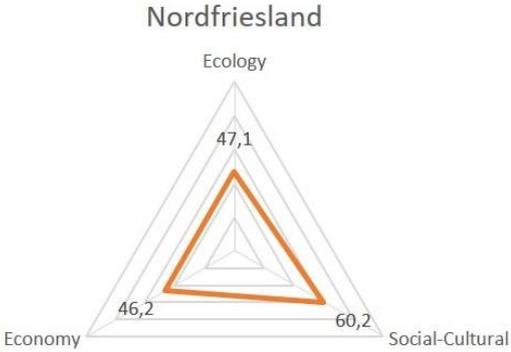
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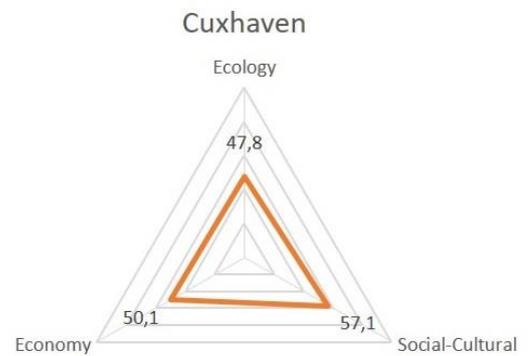
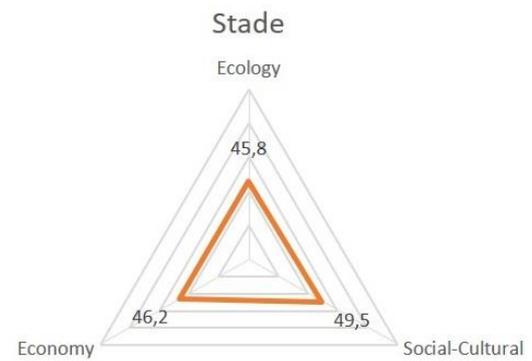
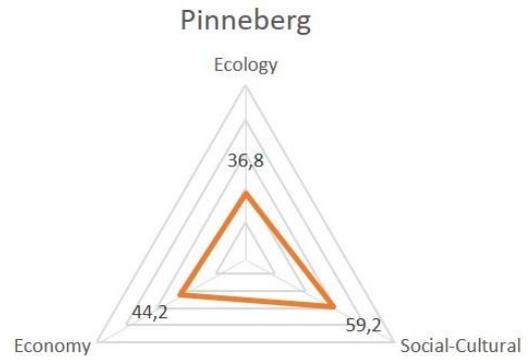
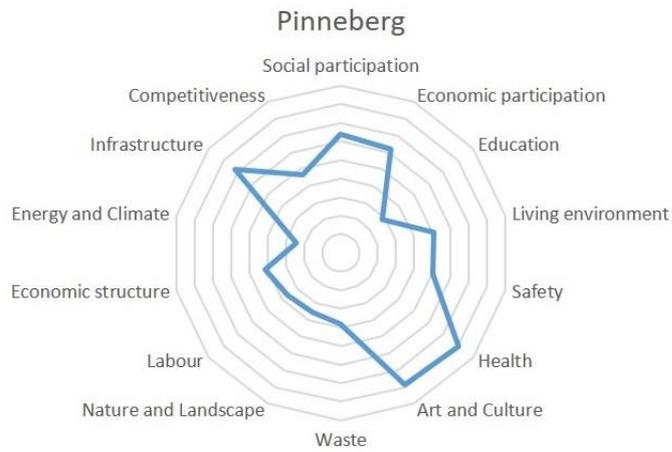


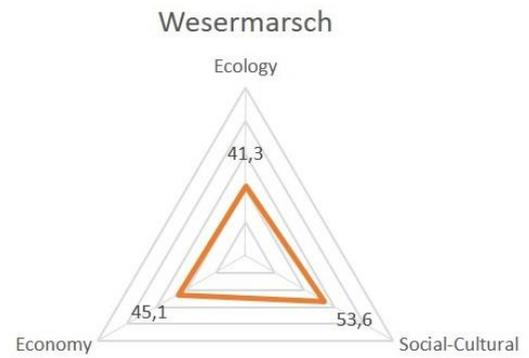
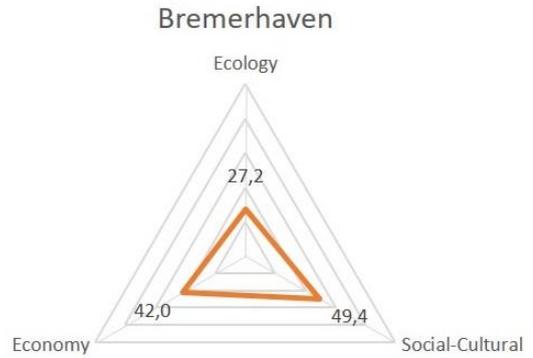
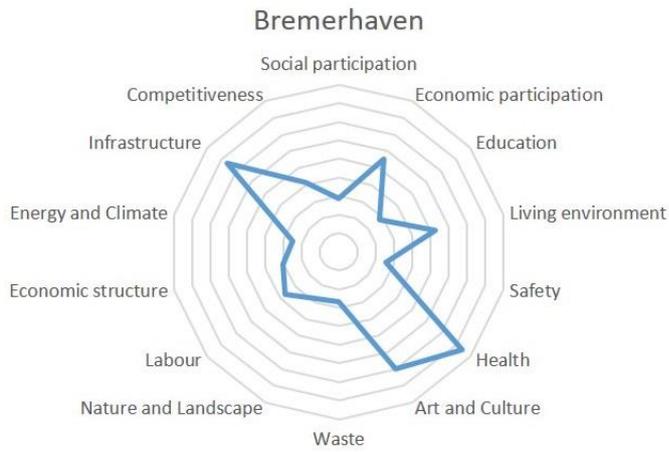
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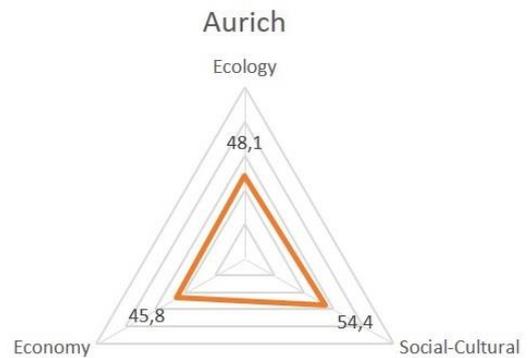
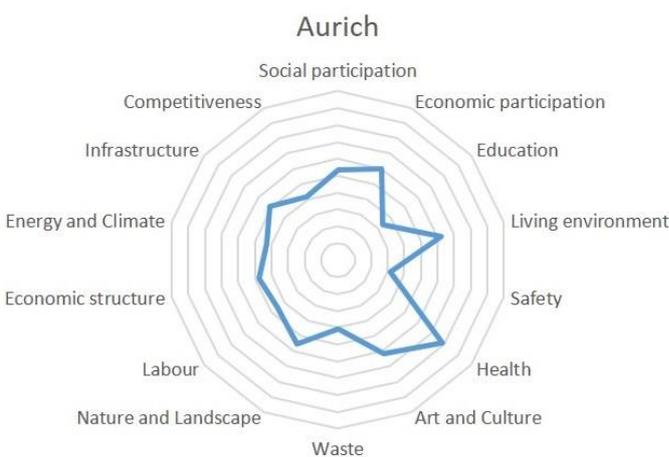
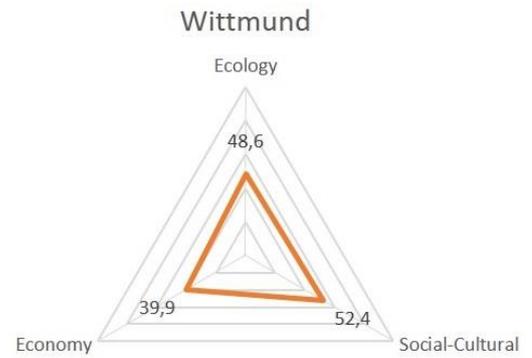
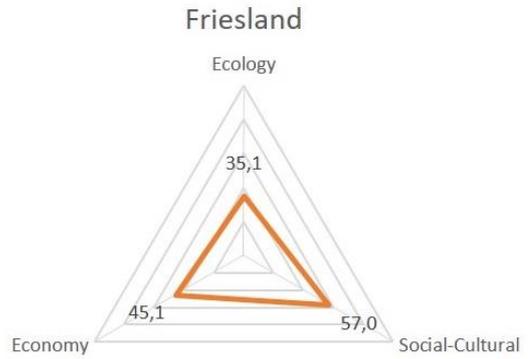


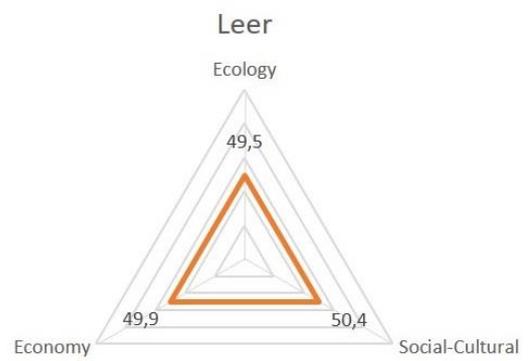
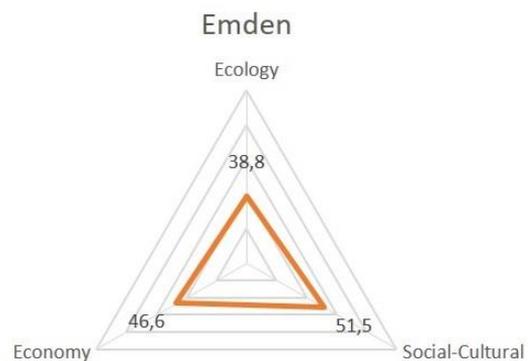
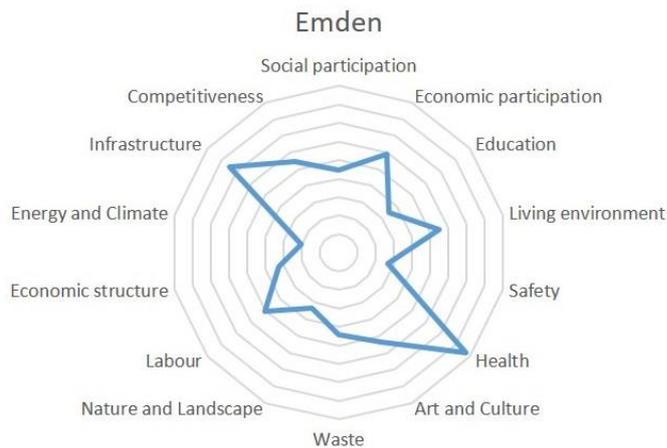
b) Spider net diagrams











Significant deficiencies can be found in education and economic structure in all counties. Nature and landscape have big gaps, especially in the district-free cities.

The data for this analysis was collected by the WSF Secretariat by searching databases and evaluated according to the selected standards. In several meetings, the working group ICZM of the WSF discussed the selection of indicators, the analysis methods and the results as well as their presentation, in order to adapt to the goals of the project.

At the regional level, there is reliable data to assess the state of sustainability. Based on the "Niedersächsische Nachhaltigkeitsstrategie", a time series will be developed. This was discussed extensively with the stakeholders in the WSF plenary. Hence, progress in efforts to sustainably develop the Wadden Sea Region will be measured over a period of time. Concrete measures to improve sustainability can then be discussed with the county representatives.

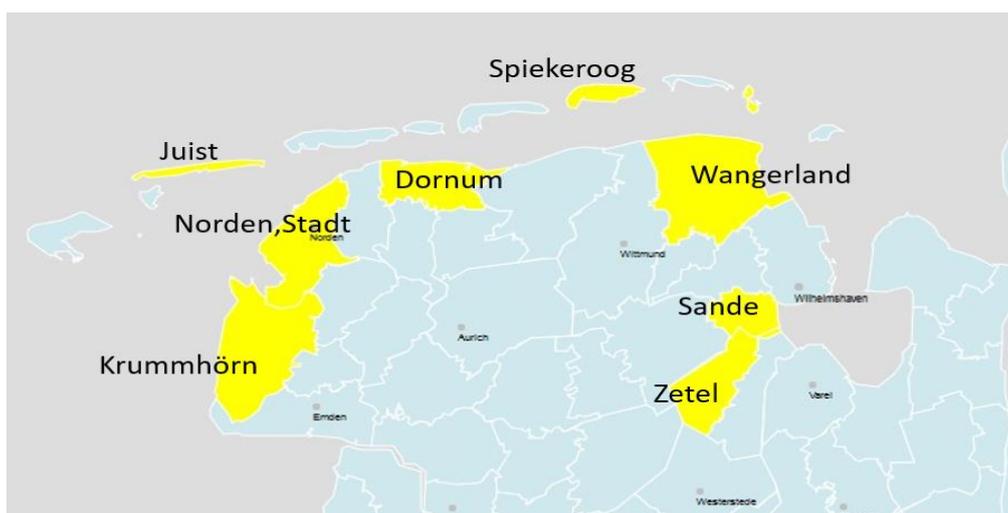
5. Sustainability Indicators of 8 selected municipalities

Indicator data on municipality-level, compiled in collaboration with the University of Kiel and Telos from the University of Tilburg, have proven inadequate for a concrete analysis of sustainability. A first assessment was discussed with individual municipalities (Juist, Norden, Wangerland), as described earlier in this report. In order to improve the data, efforts have been made in the municipalities to compile further specific data. For a meaningful assessment, which also allowed comparison with other municipalities, the results turned out still insufficient. Hence, a more detailed evaluation with data from the University of Kiel from 2014 was not considered to be effective and reliable.

At the Lower Saxony state level and at the county level in the coastal region, the defined indicators and the data collected provide valuable information about the sustainable development in the Wadden Sea Region (see Chapters 3 and 4). So control mechanisms can be used more effectively. To enhance this process at the local level too, this project has defined new indicators for 8 municipalities, providing a new basis and comparative analysis.

However, the public available data is mainly limited to demographic and some economic data. For further analysis, cooperation with the municipalities is necessary, focusing on their individual development. The results of this project form the basis of the new process, which is currently being started with the municipality of Wangerland.

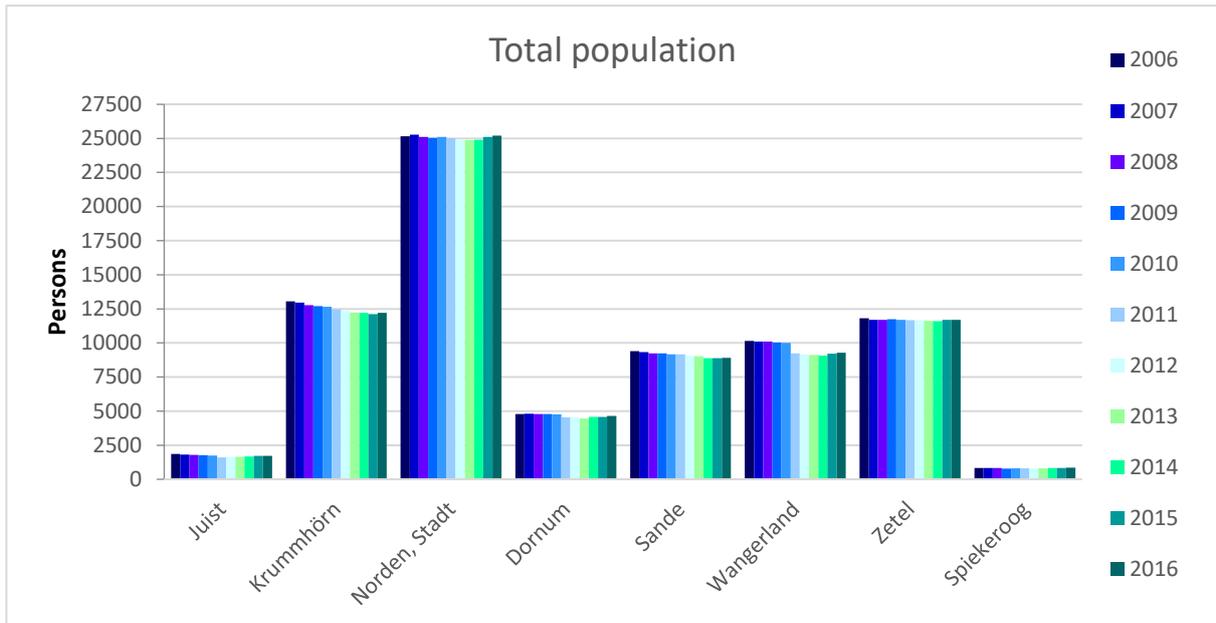
The following figure depicts the municipalities for which data on selected indicators has been compiled in this project.



Indicator list for 8 selected municipalities:

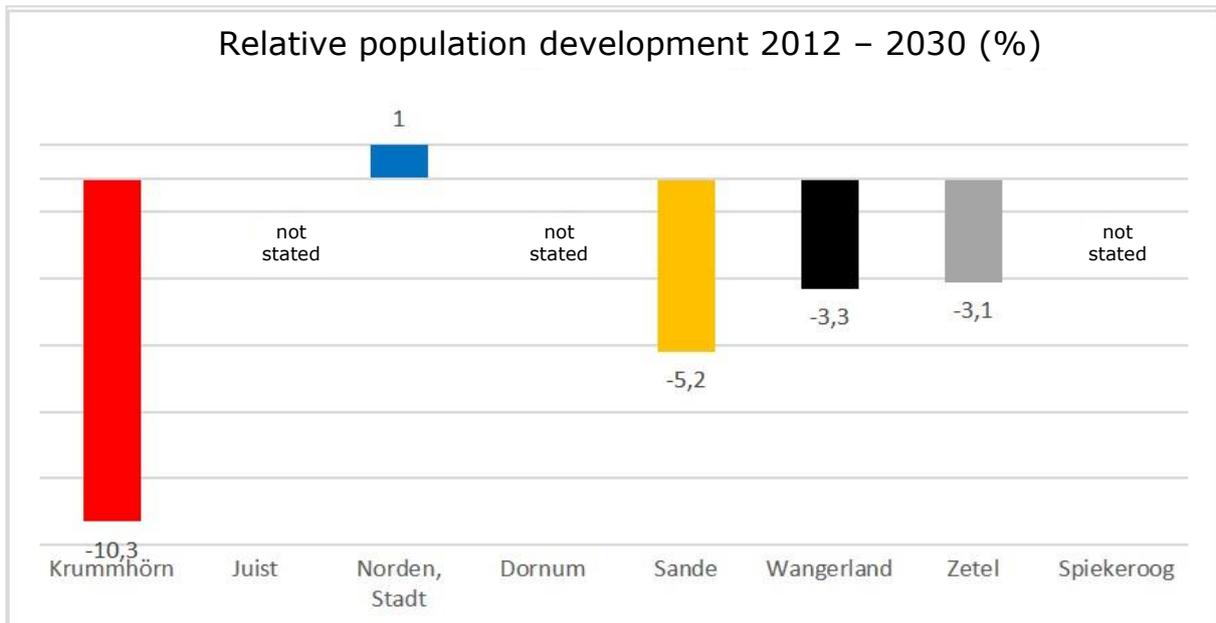
- Total population (numbers)
- Births (per 1,000 inhabitants)
- Mortality (per 1,000 inhabitants)
- Natural balance (je 1.000 inhabitants)
- Relative population development 2012 - 2030 (%)
- Unemployed per 1,000 inhabitants at working age
- Employees at residence per 100 inhabitants at working age
- Share of inhabitants 75 years and older to all inhabitants in %
- Share of inhabitants under 3 years to all inhabitants in %
- Development of inhabitant numbers under 3 years in % (2011-2015)
- Development of inhabitant numbers 75 years and older in % (2011-2015)
- Migration balance per 1,000 inhabitants (2005-2015)
- In-migrations per 1,000 inhabitants
- Out-migrations per 1,000 inhabitants
- Tax income in € per inhabitants
- Development of taxes in % (2011-2015)
- Development of income tax in % (2011-2015)
- Development of trade tax in % (2011-2015)
- Distance to hospitals 2015 (average car journey)
- Declining / growing municipalities
- Residents work place density (inhabitants and employees per km²)
- Population density (inhabitant per km²)
- Outbound commuters (trip to work 50 km and more) per 100 employees at residence
- Share inbound commuters to employees at work place in %
- Share outbound commuters to employees at residence in %
- Commuter balance per 100 employees at work place

The following pages show some results in charts, presenting demographic trends, work situation and tax revenue.

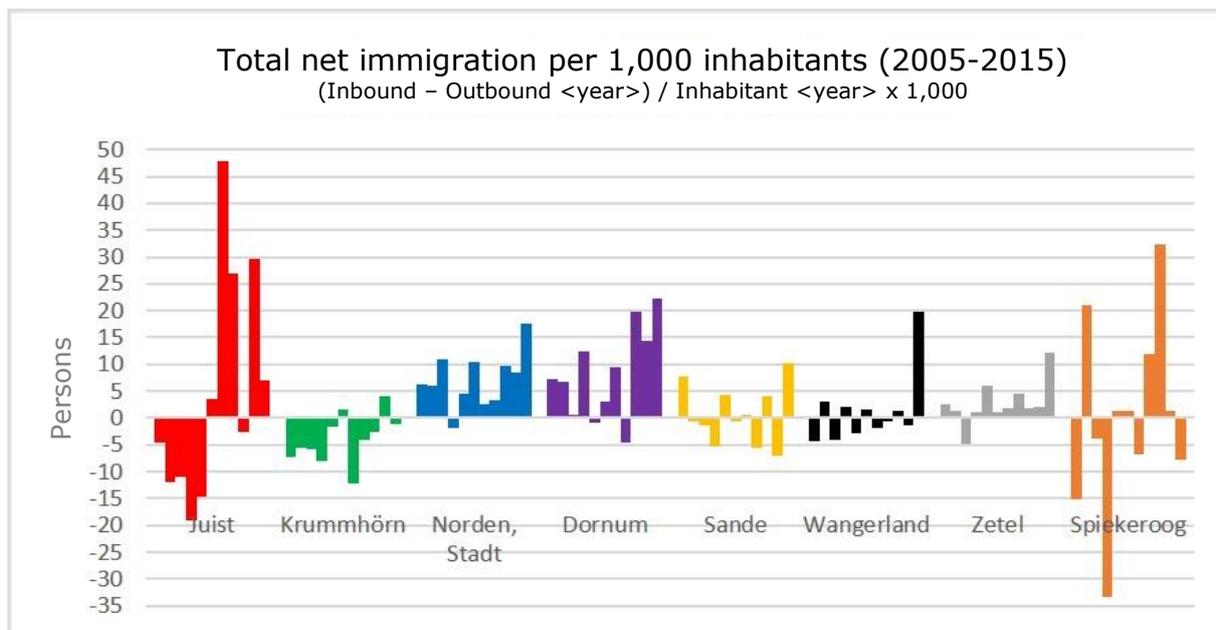
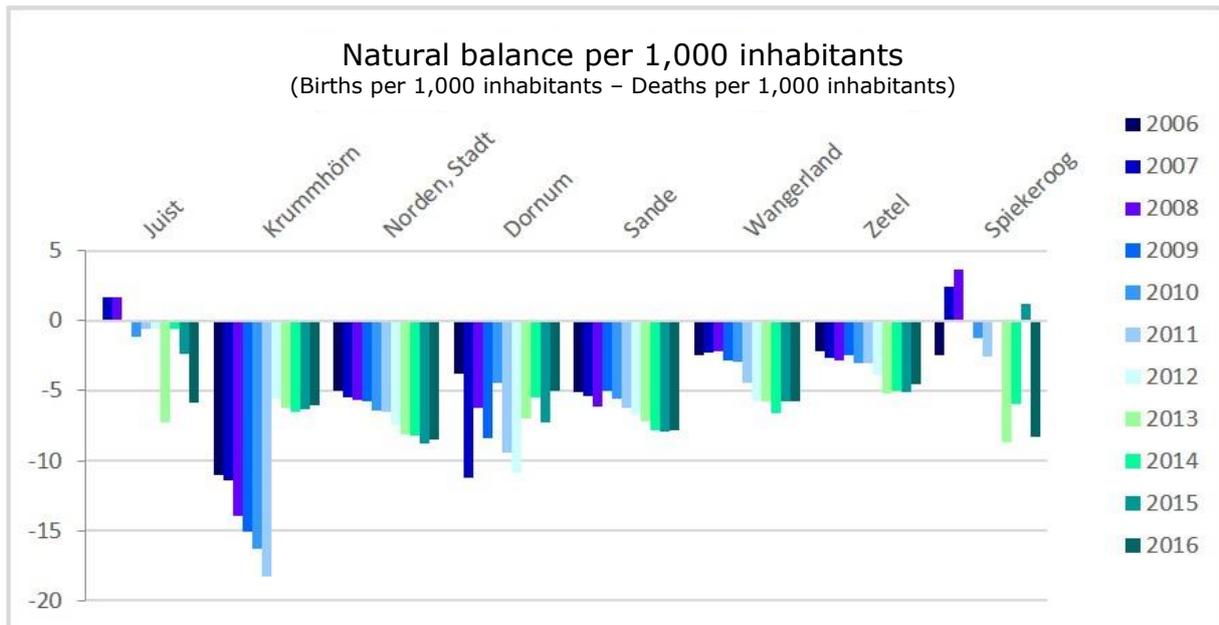


The development of population is fairly consistent in almost all municipalities. There was a slight decrease in the municipalities of Krummhörn, Sande and Wangerland, whereas the trend in recent years from 2012 was relatively stable.

In contrast, the forecast shows a different picture for some municipalities. Particularly Krummhörn would be affected by a decline in population, whereas the city of Emden probably is being the magnetic attraction for greater structural diversity.

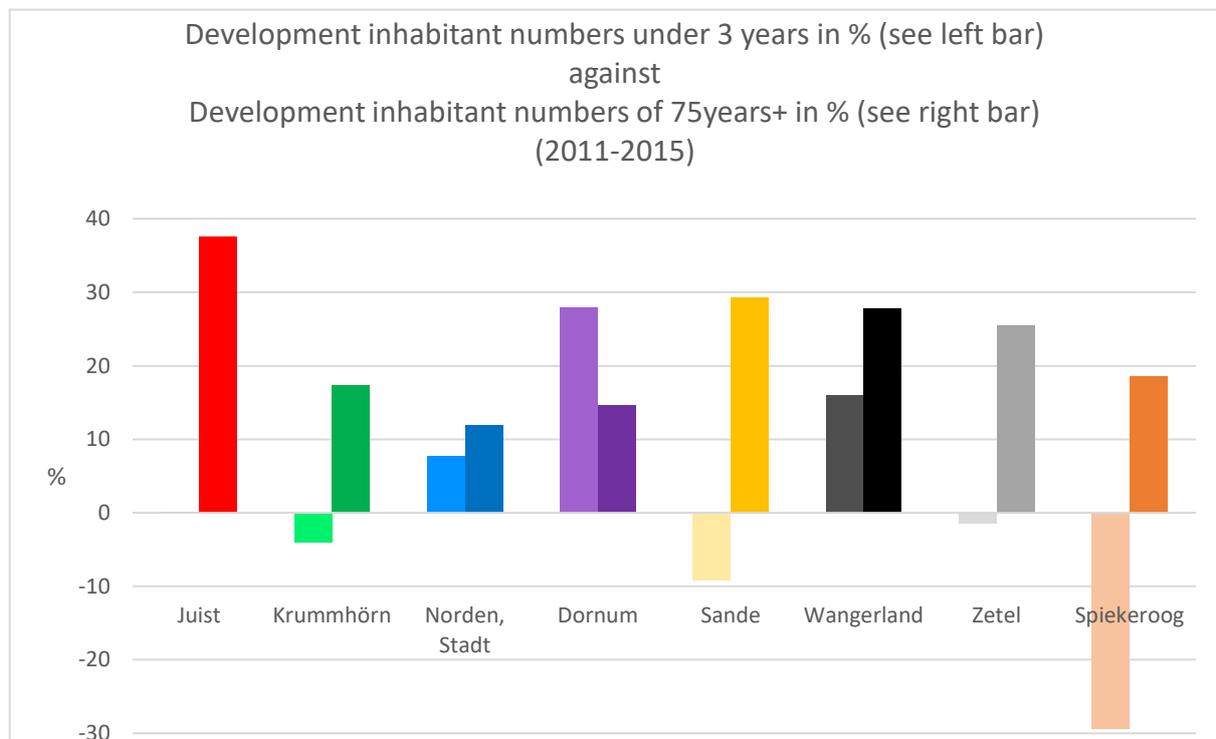
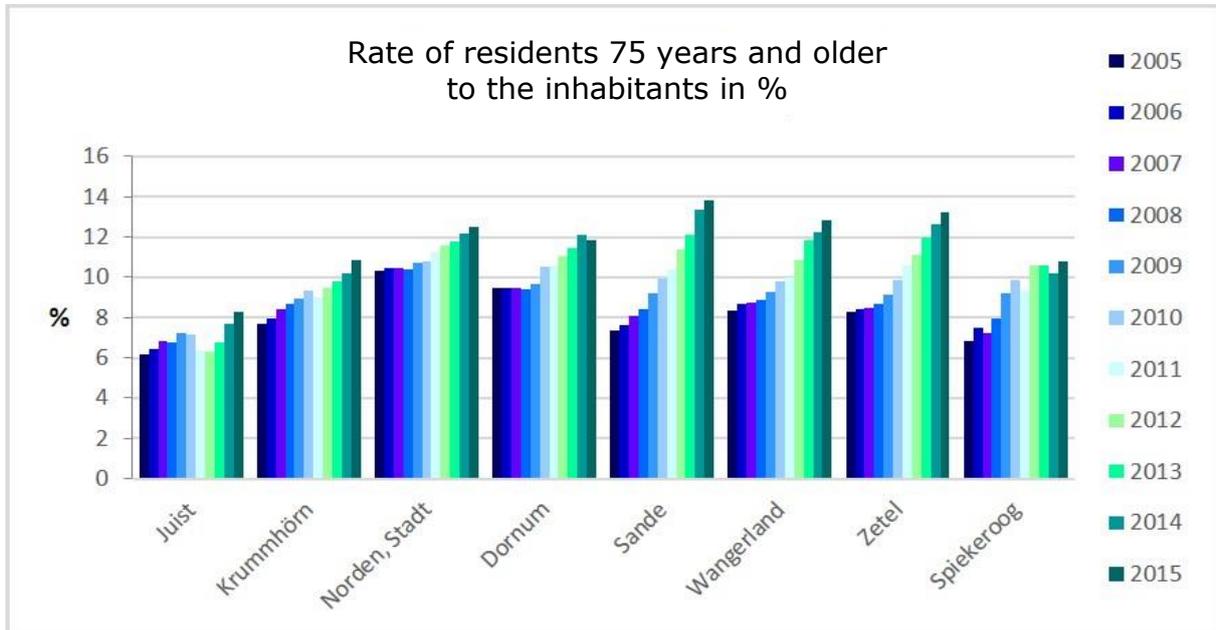


Looking at the population development on a smaller scale, the negative natural balance becomes clear to all municipalities. Here, however, only births and deaths are taken into account. Including outbound and inbound commuters, the overall migration balance gives a positive picture. The prediction should therefore certainly be discussed.

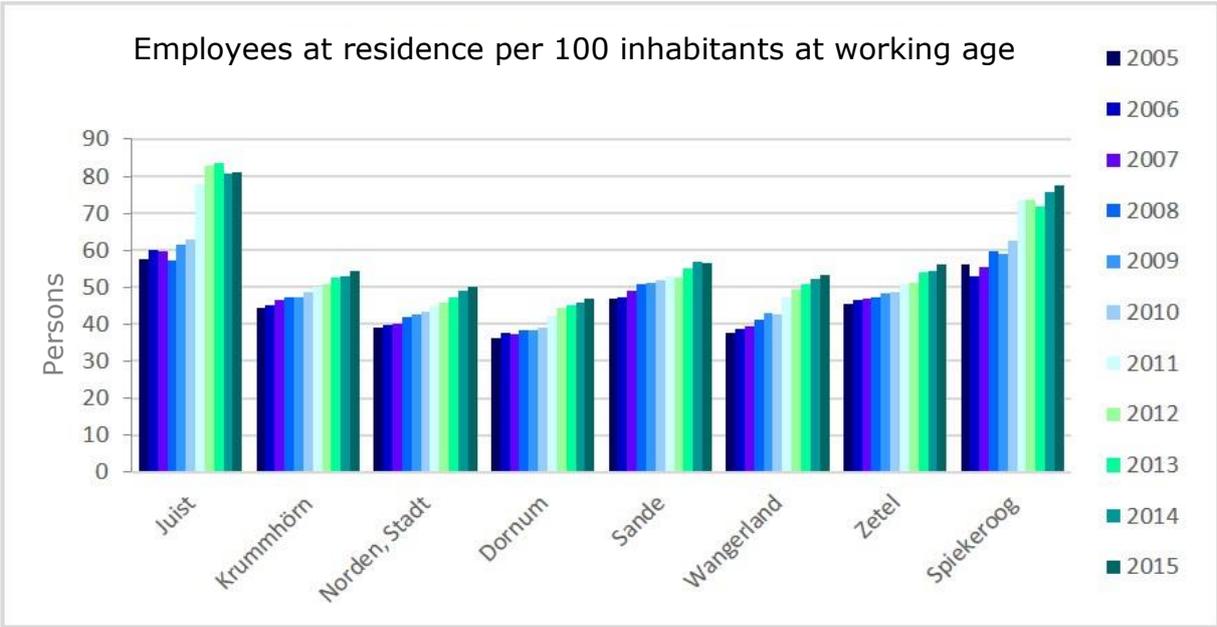
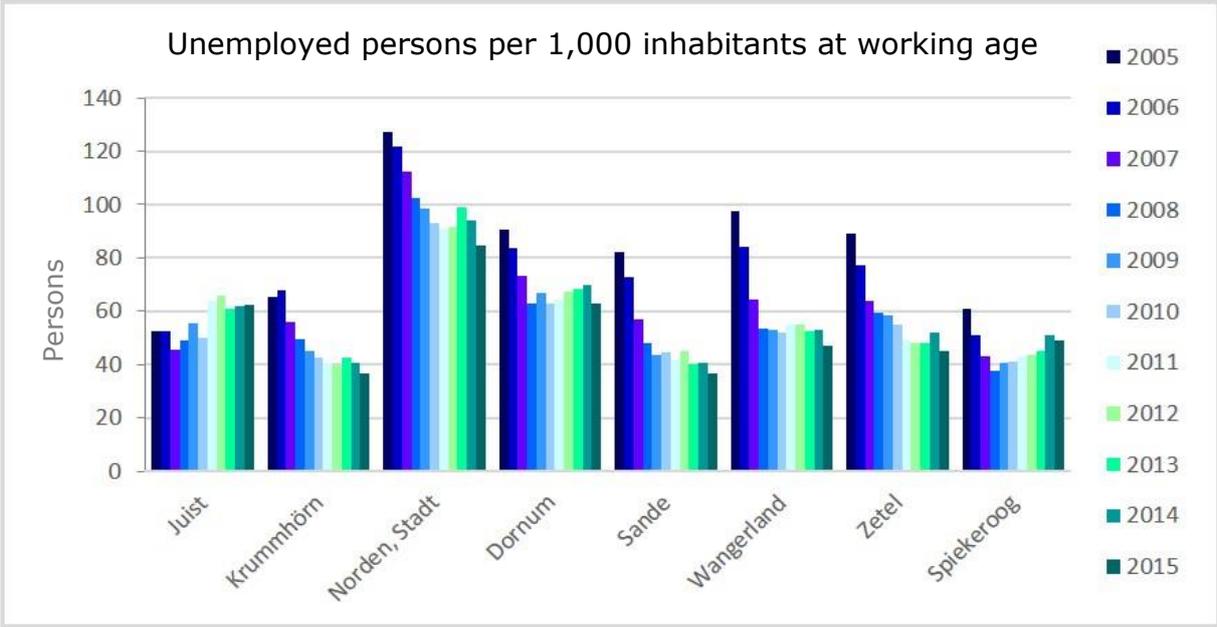


If we take a look at the demographic development of the age structure in all the municipalities, the proportion of over 75-year-olds is growing rapidly. This is particularly noticeable in the municipalities of Wangerland, Sande and Zetel. In Sande, the proportion of this age group has doubled within 10 years from 7% to 14%.

Looking at the development of the number of very young residents compared with the over-75s, the municipalities of Juist, Spiekeroog and Sande have extreme discrepancy between the share of small children and older people. Only the municipality Dornum shows the opposite trend.



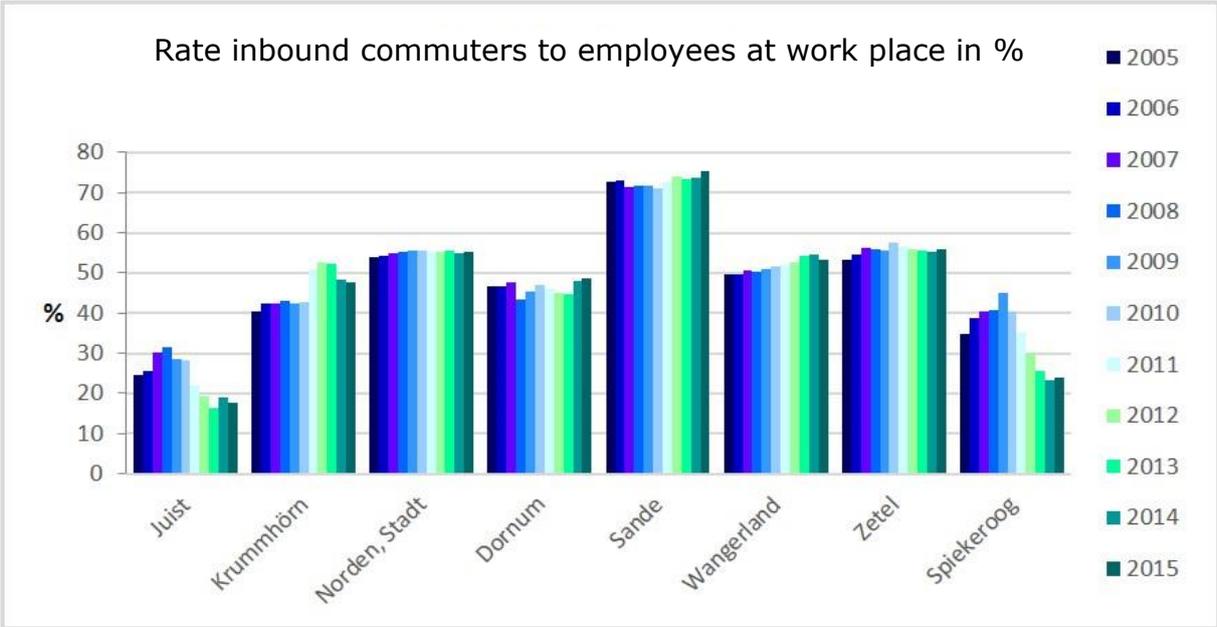
The following graphs show the number of employees and unemployed people. The situation is very different among the municipalities, although a decline in the number of unemployed from 2005 to 2010 in almost all municipalities is clear. Noticeable are the high numbers in the city of Norden and Dornum. Furthermore, it is remarkable that the two island municipalities as well as Dornum (municipalities which are heavily influenced by tourism) have recorded an increase in the number of unemployed people in recent years.



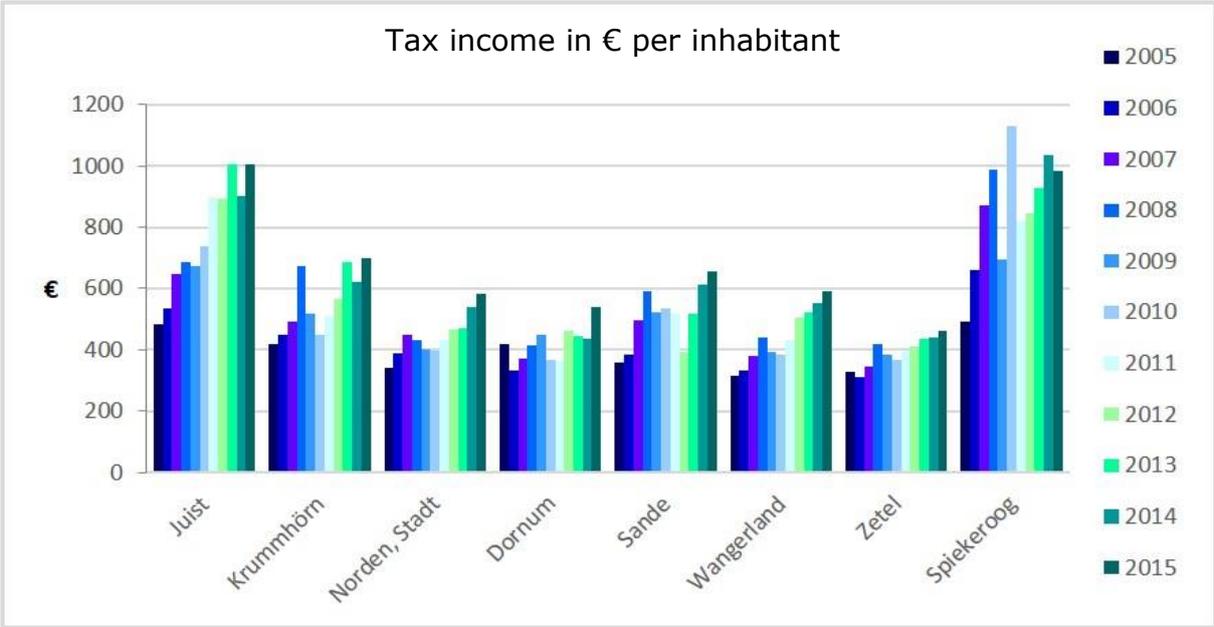
It is very pleasing that the trend of growing numbers of employees at their place of residence is increasing. This means that more and more people work at the place in which they live, which reduces the in and out migration and thus also helps to minimize air pollution.

This trend is particularly evident in the island municipalities, where now about 80% of the employees live on the island. In contrast, representatives of the island municipalities feared that the existing living space would be made more available for tourism than for the employees, as this would guaranty a higher income.

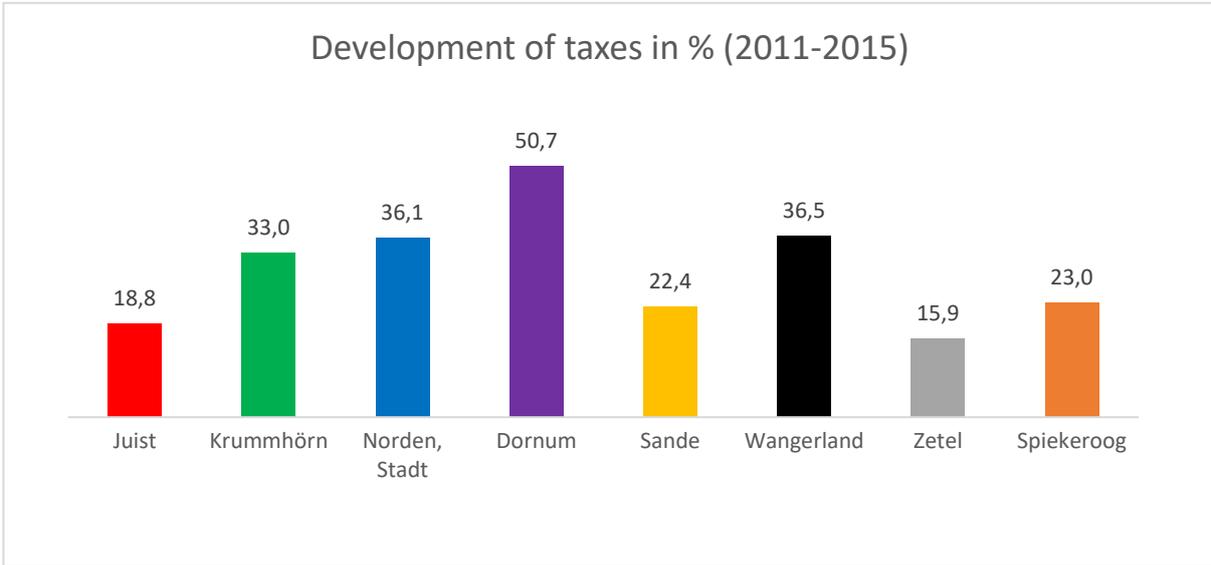
The following graph with the share of commuters at the place of residence underline this trend, again particularly on the islands of Juist and Spiekeroog.



A further analysis of the indicators broadly describes the economic situation of the municipalities. Thus, the tax income for all municipalities have increased in recent years.



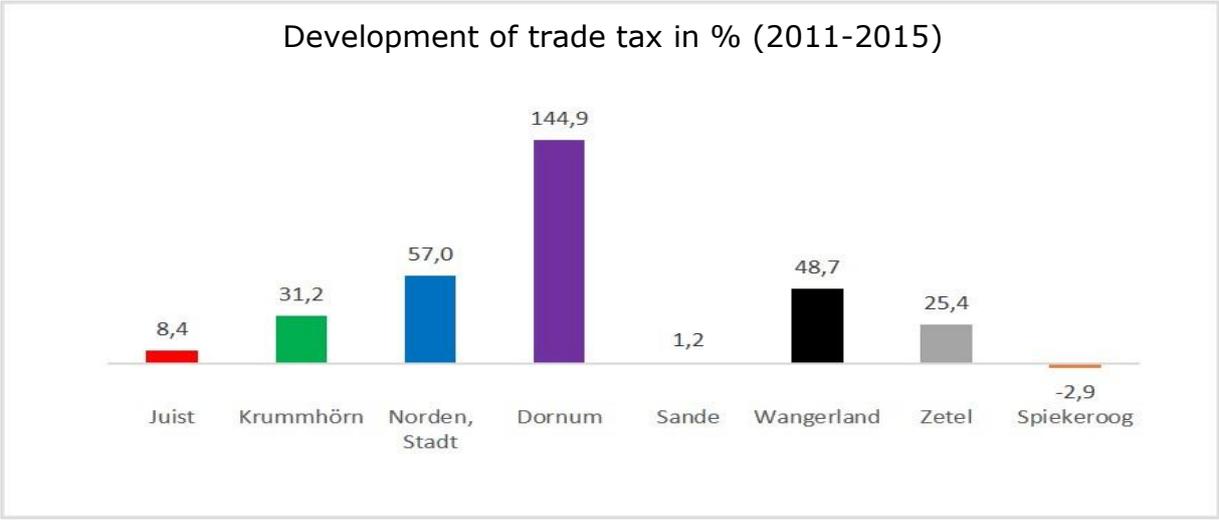
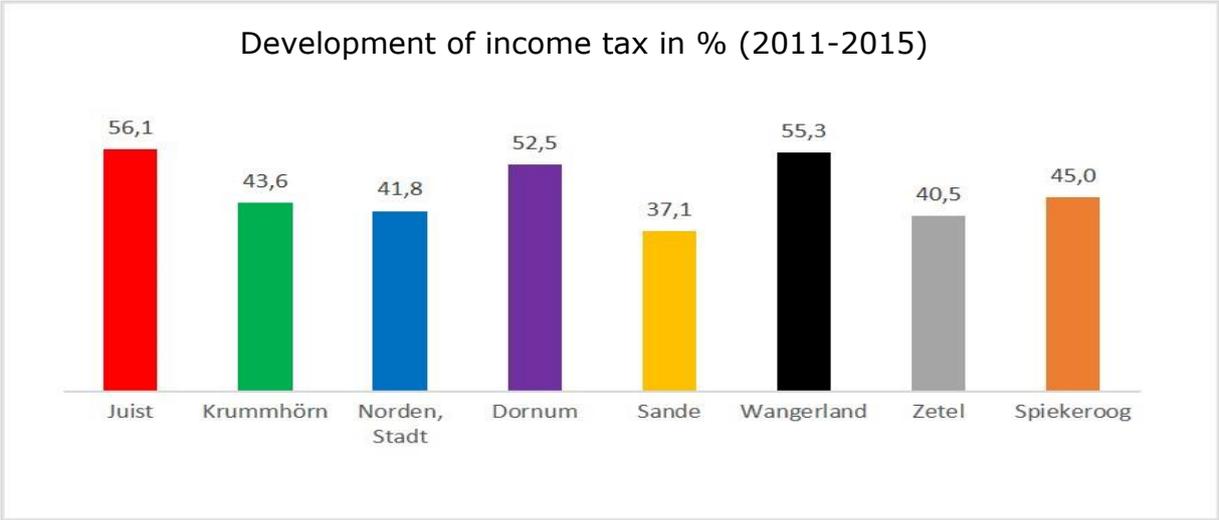
While the previous graph shows the tax revenue per capita, the following chart shows the development of total tax income for each municipality. The municipality of Dornum has recorded a very significant increase, while the municipality of Zetel is at the end of the list.



The reasons for this can be manifold and can only be worked out in cooperation with the municipalities themselves. A strong increase in tax income could also be due to the fact that the prior situation was miserable, while then every positive development leads to a dramatic increase. These more detailed analyses will be carried out in the future in projects with the individual municipality, as a preparation of guiding principles is planned with the municipality of Wangerland.

In order to take a closer look at the tax income, the revenues of income tax and trade tax are shown separately below.

In all municipalities, the increase in income tax is in a similar range, while there are serious differences in trade taxes. The municipality of Dornum stands out with a clearly high increase, while the island municipalities and Sande have recorded hardly no increase in trade taxes in the period 2011 - 2015.



6. Analysis of project contents

This chapter looks back at the objectives described in the project proposal. The objectives are briefly explained and the necessary modification regarding the aims of the overall project described in more detail.

a) Evaluation of the WSF indicators regarding importance and relevance for the Wadden Sea Region

The collected data of more than 60 indicators, carried out in cooperation with the University of Kiel, were discussed with stakeholders and representatives of some municipalities regarding their relevance and informative value. It became clear that most of the collected data was available at NUTS-3 (county) level and does not really contribute to the indicator assessment of municipalities. As a result, attempts were made in the municipality themselves to compile further data in order to work together on sustainability indicators.

However, as the data was still considered inadequate for this process, it was agreed to carry out analyses specifically targeted at individual municipalities rather than aiming at an approach for all municipalities.

Hence, the project carried out an analysis on both levels with a new database, both for the counties of the German coastal region and for selected municipalities in Lower Saxony. Both lines will be processed beyond the project.

b) Analysis of data regarding causes and relationships

The state of sustainability was discussed and analysed in small workshops and round tables with municipality representatives and the WSF ICZM working group. The complexity of causes and relationships within the individual themes could not be worked out conclusively during the project period. But the discussions within the collaboration set important knowledge and goals for necessary future steps. This was seen as a success by all parties, as the approach for further action was defined. The aim is to analyze sustainable development by elaborating a mission statement for municipalities and to use control mechanisms by specific indicators.

c) Harmonisation of the instrument and adjustments for the evaluation criteria and data interpretation

The standards used in the WSF analysis of county and municipality indicators were extensively discussed in the region. It was consensus that for comparative analyses (see below) the evaluation criteria, such as standards and weighting of the indicators, should be the same for all counties and municipalities. For this purpose, default values were used. However, characteristics and focus developments should be taken into account for a mission statement of individual counties and municipalities. Here are especially to name:

- Spatial location (Island or mainland municipalities)
- Urban or rural character
- Demography
- Focus of developments (e.g., tourism, agriculture, education, care of the elderly people)
- Infrastructure (train connection, motorway)
- Nature protection

d) Comparative analysis to clarify differences and similarities between different communities

Because a detailed assessment of sustainable development was not possible for the selected municipalities due to the lack of data, the project has created a new basis for comparative analysis at county level. Stakeholders and representatives of the counties have welcomed the results so far and see it as a basis for elaborating time series beyond the project period. From this, measures can be derived to make the region more sustainable.

At the municipality level, data on 26 indicators were compiled and presented in graphs, without any assessment being made like on county-level indicators. This corresponds to the approach of the "Lower Saxony Sustainability Strategy". In this approach, the development over a defined period of time is clearly visible.

e) Outcome and relevance

As already described in the project application, the coastal region is an important cultural landscape with a unique cultural history. This has strongly influenced the identity of the coastal inhabitants. In order to preserve the natural and cultural values of this coastal region, sustainable development, including cultural-historical development, is of particular importance. This project, funded by the "Niedersächsische Wattenmeer-Stiftung", selecting indicators that enable an analysis of sustainable development, has made an important contribution to drawing the region's attention to its strengths and weaknesses as well as to its development potentials.

Furthermore, several municipalities were involved in the evaluation process in order to discuss the key scientific data and to find an approach that takes into account the real conditions and allows a specific development in terms of sustainability. This can be achieved by elaborating mission statements and accompanying indicators for progress assessment. This also means that the benefits of the project go far beyond the duration of the project.

