INNOVA **Ezine**

Urban Climate Adaptation

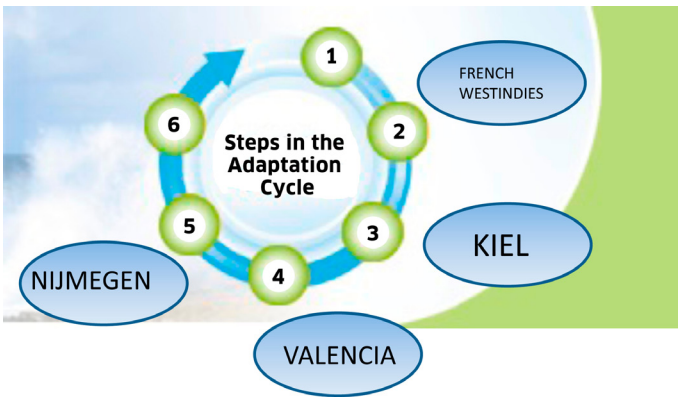
Guadeloupe & Martinique | Kiel Bay | Nijmegen | Valencia

This e-zine of the INNOVA project describes the Innovation Hub Kiel Bay on the Baltic shore of Germany, one of the most important tourist hotspots in the region. An essential element of its attractiveness to the seasonal influx of tourists is its sandy beaches. Changes to the character of the beach, and the beach experience, can therefore have an impact on tourism. Beach wrack is a mix of algae and seaweed that is naturally washed onto the beach. This e-zine describes the effects and opportunities of beach wrack washed up on shores of Kiel Bay.

Beaches with large volumes of beach wrack generally considered, by tourists, to be “dirty”, which detracts from its attraction. “Dirty” or unattractive beaches attract fewer visitors, and reduces economic activity associated with a beach experience, i.e. food sales, canopy and chair rentals, hotel accommodation, etc. As a result, local communities on the Kiel Bay remove beach wrack in the tourist season on a daily basis. The INNOVA project is investigating whether this natural process is being affected by climate change and at the same time show solutions how this material can be regarded as a resource.

This third INNOVA e-zine tells the story of the environmental and climate challenges facing the Kiel Bay region. The first issue dealt with the Mirror Waal project in the Nijmegen area (NL); the second on the water management issues in the Valencia, Spain.

It is proposed that this issue of beach wrack, and the possible increase in volume, the variability of wind patterns driving beach wrack onto the shore, and other variables, will be used to produce a “climate service”. Next, a complex planning and design effort will be made by this INNOVA project Hub (or case study) as a final result for a business case. Whereas Nijmegen (first e-zine) is far in the Adaptation Cycle; the Valencia metropolitan area (second e-zine) is between the steps of identifying adaptation options (Step 3) and assessing these options (Step 4); the Kiel Bay area is between assessing risks and vulnerabilities to climate change (step 2) and step 3.



Adaptation Support Tool on the European Climate Adaptation Platform

KIEL BAY AND ITS BEACH RESOURCES

The Bay of Kiel is located in the south-western Baltic Sea. To the west and south it is bordered by the coasts of Schleswig-Holstein, to the southeast by the island of Fehmarn and to the north by the Danish islands of Als, Ærø and Langeland. Kiel Bay contains other smaller bays and inlets such as the Schlei, Eckernförde Bay and Hohwachter Bay.

Apart from the state capital Kiel, the coastline is mostly inhabited by smaller and middle-sized communities. Coastal tourism is the main economic driver for most of these smaller communities. During 2017, the coastal area of Schleswig-Holstein accounted for almost 14 million overnight stays (see table below).

Table: Overview of the tourists overnight accommodation in some communities of the Kiel Bay area.

City, community	Inhabitants	Overnight stays (2017)
Kiel	ca 250.000	ca. 720.000
Laboe	ca. 5.000	ca. 130.000
Hohwacht	ca 800	(no data available)
Strande	ca. 1.500	ca. 31.000
Eckernförde	ca. 22.000	ca. 142.000

CLIMATE CHANGE AT THE BALTIC SEA COAST

The beaches of the Baltic Sea coast is an essential factor in the decision of tourists to stay in the area. A negative tourist perception or beach experience has direct consequences for the local economy. Examples of such negative experience includes the perception of pollution of the Baltic Sea, or the loss of the beach space due to erosion. Therefore, coastal managers of Baltic Sea communities strive to prevent or minimize possible adverse effects and perceptions.

The impacts of climate change and the consequences of human activities on the oceans are already clearly visible in the Baltic Sea. Warming, acidification, eutrophication and a depletion of oxygen levels are just a few examples of serious changes to the Baltic Sea. These processes are more pronounced and faster in the Baltic Sea. While oceans had warmed by an average of 0.5 degrees Celsius over the past 30 years, measurements for the Baltic Sea over the same period indicated warming of around 1.5 degrees Celsius. Together with changing wind patterns, rising sea levels, and changing rainfall patterns, this can have significant impacts on the coastal areas. Expected impacts from these changes are an increasing erosion of the beaches, changes in the amount of beach wrack washed on shore, but also an increase in the touristic business due to warmer air and water temperatures and prolongation of the season in spring and autumn.

BEACH WRACK

Beach wrack is a mixture of seagrass and algae that washes up on the shoreline. It appearance on the beach is irregular and seasonal, and depends on its growth and health under water, as well as wind and water movement in the Bay. During storms, which raises water levels, and strong wave action, seagrass and algae are torn off the seabed and washed up on the coasts. Between May and October 2017 approx. 4.900 tons of beach wrack were deposited on shores of the German Baltic Sea coast.

Beach wrack, once deposited on the shoreline, is a very visible element of the beach. Other than the 'waste-like' appearance, the smell of decomposing organic material also pronounces it presence. Tourists often associates the appearance of breach wrack with low water quality, especially once it starts decomposing and smelling. They often complain about low beach quality and may even be compelled to avoid these beaches all together. Local authorities and beach manager therefore see the presence of beach wrack as a "nuisance" requiring management action to protect tourist income and contribution to the local economy. As a result, beaches in the vicinity of tourism resorts or hotels are regularly cleaned during high-season. Often, these beaches are cleaned on a daily basis. The cost of removing beach wrack is very high and involves the use of heavy machinery, i.e. tractors and trucks driving on the beach. Over and above the direct cost of removing beach wrack, the unintended and unavoidable removal of sand may also affect sand volumes and result in worsening erosion.

Despite the negative perception of beach wrack, is it really only a nuisance? Not at all! Beach wrack can also be seen as a valuable resource. For example, beach wrack can be of usage in agriculture where it can be used as fertilizer. Especially the seagrass, as part of the beach wrack, can be used in different ways. Most prominently it can be used as insulation material. The occurrence of beach wrack is not only relevant in Germany, but in many places worldwide where macro-algae or seagrass grow near the coast. Numerous studies analyze the composition and ecological properties of the beach wrack, for example in Italy, France, or Great Britain.

HISTORY OF USAGE OF BEACH WRACK

In the past, beach wrack has played a major economic role in the wellbeing of coastal communities of the Atlantic Ocean, the North Sea – and the Baltic Sea. Collected, dried and pressed into bales, seagrass was exported by ship and rail to many destinations in Europe where it became processed into bolsters for mattresses and also used as packaging material. At the coast, it was utilized in some areas for building dykes or roofs for houses and also used as ingredients for soups, teas and the main ingredient in the microbiological medium know as Agar-Agar.

Extensive seaweed harvesting took place in the many bays of France, Normandy and Brittany, in the 18th century. Witnesses reported up to 30.000 people being occupied with collecting seaweeds. Protected by the church, seagrass harvesting was set aside for poorer coastal residents, which were supposed to collect their "daily bread" during the fall, when seagrass washed onto the shore. In the 19th century the Danish created a flourishing market and became a leader in exporting seagrass.

Similarly, on the German Baltic coast, traders collected the beach wrack in the early 20th century and sold it all over Germany. In and around the city of Kiel it was a much welcomed resource used as fertilizer for nearby fields. Interestingly, during the First World War, a decree was issued by the German King stating that beach wrack had to be delivered exclusively to the Imperial armies, which used the material for insulating soldiers' sleeping bags. After almost a century of intensive usage, it was gradually displaced, and disappeared from the markets in the mid 1960s due to cheaper, synthetic building materials.

Timeline of utilization of beach wrak

Ca. 17 – 18th century

Houses are covered with seagrass at the Danish island of Läsö

Ca. 1870

Dike from seagrass erected at island in Ulvshale (Island of Møns, Denmark)

1888

Paul Gauguin its famous painting ‘Breton Tang Collectors’, documenting the seasonal harvesting of seagrass at the shore of the Atlantic Ocean in Britanie

1888

The German magazine ‘Die Gartenlaube’, a forerunner of today’s magazines, thematizes the seagrass harvest with a replicate of Arthur Calamas’ seaweed collection

Sea grass harvest near St. Malo, France, 1888

1913

Procession of 8 million tons of dried seagrass in Denmark (which equalled three times the volume of the entire hay harvest in Denmark in 1913)

1914 – 1918

Degree by the German empire to German coastal communities to release all collected seagrass to the royal armies where it was used as fillings for sleeping bags of German soldiers during World War I

1917 – 1959

The Danish ‘Kalvehave Tangexport’ processed up to 500 tonnes of seagrass annually from the coasts of the island Møns and South Sealand

1969

Bay of Kiel: last harvest and processing of seagrass

2010

Foundation of the Kiel Bay Climate Alliance, a network of 20 communities in the Bay of Kiel, which are dedicated to bottom-up activities helping communities to cope with the effects of a changing climate at the Baltic Sea coast

2013

K. Dittmann is opening his enterprise ‘Strand-Manufaktur’ in Kappeln in the Bay of Kiel. He specializes in the producing of pillows filled with seagrass; re-introducing the traditional handcraft to the area from where it disappeared half a century ago

2018

Construction of artificial ‘beach wrack dune‘ in Eckerförde by the municipality after a winter storm

WISE MANAGEMENT OF BEACH WRACK

In the contemporary Kiel Bay there are several options available for managing beach wrack. The most common way of avoiding conflict with beach users is cleaning the beach after storms and bringing the organic material it to municipal composting plants. This is, however, a costly solution for the municipality which has to pay both collecting and composting fees. Local authorities are therefore eager to find new, more cost-effective, ways to manage beach wrack.

As a resource, beach wrack can be used as fertilizer. In former times, farmers picked up the beach wrack at the beach and used it as fertilizer in their fields. This is no longer done extensively because industrial fertilizers are more efficient and new laws in the agricultural sector impose detailed regulations for fertilization on the farmers. It is still under debate how much beach wrack may be used by farmers, according to the nutrients. Beach wrack is known to improve the quality of loamy soils; also it can very well be used for gardening purposes, as a potato growing competition showed in 2017.

The seagrass portion of the wrack is a particularly valuable natural resource that has many beneficial uses. For example, rooftops are covered with seagrass on the Danish island of Läsö. It can be also used as non-allergenic insulating material with a very low ecological footprint. The 'Strand Manufaktur' is a small enterprise using seagrass for cushion or blanket fillings. But in this case, the material has to be cleaned and sorted because only the non-degradable seagrass can be used.

The use of beach wrack to create and stabilize dunes has also already been demonstrated. This approach for the beneficial use of beach wrack seems promising in the light of different scenarios for rising sea level and increasing coastal erosion. Such beach wrack dune can be vegetated with typical dune plants and serve as an inexpensive 'nature-based' coastal defense structure. "Community of Practice": How citizens are driving climate and environmental services and solutions.








COMMUNITY OF PRACTICE

HOW CITIZENS SEEK CHANCES WITH CLIMATE AND ENVIRONMENTAL SERVICES AND SOLUTIONS

FOKKE DE JONG
(CHAIR OF ASSOCIATION SUSTAINABLE SOESTERKWARTIER)

Active citizens and entrepreneurs in municipalities such as from the town Eckernförde in Kiel Bay, are already creating solutions for the alternative and beneficial use of beach wrack. The collective power of people are shaping and driving these ideas and solutions, something which I have experienced in my own neighborhood in Amersfoort, the Netherlands.

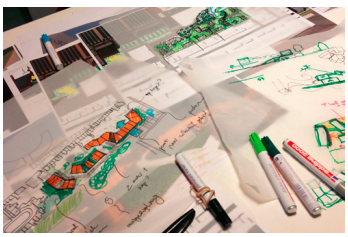
The inhabitants of the Soesterkwartier in the Netherlands have been creating a sustainable neighbourhood for the last years. After several years of discussions on abandoned buildings on a large industrial site set aside for railway maintenance activities, the Dutch Railway Association (NS), inhabitants of the surrounding suburb and the municipality of Amersfoort, agreed to maintain the buildings and the surrounding area. This was the start of activities on urban sustainability by the Duurzaam Soesterkwartier association. As part of these activities, the association arranged for 250 houses, built in the 1930's and 1940's, to be insulated based on the concept of mutual and collective labour, organized by street ambassadors. This co-working resulted in fast action, and a reduction of costs when compared to commercial installation of insulation for each individual house. The next step was the installation of roof solar panels of 100 houses and two primary schools. Simultaneously, the association arranged a car sharing system, planned the installation of a windmill; and green areas or parks were connected in green corridors.

These are now used as playgrounds for children; and urban farming and leisure activities. More information in German here.
A citizen association was formed to start plans for an 'eco-town' (40 energy neutral houses to be delivered in 2019) between the railways and the existing neighborhood. Together with students the impact of climate change at the location of the proposed eco-town was studied by literature review from the national meteorological institute and with the climate services tool Climate effect atlas - showing that increasing temperatures will change the precipitation pattern in this local area.

All the climate scenarios generally indicated a trend with wetter winters, and drier summers. While summer seasons are projected to become drier, the intensity of the rainfall is expected to increase. This aggravates the problems related to excess surface runoff and increases the groundwater levels. These interpretations from climate information and services were taken into account to formulate recommendations for the proposed eco-town (report).

Citizens used these climate services products and information to help them planning the outline of the eco-town. The availability of climate information and services also raised awareness of environmental sustainability, and the need of inhabitants to reduce energy and heat losses, and reduction of electricity and gas production on city level. An added benefit was that, over time, people in the neighborhood got to know each other, and extend their willingness to help each other.

This planned eco-town will be called Soesterhof, and construction will begin in 2020. The availability of beach wrack as a resource offers an added value for communities living in Soesterhof. Beach wrack can be used for insulation of walls and roofs, as a fertilizer for common gardens, and even to insulate against noise coming from the railways track.



CLIMATE SERVICE

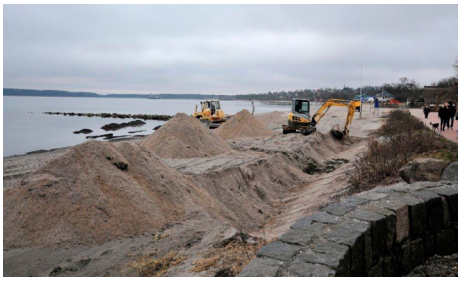
For coastal communities climate change impacts are a real and near issue. Beach management is increasingly important in a changing climate. While rising air and sea temperature provide opportunities for increasing number of tourists, and potentially an extended tourism season, there are risks arising from impaired beach and water quality.

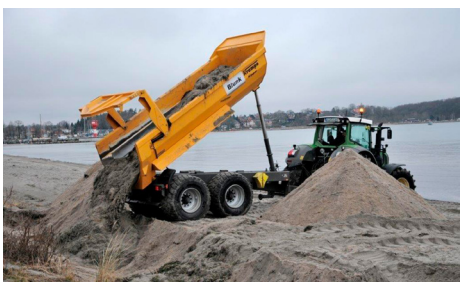
A decision-support or information tool enabling communities to better prepare for future changes in beach management add much value. Such a tool will provide climate related data and information about ,not only, changes in temperature, changes in wind pattern, or changes in precipitation, but also a change in the spatial distribution of the material. As a starting point, the proposed INNOVA climate service will focus on the knowledge base for managing beach wrack. As mentioned before, the amount and composition of the beach wrack itself, as well as the timing; when and where it is washes onshore, depends on both weather and climate factors. For example, an increase in wind events and changing wind patterns can lead to changes in the amount of beach wrack. We will provide information about these factors so that we can manage the impacts and the changes in the amount and composition of the beach wrack.

In addition, information about ecological variables that will influence beach wrack quantities could be of interest. These variables could include information about eutrophication, salinity, turbidity, and other factors and could help predict quantities of beach wrack and support its beneficial use.

Within INNOVA, we would like to develop a climate service in support of municipal beach management of the Baltic Sea coast. Based on possible changes in the amount, distribution and composition of beach wrack, we will investigate solutions for municipalities in the Eckernförde region. A practical solution tested by the community of Eckernförde is the usage of beach wrack for building a coastal defense measure. As shown in the pictures, this can not only save costs in dealing with the beach wrack, but also increase the coastal stability and reduce erosion. The proposed climate service can also potentially benefit private sector and local businesses. One possibility is the opportunity that arises from a reduction in mechanical clean-up and composting costs if beach wrack is used, rather than discarded . Recently several enterprises in the Bay of Kiel area started to develop business models for marketing products based on beach wrack (e.g. insulation or filling materials).





The Urban Climate Adaptation Ezine is a newsletter of the INNOVA project. It is the third e-zine out of ten. INNOVA is an EU research project aiming to develop innovative services for local challenges relating to climate change. A “climate service”, in simple terms, is a process or (set of) tools that brings climate change data and information to decision- or policy-makers. The climate information is presented in a way that makes sense to these users, is specific for their unique problem, and is easy to incorporate into their own work processes. Climate projections, which are simulations of possible future climate based on the scenarios of greenhouse gases, is normally the key element of climate services.

INNOVA aims to show how climate services can support the adaptation efforts of three European cities, and a small island state. These are: Kiel Bay in Germany, Nijmegen in The Netherlands, Valencia in Spain, and finally, the French West-Indies Islands of Guadeloupe & Martinique. These locations are so called “innovation hubs” and are the testing ground for the development of climate services for specific and local issues related to climate change impacts. These four hubs are also generally representative of many other local areas and issues around the globe.
They connect adaptation to climate change with local economic development, city planning and many other real-world issues. INNOVA values social alongside that of scientific innovation and the needs and ultimate benefit of the stakeholders are at the heart of the project.

In this third edition we introduced the Kiel Bay hub of the INNOVA project. In subsequent issues we will introduce the last remaining hub in Guadeloupe and Martinique, and the implementation of climate services in all four hubs. These e-zines will also explore topics related to climate projections, adaptation, how climate services are developed, amongst others. Importantly, the e-zines will present the progress and findings of the INNOVA project in a way that is easy to understand.

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This ezine has been produced for INNOVA

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