



Free and Hanseatic City of Hamburg
Senate Chancellery

INTERREG EUROPE

“Sustainability of the Land-Sea System for Ecotourism Strategies”

4th Interregional Project Meeting

4th SEMESTER

FOLLOW-UP PAPER

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Abstract

This document summarizes the LAND-SEA Interregional Meeting 4 in the City of Hamburg. The meeting was hosted by the Senate Chancellery Hamburg, German partner in the LAND-SEA Project. On the 17th September the partners attended the thematic seminar and training with presentations in the City Hall, on the second day of the meeting a field trip led to the Nationalpark “Hamburgisches Wattenmeer” and the final internal meeting day of the partners was held in the HafenCity University. Over the three days 35 people participated in any of the activities.

According to the “Hamburg Climate Plan” [1] - the project Land-Sea policy instrument addressed by the Senate Chancellery - the government of Hamburg and private actors are promoting sustainable development towards becoming a “Climate Smart City”. Both climate mitigation and climate adaptation are core of the plan as fundamental components of our shared society. Innovative technical solutions combined with behavioural changes are in focus. The combination of economic growth with the protection of climate and the environment are described as biggest challenges since Hamburg is located directly by the river Elbe which is tide-dependent (by the tidal freshwater stretch of the Elbe estuary, thus, flooding protection is classified as coastal protection) and expected to be affected by sea-level rise and weather extremes due to climate change. However, the “Hamburg Climate Plan” [1] is currently not considering eco-tourism as an own action area.

Against this background, the meeting in the City hall entitled “Flood protection for Cities” started with a presentation on multipurpose flood protection infrastructure with focus on the City of Hamburg in combination with tourism and further multiple benefits added to their main function. Furthermore, the project partners presented selected so called “main HH” issues, including e.g. management of sedimenttransport and pilot project shallow water area „Kreetsand“. In the afternoon presentations regarding the preparation of the staff exchange programme and Best Practices were given by the partners.

On the field trip to the island Neuwerk in the Nationalpark “Hamburgisches Wattenmeer”, the attendees experienced diverse aspects regarding the management of ecotourism in a highly sensitive coastal environment and learned about coastal protection via both ecosystem services and technical solutions at authentic places.

In the Hamburg HafenCity University, the partners worked on the finalization of activities related to the current semester and prepared the activities for the following semester. The expert panel members discussed the content and structure of the thematic papers. These papers should serve to prepare the production of the four action plans – one per each of the project partners to be produced by the partners, staff, stakeholders and experts. Finally, decisions about the next meeting in Barcelona and the conference call were done.



1. Introduction

The European coastal regions are characterized by a complex interaction of ecological, social and economic factors. Settlement and land use impact the environment and natural and cultural heritage. Intensified utilization of coastal zones during the last decades, e.g. due to agriculture, industrie and urbanisation, led to pollution and the loss of biodiversity and resources at many locations. Conventional tourism further increased negative impacts on European coasts and connected river basins. These impacts may lead to a higher coastal zone vulnerability regarding effects of climate change.

The European Interreg LAND-SEA project aims to develop innovative approaches to optimize existing (governance-)strategies, measurement-plans and principles of coastal zone management in order to integrate sustainable tourism. The project partners are working via exchange and evaluation of Best Practice examples (thematic seminar and training) in collaboration with the expert panel and participation of stakeholders. After the visits to Italy in April 2017, to Bulgaria in November 2017, to Catalonia in April 2018, the 4th Interregional Project Meeting took place in the City of Hamburg.

Two topics were selected for the Hamburg Meeting:

1. Multipurpose flood control in urban areas

On the 17th September the partners attended the meeting in the City Hall. A presentation given by Dr. Natasa Manajlovic, Hamburg University of Technology -Institute of River & Coastal Engineering, on “Multipurpose flood protection infrastructure with the focus on the city of Hamburg” showed new ways to combine the flooding protection with innovative infrastructure for both citizens and tourists. The Italian, Catalanian and Bulgarian partner contributed to the “main HH issues” via own presentations.

2. Managing ecotourism in protected areas

The city of hamburg consists of both urban areas, 9% protected areas [2] and a Nationalpark. The tourist management in protected coastal areas was selected as topic for the second day of the meeting. Via a visit to the Nationalpark “Hamburgisches Wattermeer” and the island Neuwerk on the 18th September, best practice of integrated coastal zone management regarding ecotourism, nature conservation, coastal protection and socio-economic interests were demonstrated.

During the meeting from the 17th to 19th September, the status of the project was assessed and the work that must be done was evaluated. The preparation for the staff-exchange and preparatory activities for the following semesters took place. Decisions about the next meeting in Barcelona were made. The experts discussed the methodology and contents of the thematic papers regarding the Action Plans to be produced, one by each of the four partner.



2. Study Visit to Neuwerk - Nationalpark “Hamburgisches Wattenmeer”

On the second day of the Hamburg meeting, the training regarding the topic „Managing eco-tourism in protected areas“ consisted of a field trip to the “Nationalpark Hamburgisches Wattenmeer”.

The Nationalpark is located 105 km outside from the main territory of Hamburg on the outer delta of the Elbe estuary and comprises the island Neuwerk. The shipping channel that connects the harbour of the City of Hamburg with the North Sea runs right north of the island Neuwerk. Together with the large neighbouring parts stretching up to Skallingen in Denmark and Den Helder in the Netherlands, the Nationalpark is part of about 10.000 square kilometers Waddensea. This worldwide unique shallow body of water with tidal flats and creeks, coastal wetlands and small islands, hosts a huge biodiversity [3]. At the same time, the habitats are impacted by diverse uses, e.g. shipping, fishery, pollution, and tourism. Moreover, effects of climate change may particularly impact this shallow body water system.

The field trip aimed to learn at site how this coastal environment is being managed particularly with regard to the consistency of conservation of nature, ecotourism and socioeconomic aspects, and coastal protection. A particular focus was placed on Neuwerk, an island with 3.3 square kilometer aerial extension. The study visit took place on September 18th with a participation of 28 people (partners, experts and stakeholders) from the four countries in the LAND-SEA project.



Horse carriage ride to the island Neuwerk -
Nationalpark “Hamburgisches Wattenmeer” -
informal learning via observation and chatting with the local coachman



2.1. Conservation of nature

2.1.1. Characterization

The Waddensea reaches out about 500 km coastline and 10 000 square kilometer in area. It is the largest continuous tidal flat of the world, characterized by extensive sand and mud flats, deeper tidal creeks, salt marshes and dunes, and the islands that are contained within this. The highly dynamic environment is permanently contested by the tides. In particular storm tides are forming the landscape by erosion and sedimentation processes.

The Waddensea is rich in biodiversity both in habitats as described above and in species. The Nationalpark belongs to the most species-rich bird habitats in Central Europe, in particular for migrating birds. It is part of the hub for the “East Atlantic Flyway for Coastal Birds”. Ten-thousands of brent geese can be observed during spring and autumn. Moreover, the islands serve as important breeding habitats for seabirds. In addition, the Waddensea serves as nursery ground e.g. for plaice and herring and hosts more than 40 fish species. There are also big mammals present like the Harbour seal and Grey seal, porpoises and an abundant benthic fauna. The flora is similarly rich in species [4]. The most important are the one-celled diatoms that cover the Waddensea floor, rich in shape and primary producers. Salt marshes settle higher in the tidal zone. They are consisting of halophytes, flowering plants that are able to cope with the saline conditions and dynamic surroundings. In in dune areas drought adapted plants dominate.

2.1.2. Conservation status

The Nationalpark “Hamburgisches Wattenmeer” was founded in 1990 by the parliament of the federal state of Hamburg. The Nationalpark is embedded between the Nationalpark “Schleswig-Holsteinisches Wattenmeer” and “Niedersächsisches Wattenmeer”. With an area of 13.700 hectare it is the smallest but bridges the gap between both larger and longer existing Nationalparks. Still it fulfills the IUCN criteria of “large natural or near natural areas to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible, spiritual, scientific, educational, recreational, and visitor opportunities.” The “Hamburgisches Wattenmeer” was accepted as a UNESCO-biosphere reserve since 1992 in the framework of the programme “Man and Biosphere” (MAB). It aims to promote economy in harmony with nature by maintaining biodiversity, supporting sustainable economy, and protecting historical cultural landscapes. The island Neuwerk has become a model region for sustainable economic activities like eco-tourism and is part of the UNESCO-biosphere reserve. The Waddensea has become UNESCO-world heritage in 2009, and since 2011 the Nationalpark “Hamburgisches Wattenmeer” is part of it [4].



2.2. Ecotourism and socio-economic aspects

Ecotourism is a ecosystem-based tourism that sustains the ecosystems in the region and at the same time avoids negative impacts on the global scale. Starting with mobility and the travel to the holiday destination, the journey should have e.g. a low noise pollution in the region and general low carbon dioxide emissions. Natural and cultural heritage has to be respected and protected. Certificates e.g. like the official recognition as an UNESCO-world heritage, UNESCO biosphere reserve and Nationalpark according to the IUCN criteria help to promote and protect such an extended area like the Waddensea. Furthermore, regional brands and official mascots (e.g. Freddy the oyster catcher in the Nationalpark "Hamburgisches Wattenmeer") increase the public awareness regarding the region and its natural and cultural value.

According to the International Ecotourism Society's definition Ecotourism is defined as "responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education" [5]. Similarly, the IUCN highlights the relevance to balance nature conservation and rural development. Social-economic aspects are of equal importance as nature conservation. Ecotourism should generate both acceptance of and income for the local people [6]. In addition to accommodation and food, booking a tour guided by a local ore chatting at site may help to get in touch with the regional culture and local peoples needs. Thus, formal and non-formal learning at authentic natural and cultural sites are integral part of ecotourism.

2.2.1. Mobility

The Hamburg Climate Plan contains „Mobility“ as one the 14 action areas to mitigate climate change and adapt to climate change since transport accounts for a 24 per cent share of final energy consumption and Hamburg carbon dioxide emissions. Thus, the Senate supports the significant potential by using more efficient new technologies, implementing innovative provisions targeted at changing mobility behaviour and changing the modal split [1].

In our case we applied modal split testing sustainable mobility. After going by bus to Cuxhaven, our field trip in the Nationalpark was conducted by a horse carriage-ride. The ride took 70 minutes to approach the destination. Time e.g. for nature observation, conservation and chatting with the local coachman. Eight persons found place in a coach. Fourteen Neuwerk coaches and 44 coaches are stationed on the mainland serving for guest transportation during the season from March to October. During the winter all transportation is running via ferry. This ferry also brought us back to the mainland after a long sunny day on the island in the Waddensea. The island itself was explored by foot to enjoy the highly valuable landscape and to take time to discover sustainable management.



2.2.2. Residents and Guests; Accommodation and Food

We learned that the island is inhabited by 36 people during the whole year. Most of the inhabitants are working in the field of tourism. Up to 120 000 day time guests are visiting the island per year. Over-night stays are less frequent. The local people are offering accommodation (200 beds on the island, e.g. including a hayhotel and a youth/group hostel) and food (10 restaurants and/or guesthouses). We were allowed to try the regional food from local fishery for diner (e.g. the “Nordsee-Platte” comprising plaice). Landscape adapted agriculture is also existing, e.g. horse pastures (three farms in total). Horses were formerly used in agriculture. Today they serve as coach horses and contribute to landscape maintenance (extensive grassland conservation).

Beside this, some public bodies and private enterprises are located on the island [7]:

- Nationalpark-Station Neuwerk (Ministry for Environment and Energy, Hamburg)
The station accommodates the employees who are working on the maintenance of the Nationalpark, implementation of nature protection measures and the islands infrastructure.
- Nationalpark-Haus (Ministry for Environment and Energy, Hamburg; NGO Verein Jordsand)
An exhibition informs guests about the Waddensea and its protection. Parts of the abundant diversity of the biota can be explored in a tidal basin. The guests are overseen by members of the NGO Verein Jordsand [8]. This nature protection association has a particular expertise on sea birds and is actually looking for a volunteer to work on Neuwerk in 2019.
- Stackmeisterei Neuwerk (Ministry for Economy/ Hamburg Port Authority HPA)
HPA is responsible for freshwater supply and sewage disposal, maintenance of the flat ways and lighthouse, and in particular for coastal and flooding protection.

Further infrastructure and enterprises on the island:

- One school
- Two hostels for school children and one Youth Camp-Site
- A fire-station
- A sewage treatment plant
- An island shop
- A beach
- Two piers without infrastructure
- One harbour



2.2.3. Formal and non-formal Learning

According to the Hamburg Climate Plan (HCP) [1], all elements connected to the requirements for climate mitigation and adaptation to effects of climate change need to be brought to the attention of the public and implemented in education (HPC action area 13).

On the island Neuwerk, we were welcomed by a ranger, representing the Hamburg Ministry for Environment and Energy, Nature Protection Agency. Mister Krüger is part of the team responsible for guest and inhabitant information and nature protection measures on the island. He is also working in the Nationalpark-Station Neuwerk and Nationalpark-Haus. Here, an exhibition informs about the Nationalpark and the waddensea, and the islands biological diversity and cultural heritage, threats and protection. These information offers are well utilized both by individual guests and numerous school classes and groups that visit the island as daytime-visitors or stay in the group accommodations for some days. In addition, diverse information plates are installed dispersed over the island at points of interest and informed us and further guests about the natural and cultural values of the island. In particular the slow motion to and on the island allows to listen to nature (concept of nature experience) and detailed observations.

However, we were happy to experience the nature and cultural value by the guided tour. Guided tours are part of the Nationalpark information system. During the horse carriage-ride, we observed diverse groups that attended guided walking tours from the mainland to Neuwerk and vice versa. Some of the groups were digging for benthic organisms to learn about the diversity and their nature protection value and services at site. These guided mudflat hiking tours serve also for safety reasons. The islands distance from the mainland is approx. 12 km and the high tide is running as fast a human. Moreover, the sand- and mudflats are intersected by tidal creeks that may cut off the way to safe land. Thus, visitors experience nature with the fascinating but sometimes hazardous dynamics of the tides and the field of coastal protection.



Guided walk on the island Neuwerk; Mr. Krüger, employee of the Hamburg Ministry for Environment and Energy, informed us about the Nationalpark "Hamburgisches Wattenmeer"



2.3. Coastal Protection

According to the Water Framework Directive (WFD 2000/60/EC) [9] and the Floods Directive (FD 2006/60/EC) [10], urban and natural areas should be increasingly designed as multi-purpose places. In particular, in areas with high user pressure flood protection infrastructure should accommodate “added values” to their main function. This holds true not only for urban areas like the City of Hamburg but also for rural and natural areas. Here the value of ecosystems and biota and their services regarding coastal protection (among others) will be highlighted. Moreover, we can learn from traditional flood protection schemes and eventually integrate components in technical solutions and ecosystems based coastal defense.



Ecosystem services - dune systems protect the coastal zone, Marram grass (*Ammophila arenaria*) stabilizes the dunes, and guests get informed



2.3.1. Technical Solutions

The island Neuwerk is located amidst of the Waddensea in 12 km distance of the main land. The dynamic environment is affected by semidiurnal tides, spring- and nip-tides and sometimes severe storm surges. The tidal amplitude at Cuxhaven is 2.97 m and 3.65 m in Hamburg, Pegel St. Pauli (2011). The island belongs to the City of Hamburg since the 13th century as a location of strategic relevance, and thus, Hamburg is responsible for its flood protection [4].

The firehouse of Neuwerk serves since centuries as a place for refuge during storm surges. It was erected in 1300 AC as a navigation mark guiding ships to the Elbe estuary and the Hamburg Harbour. It is a multipurpose building that also served as fortified tower and for living. Still today, the building is being used as lighthouse, guesthouse and viewing platform. Moreover, the inhabitants gather here during severe storm surges. The surrounding main walk- and roadways are constructed in an elevated manner that lead the fleeing inhabitants save to the tower in case of an emergency.

The Nationalpark-Haus and Nationalpark-Station are located in close proximity to the lighthouse. These buildings, the lighthouse and others were erected on a "Warft" - an dwelling mound - elevated and non-inundated during storm surges. Coastal buildings and even buildings along the Elbe estuary were regularly erected on a "Warft" during the former centuries.

While walking along the extended pastures around the lighthouse, the origin of a remarkable agricultural landscape structure was explained by Mr. Krüger. The pastures were divided in rectangular sections by long ditches. These ditches were excavated to drain the pastures during flooding. A similar structure was observed in the foreland in front of the dikeline. The small long ditches were connected to a system of larger ditches that serve to collect the drainage water and discharge to the sea. This historical landscape structure was introduced by the colonization by friesian settlers (settlement wave approx. 800 and 1100 AC).

Groynes made from oak and fascines built from bundled brushwood were further traditional coastal protection measures that were visible in the foreland. Wooden oak stems arranged in rectangular lines remained still active after their construction in the 1930th.

Today, the Hamburg Port Authority (HPA) is the body responsible for coastal protection. There is a permanent presence of twelve employees working on the 3.3 square kilometer island. HPA is responsible for supply of freshwater and sewage disposal, maintenance of the flat ways and lighthouse, and of course coastal and flooding protection. An eight meter (information HPA employee) high ring dyke encircle the 120 hectares core island of Neuwerk. The dyke toe is additionally protected by stone packings at some locations.



2.3.2. Ecosystems and Biota encountered that serve for coastal protection

As highlighted in the follow-up paper 3 corresponding to the first meeting in Barcelona (3rd Interreg LAND-SEA meeting, 11-13.4.2018), nature-based solutions for ecosystem-based adaptation may provide multiple benefits at the same time:

- LONG-TERM SUSTAINABLE flood defence
- COST-EFFECTIVENESS because MULTIPLE ECOSYSTEM SERVICES
- higher FLEXIBILITY (to tackle changes, included climate change)
- Offerte of further OPPORTUNITIES in terms of ECOTOURISM, ECOSYSTEM SERVICES, and NEW PRODUCTIVE SYSTEMS (crop production, aquaculture, etc.).

During the slow horse carriage ride (12 kilometer in 70 minutes) and by walking on and around the island, it was possible to discover some ecosystems and biota that provide nature-based solutions and form the base for the concept of “building with nature”. Building with nature is an innovative approach e.g. to hydraulic engineering infrastructure development and operation, starting from the natural system and making use of the ecosystems` services. Natural components are included in infrastructure designs so that flexibility and adaptability to changing environmental conditions can be achieved [11].

On our excursion to the Nationalpark „Hamburgisches Wattenmeer“, we were using the opportunity to see our destination, the island Neuwerk, while waiting for the coaches on the mainland. We had to follow a boardwalk that led us through the coastal dune system fringing the mainland. An information sign told us, that this dune system should not be entered since it serves for coastal protection. At many locations, dunes replace embankments where the ecosystems resistance can cope with physical forces like wind and wave action. The dunes resistance is even enhanced by marram grass (*Ammophila arenaria*). This perennial xerophyte penetrates some meter deep into the sandy dune to approach water and the grasses growth can easily keep pace with rising dunes. *Ammophila* species have been widely planted for dune stabilization since decades [12]. However, in some regions, the species are regarded as an invasive since after massive planting they spread widely and often dominate the native flora.

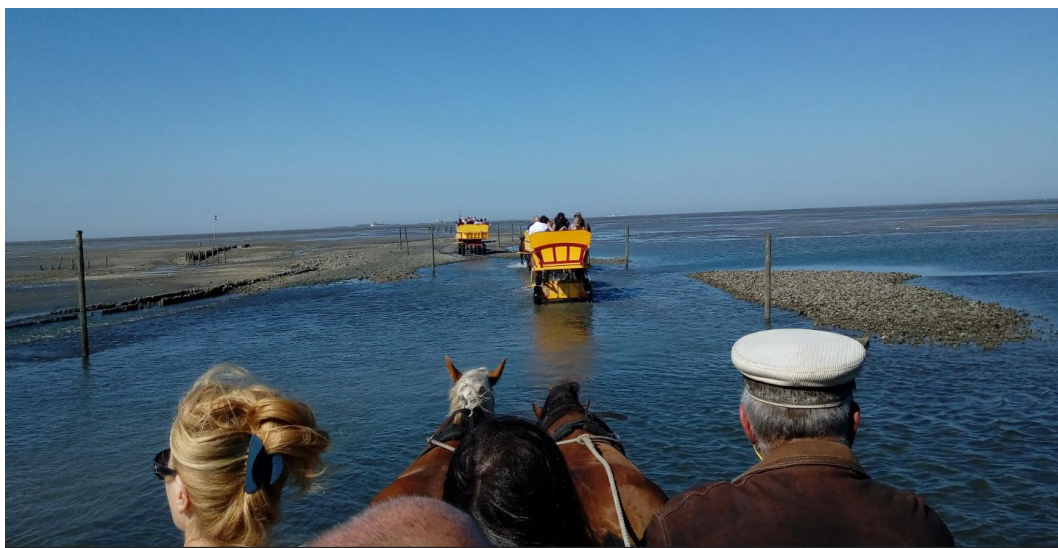
Coastal dunes may develop where sand banks occur in the intertidal. We where told that Neuwerk is based on sandy soil layers. The two newly evolved neighbouring islands Scharhörn and Nigehörn show a similar succession pattern from sank banks to dunes with lagoon formation. These lagoons are fringed by reed plants and at higher locations by willows that stabilize the bank. Bank stabilization of ponds and ditches by reed rhizomes and dense root systems of woody plants like black elder (*Alnus glutinosa*) and willows was also visible on the core island of Neuwerk.



Willows are well known as ecosystem engineering species for bank stabilization in riverine floodplains and tidal wetlands, erosion control and land slide prevention [12; 13; 14]. At the interface of the seabed to the dyke toe, we observed salt marshes comprising halophytes that are resilient to high saline loads. Similar to willows, salt marshes have proved to reduce wave loads even under storm surge conditions. In addition, salt marshes may lead to high sedimentation rates by reducing the current speed [15].

Beside vegetation, we observed oyster beds and huge amounts of benthic organisms while traveling slowly above the sea floor in the coaches. Oysters as colony forming organisms are able to built stable units that increase the seabed surface roughness, similar to mussels [16]. Oyster beds are used as an innovative approach to reduce current speed but enhance accretion.

These examples are part of the recently introduced ecosystem based approach for coastal protection [17].



Observing extended oyster beds on the sand and mud flats in the Natinalpark „Hamburgisches Wattenmeer“ during the trip to the island Neuwerk



2.4. Insights, problems encountered and lessons learnt

Insights from Catalonia (Spain) about the field trip

On the second day we visited the national park “Hamburgisches Wattenmeer”, also Declared UNESCO Biosphere Reserve, to have more insights onto the questions of coastal protection and ecological preservation. In particular we visited the island of Neuwerk, a 3 square km tidal island in the Wadden Sea on the German North Sea coast, located 13 km northwest of Cuxhaven, between the Weser and Elbe estuaries. Administratively, Neuwerk forms a homonymous quarter of the city and state of Hamburg. Dikes encircle the island and one can walk around it in an hour. Salt marshes lie outside the dikes and provide a hatchery for birds such as oystercatchers, scrays, sandwich terns, black-headed gulls, herring gulls, and others.

We reached the island in the morning on a Wattwagen, a horse-drawn mud flat coach, from Cuxhaven. A row of poles on the mud flats marks the way. The path includes some elevated cages, which are rescue pods. We came back in the afternoon at high tide with the vessel MS Flipper to the Cuxhaven port.

We visited the polders and the lighthouse a great viewing platform that provides a view of the coast and the entire island. There is a small hotel with seven guest rooms inside the lighthouse, and a hostel in a building next to the tower.

CONCLUSIONS:

- The national park “Hamburgisches Wattenmeer” in general and the Neuwerk Island in particular has a great natural interest, mainly in the Outland.
- Despite of this, the inland of Neuwerk has only few natural values to highlight, mainly transformed by human activities such as agriculture and cattle, but an important task due to its strategic position close to the coast and the Elbe mouth.
- Tides and winter storms, provoke that already in 1556 the island was protected with dikes in the entire perimeter. These “naturalised” dikes were created with the same soil present into the island.
- The attractive landscape and calm of the island, promotes the interest of visitors that visit it with sustainable transports such as horse-drawn mud flat coaches, or by foot. But also with ferry, depending on the tides.
- It is a good example about how an integrated coastal zone management approach, regarding protection of natural values, but also risk reduction and water flooding protection, can be combined in a sustainable way with sustainable tourism and eco-tourism activities.



Problems encountered and lessons learnt – further remarks

- „We were crossing a deep tidal creek while we were driving to Neuwerk. We were told that the day before and the days afterwards, horse carriage rides were not possible due to the increasing water depth. The general problem of increasing tidal creek erosion was encountered. A sounding ship just surveyed the tidal creek. In times of rising sea level and increasing extreme events, the assessability of ecotourism-destinations may become more complicated, e.g. how can climate friendly mobility like the horse carriage-rides be ensured as an component of the ecotourism at site?“
- „I’ve learnt, it may be sometimes more sustainable to live with the water and e.g. erect a building on a “WARFT” than to exclude the water via dykes and barriers. For instance, on the big river island Wilhelmsburg in Hamburg, accretion via water and sediment intrusion is lacking behind the dykes and thus the hinterland is sinking. This is also a problem regarding the Dutch Delta Werk with severe subsidence e.g. in the Oosterschelde, NL.“
- „Steering of the tourists via guided mudflat hiking tours or horse carriage rides along a marked path helps to leave most sensitive ecosystems, e.g. of the Nationalpark Zone I consisting of > 90% of the surface area, undisturbed but also helps the tourists to reach their destination safely.“
- “In the Waddensea – similar to many other ecotourist destinations – during summer, autumn and spring (birding) the islands capacity utilization is at a good level, however, how can the tourist flow be directed to the winter period?“



3. Thematic Seminar in Hamburg

3.1 Presentations and remarks

The thematic seminar took place in the Hamburg City Hall and Hafencity University and was attended by 35 people. The seminar was structured by a 30 minutes keynote presentation entitled “Multipurpose flood protection infrastructure with the focus on the City of Hamburg” given by Dr. Natasa Manojlovic and Prof. Peter Fröhle - Hamburg University of Technology (TUHH); Institute of River & Coastal Engineering. The presentation was followed by three 15 minute-contributions on the “main HH issues”, one by each of the Italian, Catalanian and Bulgarian partners. In addition, during the meeting from the 17th to 19th September, presentations and preparations for the staff-exchange, preparatory activities for the following semester and decisions about the next meeting in Barcelona were worked out by the partners. The expert panel members discussed the methodology and content of thematic paper regarding the production of four Action plans in 2019.

Doctor Natasa Manajlovic, Hamburg University of Technology Institute of River & Coastal Engineering, presented a talk on “Multipurpose flood protection infrastructure with the focus on the city of Hamburg”. According to the needs and demands of different stakeholder groups, urban areas should be designed as multi-purpose spaces. Flood protection infrastructure should contain „added values“ in addition to their main function. The Harbour-Promenade is constructed as a flooding protection infrastructure what is combined with innovative infrastructure for citizens and tourists. Floodgates hidden in walk way niches, flood protection walls designed as amphitheatres serve as shared space for both tourists recreation and attraction, and the Cities flood protection.

Pasquale Contestabile, expert of the Italian project partner team, in responding to the specific topic elaborated for this thematic seminar, gave a presentation entitled “Contribution of the Italian partners on the main HH issues”. The aim was to highlight the necessity of a widening of alternative options for a more sustainable flood response strategy, also in the perspective of ecotourism promotions. The proposed actions for the special “Land-sea” system of Hamburg city are based on three aspects:

(1) the management of the Elbe river as a whole. In particular, moving from the lesson learned from Venice, the disadvantage to deepening the bottom to accommodate cruise/container ships in encouraging the funnel effect has been emphasised.

(2) on the coast, the dissipation of the incoming wave/tidal power with tidal barriers or wave energy converters. In particular, the Venetian MOSE system and an innovative wave energy converter totally embedded in a breakwater called OBREC (Overtopping BReakwater for Energy Conversion), have been presented.

(3) the promotion of ecotourism in selected natural areas along the 130 km of the river as a way to create space for the tide, i.e. establishing flooding areas to control the peak duration of exceptional surges.



The Bulgarian Delegation presented two technical solutions related to the projects:

1. "Restoration of water conductivity of security canals on the territory of" Asparuhovo "district, Varna"

As a consequence of extremely heavy rains water-borne facilities (eastern and western security canals) on the territory of Asparuhovo district were damaged and the waters overflow and formed a high wave. Highly precipitated in the previous days soil did not absorb the water and it drained as a surface runoff. As a result, water flows rapidly overflowed the walls of the channel. Water leaves, trees, and forest branches over the neighborhood were squeezed out of the canal, they closed the openings under the bridges, and the water flew out of the bed. The formed lush water destroyed the walls and the facilities of the canals, residential homes, infrastructure, public buildings, etc. Power supply and water supply interrupted.

Two gully adjustments going into urbanized and densely built areas of Asparuhovo district has been undertaken. The decision to apply the correction to the reinforced concrete section was due to the fact that a relatively large quantity of water should be carried out in worried conditions with respect to the gauge of the facility. In order to minimize the long-lasting impact on properties on the route, it was perceived that most of the correction would have a closed profile and be overloaded. The transverse profile of the corrections was reinforced concrete, and in the open type there are L-shaped retaining walls with a height of 1.50 m, the bottom width being 3.00 meters for the East Gorge and 3.00 meters and 6.00 meters for the western gully. The adjustments were partly funded by the EU Solidarity Fund.

4. Shore protection and recreation combined on the Varna's Promenade.

Engineering solutions for overcoming the structural erosion of the coastline and the persistent land loss (avg. 0.2m/year) were presented. The design and construction phase of a long project included:

- Design phase: 3 years
- Physical model validation
- Construction phase: 5 years (until 1987)
- Access road and revetment combined
- Positioning allows for land reclamation
- Artificial beaches from dredged material
- Deposited using a split hull barge

Outcomes: Cliff toe successfully protected (By revetment and newly formed beaches)

- Access provided
- Artificial beaches and expanded recreational area with beaches to the north
- Protected areas (small boats & more)
- Land reclamation



3.2. General conclusions

„Multipurpose flood control in urban areas“ and „Managing ecotourism in protected areas“ – these were the selected topics that served as main subjects during the partner meeting in the City of Hamburg. In conclusion, the IUCN’s statement within the Business and Biodiversity Programme can be confirmed „Helping the tourism industry protect the ecosystems on which its business depends“ [6].

In the HafenCity and the Harbour-Promenade, the flood control protects the urban area that is highly frequented by tourists. The presented multipurpose flood control infrastructure itself serves as tourist recreational area and for sightseeing. Vice versa, the guiding principle of integration may engage the tourist economy to contribute to maintaining the flood protection infrastructure.

The Nationalpark „Hamburgisches Wattenmeer“ as part of the UNESCO worldheritage Waddensea protects a unique dynamic ecosystem constantly changed by the tides. It hosts a huge diversity of species (e.g. rest for millions of birds), habitats and natural processes [3; 4]. Tourism and biodiversity are related and the prosperity of tourism industry is directly dependent upon healthy ecosystems. Thus, the concept of climate-friendly ecotourism should contribute to maintain the ecosystems in the protected areas and the services (e.g. climate mitigation and adaption) the ecosystems provide.

The Hamburg Climate Plan (HPC) [1] is the policy instrument, developed by stakeholders and administration staff, that provides Hamburg with a vision of a future in which climate mitigation and climate adaptation are fundamental components of our society. Ecotourism is not mentioned per se, however, many components have been found within the action areas highlighted in the HPC, e.g. urban development and buildings comprise multipurpose infrastructures as mentioned above. We found the traditional concept of dwelling mounds observed in the Nationalpark recently applied in an innovative manner in the HafenCity. Human health in a climate smart city requires green spaces where to escape the urban heat island during extreme warm summer, e.g. to protected areas and the Nationalpark. Climate friendly mobility means modal split and to assess these destinations by the use of alternative transport systems (in our case bus, ferry and horse).

Overall, in addition to nature experience, nature experience and science based education should raise the awareness of tourists for both natural and cultural heritage, including the services (climate mitigation and adaption) these ecosystems provide. Within protected areas and nationalparcs, nature conservation has priority combined with the support of local benefits and societies. Finally, we can learn from several of these societies how to use and at the same time maintain a valuable coastal environment via some similarities on the global level, e.g. the century-old ditch system in both the Ebro-Delta and the tidal wetlands along the Elbe estuary and Waddensea.



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