

# **Dike Park Elbe Island : towards flood-adapted design strategies for Hamburg's urban coastline**

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DIKE PARK ELBE ISLAND  
TOWARDS FLOOD-ADAPTED DESIGN STRATEGIES  
FOR HAMBURG 'S URBAN COASTLINE

*Antje Stokman*

Why does Hamburg need a Dike Park?

In its natural state, the landscape of the Elbe Estuary, stretching from Hamburg out to the North Sea, is actually almost uninhabitable. The constantly changing bottomland between the tide's ebb and flood was described by the Roman Pliny the Elder: "In a magnificent movement, twice each day and night the sea pours over an endless expanse, manifesting the perpetual strife of nature in a region of which it is doubtful as to whether it belongs to the land or the sea."

Nevertheless, the fertile river sediment thrown up by the tides and the favorable climate have always attracted settlers who found ways and means of making the landscape productive – but nobody was safe when a storm tide came. The breakthrough and economic flowering came when dike construction and drainage experts were brought in from Holland in the 12th century and began to take away land from the river by raising dikes and excavating drainage ditches and canals, building sluices, and laying out linear marsh villages in order to turn the uninhabitable ground into a cultivated, man-made landscape. With the River Elbe being one of the most important navigable waterways within Europe, large-scale and ongoing river engineering measures have been carried out since the start of industrialization at the beginning of the 20th century. The Port of Hamburg, 110 km upstream from the coast, has developed into the largest port in Germany and the second largest in Europe. To meet the demands of the increasing size and depth of the container ships, the navigation channel and port basins within the River Elbe have had to be continuously deepened and expanded.

Centuries of human activity to keep the hard-won polder land dry and the hard-won waterways deep have caused extreme changes in the dynamic water environment. The combined effects of remodeling the topographic and hydrological characteristics of the Elbe Estuary now pose a challenge for its future urban and economic development. While in the past, the tidal energy in the natural estuary was damped down by the shallow and varying bed forms of the River Elbe and its marshland, the man-made inventions have removed this capability so that the flood tide now comes in with more force and amplitude. Since the water has

less space to spread out horizontally, it spreads vertically, increasing the amplitude between low and high tide dramatically (from 200 cm in 1870 to 360 cm amplitude today). At the same time, dewatering the land and cutting it off from the natural sedimentation processes has prevented the natural rise of the hinterland ground level from matching the rate of the constantly rising high tide and flood water level of the Elbe River. This situation is not only a challenge for the City of Hamburg: The situation corresponds to that found in two thirds of the world's largest metropolises, with more than five million inhabitants being located within river estuaries and thus particularly threatened by human-influenced and climate-induced rises in water levels and storm surges.

Because of these risks, the Elbe Island was not a designated area for the development of urban residential areas in Hamburg until the Second World War. Even in 1920, Hamburg's Planning Director Fritz Schumacher believed: "The elevated moraine is Hamburg's natural urban living environment. The marshlands are too expensive to be protected against storm surges and are therefore not to be developed for residential areas." However, Hamburg's actual urban development strategy now focuses on the "Leap across the Elbe": The International Building Exhibition (IBA) and International Gardening Show (IGS) on the Elbe Island shift the Island from a marginalized area to the focus of Hamburg's urban development plans.

The precondition for that, of course, is a large investment in its safety by means of flood protection measures. Without its 24 km long and up to 9.5 m high ring dike, the Elbe Island would not be habitable. However the challenge of heightening and strengthening the dikes to meet the challenges of the increasingly rising tides and storm surges not only poses technical challenges but also spatial challenges. In the 17th century the height of the dikes was only 3 m, in the 1960s only 6.5 m, while today their height is between 7.2 to 9.5 m. At the same time, the dikes have become a lot wider: Each additional meter in height means the dike expands by 3 meters on each side in order to be stable. While in the past the dike had roads, buildings, and trees on top of it, this is no longer possible for safety reasons. As a consequence, the dikes are demanding a lot more space and have become monofunctional barriers that block the view and access to the water. They are increasingly separating the life of people in the inner part of the Island from the river.

That is the reason why many people living on the Elbe Island today do not know that they are living on an island. In fact, many of them do not know any place on the Island where it is possible to access the water. They do not know where the dikes are and what people are supposed to do in case of emergency. However if people lose that knowledge and awareness, it increases the risk of erratic behavior. Therefore, a process of awareness raising and creating a sense of ownership is needed that redefines the construction and maintenance of dikes as a common task, based on a spirit of community engagement. This can only happen if flood protection is not just perceived as a self-evident service provided by an anonymous institution to guarantee safety, but as a part of people's everyday world that they themselves are also responsible for (Fischer, Reise 2011). Since Hamburg's current dike construction program is almost fully implemented and the future one is under discussion, this provides an opportunity for a paradigm shift.

#### What and where is the Dike Park Elbe Island?

The project "Dike Park Elbe Island" was initiated by the IBA (International Building Exhibition) Hamburg in cooperation with different institutions forming an advisory board: Hamburg Agency of Roads, Bridges and Water (LSBG), Hamburg Ministry of Urban Development and the Environment (BSU), Technical University Hamburg Harburg, and the Dike Authority Elbe Island. The aim of this project, which contributes to the IBA theme "Cities and Climate Change," is to find new synergies between the different objectives of flood protection: increasing the safety standards by new construction technologies, increasing the awareness of people by means of better participation as well as increasing the accessibility, perception, and beauty of the flood protection systems as elements of the cultural landscape.

The combination of the two words in the project title "Dike" and "Park" represents equally the two main objectives of future flood protection. The technical term "Dike" expresses the need for its safety and protection function, which is the main task of the dike park. The spatial term "Park" expresses the need for serving as a public open space for people that is beautiful and can provide a place for leisure and recreational activities. As such, the "Dike Park" should combine the functions of a flood protection infrastructure, a cultural landscape, a public space,



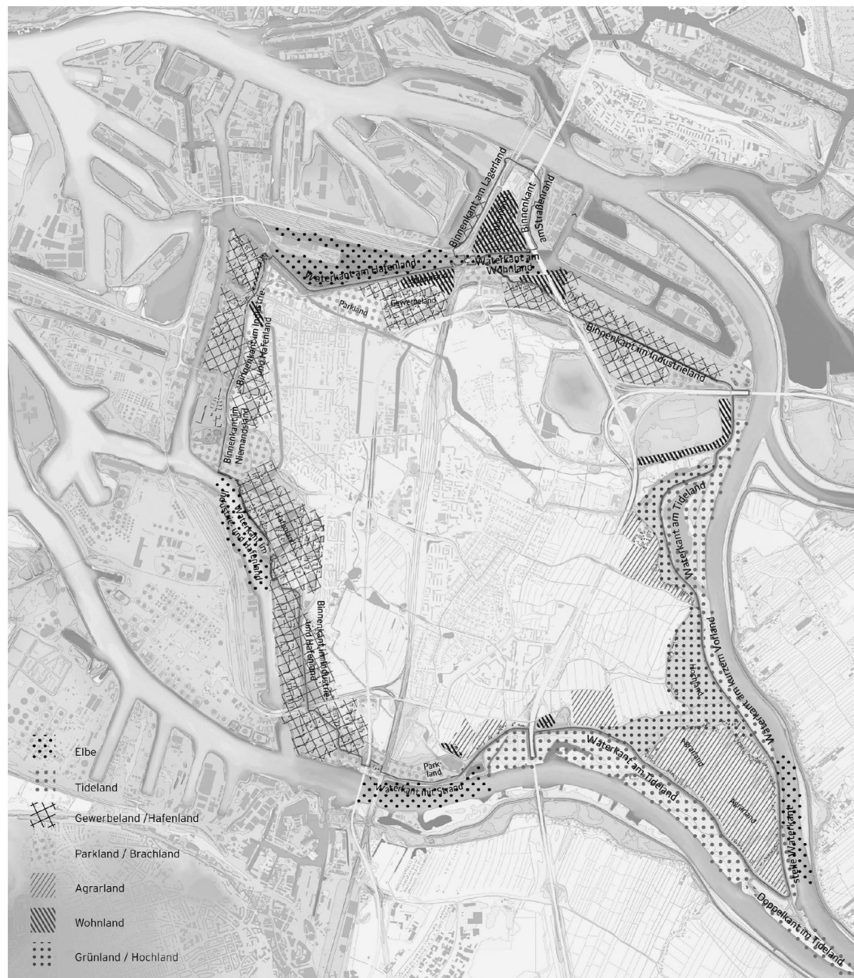


fig.2



fig.3/4



figure 2: Mapping the "Dike Park". Source: osp urbelandschaften  
figure 3/4: Existing Activities in the "Dike Park". Photos: Antje Stokman

and a linear park along the shore of the Elbe. It should be part of both the urban space and the river space. It should serve as a connecting element of the dike foreland and hinterland. The term “Dike Park” helps us to begin a new dialogue between various experts at different institutions.

The good thing is: The “Dike Park” does not need to be newly constructed like a new park. It is already there – and only needs to be perceived and upgraded in a different way. Even though in its current state the 24 km ring of dikes and floodwalls is not easy to use, some informal uses already take place in the Dike Park. People have found ways to go fishing, cycling, swimming, sun-bathing, bird-watching, dog-walking, etc. The Dike Park has different spatial forms, as there are different typologies of dikes and floodwalls as well as different uses on both sides of the flood protection line, such as residential areas, industry, harbor, wilderness, and agricultural areas. This makes us understand that there is no generic best solution; each situation in the Dike Park requires a specific solution which will create a varied and diverse character for the Park. And even in the center of the Island, traces of the Dike Park can be found, such as historic dike lines and road names, marks on buildings indicating the water height after flooding, and safety information for evacuation events at many bus stops.

In the course of a feasibility study conducted by the office “osp urbanlandschaften,” a series of innovative proposals for the present and future of the Dike Park were developed. This study consists of two main parts: “Understanding the Dike Park” and “Designing the Dike Park.” In the first part, the main features and basic principles of the Dike Park are explained. This is done on three spatial scales from L to S: The first part “L – Hamburg as a coastal city” compares Hamburg to other coastal cities and their challenges; the second part “M – Hamburg’s Dike Systems” explains where and why Hamburg needs to protect certain areas with dikes and what they look like; and the third part “S – Hamburg’s dike typologies” explains the technical basics of the dimensioning and construction of dikes in Hamburg. In the second part of the study, a series of innovative dike design strategies are proposed, referring to three different scales and planning horizons – from small, temporary installations to complex future transformation strategies for the Elbe Estuary. Short-term and future strategies are related to each other in order to develop concrete project proposals that are prototypical for the different strate-

gies. In order to develop and discuss these strategies even further, an international Symposium and Workshop was organized by IBA Hamburg and HafenCity GmbH together. International and local experts, as well as citizens and three design teams, were invited to take part and contribute their ideas and opinions. The results of the process were documented and communicated through brochures, exhibitions, and media.

The exhibition “My Dike Park” communicates the project’s comprehensive philosophy of combining the useful and the beautiful. Visitors to the exhibition are invited to sit or lie on a model dike in the scale of 1:10 as the main element of the exhibition. The sides of the dike model explain its functional profile and how it is constructed; its surface becomes a place for people. A sheep that was specially designed for the exhibition also serves as a symbol of combining beauty and function. Even today sheep are essential for the maintenance of the dike, as they not only keep the grass down but, by trampling with their hooves, help to stabilize the dike. At the same time, the flocks of sheep with their shepherd and his dogs create a very intense and always changing landscape experience of the dikes: They make their way along the dike, crossing streets with heavy traffic, passing industrial and residential areas in order to graze peacefully in different places along the dike. The element of a flood protection wall becomes the carrier of meaning to explain and address the complex issues relating to the presence and future of the Dike Park. Apart from only looking at the displayed information, the visitors are urged to play with the specious contradictions of the Dike Park and create new points of view. Technical terms of flood protection come up against romantic terms of landscape experience in order to be combined into new, unexpected, and surprising “flood poetry word creations.” The visitors can put together, change, and locate their word inventions on a large-scale sketch of the Dike Park and, through the combination of graphics and words, new meanings emerge. Postcards saying “Greetings from the Dike Park” are available for visitors to take home and send to others. The postcard motifs show typical flood protection sites on the Elbe Islands and ask questions from the Dike Park visitor’s perspective; for example, “Why are there no plants and trees growing on the dike?” The answers provided by the LSBG (Hamburg Office for Roads, Bridges, and Open Waters), which is responsible for flood protection, are included on the



reverse side of the postcards. The mobile exhibition was shown at various locations in 2011. It makes it possible to not only create the Dike Park in reality, but also in people's minds.



fig.5/6



fig.7

figure 5/6: Images of the touring Dike Park Exhibition  
 figure 7: Sheep in the Dike Park as a symbol of combining the useful and the beautiful. Photos: Antje Stokman





fig.8

### Outlook: How will the Dike Park be developed in the future?

Although dikes seem to be such massive, rigid, and permanent structures, they are merely an occurrence in space and time, and always changing. Since the first dikes on the Elbe Island were constructed around 1300, their shape, position, length, and uses have changed radically – and have facilitated new uses for Hamburg’s tidal marshlands. This means that diking actually is the prime driver of landscape change and of people’s changing everyday worlds within these landscapes. As a consequence, if planners promote a new urban development paradigm for these areas (as they do with their proposed “Leap across the Elbe”), they need to not only demand a higher level of security, but also consider how to re-integrate flood-protection systems as an integral part of their urban and landscape development strategies.

Whereas many European cities in similar locations, such as Rotterdam and London, have decided to protect their cities by huge flood gates and have moved their harbors out to the sea, Hamburg has decided to preserve its special qualities of an inner-city seaport with tidal dynamics. The huge container ships passing by, the impressive harbor industries working day and night, as well the powerful dynamics of tides and storms that sometimes even cause the flooding of certain areas adapted to withstand these natural forces, are the unique qualities of experiencing Hamburg as a tidal harbor city.



Addressing the future challenges due to the rising sea level, new demands of the shipping industries, and new urban development paradigms, Hamburg needs to initiate a long-term planning process and long-term partnerships across different public authorities, along with involving its citizens. This requires the openness of the actors involved to creatively rethink the potentials of infrastructure systems determined by rules, laws, and procedures for shaping urban form and meeting broader human objectives. Cooperating towards the common goal of creating a “Dike Park” means that the designers who are not used to dealing with infrastructural issues need to get involved in technical ideas of dimensioning and constructing dikes – and the engineers need to think beyond the efficiency and functionality aspects of dikes as technical systems by integrating them into their cultural, social, aesthetic, and ecological context.

Based on this multidisciplinary and synergetic approach, the “Dike Park” project aims to make use of the tremendous investment in the future flood protection system to create multifunctional urban water landscapes. The International Building Exhibition (IBA) started the development process of the Dike Park by initiating studies, discussions, exhibition, workshops, excursions, and international exchange – in a typical lab-format – to support the process of initiating something new. Of course, the process needs to carry on beyond the duration of the IBA, which will end in 2013.

In the final year of the IBA 2013, visitors will be able to experience the “Dike Park” on Hamburg’s Elbe Island by seeing its current state and some projects that show the way into its future. The IBA Dock is Germany’s largest floating exhibition and office building just outside the

main floodwall that protects the Elbe Island. It demonstrates a new way of dealing with the danger of flooding. The pontoon is fastened onto dolphins, on which it moves with the tide 3.5 meters up and down each day. During a strong storm surge, the IBA DOCK will float with the water. Instead of ever-higher dikes, this construction adapts to the rising sea level – a future-orientated concept for construction in flood situations. In the Spreehafen, there will be new pathways and crossings of the main earth dike in order to create a waterfront that for many years was inaccessible due to the customs fence of Hamburg Harbor, which will be demolished. In the rural part of the island, the Hamburg Port Authority will create a new tidal landscape called “Kreetsand.” It will enlarge the flood plain of the Elbe and consequently reduce the tidal hub. At the same time, the Port of Hamburg will benefit from the reduction in sedimentation and incidentally the risk of flooding will be diminished. In the course of the pilot project, the now de-embanked former flushing field, Spandenlander Busch/Kreetsand, will be deepened. In the 30-hectare shallow water area, the tide will be able to flow in and out freely, resulting in an additional tidal flow of around one million cubic meters. The existing monofunctional pumping station serves as a platform for a new structure, the so-called “Deichbude” (dike hut). This will serve as an information and exhibition center explaining the pilot project and the special features of the landscape with its functional, spatial, and aesthetic associations of dikes, and embankment foreland and hinterland. Through the Dike Park, the IBA visitors as well as the local population will be able to reconnect with the sensory experience of the water dynamics and the tidal hub of the Elbe River, and the special character that it has to bring out the cultural landscapes of Hamburg’s urban coastline.

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osp urbanelandschaften project team for the Dike Park feasibility study, exhibition and IBA/Hafencity Symposium: Sabine Rabe (project management), Marcella Hartmann, Burkhard Köhler, Malte Pill, Hille von Seggern, Gerko Schröder, Julia Schulz, Antje Stokman.

Bibliography and Sources: The Dike Park feasibility study can be downloaded from: <http://www.iba-hamburg.de/service/downloads/medien/liste/medien-kategorie/buecher/project/deichpark-elbinseln.html>

Further information about the different pilot projects can be accessed from the IBA website under the keywords “cities and climate change”: <http://www.iba-hamburg.de/en/nc/themes-projects/stadt-im-klimawandel.html>





fig.9



fig.10

figure 9: Deichbude/Dike hut at IBA pilot project Kreetzand  
figure 10: IBA Dock, Germany's largest floating exhibition  
and office building. Photos: Antje Stokman