

Heuckenlock nature reserve– a Hamburg case study

As part of the Interreg IVB SKINT (North Sea Skills Integration and New Technologies) North Sea Region Project, the Heuckenlock nature reserve, situated within the City State of Hamburg in Northern Germany, has been selected as a case-study area since its specific location in the floodplain of the Elbe offers various points of reference for nature and water protection and exposure to the most diverse interest groups.

The nature reserve will be described in more detail below, focussing on its ecological features, its role as a recreational area, the statutory conditions governing its status and conflicts of interest and use.

a. Description of the Heuckenlock nature reserve

With a length of more than 1,094 km, the River Elbe is the fourteenth longest river in Europe. It rises in the Czech Republic, flows in a north-westerly direction through Germany and finally flows into the North Sea. The Heuckenlock area in Northern Germany, which is the subject of this case study, has an area of 120 ha and is located close to the end of the River. It lies in a particular section of the Elbe valley known as the “Stromspaltungebiet” (area where the river splits). With the post-glacial rise of the sea level and the resulting tidal backwater, a large tidal floodplain landscape emerged, of which the Heuckenlock is now the main remaining section. The name “Heuckenlock” means “tideway of the Heucke”, Heucke being the name of a family which is still one of the landowners in the nature reserve.

The nature reserve is situated on the Elbe undercut slope and is an area with a high level of natural vitality and constantly changing vegetation. Since the river gorge on the undercut bank is close to the bank of the river, there is a lack of shallow water areas upstream. The area is nowadays flooded up to a height of 3.5 m as many as a hundred times a year (the highest storm surge occurred in 1976). The mean tidal range (difference between the mean high and low tides) of the Elbe is today approximately 3.3 m. The nature reserve is located in the lee of the Harburg Hills to the south, which rise to an altitude of 155 m. It extends for three kilometres along the bank of the Southern Elbe and has a width of up to 400 m.

i. Flooding potential

The Heuckenlock is a freshwater tidal area with remnants of an alluvial forest and exhibits a characteristic variety of terrain: areas of water (tideways), freshwater mud flats which dry out at low tide, reedbeds, shrubland, the softwood floodplain comprising above all willows and poplars, and the remains of the hardwood floodplain with ash, oak and elm trees, including an old white elm with trunk circumference of almost 4.5 m. Apart from the young roots of hybrid poplar trees, there are very few young trees, and hardly any hardwood varieties.

The frequency of flooding and the soil structure are the decisive locational factors for vegetation. The area is rich in mud, while the preponderance of sand deposits increases towards the river, partly in the form of an extensive sand embankment on which primarily the alluvial forest grows. The value of nature protection is particularly high in the middle section, while the eastern section and areas around the former castle offer less variety of relief.

ii. Vegetation

The shrubbery (containing willow species, hawthorn, guelder rose and spindle trees, including one example estimated to be 300 years old) and weed beds exhibit a high diversity. The richness of nutrients caused by flooding gives rise to an almost impenetrable primeval-forest-like vegetation and a unique landscape. The shrubland and reed beds are partly characterised by overgrowth, with reed heights of four to five metres. The marsh marigolds are also extremely overgrown. The lush vegetation

creates a clearly measureable filtering effect on the water of the Elbe as it flows in and, six hours later, out of the area. Such pre-embankment areas are an important pillar of the river's self-cleaning power.

iii. **Biodiversity**

The area exhibits considerable biodiversity. 700 plant species have been identified in the past, but changes in the area mean that the number is probably much lower nowadays. The difficulty of surveying the area, the frequent natural reshaping of the terrain and the introduction of seeds by the Elbe and shipping make it virtually impossible to obtain a precise indication.

Flora

The plant species include the following: Elbe hair grass and Elbe water dropwort, which only occur in the freshwater tidal area of the Elbe, wheat sedge, which only grows at this location in Germany, and species at the edge of their natural range of distribution. Plant species of eastern origin have also settled here, such as the long-leaf speedwell and black poplar. Rare or eye-catching species include broad-leaved ragwort, danewort, butterbur, common fleabane, various allium species, calamus, purple loosestrife, bistort, other sedge and scipus species, flowering rushes and snake's head fritillary, whose decline can only be warded off by their being cut back to prevent overgrowth and disappearance. The Elbe water dropwort is found in its greatest numbers in the Heuckenlock. A project by the Botanical Association, which has received finance from the Federal Ministry of the Environment for a period of five years, is concerned with the chances of survival and propagation of these plants along the Elbe in Hamburg. A new embankment has been constructed in Overhaken (Vierlande).

Fauna

Due to the frequent flooding, there are only a few ground-nesting birds in the nature reserve. Tree/reed-nesting birds predominate. Breeding birds include the penduline tit with its distinctive hanging nest, the nightingale, the long-eared owl, the lesser spotted woodpecker, the great reed warbler and the reed bunting. Large bird colonies of grey heron and cormorant can no longer be found in the alluvial forest; these birds only come to the nature reserve to feed and rest. The area does serve as a roost during bird migration: as many as 20,000 barn swallows and 42,000 starlings have been counted. If north-westerly winds are strong, up to 20 other seabird species appear along the Elbe in Hamburg.

The tideways in the nature reserve offer a good calm-water refuge for Elbe fish, but can also be a death trap if water levels are extremely low.

b. Importance of the nature reserve to the natural vitality of the River Elbe

The main aim in developing the nature reserve is to maintain its natural vitality and to restore disturbed sections. For example, the bank revetment has been lowered at a number of additional points in order to encourage the formation of further inlets and natural and diverse river banks. There had previously been four 8-15 m-wide openings behind which troughs formed. However, the erosive force at the undercut bank of the river is so high that, over long stretches away from inlets, the bank reinforcement can be lowered but not completely dismantled.

In order to restore the flow diversion, the Heuckenlock tideway has been extended and is again connected to the Elbe on both sides, which might reduce silting in the tideway.

In order to maintain a minimum water level for fish in the main tideway, remains of old bank reinforcements have been removed and deep-water drums have been dredged at a depth of 1.5-2 m.

The development of vegetation is essentially dependent on the area's natural vitality. No forest use takes place, and only at two places has an attempt been made to push back cultivated poplar. Deadwood is removed from the nature reserve only if it threatens embankments. To maintain stocks of snake's head fritillary in particular, three areas are cut back at least once a year. Willow trees are regularly cut in the area of the footpath by the River and Port Development Office (known since 2005 as the Hamburg Port Authority) and, in the western section of the nature reserve, by the Society for Ecological Planning (GÖP), an association concerned with nature conservation. There has been little planting in recent decades: willow cuttings have been planted, mainly close to the embankment, by the River and Port Development Office, a few hawthorn bushes by the hunting leaseholder and a group of oaks and white elm trees at the former castle by the association which looks after it.

Surrounding the nature reserve there are a number of smaller dike forelands with freshwater tidal habitats giving rise to the possibility of cross-linking with other areas along the river, although these are potentially open to development. The Society for Ecological Planning has produced a catalogue of measures for biotope improvement in these areas.

Inside the embankment, the Society for Ecological Planning, Friends of the Earth Germany (BUND) and the Foundation for Nature Protection have attempted to establish better linkage by restoring and rehabilitating small biotopes. However, intensive market gardening and the lowering of trench water levels have had a negative impact on the natural diversity of species there.

c. Importance of the nature reserve as a recreational area

Recreational activities are limited in the nature reserve because the area is not accessible beyond a footpath that has been built. At the end of 2003 a new bridge was inaugurated over the tideway, which means that the circular route can again be walked. The lush flora in the freshwater tidal area offers the possibility of nature watching.

The water bodies in the nature reserve are closed to boat traffic.

Bus routes 351 (with bus stops at Schützenhof, Stillhorner Weg, Heuckenlock, Moorwerder Hauptdeich 69, Moorwerder Hauptdeich 35 or Moorwerder-Kinderheim) and 152 (bus stop at the Finkenriek Cemetery) offer an hourly direct connection to the Wilhelmsburg suburban railway station.

d. Origins of the nature reserve and its statutory protection

An important factor to the preservation of the Heuckenlock was, above all, the competition between Hamburg and Harburg. The channel flow for the North and South Elbe rivers could be partially regulated at the Bunthäuser Spitze, which meant that the relative importance of both ports could be shifted. Hamburg succeeded in concentrating port development on the North Elbe. The conflict was not resolved until 1937, with the passing of the Greater Hamburg Act, which ended Harburg's autonomy. Up to that point, the boundary between the two cities was disputed at the Heuckenlock, so that parts of the territory were not even used even for agriculture and the alluvial forest could be preserved. Protection of the area was already envisaged by Harburg, then in Prussia, as early as 1935. In 1948, Hamburg issued an Ordinance establishing a nature reserve. This was revised in 1977 to extend the nature reserve, primarily to areas to the west of the motorway.

Up to 2008, the Hamburg-Harburg District Authority was responsible for the nature reserve, but responsibility was transferred in that year to Hamburg-Central District Authority.

As a unique area in Europe, the nature reserve has been incorporated into the network of biogenetic reserves, a worldwide programme of UNESCO. The Heuckenlock is also a European protected area under the EU Habitats Directive.

The Ordinance setting up the nature reserve does not restrict hunting, and the District Authority is therefore able to issue a normal hunting lease. The nature reserve also includes many small, narrow privately owned plots of land, largely on the meadowland behind the embankment.

On the opposite bank of the Elbe is the Schweenssand nature reserve, which is also protected by its own Ordinance.

All of the upstream dike forelands have also been notified to the European Commission under the Habitats Directive, but have not yet been designated as a nature reserve by the Hamburg Senate. The new "Auenlandschaft Norderelbe" nature reserve borders directly on the Heuckenlock to the east.

Of the plant species to be found in the Heuckenlock, the Elbe water dropwort is one of the priority species covered by the EU Habitats Directive.

e. Conflicts of interest and use

Conflicts of interest and use arise wherever nature protection, economic use and citizens as both residents and user come into contact with each other. Some of the main aspects relating to the use of the site are described below:

Economic use:

The alluvial areas were extensively exploited in the Middle Ages, and there was agricultural activity in what is now the nature reserve, such as cutting and grazing, timber harvesting, fruit growing, reed cutting, tree cutting to obtain willow rods and, after 1945, market gardening. All such use was suspended at the beginning of the 1970s because of the difficult terrain and frequent flooding.

Bank stabilisation:

The river bank has been largely stabilised with a stone edge. If this were to disintegrate as a result of the present-day flow velocity and water level, this would lead to rapid floodplain loss.

Extension of navigation channels and embankment construction:

The extension of navigation channels and embankment construction have permanently changed the frequency and height of flooding and thus impacted on the microclimate and vegetation.

Transport infrastructure:

The present-day nature reserve was split in two by the construction of the motorway back in 1939. The area east of the motorway suffered the most damage, with a tideway being filled in. After 1945, the hardwood trees were felled to be supplied as reparations to Great Britain, and they were later replaced with fast-growing balsam poplar trees.

Changes to the water level:

However, the greatest problems for the nature reserve result from water-level changes caused by the deepening of the Elbe shipping channel, the closing of barriers on Elbe tributaries in the event of storm surges and the construction of embankments closing off former tidal areas. While the tidal range at the Bunthäuser Spitze was indicated as being 2.21 m in 1959, it had risen to 3.22 m by 1989. Further deepening of the shipping channel from 13.50 m to 14-15 m will again affect water levels and would inevitably impact on vegetation.

f. Current challenges

Even today a massive change is taking place to the species found in the alluvial forest, with hardwood trees declining and reed beds expanding. Much deadwood is now to be found in the nature reserve, mainly because poplar trees tilt more easily in the more heavily drenched soil. The habitats of the snake's head fritillary are also under threat.

Higher flooding has made it necessary in recent decades to raise the level of embankments and strengthen them. Considerable encroachment occurred in 1965 as a result of the embankment being moved inland, and the most recent raising and widening of the embankment in the 1990s took up further land in the nature reserve. It was initially agreed between the environmental and building authorities to leave out the section of the embankment situated in the nature reserve in order to examine further the possibility of shifting it towards the river so as to reduce floodplain encroachment to a minimum. However, shortly after, the turf was removed over the full length of the embankment on the nature reserve, and it was only after the environmental authorities intervened that the works in question were suspended. In view of the *fait accompli* this resulted in and the fact that the embankment had to be finished by the autumn in order for it to perform its protective function, it was agreed to continue the works. Nevertheless, a steeper embankment with a paved exterior was built in the Heuckenlock in order to protect the floodplain. Although embankment construction was not subject to compensation measures under the (legally contested) Hamburg Nature Protection Act, the authorities agreed to act in accordance with the impact rules for the purposes of the 180 million programme to raise the Elbe embankment. The replacement of embankments planned as a substitute measure at other locations was only partially implemented, primarily because of legal problems, which meant that there was a deficit of compensation measures.

Other problems for the nature reserve are the water quality of the Elbe, which is not as yet optimal, and the large-scale washing-up with the tide of refuse, which gets caught in the lush vegetation and accumulates.

An alternative route for the southern freight rail bypass, which cuts through the eastern section of the nature reserve, has been under consideration for many years but has not been implemented.

Although private land in the nature reserve is not used because the Ordinance setting it up does not establish public rights of access, this means that desirable measures such as the restoration of a silted-up tideway and the cutting-back of two additional occurrences of the snake's head fritillary (interestingly with several flower heads in many cases) are possibly made more difficult.

g. Summary and conclusion

As it is so multi-faceted, the Heuckenlock is well suited as a case-study area. The flora and fauna at this site are exceptional and worthy of protection. This is legally achieved by the site's designation as a nature reserve.

The nature reserve touches on the specific interests of a wide variety of groups: economic, political, ecological and residents. The Society for Ecological Planning, through its on-site information centres and activities, promotes dialogue enabling these often conflicting interests to be voiced and reconciled with each other.

In this context, the Interreg IVB SKINT North Sea Region Project also promotes awareness among experts and the public of the value of the Heuckenlock nature reserve and the need for sustainable water management. Specialised information activities are organised at which best practices relating to the integration of water management and town planning are documented and disseminated. The project encourages the public to become involved in the planning process and trains urban planners and people working in the water industry on environmental protection and water management.

In the context of the SKINT EU Project, this integrated approach to spatial planning and water management and the interaction between the various stakeholder groups involved in planning offer important opportunities for guaranteeing the preservation of this area so worthy of protection.

h. References

Free and Hanseatic City of Hamburg (1977) Regulations about the Nature Protection Area Heuckenlock (19.07.1997).City Document 202. Hamburg. (in German)

Free and Hanseatic City of Hamburg (1999) Maintenance Plan of the Free and Hanseatic City of Hamburg.Ministry of Environment of the City of Hamburg, Hamburg. (in German)

Free and Hanseatic City of Hamburg (1990) Basic Assessment of the Nature Protection Area Heuckenlock,Dyke Area "Schweensand". Ministry of Environment of the City of Hamburg, Nature Protection Office, Hamburg. (in German)