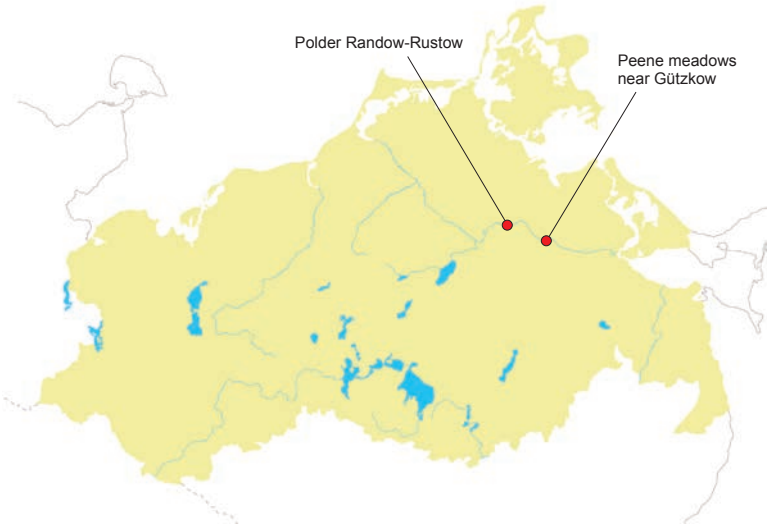
3 Peene Valley
The Amazon of the North



Introduction

The Amazon of the North – a remarkable commercial slogan quite often heard in recent years when talking about the Peene valley. Of course, the comparison clearly is nonsense considering the length of the two rivers (85 km vs. 6,387 km), the size of the catchment area (5,512 km^2 vs. > 7 mio km^2) and the discharge (24.5 m^3/s vs. 190,000 m^3/s). Most importantly and in contrast to the Amazon, the Peene has been part of a cultural landscape for centuries.

Yet on a Central European scale, the Peene valley is a wild, exciting and 'natural' landscape. The Peene is the best-preserved valley mire in Germany and a refuge for rare plant and animal species (box 3.1). The Peene valley is included in the German list of valuable natural areas and landscapes of national importance. It is a special protected area (SPA, since 1990, 20,000 ha) and a Ramsar site. The nature reserve 'Unteres Peenetal (Peenetalmoor)' is an important bird area (IBA, since 1988).

The Peene valley is a former meltwater valley in the extended flat ground moraines of Mecklenburg-Vorpommern. It stretches over 85 km from Lake Kummerow (Kummerower See) in the west to the Oder Lagoon (Oderhaff) in the east. After the Elbe, the Peene has the second largest catchment area and discharge of all rivers in Mecklenburg-Vorpommern. It has an extremely small hydraulic gradient of only 20 cm over 85 km. When water levels in the Baltic Sea are high or when strong winds blow from the east, an unusual phenomenon can be observed: the Peene flows upstream.

A typical valley mire consists of spring fens at the margin, a river with adjoining flood mire at the base and extensive percolation mires in between. With an area of 17,810 ha the Peene Valley is the largest fen complex in western Central Europe.

Natural vegetation

In their natural state, Central European river valley mires were largely open as the dominant percolation mires did not offer enough support for large trees to grow. Detailed macro- and microfossil analyses carried out at Greifswald University enabled the reconstruction of past vegetation patterns and their dynamics. The percolation mires were over vast stretches dominated by

Top photo (K. Vegelin ~2000). Low-intensity land use in the Peene meadows near Gützkow with a peat pit in the centre.
Bottom photo (F. Hacker ~2001). Aerial view of Peene Valley with intensive agriculture next to the flooded areas.

low to medium high sedges without clear zonation. Dominant sedge species included *Carex rostrata*, *C. diandra*, *C. limosa*, *C. chordorrhiza* and *C. dioica*. Further characteristic herbs were *Menyanthes trifoliata*, *Cardamine dentata*, *Galium uliginosum*, *G. palustre*, *Thelypteris palustris*, *Cicuta virosa* and *Peucedanum palustre*. The moss layer was dominated by brown moss species like *Drepanocladus* spp., *Meesia triquetra*, *Calliergon giganteum* and *Homalothecium nitens*. In small water filled hollows furthermore *Utricularia intermedia* and Characeae species occurred. On hummocks, occasionally shrubs of *Betula humilis*, *B. pubescens* and *Salix repens* ssp. *repens* were present. The reconstructed vegetation is very similar to the present day vegetation of near natural sedge fens in Eastern Europe, although some differences in species composition are obvious. *Helodium blandowii*, a common brown moss in Eastern European sedge fens, was likely not present in the German river valley mires. Only remnants of the natural fen vegetation are found in the Peene Valley today.

Use and exploitation

Valley mires are a common landscape feature in northern Central Europe and have been heavily drained and used for centuries. The Peene valley is the least affected, most natural river valley mire in Mecklenburg-Vorpommern; a notion that until recently has concealed that most parts of the mire have been under continuous use since medieval times. Its narrowness made it easily accessible and enabled an early use. Six phases of land use can be distinguished:

During the first phase (1300-1800), the mire was part of the common land (German: Allmende) and land use was hardly differentiated, a general characteristic of agriculture at that time. The intensity of use varied with the ups and downs of society and with population density. It declined in times of war or epidemics and increased in more prosperous times. In the late 17th century, land use was for the first time quantitatively recorded in the Swedish fiscal registry maps. Meadows occupied 23 % of the mire. About one half, located closer to the villages, was mown annually; the rest less frequently. The largest part of the mire was used as pasture, mainly for cattle – 22 % were grazed regularly and 55 % only sporadically. On these pastures superficial drainage and the formation of hummocks by trampling cattle allowed scattered establishment of shrubs and trees. The pastures thus rather reminded of open woods and shrublands. The widespread occurrence of denser shrublands (25 %) and woods (12 %) indicates a reduced intensity of land use and abandonment in the 17th century, when Vorpommern lost

40 % of its population due to wars, epidemics and migration.
During the second, transitional phase (1800-1850), land ownership was reformed and the importance of peat cutting increased. Peat cutting had been practised on a small scale since medieval times. Since about 1750, however, the Prussian government propagated the use of peat as fuel to reduce the consumption of wood. Since 1800 peat cutting accompanied by intensive drainage became widespread land use in the mire (fig. 3.1). The medieval tradition of common lands ceased and the now private land was parcelled and more intensively used. Levelling and improved drainage allowed the exclusive use as meadows. Until the mid 19th century the spacious and still wet common pastures were transformed into small patches of better drained meadows interrupted by peat pits. This use dominated in the third phase from 1850 to 1920.
The fourth phase (1920-1960) again marks a transition. In the 1920s, the state initiated and funded the formation of cooperatives responsible for large-scale drainage of the mire. Until World War II large areas were poldered and used as high-intensity grassland after ploughing. During the war these constructions were neglected and partly collapsed. In the fifth phase (1960-1995), two very different developments took place. Agricultural use on half of the peatland was further intensified by the establishment of polders with high intensity grassland monocultures (complex melioration, German: 'Komplexmelioration'). The formation of cooperative farms eliminated the fine-scale landscape pattern of the fen meadows. Areas that were not used, mainly the former peat pits, were invaded by shrubs and trees. Eventually one third of the peatland was forested and 17 % covered by shrubs. During the sixth phase, which started in 1995, the polder system was abandoned and large parts of the peatland were given back to nature. This initiated the transition towards a landscape dominated by wetlands and carrs.

Restoration

Already before the 'Wende' attempts were made to restore parts of the mire. The main focus was the restoration of species-rich fen meadows by mowing or grazing to prevent succession towards shrubland and forest. Examples of these successful attempts are the Trollblumenwiesen (Globe flower meadows) near Stolpe, mown by the local state owned farm, the meadows near Gützkow, mown by the Pomeranian Protestant Church and the Greifswald students' society 'Jean Baptiste de Lamarck', and the Jakob's meadows north of Anklam, mown by conservation volunteers. Quite often, the mowing of valuable parts was hampered by lack of appropriate light equipment.

Box 3.1. Biodiversity values of Peene Valley.

At present, the lower Peene valley still includes a wide variety of wetland types and is a refuge for several rare plant communities and plant and animal species. Remains of wetland types originally widespread in northeastern Germany such as alkaline fens, transition mires and calcareous fens with *Cladium mariscus* and *Carex davalliana* still exist in the lower Peene valley. Here, rare plant species grow, such as *Betula humilis*, *Primula farinosa*, *Carex buxbaumii*, *Carex hostiana*, *Calamagrostis stricta*, *Dianthus superbus*, *Epipactis palustris* and *Euphorbia palustris*. *Castor fiber* and *Lutra lutra* are common in stable populations. Also *Bombina bombina* and *Triturus cristatus* occur.

The Peene valley is important for a number of rare breeding bird species: *Botaurus stellaris*, *Milvus milvus*, *Haliaeetus albicilla*, *Circus aeruginosus*, *Porzana porzana*, *Grus grus*, *Sterna hirundo*, *Chlidonias niger*, *Chlidonias hybridus*, *Alcedo atthis*, *Luscinia svecica*, *Dryocopus martius*, *Sylvia nisoria* and *Lanius excubitor*. About 30 other Annex I species use the area as a resting or feeding place, e.g. *Gavia arctica*, *Cygnus cygnus*, *Aythya nyroca*, *Mergus albellus*, *Circus pygargus*, *Aquila pomarina*, *Crex crex*, *Pluvialis apricaria*, *Asio flammeus*, *Bubo bubo*, *Acrocephalus paludicola*.

Among the invertebrates the stable populations of the Annex II species *Carabus menetriesi* and *Lycaena dispar* are especially important. Further peculiarities include *Lacanobia splendens*, *Eriopygodes imbecilla*, *Chortodes brevilinea*, *Archanara neurica*, *Coenobia rufa* (Lepidoptera), *Chlaenius costulatus*, *Trechus rivularis* (Col.: Carabidae), *Nanomius circumscriptus* and *Dorytomus salicinus* (Col.: Curculionidae).

Several species occurring in the Peene valley are unique for Germany or for the northeast German lowlands (*Dactylorhiza russowii*, *Carabus menetriesi*, *Chlaenius costulatus*, *Eriopygodes imbecilla*) or have their current centre of distribution in this area (*Chlidonias hybridus*, *Porzana porzana*, *Luscinia svecica*, *Betula humilis*, *Primula farinosa*, *Lycaena dispar*). There are historical records of *Acrocephalus paludicola*, *Asio flammeus*, *Circus cyaneus* and *C. pygargus*, *Tetrao tetrix*, *Angelica palustris*, *Saxifraga hirculus* and *Pedicularius sceptrum-carolinum*.

Photo *Primula farinosa.*

An example of experimental grazing for restoration purposes is Schadefähr island (100 ha) in the mouth of the river Peene. This important breeding habitat for *Limosa limosa* (Black-tailed godwit), *Philomachus pugnax* (Ruff) and *Numenius arquata* (European curlew) was lost in the early 1960s when the family living on the island left and grazing stopped. In the early 1970s a dozen heifers were reintroduced for conservation purposes, but due to unfavourably high water levels and epizootics grazing stopped again in the mid 1970s. In 1988 bulwarks were built by the cooperative farm in Murchin

to enable a more frequent transport of cattle from and to the island. This plan never was executed due to the sudden political changes. Experiments with Gotland sheep in the 1980s failed because sites proved to be too wet and too overgrown.

Due to the lack of a strong state conservation body many areas could not be saved from further drainage. The designation of nature reserves was slowed down in those years as land reclamation was considered one of the main tasks and achievements of the German Democratic Republic (GDR). The biggest success of local conservation activists was the designation of several nature monuments (Flächennaturdenkmale, a low protection status) such as the Jakob's meadows north of Anklam, the Trollblumenwiesen near Stolpe and the Peene meadows near Neuhof. Several species were of particular conservation concern in GDR times. *Castor fiber* (European beaver) was successfully reintroduced near Jarmen in the mid 1970s. The animals were translocated from the river Mulde in southeastern Germany, which was affected by coal mining. *Primula farinosa* (Bird's eye primrose) and *Pulsatilla vulgaris* (Common pasque flower) underwent ex-situ propagation by conservation volunteers in the late 1970s and early 1980s. In spite of these efforts, the Pasque flower is almost extinct in the Peene valley now and also the Primrose is still rare due to habitat loss. Several species of meadow birds also received special conservation attention in the GDR.

Large-scale restoration of the Peene valley mire started soon after the 'Wende'. Already in 1992 the Peene as the best preserved lowland river and largest valley fen system in Germany was acknowledged as 'Area of National Importance for Nature Conservation'. Since 1992 the large-scale conservation and restoration project 'Peenetal/Peene-Haff-Moor' is being implemented to create a protection area of 45,000 ha covering the whole valley mire and including a core area of 20,000 ha of strict nature reserves.
A management plan defines targets for the further development of the area:
(1) In valuable cultural landscapes with species-rich fen meadows (about 20 % of the total area) appropriate agricultural management will be continued or re-established.
(2) Areas that had subsided below the mean water level of the Peene river (40 %) and that were no longer supported by state subsidies for pumping and dike maintenance since the mid 1990s, were largely flooded since 2000. Here, it is anticipated that peat accumulation will start again.
(3) Areas that were already abandoned some decades ago (40 %) and that are covered by shrubs and young forests will neither be taken into agricultural use nor further drained and will be allowed to develop spontaneously.

In total the project is funded with 28.5 mio Euro, provided by the Federal Nature Conservation Agency (BfN; 73.7 %), the federal state of Mecklenburg-Vorpommern (18.8 %) and the administration union (German: Zweckverband) 'Peene valley landscape' (7.5 %). The administration union 'Peene valley landscape' is an artificial institution representing the adjacent administrative districts (Demmin and Ostvorpommern) and towns (Demmin, Loitz, Jarmen, Gützkow, Anklam) in the Peene valley and the 'Society for the Protection of the Peene valley'. It was created to realise the large-scale conservation project and runs a project bureau in Anklam. One third of the total funds (9.7 mio Euro) is spent on the acquisition of land and by the end of the project in 2008, the most valuable and endangered sites (about 6,000 ha) will be property of the administration union. Another third (9.8 mio Euro) is spent on compensation for land use restrictions. Only a small proportion of total funding is designated for dismantling of pumping stations and dikes and for damming ditches. Additional funding has been available from compensation for the construction of the motorway A20 that crosses the Peene river south of Greifswald.

Local nature conservation authorities finance and coordinate mowing and grazing of fen meadows in Peene valley additionally. They have also contributed to preventing damaging projects like river deepening and establishment of recreation areas.

The future

With the end of the project the administrative union 'Peene valley landscape' will cease to exist. There will certainly be a successor institution as the union will own a lot of land and the protected area will need administration. The debate on this successor institution is still open.

One idea, the formation of a national park, is lively discussed. The establishment of such national park remains controversial, particularly in light of its long-stretched shape that implies intense interrelations between the protected area and its agricultural surroundings. As the federal state Mecklenburg-Vorpommern is one of the German federal states with the lowest per capita gross product and already has two national parks, two biosphere reserves and five nature parks, it can hardly finance another national park. From a legal point of view it is also possible that a private foundation becomes the responsible body for the national park. According to a feasibility study, assets of 25-90 mio Euro are needed to cover day-to-day costs from the capital yield.

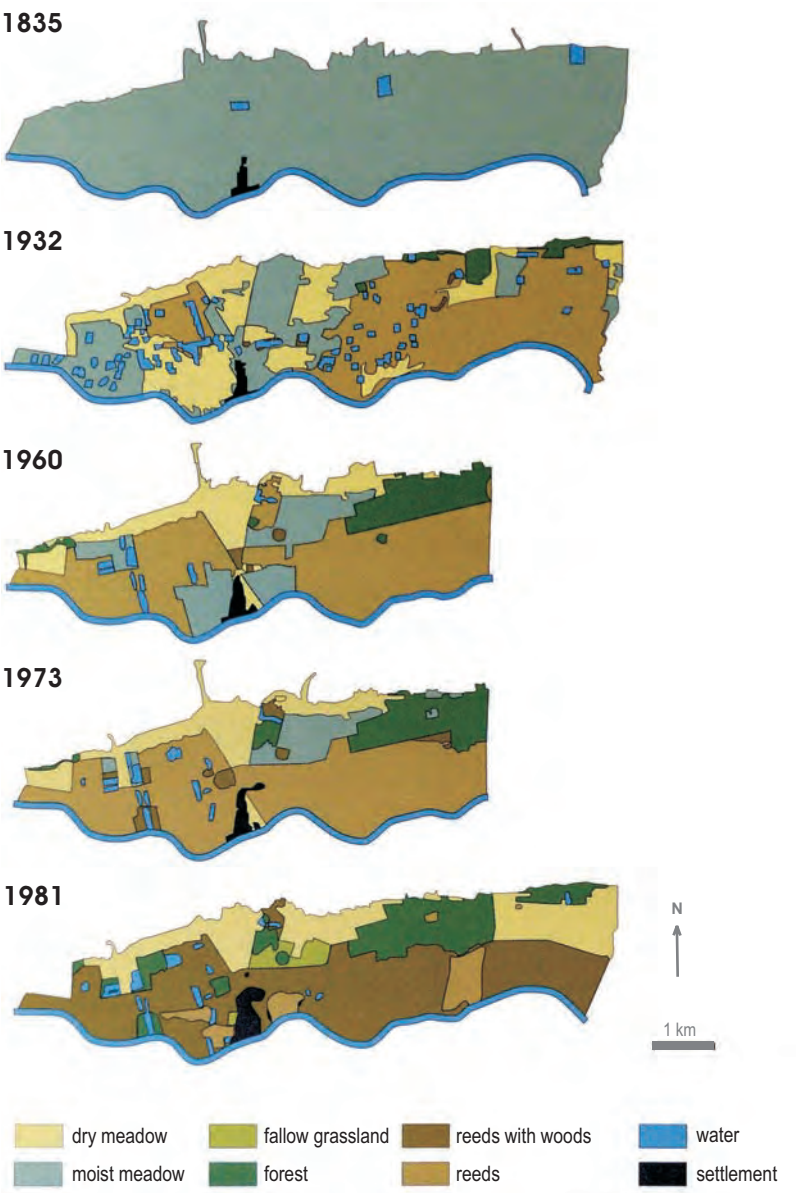
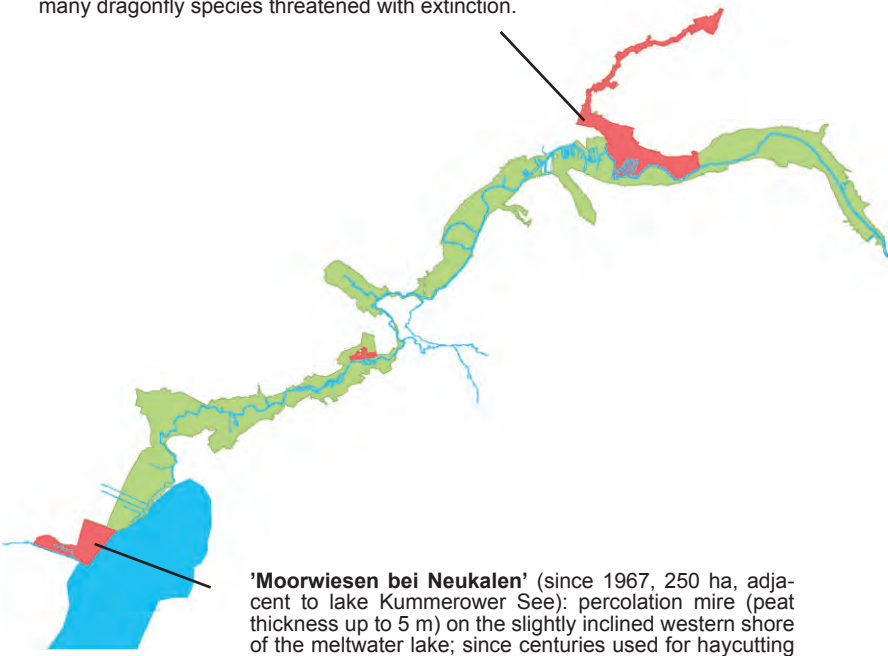


Figure 3.1. Change of the land use in the Peene-Haff-Moor (after Dierßen & Dierßen 2001).

Box 3.2. Major nature reserves in the Peene valley.

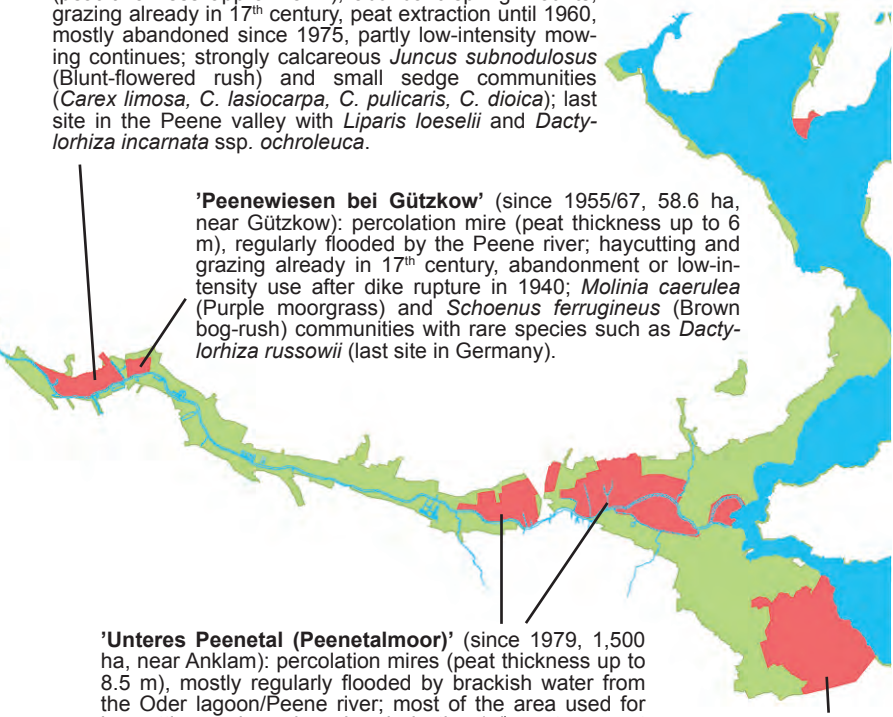
'Schwingetal und Peenewiesen bei Trantow' (since 1990, 580 ha, near Loitz): artesian spring mounts along the river valley with percolation mires (in large parts excavated in the years 1840-1890) and a narrow flood mire along the river edge (peat thickness approx. 4.5 m); *Juncus subnodulosus* (Blunt-flowered rush), *Carex acutiformis* (Lesser pond sedge) and *C. appropinquata* communities; many dragonfly species threatened with extinction.



'Moorwiesen bei Neukalen' (since 1967, 250 ha, adjacent to lake Kummerower See): percolation mire (peat thickness up to 5 m) on the slightly inclined western shore of the meltwater lake; since centuries used for haycutting and grazing, land use continues to date; *Carex gracilis* reeds and *Molinia caerulea* (Purple moorgrass) meadows; rare species such as *Salix rosmarinifolia* (western edge of distribution range), *Scolochloa festucacea* (occurs in Mecklenburg-Vorpommern in the Peene valley only) and *Fritillaria meleagris* (Snake's head fritillary), the latter being translocated from meadows near Malchin subject to drainage in 1977.

'Peenewiesen westlich des Gützkower Fährdamms' (since 1990, 310 ha, near Gützkow): percolation mire (peat thickness approx. 5 m); abundant spring mounts; grazing already in 17th century, peat extraction until 1960, mostly abandoned since 1975, partly low-intensity mowing continues; strongly calcareous *Juncus subnodulosus* (Blunt-flowered rush) and small sedge communities (*Carex limosa, C. lasiocarpa, C. pulicaris, C. dioica*); last site in the Peene valley with *Liparis loeselii* and *Dactylorhiza incarnata* ssp. *ochroleuca*.

'Peenewiesen bei Gützkow' (since 1955/67, 58.6 ha, near Gützkow): percolation mire (peat thickness up to 6 m), regularly flooded by the Peene river; haycutting and grazing already in 17th century, abandonment or low-intensity use after dike rupture in 1940; *Molinia caerulea* (Purple moorgrass) and *Schoenus ferrugineus* (Brown bog-rush) communities with rare species such as *Dactylorhiza russowii* (last site in Germany).



'Unteres Peenetal (Peenetalmoor)' (since 1979, 1,500 ha, near Anklam): percolation mires (peat thickness up to 8.5 m), mostly regularly flooded by brackish water from the Oder lagoon/Peene river; most of the area used for haycutting and grazing already in the 17th century, peat excavation until 1925, land use stopped in the mid 1960s; flooded areas characterised by *Phragmites australis* (Common reed) and large sedge communities (*C. acutiformis, C. rostrata, C. gracilis*), large areas of *Molinia caerulea* (Purple moorgrass) meadows, only small patches of *Juncus subnodulosus* (Blunt-flowered rush) vegetation on 'Schadefähr' island; many rare butterfly and moth species (345 species, e.g. *Archanara algae, Perizoma bifaciata, Scopula rubiginata*) as well as Coleoptera (such as the Central European endemic *Carabus menetriesi*).

Nature reserve 'Anklamer Stadtbruch' (see chapter 4)

Randow-Rustow and Gützkow

Until the late 1990s the polder Randow-Rustow was an intensively used grassland polder with dikes and pumping stations to regulate water levels for optimal agricultural use.
In the context of compensation measures for the Peene valley crossing of the new motorway A20 the restoration of the site was planned. The Peene valley's status as a protected site under the EU-Habitat and Birds Directives demanded a more elaborate restoration strategy than simply flooding the polder. Instead a controlled rewetting over a 15 year period was chosen to slowly change the existing, untypical fen vegetation into fen specific vegetation, thereby providing numerous faunal species with a variety of habitats.
Seven years of controlled rewetting have passed since and the floristic and avifaunistic results look very promising.

Box 3.3. Hope for the Aquatic warbler.

A Polish-German EU-LIFE-Project (2005-2010) will prepare the re-colonisation of the Peene valley by *Acrocephalus paludicola* (Aquatic warbler), a characteristic and globally threatened bird species of sedge fens. The Peene valley was once a centre of its Pomeranian population, but the last breeding record stems from 1978. Today, the species is extinct in many western European countries as a result of anthropogenic fen degradation.
The Pomeranian birds are genetically different and use different wintering areas than birds from populations breeding further east (core population: Belarus, Ukraine and eastern Poland). The remaining Pomeranian population is mainly breeding in the Polish Świna delta, only 30 km away from the Peene valley, which thus holds a potential for recolonisation. The Peene valley offers the best possible conditions for the steady re-establishment of Aquatic warbler habitats in western Europe. The project focuses on large-scale restoration of sedge fen habitats. It is supported by the Royal Society for the Protection of Birds (RSPB, UK) and implemented by the Polish Society for the Protection of Birds (OTOP) in cooperation with two national parks and three NGOs. The Peene valley part is run by the 'Society for the Protection of the Peene valley' in cooperation with the administrative union 'Peene valley landscape'. With a budget of 5.4 mio Euro it is the biggest species conservation project in Poland.

The Peene valley near the small city of Gützkow is characterised by an exciting mosaic of species-rich meadows, scattered peat pits, willow shrubs and alder carrs. The meadows are of extraordinary high floristic and faunistic value, with dozens of endangered species such as *Liparis loeselii, Eleocharis quinqueflora, Primula farinosa, Swertia perennis, Pinguicula vulgaris, Scorpidium scorpioides, Crex crex, Lutra lutra* and *Carabus menetriesi*.

The two nature reserves near Gützkow (box 3.2) have a similar landscape setting, with a steady supply of calcium-rich groundwater at the valley edge and an increased influence of flooding towards the river. Drainage intensity and site management differ between the two areas.

In the years 2000 and 2005 measures were taken in the species-rich meadows of the nature reserve 'Peenewiesen bei Gützkow' to stabilise hydrological conditions and to enlarge the area influenced by a steady supply of calcium-rich groundwater. A specific mowing regime will further help to restore the phenomenal species richness recorded here in the mid 1970s.

In autumn 2006 hydrological measures will also be taken in the nature reserve 'Peenewiesen westlich des Gützkower Fährdamms'. Parts of the meadows have already been spontaneously rewetted by beaver (*Castor fiber*).

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