

Additional information

Physical features of the site

Geology, hydrogeology, pedology

Following the withdrawal and the sedimentation of the last lake, the so-called Late Miocene Lake Pannon in this region on the Great Plain, approximately 4.5 million years ago, the ancestor structures of the Danube, the ancient Tisza and the tributaries of the latter appeared. From this point on the previous lake sediment supply was replaced by river sedimentation (primarily by the Danube). Until the Günz-Minden Interglacial Episode in the Pleistocene Ice Age following Pliocene Epoch the Danube run southeast-bound towards Szeged, cutting the region in half, and supplied river sedimentation in a width of some 1000 metres. In the Günz-Minden Interglacial Episode of the Ice Age a major change occurred: with the development of the region's southwestern depression (Kalocsa depression) the Danube gradually started to drift westward by leaving its previous diagonal flow direction and took over its present north-south position. The Danube had already filled up the previous areas. River sedimentation ceased on the alluvial fan replacing these, situated east of the region, which remained higher than the Transtisza region, and a thick eolic sedimentary layer were deposited on it (in the areas undisturbed by water).

Based on geological evolution, the geological structures covering the surface and the morphological conditions the region can be divided into three major geological units:

- The Danube-Tisza Interfluves Ridge. An area is with a varied surface protruding some 30 m above the Danube Valley and almost 40 m above the Tisza sedimentary layer smoothing into the loess Bácska plain in the SW direction. The region so characteristic of the plain territories of the Carpathian Basin in terms of geology and climate offered settling opportunities for the natural continental fauna, including elements of both steppe and mediterranean nature. In addition, due to its geographical location (e.g. as a basin centre surrounded by mountains) and its other features it became a place for the development of numerous endemic plant and animal species. Under the given geological situation and under homogenous climate conditions the varied fauna is primarily the result of the abundance of pedological, hydrological and micro-relief conditions. Based on the large scale geological and climate features of the region and based on the morphological, pedological and biological characteristics of smaller regions we can classify the proposed habitats according to the more refined categories below.

Climate

The climate variations are limited in the region of the Carpathian Basin. The macroclimate can be considered a homogenous basic feature in terms of surface and fauna evolution, as well. The region has a temperate continental climate. Its unique features are limited

cloudiness, a relatively high number of sunshine hours, high daily and annual temperature variation, relative dryness and very low humidity values.

This region is the area with the least cloudiness in Hungary. The annual average cloudiness is 52-57%. The annual average number of sunshine hours is approx. 2050. At the same time this is one of the warmest areas in the country. No significant variations exist in this region. The annual average temperature is between 10-11°C. The mean temperature of the coldest month (January) is between minus 1.5 and minus 2°C, while that of the warmest month (July) is 21-22°C. Characteristically of areas with a continental climate, the annual average temperature variance is quite significant (23-24°C). The region can be classified within Hungary as one with a short winter and a long summer. The number of winter days is only 26-31, however, major frosts are common. Spring comes early, and the average temperature rises above 10°C in the whole region between 7-12 March. The number of summer days is 81-84. In the fall the daily average temperature falls below 10°C again generally between 17-21 October.

The region is one of the parts of the country having the least precipitation. Under normal conditions the annual precipitation is between 500-600 mm in the region. The rainfall of the summer semester (April-September), the so-called breeding period, is around 300-350 mm. The winter precipitation occurs mainly in the form of snow. The number of snow-cover days is 30-40. The precipitation conditions therefore are relatively disadvantageous. This is further intensified by low humidity values, with an annual average of many years at 71-74%. Based on this data we may declare that the balance of precipitation and evaporation is negative in the region. The wetlands that have developed and exist can thank their subsistence to supplementary water influences (e.g. ground water).

General ecological features:

The prevalence of different sodic alkaline wetland habitat structures depends on water levels and seasonal fluctuation, which may be very variable year to year.

Lepidio-Puccinellietum and *Astero-Agrostetum albae* sodic marshes: The feature of this habitat is that it has only temporary or ephemeral saline water-flooding zone (0-10 cm), usually from later autumn to later spring. After it has dried out saline crystals often occur high density on the bare surface, this reason is that the plants growing are strength hampered here. The characteristic vegetation, which can thrive in these extreme conditions consists mainly of terrestrial halophyte and succulent plants such as: *Lepidio crassifolium*, *Puccinellia limosa*, *Camphorosma annua*, which occur sporadically on the surface. This habitat is one of the most important shorebird feeding zones because it has seasonal shallow (0-10 cm) water coverage and bare surface, often only the surface is wet and the muddy ground is soft. This feeding habitat exists mainly in spring and autumn for the waterbirds, when there is higher water level on the site.

Puccinellietum limosae sodic marshes: This habitat is similar as *Lepidio* marshes, but it has longer and a bit deeper saline water-flooding (0-20 cm), usually from early autumn to beginning of summer, due to more vegetation biomass can be found here, especially high

dominant of halophyte *Puccinellia limosa*. The sodium crystal accumulation is not so expressed on the surface only in the deeper level of the soil. The vegetation coverage abundance may be very variable.

Bolboschoenus-Phragmitetum sodic marshes: This habitat regularly is covered with shallow water (0-30 cm) or wet all over the year. Due to here can overgrow more abundant halophyte vegetation as on saline marshes 2. zone. The characteristic dominant plants are *Bolboschoenus maritimus* and saline ecotype of *Phragmites communis*, these may occurrence in very different coverage proportion.

Open bed of pans: This habitat regularly is covered with deeper saline shallow water (10-50 cm) all over the year. According to there is not important emergent vegetation only few sporadic saline submerged water plants as *Potamogeton pectinatus*. This habitat is the major importance for waterbirds. In hot summer, when the water level may be dropped seriously, so pool-bed surfaces can be become only wet or dried out.

Other not characteristic wetlands types can be also found such as *Alopecuretum pratensis* meadow and *Caricetum acutiformis ripariae* marshes.

Continental Pannonic sodic affected steppes are extensively scattered around the wetlands such as *Artemisio-Festucetum pseudovinae danubiale*, and *Achilleo-Festucetum pseudovinae*. Fragmented Pannonic loess steppic grasslands are also such as *Salvio-Festucetum rupicola*.