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*The History of Warsaw's Wetlands*

The history of Warsaw's wetlands began 130,000 years ago, with the end of the so-called Warta Glaciation, when the rock material brought by the ice sheet was deposited on the older substrate in the form of moraine patches after its withdrawal, giving rise to today's Warsaw and Wołomin Plains. Flowing between them for about 10,000 years, the Prawisła (former riverbed of the Vistula River) carved a valley – preventing it from spreading further out – on the west side by the Warsaw Escarpment, resulting from the undercutting of the upland by the water heading north-west. As the bottom moraine erosion progressed, after the milder erosion of the eastern side of the valley, the lower floodplains became alluvial terraces.

Today's right-bank floodplain is the widest in the area of Wawra, where the water above the terrain with erosion-resistant sediments hollowed the so-called Zakole Wawerskie [Wawerskie Bend]. After strong floods, the river was able to change its course within the floodplain, leaving sections of the former river bed as an oxbow lake (so-called sandbanks). It sometimes happened that the waters of the great river hit the older, higher terraces and were directed more to the north, just as before the glaciation. Even in the 19th century, in such cases, they were flowing down into the Narew River by a longitudinal depression, the so-called Bródno-Nieporęcka Valley, where marshes formed along the small north-flowing rivers, called Opolice by the local population, reaching southward to today's Grochów. On the Warsaw Plain, the wetland belt stretched between today's Żoliborz and Okęcie in a 2 to 4 meter deep depression of the former tunnel valley, carved by the water flowing under the glacier and remaining after its retreat as the Jeziorzysko Żoliborskie [a kind of swamp terrain]. The Warsaw Plain in the period prior to the development of the city was strewn with small kettle lakes (depressions left behind after partially-buried ice blocks melted) and cut with many small rivers and streams flowing mainly into the Vistula River Valley, whose riverbed was wider than it is today and was closer to the Warsaw Escarpment.

Such factors were taken into consideration in where the duke's castle was to be built at the end of the 13th century – on the site occupied today by the Royal Castle. The inhabitants of Warsaw, surrounded by channels of streams escaping into the Vistula, from the end of the Middle Ages drew water from a water supply network built in the wetlands in the area of a stream called Nalewki, which no longer exists but is commemorated in the name of Nalewki Street. Not only the rivers, with the Vistula at the forefront, but also the swamps were part of the natural landscape of the city; from

the diary of General Chrzanowski it is possible to find out how many troubles the Opole swamps caused in 1831 to the Russian armies storming Grochów.

The growing demand for water and land due to the city's development was draining out the small rivers of the Warsaw Plain. The first to disappear was the Dunaj, which was commemorated by naming a square – located in the stream's original location – in the city Szeroki Dunaj; the gorge of this stream was absorbed by the old town moat. Jordan, flowing down the escarpment at today's Bednarska Street, already in the fifteenth century was turned into sewage, and its gorge into a rubbish heap. Drna, the water of which was used by numerous craft workshops and which was elevated for their needs (this is how ponds formed, from which the name Stawki Street originated), was so contaminated that in the 18th century, for sanitary reasons, the water was channeled to the river Polkówka, flowing further north.

From the beginning of the 17th century, small rivers also paid for the whims of kings and magnates who wanted to increase the comfort of their suburban residences; this was done several times by changing the course and longitudinal profile of the rivers Długa, Rudawka and Sadura. Lowering the level of groundwater as a result of deforestation and development of drainage basins, drainage of wetlands and fragmentation of the area, caused by the construction of roads and railway lines, led to the disappearance of other small rivers or their upper sections. The Żurawka River – which remains now as Żurawia Street (it is not clear whether the name came from cranes living on riverside meadows or cranberries growing in swamps in its headwater area near today's Starynkiewicz Square, because żuraw in Polish means crane and żurawina cranberries) and the Książęca Street gorge – has disappeared from the surface.

The Belczęca River disappeared, and now in its place the streets Bagno (in the place of its source, meaning swamp) and the street Żabia, which was replaced with Marszałkowska Street after the war. The same happened with the rivers Nalewka, Polkówka (there was a slight deepening in its valley between Szajnochy and Kątowa Streets), Jordan and unnamed watercourses in the place of today's Mariensztat, Gęsta, and Tamka Streets. The riverbeds of Drny, Rudawka, Sadurki (currently the Służewiecki Stream), Żbikówki, and the Bielański Stream – which have no connection to springs in places based in today's Western districts of Warsaw – have been shortened and drained, and their supply has changed. The Drny Valley was then drained and reconstructed into a moat of the Warsaw Citadel, and a significant part of the Rudawka Valley, already in the 1980s, was overtaken by the construction of Trasy Armii Krajowej [Home Army Route].

From among 25 springs in the area of the Warsaw Escarpment on the section from the Bielański Forest to Królikarnia, 16 disappeared within the last 150 years. In the first half of the nineteenth century, large-scale land development related drainage was initiated in undeveloped areas, aimed at increasing the productivity of agriculture. They gained

momentum in the interwar period as well as during the communist regime. Rivers were being canalized in today's right-bank of Warsaw (including the rivers Brodnia, Długa, Rowa, Skurcza, and Struga Drojowska), changing both their courses and names.

The Sielanka Lake – devoid of any inflow of water in the course of the old Vistula river beds between the lakes Wilanowskie and Czerniakowskie and Żabie Lake in a similar stream of old river beds on the right bank of the Vistula – has dried up to a significant extent. The mouth of the stretch of the river Wilanówka has almost completely dried up, which after shortening the course of the river with the help of a dike has become Łacha Siekierkowska Lake. Another dike, above the city border caused Wilanówka – on the section between it and the mouth of the Sobieski Canal (outflow from Wilanowskie Lake) – to lose its river-like character. With the help of ditches and canals, a significant part of the wet meadows were drained on the Vistula floodplain, which was cut off by flood embankments and on the alluvial terrace, mainly in today's districts of Białołęka, Wawer, and Wilanów.

Land development also took place on wetlands on the plateau, changing, among others, the arrangement of water reservoirs in the Wawrzyszew and Zielony Ursynów areas. Among the small rivers, the only one to avoid river regulation works was the lower section of the Bielański Creek, meandering in a ravine (once much longer) through the Bielański Forest. Due to a drop in the level of groundwater and a cutoff from the spring area in Bemowo and the drained wetlands in Wawrzyszew, the watercourse here is, however, intermittent. The progressive drainage and development of the Bródno-Nieporęcka Valley caused the only hint of the previous vast swamps to be the small, forested patches in the Bródnowski Forest, in the vicinity of the relics of the oldest Warsaw castle-town built in the early Middle Ages next to a convenient crossing through Brodnia, in a place called for this reason Bródno.

All that is left for us to remember of the Jeziorzysko Żoliborskie Wetlands are artificial water reservoirs. The Vistula River itself, whose inhabitants have been taking it to ever new areas of the floodplain for 500 years, cut off by embankments and dams, has its current riverbed shape thanks to regulations from the late nineteenth century, which were designed to improve the functioning of the municipal water supply.

Within city limits – in a state deserving legal protection – the preserved floodplains in the inter-embankment zone of the Vistula survived, part of the old river beds (Czerniakowskie Lake in Mokotów, Łacha Stream on the border of Bielany and Żoliborz, Łacha Stara Wisła [Old Vistula] in Wawra, and a series of lakes in the Wilanów district), as well as remains of wetlands in Powsin, Powsinku, under Skarpa Ursynowska, and in the Wawerskie Bend, as well as mid-forest bogs in floodless depressions in the Wołomin Plain (including Bagno Jacka [Jack's Swamp], Zielony Ług, Biały Ług), and just outside the city, also in the Bemowo Forest (Kalinowa Łąka [Kalinowa Meadow], Łosiowe Błota [Elk's Mud]), the Kampinos Forest (Łuże) and the Słupecka Forest Nature Reserve (Łęgi

Czarna Struga). On the Warsaw Plain, in the present day districts of Ursynów and Włochy, small kettle lakes survived: Imielińskie, a complex of three lakes called the Pyrskie Lake, Zbarski Pond, and once the largest lake within the city, Zgorzala, which, however, decreased by more than five times due to drainage and backfill.

From the 17th century, both in the uplands and in the sub-embankment areas, artificial water reservoirs arose, being created in flooded pits after clay extraction or ponds on dammed watercourses; several park ponds and moats of forts of the Warsaw Fortress were also deliberately dug. The accumulation of watercourses draining the swamps on the floodplain near Powsin resulted in the creation of a reservoir lake with a reference to the past called the Torfowisko.