

## FLOODING AS A MEANS OF MILITARY DEFENCE: LANDSCAPE OF THE 20TH CENTURY FORTRESS WROCLAW

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### ABSTRACT

*The article presents the historical importance of the military flooding system around the city of Wrocław (Breslau) at the beginning of the 20th century. The research was carried out in the years 2010-2012 to investigate the elements of the former "barrages d'eau" (Archives de la Societe des Nations, 1920b) of Fortress Wrocław (Festung Breslau), situated on the River Odra. The author of this paper focuses on the structures built along the following two Odra tributaries: the Widawa and the Ślęza. On 9 May 1889 a decision on the modernisation of the fortress was made (Bayerische Hauptstaatsarchiv, 1911). From that moment on, the city was repeatedly renovated network in order to maintain its military effectiveness. To allow defensive flooding operations in the foreground areas in both sectors of the fortress, a number of hydrotechnical structures were erected. At the same time after the great flood of 1903, large earthworks were launched. The construction of weirs on the River Widawa coincided with the necessary expansion of the city's flood control system. Both, the fortress weirs and the canals with sluices, became an important part of the modernized system of the Wrocław Water Junction. This improvement was of major importance to the fortification of the fortress's right sector. However, Fortress Wrocław was never completed and during the Great War fortress weir's were never used for military purposes. Today the fortress weirs constitute a historical value as part of the hydrotechnical heritage.*

**Key words:** military flooding, fortress landscape, festung breslau

### INTRODUCTION

Wrocław's geographical location, with its high density of the river network, was favourable for defence. As far as the history of military conflicts is concerned, intentional floodings were crucial for defence (Pardela et al., 2012). Engineering work could be used to combine artificial and natural obstacles in roads and weirs *designed or employed to disrupt, fix, turn, or block the movement of an opposing force, and to impose additional losses in personnel, time, and equipment on the opposing force.* (Department of Defense, 2010). Guard-protected hydrotechnical structures were necessary to control the water level of defence flooding on rivers, streams and polders.

On 14 June 1910, Wrocław (Breslau) was officially named a 2nd-class fortress (*Festung Breslau*) (Bayerische Hauptstaatsarchiv, 1911). The principal line of resistance that included *Festung Breslau* as well as other fortresses, e.g. *Festung Custrin* and *Festung Stettin*, ran along the Odra River, from north to south, along the eastern border of the German Empire.

The author of this paper focuses on landscape transformations resulting from historical flooding structures deployed for military purposes, i.e. with a view to defending the 20th century *Festung Breslau* and two Odra tributaries: the Widawa (*Weide*) River and the Ślęza (*Lohe*) River (*op. cit.*). The overall aim of the research was to investigate the historical background of the river landscape around the

fortress to define the defence flooding range by using ongoing simulations with HEC-RAS flood flow models.

### RESEARCH METHODS

#### The Archives

The analysis of the local historical military structures and the Widawa and Ślęza river landscapes, which failed to attract scientists' interest for almost seven decades, was started by collecting historical data available at various archives located in the cities of Wrocław, Berlin and Geneva. The principal, pioneering archival research was conducted between March 2010 and June 2012 and was aimed at acquiring copies of the original drawings and cartographic materials related to the defence weirs and the hydrotechnical aspects of Wrocław's river network. The archival study was carried out at the State Archives in Wrocław, the Departmental Archives of the Lower Silesian Land Drainage and Water Structures Management Board, the Departmental Archives of the Regional Water Management Board in Wrocław, the Herder Institute collections, the Berlin State Library – the Prussian Cultural Heritage, and the Secret State Archives of the Prussian Cultural Heritage in Berlin. The most valuable source materials, including detailed drawings of the weirs, among other things, were obtained by the author from the Military Inter-Allied Commission of Control in the

League of Nation Archives in Geneva in September 2012 (Archives de la Societe des Nations, 1920a).

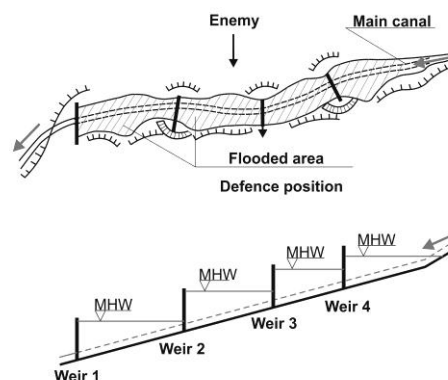
### Terrain works

The secondary, exploratory research consisted in fieldwork aimed at locating and identifying weirs on the Ślęza and the Widawa. This was undertaken between November 2010 and June 2012. All the locations of the defence weirs and other fortifications were classified as secret and so were not marked in the relevant sources. The author was searching for the locations on the basis of old military plans and descriptions of the fortress, i.e. 20th-century schematic maps, and aerial photographs taken in 1944 and 1947. However, the river landscape changed over time, depending on the season. The sites were overgrown in the summer and the metal frames and concrete or stone walls were hardly visible. All recognized historical hydrotechnical structures were measured, described and photographed during various times of the year. The collected data were catalogued and compared with old drawings and manuscripts gathered during secondary research (*op. cit.*).

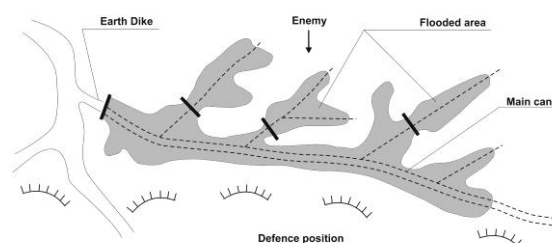
### MILITARY AND FLOOD PROTECTION ASPECTS

The fortress, being a complex system, needs more attention to prevent simplifications when discussing its operation. As a sub-discipline, 'military history' is often neglected by researchers, who concentrate instead on architecture, heritage protection, hydrotechnical or landscape aspects. In order to analyze 20th century landscape related to flooding operations, some elementary guidelines were adopted. The study covered some military aspects, e.g. those contained in handbooks for German pioneer units *D.V.E, 230* some general military solutions, and technical manuals presenting typical fortification erection methods (*Technische forschrift*). The following information can be found in one of the field fortification manuals: 'It is possible to raise the effectiveness of water obstacles through piling them up if they exist or if it is possible to direct the inflow out and to close the drain hole. However, flooding the neighboring terrain improves the obstacle. Any structures for damming the water should withstand the associated pressure and be protected against softening or being washed away', and 'The top of the weir should reach 0.5 m above the planned water level; in the case of earth dams it is sufficient if the embankment is 1-2 meters higher than its width. If possible, embankment slopes should be flat. Depending on the terrain, more than one flooding polders may be necessary to create a defence flooding line. In order to prevent the dam from being flooded or washed away, supporting installation made of channels or pipes should be

provided to drain excess water and to ensure the stability of river banks' (Wichrowski, 2005).



**Figure 1.** The flooding scheme (Source: Ministry of Defence, 1991)



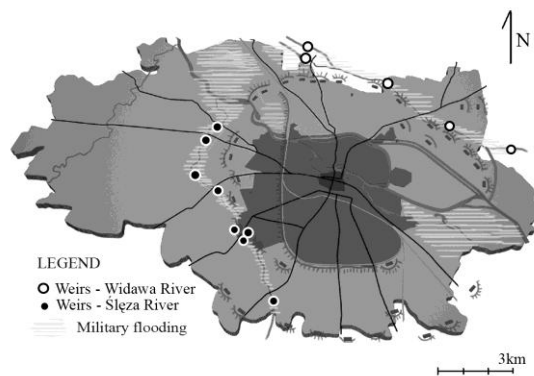
**Figure 2.** Turning the land along the river into a swamp (Source: Ministry of Defence, 1991)

Most attention was paid to a comparison of the guidelines discussed in the *Fortress Combat Guide* (1911) with the floodings of the *Fortress Wrocław*, which enabled the defence characteristics of the city and its surrounding landscape, hidden from non-military people, to be noticed. A highest cabinet order (*Allerhöchte Kabinetts-Ordre*) of 9 May 1889 (*Bayerische Hauptstaatsarchiv, 1911*) initiated the process of planning new fortifications around the city, and dividing the fortress into a left sector and a right sector along the Odra. On 10 October 1889, the Engineering Committee of the Main Inspection of Fortresses and German General Staff (*Generalstab*), decided, among other things, to erect dams on *Schwarzwasser* (Czarna Woda), the *Weide* and *Lohe* rivers. Between 1890 and 1901 main infantry shelters (*Infanterie Raum*) in Wrocław were constructed, and between 1906 and 1912, they were upgraded and converted into infantry forts (*Infanterie Stützpunkt*). Plans were drawn up to build other field fortifications during fortress mobilization. Following a disastrous flood in the summer of 1903, the right sector of the fortress was redeveloped in 1914, and received an extra line of ten group shelters (*Unterstand*), expanding the defence eastward. But at the same time, the floodwater essentially proved its strength, so the military authorities had a clearer view of the

importance of flooding used for defence purposes. After that, the city began to build new protective structures along the Widawa River valley, and to replace the meandering stream of the Czarna Woda with new canals added to the Wrocław Water Junction. The construction work was started in 1912 and completed one year before the Great War ended. (Born, 1948). After 1912, the lower course of the Widawa river became part of the Wrocław Floodway System, which had a hydraulic capacity of 2,300 m<sup>3</sup>/s, and a portion of the discharge amounting to 150 m<sup>3</sup>/s was dropped from the Odra to the Widawa by the Odra-Widawa discharge channel. (Parzonka, 2012) What was the significance of the weirs and the other defence flooding structures to the fortress itself? The natural barrier in the north-western section of the fortress was strengthened with a new important artificial obstacle. Simultaneously, in the left sector the natural valley of the Ślęza River was turned into a defence line as well. However, the fortress weirs were not used during the Great War.

### THE FORTRESS WEIRS

The first fortress weir in Cavallen (Kowale) was ready to be built just after the regulation work was officially approved. Between 1913 and 1915, a total of 14 fortress weirs were erected on both rivers – nine on the Widawa, and five on the Ślęza (Politisches Archiv, 1920).



**Figure 3.** The scheme of the Fortress Wrocław defensive flooding in 1914. (Source: the author)

The following three types of constructions were mainly used: a needle weir (*Nadelwehr*), a stop log weir (*Dambalkenwehr*) and a sheet pile weir dam (*Schützenwehr*). The structure names (*St. W. St. W. I-XII, St. W XI a*) did not reflect their types or locations, which most probably were regarded as military secret. All fortress weirs dammed the river flow and caused the backwater effect, increasing the base flood elevation and the distance for which the effects extended upstream. The fortress weirs had to be low to avoid detection by enemy artillery

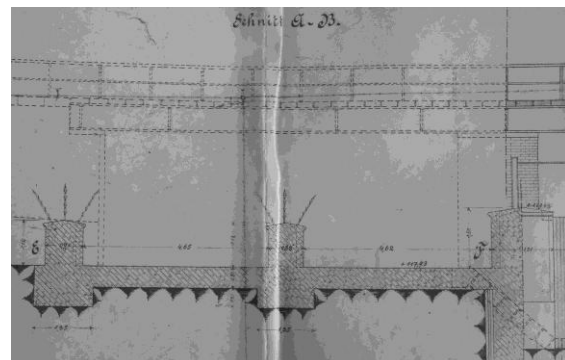
observers located on hills surrounding the fortress or in balloons. The structures fulfilled the same function as typical civil weirs, i.e. they dammed the river flow, serving to regulate the water level or to measure the river flow (Licker, 2003). The description of each civil weir contains the following information: the state of repair, the operating status



**Figure 4.** The fortress weir no IV (*Schützenwehr - St. W. IV*) with armour steel plates, 2012 (Source: photo by the author, 2012)



**Figure 5.** The fortress weir XI (*Nadelwehr - St. W. XI*) in a state of major disrepair, 2012 (Source: photo by the author, 2012)



**Figure 6.** The steel pickets of the underwater barbed wire obstacle (*St. W. XI a*) (Archives de la Societe des Nations, 1920b)

and the water lifting level. Based on the typical weir structure, the following technical data were recorded during the cataloguing of the fortress weirs: the foundation, the still and stilling basin, upstream and downstream slope protections, pillars, weir heads and bulkheads, dykes, and earthen embankments. Some differences in construction were noted (Pardela et al., 2012). Furthermore, in the case of the military weirs the following were also taken into account: armour steel plates, steel fencings and land or underwater barbed wire netting protecting the structure against sabotage or demolition (Deutsches Reich, 1911), guardhouses with telephone communication, alarm installations, and field fortifications with infantry positions around the weirs.

### THE LANDSCAPE AND THE LAND USE

The military landscape of the 20th century Fortress Wrocław was carefully designed to prevent the enemy from discovering the exact positions of the forts and shelters. All military zones were overgrown with tactical clusters of local tree and shrub species that ensured extra protection by natural camouflage (mimetism and mimicry features). The weakest, southern front of the fortress was protected by a high rail embankment equipped with five positions prepared for artillery. The cultural landscape, nowadays defined as cultural properties representing the combined effect of nature and human labour. (World Heritage Convention, 1992), in the case of the fortress was shaped by a piece of restrictive legislation known as *The Act on Limiting the Ownership of Land in the Vicinity of Fortresses*, promulgated on 21 December 1871. Under the Act, on 4 April 1910, zones (so-called *rayons*) were established in the Fortress Wrocław. According to the Act, all infantry forts and shelters along the Widawa and Ślęza rivers were subject to building restrictions; the ring of forts in the case of the Fortress Wrocław had a protected zone 2,250 meters deep (rayon I – 600 m, rayon III – 1,650 m) (Deutsches Reich, 1871). The weirs constructed within the reach of rayon I had a massive impact during construction and operation, *inter alia*, on landscape, land use and the environment.

Changes in soil moisture levels lowered agricultural productivity, and loss of vegetation growing in or alongside the rivers resulted in losses to the associated animal communities. The rural valleys along the rivers could be intentionally flooded or turned into marshes by receding floodwater.

Shallow ponds were supposed to repel the invader's cavalry (e.g. the Russian cavalry establishment, which was the largest of all among the nations fighting in 1914), infantry and light artillery carts (horse-drawn artillery guns) by preventing or delaying military manoeuvres (Pardela et al., 2012).



**Figure 7.** The ruined fortress weir (St. W. I), 2010  
(Source: photo by the author, 2010)



**Figure 8.** The fortress weir (St. W. X), 2010.  
(Source: photo by the author, 2010)

After the Second World War, the Ślęza river valley was radically redeveloped in line with the flood-protection regulations, so the natural rural landscape vanished. The historical landscape of the Widawa also changed after the city's northern beltway was constructed.

### CONCLUSIONS

Nowadays, the Wrocław Floodway System is being modernized to enable trouble-free passage of 3,100 m<sup>3</sup> of water per second through Wrocław and via the Odra-Widawa discharge channel (Parzonka, 2012). The digging and expansion of the channels influenced landscape, heritage, nature conservation fisheries, water quality, and recreation. Concrete structures are frequently an eyesore, but some, which are partly made of stone, blend well with the landscape. The fortress weirs constitute an outstanding historical value and comprise a number of untypical design solutions. The rehabilitation of the existing weirs, especially those located on sites of historic importance along the Widawa River, offers an opportunity for further research thanks to archaeological exploration. None of the weirs were officially regarded as part of the listed historic

landscape. So the first step taken by the author aimed at protecting two of the best preserved fortress weirs (*St. W. IV* and *St. W. XI*) after the pioneer research was completed was to put them on the list of protected structures in accordance with Articles 5 and 21 of the Polish Monument

Protection and Care Act of 23 Jul 2003. The landscape of the Widawa river valley was not changed for almost a century until the last decade. Is the rehabilitation of the existing, hydrotechnical heritage of the fortress weirs possible? Only time will tell.

## ACKNOWLEDGMENTS

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