Anthropogenic and natural factors affecting spatial development of seaside city of Świnoujście

Michał Kupiec, Paweł Pieńkowski

Department of Environmental Development and Protection, West Pomeranian University of Technology in Szczecin
Śłowackiego 17, 71-434 Szczecin, email: mkupiec@zut.edu.pl, pawel.pienkowski@zut.edu.pl

Abstract: The dynamic spatial development the town of Świnoujście, associated with the spa function took place intensively in the 19th and 20th centuries. At the same time a sea port developed and spatial expansion of seaside town were closely linked to environmental conditions of the Uznam island. The town has continually been growing, increasingly encroaching on surrounding valuable natural areas, despite of difficult environmental conditions of its development. The paper examines the spatial development of the fishing village of Świnoujście to a widely-known resort. The spatial development of the town is inextricably linked with natural and geographical conditions of its location (changes in the coastline, land cover, hydrologic conditions) and anthropogenic influences (hydro-technical works, expansion of the port and military functions, industry development). The study used archival maps and plans of the city dated from the seventeenth century to present times.

Key words: city development, coastal areas, Świnoujście, coastline changes

Introduction

Spatial development in most towns situated along the Polish coast is subordinated to fulfill their recreational role. This refers particularly to small and medium-sized towns. Świnoujście is one of sparse examples of a multifunctional seaside towns playing the role of a port, spa, military base and the administrative centre of the district. The history of the town is relatively short, as it is only a short above 200 years old. The spatial development of Świnoujście is an interesting example of a town with development driven by geopolitical reasons. The town was located in a place of very unfavourable natural conditions. For a few hundred years there was only a small fishing settlement with expansion inhibited by unfavourable hydrologic conditions at the mouth of the Świna river and on the coastal waters. Conditions for the development of agriculture on infertile sandy soils with frequent flows of sea water and burdensome winds, were extremely difficult.

In the course of its 200 years’ growth, the town has significantly revamped its environment. Its development has remained in close relations with hydrotechnic works in the current of the Świna river and with the growth of the port, which considerably affected the changes in the coastal line and the widening of the area available for the expansion of the town.

River engineering works carried out consequently throughout the whole period of the town history and erection of different constructions protecting the sea shore, along with natural conditions have completely changed the character of the mouth of the Świna river and thus conditioned the existence and the development of the town. The growth of the town was significantly accelerated in the 19th and 20th century due to the flourishing of spa and military functions. At present the town fully uses its location trumps fulfilling its differentiated functions. Hydrologic conditions enabling a gain in the sandy coast forming one of the widest beaches of the Baltic Sea. By developing its tourist and recreational functions, the town is still tempted to expand on the dunes what meets with opposition from the defenders of the environment and part of the society.
The study presents the spatial development of the town closely linked with the river engineering works. A close relationship was shown between the changes in the spatial conditions and the anthropogenic activities. The changes in coastal line were also traced and the results were compared with earlier descriptions of this issue (Piskorski 1985, Biranowska – Kurtz 2003).

Materials and methods

The spatial development of the town took place in modern times. Moreover, it was tightly linked with engineering works. Therefore Świnoujście has a rich collection of projects and technical drawings illustrating individual stages of the development. The history of efforts made to open a navigation passage of the Świna river and to develop the port waited until detailed descriptions were worked out during the prewar period (Guenther 1842, Burkhardt 1920). The geological and geomorphological conditions of the gate of the Świna river and the dunes forming the gate were also described in a detailed way (Osadczuk 2004, Łabuz 2005a, 2005b).

The essential material of the study was based on selected maps of the surroundings of Świnoujście that made possible to trace the growth of the town and to ensure a possibility of their analysis using GIS tools. The following archival maps were used in the study:

- Charta Öfwer Situationen af Inloppet till Stettin Genom Swinesund (1672), Kriegsarchivet Stockholm
- Merian copperplate showing the mouth of the Świna river (1652)
- Plan von den Ausfluese der Swinein die Ostsee, Aufgenommen 1739
- Map of Świnoujście (1757), Kriegsarchivet Stockholm
- Der Hafen der Swuenemunde 1766 mit den Zeit 1739 Bauarbeiten (Burkhardt 1920)
- A project of the development of the Swuenemunde water-way. Bourder (1766)
- Map of Świnoujście 1829
- Map of the park with parts of the town of Witrich (1851)
- Messtischblatt, blatt 2051(Swuenemunde) (1936)
- Map 1:10 000 in the coordinate system of 1965 (upgraded 1981)

The above mentioned material was scanned and calibrated with the polynomial method of the 3rd degree to the contemporary coordinate system (Poland 1992, EPSG 2180). Then the shore line, forests and the built-up areas were digitized so that the displacement of the shore line and the surface of the town could be calculated.

Results

The first pieces of information regarding the existence of a settlement by the mouth of the Świna river date back to the 12th century. At that time there was a small fishing settlement there, a ferry and a customs house. Difficult hydrologic conditions hindering navigation caused that until the 18th century the settlement had not developed. One of the first cartographic works allowing to trace the course of the shore line and the development of the settlement in the region of the mouth of the Świna river is Merian copperplate of 1652. Among other things, it shows houses in a small settlement of Weste Swine. A similar state to that in the Merian copperplate is shown on the map of 1655 by the same author, on which to the north of Western Fort, not far from the shore, an elongated fragment of a shoal is marked protruding above the sea level, which most probably had become linked with the land up to the first half of the 18th century. Other sources of the 18th century indicate the growth of the port and the settlement.

The reason for the development of the settlement which later became a town of Świnoujście was a need, in a changing geopolitical situation, to ensure access to the sea for the Oder trade and to the Szczecin port. After the Great Northern War (1721), due to unfavourable hydrologic conditions and high customs duty, the mouth
of Sweden controlled Piana (Peene), became closed for shipping. Mouth of the Świna became other chance for open Oder trade route and one of the elements of the trade policy of Prussia. In 1729 the construction of permanent wharves as well as deepening of the river bed moving the main current eastwards started. Initial river engineering works did not result in the intended purpose, as the bank protections were damaged by northern storms and nearly half the amount of money alloted for the works had to be spent on repairing the damage.

After ten years, due to covering the river bed with sand, the project was changed and the current was directed westwards (Guenther 1842). The map of 1739 indicates, among other things, that in two places there are shallows (Joachims Fläche and Ost Fläche), which were later used for land development while new breakwaters were built. This was illustrated in Wallrave’s project of 1745.

After 1742, planned settling was started. It was linked with the first projects of the spatial layout of the town. The original baroque conception of the spatial system assumed creation of a town open on the port wharves and used a radial system of streets in the centre and rectangular quarters on its outskirts (Biranowska – Kurtz 2003). In 1755 the first stage of building the warves was completed (Bollwerk). The main expenditure was directed on development of the port and river engineering works, developing the municipal infrastructure in a smaller range. The inventory made in 1757 showed that out of a dozen or so projected municipal quarters, only 7 were completed. Up to 1776, on the left bank of the Świna river, a stony breakwater had been developed and reinforced along a stretch of 1170 metres. On its western side, groynes of different length made of stone and fascine were built, which filled with the mud of the deepened river bed constituted a support for the growing dunes. The plan placed by Burghardt (1920) shows, among other things, very fast growing dunes within the area of the built bank protections (fig.1).

Thus the period of the 18th century is the time of intensive changes in the Świnoujście shore line, the main

cause of which was engineering-earthen work (Biranowska-Kurtz, Kurtz, 2002). At that time the area of the “new land” which was being formed was planned to be planted with trees and bushes which reinforced the ground and additionally sheltered the town from the burdensome winds.
This area was described as “Western Plantage” and “Ostern Plantage”. The fertile area of Western Plantage was used by the inhabitants for cultivation of vegetables and potatoes and for grazing the pigs. The inventory of eastern plantations made in 1878 reports that it consisted of 54 ha of forests, 155 ha of bushes, 244 ha of meadows and above 100 ha of sandy dunes (Burkhardt 1920). For planting on the dunes pines, alders, bird cherries and rowan trees were used. According to Zöllner (1795) willow was also planted there, and as to the grasses, mainly lyme-grass was used.

At the end of the 18th century an area was marked out with paths and a circular square in the centre. Up to 1806 the area was enlarged with the terrain situated to the west and to the north, repeating the geometric rule of planning the paths and circular squares at points where they intersect. However, up to the second half of the 19th century the seaside areas were regarded as valueless for building and difficult for any economic use (Biranowska – Kurtz, Kurtz 2002).

At the beginning of the 19th century the spatial development of the town was still slow and was based on quarters marked out in the original plans. In 1806 out of 449 marked out plots, only 189 were built over (Burkhardt 1920). Ground floor buildings dominated and only in the region of the market square storied, brick/stone houses occurred. However, the role of the port was successively increasing. The wharves prepared for loading and unloading ships, were elongated, dock pilot service was introduced and appropriate nautical devices were built (buoys, beacons, look-out-towers) (Biranowska – Kurtz 2003).

In 1823, the next period of the development of the town connected with its spa function started. In that year the sea spa was brought into being and this resulted in successive conversion of the plantations into a resort park and in building a resort house in the north eastern part of the town. Considerable significance in forming the shore line had the construction of a western breakwater extended out to sea. Due to the fact that it intersected the western coastal current bringing sand, it affected the pace of its accumulation. The task of the breakwaters elongation in the years 1818-1823 (fig.2) narrowed the current of the Świna river and thus accelerated bringing the sand out of the river bed and to improve conditions of the navigation. Gädicke (1823) reports also fast process of shoreline change at this period due to sand accumulation on western side of breakwater.

Since 1848 the spatial character of the town has changed due to the decision to build a seaside fortress including 4 forts on both sides of the mouth of the Świna river and a series of auxiliary works: barracks, batteries, shooting ranges. The forts of the fortress were finally abandoned by the army at the end of the 20th century. At present they are revitalised and they broaden the tourist offer of the town.

The next stage of the growth of the town was intensive development of the port at the end of the 19th century and building a seaside district in the northern part of the former plantations. It took place in the years 1885-87 and was also linked with recreational back up facilities - the pier, the swimming pool complex, the amphitheatre and the seaside promenade. At that time the town was divided from the sea by a forest with a route crossing it along the shore. A natural dune belt of about 15 metres in width ran between the beach and the road (Łabuz 2005). Similar activities in the neighbouring with Świnoujście localities: Ahlbeck, Heringsdorf and Bansin, resulted in the creation of a unique spatial complex, the so-called Kaiser Resorts. The period at the turn of the centuries was the time of spatial expansion of the town which, in comparison with the first half of the 19th century, considerably increased its area (fig. 3). A permanent increase in the dune belt and solidification of its inland part created conditions for starting building in the newly formed area. This process has been continued in a controversial way up till now and the example...
of this activity is the Baltic Park complex of apartment buildings and facilities appearing in the area dunes. Another stage of development of the town falls at the end of the 20’s of the 20th century, and is linked, among other things, with the development of its military function. The development of the port, shipyard and barracks caused the growth in housing estates for military staff, situated in the western part of the town. Along with the outbreak of World War II, the resort part and adjacent areas were taken over and developed by the army. During the war the port and shipyards were still developed and in different parts of the town a series of concrete fortifications (batteries, shelters, warehouses) appeared. In March 1945, as a result of the allied carpet air raid, more than a half of the housing built-up area of the town and most of the port terrain were damaged. In the postwar period, up to 1958 the development of the town was hindered for political reasons. After the restrictions had been lifted, housing estates Chopin and Grunwaldzkie were built. In the 70. the sea port underwent successive development through the building of the Świnoport II complex. The recent years of the spatial development of the town have been linked first of all with the growth of a hotel and facilities base. A programme of revitalization of the seaside promenade and its representative buildings, forts and the resort park was undertaken, hotels and apartment buildings were developed. Possibilities of the transport infrastructure are still limited by inefficient ferry boat crossing, although there are some improvements, as for example, the railway has been linked with Germany. Discussions on the choice of replacement for the ferry crossing (tunnel or bridge), lasting from 30 years of the last century do not seem to be heading for a strong resolution. The latest project enriching functions of the town is the construction in the right-bank part of the town, of a gas port, strategic for the energetic sector of the state economy. At present in the area of the town a series of functional zones can be distinguished. The historic city center is part with a residential and services functions. Located there are housing estates with the typical postwar apartment buildings, historic downtown with built-up residential quarters and public buildings. This zone includes demilitarized barracks, post-military residential buildings and other former military buildings. Military function of the city underwent in recent years, hampered by the reduction of military units, reducing the role of the Navy, and the withdrawal of some units in the area of the city. Today, the only significant area of this function is the navy base area. Another characteristic area is the organized urban greenery between the historic city center and the waterfront district. Spa park has survived in an unchanged spatial arrangement since its launch. Parts adjacent to the banks of Świna are a seminatural wetland forest with a high proportion of alders, willows and poplars. In the area of West Fort surroundings, survived specimens of beech trees, which judging by the shape of the stems came from the fortress green and were originally formed as bush plantation. Spa park in recent years is subject to a comprehensive revitalization, by cut trees and shrubs bloom and regulation of hydrologic conditions. The most visible changes in the postwar period has been in a seaside district. The original buildings of this area has survived war in relatively good condition. Neglected stylish villas in recent years are also revitalized and, a number of stylized hotel complexes appeared in the neighborhood. Buildings of this type enters slowly, both in the belt of dunes and the area of the spa park, which generates a lot of conflicts.
Summary

The analysis of the spatial development of the town on the background of the carried out hydrotechnical work entirely confirms Biranowska – Kurtz’s hypothesis (2002, 2003) about artificial shaping of the shore line, the present course of which resulted from the engineering-earthen work that has been carried out for 200 years. Just the initial works at the beginning of this period resulted in an increase in the land surface by 12.4 ha up to the year 1766 (fig. 4, fig. 5). A decisive role in this process was played by successive development of the western breakwater along with the deepening of the water course.

Fig. 4. The expand rate of the land surface (ha) and the annual pace of the increase (ha/year) on the western side of the Świna river

Fig. 5. An approximate course of the shore line on the background of the present spatial range of the town
The quickest gain in the surface took place from the first half of the 18th century to the completion of the construction of both breakwaters (1823). In the period from 1766 to 1851 the surface increased by about 101 ha. After the breakwaters had been completed, a further increase was continued evenly along the new coast line due to the drifting of the sand by coastal currents. In the successive stages of the development up to the contemporary times the growth in the surface reached about 95 ha inclusively. As a result of this increase the shore line moved back about 200 m. Thus the town got a significant space for further development.

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