

## Touristic geoattractions of Polish Spas

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Polish landscape is very diversified: from sandy beaches of the Baltic coast and the Masurian and Pomeranian forested lakelands in the northern part of the country, lowlands and uplands stretching throughout the central part, to the Sudetes in

the southwest and Carpathians in the south-central and southeast. In all these regions numerous spas exist that are characterized by excellent natural conditions, i.e., mild local climate, mineral waters, therapeutic mud deposits in some spas, and picturesque landscapes. Medical services include the diagnosis and treatment of diseases and problems in the following fields: dermatology, endocrine, gastrology and urology, gynecology, heart, dysfunctions of motor organs, neurology and migraines, neuroses and stresses, obesity and diabetes, osteoporosis, respiratory and rheumatism, as wells as the post-operative rehabilitation or the rehabilitation needed after prolonged and serious diseases.

The medical treatment is particularly efficient and pleasant in a nice environment and under friendly microclimate conditions offered by the majority of spas with beautiful parks and surroundings. Excellent conditions are also provided for active recreation as for instance indoor swimming pools, biking and tourist routes. The actual details of treatments and facilities offered by particular spas can be found on the Internet under Polish Spas. General information can also be found in literature (e.g. Galczak et al., 1973; Kruczek & Weseli, 1987; Paczyński & Płochniewski, 1996).

The localizations of all Polish spas in relation to the geography of the country are shown in Fig. 1. As already mentioned, the following four different geographical and geological regions can be distinguished:

- Baltic coast with the landscape formed by Quaternary transgressions of continental glaciers with the following spas: Świnoujście, Kamień Pomorski, Kołobrzeg, Dąbki, Ustka and Sopot;
- Quaternary fluvio-glacial sediments of lowlands and uplands of central Poland, mainly underlain by Mesozoic formations supplying mineral waters, with the following spas: Połczyn, Gołdap, Augustów, Supraśl, Ciechocinek, Inowrocław, Wieniec, Konstancin-Jeziorna, Nałęczów and Krasnobród;
- Paleozoic crystalline rocks of the Sudetes and Triassic carbonates of the Sudetes foreland (monocline) in the southwest with the following spas: Czarniawa, Świeradów, Cieplice Śląskie, Szczawnica, Jedlina, Kudowa, Duszniki, Polanica, Długopole, Łądek and Przerzecznik;

□ the Carpathians and the Carpathian foredeep of the south and southeast with Ustroń, Rabka, Szczawnica, Piwniczna, Żegiestów, Muszyna, Złockie, Krynica, Wysowa, Wapienne, Iwonicz, Rymanów and Polańczyk situated in the area of the Carpathian flysch mountains and Goczałkowice, Swoszowice, Busko, Solec and Horyniec within the Carpathian foredeep, which is filled with Miocene marine sediments.

Medical treatment in spas was already popular in the ancient Greece and Rome (e.g. Baiae near Napoli, Aquincum, i.e. the present-day Budapest, and Helman in Egypt). First written information on the spa treatment in Poland appears in the 11<sup>th</sup>-century chronicles, whereas the thermal waters on the present territory of Poland (Cieplice Spa) were probably discovered in the 12<sup>th</sup> century. Mineral waters attracted special attention already in the 16<sup>th</sup> century; however, Krynica, Iwonicz and Swoszowice Spas became particularly popular at the end of the 18<sup>th</sup> century. During I and II World Wars, a number of spas were considerably or completely destroyed; the majority of them were rebuilt after the wars, and all of them modernized after the fall of the communistic system.

First law regulations on the spa status and their medical activities were introduced in 1922 and 1928. Nowadays, 45 localities are regarded by law as spas, with 46 000 beds in sanatoria and hospitals, and 80 000 beds in hotels and pensions. Selected spas are briefly presented below as examples of available geotouristic attractions.

In all Baltic coast spas saline waters and brines rich in bromide and iodine ions are commonly used for medical purposes together with therapeutical muds present in some areas. The saline waters and brines are unrelated to the marine Baltic water but to waters recharged over inland areas in distant geological periods under different climates. These waters are ascending at the Baltic coast to the near-surface rocks from greater depths under hydrostatic pressures created at higher elevations of the recharge areas. In most cases, they are exploited by shallow or deep wells, though among the numerous attractions of Kołobrzeg Spa, there are springs that discharge million-year-old brines.

Among the Baltic coast spas, Świnoujście is the oldest locality known since the 12<sup>th</sup> century; the spa was founded in 1824 with a special spa district built in 1885. The present-day town is located on two forested islands surrounded by the sea, Szczecin Bay and a river. Świnoujście Spa is characterized by the mildest marine climatic conditions in Poland, whereas the medical treatment is based on brines and saline waters. The spa park neighbors the Wolin National Park where unique plants and rare birds can be observed.

A settlement in Kołobrzeg was already known in the 8<sup>th</sup> century whereas town laws were granted in the 13<sup>th</sup> century. It is known that salt was produced there and traded as early as in the 9<sup>th</sup> century. The development of the spa began in 1830 when many patients were coming also from Sweden and Russia. Today, this town spa is well known of its therapeutical achievements, beautiful parks and beaches.

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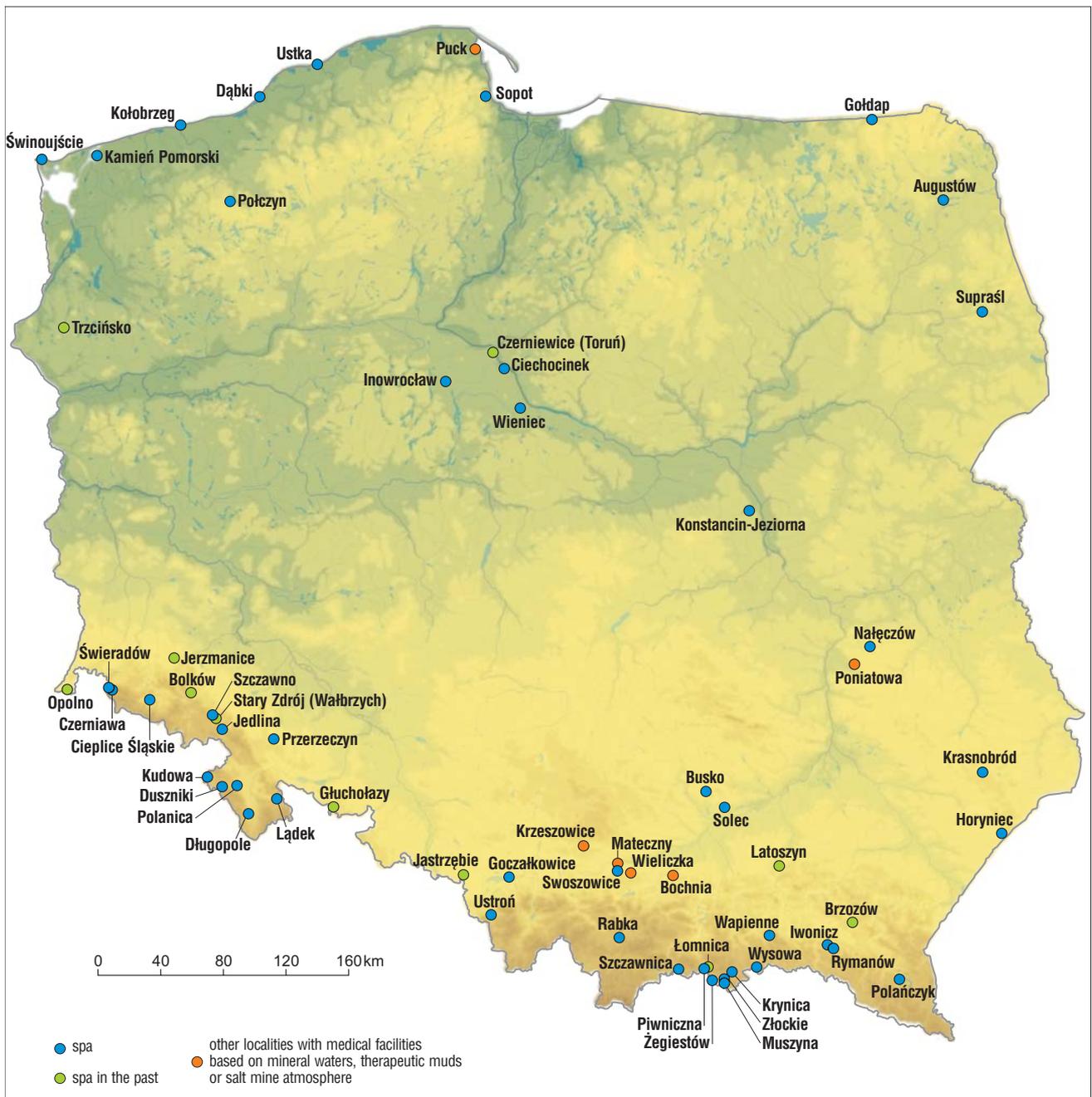


Fig. 1. Geographic map of Poland with spa localities; [http://pl.wikipedia.org/wiki/Grafika:Polska\\_hipsometria2.jpg](http://pl.wikipedia.org/wiki/Grafika:Polska_hipsometria2.jpg); [http://pl.wikipedia.org/wiki/Grafika:Polska\\_hydrografia2.jpg](http://pl.wikipedia.org/wiki/Grafika:Polska_hydrografia2.jpg)

According to historical chronicles, Sopot was already known in the 13<sup>th</sup> century. Its attractive position for both summer and winter sports is related to the ground terraces stretching from the hills of the Gdańsk Upland to the sea beaches. One of the touristic attractions is a 511.5-m-long pier built in 1827.

The spas of central Poland are characterized by very different climatic, landscape and therapeutical conditions and all are situated in forest areas. In Połczyn, Ciechocinek and Konstancin-Jeziorna, brines and saline waters similar to those at the Baltic coast are abstracted by deep wells. However, Połczyn is particularly attractive due to its abundant reserves of therapeutical muds and numerous lakes attractive for tourists. Wooden graduation towers in Ciechocinek and Konstancin-Jeziorna spa parks are used to

create marine-like microclimate, with the air significantly enriched in salt elements essential for therapeutical purposes and attractions for tourists. The graduation towers in Ciechocinek are 1 800 m long being the largest in Europe. They were built in 1828 and 1859, and represent an interesting technical monument (Fig. 2).

Nałęczów is a particularly picturesque spa with a nice park and a baroque palace (Fig. 3). The spa located in a river valley surrounded by forests with numerous ravines and loess slopes is characterized by mild climate. A tasteful mineral water is exploited from wells about 100 m deep. The water is of the  $\text{HCO}_3\text{-Ca-Mg}$  composition, moderately mineralized and was recharged in preindustrial era, i.e. it is free of any potential anthropogenic pollution. In the areas of other spas of central and eastern Poland, of importance

are the cleanest air and numerous lakes among wild forests. In the Augustów area, additionally to beautiful lakes, of a touristic interest are also the Rospuda River valley and a 100-km-long canal that connects the watersheds of the Vistula and Niemen Rivers.

The spas of the third group are based on thermal fluoride waters of low mineralization like in Cieplice and Łądek, radon and CO<sub>2</sub>-rich waters like in Świeradów and Czerniawa, and moderately mineralized CO<sub>2</sub>-rich waters in other spas. Cieplice Spa is situated in a valley among the Karkonosze Mts., Rudawy Janowickie Mts. in the southeast and Kaczawa Mts. in the northeast, all belonging to the mountain chain of the Sudetes. According to the archival chronicles, the thermal springs were known already in the 12<sup>th</sup> century and have been very popular in Europe since the 17<sup>th</sup> century. They discharge slightly mineralized fluoride waters from Carboniferous granites, which were mainly recharged during the last glacial period. Water abstracted from a deep well have a temperature of 44 °C.

Several beautiful spas with CO<sub>2</sub>-rich waters are situated on the slopes of the mountain chains surrounding the Kłodzko Valley. Waters of these spas discharge in springs (Fig. 4) or are exploited by wells (Fig. 5). Łądek Spa with thermal waters is an exception known since the 12<sup>th</sup> century. Its thermal fluoride waters of low mineralization (ca 100

mg/L) are discharged from metamorphic rocks by springs (Fig. 6) and abstracted from a deep well. These waters are recharged at high altitudes and due to a slow movement through tiny rock fractures are several thousand years old. Among famous persons medically treated in Łądek were Frederic the Second, the king of Prussia, Wolfgang Goethe, and Iwan Turgieniew. To numerous touristic attractions belong Góry Stołowe (Table Mts.), Jaskinia Niedźwiedzia (the Bear Cave) where a complete skeleton of an ice-age bear is preserved (Jahn et al., 1989), and an old mine where the gold was already exploited more than 1 000 years ago. The mine was contributing 8% to the European production of gold, and was finally closed down after the World War II, now open only for tourists.

Busko Spa belongs to the most important ones in the south-central Poland (Fig. 7). Its near-surface chloride waters with sulphides are more than 100 thousand years old and belong to the best medical waters of that type in Europe. Near the spa, there are interesting plant and rock sanctuaries, like that of steppe plants and a gorge in gypsum rocks. Around several tens kilometres to the north-east there is a museum and one of the largest in Europe Neolithic underground mine of flints (semi-precious quartz stones), which was discovered in 1922 (see Pieńkowski — page 629).



**Fig. 2.** Wooden graduation tower nr III in the Ciechocinek park (typical chemical composition of Ciechocinek brines in mg/L is as follows: Na — 22 700, Ca — 1990, Mg — 600, Cl — 40 070, SO<sub>4</sub> — 510, HCO<sub>3</sub> — 290, Br — 80, I — 3). Photo by A. Krawiec



**Fig. 3.** Sanatorium in Nałęczów (typical chemical composition in mg/L is as follows: K — 2, Ca — 128, Mg — 25, Fe — 12, Cl — 32, SO<sub>4</sub> — 14, HCO<sub>3</sub> — 480, H<sub>2</sub>SiO<sub>3</sub> — 36). Photo by J. Sołowski



**Fig. 4.** Śniadecki Spring in the Kudowa Spa (chemical composition in mg/L is as follows: Na — 490, Ca — 205, Mg — 58, Fe — 10, Cl — 85, SO<sub>4</sub> — 220, HCO<sub>3</sub> — 1 920, H<sub>2</sub>SiO<sub>3</sub> — 52, CO<sub>2</sub> — 2240). Photo by J. Chowaniec



**Fig. 5.** Pieniawa Chopina well in the Duszniki Spa (chemical composition in mg/L is as follows: Na — 150, K — 90, Ca — 230, Mg — 63, Fe — 13, Cl — 11, SO<sub>4</sub> — 52, HCO<sub>3</sub> — 1500, H<sub>2</sub>SiO<sub>3</sub> — 58, CO<sub>2</sub> — 1900)

Mineral waters rich in CO<sub>2</sub>, calcium and magnesium commonly occur in a number of spas situated in the Polish flysch Carpathians, especially along the Poprad River valley. Krynica (Fig. 8) is the largest and the most famous spa known since the 16<sup>th</sup> century, with numerous springs discharging waters mineralized up to about 6 g/L. More



**Fig. 6.** Maria Skłodowska-Curie Spring in the Łądek Spa (typical chemical composition of Łądek mineral waters in mg/L is as follows: Na — 42, Ca — 5, Cl — 6, SO<sub>4</sub> — 18, HCO<sub>3</sub> — 42, CO<sub>3</sub> — 12, F — 9, H<sub>2</sub>SiO<sub>3</sub> — 27, H<sub>2</sub>S — 2)



**Fig. 7.** Entrance to the oldest spa sanatorium in the Busko Spa (typical chemical composition in mg/L is as follows: Na — 2700, K — 68, Ca — 208, Mg — 165, Cl — 3970, SO<sub>4</sub> — 1165, HCO<sub>3</sub> — 507, Br — 3, I — 1, H<sub>2</sub>S — 25). Figs. 5, 6, 7 photo by J. Chowaniec



**Fig. 8.** Stary Dom Zdrojowy (Old Sanatorium) in the Krynica Spa (chemical composition of the Main Spring in mg/L is as follows: Na — 86, K — 8, Ca — 585, Mg — 72, Fe — 10, Cl — 9, SO<sub>4</sub> — 33, HCO<sub>3</sub> — 2376, H<sub>2</sub>SiO<sub>3</sub> — 69, CO<sub>2</sub> — 2880). Photo by M. Tomasiak



**Fig. 11.** Belkotka (Bubble Spring) with excessive methane in the Rymanów Spa. Figs. 10, 11 photo by J. Chowaniec



**Fig. 9.** Stary Dom Zdrojowy (Old Sanatorium) in the Wysowa Spa (chemical composition of the Anna Spring in mg/L is as follows: Na — 3150, K — 65, Ca — 134, Mg — 35, Fe — 17, Cl — 1560, SO<sub>4</sub> — 7, HCO<sub>3</sub> — 6443, H<sub>2</sub>SiO<sub>3</sub> — 7, HBO<sub>2</sub> — 316, CO<sub>2</sub> — 2360). Photo by A. Felter



**Fig. 10.** Józef Spring in the Iwonicz Spa

mineralized waters of meteoric origin, and some of them with a relict component, are abstracted by a number of wells up to 600 m deep. The peaks of two mountains in Krynica Spa are accessible by cable cars. Chloride CO<sub>2</sub>-rich waters occur in some spas, like Szczawnica which neighbors the Pieniny National Park, where rafting through the Dunajec Gorge and a walk to the Homole Gorge belong to famous touristic attractions (see Krobicki & Golonka — page 670). Similar mineral waters occur in Wysowa (Fig. 9). There are also spas with mixtures of meteoric waters with ascending from great depth saline waters of flysch rocks (Rabka), or with brines from basement rocks of the Carpathian flysch, which are abstracted by deep wells (Ustroń).

Iwonicz and Rymanów with chloride CO<sub>2</sub>-rich waters related to oil fields belong to the most beautiful and most important spas in southeast Poland (Figs. 10, 11).

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