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Environmental History Research Project (EHRP) Prof. Dr. Satoshi Murayama Kagawa University Saiwai-machi 1-1, Takamatsu, Kagawa 760-8522 JAPAN

Reservoirs and Ponds in South Bohemia

Josef Grulich
University of South Bohemia
The Czech Republic
&
Pavel Matlas
Státní Oblastní Archiv v Třeboni
The Czech Republic

The beginnings of fishpond cultivation in south Bohemia

The first references to artificial ponds in south Bohemia date back to the tenth and eleventh centuries. Typically, such ponds were constructed by damming a stream; their purpose was that of a water reservoir. Only in the thirteenth century did ponds begin to be used for fish farming. Establishing fishponds was first undertaken by monasteries, later by monarchs and nobles. Fish farming in this period was unprofitable, since medieval water reservoirs were filled up with fish of different ages, which as a result did not get enough food.

Fishpond cultivation and fish farming at the beginning of the early modern period

At the beginning of the early modern period, the setting up of fishponds was strongly motivated by the idea of huge financial gains. The establishment of a pond was usually preceded by taking careful measurements of both the water surface and the adjacent dike. On the base of the planned pond, it was important that there should be no turf or topsoil, so as to prevent water from soaking in. A trench was dug across the base of the future pond, laid with pipes to secure the inflow and outflow of water. The dike in which the drainage outlet was built was made from alternate layers of hard-packed stone and soil.

Originally, two-stage fish farming was practised, based on the following principles. First, small ponds were filled up with culture fish, which were supposed to reproduce there. New-born fish lived there for a maximum of two years, whereupon they were moved to larger water reservoirs, where they matured and were ultimately fished out over the course of two or three years. Methods of fish farming began to improve with the growing demand for fish as human food, which comprised a significant component of the menu during the Lent fasting period.

Jan Dubravius (1486-1553) promoted the practice of three-stage carp farming in his treatise "On Ponds". It was based on a principle of setting up three types of pond. Shallow ponds of "the first class", moderate in size, were to be used to grow fish in their first and second years of life. Subsequently, carp were to be moved to medium-sized ponds of "the second class". Three-year old carp were then put into the large main ponds of "the third class", where they could live for a further two to three years. Only carp, which were five or more years old, were to be fished out for the purpose of sale. This three-stage approach to fish farming continued to be practiced – with small modifications – up to the beginning of the twentieth century.

Fishpond regions in south Bohemia in the first half of the sixteenth century

The end of the Middle Ages and beginning of the early modern period saw the development of two large fishpond regions in Bohemia. One of them arose in Central Polabí. At its heart lay the estate of Pardubice, where – on the suggestion of the nobleman Vilém of Pernštejn – a network of ponds connected by three artificial canals was built, beginning in 1490. The golden age of Bohemian fishpond cultivation reached its peak in the middle of the sixteenth century, when the Pernštejn aristocratic family had as many as 230 ponds on its estate.

The flat landscape of the Lužnice river basin became the second, and most important, centre of fishpond cultivation in south Bohemia. The estate of Třeboň boasted pine woods, peat bogs, heather moors, brooks and small rivers. This waterlogged soil was not suitable for agricultural uses, so a system of artificial water reservoirs – ponds – was progressively constructed on it.

The first period in the development of fishpond cultivation in Třeboň is linked with the work of the fish-master Štěpánek Netolický (1460-1539), who designed a unique canal system. This canal system was fed with water from the Lužnice River, and interconnected a whole system of fishponds. The canal made it possible to regulate the water level in the ponds and at the same time to protect the area from floods. The so-called Zlatá Stoka (Golden Canal), which was 45 km in length, was at that time the longest artificial water canal in central Europe. Štěpánek Netolický not only designed new ponds, but also strengthened and heightened those water reservoirs that had been established earlier.

The golden age of south Bohemian fishpond cultivation

South Bohemian fishpond cultivation was at its prime in the 1570's. Its peak was closely related to the establishment of new ponds on the Rožmberk estate of Třeboň. The construction of these ponds was entrusted to Jakub Krčín of Jelčany (1535-1604), who built much larger ponds than his predecessors. Štěpánek Netolický based his work on the teaching of Jan Dubravius, who recommended that the dike of a fishpond should be built with a base-to-height ratio of 3:1. Jakub Krčín, by contrast, favoured a much more massive base of the dike in comparison with its height, with an approximate proportion of 5:1. The diagonal arm of the dike was directed toward the surface of the water. This ensured that the water pressure was distributed over a larger surface area, which reduced its force effect.

Jakub Krčín constructed ponds that were very large and deep. But they were not very

suitable for fish farming, because carp prefer shallow and warm waters. Whereas the first hauls brought "very good and fatty carp", the following years witnessed a gradual decrease in fish catches from his ponds. The nutrients from flooded areas were exhausted, while the deepness and low temperatures of the ponds was disadvantageous for carp. After 1584, Jakub Krčín of Jelčany was put in charge of constructing the monumental pond of Rožmberk. He designed a 2,430-metre long dike, planted with oaks, with a base 51 metres in width. The pond area was almost 1,060 hectares (it is about 490 hectares today), making it one of the largest waterworks in central Europe.

People and ponds

When it came to constructing new ponds, the hardest labour was performed by people who were not settled in villages – migrating groups of pond-makers. The core of these groups consisted of men capable of the physically demanding work of building dikes. Such groups were occasionally joined by wandering craftsmen and shepherds. However, these groups were also open to people from the fringes of early modern society – criminals, bandits and arsonists, who benefited from the anonymity of the pond-makers' groups.

The ordinary operation of the ponds was undertaken of by servants, paid by the manor. Water bailiffs (fish-masters), together with fishpond clerks, pond-keepers and a few assistants, monitored the condition of the dikes and the cleanliness of the water pipes. At the same time, the water bailiff looked after fish reproduction and supervised the fish stock in the main ponds. The water bailiff also attended to the selection, purchase and repairs of fishing equipment and its storage in winter. Assisted by the commissioner of the estate, the water bailiff decided on the dates and the order of fishpond clearances. The water bailiff's duties also included the summering of the ponds, ice cutting in winter, and cutting reeds on the banks. Water bailiffs were obliged to watch over empty ponds, where oats and other grains were grown – villagers let their cattle graze there. Craftsmen, particularly carpenters, stone-cutters and locksmiths, were summoned by the water bailiff to see to the necessary repairs of dikes, drainage outlets, bridges, bulwarks, and stews. Both pond-keepers and water bailiffs were armed with weapons since they had to watch out for human poachers as well as animal predators such as storks, king-fishers, eagles, beavers and otters.

On the dike of the fishing pond

Fish which lived to be five or six years old were caught for the purpose of sale. Most clearances of large south Bohemian ponds during the second half of the sixteenth century took place in autumn – between the middle of September and the beginning of November. Dealers bought a significant proportion of the fish – especially carp – directly on the dike of the fishpond. A smaller proportion – mostly pike – was transferred into storage basins on the estate, from which manorial needs were supplied and the remaining fish were sold. More than one-third of the fish raised were exported to foreign markets in nearby towns in Upper and Lower Austria.

The unfortunate consequences of the Thirty Years' War

The Thirty Years' War (1618-1648) brought extraordinary losses of human life and prop-

erty in Bohemia. Soldiers destroyed pond facilities and emptied ponds to provide themselves with fish. In such cases of intentional "dike failure", there was little money or manpower for repairs; damaged ponds consequently lay dry for lengthy periods, and more often than not became overgrown with weed. With the country controlled by the mercenary armies of the two opposing parties, circumstances were unfavourable for buying and selling fish. South Bohemian ponds remained empty or were only partially stocked with fish. The reasons for this lay not only in the depression of economic activity, but also in scarcity of fish stock. The overall expanse of fishponds in the Czech lands, which had amounted to 180,000 hectares at the end of the sixteenth century, decreased by one third (to 120,000 hectares) by the beginning of the Thirty Years' War.

The post-war reconstruction in the region of Třeboň

After the Thirty Years' War, property ownership changed in south Bohemia. Czech nobles who had participated actively in the Revolt of the Bohemian Estates against the Habsburgs were replaced with loyal foreign aristocratic families in the employ of the monarch. In 1660, the estate of Třeboň was obtained by Jan Adolf of Schwarzenberg, whose aim was to increase the profitability of local manorial operations. The period of his reign is symbolized by the reconstruction of most of the fishponds, canals and other technical facilities. At the same time, the Třeboň storage ponds were extended. Although most of the ponds destroyed or damaged by war had been reconstructed by the end of the seventeenth century, fishpond cultivation in the region of Třeboň remained in confusion and uncertainty.

Most south Bohemian estates lacked trained fish farmers, who were able to use traditional procedures in their practice. The low profits of fish farming were typically justified in terms of poor quality of fingerlings or fish stocks. Transport of carp and their wintering resulted in large losses, which were decimated by human poachers as well as animals (such as pike). The improved fish stock was aimed at preventing high fish mortality; however, this effect did not materialize and the number of stunted fish in the catches soared. No consistent drainage and summering (temporary drying) was undertaken prior to re-stocking ponds with fish, which meant that conditions were inadequate for ensuring sufficient food for the fish.

South Bohemian ponds in the eighteenth century

During the first half of the eighteenth century, most south Bohemian fish ponds were fry ponds (36% of the total), with the remaining consisting of clearance ponds (35%) and trout ponds (18.5%). Most ponds were in the possession of the aristocracy, towns and monasteries. It was extremely rare for the enserfed rural population to have fishponds at their disposal. In south Bohemia, ponds were most plentiful on the estates of Třeboň (42%) and Hluboká nad Vltavou (24%), which were owned by the Schwarzenbergs. The existence of these ponds was threatened during the first Silesian War (1740-1742), when direct hostilities took place in south Bohemia. Enemy armies (French and Bavarian) emptied the ponds to stop the advance of the Emperor's army. Soldiers of both enemy armies poached on south Bohemian ponds. Numerous damages to fish farming were also caused by natural disasters, particularly floods due to unusually frequent spells of rainfall (1771-1772). All in all, fishpond output stagnated during the eighteenth century in south Bohemia.

The abolition of fishponds at the beginning of the nineteenth century

Significant economic changes took place during the 1820's and 1830's in Bohemia, and one of the consequences was that owners of estates dried out their fishponds. The agrarian reforms of Joseph II, which were undertaken between 1780 and 1790, resulted in the abolition of a number of monasteries, which had been major purchasers of fish for consumption on religious fasting days. The lower price of imported sea fish also contributed to the abolition of south Bohemian fishponds, but only to a small extent. Instead, it was rising agricultural prices which increased the profitability of soil cultivation relative to fish-farming. Grain prices rose in connection with the growth in population. Napoleon's Continental System, announced in 1806, cut off imports of cane sugar, which encouraged the domestic production of sugar beets in Bohemia. These agricultural developments made it more profitable to farm the soil than to raise fish. Accordingly, almost one half of all fishponds in south Bohemia were closed down.

Aristocratic estates in the second half of the nineteenth century

The abolition of serfdom in Bohemia in 1848 meant that landlords no longer had a supply of labour that was free of charge or had to work for them at below-market wages. At the same time, the end of serfdom called for a change in existing farming methods on aristocratic estates. New labour supplies had to be found, and this – together with indirect costs – caused agricultural prices to rise. The latter half of the nineteenth century saw a continued move away from traditional fishpond cultivation in south Bohemia, as landowners sought to expand agricultural production. Although the soil in south Bohemia is by no means fertile, there was an increasing emphasis on expanding grain production.

The aristocratic estates now had to rely on their own agricultural output to be profitable, and the new labour shortage led landowners to implement ill-considered savings. In locations where fishponds had been abolished, work on draining facilities ceased. Meadows that were established on the same spot as former fishponds turned out to be flooded when snow melted or when there was heavy rain. The whole network of canals that had been constructed was meant to draw water away, but its technical condition deteriorated because landowners were trying to save money, with the result that the canal facilities became non-functional. Arable farming on the places where fishponds had formerly lain could be successful only if fish farming and fallowing (i.e. regular drying and sowing by crops) alternated.

Personalities of south Bohemian fishpond cultivation in the modern era

Despite these developments, the relative infertility of the soil in the Třeboň basin contributed to the preservation of quite a few ponds, which – despite the low price of fish – proved to be more useful than setting up fields, meadows, pastures or woods on the bottoms of the former ponds. Two directors of the local Schwarzenberg estate helped to enhance the importance of fishpond cultivation in the region of Třeboň during the latter half of the nineteenth century – Václav Horák and Josef Šusta.

Václav Horák (1815-1900) was one of the most important figures in the development of south Bohemian fishpond cultivation. He emphasized frequent summering, pond im-

provement, proper regulation of the fish stock, extension of clearance ponds, and renewal and construction of artificial water reservoirs. He was one of the first fish-masters to recognize the significance of artificial feeding of fish.

His successor, Josef Šusta (1835-1914), undertook a complete reorganization of fishpond cultivation in the region of Třeboň. In his opinion, fishpond profits could be increased through basing cultivation on research into the anatomy and nourishment of fish. He concluded that carp were carnivores and fed on minute microscopic organisms. Šusta's observations concerning carp anatomy, feeding, successful breeding, and possibilities for artificial feeding and pond cultivation were published in his treatise Carp Feeding with the subtitle New Fundamentals of Fish Breeding.

We must not brush aside Josef Šusta's efforts to improve the existing system of ponds. A new conception of the construction of water reservoirs was devised during the period that Josef Šusta held his office. This plan was based on the presumption that individual ponds did not have to be too deep, since for carp only one part of the pond was suitable – where the water column reached a depth of at most 1 to 1.5 metres. It was exactly at this place that the temperature was optimal for both the carp and its food. With regard to the ponds that had been projected by Jakub Krčín of Jelčany, Šusta decided to lower their water level. Between 1879 and 1898, when he was in charge of the estate of Třeboň, Šusta had 36 new ponds built, with 413 hectares of water surface. He also carried out experiments with a host of exotic fish imported with the assistance of German fisherman's clubs.

The modern development of south Bohemian fishpond cultivation

It was not until the end of the nineteenth century that demand for fish was brought into balance with output. Prices of fish increased, fishponds became profitable again, and therefore some abandoned water reservoirs were restored. The newly built Bohemian railway network – consisting of both main and local rail lines – opened up more distant markets to south Bohemian landowners. Although fishponds could not compete with the other branches of production on a large landowner's estate, they remained a stable source of financial income. To be utilized most effectively, ponds were left fallow every third year and their bottoms were sown with oats. Breeding of carp for consumption was initially carried out through methods of natural feeding – artificial feeding was introduced only at the turn of the nineteenth into the twentieth century. The artificial feed consisted of a mixture of herbs and meat comprising lupine, rye, maze, draff (brewing residue), or Liebig meat powder – powder from fish meat or carrion.

The birth of Czechoslovakia and the State Fishery (1918)

Hungary-Austria broke apart on 28 November 1918 and the independent nation of Czechoslovakia came into existence. So-called state forests and estates began to be cultivated on nationalized royal and aristocratic property, including pond farms. The origin of the State Fishery was made possible by the nationalization of one-quarter of all water expanses, consisting of 12,328 hectares of water surface, between Czechoslovak independence and the outbreak of World War II (1938). However, a number of ponds remained in the possession of towns and private persons.

Fishpond cultivation in the region of Třeboň during the interwar period

In 1928, the State Management of Ponds located in Třeboň reported an annual catch of 600 tons of carp, 10 tons of pike, 10 tons of pikeperch, 15 tons of tench, and 10 tons of other consumable fish. The financial results for 1928 implied that the cultivation of the 10,852 hectares of fishponds was profitable, showing a balanced annual income. During the interwar period, the fish yield per hectare showed a rising trend. Whereas in 1928 the yield amounted to 69.9 kg/ha, in 1930 it was 86.3 kg/ha. The local fish market was dominated by carp, whose catch rose as high as 91-95% of overall fish output. Regular fertilization of ponds and artificial feeding of fish was introduced in 1924. In addition to blue and yellow lupine, various cereals (rye in particular) were fed to the carp. In the 1920's and 1930's, fertilizers included lime, superphosphate, potassium salt, and soil manure. At the same time, attention was paid to traditional methods, such as summering and sowing of ponds. The bottoms of ponds were sown with oats, barley, spring wheat, or peas and vetch for "green fertilizing". In the 1930's, veterinary considerations were the focus of attention in local fish farming. To increase fish sales, a promotion campaign was undertaken, which in 1936 initiated the registered trade mark "Třeboň Carp".

The German occupation (1939-1945)

The promising upward trend in Czech fishpond farming in the interwar period was disrupted by the occupation of Czechoslovakia (1939-1945) during World War II. A number of ponds were taken over by Germany as a consequence of annexation of Czechoslovakian border regions in 1938. At the same time, ponds owned by Jewish inhabitants were expropriated. Then, in 1942, a special state committee focussing on fish breeding was established at the Ministry of Agriculture.

The Czechoslovak coup d'état and the nationalization of all fishponds

The communist coup in 1948 brought about a new economic and organizational structure for Czech fishpond cultivation. Nationalization of all water surfaces resulted in the establishment of a number of centrally controlled state-owned fisheries, whose task was to mechanize fishpond cultivation – for instance, through the modernization of drainage pond outlets. Regularly, "central pond clearance and storage of fish" took place in storage ponds. Every year, fish were artificially fed with barley and rye. Simultaneously, methods of pond clearance were improved: nets were laid on the fishing ground, which put an end to the physically demanding work of drawing the nets. Fish were transported from the fishing ground to a sorting machine and mechanical scales, which in turn did away with the difficulties of transporting fish to the dike using baskets or cloths. The sorted fish were stored in large water containers on trucks, which transported them to storage ponds.

Fish production soared thanks to fertilization of ponds with organic and mineral fertilizers, which brought about an improvement and concentration in fish stocks. Between 1949 and 1979, fish cultivation expanded by a factor of 3. Fish output increased from 312 kg per hectare in 1980 to 412 in 1987. At the same time, the state fishery focused on the production of livestock ducks, geese and broilers. Carp remained the main export fish, followed by tench, maraena and trout. The largest share of fish exports were sent to West Germany, Austria, France, Italy and Belgium. In 1987, whereas 2,040 tons of fish

were exported to west European countries, only 440 tons of fish were transported to east European states.

The privatization of the State Fishery after the "Velvet Revolution" in 1989

The south Bohemian fishery underwent fundamental changes in the "post-November" period, during which its complete privatization took place. The first half of the 1990's saw the establishment of a number of private companies which specialized in fish farming and sale of fish. The coupon privatization which took place in the Czech Republic led to the gradual foundation of large joint-stock companies. Then restitution claims were filed and enabled the foundation of companies which continued in business where their predecessors had been forced to stop after the communist coup of 1948. Completely new fisheries also arose in the 1990's. At the beginning of the decade, the State Fishery was broken up into small production units, but after ten years' time this development reversed as large companies took over their weaker competitors. At present, the number of buyers and consumers of fish appears to be remaining stable, so Czech fisheries are not interested in increasing annual production of fish, but instead in improving fish quality and widening their product range.

On the basis of the Czech Privatization Act, the Třeboň State Fishery was transformed into the Třeboň Fishery, a joint-stock company, one of the largest and most important fish producers in the Czech Republic and indeed the European Union. The company cares for a water surface of 7,440 hectares of ponds. Its annual production fluctuates between 2,700 and 2,900 tons of fish, out of which 92% consists of carp and the remaining 8% of other species such as tench, pikeperch, pike, amur, bighead carp, and bass. The joint-stock company has a fish nursery and storage basins; it also operates fishing districts for sport fishing. In addition, the company fattens broilers, and hatches and rears flappers. The sale of live freshwater fish is carried out through FISH MARKET, a joint-stock company. Approximately 75% of its total fish production is exported to European countries – Germany, Slovakia, Serbia, Austria, France, Italy, Hungary and Poland. The remaining 25% stays in the country and is typically bought in the pre-Christmas period. The daughter company FISH FOOD processes freshwater fish and sells fish products in Czech and European markets.

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