

Maria Anna Szumiec, Danuta Augustyn

CLIMATE AND PONDS SINCE THE MIDDLE AGES

Abstract: The increasing demand for fish began in the Middle Ages caused by a religious rule of fish consumption during period of fasting. Introduction of the carp culture increased profits and promoted the development of the great fishpond centres in the southern and western parts of Poland where hydrologic, climatic and geological conditions were suitable for fishpond management. Changes in the pond surface area and carp production since centuries permit the drawing of some conclusions concerning the long-time humidity and thermal variations in the above region.

Key words: pond management, carp production, climate variability.

1. Introduction

In southern and western Poland the development of great landowners' fishpond management and peasants' small fish farms occurred at the end of the Middle Ages (Nyrek 1966; Szczygielski 1967). In this region the soil, climate, and the dense river net as well as the vast area of wetlands were suitable for pond fish culture. Ponds were constructed as the response to the overexploitation of fish stock in rivers along with an increasing demand for fish during frequent and restrictive fasts. They also helped to control frequent floods in the second half of the 16th century, which resulted from deforestation of the country, caused by the surface mining, increasing population and pastoral farming (Nyrek 1992). The development of great fishpond centres followed the introduction of carp culture in the 15th century, increasing the income from ponds. The vicinity of the capital, the city of Cracow, also played an important role. The king's court and increasing number of citizens stimulated the high demand for fish. Fish delivery was facilitated by the transport along the Vistula River.

In 15th and 16th centuries the development of fish farming was associated with the warming of the climate (Zubek 1979), while the decline of fish culture and the

reduction of the area of ponds occurred during the Little Ice Age with a maximum in the middle of the 17th century (Semkowicz 1923; Zubek 1979; Brázdil et al. 1996). The aim of the paper is to confirm changes in the thermal and hydrological conditions in the Upper Silesia, applying the results of the management of carp production.

2. Study Area and Methods

Ponds of the Upper Silesia are supplied by water from the Vistula and Odra rivers and their tributaries. The sources of the two rivers lie in the Silesia Beskid Mountain Range, a part of Western Carpathians (Fig.1).



Fig. 1. Map of the present territory of Poland with Upper Silesia indicated.

Changes in pond surface area and carp production from the 15th to 19th century are discussed on the basis of the economical history of Upper Silesia and of the neighbouring territories. A tendency to the variation in air temperature from the end of the 17th to the beginning of the 19th century was evaluated on the basis of the yield of four- and five-year-old carp in the Pszczyna principality, using the exact registration of the fish farming. The number of the caught table carp is proportional to the number of stocked juveniles. The quantification of the effect of water temperature on carp survival during the first stages of its development (Szumiec et al.

unpublished) permitted the evaluation of thermal conditions in the period mentioned above.

3. Results and Discussion

In the southern and western region of Poland large fish farms were already noted in 13th century. An increase in the number of ponds, however, occurred during the 14th and 15th centuries, the development of pond management and in this number of modern carp farming occurred at the end of the 15th and in the 16th century (Szczygielski 1967). This is documented by the high income from the pond fish culture, reaching 50% of the entire income of the Oświęcim principality (Rybarski 1931). In the second half of the 16th century numerous floods forced the construction of large ponds along the rivers, thus increasing the retention of waters and protecting people from the floods. These ponds were built by landowners, disposing in serfs and enough

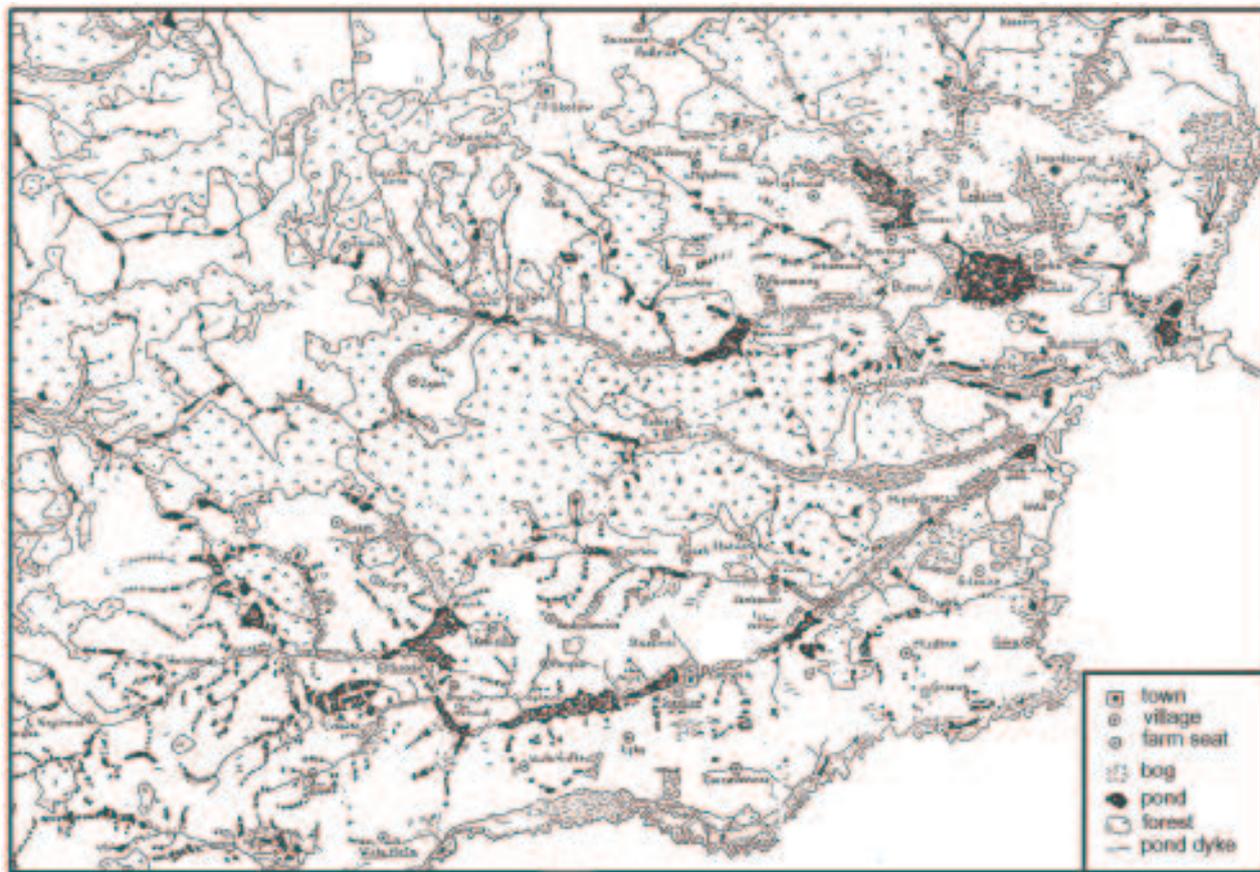


Fig. 2. Map of the Pszczyzna principality in the second half of the 17th century elaborated by Schlenger and Janiak (according to Nyrek, Wiatrowski 1961).

funds to hire professional builders. Small farmers' ponds were chiefly built using natural wet depressions, dried during longer periods of drought. In such ponds fish stocks were reared using labour-consuming methods, and sold to commercial fish farms (Nyrek 1992). Owing to the crisis in fish pond farming in the first half of the 17th century in Upper Silesia, the number of ponds was reduced by 60% at the turn of the 18th century and by further 10-15% early in the 19th century. Schlenger's map from the second half of the 18th century shows numerous ponds in the area of the Pszczyna principality and numerous dykes remained after the ponds were drained (Fig. 2). The reduced numbers and area of ponds are usually attributed to the decreasing level of ground waters and to the decline of pond farming. Nevertheless, they might have been also induced by the drought (Inglot 1968) or the meteorological water deficiency occurring for longer periods. The results of current studies suggest that in the discussed region this type of threat appears when the total precipitation is below 500 mm in the season of carp rearing i.e. from May to September (Fig. 3).

The decline of pond farming in the first half of the 17th century is among other factors attributed to devastation brought about by the Thirty-Year-War (1618-1648) and the war between Poland and Sweden (Cracow was occupied in 1655). This was the period of unfavourable changes in social and economical conditions. Also the production of cereals was more profitable at that time (Nyrek, Wiatrowski 1961; Nyrek 1966; Szczygielski 1967). The declining trend in the pond management of the Pszczyna

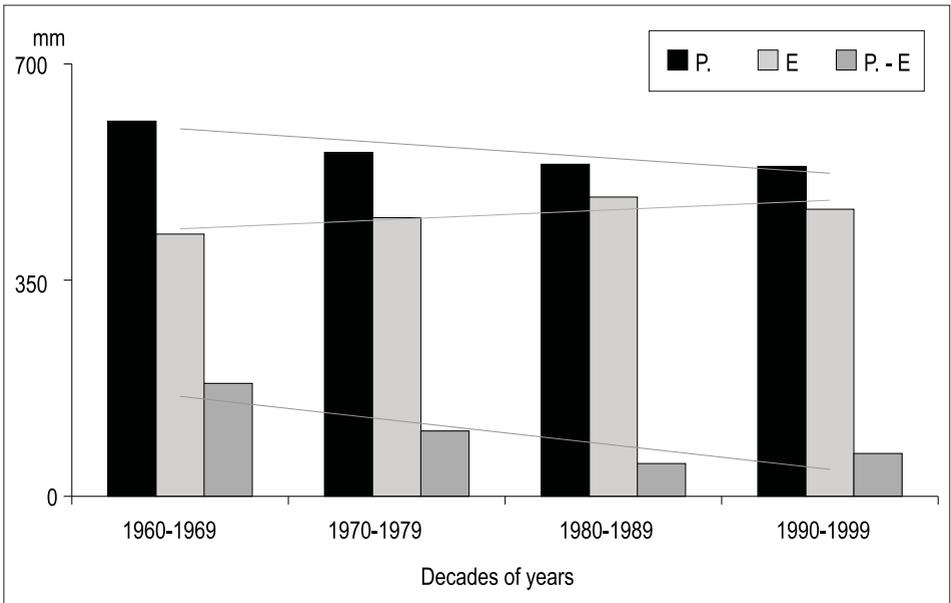


Fig. 3. P - precipitation, E - water evaporated from the pond surface, (P-E) - meteorological balance at the Gólysz Institute in the last 40 years.

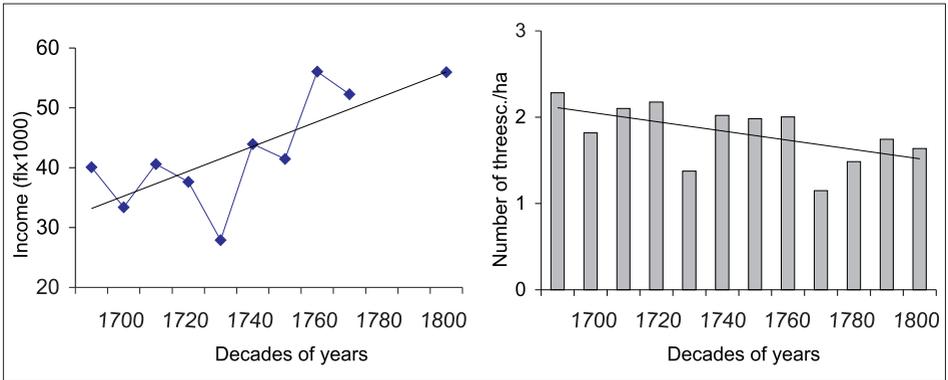


Fig. 4. 10-year-average number of carp three-scores fished from ponds of the Pszczyna principality, the income from fish sell in florens and their tendency.

principality is shown by the decreasing numbers of fish stocks from 10514 three-scores in 1536 to 9653 in the entire period of 1691-1700. Though the crisis in pond farming might also have been effected by the climate cooling which began towards the end of the 16th century (Semkowicz 1932; Zubek 1979; Nyrek 1992). In the area of the Pszczyna principality the yield of carp expressed by the numbers of caught fish was characterised by a decreasing tendency from the end of the 17th to the beginning of the 19th century (Fig. 4). This shows the lack of sufficient quantities of the fish stock, thus the occurrence of unfavourable thermal conditions, since the survival of the juvenile carp is highly limited by the warm days fish larvae development (Fig. 5). The decreasing numbers of caught carp were accompanied by the increasing profits from the sale of fish (Fig. 4). Thus it may be suggest that not the demand for fish but their deficiency indicate the intensification of unfavourable thermal conditions in this region in the period of late 17th to the early 19th centuries.

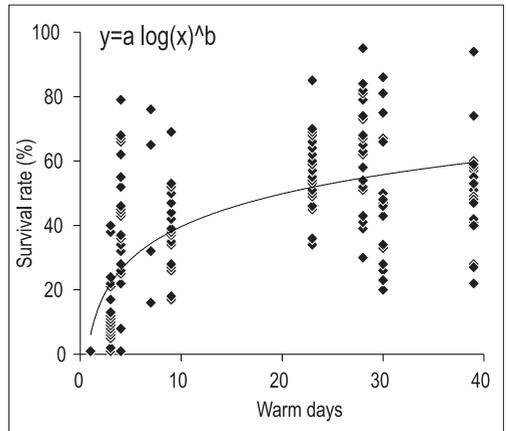


Fig. 5. Survival rate of the carp juvenile forms vs the number of warm days between stocking the ponds and the first temperature decrease from above 20° to about 14°C (Szumiec et al. unpublished).

4. Conclusions

A decrease in the number of small fishponds and the diminishing production of the carp may indicate:

- the negative meteorological water balance during the greatest part of the 18th century,
- the maintenance or even the intensification of unfavourable thermal conditions due to the occurrence of the Little Ice Age in late 16th to the first half of the 18th century.

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