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DEVELOPMENT AND STRUCTURE OF THE GOCZAŁKOWICE RESERVOIR ECOSYSTEM I. INTRODUCTION

ABSTRACT: The paper presents the scientific objectives of the Hydrobiological Station at Goczałkowice and a short history of the studies of the Goczałkowice reservoir.
KEY WORDS: Reservoir, ecosystem, study aim, history of studies.

In the early 50's, on taking the decision to build a dam reservoir on the Vistula at Goczałkowice that would supply water to the Upper-Silesian Industrial Region, The Ministry of Municipal Economy commissioned comprehensive, large-scope investigations to be carried out in the area of the future reservoir to establish the soil, biological and sanitary relations which would affect the quality of its water. Simultaneously, experts were asked to answer the following questions: (1) What will the water in the Goczałkowice reservoir be like in the first year following its flooding? (2) Will it be possible to use the reservoir immediately? (3) When will it be best to start supplying water to the waterworks?

Unfortunately, at that time no investigations of this type were being carried out in Poland. The above questions were answered mainly on the basis of relevant German and Russian literature and sketchy Polish studies carried out on dam reservoirs on the Dunajec river at Rożnów and on the Brynica river at Kozłowa Góra. Prof. Karol Starmach and Prof. Eugeniusz Zaczyński realized that the answer could not be based solely on data from the literature. They thought it was necessary to undertake detailed

studies which ought to be both long-term, and as comprehensive as possible if they were to explain the processes of development and establishment of hydrobiological relations in the Goczałkowice reservoir. Such studies would give a real picture of changes in the aquatic environment that would in future provide a theoretical and practical foundation for dam reservoir water supply management (S t a r m a c h 1957a, Z a c z y ń s k i 1958a).

It become possible to meet requirements when on the initiative of Prof. K. Starmach a hydrobiological unit came into being at Goczałkowice, on the 1 February 1955. In January 1958 it was taken over, as the Hydrobiological Station, by the Laboratory of Water Biology, Polish Academy of Sciences (Figs. 1, 2). Prof. K. Starmach also worked out a long-term research project for the Station. The principal aim of this research was: to provide scientific foundations for a rational water-supply utilization of the reservoir, and guidelines for the preparation of the building of further reservoirs of analogous type. The research plan of the Station included: chemistry of the water and underwater soil, water microbiology, plankton, periphyton, benthos, development of aquatic macrophytes, appearance of algae, algal overgrowing of technical constructions, bottom sediment deposition, effect of water-table variation on the inshore vegetation, control of suspension input, thorough hydrometeorological observations, periodic hydrobiological investigations of the catchment area, hydrobiology of the reservoir, occurrence of mosquitoes in bordering areas and the elaboration of algal culture methods in connection with the expected water blooms.

Fig. 1. Hydrobiological Station at Goczałkowice (Photo by E. Krzyżanek)

Fig. 2. Prof. Karol Starmach (first from left) and Prof. Kazimierz Matusiak (fifth from left) surrounded by Station staff (Photo by E. Krzyżanek)

Fig. 3. The village of Zarzecze before the reservoir was built

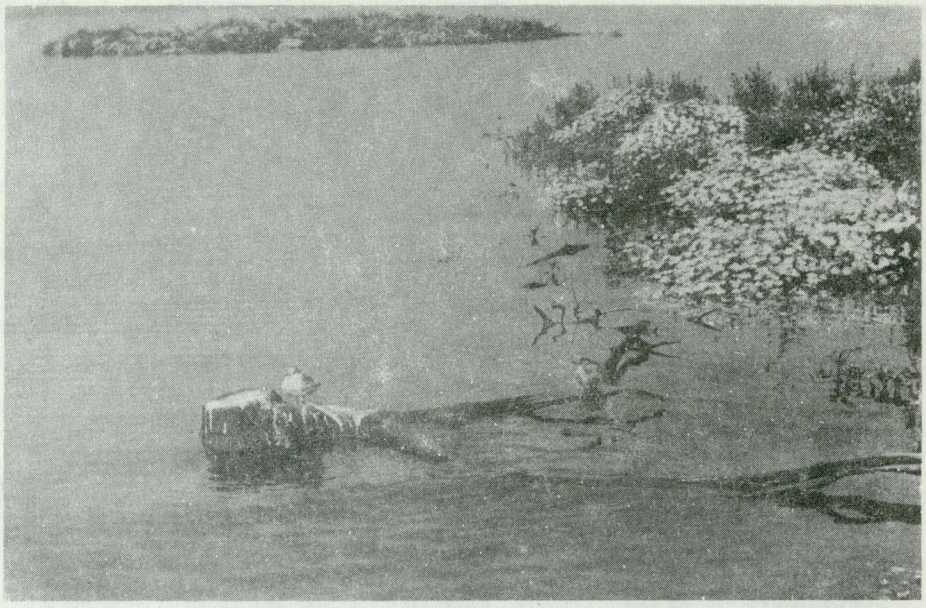

Fig. 4. Part of the reservoir where the former village of Zarzecze was (Photo by E. Krzyżanek)

Hydrobiological studies were carried out in the Goczałkowice dam reservoir in two stages:

(1) In the years 1953, 1954 comprehensive hydrobiological investigations were carried out in the catchment area of the future reservoir, on the Vistula and its tributaries and in small water bodies (ditches, canals, ponds) found in the area of the future reservoir. The results of those studies were summarized by S t a r m a c h (1957b), and some data were presented in the papers by P a l u c h et al. (1957), D o m a ń s k a (1958), J a g i e l s k i (1958).

(2) In 1955, after the filling of the reservoir with water (Figs. 3, 4), systematic hydrobiological studies were started. They have been continued to date. As a result, numerous publications have appeared. There has not, however, been a paper that would summarize all the studies. The only work to have appeared in print is a complete documentation concerning the first two years of existence of the reservoir (S t a r m a c h and Z a c z y ń s k i 1957, Z a c z y ń s k i 1958b), and a paper trying to give a general description of the reservoir mainly on the basis of hydrochemical, and partly faunistic investigations (W r ó b e l 1975).

The present series of papers is the first trial of the presentation all the studies carried out in the Goczałkowice reservoir from its coming into being until the end of 1982. An attempt has been made to present the process of biocoenose formation and plant and animal succession in this water body against changes in the environment. Attention has also been given to the distribution of biocoenoses in the particular areas of the reservoir, and to the effect of hydrobiological and meteorological conditions on their

development. Complete lists of plants and animals inhabiting this water body have been presented.

During the 28-year period systematic studies were carried out concerned with: phytoplankton (Anna Rumek, D.Sc., Jerzy Strzelecki, M.Sc., Łucja Krzeczkowska-Wołoszyn, D.Sc., Jan Cierniak, M.Sc., Grażyna Pająk, M.Sc.); zooplankton (Alicja Mleczko, M.Sc., Edward Marczak, M. Sc., Anna Rumek, D. Sc., Krystyna Kysela, M. Sc., Wojciech Krzanowski, M.Sc.); zoobenthos (Antoni Kysela, M.Sc., Krystyna Zaćwilichowska, D.Sc., Edward Krzyżanek, D.Sc.); macrophytes (Janina Cwiertnia, M.Sc., Tadeusz Kuflikowski, D.Sc.), and in recent years also with hydrochemistry (Henryk Kasza, D.Sc.).

Simultaneously, seasonal biological studies were carried out by the staff of: the Laboratory of Water Biology, Polish Academy of Sciences, Cracow (Prof. Stanisław Wróbel, D.Sc., Prof. Kazimierz Pasternak, D.Sc., Maria Bombówna, D.Sc. – hydrochemistry, Halina Bucka, D.Sc. – algology, Elżbieta Kwiatkowska-Grabacka, D.Sc., – microbenthos); Institute of Botany, Polish Academy of Sciences, Cracow (Prof. Jadwiga Siemińska, D.Sc., Ass. Prof. Teresa Mrozińska-Webb, D.Sc. – algology); Institute of Zoology, Polish Academy of Sciences, Cracow (Ass. Prof. Zygmunt Bocheński, D.Sc. – avifauna); Chair of Sanitation Technology, Silesian Technical University, Gliwice (Prof. Jan Paluch, D.Sc. and others); Laboratory for Water-Supply and Sewerage Research, Institute of Municipal Economy, Gliwice (Ass. Prof. Z. Mazur, D.Sc., J. Szulicka, D.Sc. and others), and occasionally by research workers of other institutions.

There were also extensive ichthyological studies (Zbigniew Wajdowicz, D.Sc., Władysław Kołder, D.Sc., Maria Klimczyk-Janikowska, D.Sc., Stanisław Skóra, M.Sc., Tadeusz Suskiewicz, M.Sc., and recently Prof. Janusz Starmach, D.Sc. with a group), concerned with both the development of ichthyofauna in the reservoir and the description of individual fish species.

Hydrobiological and hydrochemical data of the Regional Water Supply and Sewerage Enterprise at Goczałkowice, and the farming fishing results of the Fish Farm at Łąka have been used. For reasons beyond the control of the authors it has not been possible to present the microbiological studies. Certain results from floristic and faunistic investigations, not hydrobiological in nature, have only been taken into account in the species lists. The studies were carried out partly under the research project of the Laboratory of Water Biology, included in the problems: "Biocoenosis formation and development of an environment in dam reservoirs", "Freshwater ecosystem productivity". After the introduction of a project-financing system in 1969, studies at Goczałkowice were continued in the years 1969 – 1975 under project 09.1.7. "Causes and effects of dam reservoir eutrophication", in the years 1976 – 1980 under project MR II/15.02.02 "Routes of nutrient cycling in watercourses and dam reservoirs, and ecological indices of changes due to industrial and agricultural pressure", and since 1981 under project MR II/15.03.01.01. "Complex investigation into the functioning of selected ecosystems of the upper Vistula and its Carpathian tributaries and dam reservoirs, including water purity".

A detailed history of the studies can be found in a separate publication (K r z y ż a n e k 1979).

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