DANUBE DELTA. ECONOMIC RESOURCES

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Abstract: *The Danube Delta, with an area of 430,000 ha, is one of the largest in the world – i.e. ranking the 22nd in the world and the 3rd in Europe. Since 1980, the Danube Delta has been a Biosphere Reserve, and, in 1990, the Romanian government declared it the Danube Delta Biosphere Reserve. From the very beginning, for Romania, the Danube Delta was an important economic resource; fish, pasture, wood, reed and, in recent years, tourism represent the main economic resources of the Danube Delta. In the second half of the 50's (twentieth century), the Romanian Government decided to use reed as raw material for papermaking; thus, the Delta was organized according to this purpose. There were also created special machines and equipment for harvesting and transporting reed. Because the reed proved to be an expensive raw material, after 10 years, this activity was waived. In the following period, agriculture received greater attention. The compartments designed in order to grow reed would be drained and converted into farms on surfaces exceeding 200,000 ha. However, only an area of about 30,000 ha was drained, where agriculture and especially businesses are still practiced nowadays. Currently, it is attempted to harmonize the various activities and resources of the Danube Delta: fisheries, agriculture, forestry and, of course, tourism. Activities are conducted for the further systematization of the territory and localities, in order to improve the living standard of Delta inhabitants.*

Keywords: agriculture, the Danube Delta, reed culture, reserve, tourism.

1.INTRODUCTION

As a physical geographical unit, the Danube Delta represents the area between the three arms through which the Danube flows into the Black Sea, i.e. Chilia, Sulina and St. Gheorghe. The area of over 430 thousand hectares places it among the largest deltas of the planet, i.e. the 22nd in the world and 3rd in Europe, and, with the lagoons complex Razelm-Sinoe, it is one of the largest wetlands.

As an ecological resource, the Danube Delta is important both in terms of stretch (51.0% of Tulcea County and 27.9% of Dobrogea region) and of the richness, variety and specificity of its resources. The work *Danube Delta Reed Monograph* [1] presents a distribution of Delta land uses in the 60s, as follows: pisciculture - 323,100 ha; reed crop and pisciculture - 213,900 ha; agriculture - 62,300 ha;

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forestry - 18,800 ha; land within the built-up area, dam-bank areas and coastal belt - 17,800 ha.

In administrative terms, the Danube Delta belongs to Tulcea County, situated in Dobrogea, the South East Development Region no. 2. A significant historical milestone is represented by the 17th of October 1957, when the last collective farm was established in Chilia Veche, in the Danube Delta, ending thus the collectivization campaign in Dobrogea [2].

2. MATHERIAL AND METHOD

The material used in this paper is bibliographical and it represents a synthesis of several works published by different authors, from the 2nd half of the twentieth century to the present. In our perspective, this communication can raise the scientific community's interest, both at national and international levels. Currently, the Danube Delta is important both in terms of the variety and richness of its resources but also as a study topic, being one of the largest wetlands in Europe and worldwide.

3. REZULTS AND DISCUSSION

3.1 The reed crop. In the Danube Delta, the reed grows naturally, almost on the entire surface (except levees and water surface), i.e. almost 300 thousand ha. In the past, the reed was harvested in relatively small amounts, i.e. 10 to 15 thousand tons annually, and it was used more in home economics or as raw material for reed plates (about 60%). The reed problem had concerned the authorities for about 15 years (1950-1965), the exploitation of this (more or less agricultural) natural resource being the main economic activity in the Danube Delta, and the extent, intensity and means of action were one among the most barbaric human intervention in a space that would become *the Danube Delta Biosphere Reserve*, part of the world cultural heritage, under UNESCO protection.

The exploitation of reed in the Danube Delta started in the second half of the 50s, after the Congress VII of the Romanian Communist Party had set the task to develop the cellulose and paper industry, particularly by using the reed in the Danube Delta. At that time, there were already some studies and even experiments on reed biology, estimated production, harvesting technology, storage and transport to the processing industry.

The industrial reed production grew rapidly, from 6,500 t in 1956 to almost 60,000 t in 1959-1960; 110,000 t in 1960-1961 and 226,000 t in 1964-1965. The end of the industrial exploitation of reed took place in the period 1965-1970, when the whole activity was abandoned due to high operating and transport costs.

However, embankments, dams, locks, artwork, and rusty components of the famous machinery systems, which became museum pieces, remained (Photo 1).

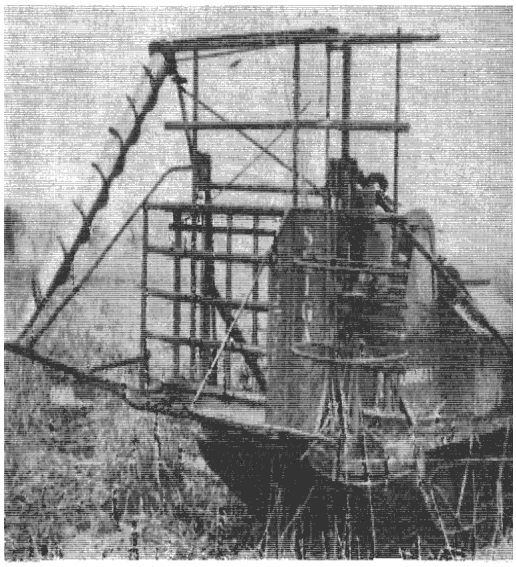

Photo 1. Equipment for reed harvest (4).

3.2. <u>The Danube Delta and agriculture.</u>

Agricultural activities have accompanied fishing since ancient times, because many levees were primarily rich in pastures, which allowed the growth of a large number of animals, sheep, pigs, and cattle, some even in a semi-wild regime. In higher areas, the delta inhabitants cultivated cereals and food plants. In 1965, the agriculture in the Danube Delta occupied an area of 62,300 ha [4].

However, during the command economy period, after the reed bankruptcy, the Delta's agricultural vocation was rediscovered; among others, it would play a priority role in the Delta economy, becoming the ultimate source for the increase in arable land, which was one of the agricultural obsessions of the totalitarian regime. For this purpose, the former dammed areas used in reed production were just right to become polders for intensive agriculture. Some of these areas were to be drained, the reed was to be removed and then they would be equipped for irrigation.

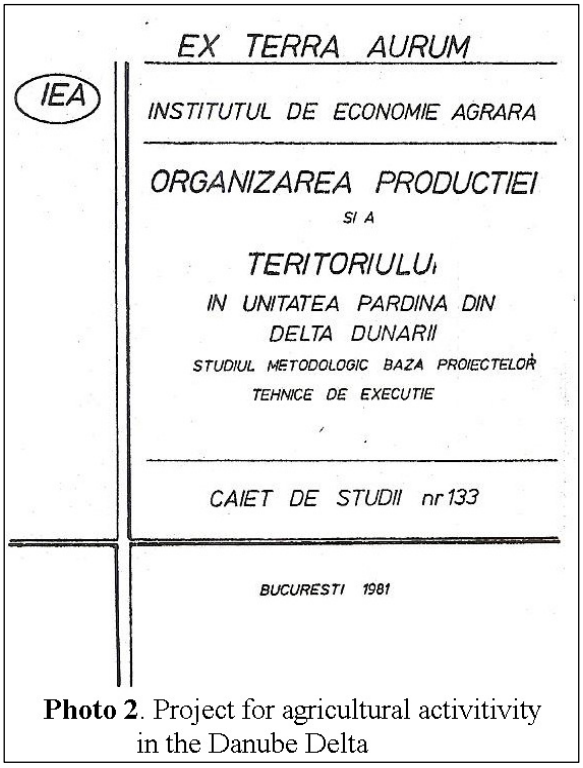

Photo 2. Project for agricultural activitivity in the Danube Delta

The drained premises would become large state farms, producing grain, industrial crops, but also growing livestock: cattle and sheep. No less than 218 300 ha were scheduled to enter the agricultural circuit, of which over 50% were already dammed.

The first and ultimately the only drained area was Pardina, with 28,970 ha. In 1980-1981, a multidisciplinary team of researchers from the Institute of Agricultural Economics, the Academy of Agricultural Sciences and Forestry, drafted the project for the organization of Pardina as an agricultural state enterprise. The author of this paper participated in this project. A final version of the structure for agricultural use in the planned economy era was the *Program for the full equipping and operation of the Danube Delta*, developed by ISPIF, in 1982, and approved by the State Council Decree no. 92/1983; the agricultural area would increase to 144,000 ha, of which 94,000 would be equipped for irrigation and 50,000 hectares would represent improved natural pastures. The number of animals was to reach 20 thousand cattle, 350 thousand sheep, 120 thousand pigs and 350 thousand birds.

After 1989, at the inaugural Conference of the Danube Delta Biosphere Reserve [5], the report of the conference on agriculture mentioned: agricultural land in the reserve - 62,000 ha, of which 53,000 ha in the polders; 4,800 ha of private agricultural land and 19,500 ha of communal pastures. In the Delta, there were also 19,000 cows, 6,000 sheep and 45,000 pigs.

3.3. Pisciculture. The evolution of the fish yield in the Danube Delta took a course similar to that at the national level. In 1960, the catch represented about 3,000 t; in 1988, it reached a peak of almost 92,000 t, while in 2010 the yield fell to 15,184 t (Figure 1).

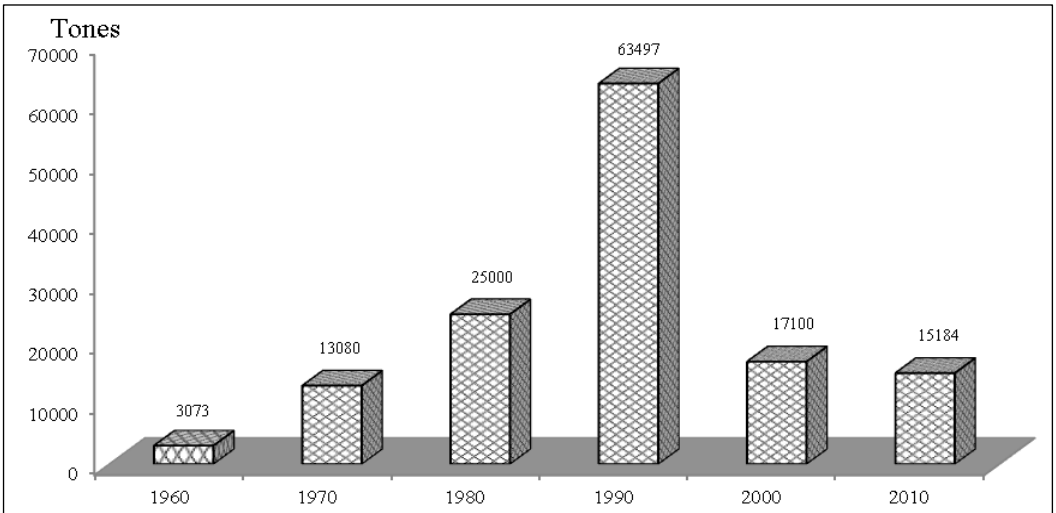

Figure 1. The evolution of the fish yield in Romania 1960-2010

In the Danube Delta, the fish yield increased from 5,400 t annually in the period 1947-1956 (yield of 16.3 kg/ha) to 14,000 t by 1990, decreasing to about 5,500 t in 1992 [5].

The report presented at the inaugural Conference of 1993 on the *Management Programmed of the Danube Delta Biosphere Reserve* [5] mentioned some figures on the evolution of the fish yield in fish farms from the Danube Delta, which, at that time, had an area of about 36,000 ha. Here also the annual quantity of the fish caught was reduced from 9,000 t to 3,710 t in only five years.

More concrete data are shown in the graph in Figure 2 [6]. From a yield valued at 8,000 t in 1973, it reached 1,600 – 1,700 t in 1993. These data were provided by the statistics of industrial fishing in the Danube Delta Biosphere Reserve. It is noted that the structure of catches reflects only a part of the fish fauna within the delta, the commercial catches respectively, i.e. about 25% of the species existing in the reserve.

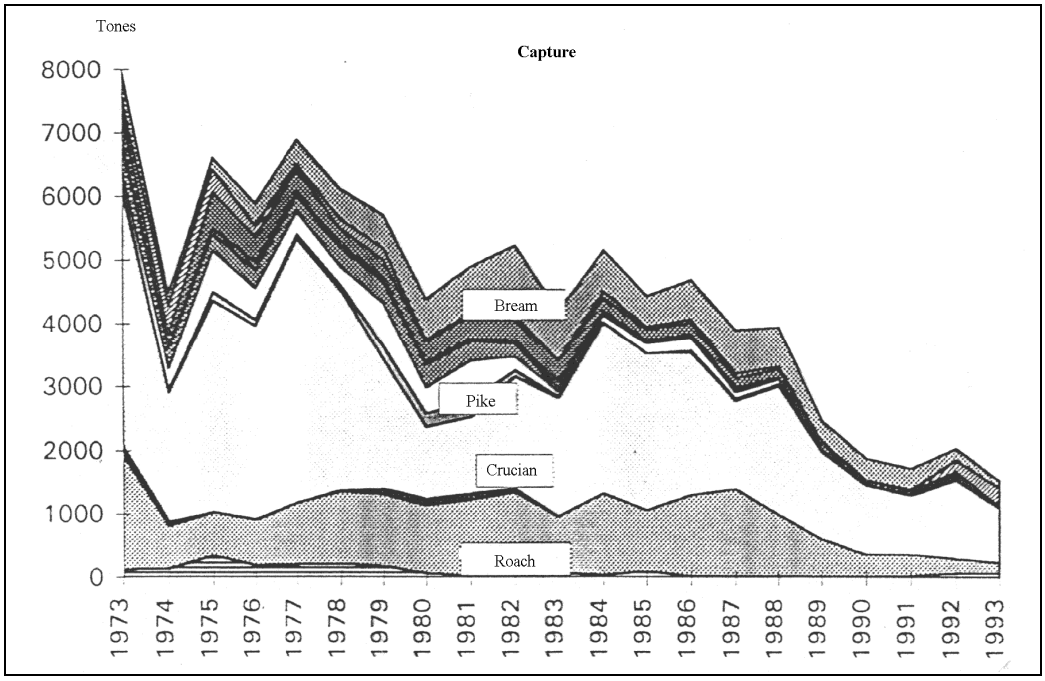

Figure 2. Evolution of the fish yield per total species, in the Danube Delta, during 1973-1993

Figure 3 shows the evolution of the structure of the main species. The largest share is held by less valuable species, such as the crucian, whose share is growing; species such as the bream or the roach are shrinking. Instead, more valuable species, such as the pike, the perch and the tench, almost disappeared. As far as the sturgeon species are concerned, they no longer appear in the structure. An assessment of the sturgeon yield in the Romanian Danube River and Delta, made by the researchers from the Delta Institute, approximates 250 t/year during 1951-1955, about 50 t/ year during 1981-1985 and only 20 t/year after 1990.

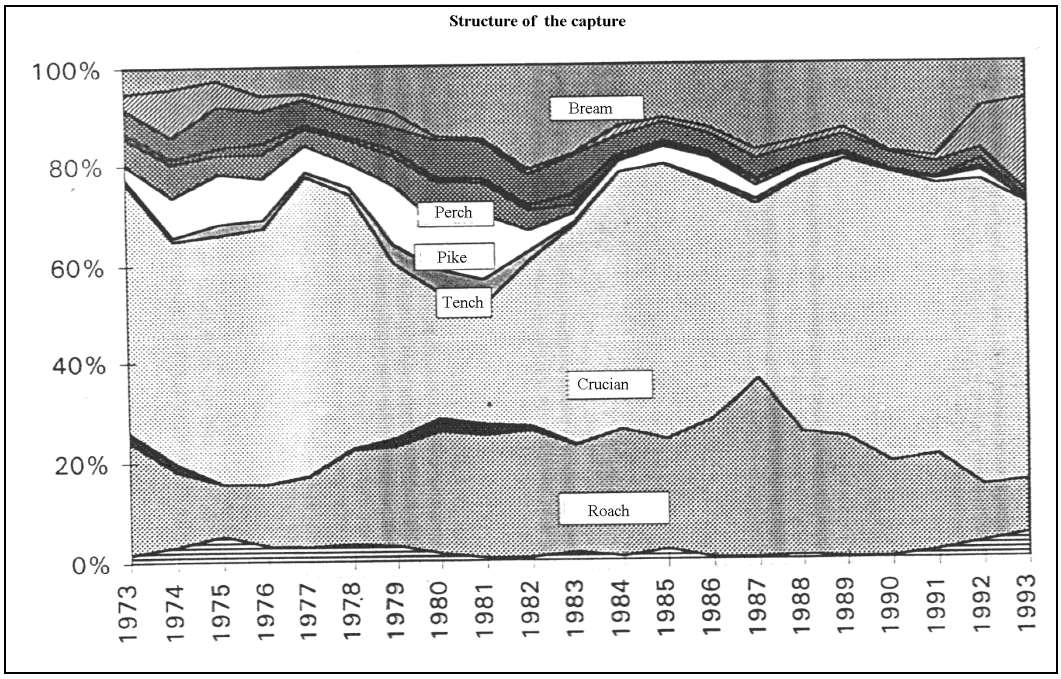

Figure 3. The evolution of the main fish species in Romania, during 1973-1993

All the figures presented to the media and the statistics are approximate. The reasons for the lack of confidence in the official statistics of the fish catch in the Danube Delta are explained by the researchers at the Delta Institute.

Until 1990-1992, the main source of error was represented by the assessment of self-consumption quantities. The emergence of private trade alongside the state sector created a black market valued at 2500-2600 t/year [7].

The black market prices were five times higher than those of state companies. In 1996, for example, the value of the fish sold on the black market was estimated at 50 billion lei, while the fishermen's risks were

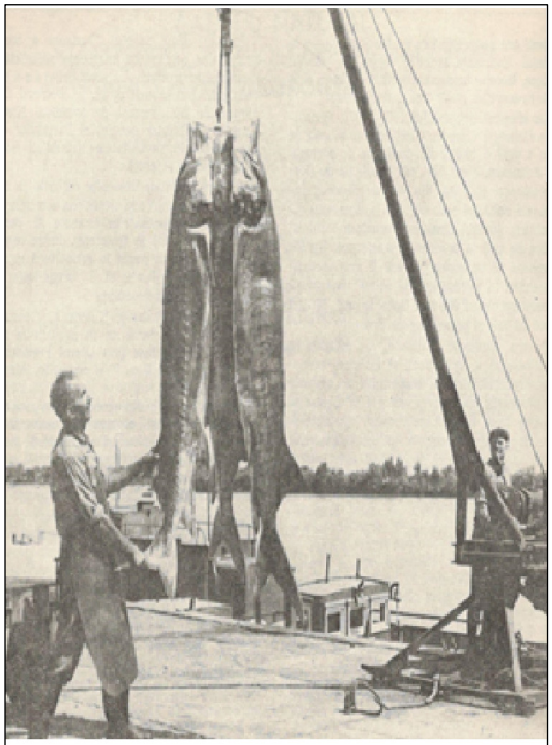

Photo 3. The fishery a great riches of the Danube Delta

minimal or nonexistent.

The number of the tools used by fishermen is also much higher than the one received from trade companies: around 1.7 times in pots, 3.3 times in fishing nets, 2.9 times in seines [7]. The catch structure is also distorted, i.e. the valuable species representing 20-25% of the catch are not mentioned in statistics.

Aquaculture or farmed fish. In the Danube Delta, the first fish farms were established in 1961 on an area of 560 ha. This area grew to over 30,000 ha in 1974, to 36,000-39,000 ha in the early 90s and to 49,000-50,000 around the 2000s.

If the agricultural development programs – in terms of area – were met, the pisciculture farm development remains an open subject due to the poor results obtained in terms of productivity. The yield in fish farms is between 100-200 kg/ ha, while the yield of the carp under natural conditions exceeds 700 kg/ ha.

3.4. Other economic resources of the Danube Delta. The fish, the reed, the plant and the animal agricultural products, the exploitable wood are natural resources of the Delta, even if each is accompanied by human impact – i.e. specific technologies that can increase their value and profitability. It is obvious that this impact must have certain limits in order to ensure sustainability, which, essentially, consists in short term operation, in order to achieve a natural balance – i.e. the preservation of the environment useful to the human being and of the environment as a whole, as a condition necessary to the survival of the human species.

Forest and wood. In the structure of delta utilities, forestry, with its remaining 6,642 ha of the 23,000 ha existing in the early 90s, is a priceless ecological wealth. An area of 5,104 ha (the Letea Forest – 3,644 ha; the Caraorman Forest – 893 ha and the Erenciuc Forest – 567 ha) represents nature reserves, classified as *natural monuments, nature reserves, ancient forests of special value* [7].

Delta fauna. It includes 75 fish species (including sturgeon), 280 bird species – some of them classified as natural monuments –, mammals – from boars to ermines and reptiles.

CONCLUSIONS

(1) The Danube Delta, with an area of 430 hectares, is one of the largest in Europe and in the world, with the status of Biosphere Reserve; it is one of Romania's greatest riches; unfortunately, it is neglected or poorly managed.

(2) In time, instead of harmonizing and using the multitude of riches (some extremely rare or unique), priority was given to only one of the resources that

could be exploited economically: fish, reed, agricultural production, neglecting the most valuable ones, i.e. the rich fauna and flora.

(3) The fish – the dominant resource of an aquatic environment – was exploited intensively, uncontrollably, until depletion, reaching the ridiculous yield of 10-20 kg/ ha and the disappearance or depletion of valuable species (official statistics confirm the evolution of the phenomenon).

(4) Reed was another resource whose exploitation subdivided the Delta by dikes and equipped it with unique equipment, entailing huge investments; however, after 10 years, the business was abandoned, but not before destroying the biological basis of reed regeneration.

(5) Agriculture is practiced on an area of about 60,000 ha in various forms: intensive, organic, traditional-primitive for the subsistence of its inhabitants. For many Romanian and foreign investors, agriculture remains a profitable business, not without a negative impact on the biosphere reserve status.

(6) The attempts of the Danube Delta Institute to restore the natural environment of the Delta are hindered even nowadays by the refusal of the government protectors of the great agricultural domestic and foreign barons from the Danube Valley.

(7) At present, instead of using it under the world Biosphere Reserve status, the Delta is the heaven of all kinds of greedy investors, who want to make profit and to get rich overnight, who see the delta as the last entertainment field.

R E F E R E N C E S

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