

Institution for the provision of amateur and sport fishing in Ukraine

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Abstract. Amateur and sports fishing, as a new, promising type of tourism in Ukraine, as well as legislative and promising acts of its regulation and management were studied. The development of «green» tourism is one of the most relevant, at the present time, in Ukraine. For many developed countries of the world, the development of the recreational industry is one of the main sources of income for the state budget. Recreational fishing and fishing tourism are popular and highly profitable industries in the field of tourism and entertainment services. The most popular fishing tourism countries are Great Britain, Panama, Turkey, USA, Venezuela, Mexico, Australia, Finland, Norway. In the US, for one dollar spent in recreational fishing, the average income is about 17 dollars. The recreational industry can become such for Ukraine, which has all the prerequisites for its development. Ukraine has a unique natural resource potential for effective recreational fishing. The contribution of scientists of the Dnipropetrovsk Hydrobiological School of technologically transformed freshwater ecosystems to the study of the processes of formation and development of amateur (recreational) fishing in Ukraine is emphasized. These studies fit well into the global trends of scientific interest in the rapid growth of the popularity of "green" tourism (in particular, water activities, fishing tourism, recreational fishing).

1 Introduction

Modern tourism is one of the most powerful branches of the world economy and the development of regions, which is second only to the oil industry in its dynamics and income. In many countries and regions of the world, tourism is a significant source of income and job creation. Ukraine is a unique complex of natural, historical, and cultural monuments, which was formed thanks to a successful geographical location, significant tourist and recreational potential and a developed network of transport connections, and has all the objective prerequisites to take its rightful place among the leading countries in the development of the tourism industry in the world. The development of «green» tourism is one of the most

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relevant, at the present time, in Ukraine. Amateur (recreational) fishing occupies one of the leading places among outdoor activities.

2 Assessment of the state of amateur and sport fishing in the world.

Starting from the 70s of the XX century there is a rapid development of amateur fishing in the world. On average, 17 species of freshwater fish are the object of fishing interest in the continental reservoirs of Europe (from 4 species – Iceland, to 21 species – Serbia, Slovakia), in Ukraine – 32 species. For many developed countries of the recreational industry is one of the main sources of income for the state budget. Recreational fishing and fishing tourism are popular and highly profitable industries in the field of tourism and entertainment services. The most popular fishing tourism countries are Great Britain, Panama, Turkey, USA, Venezuela, Mexico, Australia, Finland, Norway. Canada and the USA should be recognized as the most developed in terms of the level of organization of sport and recreational fishing, which are united under the general term «recreational fishing». In these countries (largely thanks to the efforts of state authorities), this type of business has developed into a highly profitable industry in the field of tourism and entertainment services, which brings considerable income and socio-economic benefits. In the USA, recreational fishing annually provides employment for about 1,0 million people, brings in \$ 45,3 billion in retail trade through federal excise taxes, and \$600,0 million in state fisheries and aquatic conservation funds. For example, the total annual income from this type of business in Canada was almost 50 billion dollars.

Analysis of literary data on the organization of recreational fishing in the countries of Western Europe and north America shows that it is one of the most profitable branches of the country's economic complex, which annually brings up to 40 % of net profit. In such a huge country as Canada, all inland waters are given over to the needs of recreational fishing. The simplest economic calculations show that its development in this country is 5-10 times more profitable than fishing. Foreign scientists believe that recreational fishing is very profitable economically, because one caught fish can bring profit from 100 to 1000 dollars, while in industrial fishing up to 20-30 dollars. In the US, for one dollar spent in recreational fishing, the average income is about 17 dollars.

In general, a similar situation is observed in the countries of the European Union. For example, in EU countries, about 35 % of residents prefer «green» tourism, and 7 % of the total number of European tourists travel specifically for sports (including sports fishing). Recreational fishing in Europe is an extremely popular way of active recreation. In European countries, from 1.6 % (Poland) to 32.2 % (Norway) of the population is engaged in fishing. Taking into account the centuries-old traditions of each nation, the industry of recreational fishing and related fishing tourism is gaining momentum every year. According to the estimates of specialists in developed countries, the total number of amateur fishermen is at least 10 % of the total population of the country, in many countries this indicator is much higher. For example, in Canada and the United States of America, at least 27 % of the total population aged 6 and over are actively engaged in recreational and sport fishing.

Special attention should be paid to the issue of logistical support for sport and recreational fishing. In many countries of the world, which include not only the already mentioned Canada and the USA, but also many other countries, for example, Japan, China, India, Germany, Norway, Sweden and others, the manufacture of fishing tools, devices and accessories is a huge industry that supplies high-quality products (rods, reels, artificial lures, fishing lines, hooks, etc.) to the domestic and foreign markets and brings considerable income. In the USA, for example, products for recreational fishing are produced annually for 20 billion dollars, in Canada – for 2.5 billion dollars, in Sweden – for more than 1 billion. Only 1215 % of a fisherman's total expenses are directly related to fishing, including expenses for purchasing licenses or paying membership fees. The rest are expenses that can be conventionally called «support costs» related to transportation costs, housing payments, the purchase of various accompanying fishing accessories, fishing clothes, equipment, etc.

3 The state of recreational and sport fishing in Ukraine.

The recreational industry can become such for Ukraine, which has all the prerequisites for its development. Ukraine has a unique natural resource potential for effective recreational fishing. However, today it is not considered as an important and promising type of economic activity and is unreasonably assigned a secondary role, as there was an underestimation of the water fund of Ukraine.

According to the legislative framework of Ukraine, recreational fishing is defined as the free extraction (fishing) of aquatic living biological resources in the order of general use, in permitted volumes, for personal needs, with fishing tools established by the relevant fishing rules. In all other cases, recreational fishing is carried out under special use rights. Sports fishing is considered as a component of recreational fishing, which is related to the extraction of aquatic biological resources from the habitat or without it and which involves the use of specialized non-industrial fishing tools, which are based on the principle of competition and are carried out according to special rules. The principles of sport fishing provide first of all aesthetic and cultural components, and not the extraction of water bodies as such, therefore sport fishing is aimed at comprehensive development of the personality, education of love for living nature and union with it.

Therefore, modern amateur and sport fishing can be considered as recreational fishing, which means the use of aquatic biological resources not only for the purpose of obtaining (catching) fish, but also for active recreation, fishing ecotourism, preservation and reproduction of fishing facilities and the environment. According to the European Inland Fisheries Advisory Commission (EIFAC) Recreational Fishing Code of Practice, recreational fishing is «fishing carried out by people primarily for sporting interest, but with the possible secondary purpose of catching fish for domestic consumption, but not for further sales».

Ukraine has a unique natural resource potential fishing. However, today it is not considered as an important and promising type of economic activity and is unreasonably assigned a secondary role, as there was an underestimation of the existing capabilities of the water fund of Ukraine. More than 22.5 thousand rivers flow through the territory of Ukraine the total length of which is about 170 thousand km. Also more than 7,000 units, total area about 2 thousand km². There are 23,000 artificial ponds and reservoirs. To date, there are more than 220 species of fish in Ukraine. About 70 of them are freshwater. About 83 species are objects of amateur and sport fishing. Since the 90s of the XX century amateur and sports fishing in Ukraine is considered as a potentially highly profitable direction of the state economy. Every year, the total number of amateur fishermen in Ukraine is constantly growing, and today recreational fishing is the most popular way of active recreation in nature, there are about 10 million fishermen in the country (more than 22 % of the population). Moreover, according to the results of research by TNS 76,9 % are men and 23,1 % are women among those who like to fish.

The economic advantages of recreational fishing in Ukraine are:

- the volume of financial receipts to the State Budget from recreational fishing can amount to at least 90 million hryvnias annually, not including the sale of fishing equipment, boats and the activities of fishing bases, campsites, and dive centers;
- amateur fishermen use the biological resources of water bodies more fully and diversely than fishing;
- recreational fishing of Ukraine has a super-powerful tourist potential;
- the fishing, sports and recreational industry offers 3.4 times more jobs than the industrial and fishing industry;
- the socio-economic efficiency of recreational fishing is manifested in the increase in the level of development of the collective labor force, emotional and mental relief, and the reduction of many diseases.

It should be noted that the species composition of fish caught by amateur fishermen and industrialists differs significantly. Thus, in amateur catches a significant place (up to 60-70 %) is occupied by low-value and stunted species, the catch of which is economically unprofitable and they are practically not covered by fishing. For example, crucian carp, perch, flatfish are much more common in amateur catches than in industrial ones.

The creation of suitable conditions for recreational fishing, as a popular way of recreational recreation for a large part of the population of Ukraine, involves solving a number of ecological, biological, economic and legal issues related to the reproduction and acclimatization of fish, the organization of recreational and sport fishing, taking into account economic and legal requirements of current legislation, characteristics of water bodies, influence of ecological and climatic conditions, fishing facilities, etc. At the same time even superficial estimates indicate that recreational fishing in freshwater reservoirs of Ukraine has been competing with fishing for 25 years. According to various sources, amateur catches in inland water bodies

of Ukraine, in comparison with commercial catches, are from 30 to 400 %. Although such fluctuations are quite possible due to different conditions in different regions of the country, but at same time they also indicate rather approximate estimates of the scale. Unfortunately, the development of recreational fishing in Ukraine is mainly a spontaneous and poorly managed type of nature use which competes with traditional fishing and can become an important socio-economic factor in the growth of the economy of the regions and the state as a whole. However, a relatively small number of anglers are members of various public associations and private fishing clubs. For example, at the Kakhovsky Reservoir within Zaporizhzhia Oblast, only a few thousand fishermen are valid members of the Ukrainian Society of Hunters and Fishermen (UTMR) or other public organizations, and the total number of unorganized amateur fishermen is more than 200,000. Thus, according to the Zaporizhzhia State Fisheries Service, 1,600 to 4,000 anglers visit the Kakhov reservoir within the Zaporizhzhia region in one day.

The predominantly spontaneous nature of amateur fishing in our country is explained, first of all, by the fact that, according to the current legislation, all citizens of Ukraine have the right to amateur fishing without any serious restrictions. They can exercise their right free of charge in public water bodies, which include the vast majority of water fund objects, that is, practically all rivers, lakes, large reservoirs and coastal sea water areas, as well as for a fee in water bodies where cultured fisheries are organized. Centralized accounting of the total number of unorganized recreational fishermen throughout the country has never been conducted. Until now, only fragmentary data are known, collected from individual water basins or individual reservoir in some regions of the country and for very short periods of time. About 100.000 square kilometers of small and medium-sized water bodies in Ukraine are not developed by the fishing industry, due to the unprofitability of fishing on them. If we take 3 kilograms per hectare as the minimum fish production in such reservoirs, the annual loss of food product will amount to about 30000 tons. In parallel with the organization of recreational and sport fishing services at the modern level on certain sections of rivers, lakes, estuaries and reservoirs, the creation of cultural fish farms on relatively small, as a rule, artificial reservoirs should be considered very promising. One of the categories of water bodies, which are the most difficult to develop for the purpose of recreational and sport fishing, are water bodies of complex purpose. When organizing cultured fish farms on water bodies of complex purpose, it should be borne in mind that this is a large group of water bodies of natural or artificial origin (lakes, estuaries, reservoirs, ponds, etc.) that are actively used in human economic activity. These reservoirs do not belong to public reservoirs and in most cases have a specific owner. Reservoirs of complex purpose can be draining, multi-year and one-year regulation, however, there is always a possibility of formation of ichthyofauna in them, which is of some interest in relation to the organization of amateur and sport fishing. Reservoirs of complex purpose, as a rule, are located near populated areas, so they are attractive objects for the creation of cultural fish farms. Studies conducted show that Ukrainian fishermen in general have a positive attitude to the creation of paid recreational and sport fishing farms on reservoirs that are specially stocked for this purpose and where additional services are provided for providing places for short- and long-term recreation, rental of watercraft, tools fishing equipment, etc. At the same time, even superficial estimates indicate that recreational fishing in freshwater reservoirs of Ukraine has been competing with fishing for 25 years. According to various sources, amateur catches in the internal reservoirs of Ukraine are from 30% to 400% compared to commercial ones. Although such fluctuations are quite possible due to different conditions in different regions of the country, at the same time they also indicate rather approximate estimates of the scale of amateur fishing. According to data [7, 36], amateur catches in the Dnieper reservoirs in general in terms of the number and weight of caught fish exceed commercial catches: silver crucian carp by 1.5 times by weight and 5 times by number; kranofeathers, respectively, 74 and 192 times. It should be noted that the species composition of fish caught by amateurs and industrialists is significantly different. In the catches of amateur fishermen, a significant place (up to 60-70%) is occupied by low-value and stunted species, the catch of which is economically unprofitable and which are practically not covered by fishing. For example, crucian carp, perch, flatfish are found much more often in amateur catches than in industrial catches. The share of gobies in amateur catches of the Dnieper reservoirs is approximately 28-30%, in industrial catches they are completely absent. The size composition of catches also differs. For example, the average size of flounder caught by amateurs is 12-15 cm, while in industrial catches it reaches an average of 28 cm.

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4 Scientific research in recreational and sport fishing

Amateur and sport fishing in the developed countries of the world is developing on a scientific basis. In most states of the USA, specialized research institutes for amateur fishing have been established. The US Fish and Game Service conducts specialized scientific research together with 29 of the country's largest universities; at specialized departments, many of them train specialists in the organization of active recreation, including recreational fishing. Canada has created a separate Ministry of Recreation, Hunting and Fishing. Every 5 years since 1955 in the US since 1975 in Canada. A census of fishermen is carried out, based on the results of which socio-economic studies are regularly carried out, which are the basis for the management of amateur fishing on a national scale. A classic example of the implementation of a scientific approach in the practice of recreational fishing is the restoration of the population of Atlantic salmon on the Gufu River. Which suffered as a result of predatory fishing and deterioration of living conditions. Goufre is a small tributary of the St. Lawrence River 100 km from Quebec (Canada). At the first stage of the implementation of the adopted nature protection program for the restoration of the salmon population, the "Society for the Protection of the Gufu River Valley" was created, which took on the main organizational work of conducting recreational fisheries and regulating the fish population in the river. Despite the fact that most of the river channel areas were privately owned, the Society managed to make a large part of the river accessible to all amateur fishermen within two years. At the same time, a specialized unit was created to study the hydromorphological profile of the Gufu River, and work was organized on the inventory of the salmon herd with the selection of the most promising areas and the assessment of their forage productivity.

The mentioned scientific studies made it possible to objectively evaluate different sections of the river in relation to their hydrological characteristics, to identify the most promising and problematic areas of the river, to give recommendations for carrying out restoration works in the riverbed, as well as for carrying out bank strengthening works. The assessment of the potential productivity of the reservoir made it possible to provide a reliable forecast of the optimal number of juvenile salmon and the size of the commercial. At the same time, the necessary fish breeding works were carried out. Thus, the implementation of the comprehensive development plan for Gufu, which included two sections on the reconstruction of the natural environment and implementation of reclamation works, various biotechnical measures, but also to collect a data bank for building a mathematical model for forecasting the return of salmon from the sea in Gufu. In developed foreign countries, recreational fishing is becoming more massive and profitable every year. Despite the high cost of services. Recreational fishing is not an elitist type of recreation and is available to the general population of these countries, regardless of their wealth. In the civilized world, it is not customary to spare money for active recreation, there it is well understood that savings on recreation often turn into losses on medical care.

5 4. Scientific research in the field of recreation of Ukraine. The importance of scientists of the Dnipropetrovsk Hydrobiological School in the study of the processes of formation and development of amateur (recreational) fishing in Ukraine

Scientific research is being conducted in the field of recreation in Ukraine. It should be emphasized the contribution of scientists of the Dnipropetrovsk hydrobiological school of technogenically transformed freshwater ecosystems to the study of the formation and development of amateur (recreational) fishing in Ukraine [1]. These studies fit well into the global trends of scientific interest in the rapid growth of the popularity of "green" tourism (in particular, water types of active recreation, fishing tourism, recreational fishing). The Dnipropetrovsk Hydrobiological School of Technogenically Transformed Freshwater Ecosystems is represented by a scientific team that has been studying the hydroecosystems of freshwater reservoirs subjected to anthropogenic (technogenic) transformations for over 90 years. The establishment of the Dnipropetrovsk Hydrobiological School was prompted by the need to study the consequences of a hydroelectric power station on the Dnieper. In August 1927, a proposal was approved to establish the Dnipropetrovsk State Hydrobiological Station, which was tasked with conducting hydrobiological research related to the construction of the Dniproges. The first director of the station was an outstanding Ukrainian hydrobiologist, Prof. Dmytro Onisiforovych Svirenko. The scientific and organizational activity of D. O. Svirenko as the founder of complex hydrobiological

studies of the impact of the construction of the Dniproges on natural hydrosystems became the basis for the formation of the team of Dnipropetrovsk scientists-hydrobiologists.

In the future, students and followers of Prof. TO. Svirenko significantly expanded the geography and problems of research. Innovative areas of hydrobiology were founded or significantly deepened: space hydrobiology (opening of the laboratory by Prof. G.B. Melnikov in 1961); freshwater radioecology (in 1962 – the first publication on the topic by I.P. Lubyarov); technical hydrobiology (I. P. Lubyarov); water toxicology (S. P. Fediy); expansion of the forage base of fish by acclimatization of the estuarine-Caspian fauna (P.O. Zhuravel); industrial fishing (1978) and others. The scale of the scientific achievements of the scientists of the Dnipropetrovsk hydrobiological school allows us to characterize it as a significant phenomenon of the hydrobiological science of Ukraine [1].

The first serious scientific studies of amateur fishing as a type of nature management in the recent history of Ukraine were started by scientists of Dnipropetrovsk State University (now Oles Honchar DNU), and then continued at Dnipro State Agrarian and Economic University (DDAEU) [2]. Studies of this type of fishing were not conducted in Ukraine at that time. The accounting of the number of amateur fishermen in the reservoirs in general and in their separate areas was carried out sporadically by the fish protection authorities. Determining the time fishermen spent on reservoirs (time budget), analysis of their equipment, equipment, technical support, determination of quantitative and qualitative characteristics of catches were superficial, imprecise, unsystematic. Data on recreational fishing were not reflected in the annual reports of regional fish inspectorates. Against this general background of indifference to recreational fishing, in 1992, the researcher of the Research Institute of Biology of the DSU, O. O. Hristov, together with the student of the Faculty of Biology and Ecology, Dmytro Bondarev, began to collect primary data on the visitation of the Dnieper reservoirs by recreational fishermen, their social structure, to analyze the quantitative and qualitative composition of their catches, to develop methods of accounting for amateurs, to evaluate further prospects for the development of recreational fishing. In 1994, D. L. Bondarev defended his thesis on the problems of amateur fishing (supervisor - O. O. Hristov). Understanding the perspective of scientific research of amateur fishing, which is rapidly developing not only in the region, but also in Ukraine, O. O. Hristov continues to study various aspects of amateur fishery on the Dnipro reservoir. Significant work was done together with a colleague by a graduate student of the Department of Zoology and Ecology of DNU, R. O. Novitskiy, who later expanded the directions of research, proposed new approaches and methods. In 1998–1999, graduate student R. O. Novitskiy became a member of the committee of the State Fisheries Committee of Ukraine for the development of the Rules for recreational and sport fishing (1999), which have not been updated since 1990. In the late 1990s and early 2000s, Dnipropetrovsk researchers were joined by researchers from Zaporizhzhia. It is necessary to mention the scientific researches of A. H. Drobot and M. L. Maksimenko (Zaporizhzhia Regional State Fish Inspectorate), Y. G. Kuzmenko and T. V. Spesyvy (Institute of Fisheries of the National Academy of Sciences of Ukraine). The state of recreational fishing in the inland water bodies of Ukraine was studied using the example of the Kakhovsky Reservoir, and proposals for effective regulation of fishing were developed [4]. M.L. Maksymenko, an employee of the fish inspection, and later IRG of the National Academy of Sciences of Ukraine, first investigated the qualitative and quantitative characteristics of spearfishermen. In recent years, a significant array of data on recreational fishing on natural and artificial reservoirs of Kharkiv region was obtained by G. L. Goncharov (V. N. Karazin National University of Science and Technology). Certain studies were started by Kyiv scientists P. G. Shevchenko, I. S. Mityai, V. M. Mukhin (NUBiP of Ukraine). Unfortunately, to date, scientific studies of recreational fishing as a social, economic, ecological, and cultural phenomenon in Ukraine are conducted only in the Dnipro (R.O. Novitskiy, O.O. Hristov) and Kakhovsky (M.L. Maksimenko) reservoirs in administrative boundaries of Dnipropetrovsk and Zaporizhzhia regions, partly - on reservoirs of Kharkiv region. The impact of amateur fishing on the entire cascade of Dnieper reservoirs, on the large rivers of Ukraine (Danube, Dniester, Southern Bug) is practically not studied, and the social and economic aspects of amateur fishing as a modern social phenomenon that has a powerful and versatile impact on water ecosystems are not studied. To date, even the extent of the impact of this type of anthropic (human) activity on the fauna of the water bodies of Ukraine has not been determined.

The scientific team of the Dnipropetrovsk Hydrobiological School of Technogenically Transformed Freshwater Ecosystems prepared the Fisheries Development Program of the Dnipropetrovsk Region for 2020–2025 [3]. It pays considerable attention to the development of amateur (recreational) fishing, emphasizes the need for priority development of amateur and sports fishing, fishing tourism. We should also note the growing role of recreational (amateur) fishing in the use of

aquatic biological resources of Ukrainian reservoirs. According to estimates [9], the introduction of monthly, seasonal, and annual permits for paid amateur and sport fishing only in the Dnipropetrovsk region will approximately bring to the budget of Ukraine at least UAH 10,000,000 annually. This is quite comparable to the state's profit from commercial fishing in the reservoirs of the Dnipropetrovsk region. It should be noted that the infrastructure of the recreational fishing sector already offers 16,000 jobs (especially in the clusters of ecotourism, sport fishing and active recreation services) (according to www.ukrstat.ua). Recreational fishing makes it possible to develop reserves of aquatic bioresources that are not fully covered by fishing, or are not covered by it at all, including low-value fish species, which increases the efficiency of fishery use of water bodies. Amateur fishing is a means of recreation for millions of Ukrainian citizens. Sociological studies conducted and conducted in most developed countries show that recreational and sport fishing contribute to the growth of labor productivity. Increasing the general educational and cultural level of the population, physical recreation, increasing life expectancy and working age. Since the mid-90s of the last century, Ukraine has seen an intensive increase in the number of various enterprises and organizations, most widespread in the country's inland waters, which provide a wide range of commercial services in the organization of amateur and sport fishing - from elite trophy fishing far outside the borders of Ukraine for several thousand dollars, to ordinary fishing on a small reservoir or a pond not far from home for 30-40 hryvnias.

6 Conclusions and recommendations

Today, amateur and sport fishing is an important factor in the social and economic development of the country, which cannot be ignored. Serious, scientifically based, ecological and economic assessment of recreational fishing in Ukraine, the study of its social aspects, and the search for specific models of the optimal organization of economic activity are now urgently needed. The controlled and directed development of recreational fishing together with the development of ecological (green) tourism, including foreign (inbound fishing tourism), can become a factor in the economic development of the tourism and fishing industries of Ukraine and strengthening the state's position in the international arena.

It is urgent to carry out an inventory of fishery water bodies of the Dnipropetrovsk region, develop passports and modes of use, biological justifications; implementation of monitoring of quantitative and qualitative indicators of hydrobionts, primarily aquatic ichthyofauna, the influence of natural and man-made factors on them; introduction of permanent analysis of the volumes of unaccounted for, unspecified, illegal fishing (IUU fishing) in the reservoirs of the region using modern methods of scientific research (GIS technology, modern aviation technology, etc.).

Within Ukraine, it is important to consider the issue of implementing control over the development of recreational fishing, promoting fishing tourism, carrying out constant monitoring of the volume of extraction of aquatic biological resources by recreational fishermen, developing and introducing an economically justified single "Fisherman's Ticket".

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