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POSSIBILITIES FOR RECREATIONAL FISHING TOURISM DEVELOPMENT IN PROTECTED ZONES OF NPGF²⁰

ВОЗМОЖНОСТИ РАЗВИТИЯ РЕКРЕАЦИОННОГО РЫБОЛОВНОГО ТУРИЗМА В ОХРАННЫХ ЗОНАХ НАЦИОНАЛЬНОГО ПАРКА ФРУШКА ГОРА

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Abstract: Organization and management of tourism in rural areas is complex activity that additionally becomes more complicated if it is conducted in protected areas – national parks. National park Fruška gora (NPGF) is the oldest national park in Serbia, and which has on disposal considerable potentials for different types of tourism. In paper are examined possibilities of touristic potentials networking in the segment of fishing and rural tourism within the borders of National park Fruška Gora.

²⁰ Paper is part of project III 46006, funded by Ministry of Education, Science and Technical Development of Republic of Serbia. Project period 2011-2015.

Keywords: rural areas, fishing tourism, fish fund, NPPG.

Аннотация: Организация и управление туризмом в сельской местности представляет собой комплексную деятельность, которая дополнительно становится более сложной, если ведется в охранных зонах – национальных парках. Национальный парк Фрушка Гора является старейшим национальным парком в Сербии, в котором имеются существенные возможности для различных видов агротуризма. В статье анализируются туристские возможности в сегменте рыбной ловли и сельского туризма в границах Национального парка Фрушка Гора.

Ключевые слова: сельские территории, рыболовный туризм, фонд рыбы, Национальный парк Фрушка Гора.

Introduction

National *Law on nature protection* is defining seven categories of natural protected areas (resources), as are: national parks (Đerdap, Šara, Tara, Kopaonik and Fruška gora); nature parks (Golija, Stara planina, Šargan – Mokra gora, Palić, Sićevačka gorge, etc.); protected landscapes (Lepterijski – Sokograd, Miruša, gorge of river Mileševka, Subotica sands, Vlasina, etc.); strict nature reserves (Gazimestan, Omoljica island, Kukavica, etc.); special nature reserves (Goč – Gvozdac, Brzanska Moravišta, Zasavica, etc.); protected habitats; and natural monuments (botanic garden Jevremovac, Pionirski park, oak at Cvetni square, Risovača, Ripaljka, Lisine waterfall, Resavska cave, Mlava well, plane tree at Miloš's' dormitory, etc.).

Law on national parks defines national park as wider territory that by its ecologic, biogeographic and other characteristics represents natural environment of great importance together with ecosystems and landscapes of special value in term of originality and diversity of flora and fauna, or if possesses one or some of following characteristics: representative biological, geomorphological, geological, hydrological and other occurrences and processes with cultural-historical value appeared in interaction of man and its natural environment. Closer defining each of five national parks is done by their individual legislation.

National park Fruška gora (NPPG) is the oldest national park in Serbia, which was established in 1960. By larger part is connected for the eponymous island mountain, positioned in Pannonian Plain. It directly relies to the right bank of the Danube River, and it extends in direction east-west for around 78 km. Territory of active protection covers 25.525 ha. Great diversity of flora, fauna and fungi, production potential of orchards and vineyards in foothill, and dense deciduous forests in higher areas of mountain, nearness of Danube, potential of lakes and fishponds, row of orthodox monasteries, number of archaeological localities, closeness of Novi Sad, etc., are basic assumptions to NPPG in order to organize different types of tourism, before all hunting, fishing, recreational, eco, religious, etc.

Rural tourism offers to guest „rural environment” so it can experience on unique way pervasion of nature, culture and local population. Visitor has to enjoy in authentic and original experience, as well as in return to roots or essence of rural way of life. Rural tourism is based on principles of sustainability, considering row of activities and services that characterized certain rural areas. Offer in rural tourism does not cover just visible nature, specificity of architecture, folklore and gastronomy, but also intangible things as are hospitality, customs, culture in relation to nature, communication, beliefs and legends of local population (Kuzman, Kovačević, 2014).

Fishing as touristic product has many specificities. Usually it's a part of rural tourism, as it leans to certain agro activities and natural recourses. Certainly, according to Bauer and Herr (2004), not all fishing falls under tourism, but many of them involves following elements of tourism: travelling to/from particular destination; presence of a tourism service industry (outfitters, tour guides, fishponds/artificial lakes); exchange of money and paying for services; overnights at destination; service industry; aspects of leisure and recreation; etc.

From the aspect of number of attractive location, *fishing tourism potential in Serbia is huge. Unfortunately, often not so good or lack of any marketing approach, brings to situation that from mentioned type of tourism and accompanying activities we are achieving minimal incomes. According to some estimations just in sphere of selling of equipment for fishing in EU annual turnover is around 5 mld EUR, and in package with accommodation and accompanying services, fishing tourism values almost five times more.*

Process of recreational fishing organization within the all zones under the state protection considers many activities in function of this area biodiversity protection. Planned management of fishing zones considers: estimation of biomass and fishing pressure on fish fund (according to quantum of annual catch), and determination of allowable annual/daily fish catch per present species; dictating the dynamics of fish stocking; establishing of sustainable use of fish fund; permanent education of recreational fishers; etc.

From the other side, irrational fishing (overexploitation) threatens balance within the sensitive ecosystem of some protected area. Touristic potentials of National park Fruška Gora, in sphere of fishing tourism are not inexhaustible, especially with regard to rare fish species (desired trophies of sports fishermen – potential tourists). Sensibility of area is also recognizable in existence of risk of environment pollution caused by uncontrolled stay of tourists.

Research results

Fishing capacities of NPFG – Organization of tourists group visits (recreational fishers) significantly revives rural tourism too, how most of fishing destinations within the zones of NPFG are defined as rural. In coastal part of Danube that is under jurisdiction of NPFG, fishing is possible (segment of fishing zone from 1297-1233 km). The wealth of fish species diversity in observed location is the best described by fact that from total registered fish fauna of Danube River (about 70 species), in this segment of Danube is registered appearance of even 44 fish species, where over 25% of fish species have primary importance in organization of economic or recreational fishing (14 species from 4 families: Acipenseridae, Cyprinidae, Siluridae and Percidae). Number and representativeness of fish species impose the necessity of determining of basic fishing indicators important for management process and sustainable use of fish fund as natural resource (Table 1).

Table 1. Quantitative composition of ichthyofauna on the segment of Danube River 1297–1233 km (B – relative biomass, M – relative weight share, P – production)

Species	B (kg/ha)	M (%)	P (kg/ha)
<i>Acipenser ruthenus</i> – Starlet	7.06	2.3	2.36
<i>Leuciscus idus</i> – Ide	16.2	5.3	3.42
<i>Aspius aspius</i> – Asp	2.82	0.9	0.96
<i>Blicca bjoerkna</i> – Silver Bream	11.8	3.9	1.22
<i>Abramis brama</i> – Common Bream	117.0	38.5	37.2
<i>Abramis sapa</i> – White-eye Bream	6.0	1.98	1.24
<i>Vimba vimba</i> – Vimba Bream	4.2	1.4	1.28
<i>Pelecus cultratus</i> – Sabre Carp	0.28	0.09	-
<i>Barbus barbus</i> – Common Barbel	39.0	12.8	16.92
<i>Cyprinus carpio</i> – Common Carp	22.6	7.4	7.22
<i>Carassius gibelio</i> – Prussian Carp	4.6	1.6	0.70
<i>Hypophthalmichthys molitrix</i> – Silver Carp	7.0	1.5	3.24
<i>Silurus glanis</i> – Wels Catfish	56.6	18.6	13.0
<i>Stizostedion lucioperca</i> – Zander	8.46	2.8	3.14
Total	303.62	100	91.9

As in focus is use of fish fund in purpose of fishing, previously presented indicators are referring only to the age categories allowed for fishing. According to weight share dominate Common Bream, Wels Catfish and Common Barbel.

Beside mentioned, significant potentials for the development of fishing tourism within the territory of NPFG are embodied in artificial fishing water accumulations: Moharač (60 ha), Bruje (15

ha) and Sot (22 ha). Mentioned lakes can be used in many ways for sports and recreation tourism, but current tourism offer is based only on sports fishing. In plan is tourism networking of Fruška gora lakes with system of cycle paths as a part of European cycle route (Vujko, Plavša, 2011).

In water of aforementioned accumulation, appearance of 19 fish species is registered, where over the 50% of fish species is marked as fishing significant species. Species with primary fishing importance include Common Carp, Zander, Wels Catfish and Prussian Carp, and existing fish communities are generally formed by fish stocking of established accumulations. Estimation of relative abundance and weight share, as well as estimation of fish fund biomass and production in accumulations Moharač and Bruje are given according to experimental catches of fish species, where data covers just significant species for fishing (Table 2).

Table 2. Accumulation Moharač and Bruje (estimated relative abundance and weight share, biomass and production of main fishing species)

Accumulation Moharač				
Species	Abundance (%)	Weight share (%)	Biomass (kg/ha)	Production (kg/ha/god)
<i>Common Carp</i>	13.31	29.79	91.07	83.63
<i>Prussian Carp</i>	54.37	43.98	134.46	78.52
<i>Common Bream</i>	11.79	2.23	6.82	4.32
<i>Common Roach</i>	4.18	0.39	1.19	0.67
<i>Silver Bream</i>	3.42	0.85	2.60	1.40
<i>Common Rudd</i>	2.28	0.92	2.81	0.43
<i>Zander</i>	9.13	12.93	39.51	32.71
<i>Wels Catfish</i>	1.52	8.94	27.34	18.06
Total	100	100	305.8	219.74
Accumulation Bruje				
Species	Abundance (%)	Weight share (%)	Biomass (kg/ha)	Production (kg/ha/god)
<i>Common Carp</i>	3.45	20.74	57.59	35.01
<i>Prussian Carp</i>	15.51	22.11	61.40	26.89
<i>Common Bream</i>	5.17	2.43	6.75	5.41
<i>Common Roach</i>	56.9	18.39	52.49	29.71
<i>Bleak</i>	6.9	0.20	0.56	0.35
<i>Zander</i>	10.34	9.94	27.60	17.14
<i>Wels Catfish</i>	1.72	26.2	71.31	37.55
Total	100	100	277.7	152.04

From the aspect of potential fishing tourism development accumulation Sot has relatively small importance, considering low pressure (number of arrivals) of recreational fishers (small number of arrivals was primarily caused by generally poor coast accessibility). Besides that, complex of accumulation is followed by public beach (swimming season late spring – early autumn) with accompanying infrastructure (restaurants), what also affects on fishing organization. As in quantitative, as well as in qualitative aspect, relation between major fish species is similar to previous accumulations, but with slightly reduced values.

According to weight share of fish age categories allowed for catching, at the accumulation Moharač dominate Prussian Carp, Common Carp and Zander, while at the accumulation Bruje dominate Wels Catfish, Prussian Carp, Common Carp and Common Roach.

In order to preserve water quality and fish fund on accumulations, sustainability of financial support of mentioned activity requests within the process of organization of sports-recreational fishing, selling of fishing licences to all tourists (recreational and sports fishers). It can be interesting how to solve the problem of expressed low correlation between recreational fishing and advancement of touristic offer, as significant investments for modernization of accommodation capacities close to water resources affects the increase of total number of tourists, but parallel with decrease in number of issued licences for recreational fishing. Also, negative impact on further development of recreational fishing is potentially recognized in closeness of hunting area.

Allowable catch of fish in recreational fishing – After analysis of records of professional and recreational fishers is shown that achieved quantum of catches is far below allowable one on annual level, what reinforces the assumption that mentioned results for biomass and production are around estimated level (researches about state of fish fund were done during 2008).

Recreational fishing is conducted in accordance to Regulation on the method, tools and resources for commercial fishing, then Regulation on the method, tools and resources used in recreational fishing, as well as special measures and limitations defined for certain localities under jurisdiction of public company National park Fruška gora.

Structure and size of catch, from the aspect of primary fish species for the segment of Danube River 1297 – 1233 km, is given according to estimation of fish fund state, where sustainability of fish fund use is based on next assumptions: research results from 2008; estimation of number of fishers and fishing pressure intensity (size of daily catch, catch composition, seasonal variability in fishing intensity); estimation of fish fund production; etc. In line with previously mentioned, next table shows allowable frame for recreational fishing in 2015 on observed territory.

Table 3. Estimation of daily allowable fishing in recreational fishing for the segment of Danube River 1297-1233 km

Fishing species	daily catch
Brown Bullhead	unlimited
Sunfish	unlimited
Prussian carp	unlimited
Silver and Bighead carp	unlimited under special conditions
Catch of autochthonous quality fish and whitefish	
Limitation for the mass of daily catch is established for the recreational fishers on maximally 5 kg for the catch of all autochthonous fish species	
Starlet, Common carp, Pike, Wels Catfish, Zander, Volga Pikeperch, Asp	maximally 3 pieces in allowable fishing size - summary
Ide, Common Nase, Common Barbel, European Chub, Common Bream	maximally 10 pieces in allowable fishing size - summary
In case that one caught fish exceeds the mass of 5 kg (for all autochthonous fish species), daily catch limit in pieces is not valid, so it is considered that maximal mass of daily catch have been done	

Sustainable management on three accumulations under the jurisdiction of NPGF requires the creation of plan for fishing on these locations, in other words estimation of fishing pressure height for primary fish species for the next fishing season (Table 4 and 5).

Table 4. Accumulation Moharač (estimation of total annual fish harvesting)

Accumulation Moharač		
Species	Structure of fish harvesting (in %)	Quantity for catch (kg)
Common carp	38	4,000
Prussian carp	38	4,000
Zander	14	1,500
Wels catfish	10	900
Total	100	10,400

Table 5. Accumulation Bruje (estimation of total annual fish harvesting)

Accumulation Bruje		
Species	Structure of fish harvesting (in %)	Quantity for catch (kg)
Common carp	27	500
Prussian carp	22	400
Zander	8	150
Wels catfish	27	500
Common bream	2	40
Common roach	14	250
Total	100	1,840

As was earlier mentioned, according to fishing activities, accumulation Sot currently has small importance. Planned fishing pressure on other two accumulations is in relation 1:6, where in structure of planned fish harvesting in accumulation Moharač will dominate Common Carp and Prussina Carp, while in accumulation Bruje will be forced harvesting of Common Carp and Wels Catfish.

Sustainability of recreational fishing, from the aspect of natural resources (fish fund) preservation, on accumulations in jurisdiction of NPPG will be achieved just in conformity with the principles of daily allowable fishing that was previously defined for the segment of Danube River.

Conclusion

There are undeniable potentials for organization of recreational fishing within the territory of National park Fruška gora (NPPG), where for sustainability of natural resources (fish fund and water accumulations) it is necessary that fishers (tourists) have to respect national legislative and defined principles established by the body to which the national park is assigned to management. Sustainability of financial support of recreational tourism is recognized in additional selling of time licenses to all fishers. As the analysis of annual fishing results show that achieved catches are far below allowed (projected), there is justified reason for more expressed marketing appearance in attraction of potential fishers through promotion of NPPG as desirable touristic destination.

Of course, it must be respected all natural limitations related to the concept of a protected area, respectively, it has to be respected all principles of sustainable tourism development that will not endanger the available natural resources.

Development of recreational tourism, hunting and fishing can and have to represent a leading activity within the NPPG, according to their more and more expressed attractiveness for tourists, as well as from the aspect that these activities with well established control system minimally endanger the natural resources of some protected area.

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