

FINAL REPORT ON PROJECT:

"Evaluation and role of Gružansko Jezero Lake (Serbia and Montenegro) as important site for migratory birds in Moravsko-Vardarskom migration route".

Gružansko Jezero Lake is situated on predicted moravsko-varđarskom migration route, and according to our preliminary researches, it showed an important role during the bird migration and wintering of waterfowl. Thanks to these facts, we got an idea to make a project in which we will make basic researches in ornithology in this area. Last July we got **Small Rufford grant** for project "Evaluation and role of Gružansko Jezero Lake (Serbia and Montenegro) as important site for migratory birds in moravsko-varđarskom migration route" and started with researches in September 2006. The project finished in August 2007. We got very interesting results showed below and in the table.

Artificial accumulation Lake Gruža fills the depression of the Knićko Field, situated between the mountains Gledičke and Kotlenik. It was formed mostly in order to provide water supply for industry and residential of the Kragujevac District. The building of the dam started in 1979 and it was completed in 1985. The lake covers the area of 934 ha, and it is one of the largest water surfaces in the region of Šumadija. The total length of the lake is about 10 km, the width varying between 300 and 2800 m. The greatest depth is immediately below the dam, 31 m, while the lake is only 1.3 m deep in some places. Only a small section of the banks near the dam has some characteristics of steep-shore cliffs, overgrown with forest vegetation. The lake is rich in fish.

The lake itself differentiates into four main zones: the zone of permanent open water, which covers the largest area, the flooded zone, the zone of forested and steep cliffs and the zone of strong anthropogenic influence. At the north side of the lake, at the confluences of the Gruža and Boračka rivers, formations of flooded wetland meadows make a belt up to 100 m in width.

Besides the developmental and economic significance, the Gruža reservoir represents a new and suitable stopover habitat for wetland and other birds that use Eastern European migratory pathways. This modified area, according to its advantage location, lies on predicted moravsko-varđarskom migratory route, enabling the migrating birds to rest, regain their strength and recharge the energy supplies before continuing the migration.

Our researches started in September 2006. We used two methods for bird detection. The main was bird ringing and the other was bird count. Small birds, mainly Passerines were ringed, while waterfowls and other birds were watched by binoculars, and telescopes, or are detected by voice. Birds were caged by ornithological misnets. Misenets were located in bushes, and sedge (*Scirpus lacuster*). Usually we used 6 or 7 misnets per ringing session. For this purposes we obtained 5 misnets, while other we laded by Natural History Museum in Belgrade. Aluminum rings were also got from Natural History Museum. After caging, birds were processed in a standard ringing way: a ring was put on a bird leg, after what we took some biometrical data like molt, fat and muscle scores (important for migration). Also, we measured birds' weight (by pesola scales), length of wings and wing feathers. After the processing the birds were released. Birds were ringed

in fall and spring migration, in September, October, March, April, May, July and August. Ringing data are present in table below in red colour. In June were ringed resident populations of Passerines. During the spring and autumn migration, 336 bird individuals were banded, from 35 mostly passerines species (see the list of birds in table below). According to IUCN criteria 5 ringed species of total 35 are in category of vulnerable species (VU). Seven ringed species are treated by Serbian law as natural Rarities (NR). All ringed species are forbidden to hunt or hunting is reduced to maximum. More over, all banding species are breeding on the Gruža accumulation, because we ringed individuals during the breeding period as well. Considering that during one year of research we didn't have ring recoveries, we can not claim for shore weather all banding birds belong to resident or foreign population. The most abundant species during the ringing session was sedge warbler - *Acrocephalus schoenobaenus* (71 examples). Other most abundant species are: blackcap - *Sylvia atricapilla* (32); great tit – *Parus major* (28); willow warbler – *Phylloscopus trochilus* (23) and reed bunting - *Emberiza schoeniculus* (19).

In winter months: November, December, January and February, we were watching wintering waterfowls on the Lake's surface for it is rarely frozen, so it presents wintering area for numerous resident and transitory waterfowl flocks. The most abundant month was January, when there were identified 9577 waterfowl individuals from 29 species. According to IUCN, 35 species that were recorded by binocular or telescope are vulnerable (VU). One species Olivaceous Warbler (*Hippolais palida*) is endangered on European level. On territory of Gružansko Lake we detected 95 breeding species of these non Passerine birds. 69 species recorded within the Lake are natural rarities according to Serbian's law. Waterfowl and other bird species, recorded on Lake's surface are mostly wintering birds (81 species), while 44 species are just passengers that stop on the Lake to rest and refuel their fat deposits. The most abundant species during wintering months was Mallard (*Anas platyrhynchos*) – 3540 individuals.

During the research from September 2006 till August 2007, on Gružansko Lake has been recorded in total 153 bird species.

As we planed in project proposal, we printed leaflets and posters as an educational material, which we share among school children and among University students. Our targets were children and student for they can easily realize how and why the nature is very important for all of us. We made 4 lectures. Two lectures were holding on 21 May 2007 in primary school, near the lake. They were about the Lake's importance in bird migration and its importance for humans and about bird species that can be seen on the Lake. Other two lectures were at the University of Kragujevac on 22 May 2007. Among students there were professors and other important persons who work for nature conservation and implementation of international laws in nature. The only thing that we failed were TV program about bird ringing, cause local TV station didn't find out these efforts for Lake conservation very attractive and important.

Persons that participated in this project: Boris Hardi, Marko Raković, Miloš Radaković, Kristian Barna, Antun Žuljević, Dejan Đapić (who came instead of Oto Szekeres) and Daliborka Barjaktarov as project leader. All participants are experienced ringers, holding ringing license, participated in many both national and international ringing camps. More

over, during almost each longer ringing session on the Lake we had some volunteer or terrine that are willing to pass an exam for ringing license.

At the end we can conclude that gathered ringing data shows that accumulation Gruža indeed has important roll in bird migration, along mentioned migratory route, for it enables the migrating birds to rest, regain their strength and recharge the energy supplies before continuing the migration (which we had opportunity to find out by taking muscle and fat scores). Moreover, importance of accumulation is greater when we know that significant number of wintering waterfowls and migrating birds are rare and endangers, not only in Serbia, but all over the Europe.

Like it was sad, this project aims to contribute towards resolving main problems of conservation of this area, which was mostly lack of data. Our results provide a sustainable basis for a long-term monitoring and other bird-researches and will be used in further cooperation with national institutions in order to plan better protection and proper use of the Lake. More over, these results, collected during one year of study are very valuable; they will be presented in oral and will be published in book of papers of Second Euro-Asian Ornithology Congress which will be holding from 26-29 October 2007, in Antalya, Turkey (<http://www.akdeniz.edu.tr/fenedebiyat/ornithology>).

In future, we plan to continue with ringing researches on the accumulation Gruža, because one year of research is just a beginning, so we want to know weather we will have some ring recoveries of birds ringed on the Lake or foreign recoveries. In that order, we plan to ask for project continuation in several both domestic and foreign foundations.

Table of species recorded on Gružansko Jezero Lake

No of species.	Species (scientific name)	No of individuals: ringed, seen, or estimated	Status in Serbia	Conservation status	
				in Serbia	In Europe -IUCN
1.	<i>Gavia artica</i>	1	w/p	NR, HP	VU
2.	<i>Gavia stellata</i>	3	w/p	NR, HP	VU
3.	<i>Tachybaptus ruficollis</i>	25	b/w	HV, NV	LR: nt
4.	<i>Podiceps cristatus</i>	150	b/w	HV, NV	VU
5.	<i>Podiceps grisegena</i>	5	b/w	NR, HP	DD
6.	<i>Podiceps nigricolis</i>	7	b/w	NR, HP	LR: lc
7.	<i>Phalacrocorax carbo</i>	670	b/w	NV, LS	LR: cd
8.	<i>Phalacrocorax pygmeus</i>	10	b/w	NR, LS	LR: cd
9.	<i>Nycticorax nycticorax</i>	3	b/p	HP, NR	LR: cd
10.	<i>Ardeola ralloides</i>	5	b/p	HP, NV	VU
11.	<i>Egretta garzetta</i>	3	b/p	HP, NV	LR: cd
12.	<i>Egretta alba</i>	20	b/w	HP, NR	LR: cd
13.	<i>Ardea cinerea</i>	60	b/w	NR, LV	LR: cd
14.	<i>Ciconia ciconia</i>	6	b/p	NR, HP	LR: cd
15.	<i>Ciconia nigra</i>	3	b/p	NR, HP	VU
16.	<i>Cygnus olor</i>	2	b/p	NR, HP	DD
17.	<i>Anser fabalis</i>	15	w/p	NV, HV	LR: cd

18.	<i>Anser albifrons</i>	35	w/p	HP	LR: cd
19.	<i>Tadorna tadorna</i>	5	w/p	NR, HP	DD
20.	<i>Anas penelope</i>	2420	w/p	LS	LR: cd
21.	<i>Anas strepera</i>	750	w/p	NR, HP	LR: nt
22.	<i>Anas crecca</i>	2560	p/w	LS	LR: lc
23.	<i>Anas platyrhynchos</i>	3540	b/w	LS	LR: cd
24.	<i>Anas acuta</i>	650	b/w	NR, HP	LR: cd
25.	<i>Anas querquedula</i>	200	b/w	LS	VU
26.	<i>Anas clypeata</i>	2	b/w	NR, HP	LR: cd
27.	<i>Aythya ferina</i>	1890	b/w	NV, LV	LR: cd
28.	<i>Aythya nyroca</i>	988	b/p	NV, LV	VU
29.	<i>Aythya fuligula</i>	5	b/w	NV, LV	LR: cd
30.	<i>Aythya marila</i>	1	w/p	NR, HP	DD
31.	<i>Somateria molissima</i>	1	w/p	-	DD
32.	<i>Melanitta fusca</i>	2	w/p	NR	DD
33.	<i>Bucephala clangula</i>	120	w/p	NV, LV	LR: cd
34.	<i>Mergus albellus</i>	30	w/p	NR, LS	VU
35.	<i>Mergus merganser</i>	1	b/w	NR, LS	LR: cd
36.	<i>Milvus migrans</i>	1	b/p	NR, HP	VU
37.	<i>Haliaeetus albicilla</i>	1	b/w	NR, HP	VU
38.	<i>Circetus gallicus</i>	1	b/p	NR, HP	VU
39.	<i>Circus aeruginosus</i>	3	b/w	NR, HP	VU
40.	<i>Circus cyaneus</i>	2	w/p	NR, HP	VU
41.	<i>Circus pygargus</i>	1	b/p	NR, HP	VU
42.	<i>Accipiter gentilis</i>	2	b/p	NR, LV	LR: cd
43.	<i>Accipiter nisus</i>	2	b/w	NR, LV	LR: cd
44.	<i>Buteo buteo</i>	6	b/w	NR, LV	LR: lc
45.	<i>Pandion haliaetus</i>	1	b/w	NR, LV	VU
46.	<i>Falco tinnunculus</i>	2	b/w	NR, HP	LR: lc
47.	<i>Falco vespertinus</i>	2	b/p	NR, HP	VU
48.	<i>Perdix perdix</i>	25	b/w	LS	LR: cd
49.	<i>Coturnix coturnix</i>	31	b/p	LS	LR: cd
50.	<i>Phasianus colchicus</i>	10	b/w	LS	NE
51.	<i>Rallus aquaticus</i>	36	b/w	LS	VU
52.	<i>Gallinula chloropus</i>	42	b/w	LS	LR: nt
53.	<i>Fulica atra</i>	150	b/w	LS	LR: lc
54.	<i>Grus grus</i>	10	b/w	NR, HP	(EX)
55.	<i>Himantopus himantopus</i>	15	b/p	NR, HP	VU
56.	<i>Recurvirostra avosetta</i>	25	b/p	NR, HP	VU
57.	<i>Charadrius dubius</i>	25	b/p	NR, LS	LR: nt
58.	<i>Charadrius hiaticula</i>	4	w/p	NR, LS	LR: cd
59.	<i>Vanellus vanellus</i>	12	b/p	NR, LS	LR: nt
60.	<i>Calidris minuta</i>	6	p	NR, LS	LR: cd
61.	<i>Calidris alpina</i>	22	w/p	NR, LS	VU
62.	<i>Philomachus pugnax</i>	35	b/p	NR, LS	LR: cd
63.	<i>Gallinago media</i>	12	p	NR, LS	VU
64.	<i>Gallinago gallinago</i>	30	b/w	LS	LR: cd
65.	<i>Limosa limosa</i>	5	b/w	NR, LS	VU
66.	<i>Numenius arquata</i>	1	b/w	NR, LS	VU
67.	<i>Tringa erythropus</i>	1	w/p	NR, LS	LR: cd
68.	<i>Tringa totanus</i>	15	b/w	NR, LS	VU

69.	<i>Tringa nebularia</i>	20	w/p	NR, LS	LR: cd
70.	<i>Tringa ochropus</i>	50	w/p	NR, LS	LR: cd
71.	<i>Tringa glareola</i>	15	w/p	NR, LS	LR: cd
72.	<i>Larus ridibundus</i>	2651	b/w	NR, HP	LR: lc
73.	<i>Larus cachinans</i>	1500	b/w	NR, HP	LR: lc
74.	<i>Sterna caspia</i>	1	p	NR, HP	VU
75.	<i>Sterna hirundo</i>	105	b/p	NR, HP	LR: cd
76.	<i>Chlidonias niger</i>	20	b/p	NR, HP	VU
77.	<i>Sterna leucopterus</i>	75	b/p	NR, HP	LR: cd
78.	<i>Columba palumbus</i>	8	b/w	LS	LR: cd
79.	<i>Sreptopelia decaocto</i>	20	b/w	-	LR: lc
80.	<i>Streptopelia turtur</i>	8	b/p	LS	VU
81.	<i>Cuculus canorus</i>	10	b/p	NR, HP	LR: cd
82.	<i>Otus scops</i>	4	b/p	NR, HP	LR: cd
83.	<i>Athene noctua</i>	4	b/w	NR, HP	LR: nt
84.	<i>Strix aluco</i>	1	b/w	NR, HP	LR: cd
85.	<i>Alcedo atthis</i>	6	b/w	NR, HP	LR: cd
86.	<i>Upupa epos</i>	6	b/p	NR, HP	LR: cd
87.	<i>Picus viridis</i>	3	b/w	HP	VU
88.	<i>Picus canus</i>	2	b/w	HP	VU
89.	<i>Dendrocopos major</i>	1	b/w	HP	LR: cd
90.	<i>Dendrocopos syriacus</i>	1	b/w	NR, HP	LR: cd
91.	<i>Dendrocopos minor</i>	3	b/w	NR, HP	LR: cd
92.	<i>Alauda arvensis</i>	8	b/w	HP	VU
93.	<i>Galerida cristata</i>	7	b/w	HP	VU
94.	<i>Lullula arborea</i>	4	b/w	NR, HP	VU
95.	<i>Riparia riparia</i>	4	b/p	NV, HP	VU
96.	<i>Hirundo rustica</i>	1	b/p	NR, HP	VU
97.	<i>Delichon urbica</i>	25	b/p	HP	LR: lc
98.	<i>Anthus trivialis</i>	4	b/p	HP	LR: cd
99.	<i>Motacilla flava</i>	10	b/p	HP	LR: cd
100.	<i>Motacilla alba</i>	8	b/w	HP	LR: cd
101.	<i>Troglodytes troglodytes</i>	8	b/w	HP	LR: cd
102.	<i>Erithacus rubecula</i>	13	b/w	HP	LR: cd
103.	<i>Luscinia megarhynchos</i>	14	b/p	HP	LR: cd
104.	<i>Phoenicurus ochruros</i>	2	b/w	HP	LR: cd
105.	<i>Saxicola rubetra</i>	6	b/p	NR, HP	LR: cd
106.	<i>Turdus merula</i>	9	b/w	HP	LR: cd
107.	<i>Turdus phylomelos</i>	4	b/w	HP	LR: cd
108.	<i>Turdus pilaris</i>	14	b/w	NR, HP	LR: cd
109.	<i>Turdus viscivorus</i>	5	b/w	NR, HP	LR: cd
110.	<i>Locustela luscinioides</i>	5	b/p	NR, HP	LR: cd
111.	<i>Acrocephalus schoenobaenus</i>	71	b/p	HP	LR: cd
112.	<i>Acrocephalus palustris</i>	2	b/p	HP	LR: cd
113.	<i>Acrocephalus scirpaceus</i>	7	b/p	NR, HP	LR: cd
114.	<i>Acrocephalus arundinaceus</i>	4	b/p	HP	LR: cd
115.	<i>Hippolais palida</i>	4	b/p	NR, HP	EN
116.	<i>Hippolais icterina</i>	2	b/p	NR, HP	LR: cd
117.	<i>Sylvia curruca</i>	6	b/p	HP	LR: cd

118.	<i>Sylvia communis</i>	10	b/p	HP	VU
119.	<i>Sylvia borin</i>	4	b/p	NR, HP	LR: cd
120.	<i>Sylvia atricapilla</i>	32	b/p	HP	LR: cd
121.	<i>Philooscopus sibilatrix</i>	4	b/p	HP	LR: cd
122.	<i>Philloscopus collybita</i>	8	b/w	HP	LR: cd
123.	<i>Phylloscopus trochilus</i>	23	p	HP	LR: cd
124.	<i>Muscicapa striata</i>	7	b/p	HP	LR: cd
125.	<i>Aegithalos caudatus</i>	13	b/w	HP	LR: cd
126.	<i>Parus palustris</i>	5	b/w	HP	LR: cd
127.	<i>Parus caeruleus</i>	6	b/w	HP	LR: cd
128.	<i>Parus major</i>	28	b/w	HP	LR: cd
129.	<i>Sitta europea</i>	5	b/w	HP	VU
130.	<i>Certhia brachydactyla</i>	3	b/w	NR, HP	LR: cd
131.	<i>Oriolus oriolus</i>	1	b	NR, HP	LR: cd
132.	<i>Lanius collurio</i>	8	b/p	HP	VU
133.	<i>Garrulus glandarius</i>	1	b/w	HP	LR: lc
134.	<i>Pica pica</i>	20	b/w	-	LR: lc
135.	<i>Corvus monedula</i>	20	b/w	HP	VU
136.	<i>Corvus frugilegus</i>	35	b/w	LS	LR: lc
137.	<i>Corvus corone cornix</i>	20	b/w	-	LR: lc
138.	<i>Corvus corax</i>	5	b/p	HP	LR: cd
139.	<i>Sturnus vulgaris</i>	40	b/w	HP	LR: cd
140.	<i>Passer domesticus</i>	1	b/w	HP	LR: lc
141.	<i>Passer montanus</i>	1	b/w	HP	LR: cd
142.	<i>Fringilla coelebs</i>	20	b/w	HP	LR: cd
143.	<i>Carduelis chloris</i>	9	b/w	HP	LR: cd
144.	<i>Carduelis carduelis</i>	5	b/w	HP	LR: cd
145.	<i>Carduelis spinus</i>	13	b/w	NR, HP	LR: cd
146.	<i>Pyrrhulla pyrrhulla</i>	10	b/w	NR, HP	LR: cd
147.	<i>Coccothraustes coccothraustes</i>	8	b/w	HP	LR: cd
148.	<i>Emberiza citrinella</i>	20	b/w	NR, HP	LR: cd
149.	<i>Emberiza cirrus</i>	7	b/w	NR, HP	LR: cd
150.	<i>Emberiza hortulana</i>	11	b/p	NR, HP	VU
151.	<i>Emberiza schoeniculus</i>	19	b/w	NR, HP	VU
152.	<i>Miliaria calandra</i>	15	b/w	NR, HP	VU

Shortcuts used in table:

HP - Underground hunting prohibition in the whole territory of Serbia

HV - Underground hunting prohibition in Vojvodina, in other parts of Serbia permanently protected

NR - Natural rarity in the whole territory of Serbia

NV - Natural rarity in Serbia, except Vojvodina

LS - Reduced hunting in the whole territory of Serbia

LV – Reduced hunting only in Vojvodina



