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THE ORNITHOLOGICAL INVESTIGATION ON THE FORESTS OF "TISZADOB FLOOD BASIN" NATURE CONSERVATION AREA

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Summary

The author investigated the bird-communities of the forests of "Tiszadob flood basin" nature conservation area in order to give useful advices about nature conservation. During the comparative analises he ascertained the following facts:

1. The bird-community typical of the hardwood groves of the flood basin developed during a long process, which is characterized by the dominancy of small insectivorous song-birds. The proportion of top-predatories represented by carnivores is very low. During the development the hollow-dwellers grew in proportion and in role.
2. On the examined flood basin a gradual reconstruction of the old hardwood grove becomes necessary without last utilization and without endangering the extremely rich bird-community living there. Sylviculture must not be introduced here.
3. Should Populeto cultum be last utilized, the renewal must happen with robur. In the planted robur-forests sylviculture is allowed.
4. If we keep to the rules mentioned above we can expect natural forests and bird-communities, and this is the main aim of nature conservation here.

Introduction

The Tisza was a decisively determinant river in our country's ancient scenery. Her floods covering large areas formed the largest marsh of Central Europe. The river control however hindered the roving water and made the large reedies and gallery forests of the flood basin disappear. We have only poor remains of all of those natural values that characterized the river a hundred years ago. So it is quite understandable that nature conservation preserved the remaining valuable areas. One of them is "Tiszadob flood basin", which — with its 1000-hectare surface 2471 acres) — is an important member among the preserved areas near the river. (See diagram 1.) Since the preservation was justified by the forests and the fauna — mainly birds — typical of flood basins, a deep ornithological analysis was needed, which can give useful advices to nature conservation as well. Data about the area in the ornithological literature were published by only the author of this work — Legány 1964, 1965 — but these data partly have become out of date, partly they are not enough to be the basis of nature conservation.

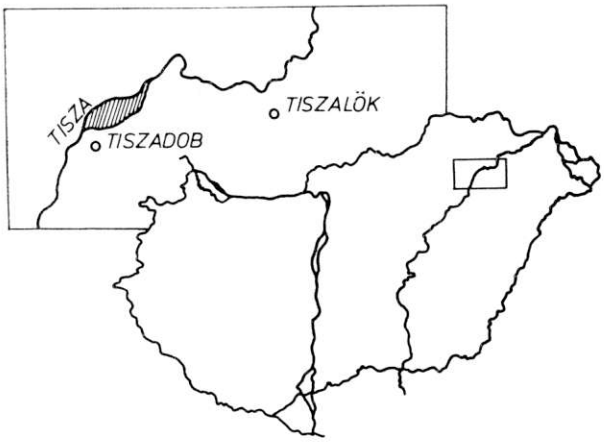

Fig. 1. The situation of "Tiszadob flood basin" nature conservation area in Hungary.

Materials and Methods

Most of the nature conservation area is covered with forests, in which sylviculture has been introduced. Sylviculture can affect — negatively or positively — the further survival of the living world here. That is why I choose the places of ornithological survey so as to be able to get useful information about the birds of the different — in age and in conbination of species — forests and about the direction of the community's changes both in quantity and quality. I choose the following places of survey: (See diagram 2 for the spatial distribution of these places.)

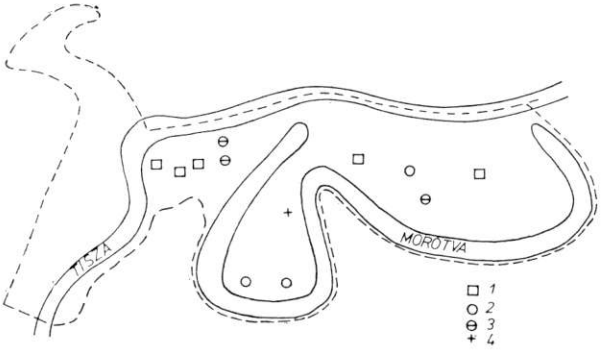

Fig. 2. The distribution of the places of investigation on the examined area
Key to the signs used: - - - border of the nature conservation area, + spruce-forest, □ oak-forest, O ash-forest, ∅ Populeto cultum.

1. *Quercus robur* planted 15 years ago. It is characterised by thick shrub stratum of *Cornus sanguinea* and *Rubus caesius.*
2. *Quercus robur* planted 25 years ago. Thick shrub stratum of *Cornus sanguinea, Ulmus laevis* and *Acer negundo.*
3. *Quercus robur* planted 30 years ago. Thick shrub stratum of *Cornus sanguinea.*
4. *Quercus robur* planted 50 years ago. Thick shrub stratum of *Sambucus nigra* beside *Cornus sanguinea.*
5. The remains of a 150—200-year old hardwood gallery forest — *Querco-Ulmetum* — which consists of sometimes decaying *Quercus robur, Populus alba, P. nigra* and *Ulmus laevis.*

The shrub stratum is not so thick as in the first four cases, and mainly consists of *Cornus sanguinea* and *Sambucus nigra*. The big, old trees have become hollow and this fact is decisively determines the combination of the bird-community. There is no sylviculture introduced here.

6. Old — 50—60-year old — ash-forest *(Fraxinus angustifolia)* in which planned sylviculture has been introduced. They are probably planted forests, but oak- and elm-trees have appeared in them because of their old age. Their shrub stratum — consisting of *Sambucus nigra* and *Cornus sanguinea* — is thin. In order to get acceptable information about the bird-community of ashforests I marked out places of survey on three different areas.

7. The area of Populeto cultum is not growing any more, but there is still a lot of them. They were mainly planted in the place of the old soft-wood groves *(Salicetum albae-fragilis)*. Considering the fact that these areas are not suitable *for birds at all* — LEGÁNY (1974) — I found it necessary to examine their role. That is why I marked out three places of survey in the case of ash-forests.

8. *Picea excelsa* are completely alien to the character of the area. These trees appear in some small groups on the flood basin, as the developed remains of old Christmas-tree forests. I intended to make clear their role and importance as well, so I marked out a place of survey here, too.

The surface of the places was 1 hectare (=2.471 acres) that I had paced off then I measured it out with the help of a range-finder of a camera, and I took it into consideration that the place should be typical of the examined kind of forest, and in every case it could be identified by a characteristic tree, molehill, ditch etc.

In the classification of nidatories I considered every momentum that could prove the hatching of the birds, that is the singing cocks, the found nests, the parents that fed and lead to their nestlings, the egg-shells etc. The data tabulated here are all the results of the 1981 examinations.

The Results of the Examination

During the tabulation of the data of the survey we could examine the hatching of 46 bird species. Of course the bird-communities showed significant differences because of the existing ecological differences. (See table I)

I examined only the nesting avifauna because these species are present, take nourishment and multiplicate during the active life of the vegetation and the whole ecosystem, so their connection is close to the biocenosis they live in. The other reason for my decision was that these species are very important for nature conservation, so we have to concentrate on them.

As I mentioned and it is clear from Table I, there are measurable differences between each type of forest. That is why my aim was to find and define the reason for it in order to get closer to the understanding of the emergence of the bird-communities. In favour of this I analysed every stand in many respects. I examined the combination of species and the relative frequency-value of the species, and with the help of the Shannon—Wiener function

$$H_s = -\sum_{i=1}^{s} p_i \cdot \ln p_i$$

I went on counting and analysed the diversity-values. I find it important because these data clearly inform us not only about the multiplicity of the examined bird-community, but also about its entropy, i.e. its disorderliness. The effects of diversity and entropy are opposite to each other, i.e. the bigger is the diversity-value, the smaller is the entropy. So the order of the structure of the community grows.

As a result of the counts I got a regular line in degree — see Table 2 — where the growing diversity-values were parallel with the growing age of the forest. Of course I got the highest value in the case of the hardly disturbed hardwood grove.

Table 1. *The bird species examined on „Tiszadob flood basin"*

Species	P	P_c	O_{15}	O_{25}	O_{30}	O_{50}	O_{150}	A
1. *Anas platyrhyncos* L.							1	
2. *Falco subbuteo* L.							1	
3. *Falco tinnunculus* L.						1		
4. *Phasianus colchicus* L.		1						
5. *Columba oenas* L.							1	
6. *Columba palumbus* L.	1							
7. *Streptopelia turtur*	1	1	1	1	1	1	2	2
8. *Streptopelia decaocto* FRIV.	3							
9. *Cuculus canorus* L.				1	2	2	1	1
10. *Strix aluco* L.							1	
11. *Coracias garrulus* L.							1	
12. *Upupa epops* L.							1	
13. *Picus viridis* L.							1	1
14. *Picus canus* GM.								1
15. *Dryocopus martius* L.							1	
16. *Dendrocopus maior* L.				1	1	1	1	1
17. *Oriolus oriolus* L.		1	1	1	1	1	2	1
18. *Corvus cornix* L.						1		1
19. *Coloeus monedula* L.							2	3
20. *Pica pica* L.			1					
21. *Garrulus glandarius* L.					1	1	1	
22. *Parus maior* L.					2	3	2	1
23. *Parus coeruleus* L.						1	3	1
24. *Parus palustris* L.				1		1	1	
25. *Sitta europaea* L.							1	1
26. *Certhia brachydactyla* BREHM.							1	1
27. *Troglodites troglodites* L.							1	
28. *Turdus philomelos* BREHM.							1	
29. *Turdus merula* L.	1		1	1	1	1	1	1
30. *Luscinia megarhynchos* BREHM.		1	1	1	2	2	2	1
31. *Erithacus rubecula* L.							1	1
32. *Locustella fluviatilis* WOLF.					1		1	
33. *Sylvia atricapilla* L.		1	1	1	2	2	2	2
34. *Sylvia borin* BECHST.						1	1	
35. *Sylvia curruca* L.					1	1	1	1
36. *Phylloscopus collybita* VIEILL.				1		1	1	1
37. *Phylloscopus sibilatrix* BECHST.					1	1		1
38. *Muscicapa striata* PALL.						1	1	1
39. *Anthus trivialis* L.			1		1		1	
40. *Lanius collurio* L.				1		1		
41. *Sturnus vulgaris* L.					2	2	4	2
42. *Passer montanus* L.			1		1	2	2	
43. *Chloris chloris* L.	3						1	1
44. *Carduelis carduelis* L.			1	1		1		
45. *Fringilla coelebs* L.	1	1	1	1	1	3	2	2
46. *Emberiza citrinella* L.			1		2	2	1	1

Key to the signs used: P = pinewoods, P_c = Populeto cultum, O_{15} = 15-year old oak-forest, O_{25} = 25-year old oak-forest, O_{30} = 30-year old oak-forest, O_{50} = 50-year old oak-forest, O_{150} = 150-year old oak-forest, A = ash-forest. The numbers mean the number of nesting couples on the place of investigation.

It means that the climax bird-communities in the hardwood groves of the flood basin develop during a long time. It is possible that beside the specific branch-structure and the plantation character of the phenomenon mentioned above also

Table 2. *The diversity-values of the examined forests*

Forests	Combination of species	Distribution of fauna-elements	Category of nutrition	Nestling stratum	Global diversity
pinewoods	1.6434	1.0114	0.1519	0.6365	3.4432
Populeto cultum	1.7917	0.8675	0.6931	1.0986	4.5409
15-year old oak-forest	2.3025	1.0296	1.0296	1.3138	5.6755
25-year old oak-forest	2.4849	1.0281	0.5623	1.3086	5.3839
30-year old oak-forest	2.8861	1.0958	0.8246	1.3713	6.1778
50-year old oak-forest	3.1293	1.1889	0.9906	1.3625	6.6713
150-year old oak-forest	3.5138	1.3188	0.9413	1.2666	7.0405
ash-forest	3.1865	1.0695	0.9319	1.3150	6.5029
national average		2.0537			

justifies the examined low diversity-values. By the time the bird-community starts to develop in these "forests" the trees have already grown enough to fall them and are ready to last utilization. So on nature conservation areas where presentation is the main aim, Populeto cultum must not be used for renewal.

When I was examining the differences of bird-communities of each type of forest, the number of nesting couples per unit area in the old oak-forests and ash-forests was very high (see Table 1). It can be explained by the consideration of the revir not only horizontally but vertically, too. In a tall — 25—30 m high — robur-forest more nesting couples find possibilities for nutrition and places for hatching than in a smaller, younger stand.

The development of the bird-community starts with fauna-elements of Europe and Europe-Turkestan. Among them there are species that nest on the ground level, in the shrub stratum and in the tree stratum. It is interesting because the number of palearctic species that absolutely dominate the country's avifauna is low at the beginning, and it grows only during the long-lasting development of the community. So the average that characterises Hungary is the result of a long development. So from the quantity of deviation from it we can infer the stage of development of the examined fauna. To do this I counted the diversity of the fauna-elements on each place of survey again, and compared it with the national average. (See Table 2) From this we can follow a gradual development of the fauna which goes from the beginning to the emergence. Here the beginning is represented by Populeto cultum, because their development stopped at a low level, although the stocking starts with similar species in every type of forest. On the preserved area we find that the old hardwood grove reaches the highest point of development, which is 64% of the national average. Of course it does not mean a stopped development but shows the character of the living place.

The development of bird-communities has a close connection with the creation and utilization of the nesting place. We can find four nesting strata in the forests, namely: ground: terricol, shrub: fruticicol, stem of tree: dendricol, foliage: arboricol strata. Of course at the beginning of the development of the forests there are possibilities for nesting only for terricol and fruticicol nidatories, and for arboricol species with great resistance. As the forest grows, the proportion of species nesting in different strata changes. Dendricol species appear at last, when the trees have enough size to be hollowed out. These changes can be followed easily on the examined area.

While there are no hollow-dwellers in Populeto cultum, and there are 10% of them in the 15-year old oak forest with equal distribution of the other three strata,

the old hardwood groves have 47% of dendricol species. Here the other three strata — although not in equal proportions — are represented in almost the same order of magnitude (See Table 3). The shift of these proportions shows a better utilization of the given possibilities for nesting. My previous experience seems to be justified — LEGÁNY 1977 — that the settling of birds in many cases depends on the possibilities for nesting — which is missing more frequently — much more, than on the nutriment, which can be found more easily. It means that in most of the cases the minimum factor is the place for nesting which limits the size of the fauna.

Table 3. *The distibution of species found on the places of survey of the examined forests according to nesting stratum and nutriment*

	P	P_c	O_{15}	O_{25}	O_{30}	O_{50}	O_{150}	A
terricol	—	2	3	2	4	4	5	5
fruticicol	2	2	3	5	6	7	9	5
dendricol	—	—	1	2	5	7	17	11
arboricol	2	2	3	3	4	7	6	5
carnivore	—	—	—	—	—	1	2	—
insectivore	1	3	5	9	13	16	25	18
herbivore	5	3	3	3	4	5	7	5
omnivore	—	—	2	—	2	3	3	3

Key to the signs used: P = pinewoods, P_c = Populeto cultum, O_{15} = 15-year old oak forest, O_{25} = 25-year old oak-forest, O_{30} = 30-year old oak-forest, O_{50} = 50-year old oak-fores, O_{150} = 150-year old oak-forest, hardwood grove, A = ash-forest.

That is why I analysed the distribution of bird-communities according to the nutriment. I differentiated carnivores eating mainly vertebrata, insectivores eating mainly Articulata, herbivores eating plants, and omnivorous birds. Of course I know that there are no absolute trophic categories like a bird eating only insects, but there are ones that eat mainly insects. I put each species to one or another group according to this principle.

As in most of the cases — here, too — I got the absolute dominancy of insectivores (see Table 3). Most of these are small songbirds, which get their nutriment from the forest itself, so they join in the energy-flow of their place of hatching, which means that they have a great role in keeping the ecological stability of the area. These species are also important because they are completely reduced to the forest, so their preservation can be solved by the preservation and right handling of the forest, and with ensuring tranquility for them. Of course it concerns several herbivores and omnivores which are also reduced to the forest. The carnivores had the lowest value, I found them only on two areas. The reason for the significant decrease of their number is the same as for the general disappear of predatories.

Because of the apparent differences of each type of forest I counted the value of identical species — Jaccard's number — and the value of identical dominants — Reckonen's number — in order to show that the communities are really different, they are not related to each other. The results in both cases mathematically proved the previous recognition that we can follow the development of a bird-community on the basis of both the values of identical species and identical dominants. I got the

same chain of relationship, which marked out the degree of relationship between the neighbouring members with the value above 45%. According to it the members follow each other like this:

Populeto cultum — 15-year old oak-forest — 25-year old oak-forest — 30-year old oak-forest — 50-year old oak-forest — ash-forest — 150-year old hardwood grove

On the basis of all counts the pinewoods were far from the other types of forests. This is shown by the diversity-values, the fauna-elements and the strata of nesting. (See Table 2, 3). So the spruce-forest is not only alien to the landscape of the flood basin of the Tisza, but also from the hatching fauna, although it gives shelter in winter. Consequently their area must not be grown and the renewal should be with oak.

We should mention the herons living in the examined hardwood grove but not on the area of survey. This colony has been known for some decades. The author of this work examined the hatching of *Ardea cinerea* L., *Nycticorax nycticorax* L., *Egretta garzetta* L., *Ardeola ralloides* SCOP., and *Phalacrocrocorax carbo* SHAW-NODD. in 1961 (LEGÁNY 1964). In the middle of the sixties — because of still unknown reasons — every species left the colony except *Ardea cinerea* L. and settled down near Tiszaluc. Since then only the common herons have hatched here, there were 81 couples during the examined period. It is very interesting that there were no nests on oak-trees, there were only on poplars, and one nest was on an elm. (See diagram 3) I could not find an explanation of this phenomenon, because they could have nested on oak-trees under the same circumstances, but they did not. Besides it was the same in 1971 in Marót-zug of Tiszabercel — LEGÁNY 1975 — where the 50 couples of *Ardea cinerea* L., and the 8 couples of *Egretta garzetta* L. nested on the 11 poplars of a 1-hectare oak-forest. This phenomenon must have such reason of biology of incubation that needs further examination.

Besides the colony of herons live in absolute tranquility and safety. There is only one problem of their preservation: the birds go far from their area for feed. They often visit the fish-ponds nearby, where the fall victim to the fisheries officials' allowed motion-away. The colony however has had the same size for years, so there is no significant loss of them.

To sum up the experiences we can state the following:

1. The development of the bird-communities typical of the hardwood groves of the flood basin is the result of a long process. The community is characterized by the dominancy of small insectivorous song-birds. The proportion of carnivores representing top-predatories is very low. During the development the hollow-dwellers grew is proportion and in significance.

2. On the examined flood basin the old hardwood grove should be reconstructed without last utilization and without endangering the existence of the extremely rich bird-community. Sylviculture must not be introduced here.

3. In the oak-forests planted during the renewal of forests sylviculture is allowed but as regards last utilization, consultation with experts on nature conservation is needed.

4. In case of last utilization of Populeto cultum and spruce-forests the renewal should happen with robur.

5. If we keep to the rules mentioned above, we can expect natural forests and bird-communities, and this is the first aim of nature conservation here.

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A "Tiszadobi-ártér" természetvédelmi terület erdőinek madártani vizsgálata

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Kivonat

A szerző a „Tiszadobi-ártér" természetvédelmi terület erdőinek madáregyütteseit vizsgálta olyan céllal, hogy a természetvédelmi kezelés számára hasznos tanácsokat tudjon adni. Az összehasonlító elemzések során a következőket állapította meg.

1. A terület keményfa-ligeteire jellemző madáregyüttes kialakulása hosszú folyamat eredménye. Az együttesre jellemző a kistestű, rovarevő énekesek dominanciája. A csúcsragadozókat képviselő húsevők aránya igen alacsony. A fejlődés során jelentősen megnő az odúlakók aránya és jelentősége.

2. A vizsgált ártéren az ősi keményfa-liget erdőfolt fokozatos rekonstrukciója válik szükségessé anélkül, hogy véghasználatot hajtanának végre és a benne levő rendkívül gazdag madáregyüttes létét veszélyeztetnénk.

3. Az erdőfelújítások során létesített tölgyesekben az erdőgazdálkodás megengedhető, de a véghasználatoknál konzultálni kell a természetvédelem szakembereivel.

4. A nemesnyárasok és lucfenyvesek véghasználata esetén a felújítást kocsányos tölggyel kell végezni.

5. A fenti szabályok betartása mellett természetközeli erdőkre és madáregyüttesekre számíthatunk, amely a természetvédelemnek itt elsődleges célja.

Ornitološka osmatranja u šumama zaštićenog okruga plavnog područja Tiszadob

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Abstract

Autor je na plavnom području Tiszadob u šumama zaštićerog okruga vršio ornitološka istraživanja u cilju unapredjivanja zaštite prirode. Uporednom analizom utvrdjeno je sledeće:

1. Formiranje ornitofaune u tvrdolišćarskim sastojinama je dugotrajan proces. U ovim zajednicama dominiraju korisne ptice pevačice. Ptice grabljivice na vrhu piramide su slabo zastupljene. U toku razvoja dolazi do značajnog povećavanja proporcije i uloge dupljarica.

2. Rekonstrukciju mestimično prisutnih stoletnih tvrdoličćarskih sastojina postepeno treba realizovati, kako nebi ugrozili njihovu veoma bogatu ornitofaunu.

3. Privredna delatnost u obnovljenim hrastovim šumama je dopuštena, ali je pri eksploataciji obavezna konsultacija stručnjaka iz oblasti zaštite prirode.

4. Obnova plantažnih topola i četinara nakon njihove seče treba da se vrši Quercus robur-om.

5. Pridržavajući se gornjih pravila očekuje se uspostavljenje autohtonih šumskih zajednica i svojstvene ornitofaune, kao prevashodni cilj zaštite prirode na ovom području.

ИССЛЕДОВАНИЕ ПТИЦ ЛЕСОВ ПРИРОДНОГО ЗАКАЗНИКА «ТИСАДОБСКОЙ-ПОЙМЫ»

А. Легань

Инспекция охраны природы, Тисавошвар, ВНР

Резюме

Автор провел исследование птиц лесов заказника «Тисадобской поймы» с целью, разрал бот атьполезные мероприятия для охраны природы, и путем сравнительного анализа пришекзаключению:

1. В широколиственных лесах этой территории формирование птичьего общества является длительным процесом. Для данного ансамбля птиц характерны здесь мелкие размеры тела, насекомоядность, с поющей доминанцией. Хищники среди них находятся в очень малом количестве. В процессе развития, в значительном количестве возрастают соотношения и значение дуплогнезниковых птиц.

2. В изучаемой пойме растут широколиственные леса, которые нуждаются В постепенной реконструкции в такой форме, чтобы не повредить имеющегося здесь богатсва орнитофауны. Здесь и в дальнейшем не советуют вести лесное хозяйство.

3. При восстановительных лесных мероприятиях культивация дубров может быть допустима, однако не без консультации со стороны специалистов охраны природы.

4. Возобновление тополевых и еловых лесов следует провести через черещатый дуб.

5. Рядом с вышеприведенными мероприятиями, со стороны охраны природы, следует обратить осбое внимание на птичий ансамбль проживающий в аборигенных лесах.