AVIFAUNA OF THE AGROECOSYSTEMS FROM THE PERIURBAN AREA OF TIMISOARA IN AUTUMN SEASON

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Abstract: *The periurban area of the city includes the forest ecosystem, represented by Padurea Verde, agroecosistem and ecotone areas. Agroecosystems are represented by agricultural crops (in the north, adjacent thoroughfares to Calea Aradului si Calea Torontalului and in the south Calea Sagului area), pastures (Freidorf area in the western side and in the south eastern the area of Calea Buziasului – Calea Mosnitei , aiming at a mixed grassland ecosystem, agricultural crops and residential areas). This paper aims to show a picture of the avifauna of these ecosystems heavily modified by humans, share the adaptability of species of birds in such habitats. These lists may contribute to the composition of similar databases as the Common Bird Monitoring Program of the Romanian Ornithological Society, very important data for nature conservation throughout the country and at international level; through this kind of research is attempted the composition of data bases on the conservation status of bird populations and to find strategies to limit negative effects on society due to their development. The investigation method applied is based on the path method (FERRY and FROCHOT, 1958), improved through a statistical method processed by specialists from the Zoology Department of the Faculty of Chemistry, Biology and Geography of the Western University from Timisoara. The method emphasizes both aspects of abundance and species coverage of energy and the importance of species in ecosystem. From observations there are present 41 bird species, characteristic for this season and type of ecosystem and also that includes species wich are in autumn migration. The species that hold higher degrees are: Sturnus vulgaris, Corvus frugilegus, Columba livia domestica, Pica pica, Passer Montanus, plus Anas plathyrhynchos and Larus ridibundus for Freidorf area, due to the proximity to the Bega Canal. They are described in various specialized works as generally useful agricultural species through biological control that is unintentionally practiced by the act of feeding, such as owl (Athene noctua) (CATUNEANU, 1952), which in a month consumes 300 mice, Asio flammeus and Buteo buteo or Corvus frugilegus, which contributes more to combat beetle by feeding with its larvae that are unearthed during plowing.*

Key words**:** *agroecosystem, birds, dominance, Timisoara*

INTRODUCTION

By applying 79/409/CCE Directive (also known as the Birds Directive) and the activity of 2000 European Natura Netwok there was a significant improvement on the conservation status in Europe, of many bird species considered endangered according to BirdLife International. Despite these successes, the data provided by the same organization shows that half of all species of birds in Europe still have an unfavorable conservation status, and the trend is decreasing. This decline is largely due to the negative effects of habitat fragmentation and inappropriate use of land, particularly in agriculture where the birds' needs are often ignored. Romanian Ornithological Society, BirdLife partner, launched in 2006 The Common Bird Monitoring Program, program that is still unfolding, which makes monitoring of birds of all types of ecosystem. The main purpose of the program is to detect changes in well known bird populations and common hatchery. Working with BirdLife ensures that the program is joining other European programs for monitoring bird species composition and contributes to creating databases inventory on species and their conservation status, the monitorization having as consequence the establishment of common strategies

MATERIAL AND METHODS

The investigation method applied is based on the routes method (FERRY and FROCHOT, 1958), improved by Prof. Univ. Phd. Biol. Dan STĂNESCU, by including in the calculation of threshold values of the dominant three indices, besides assessing the participation percentage. These indices are: kilometric abundance index (IKA), biomass, metabolic index, called consumption by KORODY (1958), reconsidered by STĂNESCU et al. (1999) as a metabolic index, which is actually the flies or body surface area calculated by the energy loss by Turcek in the tables that bear his name. According to him, STĂNESCU et al. (1999) speaks of the involvement of the user or consumer species in the ecosystem.

Dominance thresholds values are considered as follows:

→ absolute dominance threshold is given by all values placed above the average values plus standard deviation,

→ dominance threshold of all values that are above the average values

→ subdominance threshold of all values above the average value minus standard deviation

→ auxiliary threshold of all values less than the average values and standard deviation

→ quality of accident (accident) of all values under 20% of the auxiliary value (STĂNESCU et al. 1999).

Margin of error is calculated by 0.05%.

All calculation is made by using a soft, made in the informatics laboratory of Zoology Department belonging to Biology-Geography Faculty (West University of Timişoara). Currently the program is in the custody of prof. Dan Stănescu

RESULTS AND DISCUSSIONS

Investigations have been made in the autumn season of the years 2008, 2009, 2010.

Table 1

Avifauna in the agroecosystem of agricultural crops from USAMVBT resort (between Calea Aradului and Calea Torontalului)

Nr. crt	SPECIA	IKA	FRECV (%)	BIOM	I_{CONS}	Σ_{LOG}	DOMINANTA
1	*Sturnus vulgaris*	**4.10**	2.11	15.89	7.97	29.97	AD
2	*Corvus frugilegus*	3.94	3.43	**11.66**	9.59	28.62	AD
3	*Columba livia domestica*	4.02	2.89	11.12	9.25	27.28	AD
4	*Corvus monedula*	2.13	2.15	8.98	7.20	20.47	DOM
5	*Streptopelia decaocto*	1.99	2.15	8.74	6.99	19.88	DOM
6	*Pica pica*	0.98	1.55	8.08	6.08	16.69	DOM
7	*Passer domesticus*	1.90	0.94	6.80	5.64	15.31	DOM
8	*Falco tinnunculus*	0.69	1.35	7.50	5.73	15.27	DOM
9	*Passer montanus*	1.59	0.54	6.31	5.24	13.67	SD
10	*Lanius collurio*	0.89	1.35	5.80	4.66	12.70	SD
11	*Parus major*	1.13	1.35	5.53	4.57	12.58	SD
12	*Carduelis carduelis*	0.98	0.76	5.26	4.37	11.37	SD
13	*Emberiza citrinella*	0.80	-0.16	5.77	4.61	11.02	SD
14	*Parus caeruleus*	0.89	0.25	4.96	4.11	10.21	SD
15	*Phasianus colchicus*	-1.50	-0.85	6.75	4.50	8.89	SD
16	*Erithacus rubecula*	-0.81	-0.16	3.47	2.54	5.04	AUX
17	*Dendrocopos major*	-1.50	-0.85	4.38	2.92	4.95	AUX
						SUMA	269.04
						MEDIA	14.95
						ABATEREA STANDARD	6.70

The tables below are a sum of the data collected in the three years of avifauna study in the autumn season, in the agroecosystem of agricultural crops from USAMVBT resort, from the agroecosystem of agricultural crops adjacent to Calea Sagului area,in the mixt ecosystem adjacent to thoroughfares of Calea Buziasului – Calea Mosnitei, in Freidorf pasture ecosystem.

There have been registered 17 species. Absolute dominance is owned by three species: *Sturnus vulgaris, Corvus frugilegus, Columba livia domestica*, two species being antropofile and *Sturnus vulgaris* being a species which is in the autumn migration of this season, so the index of abundance is at higher mileage. Dominant species are in five at number, four and a antropofile species with a high degree of adaptability to anthropogenic ecosystems (*Falco tinnunculus*). The species appear as subdominante or auxiliary species characteristic for forest ecosystems (*Dendrocopos major, Erithacus rubecula*, etc.) due to proximity to the Green Forest, to some tree (*Salix sp.* or *Juglans sp*.) *Prunus spinosa* and to the shrubbery along the drainage channels.

Table 2

Avifauna in the agroecosystem of agricultural crops adjacent to Calea Sagului

Nr. crt	SPECIA	IKA	FRECV (%)	BIOM	I_{CONS}	Σ_{LOG}	DOMINANTA
1	*Columba livia domestica*	4.09	3.04	10.72	8.86	26.71	AD
2	*Corvus frugilegus*	3.27	3.13	10.52	8.45	25.37	AD
3	*Streptopelia decaocto*	2.27	2.38	8.54	6.79	19.98	DOM
4	*Passer domesticus*	3.22	2.54	7.65	6.52	19.92	DOM
5	*Corvus monedula*	2.11	2.18	8.48	6.70	19.47	DOM
6	*Sturnus vulgaris*	2.58	1.33	7.99	6.53	18.44	DOM
7	*Passer montanus*	2.82	2.32	7.07	6.00	18.20	DOM
8	*Galerida cristata*	1.37	1.74	6.20	4.94	14.25	SD
9	*Falco tinnunculus*	0.36	0.93	6.68	4.92	12.89	SD
10	*Pica pica*	-0.34	0.24	6.29	4.29	10.48	AUX
11	*Athene noctua*	- 1.03	- 0.46	5.08	3.38	6.97	AUX
						SUMA	192.68
						MEDIA	17.52
						ABATEREA STANDARD	5.97

There have been registered 11 species, the lowest number of species,from which two species are absolutely dominant, antropofile, *Columba livia domestica and Corvus frugilegus*, which excels in biomass and consumption index, followed by the dominant value, by other three species, antropofile, and another specia located in migration. Note that all the species found here are particularly well adapted to specific ecosystems or anthropogenic steppe ecosystem like *Galerida cristata*,

Table 3

Avivauna in the mixt ecosystem adjacent to thoroughfares of Calea Buziasului – Calea Mosnitei

Nr. crt	SPECIA	IKA	FRECV (%)	BIOM	I_{CONS}	Σ_{LOG}	DOMINANTA
1	*Sturnus vulgaris*	3.04	2.86	18.13	8.60	30.63	AD
2	*Columba livia domestica*	4.38	2.78	11.58	9.72	28.46	AD
3	*Corvus frugilegus*	2.40	2.70	10.22	8.15	23.47	AD
4	*Pica pica*	1.48	2.14	8.69	6.69	18.99	DOM
5	*Passer montanus*	2.36	1.86	7.19	6.12	17.53	DOM
6	*Phasianus colchinus*	0.47	0.88	8.82	6.58	16.75	DOM
7	*Corvus monedula*	1.03	1.29	7.99	6.20	16.51	DOM
8	*Streptopelia decaocto*	0.96	1.39	7.81	6.06	16.22	DOM
9	*Falco tinnunculus*	0.69	1.29	7.60	5.83	15.42	DOM
10	*Parus major*	1.61	1.66	6.11	5.15	14.52	DOM
11	*Parus caeruleus*	1.44	1.66	5.61	4.75	13.46	DOM
12	*Carduelis carduelis*	1.22	1.49	5.61	4.72	13.04	DOM
13	*Anas plathyrhynchos*	-0.92	-0.91	7.78	5.42	11.38	SD
14	*Lanius collurio*	0.18	0.88	5.19	4.06	10.32	SD
15	*Phylloscopus collybita*	0.59	1.17	4.82	3.58	9.62	SD

Nr. crt	SPECIA	IKA	FRECV (%)	BIOM	I_{CONS}	Σ_{LOG}	DOMINANTA
16	*Turdus merula*	-0.51	-0.51	5.70	4.17	9.55	SD
17	*Saxicola rubetra*	0.18	0.70	4.79	3.79	9.46	SD
18	*Fringilla coelebs*	0.18	0.19	5.01	3.94	9.32	SD
19	*Saxicola torquata*	0.00	0.70	4.61	3.61	8.91	SD
20	*Passer domesticus*	-0.51	-0.91	4.50	3.37	6.45	SD
21	*Accipiter nisus*	-1.61	-0.91	5.30	3.53	6.31	SD
22	*Dendrocopos major*	-1.61	0.91	4.38	2.92	4.79	AUX
23	*Lanius excubitor*	-1.61	-0.91	4.17	2.78	4.44	AUX
24	*Carduelis chloris*	-1.61	-0.91	3.33	2.22	3.04	AUX
25	*Eritachus rubecula*	-1.61	-0.91	2.77	1.85	2.10	AUX
26	*Sylvia communis*	-1.61	-0.91	2.56	1.71	1.76	AUX
27	*Sylvia curruca*	-1.61	-0.91	2.48	1.66	1.62	AUX
						SUMA	335.80
						MEDIA	11.99
						ABATEREA STANDARD	7.09

Table 4

Avifauna of grassland ecosystem - Freidorf

Nr. crt	SPECIA	IKA	FRECV (%)	BIOM	I_{CONS}	Σ_{LOG}	DOMINANTA
1	*Sturnus vulgaris*	4.97	2.61	10.69	9.23	27.49	AD
2	*Anas plathyrhynchos*	2.82	1.89	11.25	8.89	24.85	AD
3	*Larus ridibundus*	2.85	2.36	9.43	7.59	21.96	AD
4	*Corvus frugilegus*	2.22	2.07	9.77	7.70	21.76	AD
5	*Streptopelia decaocto*	2.33	2.19	8.91	7.16	20.59	AD
6	*Pica pica*	2.65	2.29	7.21	6.13	18.29	AD
7	*Passer montanus*	2.65	2.29	7.21	6.13	18.29	AD
8	*Columba livia domestica*	1.66	1.09	8.59	6.73	18.07	DOM
9	*Corvus monedula*	1.06	0.97	7.75	5.96	15.74	DOM
10	*Passer domesticus*	1.96	1.09	6.70	5.56	15.31	DOM
11	*Gallinula chloropus*	0.46	0.68	7.31	5.47	13.93	DOM
12	*Fulica atra atra*	0.24	- 0.42	7.78	5.55	12.69	SD
13	*Parus major*	1.30	1.19	5.53	4.57	12.59	SD
14	*Parus caeruleus*	1.37	1.29	5.27	4.42	12.35	SD
15	*Carduelis carduelis*	-1.34	-1.11	6.68	4.46	8.70	SD
16	*Falco tinnunculus*	0.05	0.28	6.68	4.92	11.93	SD
17	*Phylloscopus collybita*	1.37	1.29	4.79	4.04	11.54	SD
18	*Aegithalos caudatus*	1.06	0.50	4.60	3.86	10.02	SD
19	*Phoenicurus ochruros*	0.61	0.68	4.78	3.83	9.91	SD
20	*Buteo buteo*	-1.34	-1.11	6.68	4.46	8.70	SD
21	*Circus aeruginosus*	-1.34	-1.11	6.62	4.41	8.59	SD
22	*Podiceps ruficollis*	-0.64	-1.11	5.70	4.03	7.99	SD
23	*Alcedo athis isipida*	-0.24	-0.01	4.65	3.46	7.87	SD
24	*Sylvia comunis*	0.05	0.28	3.95	3.10	7.38	SD
25	*Phylloscopus sibilatrix*	-0.24	-0.01	3.18	2.48	5.42	AUX
26	*Panurus biarmicus*	-0.64	-0.42	3.33	2.47	4.74	AUX
27	*Chlidonia niger*	-1.34	-1.11	4.17	2.78	4.51	AUX
28	*Eritachus rubecula*	-1.34	-1.11	2.77	1.85	2.18	AUX
						SUMA	369. 25
						MEDIA	13.19
						ABATEREA STANDARD	6. 53

The number of species is commonly increasing, and also species diversity increases. Higher degrees are held throughout the antropofile dominant species (3 absolute dominant species, two of them antropofile *Columba livia domestica, Corvus frugilegus* and a migratory species - *Sturnus vulgaris*). Among the dominant species we meet shrub species characteristic for the forest ecosystem. This is due to the presence of trees and bushes along the canals and

railways and to the proximity with Mosnita Forest. The appearance of water species such as *Anas plathyrhynchos* is due to water drainage channels which are in a much larger number, to Subuleasa Channel and to its adjacent channels, that do not dry in the warm season and that have marsh vegetation.

Although located at the confluence with an industrial zone, the fauna from this place is more diverse. We met seven dominant species absolute value, of which two antropofile (*Corvus frugilegus, Pica pica*), an indifferent species *Streptopelia decaocto*, a migrating specia *Sturnus vulgaris*, and two water species *Anas plathyrhynchos, Larus ridibundus*. The appearance of large numbers of water species is due to Bega Channel.

CONCLUSIONS

There were registered in all these ecosystems 41 species of birds.

Superior dominance degrees are being hold by antropofile birds or by those that have a high adaptability degree to anthropogenic stress factors.

The highest bird species diversity was recorded in Freidorf grassland ecosystem, due to its proximity to the Bega channel.

The smallest bird species diversity was recorded in the crop agricultural ecosystem adjacent to Calea Sagului thoroughfares, where traffic is intense, and woody vegetation, which gives shelter to birds, is almost missing.

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