AVIFAUNA OF THE GRASSLAND ECOSYSTEMS FROM THE PERIURBAN AREA OF TIMISOARA IN HIEMAL 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 Girocului -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 pastures 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 28 bird species, characteristic for this season and type of ecosystem and therparticularity. The species that hold higher degrees are: Corvus frugilegus, Columba livia domestica, Pica pica, 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 and they are mentioned in various literatures as well adapted to city life and extremely inventive when environmental conditions change (CATUNEANU, 1952).*

Key words**:** *pastures, 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.

Of the total area of Timis County, the largest share is held by agricultural areas – 82.2%.

There are several types of agricultural ecosystems:

- Ecosystem of annual grass and biennial crops;
- -Ecosystem of permanent meadows and pasture:

These are natural or artificial grassland ecosystems, exploited in order to ensure the livestock feeding. They clasify into grassland characterized by repeated harvasting of aerial part of the vegetation used for fodder production and pastures where animals that eat these plant parts are being introduced.

Biotope is characterized by a high spatial heterogeneity and his features require the characteristics of vegetation.

Biocoenosis is less directed by man, being removed only woody plants and the toxic ones. It has a complex composition and 2-3 grass species belonging to Gramineae or Fabaceae. There is a complex layering on vertically and horizontally. The fauna is quite complex and close to that of natural ecosystems, consisting of insects mites, worms, reptiles, herbivorous mammals, which includes floor features of pastures. Timisoara is part of the steppe floor and the birds here are included by Dimitrie Radu in Columbidae Family.

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 hiemal season of the years 2008, 2009, 2010. The tables below are a sum of the data collected in the three years of avifauna study in the hiemal season, in the mixt ecosystem adjacent to thoroughfares of Calea Girocului - Calea Buziasului – Calea Mosnitei, considered so because it is a meadow ecosystem with residential and industrial areas, in Freidorf pasture ecosystem.

Table 1

Diversity of birds populations, in hiemal season, from pasture agro-ecosystems between Calea Girocului (Giroc Way) - Calea Mosnitei (Mosnitei Way) – Calea Buzeasului (Buziasului Way)

Nr. crt	Species	Ika	Frequency (%)	Biomass	I_{cons}	Σ_{log}	Dominance
1	*Corvus frugilegus frugilegus* L. 1758	3.08	2.93	11.82	9.75	27.57	AD
2	*Columba livia domestica* L.1758	2.55	2.03	10.67	8.80	24.07	AD
3	*Pica pica pica* L.1758	2.07	2.95	10.19	8.49	23.41	AD
4	*Turdus pilaris pilaris* L.1758	2.12	1.23	9.59	4.94	20.88	DOM
5	*Passer montanus montanus* L.1758	2.81	1.80	8.55	7.47	20.61	DOM
6	*Phasianus colchicus* L. 1758	0.70	1.75	9.96	7.72	20.13	DOM
7	*Corvus monedula* L. 1758	1.50	1.61	9.37	7.51	20.07	DOM
8	*Carduelis carduelis carduelis* L.1758	2.06	1.66	7.36	6.47	17.55	DOM
9	*Falco tinnunculus tinnunculus* L.1758	0.61	1.71	8.43	4.67	17.42	DOM
10	*Streptolia decaocto decaocto* Friv. *1838*	0.31	1.37	8.08	6.33	16.09	DOM
11	*Parus caeruleus caeruleus* L.1758	1.24	1.92	6.33	5.47	14.96	DOM
12	*Parus major major* L.1758	0.77	1.50	6.19	5.22	13.68	SD
13	*Passer domesticus domesticus* L.1758	0.61	0.61	6.54	5.40	13.16	SD
14	*Gallinulla cloropus cloropus* L. 1758	-0.73	-0.27	7.31	5.47	12.33	SD
15	*Turdus merula merula* L.1758	-0.58	0.61	6.55	5.02	11.60	SD
16	*Accipiter gentilis gentilis* L. 1758	-1.83	-0.64	7.70	5.36	10.58	SD
17	*Buteo buteo buteo* L. 1758	-1.83	-0.64	7.38	5.15	10.05	SD
18	*Larus ridibunuds* L.1766	-1.83	-0.64	6.21	4.37	8.11	SD
19	*Circus cyaneus cyaneus* L.1766	-2.52	-1.34	6.29	4.19	6.63	AUX
20	*Carduelis chloris chloris* L.1758	-1.83	-0.64	4.03	2.91	4.47	AUX
21	*Fringilla coelebs coelebs* L 1758	-1.83	-0.64	3.91	2.84	4.28	AUX
22	*Lanius excubitor excubitor* L 1758	-2.52	-1.34	4.17	2.78	3.10	AUX
23	*Erithacus rubecula rubecula* L.1758	-2.52	-1.34	2.77	1.85	0.76	ACC
						Σ	321.49
						M	13.98
						Ab st	7.30

Abbreviations: IKA- index kilometric of abundance, freq-frequency, biom -biomass, Icons - consumptive index, ΣLOG - sum of indices for species AD - absolutely dominant, DOM - dominant, SD - subdominant, AUX - Auxiliary, ACC - accidentally ,Σ-total sum, M- average, Ab. st - standard deviation

This ecosystem can be considered a mixed ecosystem, it is a pasture where there are built drainage and agreement channels like Subuleasa Channel with permanent water, but also where a significant proportion is owned by the construction of houses. Wood vegetation is abundant, that is why the diversity of birds is bigger. There were observed 23 species of birds from which the absolute dominance is owned by 3 antropofile species: *Corvus frugilegus*, *Columba livia domestica* and *Pica pica*. We have seven dominant species, 7 subdominante, 4 auxiliary and one accidental species. Worth mentioning the presence of *Turdus pilaris* among dominant species due to its eratism at this time in search of food. Specific diversity is completed in terms of quality by the species in the forest ecosystem, due to the abundant vegetation and the proximity to Mosnita Forest/ Padurea Mosnita. There are also species related to water ecosystems: *Larus ridibundus* and *Circus cyaneus*, due to drainage and entertainment channels.

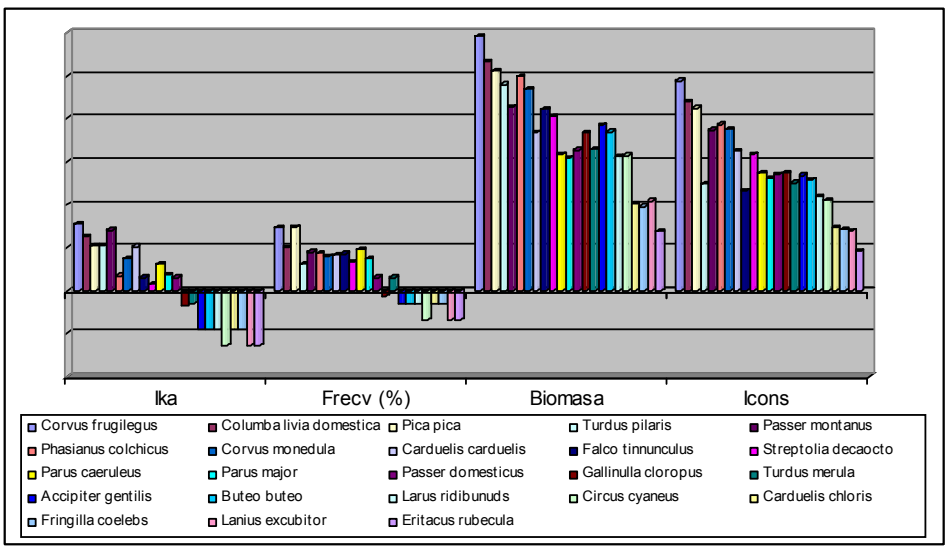

Fig 1. Graphical representation of abundance and energy flow of bird populations in pasture agro-ecosystems between Giroc Way-Mosnitei Way - Buziasului Way.

Freidorf ecosystem is an ecosystem of meadows crossed by the Bega. Canal, making the diversity of species to be higher. Human impact in the years 2009-2011 was great because some works took place in the Bega Canal in order to become a navigable channel. Thus in 2009-2010 was extracted the bottom of the channel bank and also in the area is the sewage treatment station of Timisoara. For this reasones there have been enormous drainage holes and swamp vegetation was affected on the banks of Bega. In 2011 woody vegetation on the banks was cut down, these things affecting the diversity of bird populations.

There were observed 24 species from which four species are absolutely dominant, 3 antropofile species and a water species *Larus ridibundus*, but we can say it is an opportunistic species because uses as food household debris, being in competition with crows on the field of waste from Parta. Most species are found in the other ecosystems studied, the synoptic picture being complemented by other water species such as *Anas platyrhynchos*, *Fulica atra* and *Gallinula chloropus*. Forest species have been observed in previous years of woody vegetation deforestation from the banks of Bega.

Table 2

Diversity of bird populations, in hiemal season, in Freidorf pasture agro-ecosystem

Nr. crt.	Species	Ika	Frequency (%)	Biomass	I_{cons}	Σ_{log}	Dominance
1.	*Corvus frugilegus frugilegus* L 1758	3.25	2.78	11.64	9.56	27.22	AD
2.	*Columba livia domestica* L 1758	2.81	1.61	10.58	8.72	23.72	AD
3.	*Pica pica pica* L 1758	2.42	2.81	10.19	8.19	23.62	AD
4.	*Larus ridibundus* L.1766	2.33	2.03	10.02	8.18	22.56	AD
5.	*Anas platyrhynchos platyrhynchos* L 1758	1.29	1.50	10.56	8.19	21.54	DOM
6.	*Streptolia decaocto decaocto* Friv. 1838	1.76	2.22	9.18	7.43	20.59	DOM
7.	*Corvus monedula* L 1758	1.05	1.50	9.18	7.39	19.72	DOM
8.	*Passer montanus montanus* L 1758	2.48	1.66	7.87	6.80	18.82	DOM
9.	*Gallinulla chloropus chloropus* L 1758	0.77	1.23	8.47	6.63	17.09	DOM
10.	*Turdus pilaris* L. 1758	1.32	0.28	8.44	6.79	16.83	DOM
11.	*Passer domesticus domesticus* L 1758	1.59	1.66	7.16	6.05	16.44	DOM
12.	*Falco tinunculus tinunculus* L 1758	0.60	1.31	8.07	6.30	16.28	DOM
13.	*Fulica atra atra* L 1758	-0.23	0.46	8.63	6.40	15.26	DOM
14.	*Parus major major* L 1758	1.29	1.71	6.36	5.39	14.75	SD
15.	*Buteo buteo buteo* L 1758	-0.79	0.05	8.07	5.87	13.18	SD
16.	*Carduelis carduelis carduelis* L 1758	0.72	0.86	5.66	4.78	12.02	SD
17.	*Parus caeruleus caeruleus* L 1758	0.46	0.97	5.20	4.35	10.99	SD
18.	*Phasianus colchicus* L.1758	-1.48	-0.64	7.44	5.19	10.51	SD
19.	*Aegithalos caudatus caudatus* L.1758	0.22	0.28	4.60	3.86	8.96	SD
20.	*Dendrocopos major major* L.1758	-1.48	-0.64	5.08	3.61	7.57	AUX
21.	*Carduelis spinus spinus* L.1758	-0.79	-0.23	4.09	3.19	6.26	AUX
22.	*Carduelis chloris chloris* L 1758	-1.48	-0.64	4.03	2.95	4.82	AUX
23.	*Turdus merula merula* L 1758	-2.17	-1.33	4.61	3.07	4.17	AUX
24.	*Dendrocopos syriacus* H&Her.1833	-2.17	-1.33	4.17	2.78	3.45	AUX
						Σ	355.37
						M	14.81
						Ab st	6.81

Abbreviations: IKA- index kilometric of abundance, freq-frequency, biom -biomass, Icons - consumptive index, ΣLOG - sum of indices for species AD - absolutely dominant, DOM - dominant, SD - subdominant, AUX - Auxiliary, ACC - accidentally ,Σ-total sum, M- average, Ab. st - standard deviation

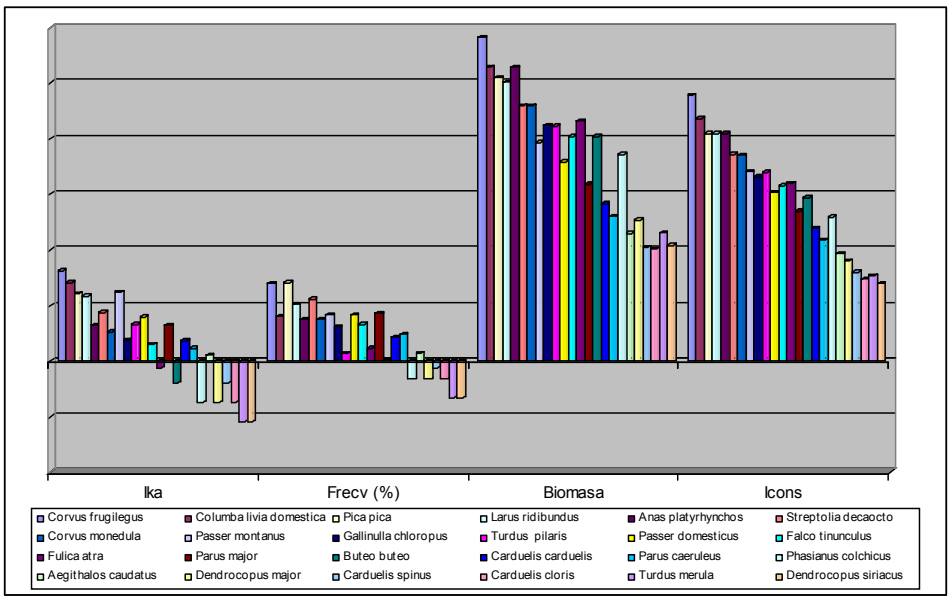

Fig 2. Graphical representation of abundance and energy flow of bird populations in Freidorf pasture

CONCLUSIONS

- There were registered in all these ecosystems 28 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 and Freidorf grassland ecosystem apears another species absolutely dominant, *Larus ridibundus,* it has a great biomass.
- The highest bird species diversity was recorded in Freidorf grassland ecosystem, due to its proximity to the Bega channel.

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