

ANTHROPOGENIC FACTORS AND THEIR EFFECTS ON AVIFAUNA FROM NATURA 2000 SITE OF ROSPA0137 PĂDUREA RADOMIR (DOLJ AND OLT COUNTIES - ROMANIA)

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Abstract. This study highlights the anthropogenic activities that take place in all biotopes of Natura 2000 Site ROSPA0137 Pădurea Radomir and the consequences of these activities on the area biocenoses and especially on bird communities. In response to the effects of the anthropogenic factors, we have developed some solutions to preserve the species and populations of birds in the protected area. The aim of these solutions is to sustain the development of the area. In the first part of the study we have presented the site biotope types and the avifauna composition with the nesting species within the protected area and those recorded in the standard site sheet. The data presented in the study are the results of the observations conducted in 2010, which were resumed in December 2013 until the present.

Keywords: anthropogenic activities, avifauna, Natura 2000 ROSPA0137 Pădurea Radomir site.

Rezumat. Factorii antropici și efectele lor asupra avifaunei din situl Natura 2000 ROSPA0137 Pădurea Radomir (Județele Dolj și Olt - România). Studiul de față reliefează activitățile antropice care se derulează în toate biotopurile sitului Natura 2000 ROSPA0137 Pădurea Radomir, precum și consecințele acestor activități asupra biocenozelor din interiorul ariei și mai ales asupra comunităților de păsări. Ca răspuns la efectele cauzate de factorii antropici, am elaborat și unele soluții de ameliorare a presiunii acestor factori și de menținere a speciilor și populațiilor de păsări în aria protejată, soluții care să permită deopotrivă, dezvoltarea durabilă a zonei. În prima parte a studiului sunt prezentate tipurile de biotopuri din sit, dar și compoziția avifaunei cu menținerea speciilor cuibăritoare în limitele ariei protejate și a celor înscrise în fișa standard a sitului. Datele prezentate în cuprinsul studiului reprezintă rezultate ale observațiilor derulate în anul 2010, care au fost reluate apoi din decembrie 2013 până în prezent.

Cuvinte cheie: activități antropice, avifauna, sit Natura 2000 ROSPA0137 Pădurea Radomir.

INTRODUCTION

ROSPA0137 Pădurea Radomir site has an area of 1,233 ha and it is located in the south part of the country, in Romanați Plain, on the villages territory across Dioști - Dolj County (65%) and Drăghiceni - Olt County (35%). In its limits, the site includes the upper and middle basin of the Gologanau Stream (Caracal); the upper arm is known as the Bratei Valley, and the lower course is known as the Caracal Creek. Its main tributary is the Eleșteului Valley, which is about 6.5 km long, located between Radomir (to the west) and Drăghiceni localities (to the east) - Fig. 1.

The hydric filling of the Bratei and Eleșteului Valleys is performed by the precipitations and groundwater leaking from the sand dunes, which are representative for this area (BADEA et al., 2011). The puddles, which are formed in the two valleys, have fluctuating levels influenced by precipitations. During the heavy rainfall periods, the accumulated water stays on the surface for a long time, and in Drăghiceni locality the two valleys discharge in a puddle (Drăghiceni puddle). However, during the dry periods, when the evaporation is intense, and the ground water level drops, the ponds greatly reduce their volume, and some of them disappear.

In the 1970, there were performed flood defense measures in the Eleșteului and Bratei Valleys, which subsequently became irrigation systems that surrounded the arable land, but currently these systems are no longer functional. The area climate is a type of continental transition, summers are long and hot, winters are long and cold, springs and autumns are short. Soils (reddish-brown, reddish brown luvic, mesobasic brown, cambic chernozem) are fertile and heavily exploited for agriculture (GRIGORAȘ et al., 2009). In terms of phyto-graphic aspects, the site area is part of the steppe with limited biodiversity (***) 1960; BĂLĂIANU, 1980). However, in 2008, PAPP & FÂNTÂNĂ (2008) have included Radomir Forest in the list of Important Avifaunistic Areas (A. I. A) from Romania. The land area of 1,031 ha was designated as A. I. A and the main biotopes described consisted in non-irrigated arable land (85.3%) and grassland (13.8%). The bird species of the area were represented by *Falco vespertinus* and *Coracias garrulus*. Moreover, there are also present other diurnal raptor species, such as: *Circus cyaneus*, *C. pygargus*, *Buteo buteo* and *Falco subbuteo*. In 2010, the additional research conducted by us, regarding the scientific project of expanding Natura 2000 Network (coordinated by I. N. C. D "Danube Delta" from Tulcea City), that reconfirmed the existence of important colonies of *Falco vespertinus* and nesting species of other valuable fauna species in the area, made possible the designation of A. I. A Pădurea Radomir as a Special Protection Avifaunistic Area (ROSPA0137 Pădurea Radomir) and integrated it in the Ecological Network Natura 2000 according to Government Law No. 971/2011.

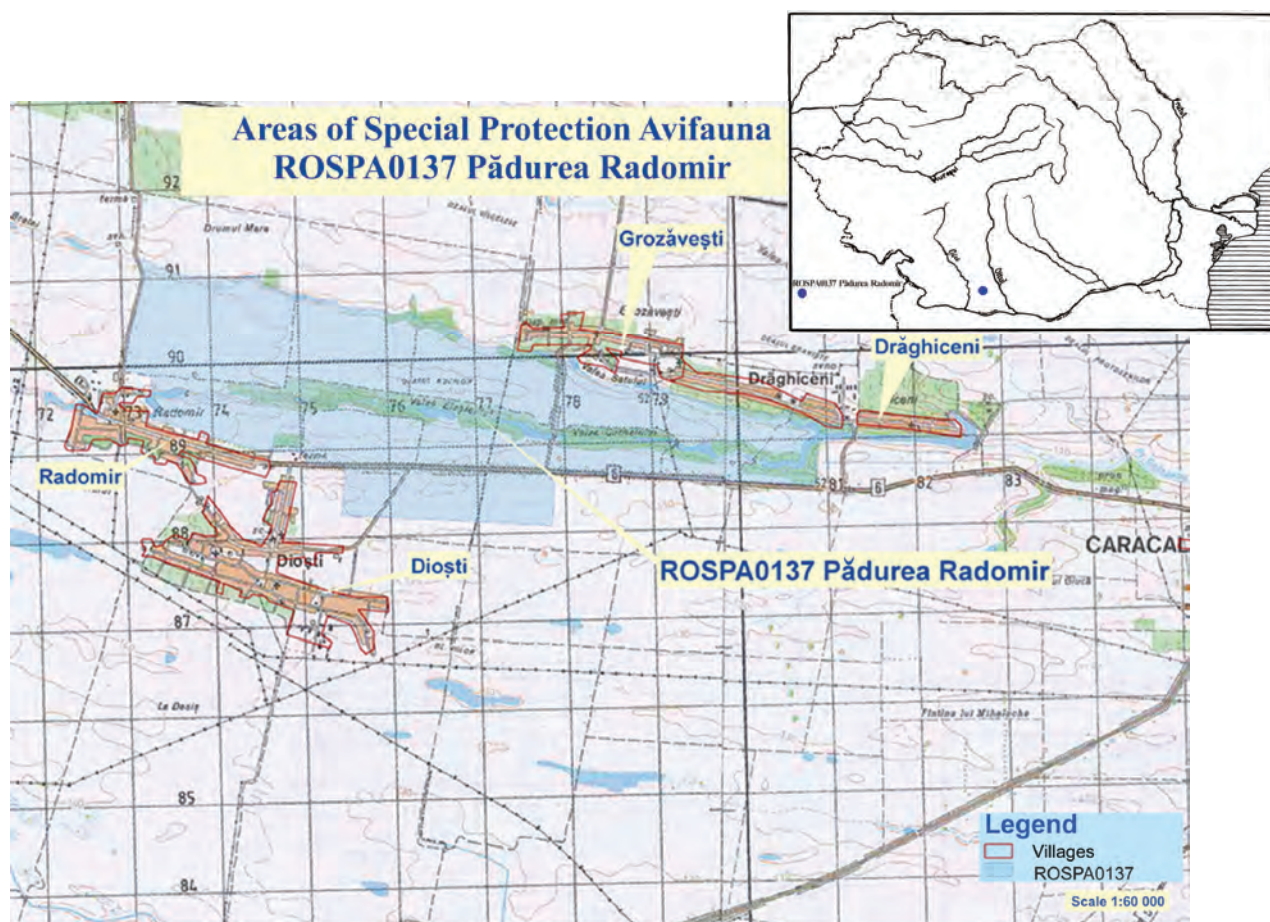


Figure 1. Perimeter of Natura 2000 site ROSPA0137 Pădurea Radomir (www.padurearadomir.ro).

The SPA area was, however, extended, to include the aquatic and terrestrial biotopes from the eastern side, which are important for the conservation of the nesting species, such as *Egretta garzetta*, *Falco vespertinus*, *Aythya nyroca*, *Lanius collurio*, *L. minor*, etc.

The situation of the site actual perimeter is shown in Table 1 and Fig. 2, according to the data from the Payments and Interventions Agency in Agriculture (A. P. I. A.) - Dolj.

Table 1. Types of biotopes from ROSPA0137 Pădurea Radomir site.

Biotope types	Area	
Productive arable lands	960.73 ha	76%
Permanent pastures	183.85 ha	14.6%
Forest vegetation (trees, shrubs, bushes)	20.96 ha	1.6%
Water surface + streams	59.92 ha	4.76%
Unproductive land, covered with reeds or rushes, swamp vegetation	14.15 ha	1.12%
Roads	17.73 ha	1.43%

Figure 2 reveals that the site largest areas are the arable lands (960.73 ha) cultivated largely with cereals, sunflower and / or rape. The grasslands are also biotopes with significant areas (183.85 ha) and along with cultivated land, provides food resources and nesting sites for species such as: *Perdix perdix*, *Coturnix coturnix*, *Alauda arvensis*, *Galerida cristata*, *Motacilla flava*, *Anthus campestris*, *Emberiza calandra*, *E. hortulana* etc. *Falco tinnunculus* and *F. vespertinus* that mostly use trophic resources (insects, rodents) from the site agroecosystems and its surroundings. Forests are an important biotic component of the site, although they are represented by modest areas (20.96 ha) of young plantations of acacia (*Robinia pseudacacia*) and oak forest, among oak species we mention the pedunculate oaks - *Quercus robur* and gray oaks - the *Q. pedunculiflora* with specimens that are more than 100 years old; there are also other species of trees interfering the oaks, such as: *Populus* sp, *Ulmus* sp. and *Fraxinus* sp., and various species of shrubs (*Crataegus monogyna*, *Rosa canina*, etc.).

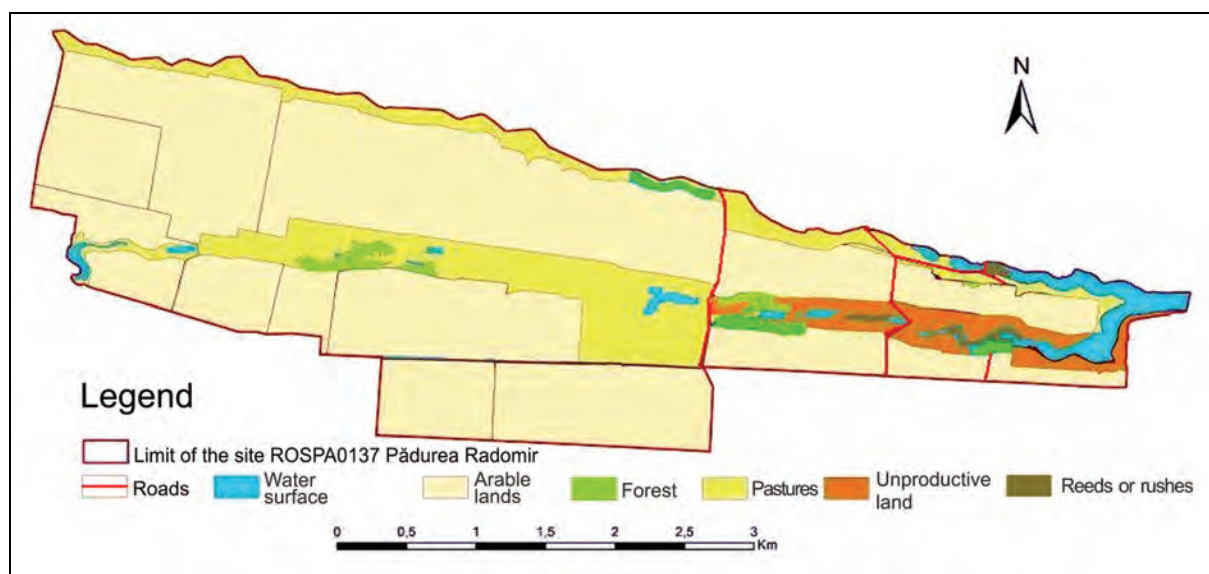


Figure 2. Biotope situation of ROSPA0137 Pădurea Radomir site perimeter (www.padurearadomir.ro).

In the ecosystems, besides the common nesting species, we have also recorded the presence of large colonies of *Falco vespertinus*, *Egretta garzetta*, *Nycticorax nycticorax*, which provides important bird site discussed. Aquatic biotopes (59.92 ha) and semiaquatic biotopes (14.15 ha) of the site also host birds of fauna value like: *Aythya nyroca*, *Ixobrychus minutus*, *Ardea purpurea*, *Himantopus himantopus*, etc. Regarding the avifaunistic importance of this area, in this study we highlight the anthropogenic activities taking place in all the site biotopes and the consequences of these activities on bird communities. The study completes our research results resumed in December 2013 and during the year 2014 (RIDICHE et al., 2014).

MATERIAL AND METHOD

The identification and monitoring activities of the bird populations and species, and also of the anthropogenic factors and site ecosystems, were performed by direct observations with optical instruments (Zeiss Jena 10x50 and 12x40 Buchnell binoculars, Sony camera 15 x), using the moving method (on predetermined routes) and the fixed observation method. In order to establish the site perimeter biotope types, we used data provided by: Olt Forest Department, A. P. I. A. - DOLJ and, also, from the Local Councils of the Dioști and Drăghiceni localities. The systematic list of species in Table 2 was configured according to the Nomenclature published by SZABO-SZELEY & BACZO (2006) and Bird field Guide (PETERSON et al., 1989, BRUUN et al., 1999). In order to improve the anthropogenic impact on the bird communities within the site, we had to develop some measures following the recommendations in the literature (MUNTEANU, 2005, 2009; MUNTEANU et al., 2000).

RESULTS AND DISCUSSIONS

The investigations performed by us in the Avifaunistic Special Protection ROSPA0137 Pădurea Radomir Area, revealed 69 species of birds; most of them are nesting species of all the habitat area (RIDICHE et al., 2014).

The SPA standard sheet includes 39 species, of which 27 are confirmed in our study. The species that we do not have information about are: *Circus pygargus*, *Caprimulgus europaeus*, *Jynx torquilla*, *Dendrocopos medius*, *Riparia riparia*, *Sylvia atricapilla*, *S. borin*, *Phylloscopus trochilus*, *Regulus ignicapillus*, *Ficedula albicollis*, *Lanius excubitor*, *Carduelis spinus*. Instead, however, in our research we have identified species of european conservation interest, which are not cited in the standard sheet of the site and require special conservation measures (Table 2).

Table 2. List of species identified in ROSPA0137 Pădurea Radomir site.

No.	Species	Nesting species	Standard sheet	No.	Species	Nesting species	Standard sheet
1.	<i>Podiceps cristatus</i>	x	-	36.	<i>Cuculus canorus</i>	x	x
2.	<i>Phalacrocorax carbo</i>	-	-	37.	<i>Athene noctua</i>	x	-
3.	<i>Ixobrychus minutus</i>	x	-	38.	<i>Asio otus</i>	x	x
4.	<i>Nycticorax nycticorax</i>	x	-	39.	<i>Merops apiaster</i>	x	-
5.	<i>Ardeola ralloides</i>	?	-	40.	<i>Coracias garrulus</i>	?	x
6.	<i>Egretta garzetta</i>	x	x	41.	<i>Upupa epops</i>	x	x
7.	<i>Ardea cinerea</i>	x	-	42.	<i>Dendrocopos syriacus</i>	x	-
8.	<i>Ardea purpurea</i>	x	-	43.	<i>Dendrocopos major</i>	x	-
9.	<i>Ciconia ciconia</i>	-	x	44.	<i>Alauda arvensis</i>	x	x

10.	<i>Ciconia nigra</i>	-	-	45.	<i>Galerida cristata</i>	x	x
11.	<i>Cygnus olor</i>	-	-	46.	<i>Hirundo rustica</i>	x	x
12.	<i>Anas platyrhynchos</i>	x	-	47.	<i>Anthus campestris</i>	x	x
13.	<i>Anas querquedula</i>	x	-	48.	<i>Motacilla flava</i>	x	x
14.	<i>Aythya ferina</i>	?	-	49.	<i>Motacilla alba</i>	x	-
15.	<i>Aythya nyroca</i>	x	x	50.	<i>Luscinia megarhynchos</i>	x	-
16.	<i>Circus cyaneus</i>	-	x	51.	<i>Acrocephalus arundinaceus</i>	x	-
17.	<i>Accipiter nisus</i>	-	-	52.	<i>Sylvia communis</i>	x	x
18.	<i>Buteo buteo</i>	?	-	53.	<i>Parus major</i>	x	-
19.	<i>Falco tinnunculus</i>	x	x	54.	<i>Oriolus oriolus</i>	x	-
20.	<i>Falco vespertinus</i>	x	x	55.	<i>Lanius collurio</i>	x	x
21.	<i>Perdix perdix</i>	x	-	56.	<i>Lanius minor</i>	x	x
22.	<i>Phasianus colchicus</i>	x	-	57.	<i>Garullus glandarius</i>	x	-
23.	<i>Coturnix coturnix</i>	x	x	58.	<i>Pica pica</i>	x	-
24.	<i>Gallinula chloropus</i>	x	-	59.	<i>Corvus monedula</i>	x	-
25.	<i>Fulica atra</i>	x	-	60.	<i>Corvus frugilegus</i>	x	-
26.	<i>Himantopus himantopus</i>	x	-	61.	<i>Corvus cornix</i>	x	-
27.	<i>Vanellus vanellus</i>	x	-	62.	<i>Sturnus vulgaris</i>	x	-
28.	<i>Tringa ochropus</i>	?	-	63.	<i>Passer domesticus</i>	x	-
29.	<i>Larus ridibundus</i>	-	-	64.	<i>Passer montanus</i>	x	-
30.	<i>Larus cachinans</i>	-	-	65.	<i>Fringilla coelebs</i>	x	-
31.	<i>Sterna hirundo</i>	-	x	66.	<i>Carduelis chloris</i>	x	x
32.	<i>Chlidonias hybrida</i>	x	x	67.	<i>Carduelis carduelis</i>	?	x
33.	<i>Columba palumbus</i>	x	x	68.	<i>Emberiza hortulana</i>	x	x
34.	<i>Streptopelia decaocto</i>	x	-	69.	<i>Emberiza calandra</i>	x	x
35.	<i>Streptopelia turtur</i>	x	x	-	-	-	-

Legend: ? – uncertain.

The biotope types within the site (pastures, arable lands, woodlands, ponds and amphibian habitats: reeds, wetlands) create a mixed composition of the avifauna. However, in the site ecosystems there are numerous anthropogenic activities (economic and recreational activities) that may directly or indirectly influence the quality and quantity of the avifauna spectrum - Table 3, Photos 1 - 8.

In order to preserve the bird communities and other faunal and botanical elements that ensure the stability and proper functioning of the ecosystems in the site perimeter, it is necessary to adopt measures, which will reduce anthropogenic pressure and also allow the long-term exploitation of the resources in the site.

Therefore, in Table 3, we have developed some solutions to counter the effects of the anthropogenic factors and, also, to preserve the species and populations of birds in the protected area, which should also allow the sustainable development of the area. It is, however, required a cooperation and active involvement of the site landowners, and also of the communities and local authorities. Furthermore it is necessary that the measures proposed to be provided by the management plan of the area and therefore, to be properly applied for all activities, plans, programs and projects, which will be carried in the site or in the immediate vicinity of the site.

CONCLUSIONS

Natura 2000 ROSPA0137 Pădurea Radomir site is located in Romanași Plain, in the southern part of the country, and includes within its terrestrial biotopes (arable lands - 76%, pastures - 14.6% forest vegetation areas - 1.6%), aquatic areas (ponds and water running - 4.76%) and semiaquatic areas (reeds and wetlands) - 1.12%, which attract specific bird communities.

As a result of the investigations carried out by us, we have identified 69 species; most of them are nesting species, and 27 of them are included in the site standard sheet, requiring a strict plan of conservation. The stability of the species and bird populations of the site ecosystems is, however, very vulnerable being threatened by human activities conducted in all the site biotopes, which we rendered in Table 3, along with their effects on the biocoenosis and bird communities.

In response to the effects of the anthropogenic factors, we have developed some solutions to ensure on one hand the preservation and conservation of the bird populations in the protected area, and on the other hand, the sustainable development of the area.

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Table 3. Anthropogenic activities and their impact on birds of ROSPA0137 Pădurea Radomir and measures to improve the negative effects.

ANTHROPOGENIC ACTIVITIES	CONSEQUENCES INSIDE THE SPA	AFFECTED SPECIES OF BIRDS	IMPROVING MEASURES
SILVICULTURE			
Tree cutting in misdeemeanour of young acacia plantations in shelterbelt. Exploitation without replanting.	The degradation of forest ecosystems. The loss of nesting sites for many species of birds.	Nesting species in the canopy of trees: <i>Egretta garzetta</i> , <i>Nycticorax nycticorax</i> , <i>Ardea cinerea</i> , <i>Falco vesperinus</i> , <i>F. tinnunculus</i> , <i>Columba palumbus</i> , <i>Sireniopelta turtur</i> , <i>Asio otus</i> (Long-eared owl sometimes uses the nests abandoned by corvides) and many Passeriformes: <i>Lanius minor</i> , <i>Fringilla coelebs</i> , <i>Carduelis chloris</i> , etc. Species nesting in hollows and holes / cavities: <i>Dendroopos</i> sp., <i>Asio otus</i> , <i>Upupa epops</i> , <i>Parus</i> sp., etc.	Establish a proper security system in order to reduce / eliminate the tree cutting and creating a replanting plan. Raise the awareness of the landowners towards the role of forest areas to preserve the site bird species of community interest. Inform the local people about the ecological and faunal value of the bird species for which the site was designated Nature 2000. Promote natural regeneration of the forest.
Monospecific forest plantations (Acacia).	Simplified structure of bird communities. Reduced nesting sites and food resources.	Birds specific to the mixed of deciduous forests.	Encourage the owners of forest areas to establish mixed tree associations, consisting in all types of vegetation, which provide vital needs (feeding and reproduction) of all types of birds. Install hollows, nests and artificial feeders to attract large number of birds, especially insectivores during the entire year.
AGRICULTURE			
Monocultures (cereals especially). Elimination of isolated trees or bushes, shrubs and reims of cultures.	Simplified structure of bird communities. Reduced nesting sites and food resources.	Specific species of the agroecosystems: <i>Perdix perdix</i> , <i>Coturnix coturnix</i> , <i>Alauda arvensis</i> , <i>Galerida cristata</i> , <i>Motacilla flava</i> . Passeriformes nesting in bushes and isolated trees: <i>Sylvia communis</i> , <i>Lanius minor</i> , <i>L. collurto</i> etc.	Promote the ecological role of the mixed cultures. Maintain the shrubs and isolated trees in cultures. Raise the landlords' awareness regarding the role of the tree vegetation in enhancing the soil quality, reducing erosion, wind intensity and, also maintaining water reserves in the soil.
Mechanization of farming. Fertilizer and chemical treatment activities. Burning the fields.	The decreasing number of site birds due to the deteriorating living conditions by: destruction or endangerment of nests with eggs and / or chicks which have no time to depart during the human activities; elimination of vital trophic sources (wild plants, insects); soil pollution (and air). The risk of expanding the impact in the forest areas or open adjacent land.	The birds that feed and nest on the ground in agroecosystems: <i>Perdix perdix</i> , <i>Coturnix coturnix</i> , <i>Alauda arvensis</i> , <i>Galerida cristata</i> . The species living in the vicinity of the cultivated land from the site: <i>Falco tinnunculus</i> , <i>F. vesperinus</i> , <i>Motacilla flava</i> , <i>Anthus campestris</i> , <i>Emberiza calandra</i> , <i>E. hortulana</i> , etc.	Limit the application of chemical treatments and control their management with qualified personnel. Awareness of the negative impact of pesticides, chemical fertilizers and burning of the agricultural vegetation of the local bioceenoses. Provide material compensations to the landowners who comply with the code of best practices in organic farming. Bann the process of burning the agricultural vegetation (stubble) - coercive measures.
Overgrazing by herds of sheep, goats, cattle - in open field and forest areas. Location of folds in forest areas of the site.	Alteration or deterioration of the grassy carpet, groundwater and surface water by changing the composition of vegetable associations, soil pollution by manure. Disruption of the biological cycle of birds (breeding, feeding and raising the offsprings).	The birds that feed and nest on the grasslands: <i>Motacilla flava</i> , <i>Anthus campestris</i> .	Maintain a traditional grazing (with moderate amounts of species). Maintain the mosaic appearance represented by areas covered by shrubs / trees alternating with areas covered by herbaceous vegetation. Inform local people regarding the ecosystem disruption. Regulation of the activity.
WASTE			
Disposal / or storage the household waste, inert materials and manure in unauthorized places.	Soil, groundwater and surface water pollution. Endanger or injury of birds due to nets, wires, hooks, fishing instruments, etc.	All species.	Proper management of waste by local authorities. Information / awareness of the citizens about individual proper waste management and / or from the households. Coercive measures.

UNORGANIZED TOURISM		
Leisure activities - weekend tourism. Improvised roads, forest paths.	Disruption of birds vital activities. Abandoned waste.	All species.
FISHING		
Individual and leisure fishing.	Disturbance of birds during nesting (if fishing periods coincide with nesting).	Birds that nest in wetlands (ponds, reeds): <i>Podiceps cristatus</i> , <i>Anas platyrhynchos</i> , <i>A. querquedula</i> , <i>Aythya nyroca</i> , <i>A. ferina</i> , <i>Chlidonias hybridus</i> , <i>Ixobrychus minutus</i> , <i>Fulica atra</i> , <i>Gallinula chloropus</i> and <i>Acrocephalus</i> sp.
Authorized hunting in the forest area, grasslands and arable lands.	Accidental shooting of protected species.	Species of conservation interest (<i>Egretta</i> sp., <i>Aythya nyroca</i> , etc.), species of hunting interest (<i>Anas</i> sp., <i>Perdix perdix</i> , <i>Alauda arvensis</i> , etc.).
Unauthorized hunting.	Shooting, injuring and disturbing bird species.	Compliance with the legislation. Coercive measures.
POACHING		
INFRASTRUCTURE		
The rehabilitation of the agricultural infrastructure (roads, irrigation system).	The disruption of the birds breeding time if the work activities take place during the nesting and raising chicks period.	Especially grassland and agroecosystems species: <i>Perdix perdix</i> , <i>Coturnix coturnix</i> , <i>Galerida cristata</i> , <i>Alauda arvensis</i> , <i>Motacilla flava</i> , <i>Miliaria calandra</i> .
ECONOMIC ACTIVITIES		
Projects, plans located in the area.	The destabilization of some of the site ecosystems, restricting the habitats, temporary / permanent disturbance of the birds vital activities.	All species. Regulation of the activities and compliance with the measures imposed by the regulatory act issued by the competent authority in the field.



Photos 1, 2. Tree cutting and overgrazing in Natura 2000 site ROSPA0137 Pădurea Radomir (originals).



Photos 3, 4, 5. Overgrazing and leisure activities in Natura 2000 site ROSPA0137 Pădurea Radomir (originals).



Photos 6, 7, 8. Disposal / or storage the waste in Natura 2000 site ROSPA0137 Pădurea Radomir (originals).