NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
POLITEHNICA BUCHAREST
FACULTY OF BIOTECHINCAL SYSTEMS ENGINEERING
DOCTORAL SCHOOL OF BIOTECHNICAL SYSTEMS ENGINEERING

SUMMARY
DOCTORAL THESIS

RESEARCH ON ASSESSMENT OF THE IMPACT OF MINERAL AGGREGATE EXTRACTION ABOUT DIFFERENT SPECIES OF BIRDS AND THE ADAPTATION OF SOME SPECIES OF MAMMALS OF HUNTING INTEREST TO THE EFFECTS OF CLIMATE CHANGES IN THE COUNTIES OF TELEORMAN AND PRAHOVACoordinator

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Thanks

Given the gradual climate change and unprecedented decline in biodiversity that threaten the lives and well-being of people around the world, as a biodiversity conservation expert with over 25 years of experience in this field within the Conservation Agency of the Teleorman Environment and currently working as a senior advisor within the National Agency for Protected Natural Areas-Teleorman Service, in order to reach level 3 of university studies, I chose to carry out this research regarding the assessment of the impact of the aggregate extraction activity on different species of birds and the adaptation of some species of mammals of hunting interest to the effects of climate change in Teleorman and Prahova counties under the careful guidance of the scientific supervisor of my doctoral thesis - Prof. Dr. Ing. Habil.Cristina-Ileana Covaliu-Mierlă. The scientific foundation and elaboration of this thesis would not have been possible without your help, which, through high professional degree and dedication, contributed to my training and the completion of this doctoral thesis.

Last but not least, I would like to thank my husband and family for their understanding and support with which they supported me during the entire period of the doctoral internship completed with the preparation of this doctoral thesis.

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FOREWORD

The doctoral thesis entitled "Research on the evaluation of the impact of the activity of extracting aggregates on different species of birds and the adaptation of some species of mammals of hunting interest to the effects of climate change in Teleorman and Prahova counties" aims to carry out research on the evaluation of the impact of the activity of extracting aggregates on different species of birds and the adaptation of some species of hunting interest to the effects of climate change in Teleorman and Prahova counties.

By researching the activity of extracting mineral aggregates from Teleorman and Prahova counties, the effects on biodiversity were observed in the two counties. At the same time, a comparative study of some species of mammals of hunting interest in four hunting funds from Teleorman County, respectively County Prahova and the stability of a plan of measures for sustainable hunting management of these species of mammals of hunting interest in the context of climate change was carried out.

Doctoral thesis begins with a word before and is structured in 6 chapters, developed in 179 of pages, which contains 31 figures and 35 of tables and a bibliography consisting of 48 references.

The doctoral thesis offers a synthesis of the theoretical studies and research conducted by the doctoral candidate Luiza-Georgeta Crăciunică on the topic of assessing the impact of aggregate extraction activities on certain bird species and the adaptation of certain game mammal species to the effects of climate change in the counties of Teleorman and Prahova.

Chapter 1 of the doctoral thesis, titled "IMPORTANCE OF THE TOPIC. OBJECTIVES OF THE DOCTORAL THESIS," details the proposed and achieved objectives, highlighting the importance of the chosen subject and its relevance in the scientific and social context.

Chapter 2 of the doctoral thesis, titled "LITERATURE REVIEW ON CLIMATE CHANGE AND MINERAL AGGREGATE EXTRACTION," comprises three subchapters. This chapter is based on an extensive study of the specialized literature, presenting the current state of scientific research on climate change and its impacts, the necessity of mineral aggregates, and the main environmental issues associated with the extraction of these aggregates.

Chapter 3 of the doctoral thesis entitled "THE CURRENT STATE OF KNOWLEDGE REGARDING THE ACTIVITY OF MINERAL AGGREGATE EXTRACTION AND PRAHOVA AND THE EFFECTS OF THE EXTRACTION OF MINERAL AGGREGATE ACTIVITY ON BIODIVERSITY, IN TELEORMAN AND PRAHOVA COUNTIES" contains five subchapters and details: 1) Identification of the geographical extension of the mineral aggregates extraction activity; 2) Identification of the specific conservation objectives of the ROSPA0024 OLT-DANUBE Confluence site and of the ROSPA0152 IALOMIȚA Corridor site; 3) Identifying the positive aspects regarding the activity of extracting mineral aggregates on biodiversity 4) Presenting the negative effects of the activity of extracting mineral aggregates on biodiversity; 5) Identification of the negative effects of mineral aggregate extraction activity on biodiversity in Teleorman and Prahova counties.

Chapter 4 entitled "OWN CONTRIBUTIONS REGARDING THE ASSESSMENT OF THE IMPACT OF AGGREGATE EXTRACTION ON SOME SPECIES OF BIRDS" presents the working method that was the basis of the research regarding the assessment of the impact of the activity of extracting mineral aggregates on some bird species for the establishment of a set of sustainable measures for the conservation of bird species in Teleorman and Prahova counties was detailed: 1) To the monitoring activity regarding the evaluation of the impact on biodiversity of the activity of extracting mineral aggregates; 2) Establishing key biodiversity indicators; 3) Methodology used in mobird species identification; 4) predicted impact; 5)

Drawing up an action plan for bird species affected by the activity of extracting mineral aggregates.

Chapter 5 entitled "OWN CONTRIBUTIONS REGARDING THE ADAPTATION TO CLIMATE CHANGE OF SOME MAMMAL SPECIES OF HUNTING INTEREST AND THEIR SUSTAINABLE HUNTING MANAGEMENT MEASURES PLAN IN THE CONTEXT OF CLIMATE CHANGE" presents the working method that wast the basis of carrying out research onadaptation to climate change of some mammal species of hunting interest infour hunting funds from counties Teleorman and Prahova and the establishment of a Plan of measures for sustainable hunting management of these mammal species of hunting interest in the context of climate change was detailed: 1) Analyzing and comparing the optimal and evaluated numbers of some mammal species of hunting interest in four hunting funds from Teleorman county, respectively County Prahova, in the period 2022-2023; 2) The influence of anthropogenic factors reflected by the management of hunting funds in Teleorman County; 3)The influence of anthropogenic factors reflected through the management of hunting funds in County Prahova; 4). Drawing up a Plan of measures for sustainable hunting management of these mammal species of hunting interest on the four hunting grounds in Teleorman and Prahova counties, in the context of climate change.

In Chapter 6 entitled “FINAL CONCLUSIONS. OWN CONTRIBUTIONS. FUTURE PERSPECTIVES ”presents the final conclusions of the PhD thesis, own contributions, as well as future perspectives. The doctoral thesis concludes with a list of publications, the conferences attended by the doctoral candidate, the bibliography, and two appendices. The research results were used for the publication of three articles in national and international journals.

CHAPTER 1. THE IMPORTANCE OF THEME. OBJECTIVES OF THE THESIS DE DOCTORATE

1.1. The importance of the topic

The effects of climate change are increasingly visible in Romania and at the international level, whether it is intense heat waves, droughts that destroy agricultural production, floods or threats to biodiversity caused by wild fires. In 2021-2024, our country faced a record number of immediate severe weather warnings (the so-called "code red") issued by the National Meteorological Administration (ANM), and specialists warn that they will become more frequent in the context of a tic climate changes. In the last year, the Intergovernmental Panel on Climate Change of the United Nations (IPCC) published new reports with data that indicate acceleration of climate change [1]. Climate change has already triggered changes in the distribution of species in many parts of the world. Impacts are expected to increase in the future, but few studies have focused on understanding the regional basis of species vulnerability.

In the European Union studies were carried out on the impact of climate change untilat endand the 21st century. In the context of the above, we considered that, through study regarding the assessment of the impact of aggregate extraction activity on different species of birds and the adaptation of some species of mammals of interest hunting to the effects of climate change inthe counties of Teleorman and Prahova to actually realize:

- the study of the activity of extracting mineral aggregates from the counties of Teleorman and Prahova in which the effects of mineral aggregate extraction on biodiversity in the two counties were observed.
- the comparative study of some species of mammals of hunting interest in four hunting funds from Teleorman county, respectively County Prahova, and thus we were able to draw up a Plan of measures for sustainable hunting management of these species of mammals of hunting interest in the context of climate change.

1.2. The objectives of the PhD thesis

The objectives set for the doctoral thesis were as follows:

a. compiling a literature review on climate change and mineral aggregate extraction

b. presentation of the current state of knowledge regarding the activity of extracting mineral aggregates from Teleorman and County Prahova and the effects of carrying out the activity of extracting mineral aggregates on biodiversity. For this purpose, we studied five wild birds species (Cygnus cygnus, Phalacrocorax pygmaeus, Falco vespertinus, Alcedo atthis and Anas crecca) from the two Natura 2000 sites: ROSPA0024 OLT-DANUBE CONFLUENCE and ROSPA0152 IALOMIȚA CORRIDOR which are more sensitive as a result of carrying out this activity, and the results of this study can be found in the field sheets in the appendices of the PhD thesis. We have also, we studied how the activity of extracting mineral aggregates is carried out, rendering in the images below, aspects of natural habitats and biodiversity before and during the performance of this activity.

The extraction of "construction minerals", especially aggregates, represents the largest sub-sector of the non-energy extractive industry in the EU in terms of value and volume. Potential sources of construction raw materials are widely distributed in all EU member states and are extracted in large quantities (approximately 3 billion tons annually).

In this context, we carried out a research study on the assessment of the impact of aggregate extraction activity on differentbird species and establishing a set of sustainable conservation measures of bird species. We carried out the assessment of the impact of the extraction of mineral aggregates on biodiversity that estimates the effects of this assetities on biodiversity conservation objectives. Therefore, the corresponding assessment focused specifically on the species and/or habitat types of the two studied Natura 2000 sites: ROSPA0024 OLT-DANUBE CONFLUENCE and ROSPA0152 IALOMIȚA CORRIDOR and on the possible effects of the activity on them. This also includes direct or indirect effects on the species and/or habitat types concerned, for example on supporting ecosystems and natural processes. In this assessment, the positive aspects of this activity of extracting mineral aggregates have been taken into account, highlighting the fact that, extraction of ores and construction aggregates is the largest sub-sector of the non-energy extractive industry in the EU in in terms of value and volume. If properly planned, modern non-energy extractive industry (NEE) activities can actively contribute to biodiversity conservation. At the same time, we also highlighted the negative aspects of this activity of extracting mineral aggregates, following the assessment of the potential impact of extractive activities on nature and wildlife, it is important to remember that this impact does not refer to not only at the mining site itself, but also at associated facilities such as: access roads, conveyor belts, crushers, warehouses, mining tailings, slurry tanks and tailings ponds. The analysis of the level of impact of mineral aggregate extraction activity on bird species of community interest from the sites ROSPA0024 OLT-DANUBE CONFLUENCE and ROSPA0152 IALOMIȚA CORRIDOR took into account the consequences and the probability of negative effects taking into account the particularities of the area, the technical characteristics of the project, the degree of reversibility of the effects produced and the observations made in the field.

c. carrying out a comparative study of some mammal species of hunting interest in four hunting funds from Teleorman county, respectively County Prahova and establishing a Plan of measures for sustainable hunting management of these species of mammals hunting interest in the context of climate change.

The need to ensure the conservation of biodiversity is considered a measure to respond to climate change and, at the same time, to protect vulnerable species by conserving and restoring ecosystems. To this end, in thisPhD thesis, I considered studying the vulnerability ofthreemammal species of hunting interest (deer, rabbit and wild boar) and their adaptation to the effects of climate change in twohunting funds from County Teleorman(the hunting fund 1 Flămanda and the hunting fund 62 Islaz), respectively County Prahova (the hunting fund 43 Lapoș and the hunting fund 11 Gherghița) .

As representative hunting mammal species for Teleorman and Prahova counties, I chose to conduct a comparative study of wild boar, deer, rabbit species in two hunting funds located in thethere are two counties. By studying a comparison of some mammal species of hunting interest in fou rhunting funds from Teleorman county, respectively County Prahova, we were

able prepare a Plan of measures for sustainable hunting management of these mammal species of hunting interest in the context of climate change.

d. carrying out a study on the impact of the noise produced by the activity of extracting mineral aggregates on different species of birds From the analysis of the results obtained regarding the measurements of the noise levelfrom the maps of noise generated by the activity of extracting mineral aggregates in the two Natura 2000 sites: ROSPA0024 Olt-DANUBE Confluence, Islaz municipality, County Teleormanand in ROSPA0152 IALOMIȚA Corridor , Tinosu municipality, County Prahova, as well as from the monitoring of bird species from the two areas, s- was able to determine what is the effect due to the noise produced by the mining activities of the mineral aggregates on the activity of the designated birds at the level of the two areas.

CHAPTER 2. LITERATURE SURVEY ON CLIMATE CHANGE AND MINERALS AGGREGATES EXTRACTION

2.1 Climate change

The dangers resulting from the increasing intensity and frequency of extreme weather events at the global and national level, such as abnormally heavy rainfall in short intervals, prolonged droughts, desertification, environmental degradation, sea level rise or tropical and extratropical cyclones, already cause on average more than 20 million people to leave their homes and move to other areas of their countries each year (UNHCR, 2022).

Romania is also affected by the impact of global warming through the effects of thermal stress, intensified in the big cities by and the urban heat island and by the increase in the intensity of short-term precipitation, which favors floods and urban flooding. These effects will continue and amplify in the future, with multiple socio-economic implications. Greater attention must also be paid in the research sector to nature-based solutions that help us respond to climate change: the identification and testing of nature-based solutions applicable in Romania; The European Union (EU) and EU Member States, including Romania have made a firm commitment by ratifying the Paris Agreement on Climate Change (Official Journal of the European Union, 2016). This commitment translated into the EU's ambition to become the first climate-neutral economy and society by 2050, with an intermediate target of reducing emissions at European level by at least 55% compared to 1990 levels by 2030 (Council of the European Union, 2022). To translate this ambition into reality, a deep transformation is needed for the EU, transforme which must be efficient from an economic point of view, i.e. from the point of view of costs and benefits, but also fairfrom a social point of view[1] .

2.2 Why the need for aggregates minerals?

The extraction of "construction minerals", especially aggregates, represents the largest sub-sector of the non-energy extractive industry in the EU in terms of value and volume. Potential sources of construction raw materials are widely distributed in all EU member states and are extracted in large quantities (approximately 3 billion tons annually). The assessment of the impact of the extraction of mineral aggregates on biodiversity estimates the effects of this activity on the objectives of biodiversity conservation. Therefore, the appropriate assessment should focus specifically on the species and/or habitat types for which the site has been designated as part of the Natura 2000 network and the possible effects of the activity on them. This should also include any direct or indirect effects on the species and/or habitat types concerned, for example on supporting ecosystems and natural processes

2.3. Major environmental problems recognized as a result of the activity of extracting aggregatesminerals

By its very nature, mineral extraction invariably has an impact, often negatively, on the land in which it is produced. But there are also increasing examples where, over its life cycle, an extraction site has had an overall net benefit for biodiversity. This is because at the end of exploitation, more and more quarries, wells and mines are being rehabilitated with biodiversity in mind. When this occurs in an already depleted natural setting, those rehabilitated sites have the potential to make a net positive contribution to biodiversity by providing new habitats for wildlife.

When assessing the potential impact of extractive activities on nature and wildlife, it is important to remember that this impact relates not only to the extraction site itself, but also to associated facilities such as access roads, conveyor belts, crushers, warehouses, mining residues, manure tanks and settling ponds, etc. They also cover all phases of the development proposal, from the initial exploration and actual operation of the site (including its rotation/expansion), to closure and rehabilitation.

The type and degree of environmental impacts vary significantly from site to site, depending on a number of factors. Therefore, they must be evaluated individually in each case. Additionally, cumulative effects must also be considered, as these can occur when multiple extraction sites are present in a certain area or as a result of the combined impacts of extraction activities with other types of development (e.g., other infrastructure elements or industrial projects).

So, even if an individual extraction project cannot be considered to have an adverse effect on a Natura 2000 site, project developers must, however, also take into account the cumulative effects of this project in combination with other plans and projects in the area. The potential effects of extractive activities on species and habitat types of community interest include:

• Habitat loss and degradation
• Disturbance and displacement of species

The impacts of extractive activities on biodiversity can be caused by a number of factors, including:

• Deforestation of agricultural land
• Hydraulic disturbances
• Changes in water quality
• Changes in habitats

Other factors include noise and vibration, disturbances associated with movement, dust.

Exploitation of sand and gravel on the rivers in Teleorman and Prahova counties will be done with high-capacity excavators, in two sub-stages, one surfaced and one submerged. Exploitation method: ballastier with the extraction of steps in descending order, with the exploitation of slices in transverse strips of 15 -20 m wide, with reverse bucket excavators, with the deposition of tailings and topsoil. To excavate the ballast, the excavator will be positioned on the work platform, respecting the safety distance provided by NTPMEMZ and will work in retreat, taking a strip of 0.5 - 0.8 m thick.

The exploitation method is on the surface, in strips parallel to the direction of water flow, their width being 10 m, and the length 30 m.

The evaluation of the ecological status for natural river water bodies is based on a classification system in 5 quality states, namely: very good (FB), good (B), moderate (M), poor (S) and poor (P) .

The quality biological elements used to assess the ecological status of natural water bodies on rivers in a natural regime are:

-Phytoplankton (for certain typologies)
-The phytobenthos
- Macroinvertebrates
- Fishes

General physico-chemical elements (support for biological elements) used to assess the ecological status of natural water bodies are:

- Thermal conditions (water temperature)
-The state of acidification (pH)
-Salinity (conductivity)
-Oxygen regime (dissolved oxygen, CBO5, CCO-Cr)
-Nutrients (N-NH4, N-NO2, N-NO3, Ntotal, P-PO4, P total)

Specific pollutants - other substances identified as being discharged in significant quantities into water bodies are: Zn, Cu, As, Cr, toluene, acenaphthene, xylene, phenols, PCB.¬

Emissions into the atmosphere generated by the extraction of mineral aggregates will be:

Powders in suspension as a result of the transport of mineral aggregates;

Gas emissions resulting from fuel combustion in internal combustion engines of machinery and means of transport.
Point emissions are combustion gases from technological equipment: CO2, CO, SO2, NOx, particles.
Diffuse emissions are exhaust gases (hydrocarbons, CO2, CO, SO2, NOx, particles) from means of transport.
During the construction phase, significant and accidental negative effects on groundwater (negative impact) may occur due to possible leaks of petroleum products from the equipment used and increased turbidity caused by the extraction of mineral materials.

CHAPTER 3. CURRENT STATE OF KNOWLEDGE REGARDING MINERAL AGGREGATE MINING AND THE EFFECTS OF MINERAL AGGREGATE MINING ON BIODIVERSITY

3.1 Identification of the geographical extension of the mineral aggregates extraction activity in the county

The Natura 2000 network is a European ecological network of protected natural areas that withthrough by:

- **special avifaunistic protection areas (SPA) -** established in accordance with the provisions of Directive 79/409/CEE regarding the conservation of wild birds (Directive "Birds")
- **sites of community interest (SCI) -** established in accordance with the provisions of Directive 92/43/EEC regarding the conservation of natural habitats, wild fauna and flora ("Habitat" Directive)

• At the level of County Prahova, 1 Natura 2000 site was identified where the activity of extracting mineral aggregates is carried out, namely: ROSPA0152 IALOMIȚA CORRIDOR - area of 25307.90 ha. Declaratory normative act: Government Decision no. 663/2016 regarding the establishment of the natural protected area regime and the declaration of special avifaunistic protection areas as an integral part of the Natura 2000 ecological network in Romania
• Importance - for the nesting population: woodpecker (Coracias garrulus), oak woodpecker (Dendrocopos medius), great vole (Buteo rufinus), short-legged plover (Accipiter brevipes), blue kingfisher (Alcedo atthis), wood pigeon (Sylvia nisoria) , little egret (Egretta garzetta), evening tern (Falco vespertinus), little heron (Ixobrychus minutus) and night heron (Nycticorax nycticorax)
• Mode of administration: Currently this site is administered by the National Agency for Natural Protected Areas
• According to Government Decision no. 663/2016, ROSPA0152 THE IALOMIȚA CORRIDOR is located as follows:
- Ialomita County (72%): Adâncata, Albești, Alexeni, Andrășești, Axintele, Tăndărei, Balaciu, Bărbulești, Bărcănești, Borănești, Bucu, Bueşti, Căzănești, Ciochina, Ciulnița, Coșereni, Cosâmbești, Dridu, Fierbinți-Târg, Ion Roată
- County Prahova (28%). Balta Doamnei, Berceni, Brazi, Ciorani, Cocorăștii Colț, Drăgănești, Dumbrava, Gherghița, Gorgota, Șirna, Olari, Puchenii Mari, Râfov, Târgșoru Vechi, Tinosu, Valea Călugărească
• At the level of Teleorman county, 1 Natura 2000 site was identified where the activity of extracting mineral aggregates is carried out, namely: ROSPA0024 OLT-DANUBE CONFLUENCE - area of 14672 ha. Declaratory normative act: Government Decision no. 971/2011 for the amendment of GD no. 1284/2007 regarding the avifaunistic special protection areas as an integral part of the Natura 2000 ecological network in Romania.
• Surface area -20960 ha (of which 14672 ha within Teleorman county, the rest in Olt county)
• Importance - The site is important for the nesting populations of the small cormorant species.
- The site is important during migration and wintering for the following species: ducks, geese, pelicans, swans.

• According to HG 971/2011, ROSPA0024 OLT – DANUBE CONFLUENCE is located in County Teleormanwith the following percentages on the administrative territory of the localities: Islaz (92%), Liţa (25%), Lunca (10%), Segarcea Vale (24%) , Magurele Tower (19%).
• Mode of administration: Currently this site is administered by the National Agency for Natural Protected Areas.

3.2. Identification of site-specific conservation objectives ROSPA0024 OLT – DANUBE CONFLUENCE [2] and ROSPA0152 IALOMIȚA CORRIDOR[3]

ROSPA0024 OLT – DANUBE CONFLUENCE[2]

This site is home to important flocks of protected bird species. According to the data we have the following categories:
a) number of species from annex 1 of the Birds Directive: 19
b) number of other migratory species, listed in the annexes of the Convention on Migratory Species (Bonn): 66
c) number of globally endangered species: 3
The site is important for nesting populations of the following species: Phalacrocorax pygmaeus, Coracias garrulus.
The site is important during migration and wintering for species of ducks, geese, pelicans and swans.
During the migration period, the site hosts more than 20,000 specimens of wading birds, possibly being nominated as a RAMSAR site.
When developing this set of specific conservation objectives at the level of the Natura 2000 site ROSPA0024 Olt - Danube Confluence, the surface values and data provided by the "Standard Natura2000 Form" and the data included in the Management Plan of the Natura 2000 site ROSPA0024 Confluence were taken into account Olt - Danube, approved by Order of the Minister of Environment, Water and Forests no. 909/2023.

ROSPA0152 IALOMIȚA CORRIDOR [3]

This site is important for populations of bird species (especially waterfowl) that nest, migrate and winter in this area.
The area is also important for the nesting population of ruffed grouse (Coracias garrulus), oak woodpecker (Dendrocopos medius), great vole (Buteo rufinus), short-legged plover (Accipiter brevipes), blue kingfisher (Alcedo atthis), wood pigeon (Sylvia nisoria), little egret (Egretta garzetta), evening tern (Falco vespertinus), little heron (Ixobrychus minutus) and night heron (Nycticorax nycticorax).

3.3 Identifying the positive aspects regarding the activity of extracting mineral aggregates on biodiversity

The positive contribution to biodiversity conservation

Construction aggregates extraction is the largest non-energy extractive industry sub-sector in the EU in terms of value and volume.

If properly planned, modern non-energy extractive industry (NEE) activities can actively contribute to biodiversity conservation. This is particularly relevant when the extraction area is located in an environment that has already been altered or affected. In such cases, the extractive industry can contribute to the creation of new natural habitats, for example new wetlands suitable for different species of amphibians or rocks that provide some birds with suitable nesting opportunities. Open pits can also provide suitable habitat for various insects and reptiles such as thermophilic beetles, spiders, bees and lizards. Also, as some of these new habitats may be located in areas of low conservation value, they may act as important ecological link points or corridors between core protected areas, thereby improving the overall coherence of existing protected areas such as the Natura 2000 network.

3.4 Identification of the negative effects of the activity of extracting mineral aggregates on biodiversity in the two counties

Effects of extraction activities on biodiversity: possible causes
• Deforestation

• Hydraulic disturbances (alteration of hydrological/hydrogeological conditions)
• Changes in habitats that can favor the colonization of invasive species
• Noise and vibrations
• Disturbances caused by movement
• Dust
• Landslides and collapses

By its very nature, the extraction of mineral aggregates invariably has an impact, often negative, on the land in which it is produced. But there are also increasing examples where, over the course of its life cycle, an extraction site has had an overall net benefit for biodiversity. When this occurs in an already impoverished natural setting, those rehabilitated sites have the potential to make a net positive contribution to biodiversity by providing new habitats for wildlife.

When assessing the potential impact of extractive activities on nature and wildlife, it is important to remember that this impact relates not only to the extraction site itself, but also to associated facilities such as access roads, conveyor belts, crushers , warehouses, mining residues, manure tanks and settling ponds, etc. They also cover all phases of the development proposal, from the initial exploration and actual operation of the site (including its rotation/expansion), to closure and rehabilitation.

The type and degree of environmental impacts vary significantly from site to site, depending on a number of factors. Therefore, they must be evaluated individually for each situation.

Cumulative effects must also be considered, as they may occur when several extraction sites are present in a given area or as a result of the combined impacts of extraction activities with other types of development (e.g. other infrastructure or industrial projects). Therefore, even if an individual extraction project cannot be considered to have an adverse effect on a Natura 2000 site, the developers of the mineral aggregate extraction activity must, however, also take into account the cumulative effects of this activity in combination with other plans and projects in the area.

• Habitat loss and degradation
• Fragmentation of habitats
• Simplification of habitats
• Degradation of habitats
• Destruction of habitats
• Loss/reduction of habitat area
• Disturbance and displacement of species
• Changes in water quality
• Noise and vibrations

The noise-generating sources are the technological equipment operating in the perimeter of the ballast: excavator, front loader, dump trucks. The generation of noise during industrial activity is a phenomenon common to all mining of mineral aggregates, the sound level can be reduced in some cases.

The main sources of noise and vibration are the extraction and transport equipment during operation.

The noise level produced by the machines working in the ballast tank, excavators, draglines, front loaders, dump trucks is of low frequency and does not affect the environment and the staff in the ballast tank.

In the case of simultaneous operation of all noise sources, taking into account only the distance between the source and the receiver and neglecting the attenuation due to vegetation, relief and wind, the noise level calculated at the nearest receiver will be non-existent. We consider that in the situation where an earthmoving machine and 2 dump trucks operate simultaneously in the ballast tank, the noise level does not exceed the admissible value at the limit of industrial premises of 65 dB (A) provided by STAS 10009/2017. The noise levels measured in the vicinity of the source, for different machinery engines are:

➢ Bulldozer 115 dB (A)

➢ Cup charger 112 dB (A)
➢ Excavator 117 dB (A)
➢ Dump truck 107 dB (A)

The equivalent noise level at the nearest receiver. To find out the noise level at a certain distance from the source, the formula can be applied:

Lp = Lw - 10 *log (r2) – 8 = Lw - 20 *log (r) – 8

where: Lp = noise level

Lw – acoustic power at distance r from the source

r= the distance from the noise source without taking the relief into account (it is used in the case of noise propagation from a point source on flat ground);

The noise level always varies strongly, depending a lot on the propagation environment (local conditions - obstacles). The further the receiver is from the noise source, the more factors intervene that change the way it propagates (wind characteristics, degree of air absorption depending on pressure, temperature, local topography, type of vegetation, etc.). According to SR 10009/2017, the permitted limit for industrial premises is 65 db(A).

Like all other forms of land use, the non-energy mining industry must operate within European environmental legislation, which includes the Birds and Habitats Directives. The European Birds and Habitats Directives are the cornerstones of EU biodiversity policy. They enable Member States to work together to protect and ensure the survival of Europe's most threatened and vulnerable species and habitat types. Article 6 of the Habitats Directive establishes the procedure to be followed for the authorization of plans and projects that could have a significant effect on a Natura 2000 site.

The directives have two main objectives:

• protects the species itself throughout the EU (through species protection provisions);

• preserve certain types of rare and threatened habitats or the core habitats of certain rare and threatened species to ensure their continued survival (through site protection provisions, which led to the creation of the Natura 2000 network). [4]

Identification of the geographical expansion in the county of the activity of extracting mineral aggregates:

• The Natura 2000 network is a European ecological network of protected natural areas that includes:

avifaunistic special protection areas (SPA) - established in accordance with the provisions of Directive 79/409/EEC on the conservation of wild birds ("Birds" Directive)¬

sites of community interest (SCI) - established in accordance with the provisions of Directive 92/43/EEC on the conservation of natural habitats, wild fauna and flora ("Habitat" Directive).¬

By its very nature, the extraction of mineral aggregates invariably has an often negative impact on the ecosystem in which it occurs. In essence, this requires that any extraction of mineral aggregates that could have a significant effect on protected bird species be subject to an appropriate assessment detailing this impact on them and how it aligns with the conservation objectives of the two Natura 2000 sites.

In this chapter, two Natura 2000 sites from the counties of Teleorman and Prahova (ROSPA0024 OLT-DANUBE CONFLUENCE - area of 14672 ha and ROSPA0152 IALOMIȚA CORRIDOR - area of 25307.90 ha) were studied considering the impact assessment of the extraction of mineral aggregates on protected bird species .

Compared to 2016, when some areas of the country were declared Natura 2000 sites[1], a negative influence on bird species of community interest was observed, having various causes.

The causes that can negatively influence the protected bird species monitored in Natura 2000 sites are the following [2]:

- the intensity of the activity of extracting mineral aggregates on a relatively small surface, observing a cumulative impact of this activity;
- lack of accurate knowledge of bird species protected by hunters, which can easily be confused with unprotected ones, which leads to a decrease in their number;

-climate changes have led to landslides, excessive temperatures, heavy rains in the spring months that have led to the flooding of the habitats of protected bird species;
- the magnitude of the phenomenon of industrialization which, through the emissions produced, produces significant damage;
-the chemicalization of agriculture has led to major imbalances in the food chains and pyramids of terrestrial and aquatic ecosystems, where protected bird species have their natural habitat;
-excessive use of chemical fertilizers causes damage to both soil and groundwater;
- the stability of soil aggregates and the physical sequestration of soil organic carbon (SOC) are essential for the regulation of anthropogenic climate change[5].

Table 3.3 Consumption of plant protection products in 2021 in County Teleormanfrom data provided by the National Phytosanitary Authority - Teleorman Phytosanitary Office

No. crt.	Category	Cantitaty used(tons)	Phisical surface (ha/no. of plants)	Total surface treated (psihical x number of treatments)	Stock plant protection products to 31.12.2021 (tons)
1.	Plant protection products used for seed treatment	100382	X	X	0,361
2.	Plant protection products used in warehouses for rodent control, disinsection, gassing	5960	X	X	0,079
3.	Plant protection products used to combat the field mouse	272	68000	68000	X
4.	herbicides	217,832	251366	251366	0,528
5.	fungicides	54,915	71199	77161	0,210
6.	insecticides	8,681	38228	52162	0,120
7.	fungicides	39,400	77000	78800	0,140
8.	acaricides	0,456	470	940	X
8.	growth regulators	0,0015	30	30	X
10	Other	-	-	-	X
Total general		**115607,605**	**506293**	**528459**	**1,438**

Source: http://apmtr.anpm.ro/[6]

Table 3.4 The quantities of plant protection products used in the period 2017-2020 in County Prahova from the data provided by the National Phytosanitary Authority - Prahova Phytosanitary Office

No.crt.	The damage agent	Quantity of plant protection products (tons) 2016	Quantity of plant protection products	Quantity of plant protection products	Quantity of plant protection products	Quantity of plant protection products

			(tons) 2017	(tons) 2018	(tons) 2019	(tons) 2020
1	Plant protection products used for seed treatment	2,103	1,970	2,451	1,824	2,405
2	Plant protection products used for seed treatment wheat	-	-	-	-	0,13
3	Plant protection products in warehouses for rodent control, disinsection, fumigation:	0,190	0,259	2,365	3,985	2,274
4	Erbicides	121,328	91,918	82,201	113,372	73,096
5	Fungicides	93,745	106,958	98,441	101,55	80,377
6	Insecticides	20,739	24,919	70,068	11,824	7,047
7	Acaricides	0,891	0,678	0,804	0,510	0,3845
8	Growth regulators	0,147	3,046	0,604	0,233	0,3118
Total		**239,143**	**229,748**	**256,934**	**233,298**	**166,25**

Source:http://apmph.anpm.ro/[7]

Like all other forms of land use, the extractive industry of non-energy minerals must operate within the framework of European environmental legislation, which includes the Birds Directive and the Habitats Directive. The European Birds Directive and the Habitats Directive are the cornerstones of EU biodiversity policy. They enable Member States to work together to protect and ensure the survival of Europe's most threatened and vulnerable species and habitat types. Article 6 of the Habitats Directive sets out the procedure to be followed for the authorization of plans and projects that could significantly affect a Natura 2000 site [2] .

European directives have two main objectives:

-protects the species itself throughout the EU (through provisions on the protection of species);

- the conservation of certain types of rare and threatened habitats or the core habitats of certain rare and threatened species to ensure their continued survival (through provisions on the protection of sites, which led to the creation of the Natura 2000 network)[5].

Birds from the Natura 2000 sites: ROSPA0024 OLT-DANUBE CONFLUENCE and ROSPA0152 IALOMIȚA CORRIDOR are monitored because they are considered species of community interest, endangered species, vulnerable, rare, endemic to the territory of the European Union. We chose these birds of community interest for the study, because following monitoring in the field, a decrease in the number of the population was observed due to the activity of extracting mineral aggregates.

Two Natura 2000 sites were chosen as study areas, from Teleorman and Prahova counties, where ten species of protected birds were evaluated considering the impact of mineral aggregate extraction activity on them.

We chose the monitoring method according to each species, respectively the 1 km and 5 km linear transect method, a method that complies with the Standard Guide for monitoring bird species of community interest in Romania, within the project "Completing the level of knowledge of biodiversity through the implementation the system for monitoring the conservation status of species of community interest in Romania and reporting based on art. 12 of the Birds Directive 2009/147/CE", financed by the Large Infrastructure Operational Program 2014-2020, a guide approved by the Order of the Ministry of the Environment, Waters and Forests no. 1358 of August 6, 2021.

The method involved the numerical evaluation of the population of 10 birds, and for wading waterfowl species, the monitoring was done during the nesting period April 15-June 15, the numerical evaluation being done in the colony and at a distance based on vocalizations and observations of bird colonies. Linear transects in these wading bird species were not only limited to the seashore, but also marsh areas, flooded agricultural land.

Identification of the geographical area studied in Teleorman and Prahova counties of the activity of extracting mineral aggregates from Natura 2000 sites

The Natura 2000 network is a European ecological network of natural protected areas that include areas of special avifaunistic protection for birds (SPA) established in accordance with the provisions of Directive 79/409/EEC on the conservation of wild birds (Birds Directive)

At the level of Teleorman county, a Natura 2000 site was identified where the extraction of mineral aggregates takes place, namely: ROSPA0024 OLT-DANUBE CONFLUENCE with an area of 14672 ha.

Bird species were monitored in this site: Cygnus Cygnus (winter swan), Phalacrocorax pygmaeus (little cormorant), Falco vespertinus (evening tern), Alcedo atthis (blue gull), Anas crecca (minfling duck).

At the level of County Prahova, a Natura 2000 site was identified where the mineral aggregates extraction activity is carried out, respectively: ROSPA0152 IALOMIȚA CORRIDOR with an area of 25307.90 ha.

Bird species were monitored in this site: Alcedo atthis (blue gull), Ixobrychus minutus (little heron), Nycticorax nycticorax (night heron), Falco vespertinus (evening tern), Egretta garzetta (little egret).

Adequate assessment of the impact of mineral aggregates extraction activity on protected bird species in two Natura 2000 sites in Teleorman and Prahova counties

The type and degree of environmental impact varies significantly from site to site, depending on various factors. Therefore, they must be determined on a case-by-case basis.

To estimate the potential impact on the two Natura 2000 sites, ROSPA0024 OLT-DANUBE CONFLUENCE and ROSPA0152 IALOMIȚA CORRIDOR, an impact assessment matrix was developed.

The value of the impact generated by the activity of extracting mineral aggregates on the species was taken into account the consequences and the probability according to the degree of damage and the possibility of occurrence.

The calculation formula used is:

Impact = probability x consequence (1)

Probability categories are defined according to table 3.5. The consequences were calculated according to table 3.6.

Table 3.5 Categories of probability[8]

Probability	Value	Observations
Inevitable	5	The effect will definitely happen
Very likely	4	The effect will manifest frequently

Probably	3	The effect will occur with reduced frequency
Improbable	2	The effect will manifest occasionally
Very unlikely	1	The effect will occur accidentally

Tableul 3.6 Description of consequences[8]

Degree of impairment	Value	Description
Disastrous	5	Reduction of local populations by81%-100%
Very important	4	Reduction of local populations by 61%-80%
Important	3	Reduction of local populations by 41%-60%
Moderate	2	Reduction of local populations by 21%-40%
Insignificant	1	Reduction of local populations by 0%-20%

The impact matrix was calculated based on the probability of the impact occurring and the maximum foreseeable consequences.

Table 3.7 Impact levels of mineral aggregate extraction activity [8]

Value	Impact level
15-25	Significant negative
5-15	Moderately negative
1-5	Negative insignificant

Using the bird monitoring method, in order to interpret the matrix of the impact determined by the extraction of mineral aggregates activity on bird species of community interest from two Natura 2000 site ROSPA0024 OLT-DANUBE CONFLUENCE and ROSPA0152 IALOMIȚA CORRIDOR, we used the methodology described below [8].
This matrix shows the level of impact of mineral aggregate extraction activity on bird species.The impact shall be deemed to be moderately negative.

Table 3.8. Matrix of consequences of the mineral aggregates extraction activity on bird species of community interest from the site ROSPA0024 OLT-DANUBE CONFLUENCE

Consequence	Cygnus cygnus	Phalacrocorax pygmaeus	Falco vespertinus	Alcedo atthis	Anas crecca
5					
4					
3					
2	x				
1		x	x	x	x

From the analysis of the information contained in Table 3.8, of the five bird species studied, it appears that for a single bird species, namely Cygnus Cygnus, the consequence being

considered of a moderate level, signifies a reduction of the local population 21%-40%, for the rest of the bird species the consequence being considered of an insignificant level signifies a reduction of the local population 0%-20%.

Table 3.9. Matrix of probability of occurrence of negative effects of mineral aggregates extraction activity on bird species of community interest from site ROSPA0024 OLT-DANUBE CONFLUENCE

Probability	Cygnus cygnus	Phalacrocorax pygmaeus	Falco vespertinus	Alcedo atthis	Anas crecca
5					
4					
3					
2	x				
1		x	x	x	x

From the analysis of the information contained in Table 3.9, of the five bird species studied, it appears that for only one bird species, namely Cygnus Cygnus, the impact of the mineral aggregate extraction activity will occasionally manifest, and for the rest of the bird species the impact of the mineral aggregate extraction activity will occur accidentally.

Table 3.10. Matrix of the impact determined by the extraction of mineral aggregates activity on bird species of community interest from the site ROSPA0024 OLT-DANUBE CONFLUENCE

Impact	Cygnus cygnus	Phalacrocorax pygmaeus	Falco vespertinus	Alcedo atthis	Anas crecca
15-25					
5-15					
1-5	4	1	1	1	1

The impact of mineral aggregate extraction activity on the bird species is considered insignificantly negative as evidenced by the analysis of the information contained in Table 3.10, it appears that for the studied bird species from the site ROSPA0024 OLT-DANUBE CONFLUENCE.
In order to estimate the potential impact on the site ROSPA0152 IALOMIȚA CORRIDOR, an impact assessment matrix was developed.

Table 3.11. Matrix of consequences of the implementation of mineral aggregates extraction activity on bird species of community interest from the site ROSPA0152 IALOMIȚA CORRIDOR

Consequence	Alcedo atthis	Ixobrychus minutus	Nycticorax nycticorax	Falco vespertinus	Egretta garzetta
5					
4					
3		x	x	x	x
2	x				
1					

From the analysis of the information contained in Table 3.11, of the five bird species studied, it appears that for a single bird species, namely Alcedo atthis, the consequence being considered of a moderate level, signifies a reduction of the local population 21%-40%, for the rest of the bird species the consequence being considered of an important level signifies a reduction of the local population 41%-60%.

Table 3.12. Matrix of probability of occurrence of negative effects of mineral aggregates extraction activity on bird species of community interest from the site ROSPA0152 IALOMIȚA CORRIDOR

Probability	Alcedo atthis	Ixobrychus minutus	Nycticorax nycticorax	Falco vespertinus	Egretta garzetta
5					
4					
3		x	x	x	x
2	x				
1					

From the analysis of the information contained in Table 3.12, of the five bird species studied, it appears that for only one bird species, namely Alcedo atthis, the impact of the mineral aggregate extraction activity will occasionally manifest, and for the rest of the bird species the impact of the mineral aggregate extraction activity will occur with reduced frequency.

Table 3.13. Matrix of the impact determined by the mineral aggregates extraction activity on bird species of community interest from the site ROSPA0152 IALOMIȚA CORRIDOR

Impact	Alcedo atthis	Ixobrychus minutus	Nycticorax nycticorax	Falco vespertinus	Egretta garzetta
15-25					
5-15		9	9	9	9
1-5	4				

The impact of mineral aggregate extraction activity on the bird species is considered moderately negative as evidenced by the analysis of the information contained in Table 3.13, it appears that for the studied bird species from the site ROSPA0152 IALOMIȚA CORRIDOR**.**

The analysis of the level of impact of mineral aggregates extraction activity on bird species of Community interest from the site ROSPA0024 OLT-DANUBE CONFLUENCE took into account the consequences and probability of negative effects taking into account the particularities of the area, the technical characteristics of the project, the degree of reversibility of the effects produced and the observations made in the field. The result is defined as the level of impact, the impact being considered an insignificant negative.

The analysis of the level of impact of mineral aggregates extraction activity on bird species of Community interest from the site ROSPA0152 IALOMIȚA CORRIDOR took into account the consequences and probability of negative effects taking into account the particularities of the area, the technical characteristics of the project, the degree of reversibility of the effects produced and the observations made in the field. The outcome is defined as the level of impact, the impact being considered moderately negative.

Compared to the data contained in the Natura 2000 Standard Form prepared in 2016 (http://www.mmediu.ro) for the bird species from the site ROSPA0024 OLT-DANUBE CONFLUENCE: Cygnus Cygnus (winter swan) -5 ex., Phalacrocorax pygmaeus (lesser cormorant) - 450 ex., Falco vespertinus (evening bream) - 25 ex., Alcedo atthis (kingfisher) - 6 ex., Anas crecca (dwarf duck) - 1 ex and for the bird species from the site ROSPA0152 IALOMIȚA CORRIDOR: Alcedo atthis (kingfisher) - 30 ex, Ixobrychus minutus (dwarf heron) - 15 ex., Nycticorax nycticorax (night heron) - 60 ex., Falco vespertinus (evening heron) - 300 ex., Egretta garzetta (lesser egret)- 50 ex., it was found that the population population decreased by a small percentage of up to 10% of the total bird populations of Community interest at site level, due to the extraction of mineral aggregates from these Natura 2000 sites.

The monitoring of threatened species revealed a change in the number, composition and distribution of wild bird species analyzed that may indicate changes in ecological processes, especially in the capacity to sustain sustainable populations of essential species.

The need to ensure biodiversity conservation is seen as a measure to adapt to climate change and at the same time protect vulnerable species by preserving and restoring ecosystems.
From the study it is found that the bird species Falco vespertinus (Evening heron) is a vulnerable species that requires the adoption of conservation measures, both active and long-term restrictive measures.

From the number of specimens of bird species analyzed and included in the Standard Form of the two Natura 2000 sites established in 2016, as well as from the analysis of the information contained in the impact matrices, it appears that the extraction of mineral aggregates in the two studied Natura 2000 sites may have an insignificant negative impact in the ROSPA0024 OLT-DANUBE CONFLUENCE site and a moderate negative impact in the Natura 2000 site ROSPA0152 IALOMIȚA CORRIDOR.

CHAPTER 4. OWN CONTRIBUTIONS REGARDING THE ASSESSMENT OF THE IMPACT OF THE AGGREGATE EXTRACTION ACTIVITY ON SOME BIRD SPECIES

4.1. The monitoring activity regarding the assessment of the impact on biodiversity of the activity of extracting mineral aggregates

Using the bird monitoring method, to interpret the matrix of the impact determined by the mineral aggregates extraction activity on bird species of community interest from two Natura 2000 sites ROSPA0024 OLT-DANUBE CONFLUENCE and ROSPA0152 IALOMIȚA CORRIDOR, we used the methodology described below.

The analysis of the level of impact of the mineral aggregates extraction activity on the bird species of community interest from the site ROSPA0024 OLT-DANUBE CONFLUENCE took into account the consequences and the probability of negative effects taking into account the particularities of the area, the technical characteristics of the project, the degree of reversibility of the effects produced and the observations made in the field.

The chosen method is the fixed-point observation method, placed in aquatic habitats that can be used as stopover sites during migration or as wintering sites. Observations were made in all chosen points over the shortest possible period. For each species, birds are counted individually and then summed to obtain the total for the respective location. In the case of very large groups, the extrapolation method is used, and this information is recorded on the field form.

4.2 Establishing biodiversity indicators

"Biodiversity" is the name for the variety of ecosystems (natural capital), species and genes in the world or in a particular habitat. It is essential to people's well-being because it provides services that support our economies and societies. Biodiversity is also essential for ecosystem services – the services that nature provides, such as pollination, climate regulation, flood protection, soil fertility and the production of food, fuel, fiber and medicine. However, we are currently witnessing a steady decline in biodiversity, with profound consequences for the natural world and human well-being. The main causes of this decline are the changes made to natural habitats by intensive agricultural production systems, construction, mining quarries, overexploitation of forests, oceans, rivers, lakes and soils, invasive alien species, pollution and, increasingly, by global climate change. The huge role that biodiversity plays in ensuring the sustainability of the world and our lives makes its continued decline all the more worrying[10].

Biodiversity indicators are a quick and easy-to-use tool for highlighting essential messages and presenting general trends regarding the state of biodiversity.

The assessment of the significance of the impact of the mimeral aggregates extraction activity on biodiversity is based on the following quantifiable key indicators:

1. the percentage of the habitat surface that will be lost;
2. the percentage that will be lost from the surfaces of the habitats used for the needs of food, rest and reproduction of the species of community interest;
3. fragmentation of habitats of community interest (expressed in percentages);
4. duration or persistence of fragmentation;
5. the duration or persistence of the disturbance of species of community interest, the distance from the natural area protected by community interest;

6. changes in population density (no. of individuals/area);
7. the time scale for replacing the species/habitats affected by the implementation of the project;
8. the key chemical indicators that may cause changes related to water resources or other natural resources, which may cause changes to the ecological functions of a protected natural area of community interest.

The Trophic State Index (TSI) is a classification system designed to rate bodies of water based on the amount of biological productivity they support. Although the term "trophic index" is commonly applied to lakes, any surface water body can be indexed. The amounts of nitrogen, phosphorus and other biologically useful nutrients are the primary determinants of a water body's STI. Nutrients such as nitrogen and phosphorus tend to be resource limiting in water bodies, so increased concentrations tend to result in increased plant growth, followed by corollary increases in subsequent trophic levels. Consequently, the trophic index can sometimes be used to make a rough estimate of the biological status of water bodies. Trophic status is defined as the total weight of biomass in a given water body at the time of measurement.

Specific structural biodiversity indicators are:

• Spatial distribution of individuals - is in close correlation with the limits of tolerance they have towards abiotic factors, with the interactions of individuals with other groups of organisms. The distribution is in the present case grouped or crowded, where the distribution of individuals in the habitat is carried out in groups of different sizes.

• The structure of ages - it is expressed by the proportions in which the different age groups or classes are represented in relation to the total number of the given population. From the analysis carried out in the bird species, species with pre-reproductive (juvenile) and reproductive (adult) age were identified).

• Sex ratio - the sex structure of populations differs greatly from one species to another. The 1:1 ratio found in the observed bird species indicates that their populations are stationary.

• Density - represents the number or biomass of individuals of a population existing on a certain surface or volume. In this case, the density counting method used was direct counting.

The physical and chemical indicators of the analyzed ecosystem's biotope are based on the physical and chemical parameters of the environment. Among the most commonly used are pH, nitrate concentration, and organic carbon level. These indicators measure the physical and chemical variables of the studied environment, reflecting its state. Since all aspects of the environment are influenced by physical and chemical factors, these are essential for assessing impacts on ecosystems.

The diversity of physico-chemical factors provides us with essential information about the state of the environment. In aquatic environments, indicators such as water quality, turbidity, and dissolved oxygen are particularly important. In terrestrial environments, soil pH and concentrations of nitrates and heavy metals are key monitoring factors.

Physical indicators:

• temperature - atmospheric temperature largely conditions the existence of terrestrial organisms, acting on their distribution in the respective biotope: the identified bird species are homeothermic species, which have an almost constant internal body temperature regardless of environmental changes.

• atmospheric humidity - in birds it affects the process of thermoregulation, fecundity, etc.

• light - in birds, light plays an important role, influencing the functions of the sex glands in the spring. Depending on the alternation of days and nights, some species of birds are active during the day and roost at night. The length of the day determines the cyclicity of reproduction, migrations, egg hatching, etc.

The chemical indicators are:

• Nitrogen (N) - the presence of nitrogen in living organisms is related, especially to the composition of proteins, substances characteristic of life.

• Oxygen (O2) - plays a role in the respiration of organisms, depending on their ability to use free molecular oxygen in respiration or included in organic substances, the identified bird species are aerobic species.
• Carbon dioxide (CO2) - the increase in the concentration of carbon dioxide in the air up to 1-3% compared to the normal value, causes an appreciable increase in the frequency of breathing.
• Ph or the concentration of hydrogen ions - the change in ph depends on the ratio between oxygen and carbon dioxide dissolved in the water, a change that influences the nocturnal and seasonal vertical migrations of aquatic species.

Bioindicators

The presence of bioindicator species is essential for assessing the health of an ecosystem. These species, named for their role in indicating the well-being of the ecosystem, reflect the overall functioning state of the environment in which they live. Bioindicators are sensitive to environmental changes and can be plants, such as lichens, as well as complex animals. In aquatic ecosystems, invertebrate organisms such as insect larvae are often used to evaluate water quality. Among vertebrates, the otter is considered an excellent bioindicator of the health of freshwater systems, being highly sensitive to deteriorating environmental conditions and quickly leaving affected areas.

4.3 Methodology used in bird species monitoring

Birds are excellent bioindicators for assessing the health of the ecosystems they frequent, as changes in their population numbers and structure can provide valuable information about the evolution of these ecosystems. Monitoring bird species, based on the specific characteristics of each species and their habitats, can be carried out using the fixed-point method, the transect method, or a combination of these. In certain situations, these methods can be customized. It is important to consistently use the same methods each time to ensure the comparability of the results.

For the Group of nesting passerine species:

The fixed-point observation method for assessing breeding populations involves counting breeding pairs at predefined points. The distance between two observation points is 400 meters. The observer must spend 5 minutes at each point. Observations are conducted twice a year: the first between April 15 and May 15, and the second between May 16 and June 15. There must be a minimum interval of 14 days between the two observation sessions. In both periods, bird counts should start as early as possible (beginning at 5 a.m.) and be completed by 10 a.m., as birds are most active during this time of day.

Period: April 15 - June 15, in the morning between 5-10

Group of species of nesting raptors

Favorable habitats for nesting will be identified, and nesting flocks will be assessed from fixed observation points located near them. The position of each occupied and unoccupied nest will be marked (using GPS).

Period: May 1 - July 31, during the day between 10 a.m. and 6 p.m

Group of aquatic species that nest colonially.

Breeding colonies for target species will be identified. To locate the colonies, the movements of individuals from feeding sites to nesting sites will be tracked. In the case of accessible colonies, a direct census of nests on-site will be conducted, counting the nests for each species present in the colony. For inaccessible colonies, particularly for shorebirds nesting at the water's edge or on islands, the observer will select the best observation point to view the colony. Birds that are incubating or the number of nests present will be counted. If parts of the colony are not visible, the estimation of breeding birds will also consider birds entering or leaving the area that is not visible. Counting will be done early in the morning or in the evening to avoid the impact of strong sunlight on the observations.

Period: March 15 – June 30, during the day between 7-10 a.m., 5-8 p.m.

Group of aquatic nesting species.

Aquatic nesting species will be assessed using the transect method. Equitably distributed transects will be completed in favorable nesting habitats. The transects will be located parallel

to the shores of the lakes, for the best possible visibility of aquatic habitats and peripheral wetlands. Nesting pairs of the target species will be counted on each transect.

Period: March 15 – June 30, during the day between 5-10 am

Group of migratory / wintering raptor species

Migratory and wintering raptor species will be assessed using the transect method. Fairly distributed transects will be covered in favorable habitats for migration / wintering.

Period: spring (March 1 - April 15), during the day autumn (September - November), during the day - winter (January - February), during the day

Group of migratory aquatic species.

The fixed-point observation method is used in aquatic habitats that can serve as stopover sites during migration or as wintering sites. Observations at all chosen points will be made over the shortest possible period. For each species, birds are counted individually and then totaled to obtain the count for each species at the location. In the case of very large groups, the extrapolation method is applied, and this should be noted on the field form.

Period: In autumn (September - October) and spring (April - May), between 10-18 hours, for the assessment of migratory species. During the winter period (January 10-20), between 10-18 hours, for the assessment of wintering species[11].

Between March 15, 2022 and June 30, 2022, ornithological observations were made in the NATURA 2000 site ROSPA0024 OLT-DANUBE CONFLUENCE, on dates when the activity of extracting mineral aggregates was not in progress, and also during the performance of the activity, ornithological observations were made to the same identified birds, the results being recorded in field sheets presented in Annex no. 1 of this thesis.

From the total species that make up the ornitofauna of the Natura 2000 site ROSPA0024 OLT-DANUBE CONFLUENCE, we have identified a number of 5 aquatic species or dependent on wet habitats, belonging to:

Order ANSERIFORMES

• Family Anatidae - species Cygnus cygnus (Winter Swan)

Order PELECANIFORMES

• Family Phalacrocoracidae: Species Phalacrocorax pygmaeus (Little Cormorant)

Order FALCONIFORMES

• Family Falconidae - species Falco vespertinus (Evening hawk)

Order CORACIIFORMES

• Family Alcedinidae-Species Alcedo atthis (Blue Gull)

Order ANSERIFORMES

• Family Anatidae - Species Anas crecca (Dwarf duck)

In the period March 15, 2023 - June 30, 2023, ornithological observations were made in the NATURA 2000 site ROSPA0152 IALOMIȚA CORRIDOR on dates when the mineral aggregates extraction activity was not in progress and also during the activity, ornithological observations were made at the same birds identified, the results being recorded in field sheets presented in Appendix no. 1 of this thesis.

From the total of the species that make up the ornitofauna of the Natura 2000 site ROSPA0152 IALOMIȚA CORRIDOR, we identified a number of 5 aquatic species or dependent on wet habitats, belonging to:

Order CORACIIFORMES

• Family Alcedinidae-Species Alcedo atthis (Blue Gull)

Order PELECANIFORMES

• Family Ardeidae: species Ixobrychus minutus (Dwarf Heron)

Order FALCONIFORMES

• Family Falconidae - the species Falco vespertinus (Evening Kestrel)

Order CICONIIFORMES

• Family Ardeidae - Species Nycticorax nyctocorax (Night Heron)

Order PELECANIFORMES

• Family Ardeidae: species Egretta garzetta (Little Egret)

In this doctoral thesis I addressed the issue of ambient noise produced by mineral aggregates extraction operations. The extractive industry is vital to people's livelihood and is a crucial sector in every state's economy. Two distinct areas were studied, in the counties of Teleorman and Prahova, respectively, where mineral aggregates extraction activities are carried out by unclogging the minor beds of the Olt and Prahova rivers, respectively. The analyzed areas are found inside two sites in the Natura 2000 network, namely ROSPA0024 Olt-Danube Confluence and ROSPA0152 IALOMIȚA Corridor, sites declared for avifaunistic protection. The presence of characteristic bird species and the temporary effect of the noise produced by the activities involved in the extraction process were observed.

Ambient noise is a significant problem in Europe, for the population especially in the case of biodiversity, affecting the activity of invertebrates, mammals and especially birds. To address this issue, the European Council of the European Union has established noise reduction policies and regulations, such as the Ambient Noise Policy, which sets noise limits for major sources of noise pollution. Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 on the assessment and management of environmental noise - Statement by the Commission within the conciliation committee on the Directive on the assessment and management of environmental noise focuses on four areas of action:

• determination of exposure to ambient noise and evaluation of its effects on health at the level of the single dwelling;
• ensuring that information on ambient noise and its effects is made available to the public;
• prevention and reduction of ambient noise;
• preserving the quality of ambient noise in areas where it is good[17] .

Water is one of the most abundant natural resources on Earth. Between living organisms and water being an indispensable link. Humans are made up of 70% water (Benchea, 2011). Of all the types of water, the most important is fresh water, because human life would be impossible without it. Human civilization was built on the availability of water[18].

The first location, located in Teleorman county, Islaz municipality, is the limits of the avifaunistic special protection area ROSPA0024 Olt-Danube Confluence. It was designated as SPA by Government Decision no. 1284/2007 regarding the declaration of avifaunistic special protection areas, as an integral part of the Natura 2000 ecological network in Romania from October 2007. Also, by decision no. 11269/CA/18.08.2022, the specific conservation objectives at the site level were established. The site, with an approximate area of 20483.80 ha, is designated for a number of 89 species of birds that use this area for feeding, breeding or nesting. According to the site's Standard Form, a number of 18 species are declared priority.

The second site, located in county Prahova, Tinosu municipality, is within the limits of the avifaunistic special protection area ROSPA0152 IALOMIȚA Corridor. It was designated as SPA by Government Decision no. 663/2016 regarding the establishment of the natural protected area regime and the declaration of areas of special avifaunistic protection as an integral part of the Natura 2000 ecological network in Romania from September 2016. In addition, decision no. 28537/BT/12.10.2021, the specific conservation objectives at the site level were established. The site, with an approximate area of 25307.90 ha, is designated for a number of 28 species of birds that use this area for feeding, breeding or nesting. According to the site's Standard Form, a number of 21 species are declared priority.

Specific to the activity of extracting mineral aggregates are the noise-generating sources such as the technological equipment operating in the perimeter of the mining areas, such as: excavators, front loaders and dump trucks. The generation of noise during industrial activity is a phenomenon common to all mining of mineral aggregates, the sound level can be reduced in some cases.

The main sources of noise and vibration are the extraction machines during operation and their transport from the work area to contractors with whom service contracts have been concluded.

The noise level produced by the machines working in the exploitation area (excavators, front loaders, dump trucks) has a low frequency character and there may be a low risk of affecting the environment, respectively the personnel in the exploitation area.
In the case of simultaneous operation of all noise sources, taking into account only the distance between the source and the receiver and neglecting attenuation due to vegetation, topography and wind, the calculated noise level at the nearest receiver will be very low. We believe that in the situation where an earthmoving machine and two dump trucks operate simultaneously in the exploitation area, the noise level will not exceed the admissible value at the limit of industrial spaces of 65 dB(A) according to SR 10009:2017 [21]. According to specialized literature, the noise levels related to the machines used in the activity carried out on the two construction sites are:

Bulldozer 115 dB (A);
Charger 112 dB (A);
Excavator 117 dB (A);
Tipper 107 dB (A).

To determine the equivalent noise level at the nearest receptor, the following formula can be used:
Lp=Lw−10·log⁡(r2)−8=Lw−20·log⁡(r2)−8 (1)L_p = L_w - 10 \cdot \log(r^2) - 8 = L_w - 20 \cdot \log(r^2) - 8 \, (1)Lp=Lw−10·log(r2)−8=Lw−20·log(r2)−8(1)
where:

- LpL_pLp is the noise level;
- LwL_wLw is the acoustic power at distance rrr from the source;
- rrr is the distance from the noise source without considering terrain (used for noise propagation from a point source on flat ground).

Noise levels can vary significantly, influenced by local propagation conditions such as obstacles, wind characteristics, air absorption depending on pressure and temperature, terrain topography, and vegetation type. According to the SR 10009/2017 standard on acoustics, the admissible noise limit for industrial spaces is 65 dB(A).

Regarding the impact of the mineral aggregate extraction activity on the identified bird species, measurements were made regarding the noise level generated by the mineral aggregate extraction activity.

The purpose of the measurements: measurements of the external noise level, daytime measurements at the limit of the studied site, carried out on 02.06.2022, between 16.00-17.00 and on 08.06.2023, between 16.00-17.00

The name of the locations where the samples were taken: location of an economic agent that carries out the activity of extracting mineral aggregates in ROSPA0024 OLT-DANUBE CONFLUENCE, Islaz municipality, County Teleorman and in ROSPA0152 IALOMIȚA CORRIDOR, Tinosu municipality, county Prahova.
Source of noise generation: the machines used in the activity - earthmoving and digging machines, pushers, bulldozers, front loaders.

The methodology used: Sampling and measurements were carried out together with a qualified representative of the territorial environmental protection authority. The results obtained regarding the measurements of the noise level generated by the activity of extracting mineral aggregates are presented in table 4.5 and in table 4.6, and in the table 4.7 shows the environmental conditions in which the measurements were made.

Table 4.5 The results obtained regarding the measurements of the noise level generated by the activity of extracting mineral aggregates in ROSPA0024 OLT-DANUBE CONFLUENCE, Islaz municipality, county Teleorman

Crt No	Measurement point code	Hourly measurement	LAeq dB(A)	LAeq corrected dB(A)	Maximum allowed limit, according to	Compliance deci-	Description of the measurement	Geographic coordinates

		interval			STAS 10009:2017	sions		
1	Z-C-TR 0001/02.06.2022	08.00 - 16.30	57,9	-	65	Yes	3m from the boundary of the site with activity	480134.81 254131.16
2	Z-C-TR 0002/02.06.2022	08.00 - 16.30	44,2	-	65	Yes	3m from the boundary of the site with-out activity	480134.80 254127.71
3	Z-C-TR 0003/02.06.2022	-	-	57,71	65	Yes	-	
4	Z-C-TR-0004/16.07.2024	08.00 - 16.30	42,2	65		Yes	10 m from the limit of the noice source- inactive source	480272.21 254065.96
5	Z-C-TR-0005/16.07.2024	08.00 - 16.30	78,3	65		Yes	10 m from the limit of the noice source	480272.21 254065.96
6	Z-C-TR-0006/16.07.2024	08.00 - 16.30	77,6	65		Yes	20 m from the limit of the noice source	480269.99 254056.65
7	Z-C-TR-0007/16.07.2024	08.00 - 16.30	76,8	65		Yes	30 m from the limit of the noice source t	480267.60 254046.73
8	Z-C-TR-0008/16.07.2024	08.00 - 16.30	75,9	65		Yes	40 m from the limit of the noice source	480265.30 254036.96
9	Z-C-TR-0009/16.07.2024	08.00 - 16.30	74,7	65		Yes	50 m from the limit of the noice	480263.00

							source	254027.28
10	Z-C-TR-00010/16.07.2024	08.00 - 16.30	72,9	65		Yes	60 m from the limit of the noice source	480260.69 254017.56
11	Z-C-TR-00011/16.07.2024	08.00 - 16.30	69,7	65		Yes	70 m from the limit of the noice source	480258.30 254007.74
12	Z-C-TR-00012/16.07.2024	08.00 - 16.30	67,6	65		Yes	90 m from the limit of the noice source	480253.68 253988.20
13	Z-C-TR-00013/16.07.2024	08.00 - 16.30	65,2	65		Yes	110 m from the limit of the noice source	480249.01 253968.73
14	Z-C-TR-00014/16.07.2024	08.00 - 16.30	61,8	65		Yes	140 m from the limit of the noice source	480242.02 253939.49
15	Z-C-TR-00015/16.07.2024	08.00 - 16.30	59,0	65		Yes	180 m from the limit of the noice source	480232.77 253900.59
16	Z-C-TR-00016/16.07.2024	08.00 - 16.30	57,5	65		Yes	230 m from the limit of the noice source	480221.07 253851.96
17	Z-C-TR-00017/16.07.2024	08.00 - 16.30	55,1	65		Yes	330 m from the limit of the noice source	480197.90 253754.53

Table 4.6 The results obtained regarding the measurements of the noise level generated by the activity of extracting mineral aggregates in ROSPA0152 IALOMIȚA CORRIDOR, Tinosu municipality, county Prahova

Crt No	Measure-ment point code	Hourly meas-urement interval	LAeq dB(A)	LAeq corrected dB(A)	Maximum allowed limit, ac-cording to STAS 10009:201	Com-pliance deci-sions	Description of the measure-ment	Geographic coordinates

					7			
1	Z-C-PH 0001/08.06. 2023	08.00 - 16.30	51,7	-	65	Yes	3m from the boundary of the site with activity	579574.80 370448.48
2	Z-C-PH 0002/08.06. 2023	08.00 – 16.30	42,7	-	65	Yes	3m from the boundary of the site with-out activity	579582.71 370448.58
3	Z-C-PH 0003/08.06. 2023	-	-	56,29	65	Yes	-	
4	Z-M-PH-0004/17.07. 2024	08.00 - 16.30	42,7	-	65	Yes	10 m from the limit of the noice source-inactive source	579506.16 370471.56
5	Z-M-PH-0005/17.07. 2024	08.00 - 16.30	77,7	-	65	Yes	10 m from the limit of the noice source	579506.16 370471.56
6	Z-M-PH-0006/17.07. 2024	08.00 - 16.30	77,4	-	65	Yes	20 m from the limit of the noice source	579516.08 370472.91
7	Z-M-PH-0007/17.07. 2024	08.00 - 16.30	76,9	-	65	Yes	30 m from the limit of the noice source t	579526.08 370474.26
8	Z-M-PH-0008/17.07. 2024	08.00 - 16.30	76,2	-	65	Yes	40 m from the limit of the noice source	579535.94 370475.42
9	Z-M-PH-0009/17.07. 2024	08.00 - 16.30	75,5	-	65	Yes	50 m from the limit of the noice source	579545.84 370476.73
10	Z-M-PH-00010/17.07 .2024	08.00 - 16.30	73,9	-	65	Yes	60 m from the limit of the noice source	579555.78 370477.94
11	Z-M-PH-00011/17.07	08.00 - 16.30	69,6	-	65	Yes	70 m from the limit of the noice source	579565.69

	.2024							370479.23
12	Z-M-PH-00012/17.07.2024	08.00 - 16.30	67,8	-	65	Yes	90 m from the limit of the noice source	579585.54 370481.77
13	Z-M-PH-00013/17.07.2024	08.00 - 16.30	65,2	-	65	Yes	110 m from the limit of the noice source	579605.36 370484.30
14	Z-M-PH-00014/17.07.2024	08.00 - 16.30	62,6	-	65	Yes	140 m from the limit of the noice source	579635.11 370488.13
15	Z-M-PH-00015/17.07.2024	08.00 - 16.30	60,6	-	65	Yes	180 m from the limit of the noice source	579674.82 370493.21
16	Z-M-PH-00016/17.07.2024	08.00 - 16.30	57,2	-	65	Yes	230 m from the limit of the noice source	579724.41 370499.58
17	Z-M-PH-00017/17.07.2024	08.00 - 16.30	54,8	-	65	Yes	330 m from the limit of the noice source	579823.39 370512.33

Table 4.7 Environmental conditions under which the measurements were made

Environment conditions		Point 1	Point 2
Medium temperature	ºC	28,5	29
Barometric pressure	hPa	1016,1	1018,9
Average atmospheric humidity	%	49,2	58
Wind speed	km/h	4	3
The direction of the wind	-	S-SE	SE

Equipment used:

Sound level meter BRUEL&KJAER type 2250 light, cls. I, metrologically verified in 2021.

- Microphone type: 4950, with wind protection
- Calibrator: 4231, cls. and
- Pre-calibration acoustic data: Sensitivity: 43.06 mV/Pa, deviation: 0.13 dB
- Post-calibration acoustic data: Sensitivity: 43.56 mV/Pa, deviation: 0.03 dB

The sound level meter was placed in the open field position, at 3m, 10m, 20m and 30m from the site boundary, 1.5m from the ground. The method of measuring the ambient noise level complies with the indications mentioned in the SR ISO 1996-1:2016 standard[23].

Ambient noise standards:

— SR 10009:2017, Acoustics. Admissible limits of the noise level in the ambient environment

— SR ISO 1996-1:2016, Acoustics. Description, measurement and evaluation of ambient noise. Part 1: Fundamental quantities and valuation methods;

— SR ISO 1996-2:2008, Acoustics. Description, measurement and evaluation of ambient noise. Part 2: Determination of ambient noise levels

— SR 6161-1:2020, Acoustics in construction. Part 3: Determination of the noise level in the case of civil constructions
— SR 6161-3:2020, Acoustics in construction. Part 3: Determination of noise levels in urban areas

Calculations, observations:

In May 2022, a series of monitoring of bird species was carried out in the area of the site related to Islaz municipality, County Teleorman using the linear transect method as a monitoring method on surfaces from 1 to 5 km long. Following these visits, 5 bird species were observed such as: Cygnus cygnus – 3 adults, Falco vespertinus – 3 adults, Phalacrocorax pygmaeus – 7 adults, Alcedo atthis – 10 adults and Anas crecca – 20 adults.

Figure 4.8 The presence of priority bird species at the level of ROSPA0024 Olt-Danube Confluence - May 2022

In May 2023, a series of monitoring of bird species was carried out in the area of the site belonging to Tinosu municipality, county Prahova using the linear transect method as a monitoring method on areas from 1 to 5 km long. Following these visits, 5 bird species were observed such as: Egretta garzetta – 20 adults, Falco vespertinus – 10 adults, Nycticorax nycticorax – 4 adults, Alcedo atthis – 4 adults and Ixobrychus minutus – 3 adults.

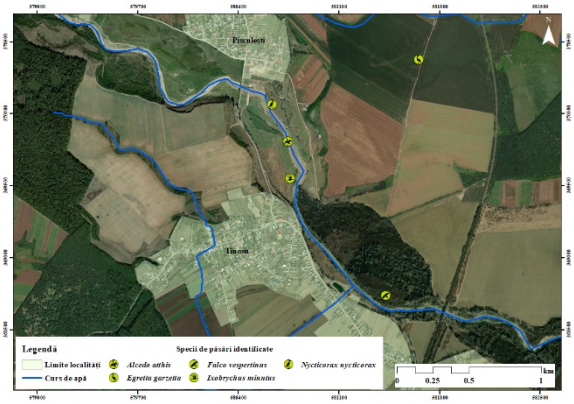

Figure 4.9 The presence of priority bird species at the level of ROSPA0152 IALOMIȚA Corridor – May 2023

Conclusions:

The admissible values of the noise level based on which the state of the environment is assessed from an acoustic point of view at the limit of the functional spaces of the activity of extracting mineral aggregates are those stipulated in SR 10009:2017, Acustica urbana., table no. and table no. 4, the benchmark being L A-weighted continuous sound pressure level.

According to the specialized literature, it is known that, in general, a high level of noise causes the removal of fauna species from the respective area. Thus, Foreman et al. (1998) indicate that a decline in birds occurs at a constant equivalent noise level above 48 dB(A) [24] .

To better illustrate the expected noise levels in the areas of the two sites, a series of noise level modeling was carried out using the software Predictor LimAType7810-B, developed by Bruel&Kajer.

It allows us to calculate noise contours for large models for all methods. The software includes both Acoustic Determinator and Predictor Analyst. LimALink is also included for advanced geometric processing of Predictor models in LimA. The Predictor–LimAType7810-B is the ideal multifunctional tool for ambient noise mapping, management and impact assessment. It can be used to meet European Commission directives such as the Environmental Noise Directive (2002/49/EC), in accordance with the Guidelines on revised intermediate calculation methods (2003/613/13 EC) and the European Commission's assessment of exposure to noise at work. Good practice guidance for groups as well as meeting the 2010/75/EU Industrial Emissions Directive (IPPC) [25] .

The input data were represented by:

• Information provided by the designer (number of machines, distances, surfaces, operating times and durations);
• Digital terrain model;
• Estimates made using Predictor LimAType7810-B;
• Information from the literature.

The worst case scenario, i.e. the simultaneous operation of one earthmoving machine and two dump trucks, was considered.

In the case of mineral aggregate exploitation areas, which involve activities carried out only in one area, we can estimate that the noise isoline with the value of 48dB(A) is recorded at distances of approx. 150 - 250 m from the work fronts, depending on the intensity of the work and the conditions in the field.

The nature of the activities carried out in the analyzed areas as well as their location does not lead to affecting the migration routes of the bird species or the important resting areas for them.

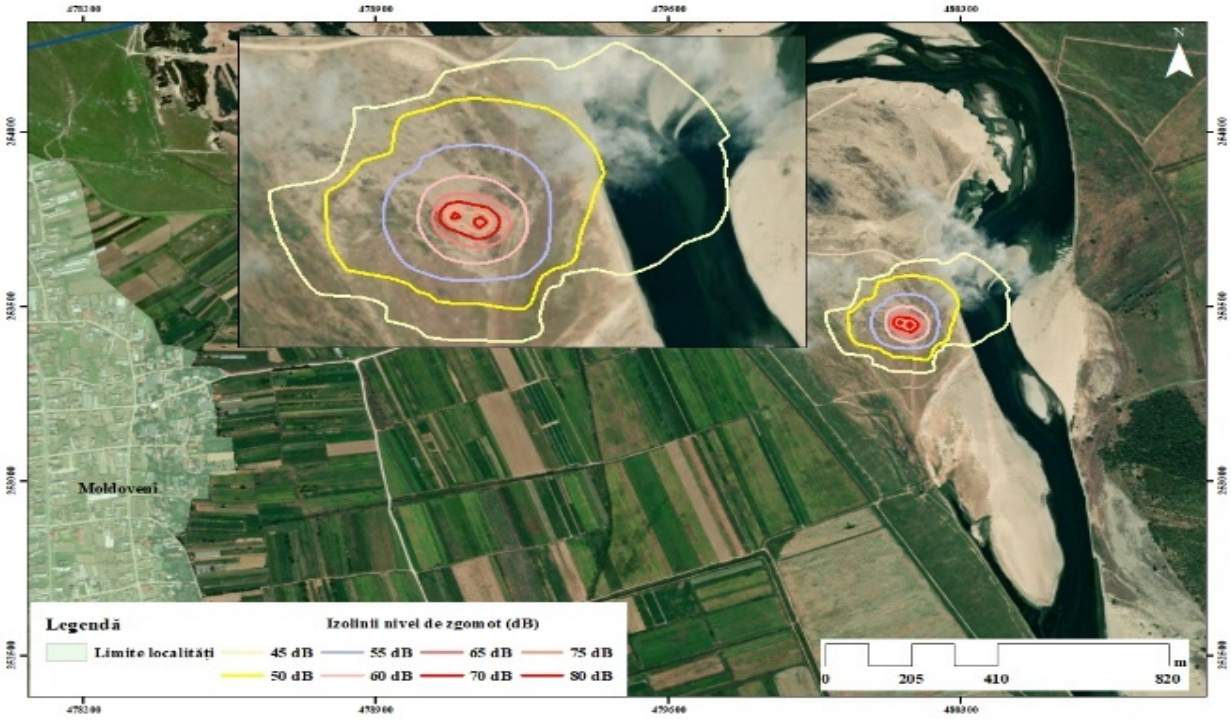

Figure 4.10 The expected noise level at the site level in the area of Islaz municipality, county Teleorman, in 2022

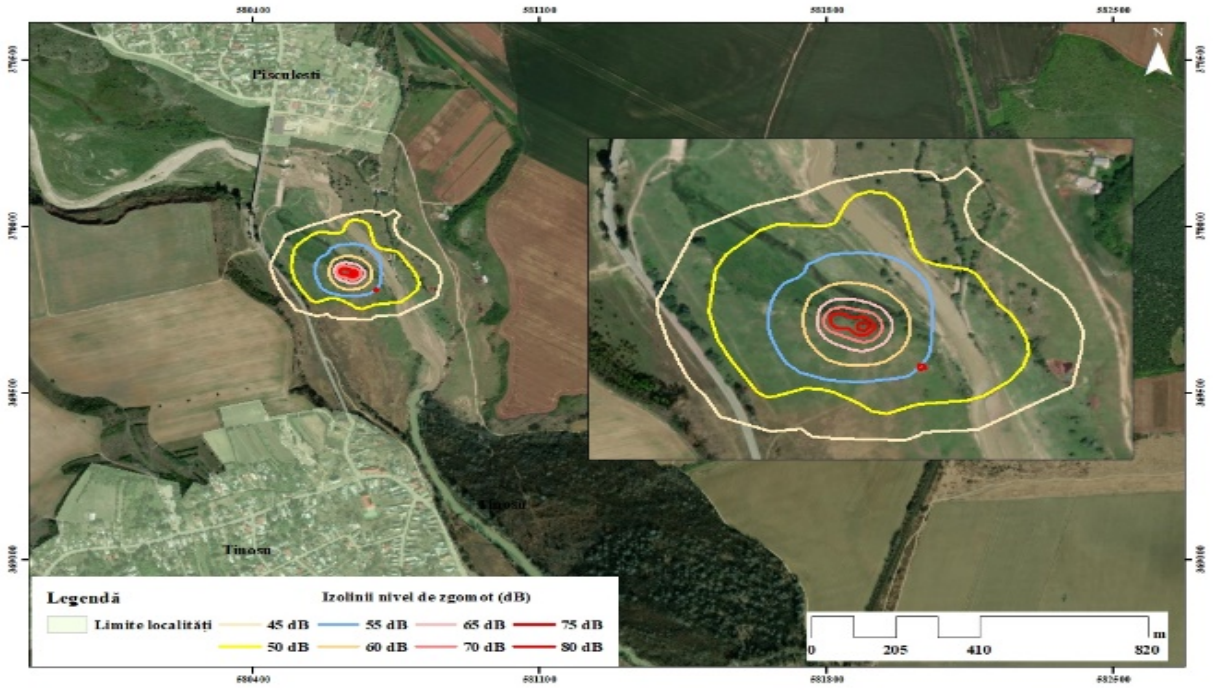

Figure 4.11 The expected noise level at the location within the radius of Tinosu municipality, County Prahova, in 2022

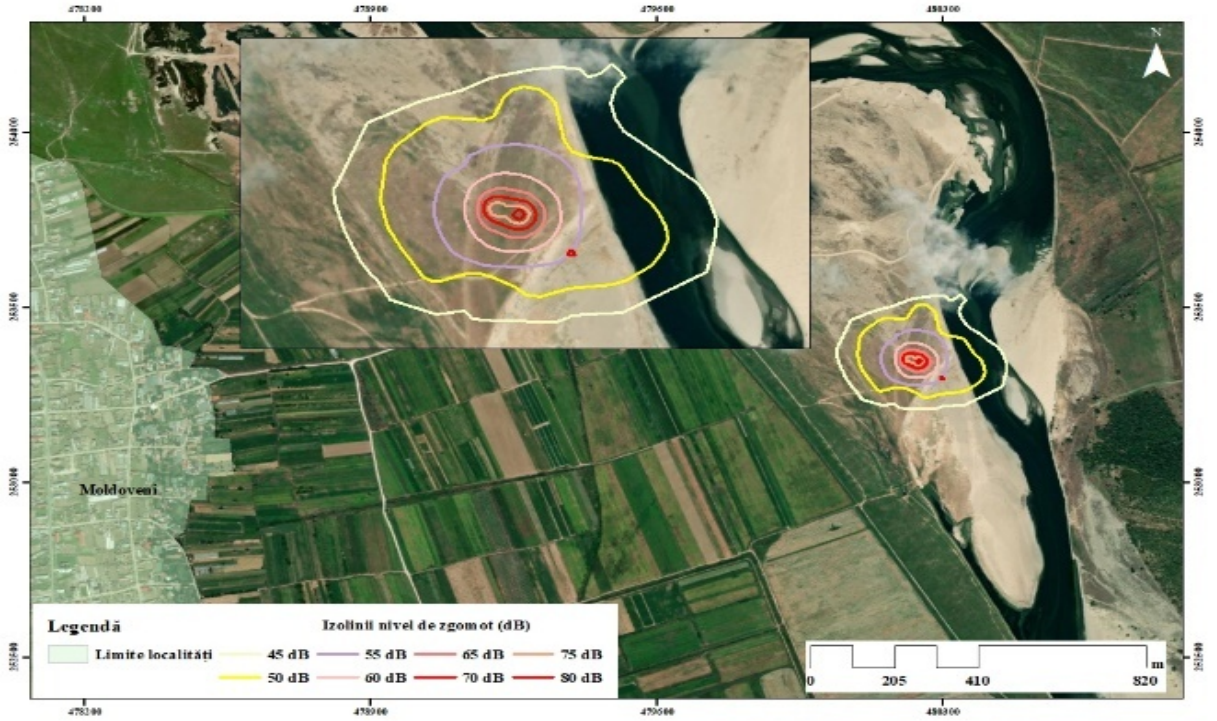

Figure 4.12 The expected noise level at the site level in the Islaz municipality area, Teleorman county, in 2020

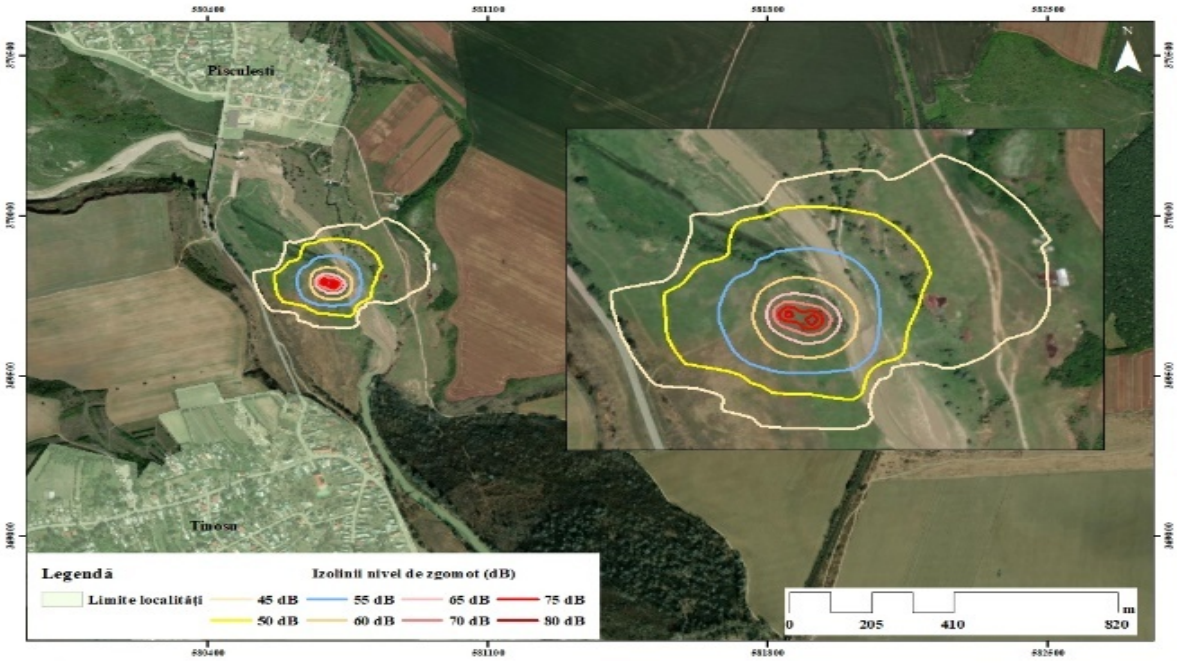

Figure 4.13 The expected noise level at the location within the radius of Tinosu municipality, County Prahova, in 2021

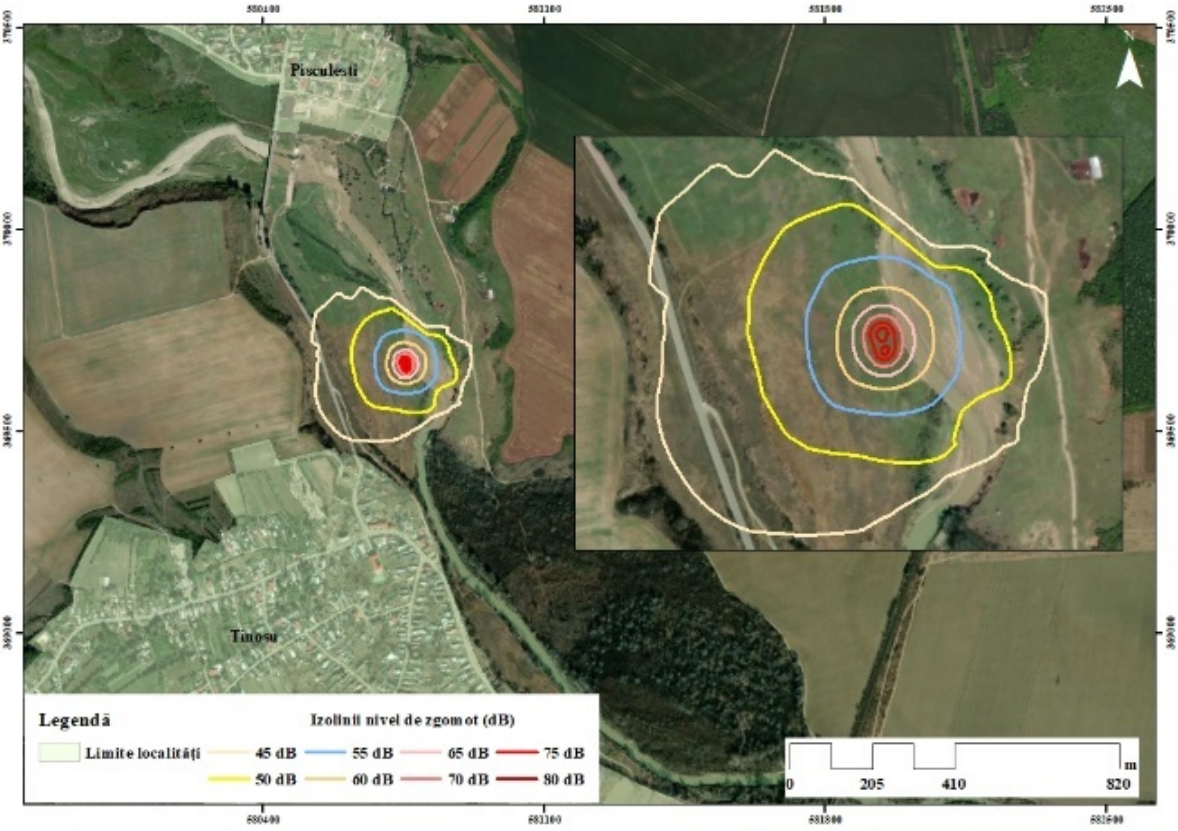

Figure 4.14 The expected noise level at the location within the radius of Tinosu municipality, County Prahova, in 2020

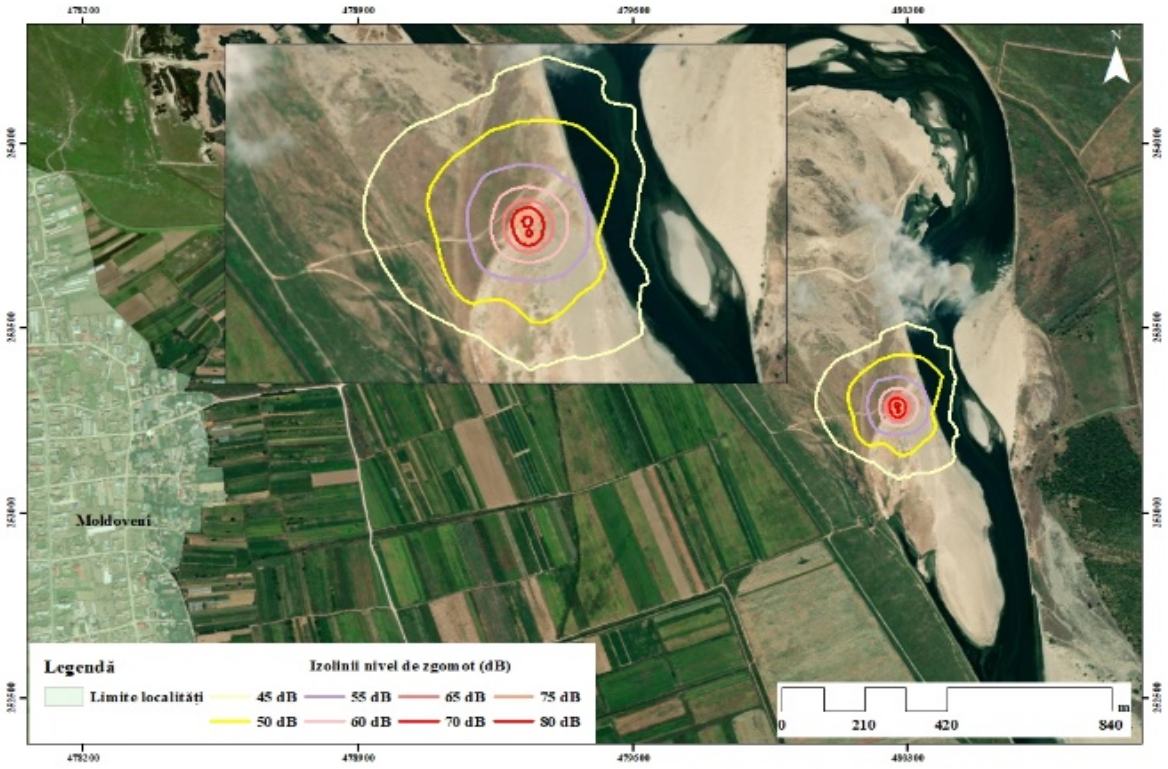

Figure 4.15 The expected noise level at the site level in the Islaz municipality area, Teleorman county, in 2021

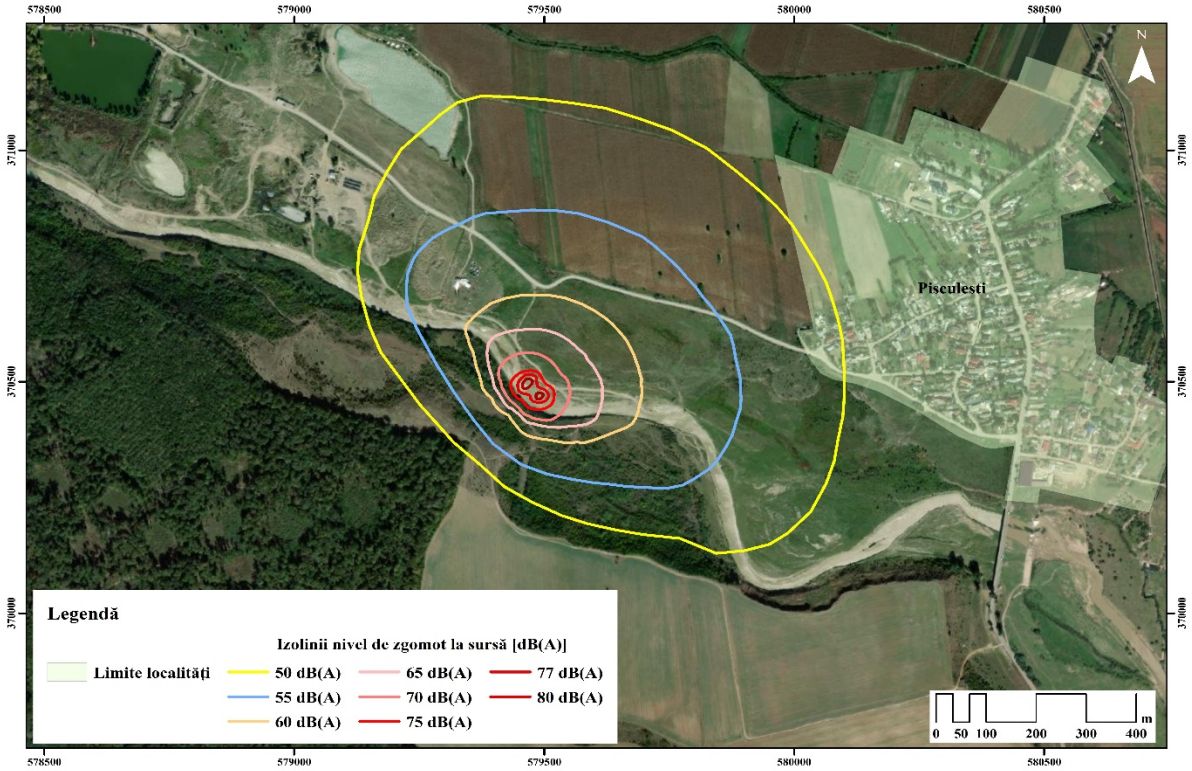

Figura 4.16 The expected noise level at the level of the location within the radius of Tinosu municipality, County Prahova, in 2024

For the site in Tinosu municipality, County Prahova, on 17.07.2024, field trips were carried out, where the mineral aggregate extraction works were observed, recording the level of noise generated at the source, linearly, at different distances from the generating sources, at predetermined coordinates prior to moving in the field. The location of the measurement

points, respectively the values recorded with the Bruel&Kjaer sound level meter, are presented in figure 4.16 and in table 4.6.

Also, knowing the average value of the noise level generated by certain machines used in the extractive industry, by using the dedicated software Predictor LimAType7810-B, developed by Bruel&Kjaer, prior to the field visit, a prediction model was made regarding the propagation of the noise level , model presented in Figure 4.16.

It could be observed that, by comparison with the values obtained in the field with the help of the sound level meter, the prediction model made shows a generally increased accuracy.

Thus, knowing this fact, as well as information regarding the topographical elevations, the characteristics of the land, of the landscape and the values of the acoustic powers at the source, it can be stated that, by using the software Predictor LimAType7810-B, the potential impact on environmental factors and sensitive receptors, generated by the performance of extractive works on the Prahova and Olt rivers.

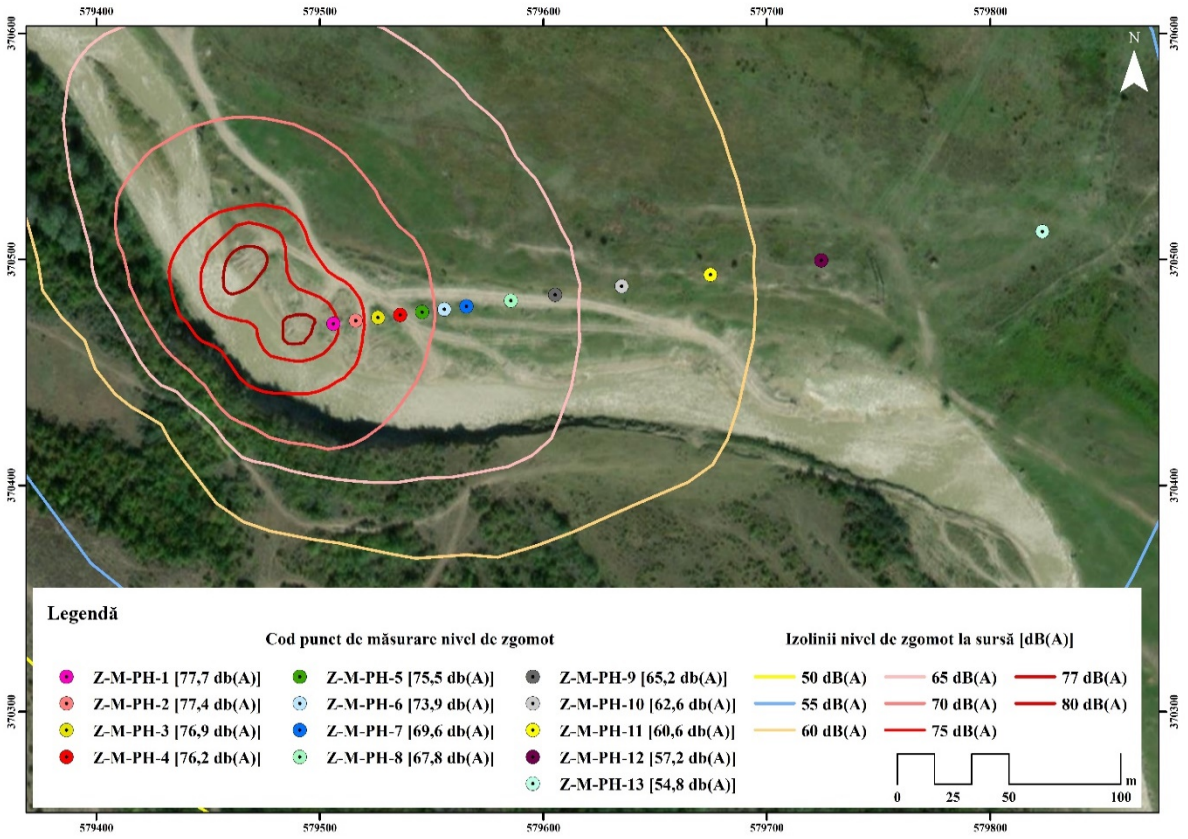

Figure 4.17 Noise level measurement points and recorded acoustic levels at the location within the radius of Tinosu municipality, County Prahova, in 2024

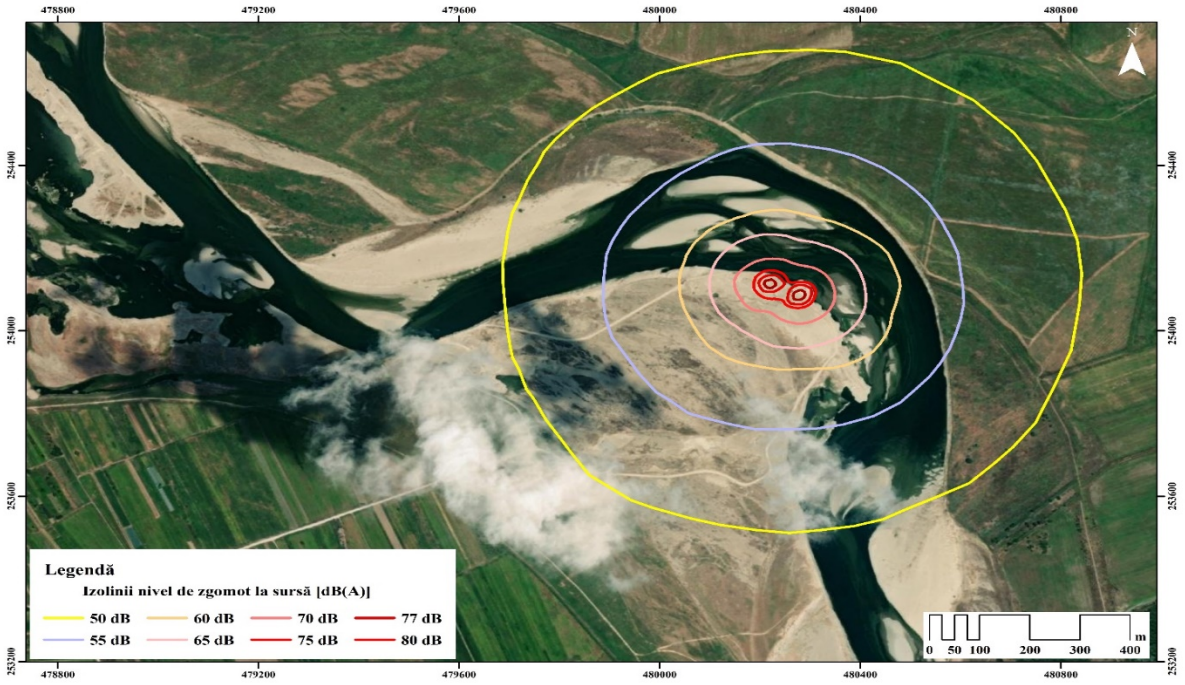

Figure 4.18 The expected noise level at the level of the location within the radius of Islaz municipality, Teleorman county, in 2024

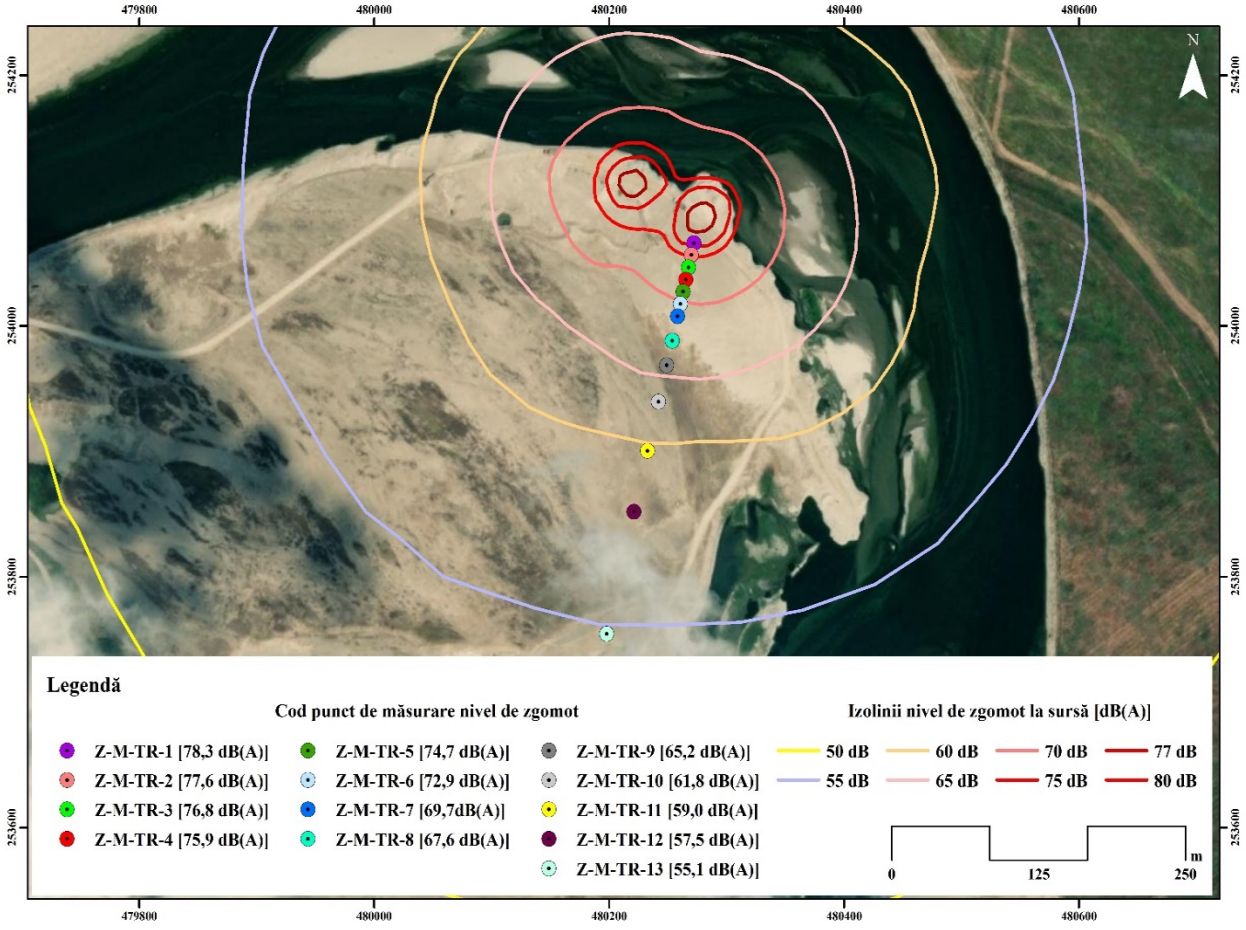

Figure 4.19 Noise level measurement points and recorded acoustic levels at the location within the radius of Islaz municipality, Teleorman county, in 2024

The activity of fauna species, especially bird species, will be temporarily disturbed during the period of operation due to the increase in human presence and the noise produced by the operation of machinery and the performance of works, the negative effects generated can be felt on a small surface, of maximum 330 m from the boundary of the working fronts.

Both analyzed natural areas present very large areas for feeding, nesting and resting for bird species, so that during the period of operation they will have available areas for carrying out the activity.

The large number of priority birds determined following the monitoring of the two analyzed areas, shows that in the case of both locations there is no major impact on their activity.

From the analysis of the results obtained regarding the measurements of the noise level generated by the activity of extracting mineral aggregates in the two Natura 2000 sites: ROSPA0024 OLT-DANUBE CONFLUENCE, Islaz municipality, County Teleorman and in ROSPA0152 IALOMIȚA CORRIDOR, Tinosu municipality, County Prahova, as well as from the monitoring of bird species in both areas, we can state that the effect due to the noise produced by the mining activities of the mineral aggregates on the activity of the birds designated at the level of the two areas will be a small negative, determined by the period of operation and the level of activity of each operator. The admissible values of the noise level on the basis of which the state of the environment is assessed from an acoustic point of view at the limit of the functional spaces of the activity of extracting mineral aggregates are those provided in SR 10009:2017, Urban acoustics, chapter. 4.1, table no. 1. The reference indicator is LAeq T equivalent continuous A-weighted sound pressure level.

From the analysis of the results obtained regarding the measurements of the noise level generated by the activity of extracting mineral aggregates in the two NATURA 2000 sites: ROSPA0024 OLT-DANUBE CONFLUENCE, Islaz municipality, County Teleorman and in ROSPA0152 IALOMIȚA CORRIDOR, Tinosu municipality, County Prahova, it emerged that the noise level falls within the maximum allowed limit, according to STAS 10009:2017.

From the analysis of the results obtained regarding the measurements of the noise level generated by the mineral aggregates extraction activity in the two Natura 2000 sites: ROSPA0024 Olt-Danube Confluence, Islaz municipality, County Teleormanand in ROSPA0152 IALOMIȚA Corridor, Tinosu municipality, County Prahova, as well as from the monitoring of bird species in the two areas, it can be stated that the effect due to the noise produced by the mineral aggregates exploitation activities on the activity of the designated birds at the level of the two areas is insignificant, not having a major impact on their activity.

4.4. The predicted impact

Structural changes to the subsoil, such as compaction and settlement caused by excavation below the groundwater level during mining operations, are not considered capable of producing changes that affect hydrological conditions, the hydrological network, wetlands, or habitats. Environmental impact assessment is carried out through a series of analytical stages, which rely on quality indicators capable of reflecting the overall state of the examined environmental factors. The quality of an environmental factor or element is assessed against permissible limits according to standards and regulatory norms.

To evaluate compliance with the maximum permissible limits, pollution indices (Ip) are used.

Ip= (Cmax/Cadmis)x100 where

IP=0-100 - the environment is affected within the permitted limits and the effects are positive or negative without being harmful

Ip> 100 – the environment is affected beyond the permitted limits, the negative effects are evaluated according to the degree (%) of exceedance

In relation to the size of the effects, we have quality indices Ic

Ic=1/+-E

where

E-effect size established by the evaluation matrix

Ic=0-1.0 - the influences are positive and the environment is affected within acceptable limits

Ic=-1-0 – the influences are negative and the environment is affected beyond the allowed limits

Ic=0 - the state of the environment unaffected by the activity

The estimation of the quality indices of the surrounding environment is done according to their creditworthiness scale, presented in table 4.16.

Table 4.16 The value of quality indices
[12]

Credit score	Value I_C	Effects of activities on the environment
10	Ic=0	Unaffected environment
9	Ic=0,0-0,25	Unaffected environment Affected environment within permissible limits -Level 1 -Great positive influences
8	c=0,25-0,50	Affected environment within permissible limits -Level 2 - Average positive influences
7	Ic=0,5-1	Affected environment within permissible limits -Level 3 -Small positive influences
6	Ic= -1,0	-Environment affected beyond permissible limits -Level 1 -The effects are negative
5	Ic= -1÷-0,5	Environment affected beyond the permitted limits -Level 2 -The effects are negative
4	Ic= -0,5÷-0,25	Environment affected beyond the permitted limits -Level 3 -The effects are negative
3	Ic= -0,25÷-0,025	The environment is degraded -Level 1 -The effects are harmful for long periods of exposure
2	Ic= -0,025÷-0,0025	-The environment is degraded -Level 2 -The effects are harmful at medium exposure times
1	Ic= sub -0,0025	The environment is degraded - Level 3 -The effects are harmful for short durations of exposure

Quality index for SOIL, SUBSOIL, VEGETATION, FAUNA (IC,S,S,V,F)
The soil, subsoil, vegetation, and fauna environmental factors will be primarily affected by the exploitation works that involve the in-situ displacement of the ballast deposit as well as by the de-covering works.
By rehabilitating the excavation after the completion of aggregate extraction activities and by creating new wetland habitats, the impact on environmental factors will be significantly reduced. Thus, environmental impacts will be within permissible limits, with moderate positive influences, resulting in a quality index Ic S,S,V,F between 0.5 and 1.

Water Quality Index (IC water)

Ballast excavation activities will be carried out below the upper level of the groundwater table to ensure the availability of water needed for fish fauna. To prevent deterioration of groundwater quality, machinery will be refueled in specially designated areas equipped with secondary

containment. Under these conditions, the water quality index Ic water will be between 0.25 and 0.50.

Air Quality Index (IC aer)

According to the documentation, the impact on the air quality factor will be maintained within permissible limits. The air quality index Ic air will be between 0.25 and 0.50.

Interpretation of results on environmental factors

Establishing the credit rating for the pollution index, calculated for each environmental factor is done using the Credit Rating Scale of the pollution index, assigning the credit rating corresponding to the value of each quality index calculated, presented in table 4.17.

Table 4.17 Credit ratings of pollution indices [12]

Factorii de mediu	I_c	N_B
APĂ	0,25 - 0,50	8
AER	0,25 - 0,50	8
SOL, VEGETAŢIE, FAUNĂ	0,5 - 1	7

From the analysis of credit ratings, the following conclusions result:

The environmental factor SOIL, BASEMENT, VEGETATION AND FAUNA will be affected within admissible limits, level 3,

The water environmental factor will be affected within permissible limits, level 2,

The AER environmental factor will be affected within permissible limits, level ,

Calculation of the global pollution index

The global impact assessment method is based on the quantitative expression of the state of environmental pollution based on the global pollution index I.P.G. This index results from the ratio between the ideal state and the real state Sr of the environment. The graphic method proposed by V. Rojanski consists of determining the global pollution index by the ratio between the surface representing the ideal state and the surface representing the real state, i.e.:

I.P.G = Si/Sr, where:

Si=the surface of the ideal state of the environment

Sr=surface of the real state of the environment

For I.P.G=1 - there is no pollution

For I.P.G>1-there are environmental quality changes

Based on the I.P.G value, a scale was established regarding the quality of the environment

Table 4.18 The effects of the activity on the environment [12]

Valoarea I.P.G **I.P.G=Si/Sr**	**The effects of the activity on the environment**
I.P.G=1	The environment is natural, unaffected by human activity
I.P.G=1-2	The environment is affected by human activity within acceptable limits
I.P.G=2-3	The environment is affected by human activity causing state of discomfort to life forms
I.P.G=3-4	The environment is affected, causing disturbances to life forms
I.P.G=4-6	The environment is affected by human activity becoming dangerous life forms
I.P.G>6	The environment is degraded, unsuitable for life forms

For the studied objective, with an area of 127.5 units, and the ideal area being 200 units, it results that the Global Potential Impact (G.P.I.) generated by the construction and operation of the mineral aggregate extraction activity, including ballast extraction, will be

I.P.G =SI/SR=200 units/127.5 units

I.P.G = 1.568

The I.P.G global pollution index has a value of 1.568, which shows that the analyzed activity will affect the environment within acceptable limits.

4.5 Drawing up an action plan for bird species affected by the activity of extracting mineral aggregates

The action plan for the conservation of bird species affected by the activity of extracting mineral aggregates has the following objectives:

-Maintaining the optimal conditions for the nesting habitat by reducing the disturbance during the incubation period and ensuring an optimal surface in the area of the species;

- Ensuring optimal feeding conditions;

-Reducing the direct mortality of individuals of the affected bird species

The actions proposed in the Action Plan are based on the experience gained in studying the nesting and feeding needs of bird species and the establishment of concrete conservation measures, measures which are presented in table 4.19

Table 4.19 Concrete conservation measures of bird species affected by the activity of extracting mineral aggregates

No. crt.	Measure	Perioad	Responsible	Remarks
1.	The works will be carried out outside the nesting and chick rearing periods for the bird species of community interest identified on the project site - the optimal time of day for carrying out the works	excluding the period May 15 – 15 July should not excdeed the time interval 0900 – 1700	The holder of the mineral aggregate extraction activity	will be avoided overlap with the very periods assets of the day for species of identified birds
2.	Spaces will be set up for the storage of construction materials, to avoid them being dragged to the ground	during the period of execution	The holder of the mineral aggregate extraction activity	
3.	The holder will delimit the work area to prevent/minimize the destruction of plant surfaces .	permanent	The holder of the mineral aggregate extraction activity	
4.	Absorbent material will be purchased for the removal of accidental spills of petroleum products on the ground	during the period of execution and functioning	The holder of the mineral aggregate extraction activity	
5.	Waste removal from the site will be done on the basis of a contract with an authorized specialized company, keeping strict records of this waste.	during the period of execution and functioning	The holder of the mineral aggregate extraction activity	Contract concluded with an authorized sanitation operator
6.	Wetting of access roads during periods	during the period of execution and functioning	The holder of the mineral aggregate	

	droughts of the year		extraction activity	
7.	The use in execution of machines and means of transport with low emissions of atmospheric pollutants; compliance with the terms of periodic technical review.	permanent	The holder of the mineral aggregate extraction activity	Technical revisions
8.	The holder will be responsible for using only silent machinery to prevent disturbance to bird, fish, and reptile species living in the area and near the project.	permanent	The holder of the mineral aggregate extraction activity	Noise dampers will be installed.
9.	The excavation activity will be rigorously monitored to ensure that the work does not exceed the area specified in the project.	permanent	The holder of the mineral aggregate extraction activity	
10.	Speed restrictions will be implemented in areas where investments are made to limit dust emissions.	During the execution and operational period	The holder of the mineral aggregate extraction activity	
11.	The operating duration of excavation and transport machinery will be restricted during certain periods of the year.	The period during which community interest birds are breeding and nesting	The holder of the mineral aggregate extraction activity	GPS will be installed on each piece of machinery.
12.	To minimize the impact on bird species of community interest in the Natura 2000 sites ROSPA0024 OLT-DANUBE CONFLUENCE and ROSPA0152 IALOMIȚA CORRIDOR, it is recommended that, after the completion of the work, the habitat for these species be restored to a favorable condition.	At the end of the project	The holder of the mineral aggregate extraction activity	

In the present chapter, in the first stage we established what are the indicators of biodiversity, one of the most important elements to assume the health of the ecosystem is the presence of bioindicator species. Birds are a good indicator for determining the state of quality of the ecosystems they depend on, so the numerical evolution of their populations can provide indices regarding the evolution of ecosystems.

The order of activities in this research report was as follows:

1. After establishing these indicators, we established the methodology used in monitoring bird species. Depending on the characteristics of the species and habitats, the monitoring of bird species can be done by: the fixed point method, the transect method or a combination thereof. The use of this methodology in the field resulted in the field records of the observations of the identified bird species.
2. Subsequently, the impact was assessed, and the method for analyzing the effects on the environment includes several stages of synthetic appraisal, based on quality indicators that can reflect the overall condition of the analyzed environmental factors. The quality of an environmental factor or element is assessed in accordance with the permissible limits set by standards or regulatory norms.

Quality Index for SOIL, SUBSOIL, VEGETATION, FAUNA (IC,S,S,V,F)

The environmental factors - soil, subsoil, vegetation, and fauna - will initially be affected by the extraction works, which involve the displacement of ballast deposits and stripping operations. However, the impact on these factors will be significantly reduced by rehabilitating the excavation after the completion of the ballast extraction activities and creating new wetland habitats. Thus, the environmental effects will fall within permissible limits, with moderate positive influences, leading to a quality index IC S,S,V,F = 0,5-1.
From the analysis of credit ratings, the following conclusions result:
The environmental factor SOIL, SUBSOIL, VEGETATION AND FAUNA will be affected within admissible limits, level 3,
The water environmental factor will be affected within permissible limits, level 2,
The AER environmental factor will be affected within permissible limits, level 1

The resulting I.P.G global pollution index has a value of 1.568, which shows that the analyzed activity will affect the environment within acceptable limits.
3. After the analysis, we established a minimum set of measures for the conservation of bird species affected by the activity of extracting mineral aggregates with the following objectives:

-Maintaining the optimal conditions for the nesting habitat by reducing the disturbance during the incubation period and ensuring an optimal surface in the area of the species;
- Ensuring optimal feeding conditions;
-Reducing the direct mortality of individuals of the affected bird species

This minimum set is based on the experience gained in studying the nesting and feeding needs of bird species and the assumption of concrete conservation measures:
1. Species identification and population size estimation
2. Monitoring bird populations and occupied habitats
3. Mapping in the GIS system of the breeding, feeding and wintering habitats within the protected area
4. Reduction of poaching and control of hunting activities. Application of the ban on hunting actions in the areas that will be proposed as integral protection areas
5. Prohibition of the introduction of new species of birds. Population activities with species of hunting interest will comply with the conditions imposed by law
6. Prohibition of harvesting bird eggs and flightless chicks
7. Prohibition of destroying birds' nests
8. Control of non-specific predators (roaming birds, cats) in nesting areas
9. Protection and preservation of trees older than 100 years. The trees of the species: oak (Quercus robur) and ash (Fraxinus excelsior) will be preserved first. Conservation of some forest subplots containing old trees in order to create a mosaic of "ages" in the forest habitat, which is why it is also necessary to maintain in the forest habitats specific to floodplains, some mature individuals of willow and white poplar
10. Along the watercourses of ponds/lakes, any cutting of trees and shrubs is prohibited at a distance of at least 30 meters from the water's edge
11. Keeping dry, broken, rotten, weakened trees in order to preserve nesting sites and food in the protected perimeter
12. Prohibition of changing the way of land use on surfaces where the presence of important areas for nesting, feeding, reproduction or colonies of species of conservation interest is found.

Regarding the avifauna, bird monitoring is recommended to be carried out in favorable periods for each type, as in table 4.20.

Table 4.20 Bird monitoring periods

Elements of biodiversity	**Month**											
	01	02	03	04	05	06	07	08	09	10	11	12
Nesting birds												
Resident birds												

The frequency of observations will be weekly during the period of the works. During field trips, all species present on the site or in its vicinity will be determined. Also, the species of resident birds and those that nest in the area must be determined in order to measure the

abundance of species in the respective area and to evaluate as accurately as possible the impact of the project on the birds.

We mention that the April - September interval is the most relevant period for monitoring nesting bird species, birds in transit, but the rest of the year can also provide data (e.g. monitoring of sedentary birds) that outline an overview of the effects of the proposed works on biodiversity .

CHAPTER 5. OWN CONTRIBUTIONS REGARDING THE ADAPTATION TO CLIMATE CHANGE OF SOME MAMMAL SPECIES OF HUNTING INTEREST AND THEIR SUSTAINABLE HUNTING MANAGEMENT MEASURES PLAN IN THE CONTEXT OF CLIMATE CHANGE [39]

5.1 Analysis and comparison of the optimal and evaluated herds of some species of mammals of hunting interest in four hunting funds from the two counties, in the period 2022-2023

In the special literature, the situation of some autochthonous game species from Giurgiu County was analyzed, based on the official evaluations given by the Ministry of the Environment. The analysis of official data from the assessments of sedentary hunters gave the opportunity to assess whether the data presented in the assessments are correct and whether the hunters' fears are justified[40].

In Teleorman county, environmental destabilizing factors have negative repercussions on game, by disturbing the tranquility of game species, as well as by reducing the stock of natural food and, sometimes, food administered on the ground in the cold season.

In County Prahova, poaching has experienced a small scale in the last five seasons. Given the potential of the fund and rural development, strict surveillance must be maintained to avoid future poaching, especially poaching. Tourism has no significant influence on the area in general and hunting in particular.

The need to ensure biodiversity conservation is considered a measure to adapt to climate change and, at the same time, to protect vulnerable species by preserving and restoring ecosystems. For this purpose, in this chapter, we considered the study of the vulnerability of 3 species of mammals of hunting interest (deer, rabbit and wild boar) and their adaptation to the effects of climate change in 2 hunting grounds in County Teleorman(hunting grounds 1 Flămanda and hunting fund 62 Islaz), respectively County Prahova (hunting fund 43 Lapoș and hunting fund 11 Gherghița).

As representative hunting mammal species for Teleorman and Prahova counties, I chose to carry out a comparative study of wild boar, deer, rabbit species in two hunting funds located in the two counties, having as a starting point the study of the exploitation of ecosystem services deer hunting in farm landscapes[41].

As a starting point in carrying out this study, we analyzed the four hunting funds that present the data below:

a) FC 1 Flămanda hunting fund

Presentation of hunting fauna on FC 1 Flămanda

The main native wild fauna species, which find good living conditions on this FC 1 Flămanda hunting ground, are, in order of the occupied surfaces, the following:

- the rabbit, the main game species, which is the object of the household and finds relatively good conditions for development on the entire surface of the hunting fund, with the exception of pastures and lands adjacent to those occupied by water (swamps).
- the deer, which is the second most important game species in terms of managing the hunting fund and which finds good living conditions only on about 20% of the surface of the hunting fund.
- the wild boar, was present in passing, especially in autumn depending on the established agricultural crops, this species being partially or totally absent due to the appearance of the African swine fever (ASF) in 2019.

b) FC 62 Islaz hunting fund

Presentation of hunting fauna on FC 62 Islaz

The main native wildlife species, which find good living conditions on this FC 62 Islaz hunting ground, are, in order of occupied surfaces, the following:

- the rabbit, the main game species, which is the object of the household and finds relatively good conditions for development on the entire surface of the hunting fund, with the exception of pastures and lands adjacent to those occupied by water (swamps).
- the deer, which is the second most important game species in terms of hunting stock management, and which finds good living conditions only on about 20% of the surface of the hunting stock.
- the wild boar, was present in passing, especially in autumn depending on the established agricultural crops, this species being partially or totally absent due to the appearance of the African swine fever (ASF) in 2019.

c) FC 43 Lapoș hunting fund

Presentation of hunting fauna on FC 43 Lapoș

The fauna-vegetation relationship must be seen from both directions. It is known that the forest offers the optimal habitat and that the very creditworthiness of a hunting ground depends on the wooded area. Cervids, represented by deer, having a greater need for food all year round, can cause serious damage, especially in the case of an increase in herd density in certain areas, if no food fields are set up. Given that the undergrowth is well represented, the measure to improve food security is the cultivation of species such as corn, beet or barley.

The administration of complementary food is done in the following way:

- for deer, all feeders are fed with hay/alfalfa starting in November;
- for wild boar, the feeding points are fed with concentrated fodder between November and February;
- salt is administered throughout the year, as follows: 10% in the first trimester; 45% in the second quarter; 40% in the third trimester; 15% in the fourth quarter.

During the winter, when the snow cover exceeds 20-30 cm, paths are opened to the feeding points and local water sources, refueling the feeders where it is found that the food has been consumed.

d) FC 11 Gherghița hunting fund

Presentation of hunting fauna on FC 11 Gherghița

The fauna-vegetation relationship must be seen from both directions. It is known that the forest offers the optimal habitat and that the very creditworthiness of a hunting fund depends on the wooded area. Wild boar and cervids, the latter having a greater need for food all year round, can cause serious damage, especially in the case of an increase in herd density in certain areas, if no food fields are set up. Deer consumption of young tree saplings and bark has negative effects on developing stands, it can even lead to the drying of trees and the cessation of regeneration on different sized surfaces.

The administration of complementary food is done in the following way:

- for deer, all feeders are fed with hay/alfalfa starting in November;
- for deer and wild boar, the frequented areas are fed with fruits and seeds between November and February;
- salt is administered throughout the year, as follows: 10% in the first trimester; 45% in the second quarter; 40% in the third trimester; 15% in the fourth quarter.

During the winter, when the snow cover exceeds 20-30 cm, paths are opened to the feeding points and local water sources, refueling the feeders where it is found that the food has been consumed.

I considered for each species that it is necessary to identify the method of establishing the optimal herds corresponding to the creditworthiness categories. The quality of a hunting fund or its biogenic capacity is characterized by all the factors: ecological, geomorphological, edaphic, climatic and biotic [24,25], which influence for better or worse the life of the animals living on that land [14]. Knowing it helps us to determine the productivity of hunting funds, to take the most appropriate management measures, to achieve optimal productivity in the shortest time. In order to find the main causes or factors that positively or negatively influence the existence of game species, it is imperative to research the fluctuation of herds and real

game harvests. The respective data must express the situation on the ground as realistically as possible, so they must be based on game evaluation or inventory methods, which have a high degree of precision, according to the criteria for the classification of hunting funds in Romania for the species: rabbit, deer ,boar[15], as well as on the instructions regarding the evaluation of the herds of some species of hunting fauna allowed for hunting and for the regulation of the way of establishing the harvest quotas for them[42].

Table 5.1 Optimal herds corresponding to the creditworthiness categories, for rabbits [15]

Name	**Creditworthiness category**			
	I	**II**	**III**	**IV**
Points awarded by creditworthiness category	91-112	61-90	33-60	8-32
Adequate optimal herds pcs/100 ha productive land	25-15	10-14.9	5-9.9	1-4.9

Table 5.2 Optimal herds corresponding to creditworthiness categories, for deer [15]

Name	**Creditworthiness category**			
	I	**II**	**III**	**IV**
Points awarded by creditworthiness category	111-140	76-110	42-75	6-41
Adequate optimal herds; pcs/100 ha productive land	9-11	7-8.9	5-6.9	0.5-4.9

Boar

The application of the keys to determine the creditworthiness on the lands that have forests populated with wild boars, was done on large forest basins, because the wild boar is a species that travels a lot, in search of sheltered food. He is less stable on lands that do not provide him with sufficient food all year round, leaving them during critical periods, in order to settle in areas where he finds the necessary living conditions.

Table 5.3 Optimal herds corresponding to creditworthiness categories, for wild boar [15]

Name	**Creditworthiness category**			
	I	**II**	**III**	**IV**
Points awarded by creditworthiness category	81-100	55-80	30-54	5-29
Adequate optimal herds; pcs/100 ha productive land	0.7-0.8	0.5-0.6	0.3-0.4	0.05-0.2

The evaluation in the field was carried out according to the provisions of the Order of the Ministry of Environment, Water and Forests no. 2847/2022 for the approval of the Instructions regarding the evaluation of the herds of some species of hunting fauna, as admitted for hunting, and for the regulation of the manner of establishing their harvest quotas.

Roe deer (Capreolus capreolus L.)

Studying specialized literature[43,44] the evaluation of the deer herds was done through direct observations, in two stages which, corroborated, in order to be able to offer a picture as close as possible to the reality in the field, both in terms of the size of the herd and its structure by age classes, sexes and condition of health.

The direct, visual evaluation, during the mating period (run), was organized in the months of July and August (first decade). During this period, very easy observations were made, which provide essential data about deer herds. The age categories of males could be easily observed, an assessment could be made on the annual increase in youth under one year of age, respectively the sex ratio: ratio of the deer population could be easily established.

In each of the four hunting grounds, the places suitable for running were identified where, as the case may be, one or more observation points were installed from where the deer in the respective area could be well seen and heard. The observations were organized for 2-3 consecutive days, at all the established points, simultaneously, early in the morning (before light) and in the afternoon, until it gets dark. The second stage of evaluation of deer herds was based on the visual observations made on the herds during the winter period (January-February).

Table 5.4 Centralizer of evaluated deer species and harvest quotas[16]

Crt. no	Name Hunting Fund	Hunting Fund Manager	Optimal Effectives (pcs)	Effectives evaluated (buc)		Harvest quotas for hunting season 2022/2023 (pcs)		Proposeed harvest quotas for hunting season 2023/2024 (pcs)	
				2022	2023	Approved	Accomplished	According to the formula	By Manager
1	FC 1 Flămânda	AJVPS TELEORMAN	60	57	57	4	4	4	3
2	FC 62 Islaz	AJVPS TELEORMAN	80	73	74	5	5	5	5
3	FC 11 Gherghița	AVPS CODRII VLAȘIEI	74	180	177	55	55	69	65
4	FC 43 Lapoș	AVPS MUFLONUL	80	223	218	35	20	69	35

Boar (Sus scrofa L.)

The assessment of wild boar flocks was carried out in the months of January - February by visual observations at the feeding points and by reading the traces left on the substrate (soil, snow).The visual evaluation procedure consisted of direct observations in each hunting fund of wild boar specimens.

Observations will be made simultaneously, on the same day, at all feeding points within each hunting fund and will be carried out at least 2 times during the month of February. Based on the data from the observation sheets, the centralizer was completed, in which the largest herds recorded in the observation sheets recorded on a day of the evaluation period were entered.

Table 5.5 Centralizer of evaluated wild boar species and harvest quotas [16]

Crt. no	Name Hunting Fund	Hunting Fund Manager	OptimalEffectives (pcs)	Effectives evaluated (buc)		Harvest quotas for hunting season 2022/2023 (pcs)		Proposeed harvest quotas for hunting season 2023/2024 (buc)	
				2022	2023	Approved	Accomplished	According to the formula	By Manager
1	FC 1 Flămânda	AJVPS TELEORMAN	5	2	2	2	2	0	2
2	FC 62 Islaz	AJVPS TELEORMAN	15	6	6	6	6	0	6
3	FC 11 Gherghița	AVPS CODRII VLAȘIEI	25	26	40	11	10	20	20
4	FC 43 Lapoș	AVPS MUFLONUL	20	62	69	40	32	30	45

Hare (Lepus europaeus)

The assessment of hare herd size is based on direct visual observations on sample areas or sample strips. Observations will be made at the end of winter - the beginning of spring (February - March), recommended in January when the specimens are relatively grouped for mating, preferably on sunny, windless days, in the evening and morning hours, when the rabbits are more active. The livestock evaluation was carried out both in cultivated agricultural land and in the forests of the plain area. Direct observations on test areas were carried out on

the hunting funds with credit rating I and II. The calculation of the livestock by land category was done with the help of the formula:

Ef. c. = (S.c. : S.p.) x n, where:

Ef.c = effective calculated on a certain category of land, in copies;

SC = the total area of the land category in the hunting fund, in ha;

S. P. = the area of the sample surface traveled from the same land category, in ha;

n = the number of specimens found on the traveled sample surface, from the same terrain category.

When centralizing the data, the results obtained by land category were totaled, excluding from the calculation the non-productive areas for rabbits of the hunting fund, finally establishing the total herd from its entire productive area

Table 5.6 Centralizer of rabbit species evaluated and harvest quotas [16]

Crt. no	Name Hunting Fund	Hunting Fund Manager	Opti-malEffec-tives (pcs)	Effectives eval-uated (pcs)		Harvest quotas for hunting season 2022/2023 (pcs)		Proposeed harvest quotas for hunting season 2023/2024 (pcs)	
				2022	2023	Approved	Accomplished	According to the formula	By Man-ager
1	FC 1 Flămânda	AJVPS TELE-ORMAN	850	775	775	30	30	58,125	35
2	FC 62 Islaz	AJVPS TELE-ORMAN	750	685	685	30	30	51,375	35
3	FC 11 Gherghița	AVPS CODRII VLAȘIEI	500	548	546	40	40	175	60
4	FC 43 Lapoș	AVPS MUFLONUL	100	134	145	15	13	40	16

From the analysis of the data of the centralizers above, it follows that for the species of deer the largest assessed herds are in the FC 43 Lapoșdin Prahova hunting fund (218 pcs.), for the boar species the largest assessed herds are in the FC 43 Lapoș of Prahova hunting fund (69 pcs.) and for the rabbit species, the highest assessed herds are in the hunting fund FC 1 Flămanda of County Teleorman(775 pcs).

5.2. The influence of anthropogenic factors reflected in the management of hunting funds in Teleorman County

• The lands included in the FC 1 Flămandași FC 62 Islaz hunting funds were and are public property (forest, water surface, pasture and part of the agricultural land) and private property of the citizens of the communes within which the hunting fund is surrounded.

• As a form of agricultural land exploitation in the past, the associative-cooperative form prevailed, as well as that of organizing the exploitation of these lands in large agricultural farms.

• Currently, agricultural holdings in associative forms or through agricultural farms are applied on an area of 80% of the agricultural lands on which the hunting fund is surrounded, predominating the individual exploitation of agricultural use, by the owners of these lands.

• The cooperative farms had the disadvantage that, under such conditions, monocultures predominated on large areas of land, thus reducing the edge effect, so favorable for game reproduction.

• Also, both the mechanization of agricultural works and the chemicalization of large areas negatively influenced the size, and the specialized literature records it as the natural increase, through the loss of a larger part of the juvenile specimens.

• These losses were either the direct result of the works themselves, through the destruction of the nests, but also the effect of the reduction of the trophic base in animal food - mandatory

during the period of growth of the chicks through the effects of these works on insects harmful or beneficial to agricultural crops.
• The individual exploitation of the agricultural use of land has the advantage that it determines the reduction of the size of the lots on which the same crop is installed, reduces the chemicalization of the surfaces, but it has the disadvantage of the permanent and impossible to control disturbance of the game, on the occasion of carrying out various works.
• It also presents the disadvantage that those who work their land individually introduce dogs or other domestic animals into the hunting ground during various works, a fact that increases the phenomenon of predation but also the transmission of diseases that can be more difficult to treat in the game from freedom.

Comparing the herd levels of the main game species registered on these hunting grounds FC 1 Flămanda and FC 62 Islaz and the neighboring ones with current levels from the point of view of the influence of the agricultural use of land, the following can be stated:
• the advantages of exploiting the land in small and relatively small plots are greater than the disadvantages for partridge and pheasant and influence relatively little the other game species
• the disadvantages of land exploitation in large agricultural holdings are much greater for pheasant and partridge and are of rather little importance for rabbit and deer
• FC 1 Flămandași FC 62 Islaz hunting funds, since its establishment, has currently been managed by the County TeleormanAssociation of Sports Hunters and Fishermen
• In addition to the agricultural works that are carried out on large areas, unevenly and over a long period of time, poaching with greyhounds or their mixed dogs, with a noose, with a beacon or with hunting weapons, the burning of stubble after the harvesting of grasslands, nor the chaotic grazing in areas cultivated with perennials
• All these factors have negative repercussions on game, by disturbing the tranquility of game species as well as by reducing the stock of natural food and sometimes of food administered on the land in the cold season.

5.3. The influence of anthropogenic factors reflected in the management of hunting funds in County Prahova

● The territory of the FC 11 Gherghița hunting fund is quiet from the point of view of industrial activity. Consequently, the pollution phenomenon does not affect in any way the studied area and, implicitly, the existing game species.
● From the point of view of animal husbandry, the area is a little active without negatively influencing the tranquility of the game.
● The phenomenon of poaching has experienced a reduced extent in recent seasons, no cases of poaching with weapons being discovered. In 2022, a case of poaching with greyhounds was discovered.
• Considering the fund's potential and rural development, a strict watch must be maintained to avoid poaching acts in the future, especially poaching with snares and poaching with greyhounds.
• Tourism does not have a significant influence on the area in general and game in particular.
● The territory of the hunting fund 43 Lapošeste is a quiet one from the point of view of industrial activity. Consequently, the pollution phenomenon does not affect the studied area and, implicitly, the existing game species.
● From the point of view of animal husbandry, the area is active, with a significant number of domestic animals being taken out to graze annually. In total, approximately 2000 sheep, goats and cows, belonging to 12 herds, graze within the hunting fund, the influence being felt negatively, especially in terms of the peace of the game. Also, the diseases that can be transmitted from domestic livestock to game species are another sign of concern, which is why in the spring of each year the flocks are checked regarding the vaccines administered to domestic animals.
● The phenomenon of poaching has experienced a reduced magnitude in the last five seasons, with only one case of poaching with a weapon being discovered. Considering the potential of the fund and rural development, a strict watch must be maintained to avoid poaching acts in the

future, especially noose poaching. Tourism does not have a significant influence on the area in general and game in particular.

5.4. Drawing up a Plan of measures for sustainable hunting management of these mammal species of hunting interest on the four hunting funds in the two counties, in the context of climate change

From these analyses, we considered that it is necessary to draw up a Sustainable Hunting Management Measures Plan for these mammal species of hunting interest on the four hunting funds in Teleorman and Prahova counties, in the context of climate change:

Revitalizing existing populations through "re-blooding" actions

In Teleorman County:

The species that lends itself to such actions within this hunting fund is the rabbit. Taking into account the fact that the rabbit is very faithful to its habitat and not taking into account other factors than the genetic one, it is possible that, due to repeated inbreeding, the population of rabbits on the background will decrease in greater proportions, thus imposing some actions of blood refreshment through populations with mature specimens and not very many from other hunting funds (excluding neighboring ones) or from other areas of the country. Another condition is that the specimens that will be populated come from areas with weaker ecological conditions or at most equal to those of the hunting fund under study.

As for the deer, we don't think it's a case of a blood refresh, given that the deer population on this hunting ground is relatively very small, almost non-existent.

In County Prahova:

By definition, blood (re)freshening consists of introducing vigorous game captured in another region into the area with lower quality game, with the aim of improving it.

Considering that the cervid herds, on which this type of actions are mainly carried out, are vigorous and taking into account that the first signs of degeneration appear after 12-20 inbred generations (a theory accepted in a geographically isolated area) it can be concluded that such actions are not required. Any deficiencies, transposed into decreases in herd, body weight or trophy quality, are caused by unfavorable atmospheric or vegetation conditions, and they can be remedied by removing the causes that led to their appearance.

Increasing the nutritional potential of hunting funds in County Teleorman

This will be done by:

a. the introduction of sub-trees in forest plantations, on non-productive land and on the lines delimiting agricultural properties: rosehip, dogwood, soft sage;

b. the creation of hedges with acacia, between agricultural properties, with the consent of the owners

c. introducing and maintaining as much as possible in the forest plantations, respectively the maintenance of helpful forest species, such as: elm, hornbeam, acerines.

d. the creation of plantations of acacia and willow, in poorly productive lands, on ravines and valleys where there is higher humidity and where there is no agricultural cultivation or grazing.

These actions will be carried out after obtaining the consent of the land owners.

Increasing the nutritional potential of hunting funds in County Prahova

This will be done by:

a. New feeding grounds

The management contract stipulates the obligation to ensure by RNP Romsilva some areas for game food totaling 5.46 ha in FC 11 Gherghița, respectively 4.21 ha in FC 43 Lapoș. It is not considered necessary to create other lands for game food, the existing ones will cover the minimum required by the legislation and the food requirement calculated at the beginning of each hunting season.

b. Introduction of the sub-tree

The undergrowth is well represented in the existing deciduous forests in the background (wild cherry, hawthorn, dogwood, soft sage, rosehip, acacia, etc.). If the protection of the existing one is ensured by reducing the damages caused by the stages of exploitation of the woody mass, no actions to introduce the sub-tree are necessary.

Improving the network of facilities, constructions and hunting facilities
Teleorman county, when placing them, certain specific conditions will be taken into account, such as: wintering places, crossing places, concentration places, etc.
The situation refers to the current numbers and the required installations, improvements and constructions in the field will be updated annually, depending on the evolution of the actual numbers during the validity of the management contract.
In County Prahova, for the food lands, 0.2 ha per 100 ha of forest are planned to be provided, therefore the required amount is 5.6 ha.
For hunting trails, a density of 0.1 – 0.5 km per 100 ha of forest is provided, therefore the necessary is 1.88 km (calculated for the average value of 0.3 km per 100 ha of forest).
Calculation of the need for complementary food
For the need for complementary food for the game flocks on the four hunting funds, they calculated the quantities according to the contractual provisions, the provisions of the management contract regarding the complementary food, are minimal and mandatory to achieve.
Improving natural game feeding conditions
Interventions to Improve Natural Feeding Conditions During the Critical Winter and Spring Period Include:

- Promoting and Protecting Vegetation: Planting and protecting shrub and tree species favored by herbivorous game, such as dogwood, soft willow, poplar, as well as forest species that produce fruits and seeds, like apple, wild pear, oak, and walnut.
- Planting Forest Species and Fruit Trees: Planting suitable forest species and winter-resistant fruit trees, either in clusters or dispersed, around forested areas, on high-voltage lines, on degraded lands, and in areas unsuitable for agriculture.
- Stimulating Fruiting: Enhancing fruit production of trees that produce fruits and seeds by thinning the canopy and maintaining isolated trees for a longer period.
- Establishing Special Crops: Creating "browse" crops with forest shrubs sought by game on degraded lands or specifically designated areas, and periodically maintaining these in strips to increase the production of shoots accessible to herbivorous game.

Supplementary Feeding of Game
Supplementary feeding is essential but should only be temporary and under conditions of natural food deficiency. It involves providing high-quality feed in special shelters (storage, feeders) or feeding points that the game will learn to find and use.
Depending on the game species, various types of feed are used, including:

- Fibrous Feed: Hay, alfalfa.
- Concentrated Feed: Dried forest fruits and seeds, grains, mixed fodder.

To prevent damage to agricultural crops by game, supplementary feeding should be extended beyond the critical period to attract game to other areas. Attractive feeds should be administered to control the spread of game.
Additionally, administering salt in the field is crucial. Salt is not only a food source but an essential ingredient for proper digestion and plays a significant role in attracting game to specific areas.
Game pest control
Combating game pests is mandatory all year round, given the negative impact they have on game herds.
Combating game pests will have a positive effect on useful game herds, the losses suffered by it will decrease, knowing that in addition to the catches, pests can contaminate the area and useful game with certain epizootics that contribute substantially to the decrease of game herds on the hunting background;
In the agricultural field, the following are necessary:
• reducing as much as possible the mechanization of agriculture
• reducing the chemicalization of agricultural land
• realization of land irrigation
• reducing the pollution of the natural environment

• the prohibition of changing the way of land use
• reducing the abandonment of agricultural land, which leads to the degradation of semi-natural habitats and the reduction of the area of places for feeding and sheltering hunting fauna[45]
Other measures to be taken:
• the prohibition of poaching which causes a destruction and reduction of hunting fauna populations, loss of balance, reduction of the genetic background
• reducing the noise produced by tourist traffic with motorized vehicles, noise that creates a disturbance in the areas of reproduction, shelter and food of hunting fauna
• prohibiting the construction of private residences outside the village that cause disturbance, fragmentation and degradation of natural habitats
• monitoring of wildlife populations using standardized methods
• minimization of the disturbance during the calving and growing of the chicks
• establishing hunting quotas aimed at maintaining the gender and age structure of the populations
• providing additional food only in periods when the natural resource is unavailable
• monitoring and management of infectious diseases that can affect wildlife
• combating poaching
• correlation of the zoning of protected natural areas (where it exists) with the quiet zones in the hunting funds
• the inclusion of fauna conservation objectives in the forest management and the planning of the works considering these aspects as well
• promoting the mosaic structures of the landscape with varied trophic resources
• the temporary delimitation of priority areas for the conservation of target species
• control of invasive or non-native species
• control of harvesting activities / collection / sale of wild flora and fauna species
• adaptation of pasture exploitation techniques and the number of animals to the support capacity of the areas intended for grazing without discouraging the development of pastoral activities [13] .

CHAPTER 6. FINAL CONCLUSIONS. OWN CONTRIBUTIONS. FUTURE PROSPECTS

6.1 Final conclusions

In this doctoral thesis, the studied areas were represented by the locations of two temporary exploitations of mineral aggregates located on the administrative territory of Islaz municipality, County Teleorman- ROSPA0024 OLT-DANUBE CONFLUENCE and Tinosu municipality, County Prahova - ROSPA0152 IALOMIȚA CORRIDOR. Both analyzed natural areas present very large feeding, nesting and resting areas for bird species, so that during the period of operation they will have available areas for carrying out the activity.

Specific to the activity of extracting mineral aggregates are the noise-generating sources such as the technological equipment operating in the perimeter of the mining areas, such as: excavators, front loaders and dump trucks. The generation of noise during industrial activity is a phenomenon common to all mining of mineral aggregates, the sound level can be reduced in some cases.

The main sources of noise and vibration are the extraction machines during operation and their transport from the work area to contractors with whom service contracts have been concluded.

To begin with, 8 maps were generated with the expected noise level at the level of the two locations, after which a number of 17 measurements of the noise level generated by the activity of extracting mineral aggregates in ROSPA0024 OLT-DANUBE CONFLUENCEwere carried out, Islaz municipality, County Teleorman and a number of 17 measurements of the noise level generated by the activity of extracting mineral aggregates in ROSPA0152 IALOMIȚA CORRIDOR, Tinosu municipality, County Prahova. Also, 2 maps of the noise level measurement points and the recorded acoustic levels of the two locations were made in 2024.

From the analysis of the results obtained regarding the measurements of the noise level generated by the extraction activity of mineral aggregates in the two Natura 2000 sites: ROSPA0024 OLT-DANUBE Confluence, Islaz municipality, County Teleorman and in ROSPA0152 IALOMIȚA CORRIDOR, Tinosu municipality, County Prahova, as well as and from the monitoring of bird species in the two areas, it can be stated that the effect due to the noise produced by the mineral aggregates exploitation activities on the activity of the designated birds at the level of the two areas is insignificant, not having a major impact on their activity.

The analysis of the level of impact of the activity of extracting mineral aggregates on the species of birds of community interest from the site ROSPA0024 OLT-DANUBE CONFLUENCE took into account the consequences and the probability of negative effects taking into account the particularities of the area, the technical characteristics of the project, the degree of reversibility of the effects produced and the observations made in the field. The result is defined as the level of impact, the impact being considered an insignificant negative impact.

The analysis of the level of impact of the activity of extracting mineral aggregates on the bird species of community interest from the ROSPA0152 IALOMIȚA CORRIDOR site took into account the consequences and the probability of negative effects taking into account the particularities of the area, the technical characteristics of the project, the degree of reversibility of the effects produced and by the observations made in the field. The result is defined as the level of impact, the impact being considered to be a moderate negative impact.

For these reasons, it was considered necessary to draw up an Action Plan for the conservation of bird species affected by the activity of extracting mineral aggregates with the following objectives:

-Maintaining the optimal conditions for the nesting habitat by reducing the disturbance during the incubation period and ensuring an optimal surface in the area of the species;

- Ensuring optimal feeding conditions;

-Reducing the direct mortality of individuals of the affected bird species

Regarding the adaptation of some species of mammals of hunting interest, the following considerations were taken into account, namely:

-due to the fact that in Teleorman county, environmental destabilization factors have negative repercussions on game, by disturbing the tranquility of game species, as well as by reducing the stock of natural food and, sometimes, food administered on the ground in the cold season, but also due to the fact that in County Prahova, poaching has experienced a small scale in the last five seasons;

-due to the fund's potential and rural development, a strict guard must be maintained to avoid poaching in the future;

- due to the need to ensure biodiversity conservation, which is considered a measure of adaptation to climate change and, at the same time, to protect vulnerable species by preserving and restoring ecosystems.

For this purpose, it was considered to study the vulnerability of three species of mammals of hunting interest (deer, rabbit and wild boar) and their adaptation to the effects of climate change in two hunting grounds in County Teleorman(hunting grounds 1 Flămanda and hunting grounds 62 Islaz), respectively County Prahova (hunting fund 43 Lapoș and hunting fund 11 Gherghița).

As representative hunting mammal species for Teleorman and Prahova counties, I chose to conduct a comparative study of wild boar, deer, rabbit species in two hunting funds located in the two counties.

It was considered for each species that it is necessary to identify the method of establishing the optimal herds corresponding to the creditworthiness categories. The quality of a hunting fund or its biogenic capacity is characterized by all the factors: ecological, geomorphological, edaphic, climatic and biotic [24,25], which influence for better or worse the life of the animals living on that land [38]. Knowing it helps us to determine the productivity of

hunting funds, to take the most appropriate management measures, to achieve optimal productivity in the shortest time.

In order to find the main causes or factors that positively or negatively influence the existence of game species it is imperative to research the fluctuation of herds and real game harvests. The respective data must express the situation on the ground as realistically as possible, so they must be based on game evaluation or inventory methods, which have a high degree of precision, according to the Criteria for the classification of hunting funds in Romania.

From the analysis of the data of the centralizers in this doctoral thesis, it follows that for the deer species the largest assessed herds are in the hunting fund FC 43 Lapoș from County Prahova (218 pcs.), for the boar species the largest assessed herds are in the fund hunting grounds FC 43 Lapoș from County Prahova (69 pcs.) and for the rabbit species, the largest evaluated herds are in hunting grounds FC 1 Flămanda from County Teleorman(775 pcs.).

From these analyses, it was considered necessary to draw up a Plan of measures for sustainable hunting management of these mammal species of hunting interest on the four hunting funds in Teleorman and Prahova counties, in the context of climate change, which should take into account the following:

• Increasing the nutritional potential of hunting funds in County Teleorman
• Increasing the nutritional potential of hunting funds in County Prahova
• Improving the network of facilities, constructions and hunting facilities
• Calculation of the need for complementary food
• Reinvigorating existing populations through "re-blooding" actions
• Improving natural game feeding conditions
• Complementary feeding of game
• Combating game pests

In Teleorman county, destabilizing factors have negative repercussions on game, by disturbing the tranquility of game species as well as by reducing the stock of natural food and sometimes of food administered on the ground in the cold season.

In County Prahova, the poaching phenomenon has experienced a reduced magnitude in the last five seasons, with only one case of poaching with a weapon being discovered. Considering the potential of the fund and rural development, a strict watch must be maintained to avoid poaching acts in the future, especially poaching with a snare. Tourism does not have a significant influence on the area in general and game in particular.

6.2 Own Contributions

Through the research regarding the evaluation of the impact of the aggregate extraction activity on different species of birds and the adaptation of some species of mammals of hunting interest to the effects of climate change in the counties of Teleorman and Prahova, it was actually achieved:

- the study of the activity of extracting mineral aggregates from the counties of Teleorman and Prahova, in which the effects of the activity of extracting mineral aggregates on biodiversity in the two counties were observed.
- the comparative study of some species of mammals of hunting interest in four hunting funds from Teleorman county, respectively County Prahova, and thus it was possible to draw up a Plan of measures for sustainable hunting management of these species of mammals of hunting interest in the context of climate change.

A series of monitoring of bird species was carried out in the area of the site belonging to Islaz municipality, County Teleorman using the linear transect method as a monitoring method on surfaces from 1 to 5 km long. Following these visits, 5 bird species were observed such as: Cygnus cygnus – 3 adults, Falco vespertinus – 3 adults, Phalacrocorax pygmaeus – 7 adults, Alcedo atthis – 10 adults and Anas crecca – 20 adults.

A series of monitoring of bird species was carried out in the area of the site belonging to Tinosu municipality, County Prahova using the linear transect method as a monitoring method on surfaces from 1 to 5 km long. Following these visits, 5 bird species were observed such as:

Egretta garzetta – 20 adults, Falco vespertinus – 10 adults, Nycticorax nycticorax – 4 adults, Alcedo atthis – 4 adults and Ixobrychus minutus – 3 adults.
The analysis of the level of impact of the activity of extracting mineral aggregates on the species of birds of community interest from the site ROSPA0024 OLT-DANUBE CONFLUENCE took into account the consequences and the probability of negative effects taking into account the particularities of the area, the technical characteristics of the project, the degree of reversibility of the effects produced and the observations made in the field. The result is defined as the level of impact, the impact being considered an insignificant negative impact.

The analysis of the level of impact of the activity of extracting mineral aggregates on the bird species of community interest from the ROSPA0152 IALOMIȚA CORRIDOR site took into account the consequences and the probability of negative effects taking into account the particularities of the area, the technical characteristics of the project, the degree of reversibility of the effects produced and by the observations made in the field. The result is defined as the level of impact, the impact being considered moderately negative.

From the analysis of the results obtained regarding the measurements of the noise level generated by the mineral aggregates extraction activity in the two Natura 2000 sites: ROSPA0024 Olt-Danube Confluence, Islaz municipality, County Teleorman and in ROSPA0152 Ialomița Corridor, Tinosu municipality, County Prahova, as well as and from the monitoring of bird species in the two areas, it can be stated that the effect due to the noise produced by the mineral aggregates exploitation activities on the activity of the designated birds at the level of the two areas is insignificant, not having a major impact on their activity.

For these reasons, it was considered necessary to draw up an Action Plan for the conservation of bird species affected by the activity of extracting mineral aggregates.

Regarding the adaptation of some species of mammals of interest, it was considered to study the vulnerability of three species of mammals of hunting interest (deer, rabbit and wild boar) and their adaptation to the effects of climate change in two hunting funds from County Teleorman(hunting ground 1 Flămânda and hunting ground 62 Islaz), respectively County Prahova (hunting ground 43 Lapoș and hunting ground 11 Gherghița).

As representative hunting mammal species for Teleorman and Prahova counties, it was chosen to carry out a comparative study of wild boar, deer, rabbit species in two hunting funds located in the two counties.

From the analysis of the data of the centralizers in this doctoral thesis, it follows that for the deer species the largest assessed herds are in the hunting fund FC 43 Lapoș from County Prahova (218 pcs.), for the boar species the largest assessed herds are in the fund hunting grounds FC 43 Lapoș from County Prahova (69 pcs.) and for the rabbit species, the largest evaluated herds are in hunting grounds FC 1 Flămanda from County Teleorman(775 pcs.).

From these analyses, it was considered necessary to prepare a Plan of measures for sustainable hunting management of these mammal species of hunting interest on the four hunting grounds in Teleorman and Prahova counties, in the context of climate change.

6.3 Future prospects

As a future perspective, the need to ensure the conservation of biodiversity is considered as a measure to adapt to climate change and, at the same time, to protect vulnerable species, by preserving and restoring ecosystems. To effectively conserve a species and manage its population, it is essential to understand the impact of climate change on habitat quality and connectivity[46].

The monitoring of threatened species can highlight a change in the number, composition and distribution of wild species (birds, mammals) can indicate changes in ecological processes, especially in the capacity to support sustainable populations of essential species.

These monitoring protocols have the role of transsectoral integration of vulnerability to climate change of natural habitats and protected species in monitoring systems and in public policies / strategies, both at national and regional level (e.g. biogeographical region) and local (county, municipality, city, etc.)
For vulnerable bird species, I believe that conservation measures must be adopted in the future, both active measures and long-term restrictive measures.

As regards the species of mammals of hunting interest, it was observed that anthropogenic factors have influenced the management of the hunting funds in Teleorman and Prahova counties, for this purpose it is necessary to create a plan of sustainable hunting management measures for these species of hunting mammals hunting interest on the four hunting funds in Teleorman and Prahova counties, in the context of climate change.

By adopting measures to reduce additional pressures due to climate change affecting vulnerable, endangered or endangered species, the following will be achieved:

1. Protecting natural ecosystems essential for climate change mitigation and adaptation
2. Sustainable management of nature
3. Implementation of a national program based on scientific evidence for the ecological restoration of rivers

In the Forestry and Biodiversity sector: Using nature-based solutions, such as tree canopy design that preserves biodiversity and ecosystem connectivity, is beneficial for adaptation, biodiversity and mitigation. These solutions will contribute to increasing carbon dioxide sequestration and restoring and preserving soil fertility.

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ISI INDEXED JOURNALS

1. Luiza-Georgeta Crăciunică, Cristina-Ileana Covaliu-Mierlă (2023). Research study of mammal species of hunting interest in 4 hunting funds in Teleorman county, respectively County Prahova, Scientific Papers. Series D. Animal Science. Vol. LXVII, No. 1, 2024, ISSN 2285-5750; ISSN CD-ROM 2285-5769; ISSN Online 2393-2260; ISSN-L 2285-5750, pag.638-643, acceptat spre publicare, F.I.=0.3

2. Luiza-Georgeta Crăciunică, Cristina-Ileana Covaliu-Mierlă (2023). Identification of potential negative effects of mineral aggregates extraction activity following an adequate impact assessment on protected bird species in two Natura 2000 sites from Teleorman and Prahova counties, Scientific Papers. Series D. Animal Science. Vol. LXVII, No. 1, 2024, ISSN 2285-5750; ISSN CD-ROM 2285-5769; ISSN Online 2393-2260; ISSN-L 2285-5750, pag.644-650, acceptat spre publicare, F.I.=0.3

3. Luiza-Georgeta Crăciunică, Cristina-Ileana Covaliu-Mierlă, Vlad George Dinu (2024). The impact noise pollution caused by the of extraction of mineral aggregate on some protected bird species in two Natura 2000 Sites from Teleorman And Prahova counties, Scientific Papers, Series D, Animal Science, trimis spre publicare.

BDI INDEXED MAGAZINES

1. Luiza-Georgeta Crăciunică (Teodorescu), C ristina-Ileana Covaliu-Mierlă (2022). Monitoring activity regarding the assessment of the impact on biodiversity of the activity of extracting mineral aggregates/activitate de monitorizare privind evaluarea impactului asupra biodiversităţii al activităţii de extragere a agregatelor minerale. INTERNATIONAL SYMPOSIUM ISB-INMA TEH, vol. 4, 2022

PARTICIPATION IN INTERNATIONAL CONFERENCES

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Titlul lucrării: Monitoring activity regarding the assessment of the impact on biodiversity of the activity of extracting mineral aggregates/activitate de monitorizare privind evaluarea impactului asupra biodiversităţii al activităţii de extragere a agregatelor minerale;
Titlul conferinței: ISB INMA-TEH 2022 International Symposium, București
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2) Luiza-Georgeta Crăciunică, Cristina - Ileana Covaliu-Mierlă
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