



Bat conservation in Pădurea Craiului, Bihor and Trascău Mountains

– Layman Report –

LIFE08 NAT/RO/000504



Environment Protection Agency
of Bihor County



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1. Bats, their role in the ecosystem and the importance of bat protection

Bats, nocturnal insectivorous mammals, occupy all habitat types of the Earth, except the two poles. These social animals live in large colonies of several hundred or even thousands of bats, use a variety of roost types (caves, buildings, hollow trees, foliage of tropical plants, etc.) and feed in different types of habitats (forests, wetlands, scrubland, residential areas, etc.). Bats have a particularly important role in the food chain, because of the fact that each night they consume a significant amount of insects and other arthropods, and in this way they control population size. In a single night, an individual bat can consume over 3,000 insects (mosquitoes, moths and other species) that could be harmful to the agriculture and forestry. Bat droppings (guano) have a high concentration of nitrate and can be used as natural fertilizer. By their mere biology, these animals bring a huge and free benefit for humanity.



Daubenton's bat (*Myotis daubentonii*)

Due the fact that bats react (by rapidly modifying their population size) to changes in their feeding habitats or roosts, they are excellent indicators for assessing the health of ecosystems. Through the monitoring of bat populations and aspects of their ecology, we can obtain information about ecosystem changes at the local or global levels. However, in recent decades, human activities have started to greatly endanger the existence of bats both at the national and global level. General factors that led to the decline of bat populations are uncontrolled speotourism, changes in agriculture and forestry practices, as well as the fragmentation, destruction and loss of feeding habitats and roosts.



In Romania, the specific factors that contributed to the decline of bat populations were an uncontrolled flow of tourists into caves, improper management of some caves (ex. inadequate installation of gates, which hindered the free movement of bats), changes/ degradation of habitats, and major changes of water courses. Bats need linear elements in their habitat which guides their flight path to and from the roosts towards feeding habitats: trees lines, bushes, streams. All these factors have contributed to the disappearance of important hibernation and maternity colonies. The negative effects of actual threats can be improved and compensated through concrete conservation, protection, public awareness actions and involvement of professionals and volunteers in research and long-term protection of bats.



Threat factors faced by bats

Uncontrolled flow of tourists in caves

Lighting and noise pollution in caves

Pollution of caves through waste depositing

Inadequate modification of tourist cave environments, with tourist routes passing under bat colonies, and/or artificial lighting oriented towards bats

Destruction or modification of feeding habitats

Excessive deforestation

Intensive agriculture, pesticide use

Water pollution

Modification of anthropic roosts without considering the presence of bats (ex. insulation of buildings, houses)

The use of toxic substances in the treatment of wood structures in buildings

The construction of wind farms on migration routes of bats

Vandalism due to myths and misconceptions about bats

2. The aim, objectives and target area of the project

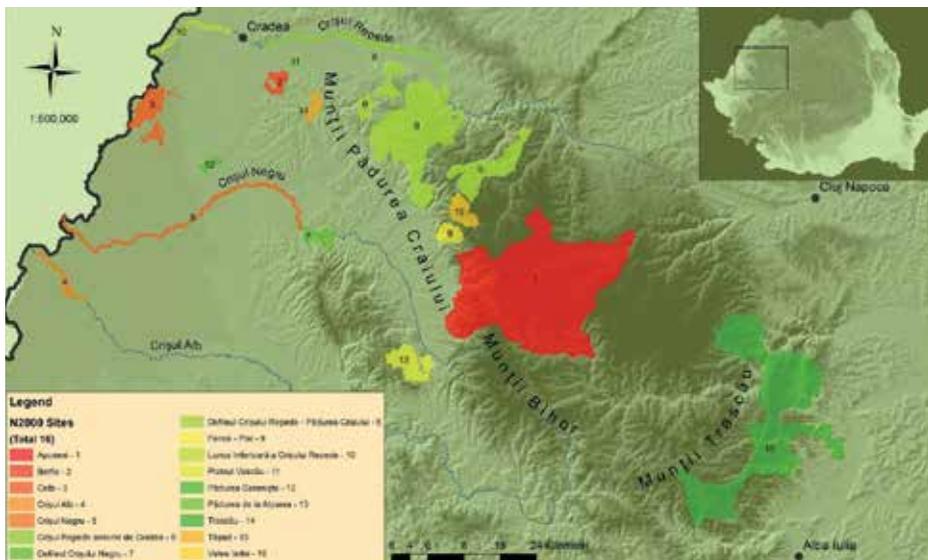
In order to solve the problems that have resulted in the significant decline of bat populations in the Pădurea Craiului, Bihor and Trascău Mountains, the LIFE+ project was implemented, with a duration from 2010 to 2013.

The project was implemented in 16 Natura 2000 sites acrossing three counties: Bihor, Alba and Cluj. A Natura 2000 is a protected natural area in Europe, which includes protected species as well as natural areas (habitats) inhabited by these species. The Natura 2000 network was established not only to protect nature, but also to maintain these natural resources in the long term, in order to ensure their availability for socio-economic development.

The main objectives of the project were:

- Ensuring the long-term conservation of bat populations in the project area;
- Raising awareness among the general public about the ecological importance of bats and their need for protection;
- Creating a network of professionals and organizations that can contribute to the long-term monitoring of bat populations in the project area.

The project was implemented through the cooperation of three institutions: the Environmental Protection Agency of Bihor County (as main beneficiary), the Romanian Bat Protection Association and the Institute of Speleology



The targeted area of the LIFE project



"Emil Racoviță" (as partners). The project was conducted in north-western Romania, specifically in the northern region of the Romanian Western Carpathians as well as in the Criș region. This region contains a vast diversity of habitats that are adequate feeding grounds for bats (deciduous, coniferous and mixed forests, grasslands, farmland, wetlands, and anthropic areas) and offers a large variety of roosts (caves, pot-holes, abandoned mines, hollow trees and rocky areas). Feeding habitats and

roosts include the key elements necessary in the biological cycle of bats. The area of the project is characterized by a high concentration of caves and other underground formations, as well as a great diversity of bat species. The Pădurea Craiului, Bihor and Trascău Mountains are the main mountain regions in the area, these are also the largest Natura 2000 sites in the project area (Apuseni – 761 km², Defileul Crișului Repede and Pădurea Craiului – 388 km², Trascău – 501 km²).

Nr.	Natura 2000 sites	Natura 2000 site code	County
1.	Apuseni	ROSPA0081 ROSC10002	Bihor, Cluj, Alba
2.	Betfia	ROSC10008	Bihor
3.	Cefa	ROSPA0098 ROSC10025	Bihor
4.	Crișul Alb	ROSC10048	Arad
5.	Crișul Negru	ROSC10049	Bihor
6.	Crișul Repede amonte de Oradea	ROSC10050	Bihor
7.	Defileul Crișului Negru	ROSC10061	Bihor
8.	Defileul Crișului Repede - Pădurea Craiului	ROSC10062	Bihor
9.	Ferice Plai	ROSC10084	Bihor
10.	Lunca Inferioară a Crișului Repede	ROSC10104	Bihor
11.	Pădurea de la Alparea	ROSC10145	Bihor
12.	Pădurea Goroniște	ROSC10155	Bihor
13.	Platoul Vascău	ROSC10200	Bihor
14.	Tășad	ROSC10240	Bihor
15.	Trascău	ROSPA0088 ROSC10253	Cluj, Alba
16.	Valea Iadei	ROSC10262	Bihor

Bat populations of Romania, with several colonies of thousands of bats, can be considered among the most representative bat colonies in Europe. Colonies located in caves, with a size in some cases exceeding 10,000 bats, are particularly important in Europe. Because of their in-

creased mobility, bats are not restricted by national borders, with many individual bats from Hungary finding hibernation roosts in Romania. In this way, the protection of bats is important at the global level.

3. Preliminary activities regarding conservation actions

Before the implementation of the project's conservation actions, studies have been carried out, in order to obtain a clear view of the actual situation of bat species in the area and to determine the optimal way to achieve sustainable conservation. With this purpose the project's team has visited more than 100 underground roosts (caves) in the summer, to observe nursery colonies, as well as in the winter period, to monitor hibernation colonies. Roosts visited were chosen based on previously collected data by the Romanian Bat Protection Association, and the based on existing data from the scientific literature. As a result of these activities, the project identified a total of 27 bat species in 16 Natura 2000 sites, the most common species being the target species of the project.



Barbastelle
(*Barbastella barbastellus*)



Greater horseshoe bat
(*Rhinolophus ferrumequinum*)



Schreiber's bat
(*Miniopterus schreibersii*)



	Species	LIFE target species
1.	Greater horseshoe bat (<i>R. ferrumequinum</i>)	*
2.	Lesser horseshoe bat (<i>R. hipposideros</i>)	*
3.	Mediterranean horseshoe bat (<i>R. euryale</i>)	
4.	Blasius' horseshoe bat (<i>R. blasii</i>)	
5.	Daubenton's bat (<i>M. daubentonii</i>)	
6.	Pond bat (<i>M. dasycneme</i>)	
7.	Whiskered bat (<i>M. mystacinus</i>)	
8.	Natterer's bat (<i>M. nattereri</i>)	
9.	Geoffroy's bat (<i>M. emarginatus</i>)	
10.	Bechstein's bat (<i>M. bechsteini</i>)	*
11.	Greater mouse-eared bat (<i>M. myotis</i>)	*
12.	Lesser mouse-eared bat (<i>M. oxygnathus</i>)	*
13.	Alcathoe whiskered bat (<i>M. alcathoe</i>)	
14.	Noctule (<i>N. noctula</i>)	
15.	Leisler's bat (<i>N. leisleri</i>)	
16.	Serotine (<i>E. serotinus</i>)	
17.	Northern bat (<i>E. nilssonii</i>)	
18.	Parti-coloured bat (<i>V. murinus</i>)	
19.	Common pipistrelles (<i>P. pipistrellus</i>)	
20.	Soprano pipistrelle (<i>P. pygmaeus</i>)	
21.	Kuhl's pipistrelle (<i>P. kuhlii</i>)	
22.	Nathusius's pipistrelle (<i>P. nathusii</i>)	
23.	Savii's pipistrelle (<i>H. savii</i>)	
24.	Brown long-eared bat (<i>P. auritus</i>)	
25.	Grey long-eared bat (<i>P. austriacus</i>)	
26.	Barbastelle (<i>B. barbastellus</i>)	*
27.	Schreiber's bat (<i>M. schreibersii</i>)	*



Lesser horseshoe bat
(*Rhinolophus hipposideros*)



Greater horseshoe bat
(*Rhinolophus ferrumequinum*)

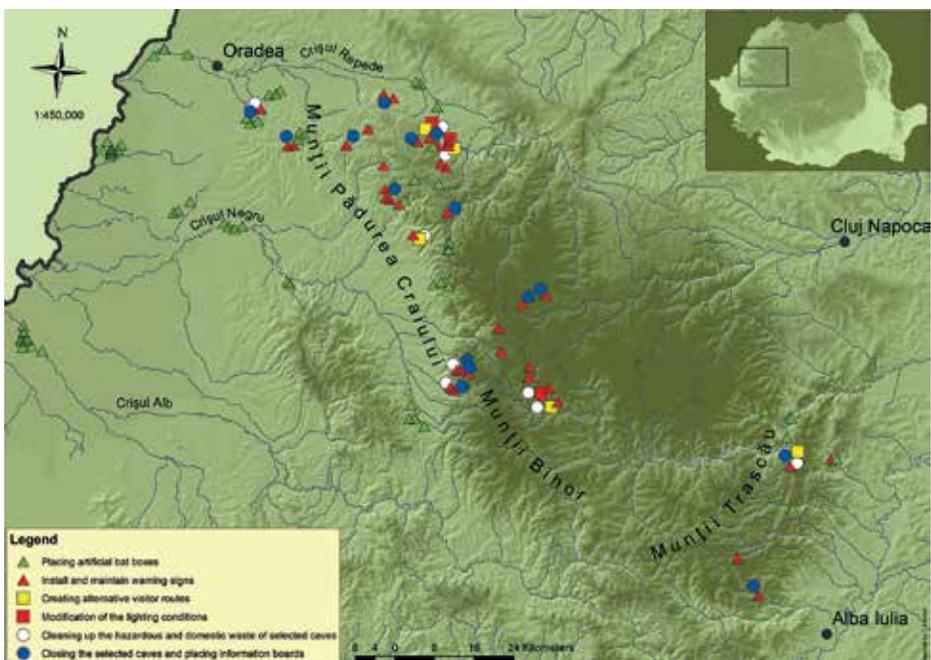


Geoffroy's bat
(*Myotis emarginatus*)

4. Bat conservation activities undertaken in frame of the project

For the effective protection of natural values, well planned and coordinated actions are needed, planned for a longer time interval and broad geographic scale. Bat protection can be achieved through the application of compensatory measures, recovery measures or preventive measures. These measures should be applied simultaneously to obtain a positive overall effect on the bat populations of the target area. Most of these measures have been applied in the LIFE project through a series of actions as follows:

- Placement of 300 bat boxes in key habitats of several Natura 2000 sites (mainly in forests near water surfaces);
- Modification of tourist routes in five caves with high tourist flow, but also with important bat colonies, in order to bypass sensitive areas;
- Modification of artificial lighting conditions in three tourist caves;
- Disposal of waste illegally stored or accumulated due to tourism in nine caves affected;
- Placement of 40 warning signs in frequently visited areas or entrances of important caves;



The map of conservation activities conducted in the frame of the LIFE project



- Closing of 15 caves in suitable way for bats and placement of informative panels at entrances;

Placement of artificial bat roosts in key habitats of several Natura 2000 sites

Several bat species use hollow trees as roosts. The destruction of these roosts by cutting old trees contributes to the fact that bats leave the area. To compensate for these losses, in the frame of the project 300 artificial bat roosts were installed in different target areas of the project, selected preliminarily based on bat activity in the area. During the placement of artificial bat boxes we took into account the orientation to different roosts, the tree species at which the roost had to be installed, and the height from the ground. Installed artificial bat boxes partially compensate for the loss of natural roosts from old forests, and contribute to the conservation of rare woodland species in the target area.



Modification of tourist routes in five caves with high tourist flow

To avoid the disturbance caused by the constant flow of tourists in some caves, that also have significant bat colonies, the project modified tourist routes, in a way that they avoid areas where bats hibernate, or form nursery colonies. The aim of this work was to reduce the disturbance caused by the presence of the human factors on bat colonies.



Caves where tourist routes were modified	
Peștera de la Vadu Crișului	Peștera Poarta lui Ionele
Peștera Huda lui Păpără	Peștera Ungurului
Peștera Meziad	

Modification of artificial lighting conditions in tourist caves

Caves where artificial lighting conditions were modified
Peștera de la Vadu Crișului
Peștera Ghețarul de la Scărișoara
Peștera Ungurului

To minimize disturbance of bat colonies in three caves often visited by tourists, changes were made to the artificial lighting system, with the light being redirected in a way that it avoids colonies or solitary bats. Changing lighting conditions will have measurable benefits for the Scărișoara, Vadu Crișului and Ungurului Caves, and together with controlled tourism will provide a friendly environment for bat colonies.





Disposal of waste illegally stored or accumulated due to cave related tourism

A major problem in the underground environment is the accumulation of waste. This may be caused by floods, river courses and/or the negligence of people (locals and tourists) living over karst phenomena. Being unnatural elements in the underground environment, through decomposition, these can adversely affect the entire cave fauna and give the cave an unpleasant aspect. The purpose of this activity was to eliminate the accumulated wastes and to restore original aspects of the underground environment. It is expected that through a rigorous education and

prevention, the amount of waste will be reduced in target areas.

Caves cleaned of deposited waste

Avenul de la Betfia

Peștera Ghețarul de la Scărișoara

Peștera Ungurului

Peștera de la Vadu Crișului

Huda lui Papară

Peștera de la Fănațe

Peștera Măgura

Peștera Meziad

Peștera Poarta lui Lonele



Placement of warning signs in frequently visited areas or entrances of important caves

Natura 2000 site with warning signs placed	Nr. of warning signs
ROSCl0002 – Apuseni	13
ROSCl0008 – Betfia	1
ROSCl0062 – Defileul Crişului Repede – Pădurea Craiului	20
ROSCl0240 – Tăşad	2
ROSCl0253 – Trascău	4

In order to inform tourists and visitors about the presence of bats and the need to protect them, the project placed 40 warning signs at the entrance to those caves that have the largest and most diverse colonies. The purpose of these signs is to inform and raise public awareness about the existence of bats and

reduce the disturbance caused by uncontrolled tourism. Warning signs contain information about the breeding and wintering periods, during which bats must be bypassed without any interference, and also draw attention to some rules of conduct, which must be respected when around bat colonies or bats.





Closing of 15 caves in suitable way for bats and placement of informative panels at entrances

The purpose of this action was to reduce to a minimum the disturbance of bat colonies, by placing a grille or a fence at the entrance to caves, but still allowing unhindered access of bats. These gates do not prohibit visiting target caves, but contribute to a controlled flow of tourists, conducted in small groups, with the consent of the custodian or administrator of the cave.

The area actively covered by some colonies located in the project area extends beyond the borders of Romania, and in this way their protection is important also at the continental level. The 15 caves closed in frame of the project were selected either based on the number of



specimens of bats (ex. Huda lui Păpără Cave, with over 100.000 bats present) or based on species diversity (ex. Leşului Cave, with min. 14 bat species present). At the entrance of closed caves, the project placed information boards displaying the reasons of closing, details about the local bat fauna, and rules of conduct in presence of bats.

Caves closed in frame of the project

Avenul de la Betfia

Huda lui Păpără

Peştera Bătrânului

Peştera Ciur Iz buc

Peştera Coliboaia

Peştera cu Apă din Valea Leşului

Peştera de la Aştileu

Peştera de la Fănaţe

Peştera de la Tăşad

Peştera de la Vadu Crişului

Peştera Liliiecilor din Cheile Ampoitei

Peştera Măgura

Peştera Smeilor de la Onceasa

Peştera Ţiclului

Sistemul carstic Humpleu



Durable bat conservation

To achieve adequate and all round protection, the first step is the dissemination of general knowledge about bats, combat superstitions and clarify misunderstandings surrounding bats.

This was achieved, in frame of the project through:

- Printing multiple types of informative materials related to the bats;
- Public awareness and environmental education of children and adolescents through classroom and field activities;
- Organizing three workshops about methods applied in the identification and monitoring of bats;
- Filming a 30 minute documentary about the life of bats;
- Placing information boards at the entrance of important underground shelters;
- Dissemination of the project results through the organization of a scientific conference.

Public awareness was achieved through printing several types of informative materials (leaflets, brochures, books, posters), containing information about the biology of bats, habitats and roosts used by bats, emphasizing threat factors and possible conservation measures.

Due to the fact that children and teenagers are thirsty for knowledge and lack misconceptions, they were the ideal target group of awareness raising actions during the project. In frame of these actions, we organized environmental education activities in 33 schools located in Bihor, Alba, Cluj counties.

During these activities presentations were held, about general aspects of the biology and ecology of bats, their importance at the global level, threat factors and possible protective measures, general aspects of the environment and nature protection. Activities also used a range of methods and interactive games.

In frame of this action we organized the interschool competition "Bats - our friends", presenting winners with the chance to visit one of the project's target caves, Meziad Cave, one of the most important underground roosts in Bihor County. At the cave entrance, the children were informed about the rules of conduct in an underground roost, we discussed and clarified superstitions about bats, after which we visited the cave's tourist route and observed bats in their natural environment.





In the three workshops, attended by custodians and managers of Natura 2000 sites, cavers, young biologists and specialists, the participants mastered the basics of theoretical and practical identification of bat species and appropriate methods for their study.

Filming a documentary about the life of bats is a significant result of the project and an appropriate tool for public awareness. The film details the biological aspects of bats, the conservation actions of the project, draws attention to the rules of conduct in caves and presents the need to protect bats, all this in a manner easily understood by the audience.

Presentation of the results obtained during the project was carried out by organizing a conference for a specialized audience. The purpose of this conference was to provide a forum for the presentation and evaluation of the project's results, to formulate critical and useful comments in order to improve efforts of bat protection in the future, and as an experience exchange among the specialists of this field.

5. The project message

The long-term conservation of bats can only be carried out if we protect existing natural values, implement effective measures of protection, and

make aware the general public about the importance and necessity of bat protection.

6. Conclusion

This project was unique in the sense that conservation activities took into account the real ecological needs and current threats regarding bats. Specific conservation actions were preceded by a well-established scientific survey, in which bat specialists, recognized nationwide, have been involved. In the various professional decisions, alongside the project's experts, several renowned international experts took part.

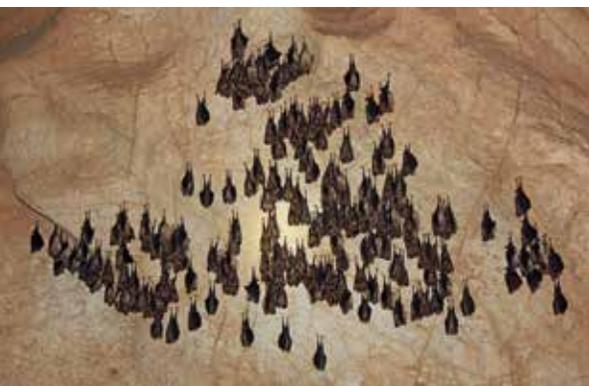
During the project, partial results and successes achieved were regularly published in different national forums and presented at international professional

meetings (ex. bat protection conferences, EUROBATS meetings).

The project was awarded several prizes:

- Partial results of the project results were summarized in form of a poster, and presented at the XIIth European Bat Research Symposium, Vilnius, Lithuania, 2011. Our poster was qualified as the best poster in the „conservation” category.
- The project took part in the photo competition announced by LIFE in 2012 (LIFE at 20 Photo Competition), with a photo of a hibernating lesser horseshoe bat (*Rhinolophus hipposideros*) receiving the "Best Picture" prize.

The project targeted not only children and teenagers, but, in a unique way, provided valuable information about bats also to older generations, ranging all the way to university students. Through lectures, informative materials, books, data sheets for children, trips, participants had the opportunity to gather infor-





mation about the previously unknown world of bats.

So far, Romania did not make a documentary that would show the lives of bats and the importance of bat protection, through the work of professionals, NGOs and institutions responsible. The project did not only solve, as urgent interventions, the protection of already identified and vulnerable nursery and hibernation colonies, but also contributed to the protection of bats in the long run.

Conservation activities were strengthened through partnership agreements and contracts. Thus, specific protective interventions in the Natura 2000 areas are in the administration of custodians, with bat protection continuing to operate in a sustainable manner.

Being unique at the national level, the project produced an action plan that includes conservation measures for bats, and which can be included in



management plans of protected areas, thus contributing to the short and long term protection of bats in Natura 2000 areas.





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