Audiomoth donation in exchange for sounds

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Abstract

The migration routes of bats in Europe are poorly known. To increase our knowledge and better protect migrating bats, the project Bat migration routes in Europe builds a European database of sounds collected using passive acoustic monitoring by numerous partners. To encourage the participation of partners from countries underfunded in bat research and conservation, 196 Audiomoths were distributed to non-profit structures from these countries. This allowed partners from nine additional countries to join the project. Half of the beneficiaries already sent the sounds they collected. This donation also had the objective to provide material to collect data to feed other projects in bat research and conservation in these countries.

Introduction

Several species of bats migrate each year over Europe. During their journey, they travel along river valleys and coastlines which are rich in prey that they capture en route and which constitute probable geographical landmarks; they also take mountain passes which allow the crossing of mountains with minimum energy expenditure (Bartonička et al., 2019; Popa-Lisseanu and Voigt, 2009). However, the precise routes that they use and the possible shortcuts that exist between preferred habitats used during migration are still poorly known. Yet, thousands of bat workers and researchers collect acoustic recordings of bat activity throughout Europe each year. These recordings can inform on species presence and provide a proxy of abundance (Roemer et al., 2025).

To progress in the understanding of bat migration, the French Museum of Natural History (MNHN) started the project Bat migration routes in Europe in 2021 (bat-migration-europe.netlify.app). It was funded by three different funding sources: 132k€ from the French Office for Biodiversity (OFB), 24k€ from Naturalia Environnement and 10k€ from the EUROBATS Projects Initiative. The objective was to build species distribution models (SDM) and connectivity models thanks to passive acoustic recordings collected by different contributors all around Europe. The MNHN started working on the modelling of bat activity before this project. The originality of this data is that it provides information on animal abundance, including zeros, and that the activity varies greatly from

one night to the other. Models for this kind of data have never been published before and represent a methodological challenge.

The MNHN already had a collection of several thousands of study sites in France, and other citizen science programmes promised to contribute with their sounds to the initiative. By collecting European sounds, this project would provide the material to build SDM and connectivity models, but it would also archive raw acoustic sounds for an unlimited amount of time, in case the partners agree to make their sounds available for other research projects.

It was expected that bat workers and researchers in some countries in Europe would have more resources to collect sounds than others, because of their economical situation. Therefore, one of the objectives of the project was to make a donation of acoustic recorders to participants from countries underfunded for bat research and conservation. This donation would be without any formal engagement other than a moral engagement to provide sounds for the project. The number of study sites and nights collected and transferred for the project would be left to the appreciation of the beneficiaries of the donation. Indeed, we wanted to give this liberty in order to achieve a real collaboration between the beneficiaries and the MNHN.

Donated material

Figure 1: Audiomoth and micro SD card donated for the project (photo: LABMAKER).

The choice of the material was made to ensure that partners would not have any problem to deploy the recorders, even in the case of a difficult economical or political situation. We also wanted to be able to distribute as many recorders as possible. We thus chose the low-cost AudioMoth v1.2.0 from Open Acoustic Devices, which were the cheapest on the market at the time, and which matched the quality and compatibility requirements for the passive acoustic monitoring of bats. Audiomoths are basic printed circuit boards attached to a battery case. We bought 200 units. The circuit boards can be protected in a custom-built box thanks to a junction box in which a hole is drilled for the microphone. The microphone can then be protected from the rain thanks to a simple cellophane sheet. The boxes were not provided because they are cheap and easy to find.

Audiomoths function with micro SD cards of at least 32 Gb. To lower the costs and because SD cards can be found in many supermarkets, we bought 99 Micro SD card SanDisk Extreme 32 Gb U3. We did not provide the AA batteries because they are cheap and easy to find in supermarkets.

Application forms

Only non-profit structures (academics, NGOs…) were allowed to apply. The list of candidate countries was directly copied from the COST Inclusiveness target countries: Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia, Slovenia, Albania, Bosnia and Herzegovina, Moldova, Montenegro, North Macedonia, Serbia, Turkey, Belarus and Ukraine.

Applicants could ask up to 10 Audiomoths per structure. Because we did not have one SD card for each Audiomoth, we promised at least one micro SD card per beneficiary.

We provided recommendations to install the devices, use standard settings, and protect them from the rain.

Donation

Two applications were rejected because the country of the applicant was not in the list of eligible countries. All other applications were accepted, which represents 28 beneficiaries from the following countries (see Figure 3):

- Belarus
- Bosnia and Herzegovina
- Bulgaria
- Croatia
- Cyprus
- Czech Republic
- Greece
- Hungary
- Malta
- Moldova
- Montenegro
- Poland
- Romania
- Turkey
- Ukraine

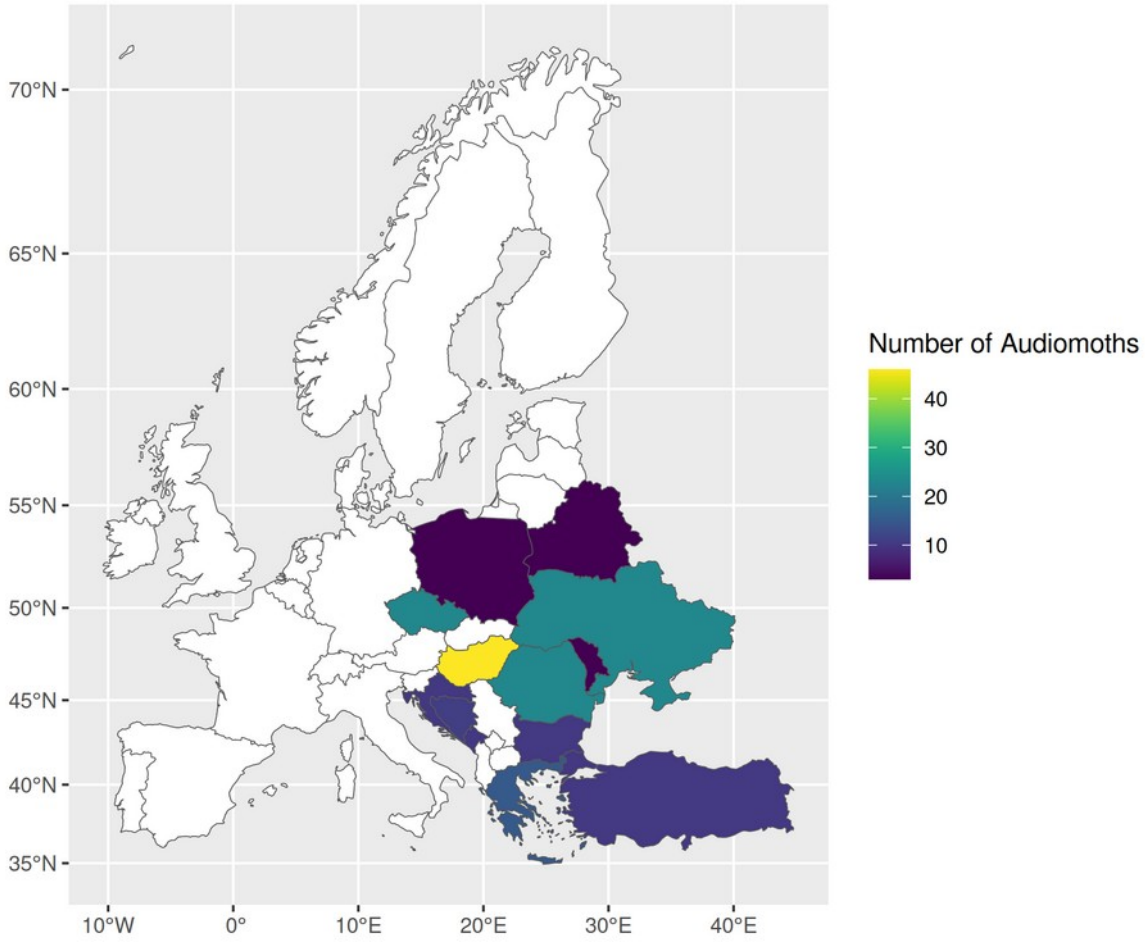

Figure 2 : Number of Audiomoths donated for each country

We donated one SD card for each Audiomoth for Ukrainian beneficiaries because we expected more difficulties for them, because their country was at war. For the other beneficiaries we distributed the SD cards proportionately to the number of Audiomoths donated.

All Audiomoths have been donated, except four Audiomoths that were kept for field tests in the scope of Bat migration routes in Europe, to develop a correction factor for the analysis of sounds originating from different bat recorders.

Sounds received until now from beneficiaries

The donation allowed to include nine new countries in the project: Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Malta, Montenegro, Romania and Ukraine.

13 out of 28 beneficiaries already sent sounds to the server of the project. These beneficiaries are from Romania, Bosnia and Herzegovina, Czech Republic, Ukraine, Montenegro, Greece, Belarus, Bulgaria and Hungary. The rest of the beneficiaries are contacted on a regular basis to encourage them to send their sounds.

Conclusions and perspectives

All Audiomoths have been donated, except four that were kept for field tests in the scope of the project. The project allowed to add nine new countries to the project. Half of the beneficiaries sent sounds, the others were asked to kindly send them during the winter of 2025/2026.

This donation allowed the collection of sounds for the project Bat migration routes in Europe from countries where the passive monitoring of bats is scarce. But it also provided material that can be applied in the future directly for the purpose of bat research and conservation in countries that are underfunded. In addition, recommendations have been provided to use standard settings (settings recommended by EUROBATS for passive acoustic monitoring), so that the recordings collected can be compared in the future with recordings from other countries in Europe.

Financial summary

Three funding sources have been mobilised in the scope of this project: 132k€ from the French Office for Biodiversity (OFB), 24k€ from the French consulting firm Naturalia Environnement and 10k€ from the EUROBATS Projects Initiative. LABMAKER, the maker of the Audiomoths, agreed to make a 3% discount.

Table 1 : Financial summary of the expenses of the Audiomoths donation. The coordination time was covered by the funding of the OFB and is not shown in this table.

Costs		Funding	
Name	**Price**	**Name**	**Amount**
200 Audiomoths	16,296	EUROBATS Projects Initiative	10,000
99 SD cards	956.67	Naturalia Environnement	7,828.75
Postal shipments	576.08		
TOTAL	**17,828.75**		**17,828.75**

Acknowledgments

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List of Annexes

- Application form

List of Annexes made available to the EUROBATS Secretariat only

- List of accepted applications
- List of the number of Audiomoths and SD cards sent to each beneficiary

References

Bartonička, T., Miketová, N., Hulva, P., 2019. High throughput bioacoustic monitoring and phenology of the greater noctule bat (Nyctalus lasiopterus) compared to other migratory species. Acta Chiropterologica 21, 75–85.

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