LIFE Danube Free Sky: Safer power lines for birds along the Danube river

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Introduction

One of the biggest threats for the wild bird species is electrocution and collisions with power lines causing thousands of avoidable deaths and injuries. These threats are targeted by the LIFE Danube Free Sky project (www.danubefreesky.eu) representing a unique example of wide transnational cooperation along with one of the most important migration corridors, stop-over sites, and wintering places for many bird species in Europe - the Danube River.

The LIFE Danube Free Sky project is co-funded by the LIFE Programme of the European Union and the Ministry of Environment of the Slovak Republic. During the period of project implementation (2020–2026), 15 project partners (8 energy companies, 1 railway company, 3 national parks, and 3 non-governmental bird conservation organizations) from 7 countries collaborate and apply the most effective solutions in order to prevent existential threats to birds. The project is implemented along the Danube River in 25 Special Protection Areas and their adjacent areas located in Austria, Slovakia, Hungary, Croatia, Bulgaria, Romania, and in 9 Important Bird Areas in Serbia. The main goal of the project is to contribute to the aim of the EU Biodiversity Strategy to halt the loss of biodiversity and ecosystem services along the Danube River. This will be achieved by reducing bird mortality on power lines (caused by either electrocution or collision) for 12 target species: *Anser erythropus, Aquila heliaca, Botaurus stellaris, Branta ruficollis, Clanga clanga, Clanga pomarina, Coracias garrulus, Crex crex, Falco cherrug, Falco vespertinus, Otis tarda*, and *Pelecanus crispus.* The most important areas for populations of target species are included in the project area. Thus, the project ensures implementation of measures and prevention of target species proximity with power lines in the most valuable and critical parts of the migration route along the Danube River. The focus is given to hotspots to achieve maximal efficiency of invested personal and financial resources while ensuring safety for target species. Transnational cooperation will help achieve adequate results and share knowledge between experts on this issue to prevent mistakes and adopt best practice methods and standards. The project is coordinated by a team of experts from Raptor Protection of Slovakia.

Monitoring of power lines and mortality risk evaluation

In order to take effective mitigation measures for the prevention of electrocution and collisions, it is necessary to identify the real mortality rate in the area and define the riskiest pole designs and sections of power lines. Over 80 trained field assistants carried out a field survey that covered almost 1,580 km of 8 types of the above ground power lines (10 kV, 20 kV, 22 kV, 35 kV, 110 kV, 220 kV, 400 kV, and electric railway lines) and 12,535 poles according to the International Monitoring Scheme prepared under the project. For each electricity pole/pylon, special technical data were collected together with other abiotic and biotic factors about the surrounding landscape structure and habitat important for birds. This survey provided important input data for the following assessment and classification processes.

During the field surveys, 2,098 bird carcasses and bird remains

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Image 1: Mute swans were the most common victims of collisions with power lines under the field survey of the LIFE Danube Free Sky project

representing 103 bird species were identified under the power lines. For 1,833 individuals belonging to 93 species, it was possible to determine the exact cause of death. Electrocutions accounted for 55% (1009 individuals), belonging to 35 bird species; collisions accounted for 45% (824 ind.), involving 78 bird species. The Eurasian Magpie *Pica pica* was the most detected and was associated with 27% (n=193) of all electrocutions. The second highest mortality was observed for the Eurasian Buzzard *Buteo buteo* with 22% (157 ind.). The Mute Swan *Cygnus olor* was the most common bird detected with 20% (155 ind.) of all identified collisions **(**Image 1**)**. The second highest mortality was observed for the Mallard *Anas platyrhynchos* with 9.1% (71 ind.).

Carcass removal near the powerlines by scavengers often biases the real mortality rate. Therefore, photo traps, video cameras, binoculars with nocturnal vision systems, and metal detectors were also used as additional forms of data collection to increase the detection efficiency and identify the scavenging rate to the maximum **(**Image 2**)**.

In Austria, specially trained dogs have been used to increase the effectiveness of detection around railway lines (Image 3). Another dog unit was also used in the field survey of transmission power lines in Hungary.

Preventing birds from collisions and electrocution is important to compensate for other threats that the endangered species need to face. The positive fact is that only parts of potentially dangerous lines are responsible for the majority of bird mortality. Based on the results of field survey, the highest-risk sections were prioritised for the implementation of mitigation measures. Taking into account the economic cost of marking, it is more likely to use

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Image 2: Metal detectors, cameras, and photo traps were also used during the monitoring

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Image 3: Specially trained dog for tracking bird carcasses

JOZEF CHAVKO

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Image 4: Data from the satellite transmitters help us to identify the locations of the young individuals and possible threats

attachment of flight diverters to these hot-spots rather than to the whole sections of the power line. In the case of electrocution risk, it is necessary to proceed according to priorities, with the aim of focusing on the riskiest sections first, and then gradually on the whole surrounding area. These approaches adopted in the framework of the LIFE Danube Free Sky project ensure the treatment of the most dangerous poles/line sections while saving money for the distribution and transmission system operators.

One of the applied ways to identify risky poles in relation especially to juveniles is the installation of satellite transmitters (Image 4). Thanks to this data, it is then possible to identify which of the dangerous poles/lines are located in the home range of breeding pairs and priority habitats and accordingly take effective measures.

Preventing collisions of birds with power lines

Collisions of birds with power lines represent a significant mortality

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Image 5: Collision of swan into power lines often causes outages

factor for several waterbird species. They are related to a very important fact – power lines are unnatural obstacles in the landscape, and a flying individual is not always able to register such an obstacle in front of him in time. While interactions with electric power lines are one of the main threats to certain species, these interactions (collisions of heavy birds such as bustards, cranes, or swans) are also a problem for electricity companies and can be costly, causing power outages and damage to equipment (Image 5).

Even if collisions themselves cannot be completely eliminated, they can still be reduced by means of proper mitigation measures. Line marking is one of the best and quickest solutions to increase the visibility of power lines. Based on the results from the field surveys, under the LIFE Danube Free Sky project almost 270 km of power lines were identified as a top-priority for increasing the visibility via installation of several types of bird flight diverters. For example, the latest types of RIBE flight diverters (black and white lamellas) with glow-in-the-dark illumination, a FireFly Bird Diverter and a LED diverter capable of glowing thanks to the induction of voltage from the wires have been installed on power lines along the Danube river (Image 6).

Using a special drone to install the diverters reduces conflicts between the farmers and the power energy companies. There is no need to pay compensation for destroyed crop. At the same time, there is no need to shut down the line during the installation of the diverters (Image 7).

By implementing the mitigation measures, we will increase the visibility on 263.5 km of top-priority power lines in the most valuable and critical areas of the entire migration route along the Danube River. These long-term solutions will also prevent power outages and increase the reliability of electricity distribution to customers.

Some devices can be attached manually from the ground (e.g. during the construction of the line), others are snap on automatically via a claw, and some need to be manually attached in place from a hanging basket. Related to this is the speed of installation. For example, a FireFly diverter can be installed from the ground using a telescopic stick in 1 day in a quantity of 50 pieces, which means about 500–600 meters

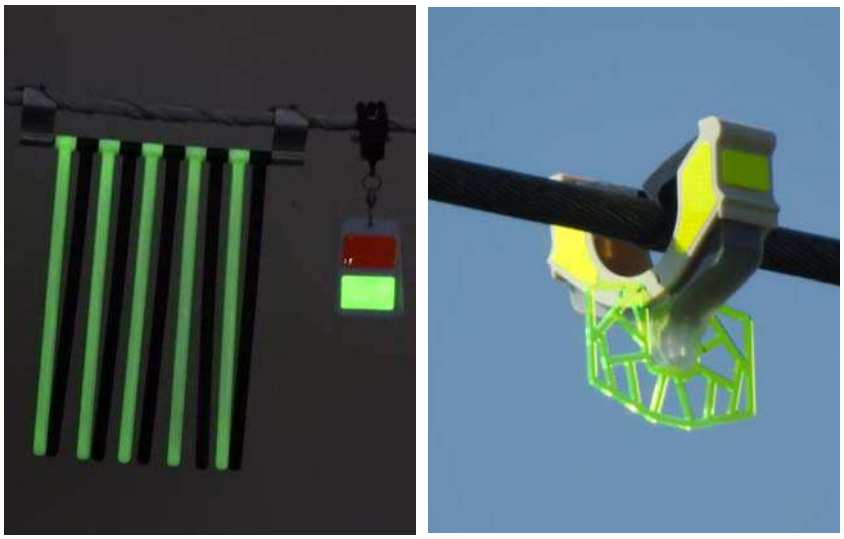

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Image 6: RIBE lamella, FireFly and LED Diverter used to protect birds from collisions

of secure power line. In the case of installation using rollerblading, from a bucket truck, it is necessary that the power line is switched off. Installation of bird diverters is also possible by drone, while the power line is on. Installation requires a specially equipped drone, pilot, and navigator. It is possible to attach 200-250 pieces per day, installation of 1 diverter takes approximately 1.5 minutes. In terms of time efficiency, this method is four times more efficient compared to the installation from the ground using a telescopic stick.

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Image 7: Installation of the flight diverters on power lines with drone

Anti-electrocution measures

According to current knowledge and experience, it is possible to reduce the risk of electrocution significantly, within acceptable costs for electric utility companies. The adoption of permanent measures on power lines with dangerous poles may involve the total or partial modification of the line/cross-arm. Replacing of bare conductors of overhead power lines with covered conductors is a long-lasting solution and it doesn't cause difficulties with maintenance in comparison with insulation equipment installation (Image 8). Almost 4,000 poles were identified within the LIFE Danube Free Sky project as critical for implementing measures to avoid the high risk of electrocution.

Covering the conductors and other live elements with insulating materials helps reduce the mortality risk and is also an effective solution. This solution is very common, universal and is used in many countries and by many grid operators. On metal cross-arms, another possible type of insulation consists of placing rigid plastic covers on the parts where birds perch, so that they avoid contact with the ground connection of the pole (Image 9).

A transnational approach is necessary to achieve adequate results and share knowledge between experts on this issue to prevent

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Image 8: Changing the construction of the dangerous pole to more bird-friendly pole

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Image 9: Measures against bird electrocution – covering conductors with insulation materials and installation of rigid plastic covers for safe perching of birds

mistakes and adopt best practice methods and standards. As part of the project, a special Facebook group of experts "Birds and power lines" (https://www.facebook.com/groups/birdspowerlines) has been created. The group is a space for discussion, its purpose is to exchange experiences, knowledge, best or new (innovative) practices on the issue of birds and power lines.

Raptor Protection of Slovakia (RPS)

Since 1974 our mission has been to improve conditions for birds of prey and owls in wild nature all over Slovakia with a special emphasis on endangered species. We study the breeding biology, threats, habitats and carry out actions to create and/or conserve safe nesting conditions, suitable foraging habitats, and roosting sites for birds of prey, owls as well as other bird species. One of the topics we focus on since the beginning is the birds vs. power lines interaction. Web: www.dravce.sk; e-mail: dravce@dravce.sk

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