



After Life Communication Plan

LIFE+ Life at Night

Life at Night - Improving the conservation status of nocturnal animals (moths and bats) by reducing the effects of artificial lighting at cultural heritage sites (LIFE09 NAT/SI/000378)

January 2014



LIFE AT NIGHT

Achievements of the project »Life at Night«

The main goal of the project was to decrease the negative impact caused by illuminating churches and thus to improve the conservation status and biological diversity of nocturnal animals such as bats and moths in the long term.

1. Innovative technical solution, nature-friendlier luminaire



A technical solution – a luminaire for nature-friendly and energy efficient illumination of churches and other objects of cultural heritage has been developed. In the framework of the project the existing lighting was replaced with new nature friendlier luminaires.

- The luminaire is equipped with a special mask, adapted to individual facade of the church, which reduces a light beam pasting the facade towards the sky and the surrounding. With the initial lighting, up to 80% of the light was lost this way, while with the adjusted luminaire the beam was reduced to about 2%. This is considerably less than 10%, permitted by the legislation. The mask also allows dimming of flight openings for bats.

- The luminaire emits a warm, yellow-white light. This was achieved by a metal halide light bulb with a color temperature of 3000 K and a filter which cuts ultraviolet radiation and most of the blue part of the spectrum with a wavelength shorter than 480 nm.

- The light bulb has less power than the original one, but it is still strong enough to illuminate the church nicely. This measure led to reduction of the brightness of the church facades from more than 7 cd/m² to the limit set by law (1 cd/m²). In some cases the values measured were even lower than permitted. In addition, it reduced the energy consumption on average by 65%, in some cases up to 90%.

During the project there has been a great progress in LED technology, which allows even greater savings in energy consumption. Therefore, in the final phase of the project the lead partner developed a new luminaire based on LED technology with a yellow light. With the new generation of luminaries based on this LED technology we have equipped additional 5 churches.

Communication of the innovative nature-friendly lighting for objects of cultural heritage:

The solution was presented to all Slovenian municipalities and parishes, which are responsible for lighting of cultural monuments. The lead partner will start marketing this technology in Slovenia and the EU after the completion of the project. This will enable the project results to be implemented in other EU countries as well.

2. Preservation of biodiversity - reduced impact on nocturnal animals

The results of the three-year researches on moths and bats has confirmed that the new lighting, developed in the project, has a significantly smaller impact on the nocturnal animals compared to the original one.



■ **Moths:** Up to 6 times fewer moths were gathering at new luminaires. The yellow light attracted 40% less specimens than the blue one. The yellow light attracted less moths, therefore is less disturbing for them.



■ **Bats:** At the adjusted lighting the bats went hunting earlier - they flew out 20 minutes earlier than at the original lighting. Generally the bats prefer to fly out from flying gaps which are not directly illuminated.

Communication of monitoring results:

The final results will continue to be presented at international environmental and scientific events and published in scientific journals after the end of the project. This way the scientific arguments for limiting light pollution will extend beyond the borders of Slovenia.

3. Recommendation for nature-friendlier illumination of object of cultural heritage



For the protection of nocturnal animals the best option would be no illumination. Switching off the lighting after 23:00 is only a compromise. In case that the illumination can not be avoided, we appeal to decision-makers and managers of public lighting to consider the recommendations for environmentally friendly lighting, which combines the requirements of the legislation and the latest scientific findings. These recommendations were prepared in cooperation with the National Commission for UNESCO and Slovenian organizations of ICOMOS and IUCN and aligned with natural and cultural conservation professionals. The recommendations were published in the form of brochures and leaflets.

Communication of the recommendations:

The recommendations were distributed to all Slovenian municipalities and religious communities as well as communicated to the Institute for Nature Conservation and the Institute for Protection of Cultural Heritage of Slovenia. The relevant Ministry was made aware of the serious deficiency of light pollution legislation (Decree on limit values due to light pollution of environment, hereinafter Decree), associated with a non-existent provision regarding the light spectrum, the colour of light. In order to address the global problem of light pollution in connection with the loss of biodiversity, the achievements of the project and the recommendations were communicated to environmental and nature conservation organizations as well as to representatives of the UNESCO programme "Man and Biosphere". This way we would like to encourage the implementation of the recommendations at European and international level.

4. Informing the general public

A significant progress has been made in raising awareness of the negative effects of light pollution on biodiversity, human health and astronomical observations. This was done through lectures, meetings, workshops and seminars.

Regular contact between field researchers and local residents was important in the context of adapting the lighting of churches. Those who live in the immediate vicinity of churches are satisfied with the new illumination, as the new lighting is less disturbing and the light does not enter their living areas.

5. Coordination of the project

The activities were carried out by Euromix Ltd. as a lead partner in cooperation with 5 partner organizations: Dark-Sky Slovenia, University of Ljubljana (Department of Biology of the Biotechnical Faculty), Society for the Conservation and Study of Lepidoptera of Slovenia, Slovenian Association for Bat Research and Conservation and Baza Media 2.1 Ltd..

6. Relevance to environmental policy and legislation

■ **Local level:** A step towards designing a more sustainable lighting of objects of cultural heritage was made by communication with decision-makers at the local level.

■ **National level:** The importance of cooperation between nature and culture conservation professions was emphasized and it is expected that the dialogue between these two disciplines will rise in the future. The results of research on the impact of the light spectrum on moths serve as an additional argument for amending the Decree. Activities related to the amendment of the light pollution legislation will take place after the end of the project.

■ **International level:** Recommendations for nature-friendly lighting provide a good basis for a step towards the international standardization in the field of illumination of cultural heritage. In the future we plan activities to promote the international reflection on the topic of illumination of cultural heritage in cooperation with UNESCO.

Evaluation of the communication strategy's main target groups

Other activities

■ Design of a project logo, webpage and its maintenance

The logo, which appears on all project documentation and publications, represents well the content of the project. It is also a part of the web page in Slovenian and English, which presents information on the project and on light pollution in general in an attractive manner. The web address appears on all our publications and correspondence. On average 480 users per month were recorded (all together over 18,000 users, more than 13,000 as first-time users) during the period of 35 months (from launch of the web site until the end of the project).

■ Leaflet "Light pollution"

The easy-to-read leaflet presents the light pollution and its negative effects on biodiversity, consequences for energy consumption as well as solutions to reduce these effects.

It was published in 15,000 copies (10,000 in Slovenian and 5,000 in English) and half of them were distributed at lectures, field workshops, meetings with stakeholders, seminars, national/international conferences and other events. They were also sent to all municipalities, schools, Dark Sky organizations and the scientists working in related fields.

■ Articles in press and other media

To reach a broad range of groups, our staff wrote 16 articles and sent out 6 press releases on how the light pollution threatens biodiversity, what other negative consequences it has, and what measures are needed to reduce it. These resulted in 40 press articles, 91 internet media articles and announcements, 16 radio and 6 TV emmissions. The magazine for Slovene bat specialists "Look, a Bat!" ("Glej, netopir") was published in three ordinary issues (3 x 200 copies) and one special issue (1 x 500 special copies), dedicated to the results of the project and interactions between bats and artificial lights. 19 articles in these magazines were written by the project staff.

■ Participation of children in our fieldwork

Local primary and secondary schools in the project areas participated in our work in 14 field workshops. 207 children, their teachers and parents, students and local people gained personal experience, which helps them to a better understanding of the subject.

■ Competition for best dark sky drawing

334 works of art arrived to the competition, to which all 468 Slovenian primary schools were invited. Beside the three best drawings, 12 more were awarded.

■ Notice boards

Notice boards were placed on visible places at 20 project churches to inform not only the residents of the project areas, but also the tourists and passers-by about the effects of light on nocturnal animals, the activities carried out in the project and also some information about the church.

■ Public lectures

During the whole project 36 lectures were carried out, reaching more than 1164 people. Each lecture was followed by a discussion with the participants. The lectures were advertised on the project website and occasionally in local newspapers. We will continue with responding to invitations for lectures after the end of the project.



■ **Workshop for school teachers**

The workshop for school teachers was attended by 68 teachers of biology, physics and natural science from primary and secondary schools and other educational institutions. The teachers were encouraged to include the topic of light pollution and its consequences for biodiversity into their lessons and were provided with necessary teaching materials.

■ **Recommendations / Technical guidelines (Booklet and leaflet)**

Detailed guidelines/recommendations for nature-friendly and energy efficient lighting of objects of cultural heritage are presented in a booklet in Slovenian and English language, each in 2000 copies. A leaflet, a shorter version of recommendations was published in both languages in the same circulations. In this form is more accessible to people who are not willing to dedicate a lot of time to this problem. The publications were promoted at the symposium for stakeholders, sent to all municipalities and communicated to the relevant Ministry.

■ **TV documentary**

A 27-minute TV documentary in Slovenian with English subtitles presents light pollution in general, its implications for biodiversity and the innovative technical solutions for nature friendly illumination. The film was shown at the symposium for the stakeholders and handed over to the national TV to be assigned to the educational programme in 2014.

■ **Scientific papers**

A scientific paper is a basic tool to inform scientist about results of a study. Two scientific papers on the effects of different lighting conditions, one on moths and one on bats, were submitted to SCI journals.

■ **Interantional conference presentations**

In order to reach a broad scientific audience from three different fields that very rarely overlap, the project and the preliminary results were presented as lectures or posters at 10 international conferences (topics: light pollution, moths, bats). Participation at conferences gives opportunities for networking which can be of great importance for the future development of this discipline in Slovenia.

■ **Symposium for stakeholders**

The major objective of the symposium for stakeholders was promotion of the Recommendations/Technical Guidelines and presentation of the major outcomes of the project. To increase the publicity at the end of the project and to promote the technical guidelines, a Press conference accompanied the symposium.

■ **Diploma thesis**

To promote the topic (ecological impacts of light pollution) among students, the project offered them an opportunity to conduct their diploma and master thesis. By conducting their own research, young scientists would get acquainted with the topic and be stimulated to continue light pollution-related research later in their career. One bat-related diploma was successfully completed and its results presented at the 3rd International Bat Meeting in Berlin in March 2013.

■ **European bat night**

Slovenian Association for Bat Research and Conservation has been taking part in the European Bat Night (EBN) since 2002. The event was renamed International bat night (IBN) in 2012. In years 2010-2013 the Slovenian Bat Night was dedicated to the problem of light pollution. This topic was communicated to local residents (general public) through workshops for children, lectures, workshops and bat observations. More than 860 participants took part in 37 events organised in 25 locations all over Slovenia. The programmes of EBN/IBN were announced in press releases.

■ **European moth nights**

Society for the Conservation and Study of Lepidoptera of Slovenia has been organizing the European moth nights (EMN) since 2003. More than 110 people participated in 17 fieldwork events lead by the project moth experts on 11 locations in Slovenia, as the years 2010-2013 were dedicated to the light pollution problem.

■ **Layman's report**

In Layman's report all major actions and results of the project are presented. It was released in 500 copies in Slovenian and English language and distributed among all the stakeholders, sent to the dark-sky organisations in other countries and used to present the project after its end.

■ **Meetings with stakeholders**

In order to present the project and ask for cooperation, 6 group meetings and some individual meetings with municipalites, local priests and other stakeholders were organized in the beginning of the project. In case of changes or problems the meetings were held individually. In order to present the results and to communicate the technical guidelines, a final conference for stakeholders was organised in January 2014.

After Life Communication Strategy

DTNS	Dark-Sky Slovenia (Društvo Temno nebo Slovenije)
UNI	Department of Biology, Biotechnical Faculty, University of Ljubljana (Oddelek za biologijo Biotehniške fakultete Univerze v Ljubljani)
DPOMS	Society for the Conservation and Study of Lepidoptera in of Slovenia (Društvo za proučevanje in ohranjanje metuljev Slovenije)
SDPVN	Slovenian Association for Bat Research and Conservation (Slovensko društvo za proučevanje in varstvo netopirjev)

Action/media	Target audience	Message	Time	Benediciary	Response indicators	Budget(EUR)
D1-Web site	general public, pupils, students, stakeholders, decisionmakers, specialists	Information about the project. Updates whenever relevant new information is available.	until 2019 or more	DTNS	No. of clicks	6,900
D2-Leaflet "Light pollution"	school children, students, general public	Information about the project. Used at all the events and workshops + sent by mail.	until 2019 or more	DTNS	No. of distributed copies and e-versions	0
D10, D11-Booklet and leaflet with recommendations/ technical guidelines	stakeholders, operators of public lighting, environmentalists, general public, UNESCO	The main information material for nature-friendlier illumination. Promotion of this issue on the interational level.	until 2019 or more	DTNS	No. of distributed copies and e-versions	1,500
D3-Media work	general public	Awareness raising of the problem of light pollution, its influence on our health and biodiversity through media.	until 2019 or more	DTNS, SDPVN, DPOMS	No. of articles	2,600
D8-Public lectures lectures	school children, students and general public	Awareness raising of the problem. The lectures will continue after the end of the project. We will respond to invitations in the future.	until 2019 or more	DTNS, SDPVN, UNI	No. of lectures and participants	4,500
D9-Seminar za učitelje	school teachers	Developing a 3-day educational programme on the relevant topics.	until 2016 or more	DTNS, SDPVN, UNI	Elaborated programme	2,700
D12-TV documentary	schools, general public	Broadcasting on national television as part of the educational programme in 2014. Offering to schools.	until 2019 or more	DTNS	Playcount of the film	3,500
D13-Scientific papers	scientists, bat and moth experts	Two more articles in professional journals - scientific argumentation for limiting light pollution.	until 2015 or more	UNI	No. of citations in the following years	6,400
D14-Conference presentations	scientists, bat and moth experts	Participation on 3 international expert events in the field of biology (2) and light pollution (1).	until 2015 or more	DTNS, UNI	Response from the audience.	3,700
D17-Diploma thesis	University students, scientists, bat experts	Two master thesis on the effects of artificial lighting on bats.	by the end of 2014	UNI	Master thesis defended	0
D18-International bat night (IBN)	local residents, visitors	Awareness raising in the IBN events.	every year in Sept.	SDPVN	No. of events and participants	0
D18-European moth nights (EMN)	local residents, visitors	Awareness raising in the ENM events.	every year	DPOMS	No. of events and participants	0
D20-Layman's Report	partners, general public	Information about the project.	until 2019 or more	all partners	No. of copies	0
D22-Cooperation with UNESCO	UNESCO, ICOMOS, IUCN	Promotion of recommendations on the international level.	until 2017 or more	DTNS	No. of meetings, correspondence, presentations	4,500



LIFE AT NIGHT

www.lifeatnight.si



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