Action Plan for

Astrotourism development and for

Light Pollution Prevention

PROJECT: NIGHT LIGHT	
Partner organisation concerned:	Basilicata Region
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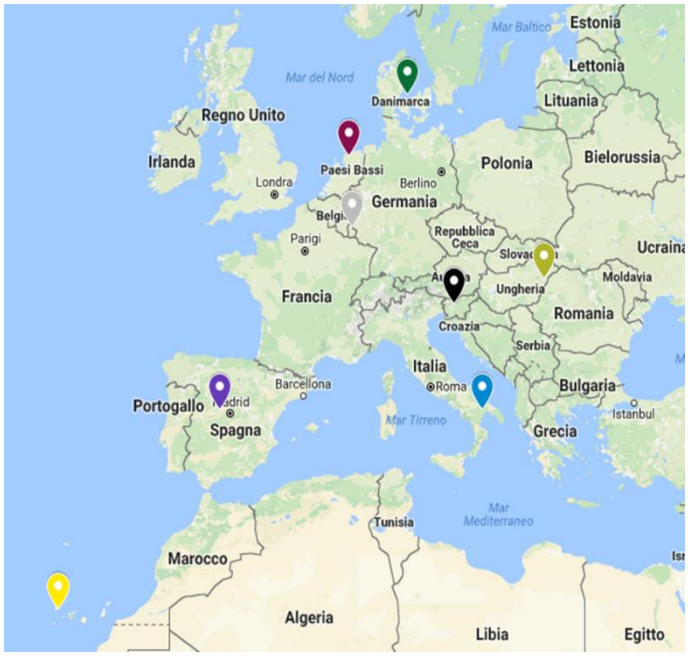


Lead Partner

Province of Fryslan (Olanda)

Partner

- Regione Basilicata
- Fondazione Matera- Basilicata 2019
- HajdúBihar County Government (UH)
- Avila County Council (ES)
- La Palma, Island Government (ES)
- Nature Park Our (LUX)
- Samsø Energy Academy (DK)
- BSC, Business support centre Ltd., Kranj (SLV)

Circadian Rhythms

https://www.angelini.it/wps/wcm/connect/it/home/patologie-e-cure/ansia-e-depressione/speciali/sonno-sogno/ritmi-circadiani

The human organism is characterized by daily working rhythms. These are the circadian rhythms (from the Latin dies which means day) or day-night, which consist of cyclical variations of human biological activities. Virtually all of our body's functioning is influenced by these cycles; blood pressure, fatigue resistance, muscle tone, body temperature, heart rate, kidney function, some endocrine functions, etc.

Surely the most influenced operating parameter is the sleep-wake rhythm. There are notable individual differences that make it possible to make a distinction, based on the moment of greatest efficiency, between "morning" and "evening" people.

Circadian rhythms can be offset by particular events such as changing time zones or a night job. Scholars have wondered if this sort of internal clock is regulated by exogenous factors (external, such as the alternation of day and night) or endogenous (internal). To answer this question, the subjects were placed in a closed environment without changes in light and temperature and, of course, without clocks. In one of these experiments, after 40 days it was observed that a rhythmic trend had been maintained, but that this rhythm had slowed down from 24.5 hours to 46. Thus, in the absence of external indicators, the subjective time slows down. It is however interesting, that the subjects returned to daily life and to all its time indicators rapidly (about 3 days) and even returned to the usual circadian rhythms.

The Basilicata Region participates in the Night Life Programme, to study and verify good practices, to contain and reduce light pollution in order to improve the health of its citizens. In addition, to develop astrotourism and tourism in general, and finally to reduce and optimize electricity consumption.

Participation in the INTERREG NIGHT LIGHT project was commissioned by the Basilicata Region and the Fondazione Matera 2019.

During the implementation of the project, other local partners were involved and others will be involved.

The realization of the Action Plan and the development of the guidelines are attested to the Department of Finance and Planning of the Basilicata Region in collaboration with the Fondazione Matera 2019.

The drafting of the Action Plan and the development of the guidelines takes into account the experiences of 4 good practices identified among project partners:

- ✓ Good Practice Avila: Astro-tourism/dark sky tourism;
- ✓ Good Practice Samsoe Energy Academy: A dark sky island;
- ✓ Good Practice The Netherlands: Public awareness and engagement on light pollution and dark skies;
- ✓ Good Practice La Palma Island Government: Astro-tourism/dark sky tourism Pubic awareness and engagement on light pollution and dark skies;

Good Practice Avila: Astro-tourism/dark sky tourism.

It was very interesting to learn about the experience of Avila Council during the Peer Review Meeting held in Avila in astro-tourism policies as well as to know the uniqueness of all the area of Castilla y Leon, especially the Gredos Park for the development of a sustainable astro-tourism projects. There are many similarities we would like to develop in our Region (developing a set of pilot activities in the regional parks in order to highlight the environmental value and to protect the darkness of those sites), thus their long-lasting experience is really important for us to learn how to move forward.

In addition, the experience and the extremely interesting approach of the Avila Council is a very crucial reference to us, since they are having a very interesting approach which connects cultural, touristic activities and topics with the improvement and implementation of regional and national policies.

Good Practice Samsoe Energy Academy: A dark sky island

We attended the Peer Review Meeting in Samso, May 13-17, the experience during the Peer Review Meeting in Samso, from 13 to 17 May, was quite interesting especially concerning sustainability policies.

Good Practice The Netherlands: public awareness and engagement on light pollution and dark skies.

It was a rare experience to find an undisturbed night darkness and a starry sky in an urbanized context of this country. The presence of the "dark sky" and the true darkness with silence, tranquility and expanse is one of the ecological values of the Wadden Sea World Heritage Site

Good Practice La Palma Island Government: Astro-tourism/dark sky tourism Pubic awareness and engagement on light pollution and dark skies

The lesson learned through the interesting experience lived in La Palma during Meeting on La Palma 19-21 November was important. The entire island is organized against light pollution. The starry sky, like all the other beauties of this island, is an example of protection from light pollution.

Through the consolidation of the product of astrotourism that requires the constancy and development of activities and local people's interest, it is possible to develop the same model even some areas of Basilicata could be proposed as "astro-tourist" areas.

The Action Plan is based on 4 guidelines:

- ✓ Collection and dissemination of information on light pollution;
- ✓ Sharing of the plan and lines of action with the stakeholders;
- ✓ Actions and possible penalties for those who do not comply with the legislation;
- ✓ Environmental responsibility.

The Basilicata Region, in the preparation of the proposal for the ERDF 2021/2027 Operational Program, aims to contemplate an Axis implementing OP2 - "A greener Europe" of the 2021/2027 programming, envisaging actions consistent with the specific objective (OS) B.1. "Promoting energy efficiency measures". Among the selection criteria of the actions related to the aforementioned O.S. B1., the Basilicata Region intends to contemplate the reduction of light abatement.

In this regard, as known, OP 2 "A greener Europe" of the 2021/2027 programming foresees the following "enabling conditions", as well as the presence of a "Strategic political framework to support the renovation of residential and non-residential buildings for energy efficiency purposes ". At this purpose, in the planning documents of regional competence connected to this "conditionality", relevance will begiven to the issue of lighting abatement.

Moreover, the Basilicata Region intends to dedicate an Axis of the ERDF 2021/2027 to territorial policies in line with the OP5 - "A Europe closer to citizens" in order to develop the themes of urban and territorial development strategies, therein including actions in favor of culture (cultural heritage and landscape). Ever within this axis, where relevant, the Basilicata Region intends to contemplate the reduction of light abatement among the selection criteria of the actions.

CONTENTS

INTRODUCTION

Basilicata is one of the few Italian regions that still has a dark sky, and it is important to contain and reduce light pollution to protect the environment and create a further opportunity for the development of "astroturism" tourism. Of equal importance is the development of scientific activities linked to earth observation. Basilicata has one of the most important national centres and two important sky observatories.
Therefore preserving and further reducing light pollution in the Region is in the interest of the general public .

Consequently, facing and reducing light pollution to improve the quality of the observation of night skies brings benefits to public health, biodiversity and energy efficiency; furthermore, if properly promoted and organized, it could lead to significant economic and social benefits deriving from astroturism, a new form of tourism that has been developing rapidly in recent years.

It is important that the bodies in charge, interested stakeholders and populations are adequately informed of the value of an environmental heritage that we have available of which we are not aware, and of how much this heritage can be useful for the development of tourism in general. Not only of astroturism, for the protection of the environment and biodiversity, with reference to the migrations of birds and animals in general, but above all to the health of the human species.

This action plan is formulated to improve the control of light pollution and to ensure compliance with existing regulations and those that will be issued later.

The general requirements of this plan are:

• promote the development of eco-civilization;

• focus on improving the quality of the light environment;

• give importance to the conservation of the resource;

• give equal importance to the conservation of the resource and the development of policies to develop it.

The development strategy of the plan will be linked not only to the development of astrotourism, but to the conservation and reduction of light pollution; to the attention to the health of citizens; to energy saving and security, through modern methods of scientific management and remote control in all areas and municipalities of the Region.
In the plan we propose a more rigorous environmental protection system and we propose to develop a social responsibility system. We will ask, in meetings with regional stakeholders, that citizens are informed and involved, with appropriate communication actions and through calls for tenders and support for businesses and citizens.

The natural night sky is a common and universal heritage, but it is being lost and is unknown to many, mainly due to uncontrolled external lighting that hides the stars and galaxies otherwise visible to our eyes.

Without considering the simple wonder and inspiration that the beauty of night skies can instill, there are other important social, economic and cultural reasons that underlie the need to create environments that favour the vision of night skies in all their beauty.

Light pollution has a negative impact on human health and biodiversity conservation.

Negative impact of light pollution:

Health

The rhythms of the natural light-dark cycle of day and night are vital to human health. Yet few people, especially those living in urban and peri-urban areas, rarely manage to experience truly dark nights.

Scientific studies suggest that artificial night light can increase the risks of obesity, depression, sleep disorders, diabetes, breast cancer.

In particular, exposure to blue light at night is particularly harmful, as it inhibits the secretion of melatonin, a hormone that influences circadian rhythms and our daily rhythms. This light is emitted in particular by most LEDs used for external lighting.

The International Dark Sky Association (IDA), with various researches and numerous articles on visibility, environment and astronomical issues associated with external lighting and a recent report by the American Medical Association (AMA) have illustrated in detail, the associated health threats of exposure to sources of white light, rich in blue.

The IDA affirms that external lighting shielded effectively and through adaptive controls to dim or turn off the light and limit the correlated color temperature (CCT) of outdoor lighting to 3000 Kelvin (K) or lower limits, can solve the problem.

Wildlife and ecosystem

There is now a great deal of scientific evidence indicating the harmful effects that artificial light at night has on many animal species including amphibians, birds, mammals, insects and plants.

The 2016 AMA report:
https://www.google.com/search?client=safari&rls=en&q=4+http://darksky.org/wp-content/uploads/bsk-pdf-manager/AMA_Report_2016_60.pdf&ie=UTF-8&oe=UTF-8

indicates the damaging effects of intense blue LED lighting not only on humans, but also highlights the effects on other animal species of the interruption of circadian rhythms.

New research in 2017 showed the impact of LED lighting on the behaviour of animal species and the deleterious effects on food rhythms.

Crimes and security

The reduction of external lighting is sometimes mentioned as being responsible for an increase in crime, anti-social behavior and reduced road safety. Therefore, outdoor lighting at night is often intended to improve safety and security, however its excessive use and/or mismanagement can actually have the opposite effect. A glaring light can negatively affect visibility. In fact, the dazzling of pupils from bright and unshielded lights affects the ability to see, making it more difficult to adapt to low light conditions and thus reduces safety.

Negative impact on energy costs and carbon emissions

Badly designed and / or misdirected light, which shines in the sky instead of on the ground or on the object to be illuminated, contributes to the "glow of the sky", the orange haze that many of us see, rather than the dark sky and stars, is the effect of light pollution which negatively affects our ability to see the dark sky, but it is extremely expensive from the energy point of view, thus unnecessarily increasing costs and also contributing to carbon emissions and ultimately, global warming.

Positive impact of the dark sky

Reducing light pollution, as well as mitigating the negative impacts previously seen, with the concomitant benefits for society and the environment and unpolluted night skies ; produces an increase in the so-called astro-tourism, with the consequent financial effects.

Northumberland, after its designation as Europe's largest Dark Sky Park, (in the link you can see the section and the documents that the park dedicated to the topic, https://www.visitnorthumberland.com/darkskies), has increased the number of hotels in the area. This has resulted in the relative increase in the volume of business, with tourists coming mainly from the most populated urban areas, eager to see the wonders of the night sky.

It is a fairly widespread phenomenon. In an area where it is possible to observe the sky and with appropriate publicity, there is an increase of tourism.

In Italy there is national legislation that takes into account the guidelines of the European Commission and is quite detailed and stringent.

National Legislative Framework

In the definition of CAM (Minimum Environmental Criteria) which is the document that establishes the rules to avoid light pollution and to save energy, particular attention was given to the following national and European standards:

- Legislative Decree 50/2016 of 18 April 2016 on “Implementation of the 2014/23 / EU, 2014/24 / EU and 2014/25 / EU directives on the awarding of concession contracts, on public tenders and on the procedures for procurement by providers in the water, energy, transport and postal services sectors, as well as for the reorganization of the regulations in force on public contracts "(GU n. 91 of 19 April 2016);

- Legislative Decree 201/2007 "Implementation of Directive 2005/32 /EC concerning the establishment of a framework for the development of eco-compatible design specifications for energy-using products";
- EU Regulation No. 1194/2012 "laying down rules for the application of Directive 2009/125 / EC of the European Parliament and of the Council regarding the specifications for the eco-compatible design of directional lamps, lamps with light-emitting diodes and relevant equipment";
- Regulation (EC) No. 245/2009 laying down the procedures for the implementation of Directive 2005/32 / EC of the European Parliament and of the Council or as regards the specifications for the eco-compatible design of fluorescent lamps without integrated power supply, high intensity discharge lamps and of power supplies and lighting equipment capable of operating these lamps, and repealing Directive 2000/55 / EC of the European Parliament and of the Council, as amended by Regulation (EC) No. 347/2010;
- Directive 2011/65 / EU of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (ROHS Restriction of Hazardous Substances in Electrical and Electronic);
- Directive 2012/19 / EU of 4 July 2012 on waste electrical and electronic equipment (WEEE);
- Legislative Decree 49/2014 of 14 March 2014 "Implementation of Directive 2012/19 / EU on waste electrical and electronic equipment (WEEE)";
- Legislative Decree 151/2005 of 25 July 2005 "Implementation of the directives 2002/95 / CE, 2002/96 / CE and 2003/108 / CE, concerning the reduction of the use of dangerous substances in electrical and electronic equipment, as well as waste disposal ";
- Legislative Decree 152/2006 dated 3/4/2006 Environmental regulations, Part Three - Rules on waste management and remediation of polluted sites;
- Legislative Decree 188/2008 of 20 November 2008 "Implementation of Directive 2006/66 / EC concerning batteries, accumulators and related waste and repealing Directive 91/157 / EEC";
- UNI 11248 "Street lighting";
- UNI EN 13201 "Street lighting - Parts 2, 3, 4, 5.

Regional Legislative Framework

- Regional Law 10 April 2000, n. 41 - Light pollution and preservation of transparency and atmospheric stability of the sites for the location of astronomical stations;
- Regional law proposal n. 126/2017 - "Rules for limiting light pollution, energy saving in outdoor lighting and protecting the environment and the activity carried out by astronomical observatories".

ERDF Operational Program Basilicata 2014/2020

ERDF Basilicata 2014/2020 - Thematic objective 6: Environment and resource efficiency. In particular, priority 6C.6.6 (section 5) of the Operational Program sets the goal of improving parks and natural landscapes and improving ecotourism and innovative models of tourism development in the Basilicata Region.

Below is a list of municipalities in Basilicata, which is neither exhaustive nor certain, which have complied with the national legislation, which however must be monitored for the purposes of this Action Plan:

PROVINCE OF POTENZA

Armento, Filiano, Ruoti, Pietragalla, Bella, Ginestra, Ripacandida, Picerno, Maratea, Sasso Di Castalda, Marsico Nuovo, Sarconi, Paterno, Satriano di Lucania, Muro Lucano, Trivigno, Venosa;

PROVINCE OF MATERA

Calciano, Accettura, Montemurro, Pomarico, Montescaglioso, Colobraro, Stigliano, Grassano, Bernalda

Most of the remaining municipalities of Basilicata have implemented energy efficiency measures (2009-2015) with the conversion of technology from Vapori di Mercurio to SAP and with centralized flow regulators. The SAP installed lithning devices are mostly semi-cut-off optics, so they have, even if low, a light emission towards the sky.

Many municipalities have replaced 5% - 10% of their lamps with the installation of LED technology;

Numerous municipalities are in the process of evaluating proposals to adapt their facilities to national legislation.

The Basilicata Region with Regional Council Resolution n. 1257 of 24 November 2017 to apply to the priority sector "ENERGY AND DIVERSIFICATION OF ENERGY SOURCES" the strategic.

Intervention "ENERGY EFFICIENCY PUBLIC STRUCTURES AND INFRASTRUCTURES" has identified the resources to implement: Ca.P.I.Bas. - Basilicata Public Lightning Cadastre.

Source or inspiration from the project (initiative/activity or good practice that inspired this action)	Action	Sub-actions (if any)	Relevance (how the action contributes to improve the policy instrument(s) addressed)	Stakeholders involved	Costs	Financing sources	Timeframe*
May 2019 - Peer review Samsoe -13th -17th "Using lighting technology to reduce light pollution"	Axis 4 – (Thematic Objective 4) Energy and Urban Mobility- Promotion of renewable energy source, increase in sustainable mobility in urban areas.	Incentives aimed to the reduction of energy consumption though the energy efficiency	New projects funded through ERDF 2014-2020 aimed to reduce energy consumption also through the introduction of led technologies	Municipalities	€ 6.000.000,00	ERDF 2014-2020	31.12.2020
May 2019 - Peer review Samsoe -13th -17th "Using lighting technology to reduce light pollution"	Thematic Objective 4) Energy and Urban Mobility- Promotion of renewable energy source, increase in urban areas.	Promotion of technological solutions to reduce energy consumption of public lighting	New projects funded through ERDF 2014-2020 to promote the adoption of automatic regulation systems(e.g. light sensors, remote control and management system operating in the energy network) to monitor and reduce public lighting consumption	Municipalities	€1.500.000,00	ERDF 2014-2020	31.12.2020

12th -15th March 2019 – Policy learning seminar Matera/Basilicata	Measure 6 "Promotion of farms and enterprises	Sub 6.4.2 "Support for economic activities related to tourism and agriculture"	New project funded through Rural Development Program (PSR) 2014-2020 aimed to the introduction of innovative technologies for energy saving, light pollution reduction and promotion of renewable energy sources	Farmers and agricultural enterpreneurs	€10.000.000,00	(Rural Development Program) Psr 2014-2020	31.12.2020

*The action should be implemented within 2023

The Basilicata Region, through the interregional learning within the NIGHT LIGHT project, has identified the following actions to increase its public commitment to the prevention of light pollution and the protection of dark skies, aiming at energy efficiency through the reduction of consumption and introduction of energy technologies of the latest generation, also creating new opportunities for eco-tourism services such as astrotourism.

With regard to the reduction of light pollution through the efficiency of lighting quality, in the frame of **Axis 4 "Energy and urban mobility", ERDF 2014-2020**, the specific actions are the following:

- Promotion of eco-efficiency and reduction of primary energy consumption in buildings and public facilities: renovation of individual buildings or building complexes, installation of intelligent remote control systems, regulation, management, monitoring and optimization of energy consumption (smart buildings) and pollutant emissions also through the use of technological mix
Total budget : € 1.5000.000,00.

Stakeholders: Minicipalities

Timeframe: 2020.

(The action should be implemented within 2023)

-Promotion of technological solutions to reduce the energy consumption through energy efficiency- also through the introduction of led technologies.

Total budget: € 6.000.000,00

Stakeholders: Minicipalities

Timeframe: 31.12.2020

(The action should be implemented within 2023)

A strong interest was expressed by Società Energetica Lucana, (the Energy Society in Basilicata, Centro di Geodesia Spaziale-ASI- (the Space Geodesy Center) located in Matera and the Astronomical Observatory of Anzi. The Municipality of Castelgrande has shown a strong and vivid interest to all activities and meetings; its area in fact hosts an astronomical observatory with two telescopes.

The above actions have been influenced by the May 2019 meeting (13-19) which followed the peer review held in Samso, on 6-7-8 June 2017 during phase 1 of the Night Light project.

The experience of Samsŭ Energy, useful for the Basilicata Region to implement and define its action plan, brought to the work table the results of the acticities done to switch to LED lighting in all outdoor lighting infrastructure. The experience of Samso has been a source of inspiration to reflect on new technologies to be used to improve and/or replace public street lighting systems and that of public buildings, exemplary experience to raise awareness of municipalities and enterprises of our territory.

The Basilicata Region is located in the southern part of Italy: a large part of its territory is recognized as a natural park and this is a fundamental resource for its development.

Four officially recognized natural parks, which cover a large part of the territory of Basilicata, host a rare biodiversity characterized, among other things, by habitats of different species of migratory birds. The population is concentrated in the cities of Matera and Potenza and smaller cities. The city of Matera borders directly with one of these parks, the Park of Materano. Basilicata is one of the most "dark" regions in Italy (http://www.lightpollutionmap.info/) but the quality of light and the distribution of light collide with the biodiversity and the values of nature of parks, especially where cities (such as Matera) and the settlements border the natural areas.

The values of light pollition are very different throughout the region: in any case, the main problem related to light pollution is not represented by the high brightness values, but rather by the quality and distribution of light that constantly deplete natural darkness (the dark sky), impacting negatively on the need to preserve biodiversity and the natural peculiarities of a region that boasts a great environmental heritage.

Shared guilidelines have also benn developed with regional stakeholders in order to set general guidance regarding factors to be considered to implement facilities that contribute to improve public ealth, astrotourism's development and energy consumption's reduction, thus reduction of light pollution too.

ASTROTURISM

The synergic action of the regional working group Night Light, in the framework of dissemination's actions to stakeholders, with the Manager responsible for the Measure 6-Sub-Measure 6.4- Rural Development Programme (RDP) Basilicata Region 2014-2020 made it possible to evaluate positively the implementation of an action aimed to enhance atrotourism with the cooperation of farms.

At the meeting of Matera on 13 March 2019, the idea of planning and financing actions for astrotourism, promoting the value of the dark sky, was strengthened, also thanks to debate and the exchange of practices with the project's partners and stakeholders.

This planning idea was then realized through the drafting of the action aimed to introduce innovative technologies to fight light pollution:

"Support to the costitution and development of multi-functional farms and farmhouses "which also provides for the financing of interventions for the functional recovery of agritourism companies through the use of innovative technologies to save energy and interventions to introduce innovative technologies reducing light pollution" - Measure 6-Sub-Measure 6.4- Rural Development Programme (RDP) Basilicata Region 2014-2020

The involved stakeholders have been all the regional partners of the project Night Light, attending themeeting hold in Matera on 13 March 2019 in addition to farmers, holiday farms, agrotouristic farms, rural entrepreneurs, astrotouristic associations.

Total budget: € 10.000.000,00

Financing source: ERDF 2014-2020

Timeframe: 2020.

(The action should be implemented within 2023)

Goals and Recommendations:

With the next community programming, and on the basis of the experience gained with this project, the Basilicata Region wants to set the following objectives:

• Savings on energy costs;

• Promotion and increase of astrotourism;

• Requalification and safety measures for lighting systems;

• Reduction of maintenance costs;

• Improvement of visual comfort;

• Improvement of social and road safety;

• Positive impact on the environment (reduction of CO2 emissions, protection of the sky, nocturnal animals and biodiversity);

Consistent with the UNESCO Declaration (United Nations Educational, Scientific and Cultural Organization) on the Responsibilities of Future Generations adopted by the General Conference on 12/11/1997, which states that future Generations have the right to inherit a Land in which the present generations should act for sustainable development while preserving the conditions of life and the quality and integrity of the environment, avoiding pollution that would risk endangering their health and existence;

In line with the definition of Light Pollution (Light pollution) given in the International Workshop and Expert meeting "Starlight Reserves and World Heritage, scientific, cultural and environmental values" organized in collaboration with UNESCO in March 2009 in Spain which defines the alteration of the natural level of night light due to artificial light;

We will improve the quality of lighting systems in the region, with a strong impetus on adopting new lighting systems, in the municipalities that have not yet done so, which comply with criteria aimed at energy saving and the reduction of light pollution;

We will promote a new and interesting form of tourism: astroturism

We will promote an important form of energy saving, linked to external lighting, as a key tool for preserving non-renewable energy sources. limiting the emission of polluting and climate-altering lights, deriving from the combustion processes necessary for energy production , will protect the environment from light pollution.

It has now been shown that this kind of pollution has negative effects on human health (as it alters the circadian rhythm, has negative effects on the circulatory system, on the nervous system and on the production of

important hormones such as melatonin - the main regulator of sleep/waking rhythm - or cortisol - natural protector of our organism from tumors) but also and above all on the life of nocturnal animals and plants.

Main indicators that the Basilicata Region will adopt:

- Number of redeveloped lighting systems;
- Percentage of reduction of energy costs;
- Percentage of reduction of maintenance costs;
- Percentage of reduction in the number of night-time traffic accidents.

Taking into account all the above and to implement the action plan, we propose to pay attention to the following points:

RECOMMENDATION 1

Promote and support the registration to the International Dark sky Association, IDA, as Dark Sky Community by the parks present in the Region.

RECOMMENDATION 2

In order to request the status of Dark Sky Community (or Park), the Basilicata Region will have to establish a regular monitoring programme for the night sky; develop a plan for the progressive reduction of lighting that seeks to reduce and/or minimize light pollution and promote a plan for dissemination/education/training and awareness of local communities.

RECOMMENDATION 3

The development of a regional lighting plan must be carried out through the mapping of the municipalities, probably with the ENEA that is dealing with it at national level and could/should be developed by the SEL, in accordance with the institutive regional law of the company.

RECOMMENDATION 4

Create, in the coming years, a series of events and activities to raise awareness about light pollution and the need to reduce it, based on the experiences of the activities and the events undertaken within this project.

RECOMMENDATION 5

Use the guide IDA, https://www.darksky.org/wp-content/uploads/2018/12/IDSP-Guidelines-2018.pdf to present the request for Dark Sky Community or Park status.

RECOMMENDATION 6

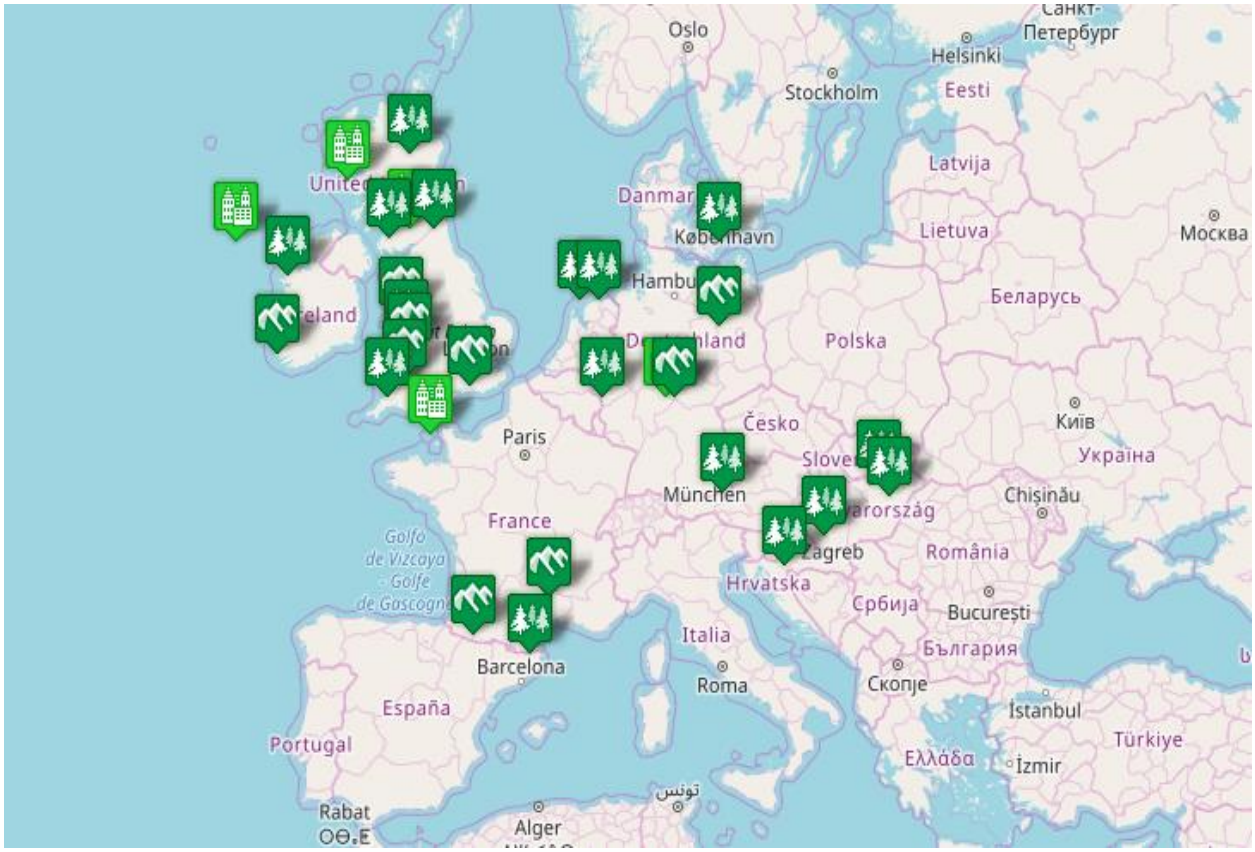
If necessary, the Region can modify the plan and the guidelines to support any additional requests to the plan.

RECOMMENDATION 7

Identify the political and administrative leaders, who support and recognize the benefits of the Dark Sky and who must act as supporters, and contribute to advancing the action plan.

RECOMMENDATION 8

- Encourage and help tourism-related businesses to develop and improve their performance, structures, sustainability and relationships;
- Encourage companies to reach, maintain and promote high quality standards;
- Encourage and recognize good sustainability practices among businesses.



Map of the dark sky sites in Europe

ACTIONS

1. Analysis and control of light pollution sources.

Strengthen the prevention and control of light pollution and energy saving. We will help public bodies and companies, with particular reference to those operating in rural areas and above all in parks, to equip themselves with lighting systems that favour environmental protection and energy saving. With the next community programming, rules and calls for support will be issued for all public and private operators who will have to comply with the laws and regulations on the control of light pollution and energy saving, launched by the Region and the state . (The activity will be delegated to the Department of the Environment, in collaboration with the Department of Industry and the Department of Agriculture. The actions must be monitored and implemented by the municipalities).

Start of a special programme in the municipalities of Potenza and Matera, with particular regard to the area in which the Centre for Space Geodesy is located, and to the Municipalities of Castelgrande and Anzi, paying particular attention to the needs of the areas where the observatories are located. In the Municipality of Aliano, the needs in relation to the light in the ravines and on the regional industrial areas. Around the Centre for Space Geodesy and the observatories, the buffer zones within which the lighting will have to be contained will be brought from the current 800 meters to 10 km and the law enforcement officers will be identified and sanctions will be established for those who do not respect it (The coordination of the activities is entrusted to the Department of the Environment, in collaboration with the Department of Industry, the Department of Agriculture. Local law enforcement officers will be responsible for compliance with the rules established by the programme).

The project requires the identification of one or more subjects that, at the request of the Public Bodies, performs the following interventions:

1. Analysis of existing lighting installation and development of new lighting systems with particular attention to sustainability. (ENERGY AUDIT);

2. Financing the intervention, light is an investment for the future. (FINANCING - also evaluating ESCO interventions and helping municipalities to interpret contracts if necessary);

3. Combine financing with additional services such as maintenance, disposal of disused facilities etc. (CONTRACTOR);

4. Support for lighting design with lighting equipment, Lightning Management System and verification measures. (DESIGN);

5. Management services such as remote monitoring, maintenance or content management.

For each intervention the phases are as follows:

1) Potential estimate of the reduction of light pollution and energy saving:

• On-site inspection;

• Detection of lamps and lighting equipment;

• Evaluation of the investment;

2) Evaluation:

• Investment;

• Amortization;

• Calculation of light pollution reduction and energy saving.

3) Analysis:

• Analysis of the existing brightness;

• Recording of lamp life and type;

• Planning of light and type of equipment;

• Calculation of: - Savings - Investment - Amortization.

4) Choice of the type of lighting in the areas concerned:

• Development of lighting solutions in the selected area;

• Considerations on Light Management Systems;

• Lighting solutions including Lightining Management System;

5) Recycling and disposal:

• Dismantling of current lighting systems;

• Complete disposal of the old system;

• Disposal based on national rules.

6) Installation:

• Installation of new lamps and lighting equipment.

• Considerations of the hours needed to complete the operation.

• Complete installation of new lighting systems including Lightning Management System.

Savings could partially or totally cover financing costs, in compliance with budget constraints for public bodies, and the following advantages would be obtained:

- The high operating costs (energy /maintenance) of obsolete installations would be reduced through the use of new technologies in luminaires and lighting management systems that guarantee the reduction of light pollution;
- The financing of the new lighting systems would take place through energy saving;
- Liquidity not necessary and available from the beginning;
- Massive savings after the contract period;
- No capital expenditure;
- No investment in evaluation and design activites etc.

2) Strengthen the adoption of energy saving systems and the reduction of light pollution and the modernization of transport networks.

We will accelerate the development and upgrading of lighting systems that allow energy savings and the reduction of light pollution. By the end of 2022, the new regional law must be approved which regulates public and private lighting in areas of public interest, such as those in parks or near observatories. (This activity is the responsibility of the Presidency and is entrusted to the Department of Finance and Planning).

We will ask the National Electricity Transport Authority (TERNA) to monitor and maintain the networks that cross and affect our region. Where possible we will ask for the pylons to be removed and for all cables to be buried (the activity will be delegated to the Department of the Environment).

(3) Prevent and reduce light pollution in agricultural-rural areas and promote energy savings. All the population living in the Park areas will be made aware and informed about the advantages deriving from the use of policies aimed at saving energy and reducing light pollution. The Park areas of the Region will be constantly monitored, in order to promote, through the reduction of light pollution, biodiversity and a favourable environment for resident species and migratory species that cross our territory during their movements. (The activity will be delegated to the department of the environment).

(4) Strengthen control actions for compliance with legislation on the reduction of light pollution. Awareness-raising activities will be carried out by local law enforcement officers responsible for monitoring compliance with the rules established by regional law and national laws. (The activity will be delegated to the department of the environment).

2. Replacement and renovation of existing systems, an opportunity for new economic activities.

(1) Adaptation and replacement of existing plants.

In many cases not in accordance with the law, they also represent a new opportunity to create jobs and develop new technologies for monitoring, control, assembly and maintenance of the plants. With the approval of the new regional law, all the municipalities will be obliged to carry out an analysis of the existing plants and to comply with the legislation required by regional and national law. A control, monitoring and sanction system will be established to comply with the law (the activity will be delegated to the Department of the Environment).

(2) Optimization of territorial planning.

The Region, taking into account the existing data, will raise awareness and encourage the municipalities, other public bodies and companies that contribute most to the waste of electricity and light pollution, especially in areas that are particularly polluted and above all in proximity of parks and observatories.

(3) Adjustment of the industrial structure.

The gradual elimination of existing outdated plants requires technical and financial analysis and monitoring services, supply of plants and equipment in accordance with the law, disposal services for obsolete plants. These are all job opportunities the industrial structure and services of the region, (with particular reference to the university structure), will be adequately informed about.
(This initiative is entrusted to the productive activities department of the region).

3. Strengthen the actions for the conservation and protection from light pollution in rural areas.

1) Control of the total amount of energy used in the region by public bodies.

We will implement rigorous management of energy resources and develop a system for measuring the total amount of energy use. We will promote the adoption of green systems for electricity production. We will formulate a list of institutions that must be carefully monitored.

2) Improvement of energy efficiency.

We will establish energy efficiency rating systems, such as the amount of energy used per square kilometer and how much energy comes from green production plants. In order to support public administrations and private individuals, documents and information material will be prepared.

3) Protection of energy resources in a scientific way.

We will optimize the evaluation system on the reduction of light pollution and energy saving. We will improve the supervision and management of the Park areas and evaluate the energy dispersion of the

transport systems. We will improve the management of energy dispatching (the activity will be entrusted to the Environment Department.)

4. Strengthen scientific and technological support for companies operating in the region.

(1) Promote the use of appropriate technologies. We will accelerate and promote the application of appropriate technologies, in particular the securing of existing plants and their restoration, if they are already partly adapted to the existing regulations. We will start an environmental technology assessment system, we will start developing a platform for sharing environmentally friendly technologies and promote the use of the results obtained from monitoring. We will give a central role to companies that want to participate in the development of these technologies, we will encourage companies to establish strategic alliances for technological innovation with scientific institutions and universities and for the dissemination of advanced technologies for reducing light emissions and clean energy production. (The activity will be entrusted to the Production Activities Department.)

(2) Research and development of advanced technologies. In the region there are important research centres that could support the identification and development of technological resources and relevant regional technological plans (special projects or funds) to develop technologies for detecting light pollution and energy savings.
We will strengthen international cooperation on reducing light pollution and saving energy. (The activity will be entrusted to the Productive Activities Department).

(3) Initiatives taken to develop the environmental protection industry. We will regulate the environmental protection industry market through the coordination of the various departments concerned. We will coordinate laws, regulations and rules regarding market entry and company standards and we will abolish behaviours that prevent the development of a uniform market and hinder fair competition. We will improve management measures and technical standards in the areas of engineering design, construction and operation, promote advanced energy saving technologies, pollution treatment and restoration and facilitate the marketing of equipment.

We will accelerate the development of the business of environmental protection services. We will clarify the duties and obligations of regional departments and environmental protection service providers and will optimize the mechanisms for sharing risks and guaranteeing performance. We will encourage a general contract model that includes system design, complete equipment supply, construction, commissioning, maintenance and management, and will develop a financial model that enables the use of public / private capital. Activities concerning the disposal of obsolete plants will not be overlooked (The coordination of these activities will be delegated to the Department of the environment.)

5. Compliance with market mechanisms.

(1) Promote project financing and private capital investments.

We will actively promote the use of private capital, through the Energy Saving Companies and the establishment of guarantee funds for the financing of energy saving and light pollution reduction plants.

We will adopt various measures such as the drafting of contracts for the provision of development and management services to encourage private capital investments aimed at saving energy and reducing light pollution. (This initiative is entrusted to the Department of Productive Activities which will make use of the collaboration of SVILUPPO BASILICATA.).

(2) Increase of public investment.
The various regional departments will be involved, to ensure that the issuing of calls for support in support of public and private activities, pay attention to the inclusion of clauses and scores, that allow the support of projects to protect the luminous environment, in order to promote the reduction of light pollution, energy saving and astrotourism.

(3) Establishment of incentive mechanisms.
We will develop guides for public bodies and individuals for the conservation and protection of the luminous environment.

6. Elaboration and implementation of the legislation on the reduction of light pollution and the promotion of astroturism and the observation of stars.

(1) Development of rules and regulations.

We need to improve the existing law and issue implementing regulations. We will amend the existing law to reduce light pollution and energy consumption and to promote astroturism and tourism linked to the observation of stars.

The Region will have to be mapped. The activity could be entrusted to the CNR or ASI to identify the places and areas of interest, for example the observatories, the Matera agency, the park areas and for each of them the maximum possible pollution level and the buffer zones, of at least 10 km, which must be monitored to allow scientific and tourist activities.

Standards to be respected and the regulations on polluting emissions in the treatment of light pollution will be established. We should also establish indicators on the specific emission limit value of light pollution of the main industries and industrial areas.

(2) Improve supervision and regulation.

We should improve the monitoring mechanism and keep the most sensitive areas under constant control, with the task of providing monthly data on light pollution and signalling activities that put regional heritage at risk. (The activity will be entrusted to the environment department).

7. Implant and implement a night lighting management system.

(1) Set up a system for managing environmental quality objectives.

After mapping the Region, we will have to establish the standard level that must be respected by local public bodies and businesses. In the areas where lighting quality does not meet standards, local authorities will have to draw up plans to meet the standards; in this activity they could be supported by the Società Energetica Lucana.

(2) Establishment of the pollutant emission observatory.

The monitoring system must include all lighting systems, including those of industries, industrial areas, urban and peri-urban areas, lighting systems on arterial roads and agricultural companies. The control must be rigorous in order to preserve the heritage and to prevent environmental and public health risks. We must implement prevention and control measures. local public bodies, at all levels, should develop and improve the plan to deal with light pollution emergencies. (The activity will be entrusted to the environment department).

8. Guarantee the safety of lighting systems and safeguard against light pollution.

(1) Ensure the safety of lighting sources.

We must ensure the safety of light pollution sources; all public administrations will have to take action to adapt the lighting systems to the safety standards defined at national level and to adapt to the light emission standards established by the Basilicata Region. All municipal lighting systems not in compliance with the law must be adapted to national and regional standards within four years of the programme being activated. The region will facilitate the construction, by public and private bodies, of clean energy generation plants. Promote environmentally friendly activities such as farmhouses and campsites that reduce lighting sources and organize / build special spaces and rooms for observing stars and nocturnal animals.

(2) Protection of the ecological system of the Natural Parks and around the observatories.
We should protect the environment in parks by reducing light pollution where it exists and we should set a deadline to restore the already polluted areas (a buffer zone for areas around observatories and points of interest).

We should improve the protection of wooded areas and wetlands (Pantano, Monticchio and San Giuliano lake) and river courses in order to favour the return of resident species and migratory species.

9. Define the responsibility of stakeholders.

(1) Reinforce the responsibility of the Region in protecting the luminous environment.

The Stakeholders are:

1. Ente Parco Chiese Rupestri del Materano;
2. Park of the Lucan Apennines;
3. APT Basilicata;
4. Municipalities included in the parks and not;
5. Astronomical observatories of Anzi and Castelgrande;
6. Space geodesy center / ASI;
7. Lucana Energy Society (SEL);
8. CNR;
9. University of Basilicata;
10. International Academy of Light in Matera;

- Identify the main annual tasks and objectives of each of the Stakeholders;

- Improve policies and measures aimed at reducing light pollution by issuing calls for proposals to increase the contribution of private capital;

- Regulate the treatment of pollution in urban, peri-urban and rural areas;

- Control and guarantee the completion of the objectives of all the parties involved;

- Strengthen coordination between different authorities;

- All public bodies should carry out self-inspection and be the first to fulfill their responsibilities to reduce pollution, emissions and prevent risks.

- The evaluation results will be used as a reference to allocate funds to treat and prevent pollution.

10. Strengthening public participation and social control.

(1) Make public the information about the environment.

On the website created with the NIGHT LIGHT project, which will continue to be used in the future as an information platform, a list of the 10 worst and the 10 best situations will be published.

(2) Strengthen public supervision.

Supervision of compliance with light pollution prevention regulations for public bodies and private individuals, will be entrusted to municipal police forces, and through appropriate dissemination actions we will invite people to participate in the application of environmental law on pollution of the bright environment.

(3) We should establish a participatory campaign framework.

The principle that "saving electricity and keeping the sky clean is everyone's responsibility" should be respected at all levels and by everybody.

CONCLUSIONS

We need to strengthen the dissemination and the education, such as the knowledge of light resources, the protection of the luminous environment and the conditions of the sky in our region, in the regional educational system, in order to make citizens more aware of the relationship between socio-economic development and conservation of the environment. Education campaigns to conserve water, soil, darkness and environmental education should be promoted in elementary and middle schools.

We should also support the work of environmental NGOs and volunteers. The new trend of "green consumption" should be encouraged and innovative public activities of eco-friendly communities, schools and families should be conducted.

We should also contribute to saving electricity by encouraging the purchase of ecological products.

Since the Region is experiencing rapid tourism development in all its forms, the prevention and treatment of light pollution has become a demanding task for the region. Local authorities should coordinate socio-economic development with environmental protection through concrete actions.

In particular, we should clarify within the law the responsibilities of local authorities according to the requirement that "the local authorities implement the measures while the regional departments regulate and strengthen the management of the sector".

Consequently, all the regional departments involved must carry out their respective tasks within a time frame compatible with the next regional programming. We need to clarify our priorities after a complete analysis;

We must take important measures to implement this plan in order to ensure the achievement of targets for the treatment and protection of the luminous environment and beyond.