

The Light Pollution Programme in Greece

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Abstract. The problem of light pollution exists almost everywhere, and is still growing rapidly. The preservation of the astronomical environment requires effective education. In this paper we present our educational programme, based in Greece and also including other countries. For full information see our web pages:

<http://www.uoi.gr/english/EPL/LP/lp.htm>

1. Introduction

The Greek “light pollution” educational programme has been arranged through the Greek Ministry of Education and Religion with support and finance from the EPEAEK Action III initiative. The two year programme has run from 1997 to 1999. The programme was a proposal of the Astrolaboratory of the Second Lyceum of the Arsakeio of Athens. Two schools were acting as partners in the programme, the EPL from Ioannina, Greece and the Grammar School of Manchester, UK.

It was the first time in Greece that almost all the scientific organizations related to a topic cooperated for an educational programme. To be more precise, this programme involved observatories (Athens, Crete), universities (Athens, Crete, Thessaloniki, Ioannina), environmental organizations (Sea Turtle, Mio), foundations (Eugenides, Goulandri), municipalities (Athens, Pireus, P. Faliro, Lemnos, Axioupoli, Ag. Nicolaos), lighting companies (Philips, Siemens, iGuzzini), and schools from all over the world (40 schools with 720 students)

2. Description of the Programme

Besides the three main partners, a great interest was expressed from other Greek and foreign schools. As a result in total 40 schools (32 from Greece and 8 from abroad) with 76 teachers and 720 students collaborated with us.

The programme’s purpose was:

- to familiarize students with the problems of light pollution through astronomy, physics and computer science
- to make students consider the cultural and social dimensions of the impact of light pollution, and

- to help students to appreciate the effects of light pollution on heritage and environment throughout their country.

In order for this programme to be effective, the students were divided into four groups, according to their preferences and abilities:

1. The Astronomical Group - which studied the astronomical dimension of the problem.
2. The Lighting Group - which studied the design of lighting, the different types of lamp and their effects on the problem.
3. The Social Group - which studied the social dimension of light pollution such as its effects on the ecosystem, the psychological dimension and the laws that must be enacted to minimise these problems.
4. The Public Relations Group - which consisted of members from the other groups. Their task was to inform the local authorities, media and society about the problem by organising special events. Their main target was to attempt to influence planning authorities to produce efficient and effective lighting schemes.

2.1. Structure of the Programme

The programme had three main parts. The first was related to the background knowledge that the students and teachers should learn and the activities they should be involved in. In the second part of the programme the participants communicated their activities and results to the local mayors and other authorities. In that way the programme was opened to the public and to the media, and thus given a different dimension. The third part consisted of meetings for the participants to get know each other, communicate their results, make presentations, and learn from experts. Exhibitions of photographs as examples of good and bad lighting were also held.

In order to accomplish all these, a very tight organization was needed. We thus established in 18 cities light pollution centres, whose main duties were:

- (a) to coordinate and inform the schools situated in their local area about the programme;
- (b) to inform and communicate about the light pollution problem with their local authorities, local environmental associations and scientific societies, and
- (c) to inform local media about the light pollution problem.

2.2. Students' Activities

Through the various activities that were part of the programme, we wanted our students and the general public to become familiar with the night sky. Additionally we wanted to increase awareness of the effects of light and air pollution and to attempt to influence planning authorities to produce efficient and effective lighting schemes. Well designed lights not only cut down light pollution but also save energy. The activities proposed were similar to those that have been run in other countries for a number of years: United Kingdom, Japan, United States and Canada. Student activities included:

1. A visual project, i.e. students reported which stars they could see in the Pleiades cluster and/or in a selected part of the constellation of Ursa Minor.
2. A photographic project, i.e. students took standardized photographs of the sky.

In addition, students were asked to take photos of good and bad lighting examples in their local area. After familiarizing themselves with the CIE zoning system, they were then asked to implement the system and check it within their local area.

3. Theoretical Framework

Contemporary teaching requires a connection with events in our everyday lives. This is very successfully provided by the UNESCO model for environmental studies. This model requires that each project should be placed in the following environment: natural, historical, social, and technological. The goal of this model is “the development of citizens/people with knowledge, sensitivity, imagination and an understanding of their relationship with their physical and human environment, ready to suggest solutions and participate in decision making and implementation”.

This model fits excellently with our light pollution project and so we followed it. In our case, the natural environment is provided by the night sky, or the loss of the night sky! The historical environment is provided by the historical activities, buildings and persons who were related to the night sky, e.g. the ancient Greeks. The social environment is provided by the social activities concerned with communication of the problem to the local authorities, the media and professionals. The technological environment is provided by the means that students use in order to communicate, get information, etc. These means are mainly computers and the world wide web. Use of technology in the classroom can foster an environment that more closely reflects the methods scientists use in doing research.

4. Key Elements of our Programme

(a) Meetings

During the programme four meetings have been held: one in Manchester, two in Athens and one in Agios Nicolaos of Crete, Greece. All these meetings were successful and were attended in total by 500 students and 30 teachers. Bad and good lighting examples were presented in students' posters (by photographs), while they also talked about their local light pollution problems and the actions they had taken to overcome them. Scientists also gave lectures during the meetings. The final event was a Light Pollution Symposium held in Athens. Here we would like to express our deepest thanks to, Dr. D. Crawford (USA), Prof. J. Percy (Canada), Prof. J. Pasachoff (USA), Dr. S. Isobe (Japan) and Prof. Osorio (Portugal) for the honour of their participation in our Symposium and for giving our students the opportunity to better understand many aspects of the

problem. Furthermore, we hosted teachers and students from Italy, Switzerland and our partner school from Manchester, UK. From Greece, 30 schools participated with oral or poster papers.

(b) Publications

The students and teachers that participated in our programme often opened their results to the public. They communicated regularly with their local authorities, environmental associations and scientific societies on the light pollution problem. In this way they gained a real sense of participation.

5. Results and Conclusions

Through this programme many interesting things came to the surface. Most of the teachers and students were totally unaware of the problem at first, and after hearing about it were surprised and became strong supporters of finding solutions. After all, it is an important and “different” environmental issue.

After the meeting that was held at Ag. Nicolaos of Crete, a pilot programme of a good lighting environment was implemented for a local road. Also, in Tarrega, Spain ordinances were implemented by the local authorities after the communication of the problem through our participating school.

Goulandri Museum, in Athens, will host a diorama constructed by the students of Arsakeio School, with material from our programme, concerning light pollution. This Museum is visited by 1,000,000 people annually. Thus a different dimension of the programme will reach the public.

We conclude that our educational programme, over two years of implementation, reached society in a most effective way. Let me here just repeat the words of Prof. Percy: “The only good thing about light pollution is that it provides students with an excellent way of learning about science, technology and society.” The result was the establishment of a Light Pollution Office in collaboration with IDA. This Office will continue the programme’s efforts by

- (a) exchanging views with Greek and foreign organizations;
- (b) promoting standards that have been established;
- (c) contacting municipalities about the problem in order to take actions, and
- (d) educating the public, having as a final target regulations that will reduce light pollution.

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