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LitusGo Manual

Module 9

Air Pollution

Editor: Isotech Ltd, Environmental Research and Consultancy
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Preface to the LitusGo Education Manual

The LitusGo Manual is part of the LitusGo educational package which is included in the LitusGo portal: www.litusgo.eu. LitusGo aims at the training and capacity building of Local Authorities and local stakeholders in Integrated Coastal Zone Management issues and the reaction to the impacts of climate change.

This Manual consists of 20 autonomous, self-contained and inter-related modules. The modules are available in four languages, Greek, English, Maltese and Turkish and in three different forms: the dedicated wiki application in the LitusGo portal, the dvd and the hard copy version. This hard copy version of the LitusGo Manual consists of 20 self-contained booklets, one for each module, kept in a hard collective case.

List of modules of the LitusGo Educational Manual

Module 1:	European legal framework
Module 2:	Stakeholder involvement/Public participation
Module 3:	Sustainable tourism-carrying capacity
Module 4:	Water resources management
Module 5:	Fisheries/fish farming
Module 6:	Coastal water quality
Module 7:	Ecosystems management (land and coastal ecosystems)
Module 8:	Waste management/recycling/compost
Module 9:	Air pollution
Module 10:	Land uses/urban planning/coastal over-development
Module 11:	Landscape and marine-scape management
Module 12:	Coastal erosion control
Module 13:	Community annoyance issues 1: noise pollution
Module 14:	Community annoyance issues 2: light and thermal pollution, odours
Module 15:	Archeological areas/historic sites/cultural heritage
Module 16:	Extreme conditions management: flood risks, coastal flooding and storm surge
Module 17:	Droughts
Module 18:	Desertification
Module 19:	Energy use, consumption and management
Module 20:	Green buildings

Credits

The LitusGo Education Manual has been developed by the LitusGo Educational Manual Working group:
Modules 1, 2, 6, 7, 8, 9, 12, 13, 14, 16, 17, 18, 19 have been prepared by the scientific team of the beneficiary/coordinators ISOTECH Ltd. Major authors: Michael I. Loizides, Chemical/Environmental Engineer and Xenia I. Loizidou, Civil/Coastal Engineer. Constantinos Georgiades (MSc in ICZM) is responsible for the overall editing. The hard copy of the educational Manual is designed by Anastasia Georgiou.

Modules 3, 4, 5, 10, 11, 15, 20 have been prepared by the scientific team of the Sustainable Aegean Programme of ELLINIKI ETAIRIA - Society for the Environment and Cultural Heritage. Major authors: Georgia Kikou, Geographer, MSc Environment (Manager of the Sustainable Aegean Programme), Alexandros Moutaftsis, Economist, MSc Environment, Leonidas Economakis, Political Sciences, MA International Development.

Dr Alan Pickaver on behalf of partner The Coastal & Marine Union (EUCC) was responsible for the quality control of the educational material.

LitusGo partnership:

Coordinator/Beneficiary**:**

ISOTECH Ltd Environmental Research and Consultancy www.isotech.com.cy

Cyprus:

Municipality of Pafos www.pafos.org.cy

AKTI Project and Research Centre, www.akti.org.cy

Greece:

ELLINIKI ETAIRIA - Society for the Environment and Cultural Heritage www.ellet.gr **/ Sustainable Aegean Programme**, www.egaio.gr

ONISIS web development www.onisis.gr

Malta:

Municipality of Kirkop www.kirkop.gov.mt

The Netherlands:

EUCC – The Coastal & Marine Union www.eucc.net

1| Theoretical background

According to the Australian Environment Protection Authority [1], «air pollution is defined as the presence of airborne pollutants such as gases, dust, smoke and odours in the atmosphere, in concentrations/quantities that are a direct threat for the comfort and health of humans, animals, even causes damages to the flora and other objects».

The substances that cause the atmospheric pollution are called pollutants. The pollutants that are emitted directly to the atmosphere from the source are called primary pollutants (e.g. carbon monoxide and sulphur dioxide), while those which are formed from different chemical reactions and conversions of the primary pollutants are called secondary pollutants. In the Mediterranean countries, due to the great sunlight, it is very common to observe a photochemical cloud, which is an example of secondary pollution.

The European Union is approaching the matter of the Air Pollution through the central legislation with the ”Directive 2008/50/EC of the European Parliament and of the Council of the 21st May of 2008 on ambient air quality and cleaner air for Europe”. The Directive includes the following definitions:

- Ambient air: outdoor air in the troposphere excluding workplaces defined by Directive 89/654/EEC (where provisions

concerning health and safety at work apply and to which members of the public do not have regular access).

- Limit values: a level fixed on the basis of scientific knowledge, with the aim of avoiding, preventing or reducing harmful effects on human health and/or the environment as a whole, to be attained within a given period and not be exceeded once attained.
- Target value: a level fixed with the aim of avoiding, preventing or reducing harmful effects on human health and/or the environment as a whole, to be attained where possible over a given period.
- Information threshold: a level beyond which there is a risk to human health from brief exposure for particularly sensitive sections of the population and for which immediate and appropriate information is necessary.
- Alert threshold: a level beyond which there is a risk to human health from brief exposure for the population as a whole and at which immediate steps are to be taken by the Member States.
- Critical level: a level fixed on the basis of the scientific knowledge, above which direct adverse effects may occur on some receptors, such as trees, other plants or natural ecosystems but not on humans.

The entire EU legislation on air pollution [1], including the Directive, can be found in the European Union website [2]. In addition, the website also contains information on all the air pollution sources, such as motor vehicles, other vehicles and industrial activities, as well as laws that are focused on those pollutants and suggestions of different solutions.

2| Objective

Based on this Directive, the Member States established the designated authorities and bodies that are responsible for the evaluation of the ambient air quality, the approval of the measuring systems, to ensure the precision of the measurements, to analyze the assessment methods and to cooperate with the other Member States and the Committee.

This LitusGo module intends to provide local authorities and local stakeholders with knowledge and guidance in order to promote the guidelines, actions and goals of the Directive, which are:

- Defining and establishing objectives for ambient air quality designed to reduce harmful effects on human health and the environment.
- Assessing the ambient air quality in Member States on the basis of common methods and criteria.
- Obtaining information on ambient air quality in order to monitor long-term trends and improvements.
- Ensuring that such information on ambient air quality is made available to the public.
- Maintaining air quality where it is good and improving it in other cases.
- Promoting increased cooperation between the Member States in reducing air pollution.

3| Problem

Despite the fact that, through Directive 2008/50/EC, the European Union is giving Member States a very good basis where they can develop and support their own actions of protecting their citizens, the environment and monuments, financial and other barriers seem to restrict the efficiency of the measurements they are taking. Therefore, depending on each Member State's situation, an heterogeneous act of protection of the European citizens is emerging.

The European Union is trying to solve the problem of the heterogeneity and protect the European citizens through counselling, sponsoring and supporting different actions but also through legal actions against the Member States that are not complying.

On this basis, through the aforementioned Directive, a system of homogeneous assessment of the ambient air quality concerning sulphur dioxide, nitrogen dioxide and nitrogen oxides, PM_{10} and $PM_{2.5}$, lead, benzene and carbon monoxide, and O_3 have been established.

The Member States have the right to determine different zones (urban, suburban and rural) throughout their territory and carry out air quality assessment and air quality management.
All Member States have common assessment points according to the pollutant, assessment criteria (especially for the sampling points), reference measurement methods, limit values and alert thresholds for the protection of human health and the environment,

national $PM_{2.5}$ exposure reduction target, limits for information and alert, critical values for the protection of the vegetation and a catalogue listing all the necessary information that need to be included in the action plans to improve the air quality.
Each Member State is obliged to install and run at least one measuring station and also have one or more common stations with neighbouring Member States.
The legal tools set by the European Union for the Member States are considered by the scientific team of LitusGo as a clear framework which can support national actions. The local features, climate, culture, etc. are limiting the ability of the European Union to become more specific in terms of optimal solutions for reducing the emissions from the major air pollution sources of each Member State.

Most of the European countries have an inability to achieve the objectives of ensuring and maintaining a good atmosphere for the people. This weakness seems to be a result of the financial interests, the lack of infrastructure and support of maintenance techniques and technologies, the ineffective coordination between the competent parties as to who is responsible for what and by what means, the great cost of implementing the measures, but mostly the problem is due to the refusal of society and countries to capitalise the causes of air pollution and take actions with the equivalent cost and priority. According to the World Health Organization [3] each year 1.3 million human lives are lost because of air pollution. Is the importance that we give air pollution and the available means for managing it, appropriate and enough to deal with the risks, compared with, for example, traffic accidents?

4| How to deal with the problem

It is a fact that for the greatest number of pollutants, actions on national level are expected to be implemented. More precise, volatile organic compounds and nitrogen oxides, which are the basis for the formation of a secondary pollutant, ozone, are a result of exhaust emissions and losses from vehicles and industries. If greater attention is given by the special inspectors and the motor engineering inspector centres to the industrial and vehicle emissions respectively, we would have fewer emissions and, therefore, lower pollutant concentrations in the atmosphere.

In addition, emissions are related with the technology that is being used. If a nation provides incentives to change the car fleet and industrial machinery, into a new, more environmentally friendly technology, then these emissions could be reduced. The increased use of public transportation and the relocation of industries away from urban areas would also reduce emissions.

Local authorities have the right and the responsibility to take action and to intervene.

1. Local authorities can organize training for both employees and local partners. These programmes will provide the needed knowledge and skills in order to implement proposals, such as the one that follows, as well as other actions and projects.

2. The proposal of the LitusGo scientific team includes the following actions:

- The creation, either through a union between

municipalities/communities, or through cooperation between certain municipalities/communities, of a technical team for the reduction of air pollution, consisting of as many as possible relevant officers from the involved authorities.

- This team can proceed directly to engage any specialist/s or consultant/s who can offer scientific support to the overall effort.
- Design, develop and complete a database listing all the sources of air pollutants in the study area: quality, quantity and spatial distribution.
- In the case of new developments, changes of urban areas, etc., the local authorities should use the relevant information from the database in order to support a more suitable decision and avoid taking actions which are incompatible with each other.

3. For parameters such as dust, which in areas with low rainfall, like Cyprus, are emitted into the atmosphere mainly from empty sites, resuspension from road vehicular traffic, construction sites, farming, etc., the local authorities are mainly accountable. The sources of dust emissions should be identified according to the region, and prioritized according to the effect that they are expected to have on the overall presence of atmospheric dust of the area. The most effective solutions, varying on the circumstances of each region, should be selected from local tests or international technological suggestions.

Those solutions should apply for one year on a pilot test and depending on the results and the rate of success, should be enhanced and presented as national solutions to other local

authorities in their country and also to other European countries with similar conditions.

The European Union Directive is giving great importance to public information and therefore local authorities should promote the establishment of free access databases. In the event of information or alert thresholds being exceeded, the Member States are obliged to create and include in such databases the following:

- Information regarding the observed excess (location, limit kind, excess time and duration, maximum excess),
- Forecast for the next hours and days,
- Information regarding the affected population, the possible effects on human health and recommended behaviour,
- Information on precautionary measures and emission reduction measures.

Member States should also provide public annual reports for all the pollutants that are covered by the settings of the aforementioned Directive.

References/useful information:

E-Sources:

1. http://europa.eu/legislation_summaries/environment/air_pollution/index_el.htm
2. http://europa.eu/legislation_summaries/environment/air_pollution/ev0002_el.htm
3. http://www.who.int/mediacentre/factsheets/fs313/en/index.html

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