



MONITORING ASPECTS OF AIR QUALITY IN URBAN AREAS OF TIRANA AND DURRES, ALBANIA

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Key word:

air,
monitoring,
quality,
standard,
pollution

SYNOPSIS

The air is a mixture of gases that compose the atmosphere of the earth, or its covering layer . Its approximate composition in the sea level is : nitrogen 78%, oxygen 21%, argon 0.9%, dioxide carbon 0.03%. The air contains also small quantities of other gases. The air can never be totally pure. Many sources of air pollution have always existed. [1,4] Air pollution has constantly increased with the development of different industries. The monitoring of the air that is carried out in Tirana and Durres , by the Institute of Public Health (ISHP), shows that the most important polluters continue to be the total dust LGS and respiratory dust PM 10. The PM 10 of the urban area of Tirana on the average is 432 μgm^{-3} " 21 Dhjetorit" Street (Tirana 4) and Duresi (Centerr) is 95 μgm^{-3} . The causes include the intensive urban traffic and streets which are not paved yet. At present are seen tendencies of the increase of the contents of solid particles PM , of lead Pb and bioxide of nitrogen NO₂ in the air. These indicators of pollution, and also according to current international classifications, are considered dangerous for the health (especially regarding the content of PM 10). The average quantity of lead in the monitored air drops has been increased from 0,19 to 0,29 μgm^{-3} , that is an amount of 50 Pb which is constantly increasing in the content of urban air almost in all monitored places of the country. The content in percentage within two recent years.

INTRODUCTION

The problematic of the stable development is very wide. Recognition of ecological aspects of stable development composes a guarantee of health in ecosystems and especially for the community. Even in Albania the ecosystems present deviations regarding natural equilibriums for known and unknown causes and reasons, but the provision of a better ecological and environmental alternative depends greatly on the predisposition of the community, scientific and institutional potentials. [2,3,9]

Some ecological aspects of stable development which are scientifically and practically noticed and evaluated are also presented with improving alternatives.

The most noticed and sensible aspect presented nowadays is the change of atmosphere. In the atmosphere is released the whole gas content of ecosphere. But in the atmosphere occur many physical and physical-chemical phenomena which isolate the life of living creatures in the ecosystem. These atmospheric phenomena reflect their result in climatic deviation. Climatic deviation holds the change of energy and consequently there are deviations in the parameters of stable and natural development. The climate with the values of its components gives instability of ecological equilibriums stimulating antagonist relations of competition between living creatures for survival. [5,7,10]

Human technologies during the second half of the last century have brought high effects for the recent welfare of generations, but defects for the future of people. The risks of the technologies which were not seen yesterday flourished today and the scientific world is placed before the dilemma between a short luxurious life and a moderated long life. Many of the technologies in the system of industry, agriculture etc. have also carried the deviations in the atmosphere and climate.

The aspects of gas pollution of the atmosphere are the most sensible for the community in the ecosystems. Because of the overdose of some chemical substances in the form of gas which are released in the atmosphere by technological resources such as CO, SO, Hidrocarbide, CO₂, NO, and other gas mixtures have indirectly caused climate changes such as the warming of the atmosphere, disorder of hydrologic cycle, bad health of the people, increase of mortality and respiratory diseases.

From the ecological point of view the most considerable damages are mainly noticed in water and forest ecosystems. The atmospheric and climatic have carried the increase of average values of temperature and the decrease of average values of rain in different eco-zones. Consequently, in water ecosystems e.g. lakes, rivers, Laguna there is a decrease of the volumetric amount of water while in forest ecosystems there is an annual low increase, frequency of fires, loss of forest surfaces. Because of abovementioned phenomena there are disorders in the ecological pyramid of the ecosystem, the elimination of special species, and decrease of biodiversity. [6,8,11]

POLLUTION OF THE ATMOSPHERE

The main resources of the pollution of the atmosphere are the industrial activity, burning resources in the atmosphere, burning of charcoal, engine vehicles for transport and recently the explosions and atomic centrals. Nowadays the atmospheric pollution has greatly increased. In many places with developed industries it threatens seriously the life and activity of people every day. The pollution of atmosphere is composed of gas pollution (90%) and pollution from solid parts (10%). The most important polluters in the form of gas we can mention:

Oxide of carbon is naturally found in the atmosphere with a concentration 0.1 ppm. Its resources are sea organisms, burning of forests, plants, warming and petrol engines. According to studies results that its concentration increases to 1 in industrial areas, while in big cities up to 100 ppm.

Hydro-carbides derive from the evaporation of the tankers of oil production and mainly by their non complete burning in engines and in different warmers.

Oxide of nitrogen, nitric oxides (N₂O), azotes oxide (NO) and bio-oxides (NO₂) are the common components of the atmosphere. They derive from volcanic eruptions, natural releases while nitric oxides derive also from bacterial activity, especially in non-aired lands. Bio-oxide of azotes stays in the atmosphere only a few days. Then it is transformed in contact with water vapors in nitric acid and later in salts (nitrate), mainly in ammonium nitrate brought by rain in the earth. It can also participate, in the formation of nitrate of peroxide acetate which composes the so-called "oxide smoke".

Sulfured anhydrite SO₂, is in the atmosphere in the condition of signs with volcanic origin, but its concentration increases by the burning of carbon as well as by metallurgic industry. The air of industrial cities is rich in SO₂, especially in cold winter, and this is why the pollution caused by this element influences mainly cities with wet climate and cold winter.

The air can never be totally clean. There have always existed many resources of air pollution. The ashes coming from volcanic eruptions, pollen and spores released by plants, smoke and the burning of forests and bushes and the dust raised by the wind are examples of "natural pollution of the air". But this pollution has constantly increased through the development of different industries. The contrary occurs in the oceans where the spread of pollution is low and in other reservoirs of the earth pollution occurs only in geographical timely scale for million of years.

Some kinds of air pollution have been created recently, others have existed for centuries. E.g. pollution of London by the smoke created from the burning of charcoal. Prohibition of the burning of charcoal caused the use of the alternative fuel-wood and the massive burning of wood caused a drastic reduction of English forests.

The air is a mixture of gases that compose the atmosphere of the earth or its cover layer. Its approximate composure in the sea level is azotes 78%, oxygen 21%, argon 0.9%, carbon dioxide 0.03%. The air contains also small amounts of other gases.

Table no. 1 Type of gases, percentage in volume against dry air

Type of gases	Chemical symbol	% Percentage in volume against dry air
AZOTES	N ₂	78.10
OXYGEN	O ₂	20.95
ARGON	Ar	0.9325
DIOXIDE CARBON	CO _x	0.033
NEON	Ne	0.0018
HELIUM	He	0.0005
KRYPTON	Kr	0.0001
XENON	Xe	0.000009
OZONE	O ₃	0.00006
HYDROGEN	H _x	0.01
MONOXIDE CARBON	CO	0.03-0.04
METHANE	CH ₄	1.4
MONOXIDE AZOTES	NO	0.3
DIOXIDES AZOTES	NO _x	0.02-0.07
DIOXIDE SULPHUR	SO _x	0.02
WATER	H ₂ O	1000-3000

DATA ON AIR POLLUTION IN ALBANIA

The generating activities of air pollution have increased as a result of the development of some economical sectors, especially of transport, construction, insufficient and arrhythmic supply with electric power etc.

TRANSPORT

Movable resources generate a complex of polluters that make the pollutions diffusive and recycle the deposited dust. According to the data of literature is estimated that the vehicles are responsible for releasing in the environment 24% of dust ,77%te CO, 49% NO_x approx. 90% of Pb etc.

The number of vehicles that circulate in Tirana has reached about 100 000 vehicles ,or about 30% of the total ,including the vehicles coming every day from the other districts ,etc.

CONSTRUCTION

. The construction sector is a powerful resource of pollution regarding the mass of dust which increases pollution in the spaces where constructions are carried out

and the amount of deposited dust. Even though it is mainly dealt with categorized dust such as “dust from construction garbage” this type of dust affects the mass of dust registered by monitoring, increases the level of internal pollution, creates a strong sense of dirt to the citizens and carries microbes.

ENERGY

Regarding the energy it is difficult to evaluate its positive and negative contributions in air pollution. The fact that the people use “abundantly” energy by hydro resources continues to play a positive extraordinary role. Any reduction of this energy in favor of that from fossil materials would aggravate the existing situation.

SOCIAL-ECONOMICAL PERIODS IN AIR QUALITY IN ALBANIA

In order to give an evaluation on the quality of air in Albania we refer to two social-economical periods, that before 1990 and that after 1990. In the period before 1990 are noticed some indicators which played a considerable role in the quality of air in Albanian environment. Some characteristics were: controlled demographic movements, industrial activities located in the suburbs, road transport with a limited number of vehicles, few constructions etc. economical social period after 1990 caused profound changes, reflected also in the content of the air, where its quality in many cities of Albania was considerably aggravated. Characteristics of this period are: uncontrolled and rapid movement of population, almost total collapse of industry with a high potential of pollution, increase of the number of vehicles of road transport, high and uncontrolled number of constructions etc.

Based on the indicators of air quality and its monitoring in Albania ,apart from totally clean areas , there exist also many environments where the quality of air is in low levels based on the standards specified by Albanian and international bodies.

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“Sharra” place is the main point of the collection of urban garbage in Tirana. The greatest part of urban garbage non-industrial and hospital garbage are collected and burned in Sharre. The place of unload is located in a valley side, in the water collection basin of Erzen river in the southwest of Tirana. Even though the place of unload is set up on clay layers, the bed of the valley contains sand and gravel. The place of unload has no protection layer in the lower part and in the side parts. There is also no drainage system for the flow and filtering of garbage. On the other hand, solid garbage pollute the air through the production of smells, of methane, particles of dust containing heavy metals and burnings associated with emissions with inorganic and organic content (dioxin, furane etc). Nowadays the place of unload presents an

enormous threat for the health of the habitants of the area as well as for the adults and children, who collect and recycle garbage from this place. Monitoring environment of crossroads of vehicles (Tirana, 21 Dhjetori, Zogu i Zi and in Durres, Train station).

RESULTS

Monitoring and provision of results of air quality carried out by the Institute of Public Health. Air monitoring is carried out in the points and terms determined in the study based on the methods of receipt and analysis of samples as well as on the calculation of average values. Based on norms is carried out the comparison of the real condition and the results are discussed.

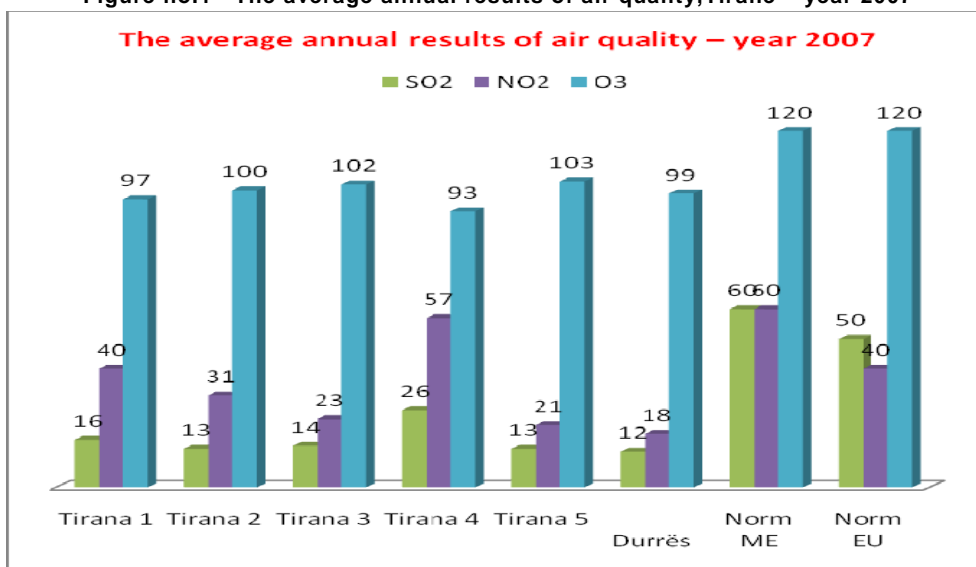
The average results presented in table 2 as a summary indicate the development of a situation already stabilized, of the quality of urban air. The most important pollutants continue to be the total dust LGS and the respiratory one PM10. Tirana continues to be on the top exceeding almost twice the average, where the point of 21 Dhjetori is considered dangerous for the health of the people, exceeding the order over 6-7 time.

Table no. 2 The average annual results of air quality– year 2007

$\mu\text{g m}^{-3}$	Normative According to Ministry of Environment, Albania and European Union					
	LGS	PM10	SO2	NO2	O3	Pb
Tirana 1	280	126	16	40	97	0,2
Tirana 2	233	108	13	31	100	0,16
Tirana 3	151	67	14	23	102	0,13
Tirana 4	965	432	26	57	93	0,3
Tirana 5	219	99	13	21	103	0,2
Durrës	209	95	12	18	99	0,34
Norm ME	140	60	60	60	120	1
Norm EU	80	50	50	40	120	0,5

According to the official classification of Great Britain, respiratory dust PM10 considered as the most important pollutant of urban air in Europe and worldwide, is treated as very dangerous for the health of people when encountered in urban air with a content more than 100 $\mu\text{g m}^{-3}$. It is considered normal in contents lower than 49 $\mu\text{g m}^{-3}$. In the results that we have provided, 7 drops out of 14 monitored throughout the territory contain over 100 $\mu\text{g m}^{-3}$, in the point of 21 Dhjetori the air contains 432 $\mu\text{g m}^{-3}$.

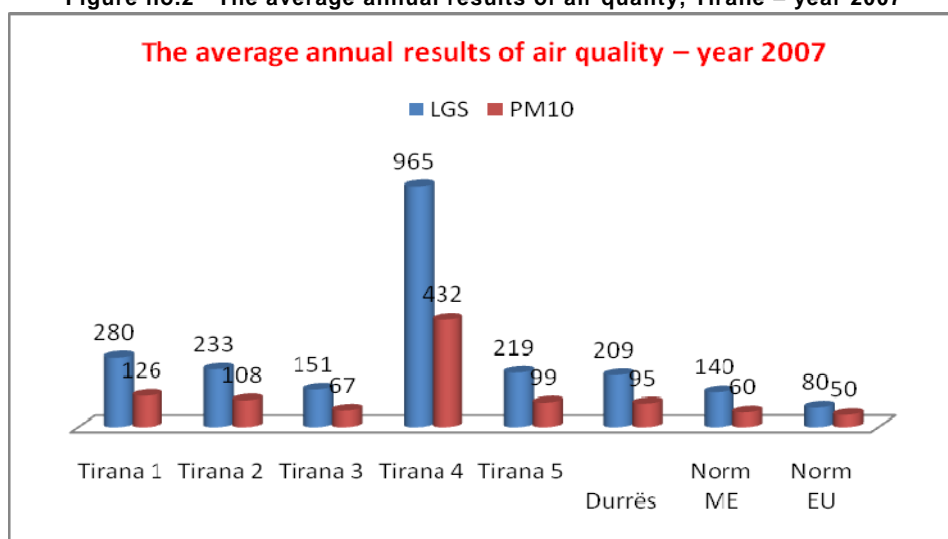
Figure no.1 The average annual results of air quality, Tirane – year 2007



Tirana continues to be “the big factory” of air pollution in Albania. Apart from the direct influence of the more intensive urban traffic and of the roads which are not yet systematized and the measures taken, have been noticed tendencies of the secure growth of the content of solid particles PM, of lead Pb, of bio-oxide of azotes NO₂ in the air of Tirana.

These phenomena mark the entrance of the problem in a phase, that even according to today’s international classifications of the field, is considered very dangerous for the health (especially regarding the content of PM 10), and this requires the intensification of technical-legal measures in order to handle the situation with fewer loss of human lives.

Figure no.2 The average annual results of air quality, Tirane – year 2007



Lead Pb is also increasing in the content of urban air almost in any monitored points of our country. Its average content in the air of monitored points has increased from 0,19 to 0,29 $\mu\text{g}\cdot\text{m}^{-3}$, that is about 50 percent within two last years.

Even though its content is within the permissible norms of our country in EU, this rapid growth and its extremely toxic effects on the population in general and especially on kids, oblige the taking of drastic legal measures for lowering the permissible limit of the content of Pb in the fuel of vehicles to approximate levels with those of EU.

Monitoring environment of crossroads of vehicles (in Durres, Train station).

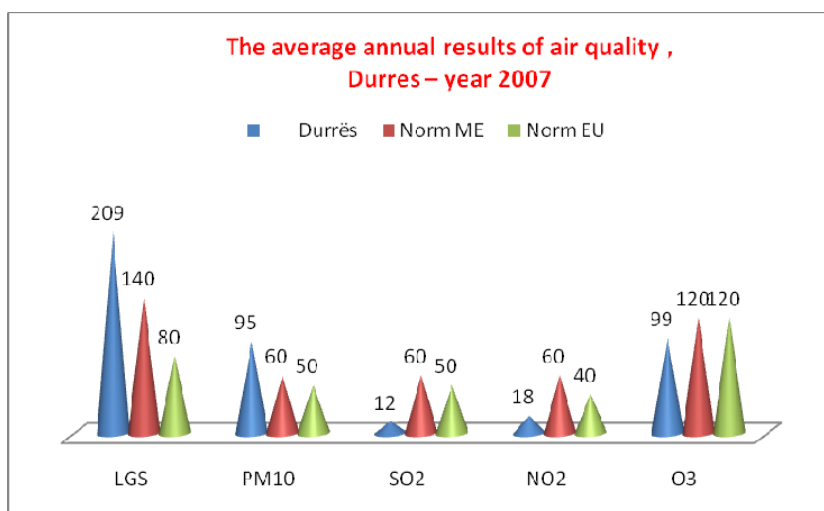


Figure no.3 The average annual results of air quality, Durres – year 2007

CONCLUSIONS

Different kinds of dust cause different damages in the lung tissue. In general these damages are similar to each other and that is why they are known with the common term the disease of “pneumoconiosis”. According to the type of the dust that damages the lung tissue are known several types of “pneumoconiosis”, and because of the entrance and activity of free biocuid of silicium in the lungs is caused the disease of silicosis, because of the activity of carbon dust is caused anthracnose, because of the activity of the dust of iron is caused syderosis etc. because of the activity of dust for a long time, skin damages may appear (glandules of grease are blocked and consequently appear pimples and are created chances for suppuration infections of the skin).

- The rate of the damage of organisms depends mainly on the concentration and dimensions of dust particles, on the chemical content and solvable characteristics of harmful dust in body liquids, by the ways of entrance etc. the more the quantity of dust in the air and the smaller the dimensions of particles, the more is the dust that will penetrate in the organism.

- The people who suffer from lung tuberculosis and chronic bronchitis and emphysema are more vulnerable toward the pollution of dust and gases.
- Biooxide of sulphur (SO₂) when increases in the atmosphere above the norm ,it prohibits the normal activity of photosynthesis in cooperation with air and humidity is provided sulfuric acid (H₂CO₃) which is very harmful for the health of people and living creatures , animals or plants.
- Removal of urban residues on time and their deposit in the place of treatment.
- Tests shall be carried out time after time for the health of the employees who collect urban garbage and of habitants in the areas with high air pollution.
- The care of local institutions shall be increased regarding the environmental education for reducing the resources of air pollution.

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