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*THE ENVIRONMENT IN THE BEGINNING OF  
THE 21<sup>ST</sup> CENTURY:  
PROBLEMS AND CONSEQUENCES ON  
TOURISM*

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**ABSTRACT**

Tourism development is affected by a number of environmental parameters that their effects can be visible in our daily lives as extreme weather conditions (cold or heat) appear on seasons that depict a different weather behavior. In this paper, we focus on the effects of the climatic changes on the tourism dynamics, while we stress out the relation between the environment and tourism.

**Key words:** ENVIRONMENT, POLLUTION, INDUSTRY, TOURISM

**1. INTRODUCTION**

When referring to environmental changes, it is more than obvious that it is not just an internal affair for a country but a global issue. Climate changes have been a

worrying subject for the scientific community on a global scale, but have not been widely considered by common people.

Environmental changes, and thus human environment structure, is dependent on the kind of social evolution. Each historically descending society has its own specialized environmental behavior with regards to the nature as the living environment. From a financial aspect, through the intensity and way of exploiting nature (take tourism for example), the natural and finally the spiritual way, each society behaves according to the degree of intervention of human to nature that can result to his total alienation from it.

## **2. EFFECT FACTORS – NATURAL ENVIRONMENT**

During the last forty years, people consumed more water, than what was consumed in the three past centuries<sup>12</sup>. Water natural resources as means of agricultural, tourist and energy development in the Greek area is the daily topic of interest for the simple farmer to the scientist-researcher. The percentage of the total quantity of salt water on earth is 97.5%, while only 2.5% is drinkable water, whose vast majority is in the form of ice on the poles (70%). The percentage of water that human has direct access to, is about 1%, of drinkable water, or about 0.0007% of the total earth water. Great draughts and desert phenomena will be faced, according to scientific research, in the Mediterranean basin in the years to come, because of the increasing temperature. On the contrary, Central Europe will become more susceptible to floods, while the northern parts of Europe will become more susceptible to ice periods, with obvious results for the countries constituting the EU. Models developed in Max Planck Institute of Meteorology, located in Hamburg and his director of research is Dr. Guy Brasseur, showed that Earth's temperature by 2100 will have risen from 2.1 °C to 4.1 °C<sup>13</sup>. Half of the quantity of the ice will be vanished, and by 2080 and on, the European vessels would be able to reach Japan, through the North Pole on the summer, without having to face any ice rocks. Even if the submission of CO<sub>2</sub> stopped now, the global temperature would continue to rise for another 200-300 years, as stated by Dr. Brasseur<sup>14</sup>. We can therefore understand that with these percentages available to people, it is at

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1. [KeKK 98] Keki K.: "Defenseless the tourist the summertime", newspaper Kathimerini, pp.18, 19-07-98

2. [Agrok, 05] "The meteorological forecast of century", magazine Agroklima, pp.16, 04-01-2006

3. [Agrok 05] "The meteorological forecast of century", magazine Agroklima, pp.17, 04-01-2006

least a crime to pollute and destroy lakes (desert risk)<sup>15</sup>, rivers and the direct water horizon.

The disorder caused to the aquatic environment (mostly indirect) from the waste of energy is possibly more important than the one caused by waste pollution. The greater part of energy used by the industrial society (heat production, earth exploitation, urban buildings, agriculture, foresting, geological researches and water barriers) affects and causes disorder to the ecosystem operation. This in turn has a direct consequence on the climate of each area. People (as earth beings), have a direct impact with the earth environment, but due to both the interdependency between ground and aquatic ecosystems, and the sensitivity of aquatic ecosystems, the pressure imposed on the ecological stability and on the environment, resulting from the evolution of our civilization, is reflected on the aquatic ecosystems. The consequences of this energy consummation are obvious in atmosphere as well, as it acts as a transfer channel between different ecosystems for a number of pollution factors. Therefore, it is more than obvious that the capability of the human affection on the environment seems to be greater than the capability of facing with their technological means the consequences of the environmental disorders caused.

## **2.1 Biological – Chemical Approach to human-oriented pollution sources**

Human interaction to the natural environment can be historically distinguished in three sequential (and sometimes overlapping) phases<sup>16</sup>.

### *2.1.1 Intense but specified pollution from industrial and urban wastes*

This kind of pollution creates unhealthy conditions in the water that wastes fall (unpleasant smell and taste). Thus, their removal is very difficult if they are freed to the environment. However, their consequences are not so wide, if the relevant EU and government directives are followed. This pollution causes the further spreading of pathogenic organisms (diseases caused by the use of these waters). It is also

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4. [PapM, 00B] Papanidis M. 'The water leaves the desert...comes', newspaper Express (Greece) pp.16, 23-7-00

5. [StefE 05] Dr. Eyr. Stefanoy Professor of Environmental Organic Chemistry of University Crete: "Environmental Chemistry", pp. 89-98, September 2005

responsible for the reduction in the oxygen, thus creating the development of saprophytic organisms in these waters (e.g. organisms that are products of decomposition)

The problem of the specified manipulation of liquid wastes has been successfully faced on a global scale. Despite the fact that we will continue to depend on the need to develop more satisfactory waste disposal and removal techniques, we can still apply current know-how to the water-flow basins effectively. Towards this target, we should consider the dependence between water supply and waste removal on water flow basins. Even though we are far from developing an integral solution to this problem, it is obvious that this kind of specified pollution can be dealt with the use of technology.

### 2.1.2 *Pollution caused by chemical combinations.*

By pollution synthetic combinations we consider the wastes of the modern industrial society: Synthetic organic combinations, mining products as phosphorous or other heavy minerals but also energy production wastes. These combinations are scattered using many transfer channels to the environment. In many cases they cause disorder to the operation of aquatic ecosystems while in some cases they can become harmful for human health. It has been calculated that daily people use 40000 of these combinations, while this number increases by 1000 annually.

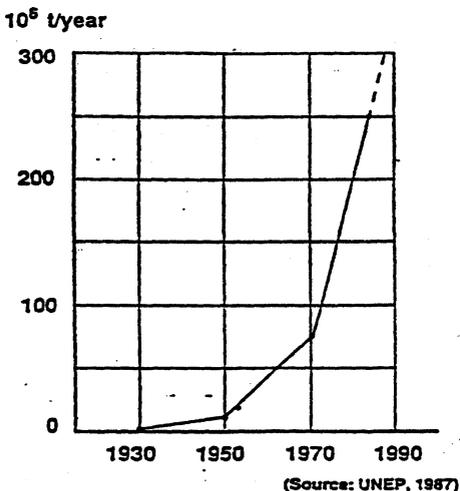


Figure1

A majority of these synthetically produced industrial combinations end up indirectly to the water reservoirs. This is done mainly through their use on household (e.g. detergents) or through agricultural waste disposal systems (pesticides) or even through atmosphere. Some of the combinations are very durable (e.g. they are not easily decomposed) and are eventually accumulated on aquatic ecosystems, affecting the abundance of species. The changes in the species variety resulting from changes in natural or chemical parameters will affect each species in a different way, altering in that way their abundance. In the next figure (figure 2) we present an example of the way a number of organisms is affected by the disorder caused by pollution. The number of species with low frequency (small number per species) is getting smaller; while very few of the species are abundant.

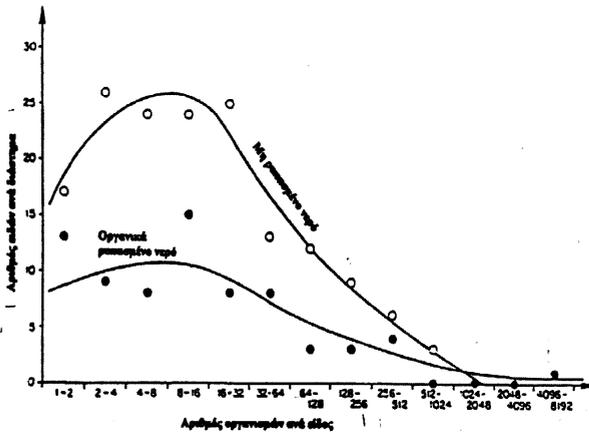


Figure 2

The removal operations of these substances, as self cleaning of the water, or their process in tanks of biological cleaning do not appear to be effective. On the contrary, with regards to pollution combinations, the registration of sales and production of a) DDT and b) PCB and the presentation of the resemblance of their diagrams, in accordance to the sediment accumulation ratio are depicted in figure 3 (depicting an ecosystem in Ontario lake – Canada), and is an important clue for Crete’s ecosystems (Kourna lake – Chania, Agia lake, Almyros lake – Herakleion).

The technological evolution of our civilization has been more extensive than the natural evolution of species.

This resulted on the following remarks regarding the industrial countries:

- a) Industrial activities have developed more extensively than the growth of population
- b) Agricultural production, with the use of pesticides and fertilizers, has intensified.
- c) Energy production ratios have raised exponentially
- d) A large number of synthetic chemicals added in the biosphere the last decades do not resemble to natural substances and depict an extensive time life in the environment, because they are not directly decomposed. Some of them even if they do not present high toxicity, can cause disorder the self-organization of aquatic eco-systems destroying their capability of supporting the life they present. Other chemicals tend to accumulate on organisms becoming dangerous for human health.

The prediction of possible ecological consequences and problems arising from various pollutants is very important. This can not be achieved by evaluating the danger they impose on the basis of toxicity tests and a registration of their environmental consequences. On the contrary, a scientific approach for solving specific eco-toxicological problems is required to acquire a solution.

To be more specific, an evaluation method for proper solutions is required (on the basis of biochemical parameters) of the fate, the distribution, the tendency of bioaccumulation in food chain as well as the residence time of pollutants and their residual concentration in the environment. Also, a better understanding of the effect of these combinations in the ecosystems' operation is required.

### *1.1.1 Third-generation problems: effects on hydro-geochemical area*

Humanity on its course of socio-economical evolution continues to use and manipulate successfully energy for the benefit of its civilization. Water as receptor does not only reflect these activities on flowing areas (basins)<sup>17</sup> but also the influence of different wide-scale emissions that are transferred through the atmosphere.

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6. [UnivA 1995] Eduard Interwies, Ecologic, 'Ground and water', University Athens (Agronomics)-wwf gr, Athens 3-11-05

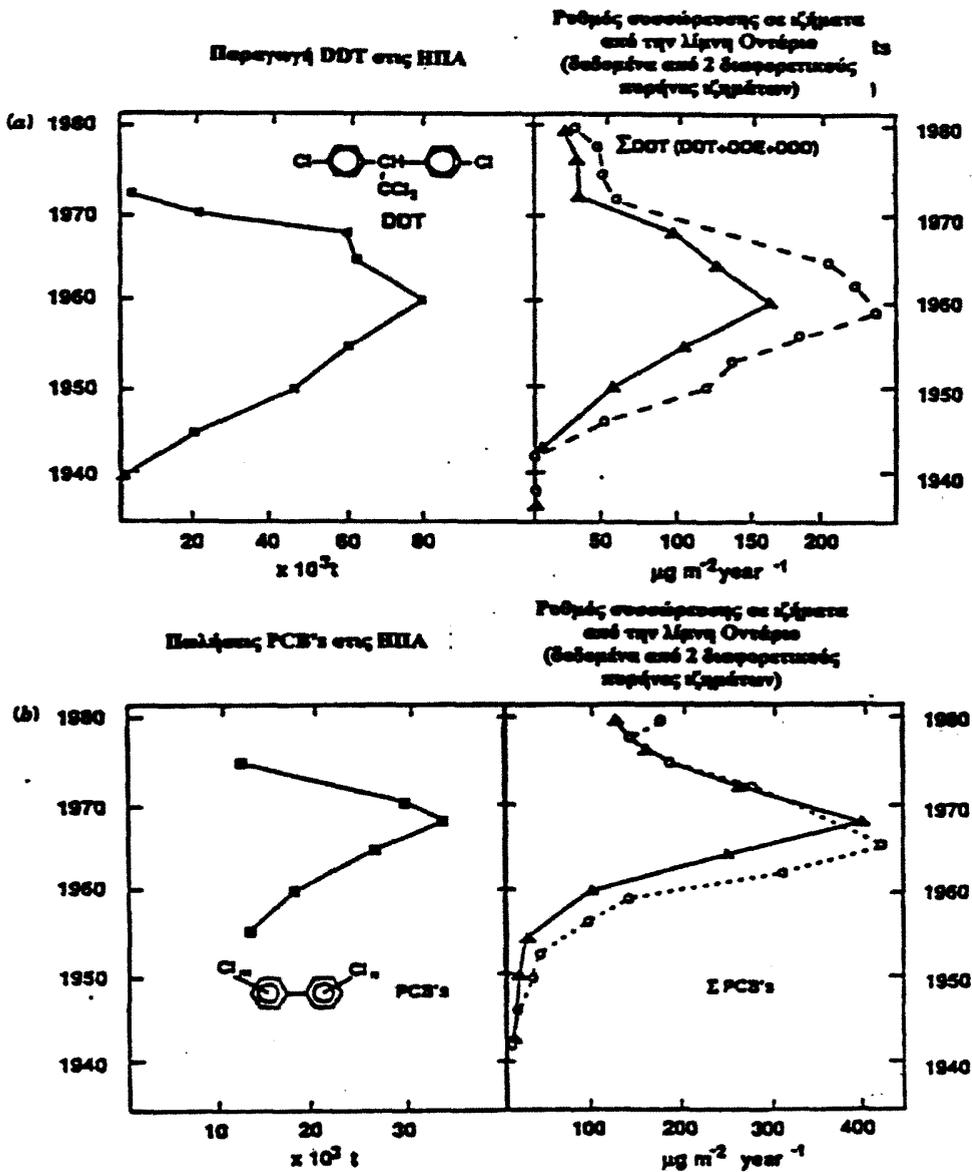


Figure 3

Human effect can be observed by the rapid changes that happened during the last decades, in the chemical and biological properties of many coastline and natural waters. Oil combustion, natural gas combustion etc, results in the production of a large number of carbon, nitrogen, hydrogen, sulphur and heavy mineral combinations. Nitrogen and sulphur oxides can be easily converted to nitrogen and sulphuric acids that can be subsided in the form of acid rain, as it has been observed in many industrial cities of Greece.

Special interest is taken on combinations that can scatter in great distances and thus affect the ecology of natural waters. Even ejaculation of minerals in the atmosphere through industrial and agricultural activity (artificial erosion-mostly on the northern and middle Crete axis) seems to compete and sometimes exceed their natural movement (natural erosion)

## **2.2 Water cycle is primarily connected to the bio – or hydro-geochemical cycles.**

Human beings tend to transmute to modifiers of the geochemical cycles and to factors of environmental changes on a global scale. They constitute the leading force in element and substance transfer from the solid surface of earth, and the chemical side-products produced affect the atmosphere negatively. Planet changes are formed up by complex interactions between inorganic, natural and biological process. People, however, do not always understand the negative phenomena imposed on the ecosystems by this interference.

The consequences and the results of these problems may not be obvious for some periods. Cause and result may happen in a totally different time. The identification of the sources or causes of some problems may be very difficult.

Air in its natural composition is of vital importance both for the necessary factors of life of people, and for animals and plantation.<sup>18</sup> Each interference to its natural composition may negatively affect the human, the flora and fauna life cycle.

Clear air is constituted by the following elements:

- a) Oxygen (20.93 %)

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7. [Kell 88] Kellner, Mr X.: Luft, in: Handbuch fuer Planung, Gestaltung und Schutz der Umwelt, Band 2, Muenchen 1988



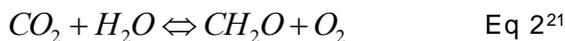
If this destruction rate continues as nowadays, this would directly imply that in the next 15 to 20 years one of the most productive industries of Austria would vanish: Tourism. The so-called environmental protection would put in risk 100,000 work places in the future, while a whole area would be uninhabited. The extent of the disaster is proven by the example of neighboring countries: Already 69% of the protected forests in the Alps are dying. This is proven by the estimation of the forest service of Bad Reichenhall, who was completed last summer.<sup>19</sup>

The relation between the different geochemical cycle elements, as carbon, sulphur and oxygen is very complicated. The most important geochemical tanks on a global scale (the surfaces of the cycles correspond to the size of the tanks), for the adjustment of the environment on the last 600 million years is depicted on the following figure (figure 4):

The lines between the different tanks depicted important flows: e.g. erosion reactions (reaction 1) as



The processes of photosynthesis and respiration that are depicted in a simplified way by the following equation and that are vital for the ecosphere:



It is important to point out the presence of Carbon Dioxide as a spot in the middle of the figure, depicting the fact that because it makes up a very small tank it is more susceptible to human changes.

An equation that approaches the pollution parameter of the environment and the Gross Natural Product (GNP) is the following:

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8. [KarS 05] Karagiannis S. "Development of activities friendly to the Eco-Tourism: case study of Samaria in Crete", Journal of Finance Informatics, Technological Educational Institute of Patras, volume I p.12, 2005

9. [KampA 00] Adamantia Kabioti: "2000DIS0714", Doctorate Thesis, Chemistry of University Crete, July 2000

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$$J = \text{stable variables} * \frac{I}{DA} * \frac{GNP}{C} * (1 - n)^{22}$$

Where I: population

DA: discharge area

GNP: Gross Natural Product

n: the efficiency of the environmental protection (e.g. recycling, waste production minimization, water processing)

C: per capita

Stable variables are inter-dependent parameters as Discharge Area.

Crete district and Eastern Mediterranean in general with regards to rainfall, has no relation to the districts of Macedonia, Epirus and Thessaly. It is closer to the climate of Egypt-Libya with which borders in the south<sup>23</sup>. This becomes more obvious by the tendency of having an extensive summer period during the last decade, which is good from a tourist aspect, if (there is always an if) it was not accompanied by a dramatic increase in the average temperature. Crete does not depict large rivers to supply drinkable water, large storage tanks both underground and on earth (barriers), in relation to the fact that rainfalls have dropped, according to studies of the Agricultural Department of the University of Athens, thus implying the inevitable requirement for protection of the aquatic sources. It is beyond doubt, that we can not consider evolution, agriculture,<sup>24</sup> and of course tourism in Crete, if the water efficiency is not solved, while although many agree that this is a general problem, yet in Crete the problem is not dealt with effectively.

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14. Ministry of Rural Development and Food (Statement), 27-01-06

## CONCLUSION

Taking the aforementioned into account we realize that industries should adopt a more social and ecological confrontation towards environment. <sup>25</sup> There would be dangerous for the humanity to face new forms of air-pollution, water-pollution all caused by the above mentioned industrial societies<sup>26</sup>

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