

# S E N S ' 2 0 0 6

*Second Scientific Conference with International Participation*

**SPACE, ECOLOGY, NANOTECHNOLOGY, SAFETY**

*14 – 16 June 2006, Varna, Bulgaria*

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## **PROTECTION OF MACEDONIAN CULTURAL HERITAGE WITH COMBINED GEO-BIOLOGICAL, HYDRO-GEOLOGICAL AND ECOLOGICAL METHODS**

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**Keywords: geo-biology, archaeology, underground waters, ecology**

**Abstract.** *In Macedonia it is hard to find a square kilometer without archeological remains of the ancient times. All the time different projects are implemented, be they research, exploitation, production, urban, infrastructural etc. in nature and little or no attention is paid to such localities. During their realization various precious archeological localities are encountered which have not been registered so far. Since they have been managed by unprofessional and reckless people very often they are left damaged or ruined and still not registered.*

*In this regard the Sunray Research Center from Skopje undertakes appropriate measures to protect these localities from further ruin.*

### **Introduction**

When applying different techniques and technologies in realization of independent projects care has not always been taken about the environment as regards inflicting damages or destroying areas of scientific importance on the earth.

Nowadays it is well-known that profitable projects take least care for geo-biological, archeological, ground water and ecological parameters which are constantly exposed to unauthorized and unprofessional usurpation, destruction and pollution.

Taking into consideration the needs on the one hand and the lack of action in some scientific fields on the other hand the Research Center Sunray has made a decision to make a contribution to the quality and quantity of the results of their research.

### **Materials and Methods**

Researches have been done on the territory of the Republic of Macedonia in which several archeological localities are comprised, as well as ground aquifers of water, various wildlife and other hydro-geological analyses.

In the research previously acquired knowledge has been used as well as various technical devices, hydro-geological and geo-biological methods and techniques.

In these researches archeological localities dating from different historic periods have been explored, through which different cultures and civilizations have been studied. These researches yielded a lot of information about the life and work of the antecedent civilizations.

In the researches in the field of archeology, ecology, geobiology and ground water, among other techniques, the latest technologies and methods have been used such as:

- satellite;
- hydro-geological;
- geophysical;
- laboratory and other.

All these methods and techniques have been applied in a longer period of time. Analyses of the results of the earlier researches have been done.

### **Explored Area**

In the researches of this effort four scientific fields have been comprised, which have acted independently so far, hence putting in danger other fields. Damages which have constantly arisen from this uncoordinated acting are above all a result of insufficient understanding of other fields and hence their incompetence in the other fields. This is also due to the lack of care for the values and consequences which constantly reappear.

In this project the following sciences have been united: geo-biology, archeology, ground water and ecology.

### **Results and Discussion**

**Geobiology.** Geobiology is a science which studies the influence of the earth, water, air and space on the plant and animal life. It also studies their mutual influence and the necessity for their survival on the planet Earth. Geo-biology represents a connection of archeology, ground water and ecology, forming a whole for the life on earth.

**Close Relationship between Geobiology and Archeology.** All the analyses and researches done so far have given quite positive results and confirm the need for their united acting as a whole. This is because geobiology and archeology have very close and common approach to solving archeological inconsistencies and great number of unanswered questions. For instance, geo-biology is the science which can give the answer to the question of the influence of natural geological structures, water and air on the exponents found in the earth or in water.

Today we cannot provide all the parameters for the mummies discovered in the village of Lipkovo in Kumanovo region without geobiological analyses. Once the geobiological analyses and examinations are done they will reveal the numerous mysteries and give parameters needed for mummies or other exponents which are a subject of exploration.

In this way we can get answers to many queries which remained unsolved till present day.

**Close Relationship between Geobiology and Ground Water.** Geobiology is directly connected with hydrogeology from many aspects. The presence of ground water, among the rest, depends on the geological structure as to hydro-retaining and hydro-porous structures i.e. existence of hydro collectors. It is well-known that people can find ground water by knowing only the morphology, that is, by observing and analyzing the plant life on earth. There are certain types of herbs and several-year-old plants that grow on locations with ground water only.

It is only one of the indicators which are used for discovering ground water. Geo-biology, among the rest, makes use of various methods and techniques for finding ground water as for example radiestesy. By using such methods also the presence and harmfulness of strengthened electromagnetic fields is discovered and analyzed, which appear as a result of ground and cosmic sources of radiation.

Ground flowing water produces electro-magnetic waves which stretch vertically and have negative influence on the entire living world, both plant and animal.

In this context a study has been done on the harmful influence *on people* who live or work in a building. The study showed that the people exposed to these waves had a lot of health disorders (figure 1).

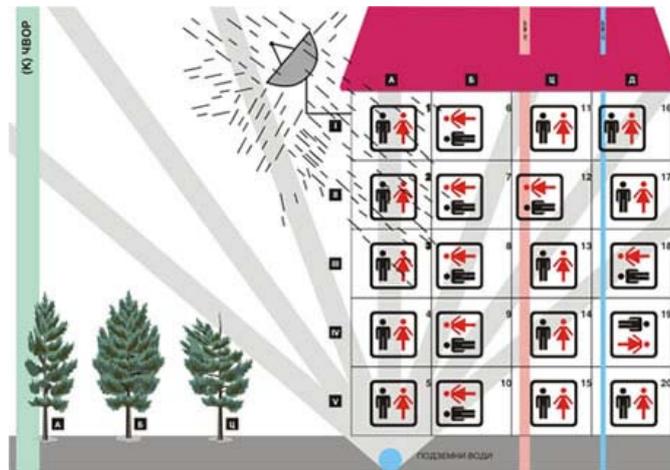


Fig. 1. The object exposed to Geo-pathogenic, cosmic and technical sources of radiation

The harmful influence of enforced geological fields caused by ground flowing water *on plant life* has been studied (figure 2).



A Plant on safety zone      B Plant S2-knot

Fig. 2

The harmful influence of enforced geological fields caused by ground flowing water *on animal life* has also been studied (figure 3) and worse consequences for their health have been observed.

Therefore it is impossible to mention geobiology and not to take into account ground water and earth's geological structures.

Geological structures also represent a very important factor for the harmfulness of electromagnetic fields, which appear as a result of geologic anomalies in the earth. Comparatively explored locations of old and new settlements have confirmed the thesis that the old settlements were built in safe locations for living. One such project has been done in the town of Ohrid, whose old and new part has been compared.

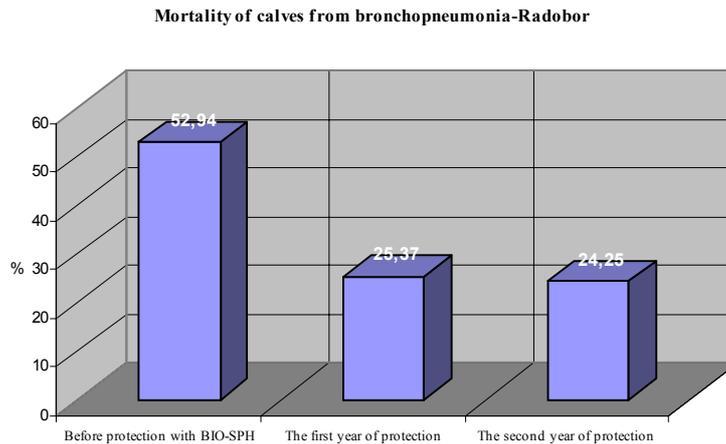


Fig. 3

Where there's no water there's no life, but living on ground flows also poses a serious threat on living world. Ancient people learned this from their practice and, in their own way, learned to protect themselves from this threat.

**Close Relationship between Geo-biology and Ecology.** These sciences are inseparable in regard of pollution and destroying of natural goods, selection of natural construction materials, selection and food production, so we cannot mention the first one without interference of the other. The development of these two sciences went on simultaneously with their mutual complementation.

**Archeology.** Archeology presents artifacts of the life and culture of the ancient civilizations, which lived and created in certain locations. Nowadays the world more and more searches and discovers those locations which give information about our ancestors. Owing to the educational and technical-technological development of our modern civilization, we are able to quite successfully discover and study archeological locations and findings since the very beginning of human existence.

Macedonia represents one of the greatest archeological localities in Europe and the world as a whole. Unfortunately, this is a period when archeology in Macedonia faces a real chaos. Legal measures for protection of the cultural monuments and heritage do not prove good from expert or national-analytical perspective and threaten to permanently damage archeological heritage in this locality. Archeological treasures are literally robbed in front of the eyes of all institutions, which moreover, are directly or indirectly involved in this robbery. The archeological locality on the territory of Macedonia has been discovered or explored for no more than 20 % of its richness. This locality (rightfully called the cradle of civilization and navel of the world) holds the biggest secrets of the first ancient civilizations and the writings of many greatest philosophers, tsars, kings since the very beginnings of human society, among which Aristotle's, Philip's, Alexander's the Great, Kostadin and Elena's and Justinian's writings. The world should discover and study their culture, scientific achievements, and many, insufficiently known to us, sciences, techniques and technologies.

With an appropriate studious-technical-technological-international approach to solving this problem we can open the gates of the biggest world wonders. These discoveries can instigate new sciences, and can complement and redirect the existent ones. All these secrets lie closed in the treasure troves and tombs of those great people. What is urgently needed is to stop the vandalism in archeology and put an end to this

grave problem. To this end we need urgent international support since the archeological locality in question is of international interest.

Due to its geographic location in which the territory of present Republic of Macedonia stretches, Macedonia has always been the center of cultural events and war fares. All the civilizations that lived here left traces of their existence. The information about their everyday activities gives cultural, technical, biological and other parameters which are analyzed today. The results from the analyses give support to the thesis that old civilizations were in close relationship with geo-biology, hydro-geology and ecology. In terms of today's explorations we talk about close relationship between archeology on the one side and hydrogeology or more exactly with ground and surface water on the other side. In this relation the actual hydrogeological situations on site played an enormous role in the existence of the oldest settlements, which are now partly discovered archeological localities or are not discovered at all. The archeological research done so far confirm this. Most of the archeological localities were found near ground or surface flowing water, and in a safe location from the aspect of microclimate conditions and natural strengthened electromagnetic fields.

The research was done on ancient urban settlements, such as Stobi, Heraklea, Skupi and others (Fig.4, 5, 6).



Fig. 4. Heraklea



Fig. 5. Skupi



Fig. 6. Stobi

**Close Relationship between Archeology and Ground Water.** Since the Republic of Macedonia represents an enormous archeological locality and is abundant in ground water their relationship is evident. All old settlements supplied their drinking and other water from ground or surface sources. Most of them are still used for water supply to villages and towns. Lately, especially since the second half of the last century, new urban settlements have been built, thus increasing the need for fresh water.

This need for fresh water increasingly more calls for exploitation of ground water or captivating of sources. To implement a hydrogeological project it is needed to carry out more exploration works such as: electric sondage, geological drilling with different profiles, excavations and similar activities. For such a project powerful construction and

hydrogeological machines are used which penetrate into the ground. Each of these exploration works has a direct contact with significant archeological localities and their precious archeological artefacts, which are permanently damaged and their centuries-old-history wiped out.

When come across, these localities more often than not are not reported, on the contrary, they are recklessly robbed and destroyed. In this close relationship there are many flaws; for example, lack of expert supervision for activities into ground undertaken by both sides. If there is cooperation between these two sciences then it will make great contribution as to preserving the national and archeological heritage in Macedonia. At the same time two goals will be accomplished: first destroying of archeological values would be very rare and pollution of ground water would be avoided.

**Close Relationship between Archeology and Ecology.** Ancient people when choosing a location for a settlement, apart for the hydrogeological and geological aspect, took care for the ecological aspect as well. Most old settlements were built near a river which they used for disposing of faecal water and hence they avoided epidemics and ecologic catastrophies. It is known that sacral buildings i.e. tombs, mausoleums, graves, etc., of the dead were not placed in locations with ground water. In this way they successfully avoided pollution of ground water. Today, care is not taken when refuse is disposed of and it can easily happen an unknown archeological locality to be chosen for this purpose. Often we can see excavations for drainpipes or canals which are accidentally placed in an archeological locality.

**Ground Water.** The Republic of Macedonia has relatively well developed hydro graphic network, which means artesian and subartesian water, used for water supply to settlements and cities. Utilisation of ground water has several advantages compared to surface water, as for example, it is safer from ecologic and terrorist pollutions, temperature variations, and many other factors which can influence water quality and quantity.

Ground water has not been sufficiently used from the aspect of water supply to cities and irrigation of sown fields in agriculture.

The Sunray Research Center from Skopje has made a practice of using the latest methods for exploration of ground water locations, which methods successfully solve the problem of water supply even in the most water scarce regions.

Ground water is directly connected to geo-biology, archaeology and ecology and they all together form a whole.

**Ecology.** Ecology is an inseparable segment in this knot work of sciences for a normal bio-life. The establishment of every science starts with its history of beginnings, pressures, negative and positive influences until it is eventually acknowledged as a science necessary for contemporary living as was the case with ecology.

Buffoon (1707-1788) wrote thirteen volumes of "True History" in which he describes the bond between living organisms and the environment, climate influences on organisms. Lomonosov (1711-1765) underlines the influence of environmental factors on organisms. In the first half of the XIX century many scientists studied the unity between organisms and environment. These ideas were shaped by the Russian scientist Rule (1814-1858) and the French naturalist I. Jo Frua Sent-Iler. Humboldt (1769-1859) in 1807 published his "Idea for Geography of Plants", a publication which at the time was an innovative monography of ecology. Many claim that ecology started in 1866 when the young scientist encyclopedian Heckle in the foreword of his book "General Morphology of Organisms" woke up the need for a new biological science which he called ecology, from the Greek word jokos=home, which studied the mutual bond between organisms and environment. Nowadays the word ecology is a synonym for the clean and healthy.

**Ecology and ground water** are also inseparable parts for many reasons, the most important being the lack of fresh and clean water for the population and wildlife on the planet Earth. Today the industrialisation ever more usurps the basic cells of life, that is, earth, water and air. Ecology is the science which bravely and publicly opposes everyone who disturbs or diverts these cells. If pollution happens then the survival of millions humans is endangered, as well as other life on earth. The pollution of ground water is frequently a result of carelessness, as in cases when personal profit in industry is important, then terrorist attacks and natural disasters. Until present several events of pollution and ecological catastrophies of surface water are known, polluting ground water as well. This was the case with the river Vardar in the 1990s, when factories in Skopje released pollutants into its water and at the same time polluted ground water in Dracevo and wider area. This was the case with the river Danube too, and other surface and ground water worldwide. In almost every case the ecologists were the first to alarm the world for the consequences and dangers inflicted.

All this lands support to the thesis that ecology and ground water ought to be closely related in order to provide a normal bio-development on our planet.

### **Conclusion**

A studious and joint approach to the realization of future projects in these fields, in which simultaneously will be involved all four sciences as a whole, will help avoid problems known so far (such as pollution of ground water, destroying of archeological values, inflicting ecologic damages and endangering the entire wildlife).

These sciences as a whole would upgrade and perfect each other, and their united approach would produce scientific-educational sources of knowledge.

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