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# SOME CURRENT ISSUES IN BULGARIAN GEOECOLOGY

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ABSTRACT

The issues of evolutional development of matter, of its structure and redistribution have been intensively explored in the last decades by various geological sciences. However, the issues of setting geochemical zones apart from zones of anthropogenic invasion of soil compolexes has only recently become an object of careful studies. To an extensive degree these are problems of agroecology, but have already been incorporated within the framework of geoecology. Geoecology has consolidated as a science of polygenic and three dimensional components (both geological and soil) and effects upon the environmental ecological characteristics.

Bulgaria is one of the countries of unique landscape features, geological and geochemical peculiarities admitting definition of the fundamental principles of geoecology and also, to a considerable degree, understanding how the geological and soil substrata exert their effect upon waters and biocenoses. The present paper examines some basic issues of Geoecology:

- Kinds of geochemical barriers, anomalies and accumulations;
- - Kinds of geochemical processes;
- - relations between geogenic and technogenic pollution, etc.
- The Bulgarian theoretical and applied geoecological studies are leading in European science.

## INTRODUCTION

The issues of evolutional development of matter, of its redistribution and structuring have been intensively explored in the last decades by various fundamental and interdisciplinary earth sciences. It is interesting to note that these studies turn to the dynamic natural and nature-anthropogenic systems, i.e. to the issues of the dominant significance of dynamics in their development and forecasting. In this respect of extreme importance for geological knowledge today is the formation of new interdisciplinary sciences which examine the processes in the earth's crust in their dynamic development: from past static geological systems through current dynamic and static ones to prognosticated states and development of the natural and anthropogenic environment. In our opinion and interesting developing interdisciplinary science is geoecology.

## BASIC STAGES IN DEFINING GEOECOLOGY

### 1. General definition of Geoecolo gy:

Geoecology has consolidated as a scienceof the polygenic and three-dimensional geological soil components and effects upon environmental ecological characteristics (dachev, Teoharov, Dochev, Mianoushev, 1994).

Scientific justive requires (insofar as this still exists) to pass a note on the one-sided stance of a number of colleagues in respect of the issues of defining and setting down the goals and objectives of this interdisciplinary science. Many think tha t the research spectrum of Geoecology is limited to individual specific methods for studying the effects of geological and neogeological processes upon the environment. Some colleagues, for example, are attempting hard to implant the concept of 'ecogeology'. But as regards the naturrre of their studies and formulation of theses what one really sees is an old science, established throughout the world – biogeochemistry – i.e. studying the ecological status of a certain region by means of in-depth analysis of chemical characteristics of plants and their relationship with soil and rock substrata. Other authors bring geoecological methods down to an in-depth analysis of some engineering geological parameters, such as the ones of landslide and earthquake processes, erosion, geological risk ( as a whole), etc. We must expressly underline our firm conviction that these concern individual methods and scientific branches in the large family of Geoecology! In this sense also is the position of another interdisciplinary science defined by us (Geosozology), for studying and preserving non-living nature (Дачев, 1986; Костов), i.e. this also is a branch of Geoecology.

### 2. Short Histoical Refence on Defining Geoecology:

First (preliminary) stage – till 1990;

Some western publications (Goldschmidt, 1954; Keller, 1979) consider the issues of defining the specific knowledge of preserving the geological environment and its relation to the other components of environment. Almost simultaneously similar ideas appeared in works that came out in th eformer Soviet Union (Перельчян, 1972; Сает и кол., 1980). At the end of the period under consideration editions and publications came out that discussed specific geoecological issues (Grudev, 1981; Крайнов, Галицын, 1989; Грудев, Браун, 1989).

Second stage:

It is noted for identification of objects of geoecological studies. The name of the science Geocology begins to appear at approximately this sense that has since been precisely defined (Всесоюззная научно-техническая конференция "Геология: проблемы и решения", 1991). At the sited

Moscow conference a relatively exact definition was formulated: Geoecology is a a scientific branch on the border between geology and ecology, which studies the relations arising as a result of natural laws, between living organisms, incl. Man, the technogenic and geological environment (Фролов, 1991). It is important to point out that in this period (till 1993-1994) in the debates of the conferences of the Carpathian-Balkan geological association the serbian and Bulgarian geologists expressly formulated the issue for setting apart geoecological studies as an interdisciplinary science, but it did not receive a precisely formulated definition. However, the advanced studies of some researchers as well as the imprecise definition of geoecology up till then stimulated the dilution of the problem area in too wide a spectrum of highly specialised studies. We acknowledge these todayas contributive to the orbit of the science Geoecology (as we wrote above), but in our opinion these engineering, geological, geotechnological and similar studies can only be acknowledged as geoecological (sansu strictu) if they fall within the research chain formulated in the definition of this science.

**Third stage:**

We brought forward the issue of revising the relations between certain interdisciplinary sciences for the first time in 1991 (Dachev, 1991). But in the article by a team of geologists and soil scientists "Outlines of Geoecology" (Dachev, Teoharov, Dochev, Mianoushev, 1994) the definition, goals and objectives of this science are precisely laid down, i.e. the thrid stage – since 1994 to the present – has focused our attention to the principles underlying the research. It is important to point out that a number of academic and university publications and monographs came out (Близнаков, 2000; Георгиев, Манолов, 1999; Недялков 1988), considering the relations in the system 'lithosphere – ecosystems'.

**3. Principles of Geoecology:**

The basic principles of the science Geoecology can be brought down to the following postulates;

- Research is carried out from the most ancient (lowest) geological formations and water levels to the most recent; thence, to soils and other components of the environment;
- Geoecological studies are multifaceted, which means that depending upon the tasks, the research teams must be expert in the specific fields of science and in concrete terrains; however, multivalent specialists are to b epreferred (Dachev, 1991);
- Geoecology holds that the methods employed in studying static and dynamic geoecological systems to be equal (Дачев, Узунов, 2000) with a view to an exact estimation of the status and effect upon the environment;
- Geoecological studies can be regional and local with basic methods landscape-cum-geochemical mapping, using point geological profiling (Dachev, 1995), as well as biogeochemical methods.

Doubtless, new principles will be formulated in the process of perfecting the methods and scope of geoecological research.

## BASIC GEOECOLOGICAL PROBLEMS, CHARACTERISTIC FOR BULGARIA

In the last decade the term "geogenic pollution of the environmet" has been adopted. This in fact is an autogenic natural pollution with various geochemical elements (and substances: oxides, sulphides, etc.), especially characteristic to the entire Alpian-Himalayan orogen. We have been drawing the attention to this geoecological phenomenon for some time, actually for the closing ecade of the previous century (Дачев, Чунев, 1994; Дачев, Теохаров, 1995; Дачев, 1997; Дачев, Мърхова, 2002); within the same period a number of other Bulgarian and foreign authors have also directly or indirectly brought forward this phenomenon to attention (Куйкин, 1989; Витов, 2000; Куйкин, Атанасов, Христова, Христов, 2001; Teritze, Atanassov, 2002). In our opinion the geogenic environmental pollution with **geonoxes** (poisonous substances of geological origin) is caused by erosive and accumulative processes in the zones of geochemical concentration of these substances. Therefore a detaled geochemical mapping should be carried oout as soon as possible in the zones of geochemical anomalies and accumulations. With a view to setting technogenic anomalies apart from geochemical ones, while both had been brought under one heading in the list of polluted land (Дачев, 1997).

We think that a generalised overview of topical geoecological problems in our country necessitates a strategy for **detailed study and monitoring of the following geological phenomena:**

- **Geoecological anomalies and accumulations;**
- **The torrential cones** at the foot of mountains which are the cause of a negative dynamic geoecological system not only with their erosive effect, but also with accumulated geonoxes (from ore-bodies located higher up the mountain side) in the soils of the fields and valleys;
- **Seasonal accumulation of pollutants** in the river, lake, dam and sea sediments;
- **The processes of sea, river and dam abrasion**;
- **Specific geological, geomorphological and biological processes**, such as: landslides, earthquakes and other natural risk factors (Бручев, 2000; Велев, 2000; Янев, Дачев, 2001), acting upon the ecodynamics of the earth's crust, soils and waters.

## CONCLUSIONS AND RECOMMENDATIONS

1. Geoecology was defined and consolidated as an interdisciplinary science in Bulgaria, which oblliges us to continue the research and applied work on a wide field of issues, in consolidated teams.
2. Topical and not to be further delayed are the activiites relating to **delineation of geochemical anomalies and accumulations with extremely high content** of geonoxes and technonoxes with a view to the necessity of making national agroecological politics more precise.
3. The formation of interdisciplinary research teams is necessitated, to study geoecological phenomena and problems, contrary to current practice of teams with too narrow a spectrum of scientific and appplied knowledge of experts.
4. When studying dynamic geoecological systems to estimate the effect upon the environment, the truly and justly balanced approach should be applied, i.e. actual benefits from business and technogenic invasion should not be for the account of natural geoecosystems. Only with the recognition and spread of this approach in our geoecological practice can

we speak of the sustainable development of prospecting, extraction, construction, urban and industrial activities.

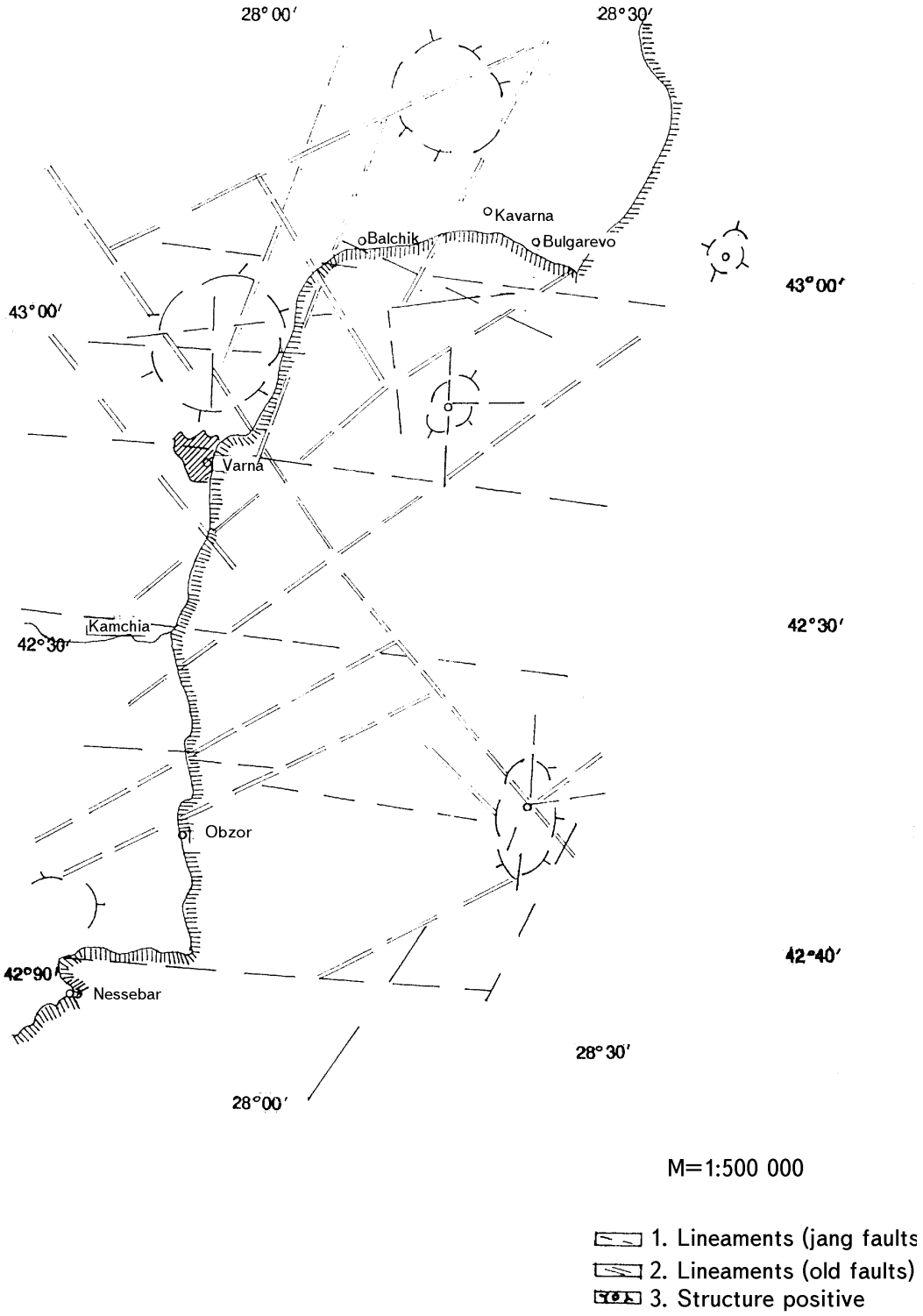


Figure 1.

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