

## ENVIRONMENTAL EDIFICATION AT UNIVERSITIES AS A PART OF SLOVAKIA SUSTAINABLE DEVELOPMENT

KATARÍNA KORÁLOVÁ, ALENA PAULIKOVÁ

### 1 INTRODUCTION

The Czechoslovak republic was the country with relatively high concentration of production. Heavy industry and production of semi-products were concentrated predominately in area of Slovakia whereas consumer industry was in Bohemia. Industrial manufacture development, which was represented the wide range of vehicle production as well as constantly threatening risk of ecological crisis situations, required to deal with restriction of influences for activities, technologies and processes in environment. However, there was not done in the past and that is why very low or none environmental consciousness was „underwritten” below environmental debts of our society.

### 2 HISTORY OF ENVIRONMENTAL PROTECTION AND GENERATION IN SLOVAKIA

Several Czech and Slovak ecologists and environmentalists were identified with this opinion. One of the principal authors, who has comprehended “ecology” as a science discipline, was A. DICHTL (*Animal Ecology, Brno, 1924*).

Further, the importance of environmental protection was also emphasized even in the works A. ZLATNÍK (*Fundamentals of Ecology, Prague, 1973*) and P. FARB (*Ecology, Prague, 1977*). Besides conception “ecology” as well as the terms “life environs” and “environment” have begun to be applied.

From Slovak authors who adopted just this terminology, it is necessary to name for example the work of E. MAZÚR and J. HUŠŤÁK (*Making More Effective A Science Application - Integrated between Science Solution of Problems With Environment, 1978*). In generally Slovak authors E. MAZÚR J. DRDOŠ J. URBÁNEK (*Landscape Synthesis and Their Role For Creation of 3D Environmental Structures, 1980*) dealt with landscape ecology.

In Slovakia M. LISICKÝ founded nature protection in the framework of ecological base. After all that works expressed one common idea. They highlighted a need of environmental conscious human, who would be motivated oneself to behave in consideration to environment, [1].

Environmental developed countries' pressure was a stimulator of new approaches to the environmental development and protection. That is why the majority of available environmental knowledge and documents were in foreign languages. There were predominately English, French and German languages.

### 3 LEGISLATIVE SUPPORT

The necessity for integrating approach in solution of given problems was a support and an international unification of legislative. In ČSSR (the Czechoslovak Socialist Republic) there were existed over 350 juridical standards concerning the partial questions of environmental conservation. For the first time there were the terms “ecology“ and “ecological edification” put into the practice by means of *Conception of State Development Of Nature Protection in the SSR (the Slovak Socialist Republic)*, adopted with the resolution of previous government No. 113/1987, [1].

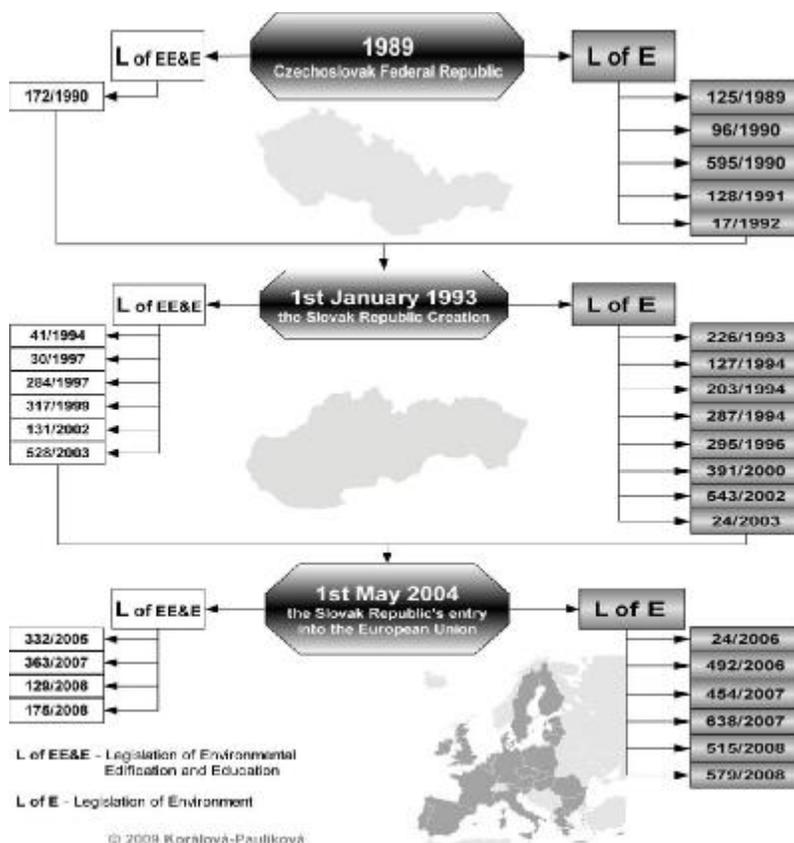


Figure 1 - Development of environmental legislation from point of edification and education in Slovakia

On 14<sup>th</sup> June 1991, during the negotiations of previous Slovak Commission for Environment there was introduced a term “environment” for the first time. Under

a political development and an outer pressure from environmental developed countries there were created, cancelled or novelised laws and regulations concerning to environmental protection. The main point of environmental legislative development was to achieve the independency of the Slovak Republic in 1993. The next very important year is 2004, when the Slovak Republic entered into the European Union's structures and it was beginning of an extensive rebuilding of regulations as a consequence of approximation to the laws and edicts towards European legislation.

In Fig. 1 there is schematically illustrated legislative development of laws, public notices and rules concerning to environmental edification and education in the framework of environmental legislative.

The environmental care, which is done with the national institutions and it is represented with environmental policy and legislative standards, would not satisfied an expected aim. It was necessary to transform specified standards together with actual environmental knowledge into not only citizens' minds but also into managers' minds in all regions and all sectors of economic activities.

The first "environmental" points came into existence at the sections of BOZP (Safety and Protection of Health at Work). In firms there were safety technicians often substituted; eventually they were at work in cumulative positions as "environmental conservators". There was a need of environmental educated people, who would take the new places of "company ecologist" in the system of industrial, manufactural and assembled operations and services. In general environmental activities are conditioned of environmental consciousness. It means that the change from consciousness toward to behaviour is often very long.

#### **4 ENVIRONMENTAL EDIFICATION AND EDUCATION AT TECHNICAL UNIVERSITIES IN THE SLOVAK REPUBLIC**

Environmental consciousness, itself is received mainly environmental edification and education in a family as well as in educational system from nursery, basic school to universities. If we went out above-mentioned information it was necessary to coordinate edification and education in such a way that people not only understood environmental problems but also they were able to solve them from point of causes and consequences. Also there was very important to understand where their place is in this process. However, academic education was under the highest pressure because universities were cradles of environmental edification later this new system was transferred to lower levels of education. At basic and secondary schools there was environmental edification integrated into curriculum in low-coordinated way. Till this time environmental studies were understood like a broad issue rather than an intersection of ecology, biology, geography and chemistry. In curriculum there were environmental studies only like small parts of the main study subjects.

Since 2000 at universities the coordinated integration of environmental aspects for edification and education at universities has already evident and intercepted in new environmental curriculum even with technical study fields. The specialised places with environmental orientation – departments as well as faculties have come into existence. They were developing and reorganizing during previous years.

### The Slovak Republic



#### Legends:

##### 1. Matej Bel University in Banská Bystrica

- Department of Environmental Management
- Department of Biology and Ecology
- Department of Geography and Landscape Ecology

##### 2a. Slovak University of technology in Bratislava

- Institute of Chemical and Environmental Engineering
- Institute of Safety and Environmental Engineering
- Institute of Manufacturing Systems, Environmental Technology and Quality Management
- Institute of Ecological and Experimental Architecture
- Department of Sanitary and Environmental Engineering

##### 2b. Slovak Academy of Science in Bratislava

- Institute of Landscape Ecology

##### 3. The Technical University of Košice

- Department of Environmental Studies and Process Management
- Faculty of Mining, Ecology, Process Control and

##### 4. Constantine the Philosopher University in Nitra

- Department of Ecology and Environmental Sciences

##### 5. University of Prešov in Prešov

- Department of Ecology

##### 6. University of Central Europe in Skalica

- Institute of Environment and Regional Development

##### 7. University of Trenčín A. Dubčeka in Trenčín

- Department of Chemical Technology and Environment

##### 8. Trnava University in Trnava

- The Department of Administrative Law, Environmental Law and Financial Law

##### 9. Technical University in Zvolen

- Department of Biology and General Ecology
- Department of Applied Ecology
- Department of Environmental Engineering
- UNESCO Department
- Department of Environmental Technology

Figure 2 - The allocation of universities providing specialized environmental edification and education, [3]

The actual allocation of Slovak universities, which provide environmental education and edification, is illustrated with a survey map in Fig.2. In the framework of the Slovak republic there is the allocation of environmental

departments and faculties balanced. The representation of schools with technical orientation is a most significant fact.

## **5 DEPARTMENT OF ENVIRONMENTAL STUDIES AND PROCESS MANAGEMENT**

The department of Environmental Studies and Process Management, Mechanical Engineering Faculty at Technical University in Košice is considerable for mechanical engineering industry. It came into existence in the year 1998 and during ten years it was extensively transformed. At present this department has got an important position not only in Slovakia but also abroad. It cooperates with many industrial companies and technical universities (Badger Meter Europa, GmbH, Beuren (Germany); Netzsch Filtrationstechnik GmbH, Selb (Germany); SE, a.s., Bratislava; Siemens, a.s. Michalovce; Whirlpool, a.s. Poprad; SCP, a.s. Ružomberok; MobilStar, s.r.o. Košice; TU Vienna (Austria); BUGH Wuppertal (Germany); TU Maribor (Slovenia); TU Novi Sad (Serbia); TU Cluj-Napoca (Ro); TU Budapest (Hungary); STANKIN Moscow (Russia); Zakarpatska State University Uzhhorod (Ukraine) and Institut Neftechim Moscow (Russia), [2].

By means of such co-operation the department of Environmental Studies and Process Management is able flexibly and fast to accommodate trend and contains of individual study subjects for practical needs of mechanical engineering industry. The department curriculum was an inspiration for foreign universities (TU Novi Sad in Serbia, Kokshetau University in Kazakhstan). The department has got accredited two educational programmes in the framework study fields: Environmental Engineering (EI) and Environmental Management (EM), which include environmental edification and education for sustainable development as a complex in.

The profiled study subjects of educational programmes in the frame of study fields are illustrated in Fig. 3.

The study programme Environmental Protection Technology in the framework Environmental Engineering study field deals with machines, instruments and technologies for mechanical engineering production. The study programme Environmental Management in the framework Environmental Management study field deals with management and regulation outdoor and indoor environment.

The interest in the study of environmental engineering and management is evident from the number of applied student every year. In 1998, when the department was established, the total number of M.Sc. study: in regular and external types and B.Sc. study: in regular type were 35 students per an academic year. At present there is this number increased to 250 applicants for the study with environmental orientation. Very important year was especially an academic year 2005/2006, when the number of students double-increased from 110 students to approximately 225 ones. We can suppose that interest will be

accelerated henceforward for B.Sc; M.Sc. and Ph.D. study. It is satisfied that the high proportion of applied students finish their study as well.

More and more new skills are needed. The conscious students should be to have “environmental skills” because they can integrate into their future work process in a more successful way. It is necessary to make out a new plan for development of individual study programmes and subjects. This way there will be filled up the incurred gaps from point of new knowledge and progress of environmental protection. There is one possibility to make-to-measure “environmental education“. It means the education for individual technical operations e.g. automotive industry, sorting and recycling operation plants, electric power plants, municipal and dangerous waste incineration plants with and without energy utilisation, municipal and industrial water treatment plants and other industrial, production and assembled operation plants. In this way the graduated students should be ready for a practice in industrial operations, where they would be able to solve effectively old as well as new-developing environmental aspects, impacts, hazards and loadings. There are solutions of all these problems regarding to avoid them without potential consequences in future, [4].

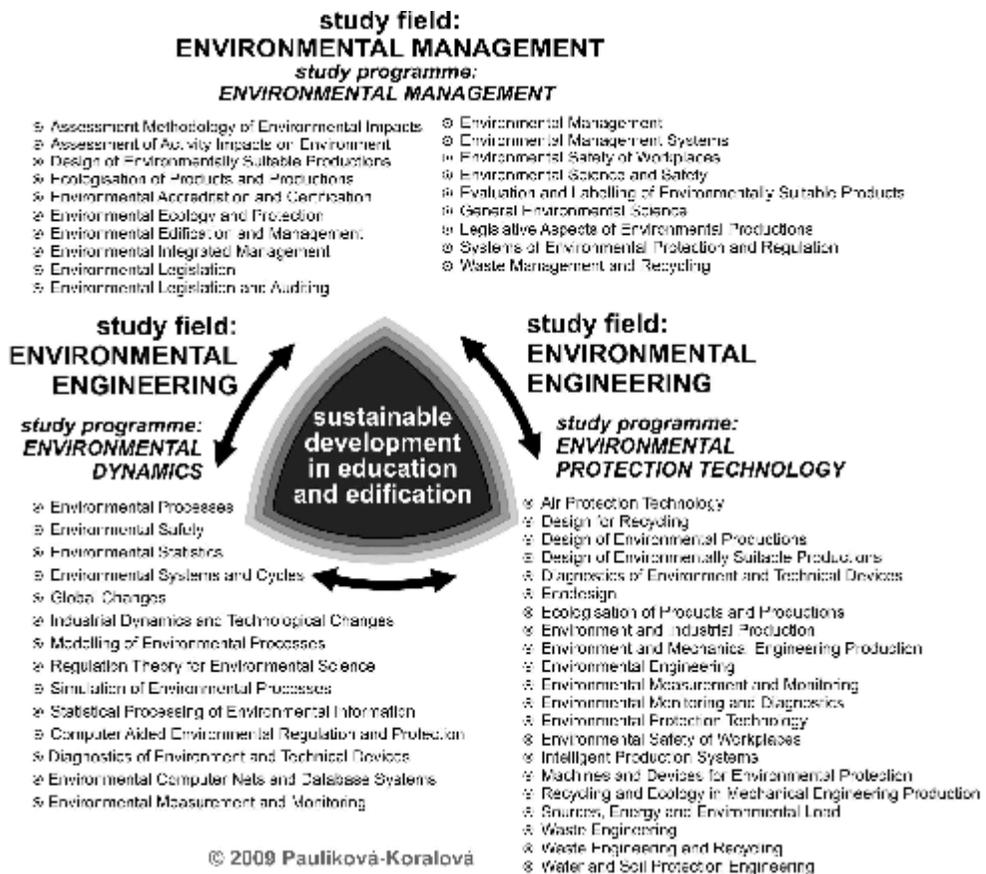
## **6 THE NEW STUDY PROGRAMME – ENVIRONMENTAL DYNAMICS**

Environmental Dynamics (ED) as a new study programme is a new challenge for environmental education. The programme would be focussed into processes by means of long -term and short-term aspects and would be developed present study fields in the above-mentioned department. This vision is also included in Fig. 3.

By developing of the new study programme it will prevent a frequent diffusion of study subjects in the frame of accredited study programmes: “Environmental Protection Technology” and “Environmental Management” and students will be organized better and more specifically. This way the department would educate students with more flexibly and variably orientation of their knowledge and skills.

In Fig.3 there are individual subjects of Environmental Management, which are oriented in the areas:

- Activity impacts assessment on environment according to the law of No. 24/2006 Collection of Laws;
- Environmental oriented regulation and audit;
- Systems of environmental and integrated management and accreditation and certification of these systems by means of standards ISO 14001;
- Registration Eco-Management and Audit Scheme (EMAS), etc.



*Figure 3 - Sustainable development in environmental education as integration of engineering, management and dynamics*

The study programme: Environmental Protection Technology, in the study field: Environmental Engineering deals with:

- Industrial production from point of environmentalism;
- Industrial production from point of consumption;
- Industrial production from point of production and assembly processes.

The study programme: Environmental Dynamics, in the study field: Environmental Engineering would deal with:

- Diagnostics of environmental factors;
- Objectification of environmental factors;
- Computer Aided Simulations (Stella, Vensim, PowerSim).

The individual subjects will be created by means of above-mentioned divisions. All of the programmes have got one role to keep sustainable development in mechanical engineering industry and in our society.

## CONCLUSION

At present ecologisation and sustainable development are developing trends and strategies in industries. Sustainable development is understood like very good balanced social-economic-environmental development. However it is not separated from environmental consciousness, feeling and knowledge. It is pleased that there is progress in environmental edification and education in Slovakia. The interest in environmental education still increases and influences the sustainable development strategy and environmental policy of the Slovak Republic. It is necessary to realise that Slovakia has got the biggest environmental debts in comparison with the other European states, [2]. That is why it is needed to pay attention for these problems. Knowledge of the areas Environmental Protection and Generation must be still developed and enlarged for benefit of future generations. It is expected that there are introduced the new environmental study fields, programmes, forms and subjects for all school levels and for system of life-long education. Only qualitative environmental edification and education can be regarded as “initiator” and “engine“ for changes of human attitudes and behaviours.

## AFFILIATION

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## **ABOUT THE AUTHOR**

M.Sc. Katarína Korálová, Technical University of Košice, Faculty of Mechanical Engineering, Department of Environmental Studies and Information Engineering, Park Komenského 5, 041 87 Košice, Slovak Republic, katarina.koralova@tuke.sk

Assoc. prof. M.Sc. Alena Pauliková, Ph.D; Technical University of Košice, Faculty of Mechanical Engineering, Department of Environmental Studies and Information Engineering, Park Komenského 5, 041 87 Košice, Slovak Republic, alena.paulikova@tuke.sk