

Environmental education for sustainable development and biodiversity conservation in selected study programmes at the Faculty of Natural Sciences of Comenius University in Bratislava (Shortened version in English)

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Abstract

Sustainable development, biodiversity and landscape diversity should be a key component in nature oriented curricula. The Faculty of Natural Sciences of Comenius University in Bratislava trains specialists in natural and environmental science in Master's degree, in particular in the context of the curricula "Environmental Planning and Management" and "Landscape Protection and Land Use". The aim of the analysis was to assess the compulsory and elective study subjects of the curricula in question in terms of coverage of themes of sustainable development (SD). The curricula structure and content were analysed on the basis of 14 themes. The results showed that 20 out of the 41 study subjects cover more than 50% of SD themes. The other subjects, more narrowly focused, are also of importance, because they cover key themes such as biodiversity in detail. Graduates' preparedness for practice and competencies should be sufficient, but it would be appropriate to also focus on the themes in the study subjects in terms of SD indicators.

Keywords:

environmental science, sustainable development, biodiversity conservation, teaching, practice

Abstrakt.

Udržateľný rozvoj, biodiverzita a rozmanitosť kultúrnej krajiny by mala byť základnou súčasťou vo vyučovaní nielen prírodovedných predmetov. Prírodovedecká fakulta UK v Bratislave vychováva odborníkov v prírodných vedách a environmentalistike, v magisterskom stupni najmä v rámci študijných programov Environmentálne plánovanie a manažment a Ochrana a využívanie prírody a krajiny. Cieľom analýz bolo hodnotenie povinných a povinne voliteľných predmetov uvedených študijných programov z hľadiska pokrytia tematických okruhov udržateľného rozvoja (UR). Študijné programy a štruktúra obsahového zamerania boli analyzované na základe 14 tematických okruhov. Výsledky ukázali, že 20 zo 41 predmetov pokrýva viac ako 50 % tematických okruhov UR. Ostatné predmety, čo sú užšie zamerané, majú tiež svoj význam, nakoľko podrobnejšie pokrývajú kľúčové tematické okruhy napr. v oblasti biodiverzity. Pripravenosť pre prax a kompetencie absolventov by mali byť

dostatočné, bolo by však vhodné podrobnejšie sa zamerať na dané témy v rámci predmetov aj z hľadiska indikátorov UR.

Kľúčové slová:

environmentalistika, udržateľný rozvoj, ochrana biodiverzity, výučba, kompetencie, prax

Introduction

Environmental education and instruction are important elements in environmental management strategies. The dissemination of environment-related knowledge and information plays an important role in issues of sustainable development and biodiversity protection; it should be founded on environmental education, which should lead to the acquisition of experience in making decisions and forming the rules of people's conduct towards the environment (Kminiak, 1997).

Today, environmental education can be acquired at multiple faculties of Slovakian universities, in the form of either master's or engineer's study, but the environmental pillar constitutes but one part of the sustainable development concept. The other pillars are economic, social and humanist principles. The Johannesburg Declaration (2002) formulated the thesis of "collective responsibility to advance and strengthen the interdependent and mutually reinforcing pillars of sustainable development" (Kates et al., 2005).

The importance of a holistic combination of environmental, economic and social aspects for defining education for sustainable development is emphasised by Hilbert (2007).

Tertiary education should make a significant contribution to education for sustainable development (ESD) when developing appropriate knowledge and competencies (UN ECE, 2005). According to Blaško (2010), the French term *compétence* was originally used in the context of professional training and denoted the ability (qualification) to perform a certain task. Having penetrated the sphere of education, this term refers to an ability, or potential to act effectively in a given context. Today, an isolated piece of knowledge is meaningless: its application matters. Creating competencies then means enabling individuals to mobilise, apply and engage their acquired knowledge in complex, diverse and unforeseeable situations. The notion of key competence is an internalised, interconnected set of acquired knowledge, skills, abilities, attitudes and value orientations that are important for quality development of an individual's personality, their active participation of society, assertion in employment and lifelong learning.

Environmental education in Slovakia takes places at all school levels, including the tertiary level. The issues of sustainable development (SD) have become an organic and important component of environmental education. University and college graduates in particular are the potential bearers of the sustainable development principles in performance of jobs that have an influence on environmental awareness (Fúry and Hlatká, 2013).

The tradition of environmental education in Slovakia's school system is relatively deeply rooted, although it was closely intertwined with the specific themes of ecology and ecological education in the first stage of its evolution. Eventually, this fact led to progressive infiltration of the two conceptually different notions, that is, fully established ecological science and interdisciplinarily defined environmental science. The new generation of environmental education does not deny the existence of the two concepts, it rather makes a synthetic search for their common themes into a view in which environmental science is grounded in ecological foundations and ecology is transposed into practical environmental issues (Fedor, 2013).

The objective of the paper was to assess and compare the contents of subjects of two master's study programmes at the Faculty of Natural Sciences of Comenius University in Bratislava – **Environmental Planning and Management and Landscape Protection and Land Use** – in terms of coverage of themes of sustainable development in the context of teaching of compulsory and elective subjects.

Methodological approach

The analysis of the master's study programmes **Environmental Planning and Management** and **Landscape Protection and Land Use** involved an assessment of the potential preparedness and competencies of graduates from the study programmes specified above in the school year 2014/2015 (Rybárová, ed., 2014b, www.fns.uniba.sk).

The methodological approach to analysing the above study programmes focused on assessing the contents of lectures, seminars and workshops in compulsory and elective subjects. Attention was concentrated on the presence or absence of themes of sustainable development (SD) in the different subject that form the teaching plan. This was followed by assessing (1) the percentage of subjects containing each of the themes, and (2) the number of themes covered by each of the subjects (Fig. 1 and 2). The study programmes and the structure of the thematic focus were compared based on the themes defined by the UN ECE (Table 2).

The sustainability indicator set of the United Nations Commission on Sustainable Development (UNCSD) contains 50 primary indicators. The sustainability indicator set developed within the United Nations contains 50 primary indicators that match three criteria: they cover themes that concern the majority of countries, they provide fundamental information not provided by any other indicator, and they can be evaluated in the majority of countries based on available or realistically obtainable data. The division of the indicators by the four fundamental pillars (social, economic, environmental and institutional) is not explicit insofar as it respects the importance of mutual integration of the pillars, which means in practice that one indicator can be applied in several themes. There are 14 themes, namely: 1. Poverty, 2. Governance, 3. Health, 4. Education, 5. Demographics, 6. Natural hazards, 7. Atmosphere, 8. Land, 9. Oceans, seas and coasts, 10. Freshwater, 11. Biodiversity, 12. Economic development, 13. Global economic partnership, 14. Consumption and production patterns (United Nations, 2007). The specified themes are comprehensively understood and they correspond with the priority themes of the European Union (Eurostat, 2011). A comparison of the themes for the sub-theme level is shown in Table 2. To compare the sub-themes, the themes as defined by the UN and according to the European Union are largely understood very similarly; there are certain differences in themes 2. governance and 3. health. The European Union's indicator set does not explicitly include theme 6. natural hazards.

Table 2: Comparison of priority themes and sub-themes of sustainable development in the global and European context

No.	SD THEMES AND SUB-THEMES	
	UN (United Nations, 2007 : 10)	European Union (Eurostat, 2011)
1.	Poverty - Income poverty - Income inequality - Sanitation - Drinking water - Access to energy - Living conditions	Poverty and social inclusion - Monetary poverty and living conditions - Access to labour market
2.	Governance - Corruption - Crime	Good governance - Policy coherence and effectiveness - Openness and participation - Economic instruments
3.	Health - Mortality - Health care delivery - Nutritional status - Health status and risks	Public health - Health and health inequalities - Determinants of health
4.	Education - Education level - Literacy	Poverty and social inclusion - Education
5.	Demographics - Population	Demographic changes - Demography - Old-age income adequacy - Public finance sustainability
6.	Natural hazards - Vulnerability to natural hazards - Disaster preparedness and response	
7.	Atmosphere - Climate change - Ozone layer depletion - Air quality	Climate change and energy - Climate change - Energy
8.	Land - Land use and status - Desertification - Agriculture - Forests	Natural resources - Land use
9.	Oceans, seas and coasts - Coastal zone - Fisheries - Marine environment	Natural resources - Marine ecosystems
10.	Freshwater - Water quantity - Water quality	Natural resources - Fresh water resources
11.	Biodiversity - Ecosystem - Species	Natural resources - Biodiversity
12.	Economic development - Macroeconomic performance - Sustainable public finance - Employment - Information and communication technologies - Research and development - Tourism	Socioeconomic development - Economic development - Innovation, competitiveness and eco-efficiency - Employment
13.	Global economic partnership - Trade - External financing	Global partnership - Official development assistance - Globalisation of trade - Financing for sustainable development - Global resource management
14.	Consumption and production patterns - Material consumption - Energy use - Waste generation and management - Transportation	Sustainable consumption and production - Resource use and waste - Consumption patterns - Production patterns
		Sustainable transport - Transport and mobility - Transport impacts

Environmental education – master's degree, analysis by sustainable development themes

In the master's studies at the Faculty of Natural Sciences of CU in Bratislava (Rybárová, ed., 2014b), environmental education for sustainable development and biodiversity conservation takes places chiefly in two study programmes: (1) Environmental Planning and Management and (2) Landscape Protection and Land Use.

When designing the study programme **Environmental Planning and Management**, it deliberately included subjects focused on sustainable development issues; its pivotal themes are: sustainable development, environmental planning, environmental impact assessment, environmental monitoring, land use planning, and others (Pauditšová, 2012). In terms of competencies, the graduate should acquire comprehensive and interdisciplinary knowledge in the areas of environmental protection, environmental policy, landscape management and sustainable development, and know how to cooperate in a team of experts in different professions at a high professional and technical level.

The study programme **Landscape Protection and Land Use** is orientated more on nature protection, biodiversity and environmental ecology, which is reflected in the structure and programme focus of the compulsory and elective subjects within the study programme; the pivotal themes of the study programme are: nature and landscape protection, biodiversity conservation, environmental ecology, and environmental risks. The graduate should be competent to handle problems of threats to quality of environmental components, synthesise the knowledge acquired, evaluate it and propose specific measures to solve problems in nature and landscape protection at various levels.

Within the two above master's study programmes, we analysed the content of 41 subjects, including 18 compulsory ones (1 joint for both programmes) and 23 elective ones (1 joint for both programmes); see Fig. 1 and 2.

The analysis results showed that 20 out of the 41 subjects cover 50-100% (7-4) of the SD themes, within which there were 12 compulsory and 8 elective subjects. The subjects and themes are shown in Fig. 1. The study programme (1) Environmental Planning and Management (EPM) contains 7 such compulsory and 4 elective subjects. In the study programme (2) Landscape Protection and Land Use (LPLU), 4 compulsory and 3 elective subjects cover more than 50% of the SD themes. Two subjects (1 compulsory and 1 elective) are joint for both the study programmes.

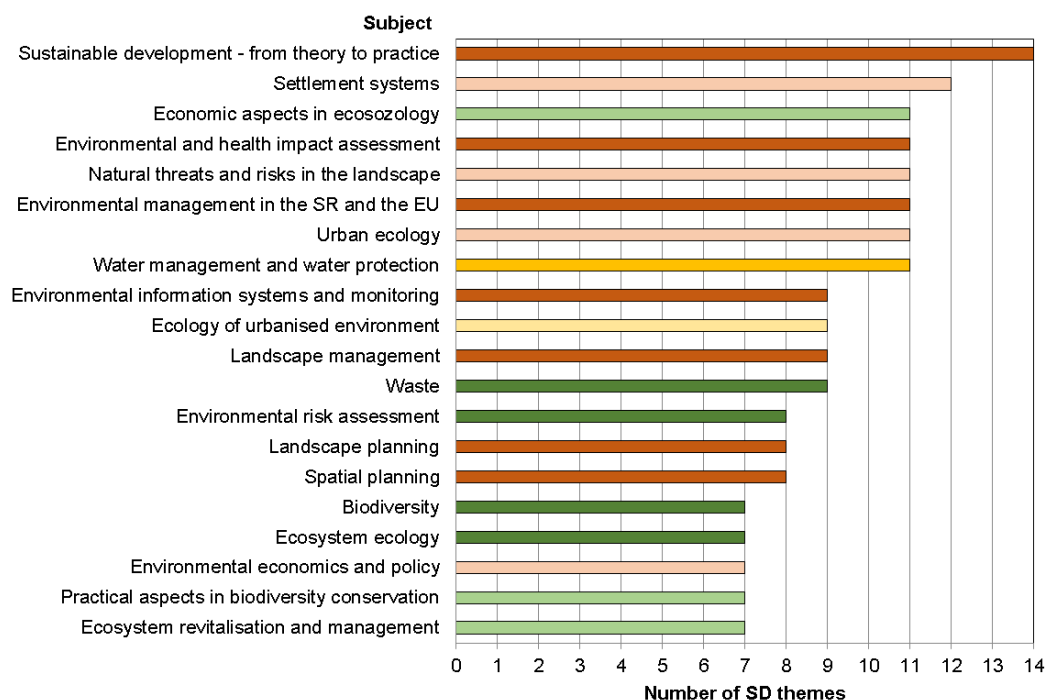


Fig. 1: Representation of SD themes in the subjects of the study programmes Environmental Planning and Management (red colour: dark – compulsory subjects, bright – elective subjects) and Landscape Protection and Land Use (green colour: dark – compulsory subjects, bright – elective subjects) in the academic year 2014/2015. Green colour marks the subjects taught in both the study programmes (subjects adopted from Rybářová, ed., 2014b).

All the SD themes are naturally covered by the subject *Sustainable Development – From Theory to Practice*. The subject provides students of Environmental Planning and Management with an up-to-date overview of sustainable development issues, the students learn to correctly identify strategic priorities and formulate alternative development scenarios for land use at local and regional levels. In the course of the study process, the students understand global principles, criteria and indicators important for ensuring sustainable development at the global level. Fig. 1 shows the other subjects covering 7 and more SD themes.

Landscape is the priority topic for both the study programmes. Approximately 90% of the subjects in both the study programmes deal with the landscape condition, development and methods of use. The pivotal compulsory subjects are *Landscape Planning*¹, *Spatial Planning*¹ and *Landscape Management*¹, and may well include the subject *Environmental and Health Impact Assessment*¹ (Fig. 2). In the study programme Landscape Protection and Land Use, biodiversity conservation issues resonate the most besides the landscape topic. Both the study programmes offer subjects that are related to themes which are interdisciplinary for the Faculty of Natural Sciences of the CU, namely: economic development, global economic partnership and consumption and production patterns, which represent the economic pillar of SD.

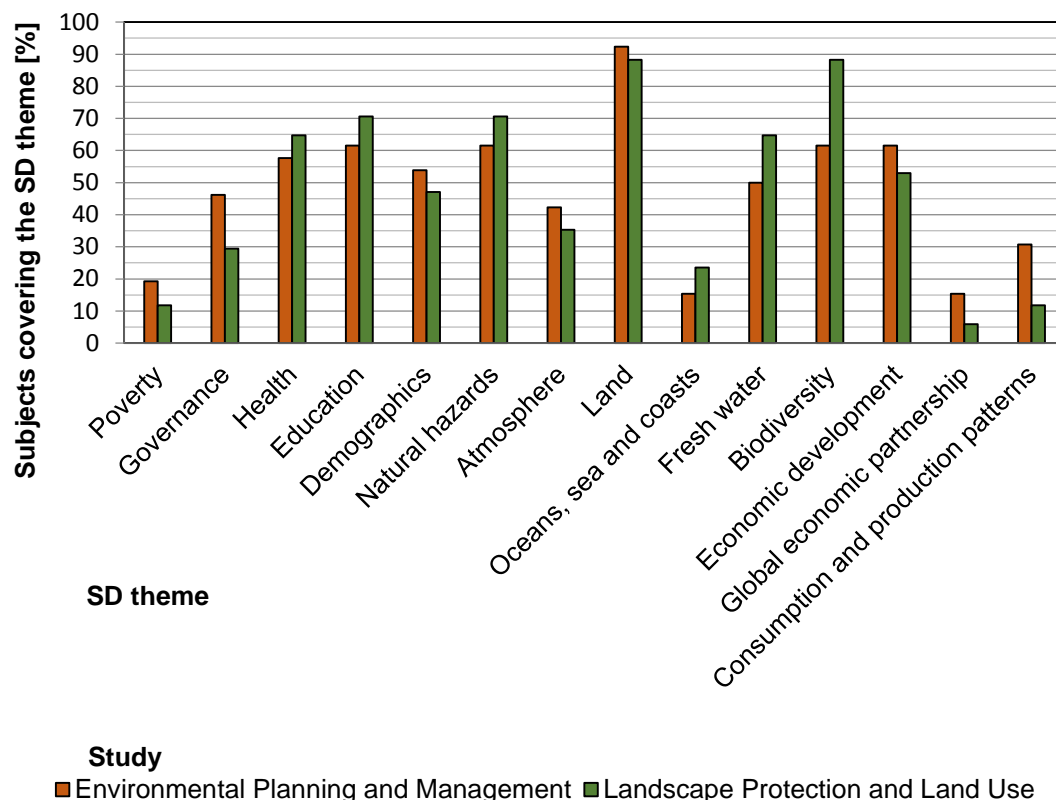


Fig. 2: Percentage representation of SD themes in the different subjects of the study programmes Environmental Planning and Management and Landscape Protection and Land Use in the academic year 2014/2015 (subjects adopted from Rybárová, ed., 2014b)

The difference between the study programmes is obvious and corresponds with the purpose of their design. The study programme (1) Environmental Planning and Management is deliberately focused on sustainable development issues from a broad perspective; the study programme (2) Landscape Protection and Land Use is more narrowly oriented on natural risks and biodiversity conservation. Both the study programmes provide a relatively wide scope of knowledge in the area of sustainable development, but it would be advisable to motivate the teachers more to present these contexts systematically in all the subjects of the study programmes.

At present, the Faculty of Natural Sciences of the CU in Bratislava is running the project *Interdisciplinary integration in establishing an environmental study programme in the English language* (2012–2015), the implementation of which is meant to support cooperation between the university, research and development organisations and the private sector at the national and international levels. Its objective is to build two new bachelor's study programmes in the English language, established based on the needs of the labour market (Abrahámová et al., 2013).

Discussion and conclusion

The methodological process of analysing the master's study programmes **Environmental Planning and Management** and **Landscape Protection and Land Use** focused on assessing the contents of lectures, seminars and workshops in compulsory and elective subjects. Attention was concentrated on the presence/absence of sustainable development (SD) themes in the different subjects of the programmes. This was followed by an assessment of (1) the percentage of subjects containing each theme, and (2) representation of themes in each of the subjects. The study programmes and the structure of their thematic focus were assessed based on the 14 themes defined by the UN Commission (1. Poverty, 2. Governance, 3. Health, 4. Education, 5. Demographics, 6. Natural hazards, 7. Atmosphere, 8. Land, 9. Oceans, seas and coasts, 10. Freshwater, 11. Biodiversity, 12. Economic development, 13. Global economic partnership, 14. Consumption and production patterns), insofar as they are a synoptic representation of the pivotal themes of sustainable development. It follows from a comparison down to the sub-theme level that the themes defined by the UN (United Nations, 2007) and the European Union (Eurostat, 2011) are understood very similarly.

The analysis of the study programmes in terms of coverage of the 14 themes of sustainable development indicated that the pivotal topics of both the study programmes assessed are natural risks, landscape and biodiversity, which corresponds to the environmental pillar of sustainable development. However, the study provides knowledge in the other pillars as well: multiple subjects cover the economic and institutional pillars, whereas the social pillar is only represented marginally.

The analysis results showed that 20 out of the total of 41 subjects cover 7-14 (more than 50%) of the SD themes. In the study programme Environmental Planning and Management, there are 7 such compulsory and 4 elective subjects. All the SD themes are covered by the subject *Sustainable Development – From Theory to Practice*. The study programme in question was designed from the very start with an emphasis on graduates' acquisition of competencies in the area of sustainable development, which is reflected in the broad range of interdisciplinary subjects, which provide both knowledge and acquisition of practical skills for practice. However, this depends on the graduates' further practice and lifelong learning. According to Blaško (2010), key competencies have a longer life than professional qualification; acquisition of key competencies is a lifelong process, maintained by the dynamics of a person's new education and retraining.

The Action Plan for Education and Instruction for Sustainable Development in the SR for 2006-2010 defines multiple tasks supporting sustainable development of the SR. The status of universities and colleges with respect to achieving sustainable development objectives is emphasised in this context. Sedlačko and Kozová (2007) emphasise the comprehensive importance of universities and colleges in relation to SD. According to the authors, universities and colleges as organisation are also consumers and employers, which is why sustainable universities and colleges develop the abilities of sustainable operation and management (which concern energy and material consumption, waste generation and management, transport, food, procurement of products and services, and human resources policy).

The broad-range understanding of sustainable development has found response in tertiary studies at universities and colleges of various orientations. Different study contents with a focus on sustainable development and different objectives for student education is obvious when, e.g., comparing multiple study programmes across Slovakia's universities and colleges. Education for sustainable development in programmes for students of teaching at the Faculty of Natural Sciences of the CU in Bratislava has been analysed by Chrenščová (2008). According to the author, the levels of environmental education for future teachers

differ in terms of both the extent and content. Environmental education for future teachers differs across study programmes and specialisations.

The study programme Environmental Management was accredited at the Faculty of Management of the University of Prešov in 2011. Teaching of the study programme commenced in the academic year 2012/2013. Its graduates should be able to make effective managerial decisions in connection with sustainable development, and are also supposed to be able to work with all population age groups with the purpose of forming their environmental awareness. The ambition of the programme is not to produce a rigorous environmentalist; the product of education in the programme should be a graduate who has (in the bachelor's stage of study) a broad scientific foundation of the underlying disciplines – chemistry, ecology and environmental studies – which are then expanded by profile subjects of cross-section disciplines of environmental management as an intersection of natural science and social science perspectives of the area (Adamišín, Chovancová, 2013).

The Slovak University of Agriculture in Nitra offers a more narrowly specialised study programme than the Faculty of Natural Sciences of the CU in Bratislava. The Department of Sustainable Agriculture and Herbology of the Faculty of Agrobiological and Food Resources provides teaching of subjects focusing on the areas of sustainable and ecological agriculture, agroenvironmental indicators of sustainability, design of sustainable agricultural systems, and development of non-productive functions of agriculture and agrotourism. These topics are taught in subjects of the engineer's stage of the study: *Design of Sustainable Agricultural Systems* and *Sustainable and Ecological Agriculture* (www.fapz.uniag.sk). The Faculty of European Studies and Regional Development of the SUA in Nitra provides the study programme Environmental Management (in both the first and second degree, as both presence and distance study) through two of its departments: Department of Ecology and Department of Sustainable Development (Eliáš, 2013).

According to Neubergová (2009), the issue of graduates' "leaving" knowledge is closely related to requirements of practice. In the ideal case, students should strive for the application of the sustainability concept in practice, and its practical application should in turn radiate its requirements, to which tertiary education should respond flexibly.

Assessing the graduates of the study programmes in question taught at the Faculty of Natural Sciences of the CU in Bratislava based on feedback, their practical application is positive in that they have been finding jobs and applying sustainable development principles in practice in state institutions active in nature protection as well as in non-governmental organisations, including ones they have founded themselves. The NGO BROZ, for example, has used support from the European Commission LIFE-Nature scheme to take a 25-year lease of 250 hectares of land on the Veľkolélsky Isle, where it is implementing a project of forest conservation, restoration of neglected meadows, reintroduction of grazing of farm animals, and cooperation with the local community.

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