

CRITICAL APPROACHES, INTEGRATION OF RESEARCH AND RELEVANCE OF GEOGRAPHY

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Critical approaches, integration of research and relevance of geography

The article examines considerations about the challenge of “critical physical geography” which spurs the cooperation of physical and human geographers in search of the solution to problems stemming from climate and environmental changes. The challenge is associated with the adoption of geographical results in social practice and the consecutive acquisition of finances for research and education. In this context, the aim of the article is to draw attention to the integrating developmental conceptions in the geographical cognition in Slovakia and their continual relevance for scientific tendencies, political and social interests. Application of modern technologies (Geographical Information Systems and remote sensing) and databases about landscape (Copernicus Programme) is reflected in the participation of geographers in important national and international projects. These activities have also led to the development of methodology of scientific research and the modernisation of the educational process.

Key words: critical physical geography, integration of physical and human geography, integration tendencies in Slovak geography, environmental governance, politics of knowledge, social relevance

INTRODUCTION

Transformation processes in the Slovak Academy of Sciences (SAS), problems with funding for the universities and research centres in Slovakia spur discussions about the relevance of academic institutions, scientific disciplines and study programmes. Importance of the scientific branches also depends on their acceptance and practical application in terms of solutions to serious social, economic and environmental problems which is also reflected in the competition for scarce financial resources (Matlovič and Matlovičová 2015). Scientific discussions reveal that the universities and research institutions, including the geographical ones all over the world face the same problem (Castree 2012, Lave et al. 2014 and Ellis 2017). First of all, the evaluation of scientific production (publications), applicability of projects and subsequent funding of institutions, teams and workers are discussed. Special emphasis is laid on the present interdisciplinary geographical work and first all the benefits of a permanent integration of physical and human geography for the applied sphere. This area of overlapping geographical researches is, because of political and pragmatic reasons, referred to as the *critical physical geography* (CPG) which even sounds as a challenge on the side of the North American geographers (Lave et al. 2014 and Lave 2014). These authors interpret CPG as a research area which combines the critical view of power relationships with the deep knowledge of physical geography or technologies in service to social and environ-

mental transformation. “Such work neither oversimplifies physical geography as “naively positivist” nor seeks to criticize physical geography from the outside. Rather, CPG “requires critical human geographers to engage substantively with the physical sciences and the importance of the material environment in shaping social relations, while expanding physical geographers’ exposure to and understanding of the power relations and human practices that shape physical systems and their own research practices” (Sayre 2015, pp. 576 – 577). A wider objective is now the search for more efficient solutions to the existing problems. This, however, requires a critical assessment of the origins and history of concepts and terms used in physical geography (Sayre 2015, p. 577).

In opinion of some authors it is not practical to separate the analyses of natural and social systems. They recommend applying a synthesis of socio-bio-physical knowledge (of cultural landscape) especially by means of modern technologies with the aim to increase the political significance of physical and human geography (Lave et al. 2014). The challenge and identification of CPG is not unambiguously accepted. To some it means ignoring of the scope of epistemological contribution of the physical geography (Rhoads and Thorn 1996, Gregory 2000 and Trudgill and Roy 2003), or simplification, disuse or underestimation of the reached results by human geographers. In spite it is appropriate to remind that there are historical examples when application of the integrating tendencies to the geographical cognition has greatly contributed to the increase of its social relevance. Progress in physical geography in this sense is a three-way process including research, tuition and its social response, the outer image (Castree et al. 2008). These authors presented a forum based on the idea that entire geographical knowledge is pedagogical and that pedagogy is political. Using the broadened concepts of “pedagogy” and “politics” they propose to always include geography into the process of formation and management of wider society and that not only in the “participatory”, “activist” or “public” geographies. This conception also renders a feedback how the political response motivates geography and what are the creative potentials of pedagogy in benefit of researchers and students (Castree 2012).

This article aims to emphasize the significance of integrated research where the physical and human geographers contribute to the basic knowledge of how human and social systems function. Integration of the geographical research referred to as CPG yields efficient results in the context of interdisciplinary approaches applicable to the solutions of social and environmental problems. The CPG challenge simultaneously raises questions about the present position of geography in Slovakia and also the orientations of its research in the context of accreditation of its units in the universities and the SAS. Authors attempt at describing the integrating conceptions in the development of Slovak geography in order to remind its social relevance, international geographical trends, and to suggest the stimuli of further development.

DEVELOPMENT OF INTEGRATING TENDENCIES IN THE SLOVAK GEOGRAPHY

The development of geography in Slovakia and its position in the world geographical knowledge was started by the pioneers of geography and cartography, Matej Bel and Samuel Mikoviny (Matlovič and Matlovičová 2015). Bel’s synthesised, nature-historical and social description of Old Hungarian stolitzas (historical

territorial units) in his *Notitia Hungariae novae historico geographica* were complemented by Mikoviny's maps. Further development of geography will be presented with an emphasis on its integrating conceptions in the context of research, education and social acceptance. The most important personalities of Slovak geography were Jan Hromádka and Michal Lukniš, who greatly contributed first of all to the tuition of geography at the Comenius University (Lauko 2006). Their share in institutionalisation of scientific research in Slovakia at the Geographical Institute, today the Institute of Geography of the Slovak Academy of Sciences (IG SAS), one of those that founded the Slovak Academy of Sciences in 1943, is also important. Both of them developed geography following the Vidalian concept of regional geography and stressing the immanent attributes of geography. According to Matlovič (2006, p. 8) works of Hromádka (1943) and Lukniš (1947 and 1977) reveal a search for the links (dialogue) between civilisation (as a source of creative and conservative ideas) and a broadly meant geographical *milieu* reflected in various *genre de vie* in individual *pays*.

In its beginnings, geography developed since 1952 at the Faculty of Natural Sciences of Comenius University at the Departments of Physical and Economic geography (Lauko 2006) and at the Geographical Institute of the SAS pursuing the dual conception of physical and human geography. This dichotomy reflected the natural effort to reach specialisation of scientific disciplines and resulted in differentiating tendencies in geography (Bašovský 1979). The specialised development of cognition in individual disciplines of physical and human geography brought many important results: in geomorphology Mazúr (1963), Lukniš (1972 and 1973), Krcho (1973) biogeography (Plesník 1971), pedogeography (Mičian 1972), geography of industry (Ivanička 1959), and geography of settlements (Bašovský 1966 and Verešík 1974) with their corresponding international response.

Work of Mazúr (1968) was an important milestone evaluating the position of geography, results of its specialised research as a legacy for further development of geography in Slovakia. Mazúr (1972) specified his legacy in a work which emphasised the synthesising nature of geography as a science but also the need of its constructive engagement in social sphere. The incentives leading to the integration of the results of geographical knowledge in the context of complexity and spatiality of the science were based on the requests of the applied sphere. The first integrating concepts of geographical cognition in Slovakia were, for instance, the studies devoted to broader "geographical" conditions of the construction of the East Slovakia's Steel Works near Košice (Ivanička 1964). Geographers took part in many studies evaluating the natural and socio-economic conditions in selected areas of interest, for instance, designs of the conurbation of B. Bystrica and Zvolen, of housing estates or centres of tourism (Ružička et al. 1969 and 1974 and Mazúr et al. 1985). The integrating nature of research is also obvious in the works devoted to regions (Drdoš and O'ahel' 2006), dealing with the environmental problems, public defence of the reached results and simultaneously conclusion of the geographical research by spatial synthesis (O'ahel' 2005).

The political thaw in the 1960s and chances of international contacts with scientific and research centres especially contributed to the development of the integrating aspects of geography and its social acceptance. Apart from the influence of the Russian *Landschaft* geography (Isačenko 1965 and Armand 1975) there were contacts with the West European universities and research centres focused on the territorial and landscape planning and landscape ecology (*Landschaftsökologie*), geo-

ecology (Universities of Hannover, Gent, and Leipzig) that provided some responses to the integrating approaches first of all in physical geography. It was work of Drdoš (1965) that initiated a research orientation to what was referred to as landscape science (náuka o krajine) with a clear synthesising, landscape-ecological approach to landscape research. It also introduced an appropriate methodical guide to optimisation of land use as the basis of the living environment and formulated methodical principles and procedures of landscape ecological planning LANDEP (Ružička and Miklós 1982). Landscape-ecological school of the University of Hannover influenced the studies of Žigrai (1971), emphasising the integration in research and optimisation of land use (Žigrai 1983 and 1995, Žigrai and Drgoňa 1995).

Landscape science along with the cited schools, especially the geo-ecological school of Leipzig (Neef 1967 and Haase 1978) also motivated the formation of the educational programme of geographical studies at the Faculty of Nature Sciences, Comenius University in Bratislava. The course of *comprehensive physical geography* lead by Ľudovít Mičian (Mičian and Zatkalík 1984 and Mičian 2008), provided stimulating methodical foundations of geo-ecological, landscape ecological, holistic approach to cognition of landscape and eventually an impulse for the followers of integrated landscape research (Hynek 1981, Miklós and Izakovičová 1997, Minár et al. 2001, Oľahel' et al. 2004 and Tremboš et al. 2009) adhering to the geo-ecological school of Bratislava.

The synthesised approach and adoption of physical-geographical knowledge has also manifested in research of Slovak pedologists. Their results have been processed in the *Comprehensive Survey of Agricultural Soils of Slovakia* (1961 – 1970), thematic maps and the accompanying reports which are archived in the Soil Science and Conservation Research Institute (SSCRI) in Bratislava. The research continued by evaluation of soil-ecological units recorded in maps which are important materials for, beside other, evaluation of agricultural landscape (Džatko 2002).

Apart from the requirements of practice, international impulses also influenced the synthesising aspect of geography (Hagget 1972) and offered favourable conditions for the formulation of scientific programme of landscape synthesis at the Institute of Geography of the SAS (Drdoš et al. 1980, Mazúr et al. 1980 and Urbánek et al. 1980). The programme introduced methodical procedures for the system of geo-ecological information which diagnosed the status of landscape, was a relevant material for forecasting and served as a guide to rational land use and landscape management. The results were presented at several international conferences and published in numerous theoretical and methodological (Drdoš 1973 and 1983, Huba 1984 and Mazúr and Drdoš 1984) or empirical studies (Mazúr et al. 1985, Oľahel' and Poláček 1987, Lehotský 1991 and others).

The break-through work of the Slovak geography and cartography, that is, the *Atlas of the Slovak Socialist Republic* (Atlas SSR 1980) deserves a special credit in spatial studies. Especially the syntheses of the natural (geo-ecological) landscape and those assessing geo-ecological and socio-economic conditions in the context of environmental quality and potentials of regional development obtained international recognition. The environmental concept was not only an excellent integrating theme of both the physical and human geography but the presented results became an original contribution to the world atlas creations.

The integrating environmental/geographical approach also applied the principles of landscape synthesis when assessing effects of assorted intentions on landscape and on the environment: designs of motorway routes, potential risks of dolomite mining, construction of the Gabčíkovo Water Works (Lehotský et al. 1989, Drgoňa et al. 1992 and Lehotský and Mariot 1992). The studies also stimulated formulation of the procedures associated with the environmental impact assessment (EIA) and their legal frame (Kozová and Drdoš 1995).

NEW THEMES OF GEOGRAPHY AND SEARCH FOR THE BOND

Transformation of social and political development in Slovakia has also influenced the science of geography. New chances of international cooperation, participation in the European projects, new technologies and tools (the GIS and remote sensing), but also new possibilities to take part in the national activities in public life have opened a broad space for self-realisation of the geographical centres, teams and individuals. The origin of the new State was followed by the new administrative division, newly established governmental and public administration authorities which required the participation of geographers. Most of the opportunities were offered to geographers by the environmental sector, whose legislative framework and research methodology were coordinated by the Ministry of the Environment of the Slovak Republic. On the national level, the new activities were fed by the need to establish legal regulations, methodology for the assessment of the real status of the environment, its sustainable development, environmental impact assessment, conceptions and processes of the territorial systems of ecological stability, etc. (Huba et al. 2017). Significance of the task greatly increased in the context of coordination with international institutions (e.g. European Environmental Agency – EEA, CORINE Programme, Agenda 21, European Landscape Convention and the activities in the International Geographical Union – IGU and the International Association for Landscape Ecology – IALE).

It seemed that the share of geographers in the “participative”, “activist” and “public” spheres of interests (Castree et al. 2008) again differentiated the research-scientific themes, identity, and unity of geography. The integrating, holistic approach to landscape research continued for a while as part of the IALE programmes and conferences but it rather faded in work on individual research themes in which geographers participated: sustainable development, landscape planning, integrated water management, flood risks and hazards, perception and appearance of landscape, landscape physiognomy, landscape typology, and landscape changes. Some results were comparable to the European trends as they were parts of many international projects (CORINE and Urban Atlas) and activities the IGU Commissions (Land use/cover change – LUCC/IGU). But the common interest in integrated themes and programmes (Huba et al. 2017) confirming the identity of geography and increasing its social and political relevance was missing.

Globalization at the turn of the millennia but also the competition of scientific communities for the limited funds usable in research and education activities affected the position of geography all over the world. As if these processes, new communication and technological changes, caught geography in a recurrent stage of differentiation and disintegration. Buttner (1990) pointed to the need of self-reflection and her comments were summarised by Matlovič (2006, p. 2) as “*the disintegration of geography into a free association of disciplines and its slow mel-*

ting in other than geographical special sciences". This disintegration of research interests was also associated with the origin of new institutions, teams and subjects. At the beginning of the millennium, the worry about future of geography in Slovakia led to a special discussion about the development, the status quo and perspectives (Matlovič and Ira 2006) which presented a critical diagnosis of this science. Discussion also brought about valuable suggestions how to interpret the object of geography and its hierarchic levels, how to interpret the expertise of geography to integrate the knowledge of other nature scientific and humanist disciplines and eventually search for the bond of the autonomy and identity of geography (Matlovič 2006).

CRITICAL PHYSICAL GEOGRAPHY OR A NEW CHALLENGE FOR GEOGRAPHY?

In the second decade of the new millennium the discussion about the status and future of geography goes on and questions about the dichotomy of physical and human geography are repeated and so are the suggestions concerning the synthesis of physical-geographical and human-geographical research. A special issue of *Progress in Physical Geography* (Sayre 2015 and Lave 2015) was even dedicated to this discussion. Why all these intentions, inherent to geography, to recognize spatial relationships between the natural basis (biophysical entity) and human society (sociosphere) are merely partial or they even fail? As if both, the physical and human geographers stubbornly defended their approaches without attempting to cooperate (Lave 2015).

One of the catalysts of the world-wide discussion (Lave et al. 2014) was the contribution of geologist Johnston (2012) who blames physical geographers for certain "arbitrary" incommunicativeness, obsession with their own themes and missing cooperativeness with other nature-historical sciences and humanities. Positively, this reprimand was meant as a challenge and anticipation of common solutions to the issues that global climate change brings. This appeal of a geologist led geographers to research the Quaternary system of the Earth and simultaneously call for an integrated and interdisciplinary research by the departments involved with sciences about Earth. But during the discussions that followed, the majority refused Johnston's interdisciplinary isolation of physical geographers asserting that the potential intellectual synergy is to some extent also real in and outside geography (Lave et al. 2014). Geographers especially point to the synthesis within geography. As a matter of fact, the emphasized integration of physical and human geography is associated with the social and political relevance. The change of climate itself concerns society, its activities, economic development, urban sprawl, artificial surfaces, and warming. Humans as part of the sociosphere, and because of their interests also the noosphere and cybersphere, are one of the most important forces that transform the landscape sphere of Earth and since their arrival the landscape sphere became part of their living environment. Therefore, it is not by chance that since the existence of humans this period is referred to as *anthropocene* (Ellis 2017 and Castree 2012). Although the age of anthropocene is very short in terms of geological time, transformation of landscape and the environment means a possible change of the paradigm also in the context of stimulation of physical and human geographical research. Comprehension of the dynamism of anthroposphere (Ellis 2017), as part of the landscape sphere, requires application of not only the nature-historical tools of studies but its management and forecasting also calls for application of a

broader methodological apparatus of humanities. In spite of it, physical geography with its methodological base is one of the key disciplines in the integrated comprehension of the form, functioning, and dynamism of anthroposphere and its relationships and interaction in all landscape spheres (Ellis 2017) and consecutively for the cognition of the feedback with the sociosphere and noosphere. This may also provide the answer why the present challenge and critique is first of all addressed to physical geographers (Lave et al. 2014 and Lave 2015) and formulated as CPG. Meanwhile, the appeal for cooperation and integration of results of geomorphologists, hydrologists, climatologists, pedologists, bio geographers, and ecologists has been repeated for a long time (Massey 1999, Clifford 2002, Bracken and Oughton 2009 and Lave 2015). Justification of the synthesis of physical geographical knowledge and its interpretations for social use is easily found in the retrospective of developments. In this sense the world literature quotes direct interpretation of geomorphology (Wilcock et al. 2013), climatology (Johnson 2010), pedology (Warkentin 2006), and biogeography (Duvall 2011). Important synthesised contribution for social use is that of fluvial geomorphologists (Clark and Richards 2002 and Lane et al. 2013). Studies of political ecology (Grabbatin and Rossi 2012), for instance, treating degradation of soil and the associated economic losses (Blaikie 1985 and Bakker a Bridge 2006) are especially appreciated.

Perhaps the first step toward integration should have started with the knowledge of the biophysical basis of landscape. Lave (2015) quotes two key characteristics of CPG which are consistently focused on 1) biophysical landscape and power relationships which are ever more often forming and to 2) the politics of environmental sciences and the role of biophysical research in support of social and environmental justice. He also suggests that this combination of its characteristics makes it different from other scientific fields even though they influenced it.

The key areas based on the integrated research approaches include the changes of land cover and land use. Their dynamics are predominantly determined by social drivers linked to economic and regional development, influenced by determinants of biophysical, social, interactive, neighbourhood and political nature (Verbung et al. 2004). Knowing the causes of landscape changes is necessary for the analysis of scenarios of further development. Modelling processes based on the change determinants is one of the tools for the prediction of the development and for the spatial organization of land use (Overmars et al. 2003 and Pazúr et al. 2014).

Formulation of integrating approaches in physical geography is also significantly influenced by political ecology. Especially the studies making use of the ecological and pedological knowledge along with the agrarian political economy for the critical assessment of the developmental applications (Blaikie 1985) are often cited in the context of the world incentives. The concept of political ecology is also frequently more broadly interpreted from the position of political and economic interests of society for the exploitation of biophysical basis of the landscape sphere (Walker 2005 and Turner 2015). The term environmental policy along with the various assessments based on the economic indices for the environmental accounting is better known in Europe (Haines-Young and Weber 2006). The political interest prefers an integrated and interdisciplinary research also given by the logic of interdisciplinarity (Barry et al. 2008) and indispensability for solutions to environmental issues which “preclude the luxury of assessing the things from a unique perspective using a unique conceptual framework” (Aligica 2004, p. 68).

INTEGRATION OF RESEARCH AND ACCEPTATION OF GEOGRAPHY (DEVELOPMENTAL STIMULI)

The diagnosis of the condition of Slovak geography at the beginning of the millennium (Matlovič and Ira 2006) expressed the worries but also offered ideas and presented proposals of solutions. In accord with Minár (2009) “space and integral geographical synthesis are the postulates on which stands the definition of the united geography as a fundamental science”. Minár (2009) outlined the general conception, i.e. the theory of geographical fields concentrating on its basic building material which may unite a number of conceptions autonomously developing both in the physical and human geography. Lehotský et al. (2008) also hinted at the importance of the holistic concept of the river landscape presenting a “synoptic approach”.

Orientation of scientific research and the development of scientific disciplines are also influenced by social challenges, the interests mediated by the political hinterland and finances. The questions of funds in science are discussed all over the world. Analyses of scientific production analogue to political economy (Lane 2017) are underway in order to support science with the comment that it is scientists and not politicians who should decide about funds for research. Analysis of the universities as the owners of means of production through physical geographers (work) and sources (finances), and the assessment of production (scientific articles) pushes research to the position of political economy and subjects science to the extreme scientometry so that the articles represent the key output of research activities at the universities at the cost of other forms of academic publication (Keighren 2016). Increased funds mean also engagement of specialized experts and teams dedicated to work on financially attractive projects, refreshing the teams with PhD students with special financing, and the like (Lane 2017).

Our system of funding academic and university centres is, apart from institutional means, also motivated by financial sources of Slovak grant agencies (Scientific Grant Agency of the Ministry of Education, science, research and sport of the Slovak Republic and the Slovak Academy of Sciences – VEGA, Slovak Research and Development Agency – APVV) or European agencies (EEA and ESA). Acceptation of research teams in competition for financial sources is associated with the expertise, originality of the theme, professionalism in processing the project and the existing social and political interest both in the national and world context.

The first important stimuli to the geographical research included the participation in the pan-European projects BIOPRESS and CORINE Land Cover (CLC). International interest and coordination of the CORINE Programme of EEA were decisive for the implementation of projects. The first results were connected with the processing and creation of data layers of Slovakia's land cover by the CLC method which made it possible to participate in work on the global landscape changes also in the frame of the LUCC/IGU Commission (Kopecká et al. 2014 and Feranec et al. 2016). For example changes of land cover on the level of Slovakia were assessed in the studies of O'ahel' et al. (2004) and Feranec et al. (2018a). They analyse the changes of agricultural use (Pazúr et al. 2014) or the dynamics of built-up areas (Kopecká et al. 2015). Several studies assessing landscape changes on the regional level are based on the same conception (Cebecauerová 2007, Falt'an et al. 2008 and Ivanová 2013). Other approach to the research of

landscape changes is based on the concept of the secondary landscape structure presented in numerous geoecological and landscape-ecological works (Olah 2003, Boltižiar and Petrovič 2005, Petrovič 2005 and Solár 2018).

The issue of landscape change is one of the integrating themes, which has been reflected in the acceptance of several projects of the VEGA or APVV agencies. Dynamics of built-up areas, first of all in large cities, is related to the changing temperature regime and the theme of the APVV project now worked on by the interdisciplinary team of authors from the Institute of Geography of the SAS and the Slovak Hydrometeorological Institute in Bratislava (Feranec et al. 2018b). The applied aspect is an important characteristic of the studies in the field of geography of agriculture. Several projects supported by the grants of the APVV agency obtained by the teams from the Faculty of Humanities and Nature Sciences of the University of Prešov in cooperation with the Prešov branch of the Soil Science and Conservation Research Institute and the Faculty of Natural Sciences of Comenius University in Bratislava confirm the interest in result in this sphere. Results of the quality and potential assessment of agricultural land in Slovakia (Vilček 2006 and 2014, Vilček and Bedrna 2007 and Vilček and Koco 2018) also contributed to acquisition of funds. Results of a detailed geoecological research of location conditions in vineyards further developed the concept of the *natural terroir* and contributed to the management of viticulture by implementation of the appropriate procedures of precise agriculture (Matečný 2014 and Karlík et al. 2017).

Suburbanisation processes definitely modify hinterlands of large cities. Political and economic stimuli along with the demographic and social conditions determine the dynamism and character of suburban landscape. The theme requires integrated approaches as numerous studies demonstrate (Matlovič and Sedláková 2007, Šveda and Šuška 2014 and Šveda et al. 2016). Social significance of the theme is also confirmed by research into the determinants of land cover and land use changes (Šveda and Pazúr 2018) financially supported by the VEGA and especially APVV agencies.

Important themes of physical geography which applied the holistic approach (Lehotský et al. 2008) include the integrated research of morphology of river systems eventuating in the management of cultural landscape. Comprehensive morphological research is focused on the analysis of flood risk in detailed scales, morphological effect of floods and production of flood risk maps of Slovakia. One of the key problems connected with the management of river basins is runoff as one of the basic processes of the hydrologic cycle. The size of runoff is closely connected with the occurrence of floods, which is the reason why the study is so important. It may contribute to a targeted, financially and technically efficient application of counter-flood measures in river landscape (Lehotský et al. 2008, Solín et al. 2011, Rusnák and Lehotský 2014 and Kidová et al. 2016).

For its complexity, the theme of cultural landscape requires application of critical and integrated approaches of research from the point of view of cognition of natural, industrial, architectural, and cultural phenomena including the local customs in the context of conservation of cultural and historical heritage, as well as for the sake of prediction of further development in regions (Hanušín et al. 2013). An important motivation for the renaissance of cultural landscape research was the adoption of the European Landscape Convention in 2000, which also found reflection in works of Slovak authors (Šebo and Huba 2013 and 2015).

Nature and landscape protection is a priority research, social and political interest with supranational significance (Hanušín et al. 2008). Participation of the IG SAS in the international projects of the INTERREG and the European Territorial Cooperation Objective, CENTRAL EUROPE Programme meant a significant financial contribution and professional recognition of geography. Research of the Sub Little Carpathian cultural landscape especially presumed application of integrated approaches of geographical and interdisciplinary research (Hanušín et al. 2013).

Among other research themes that apply critical approaches and integration are *ecosystem services, landscape management and planning, and quality of life*. Principles of ecosystem services are close to the concept of landscape potential for social use and were derived from the synthesis of natural ecosystems (Daily 1997). Agricultural land (Vilček 2014) or the settlement greenery from the point of view of multiple functions is assessed in this context as topical themes of the interdisciplinary research (Kopecká and Szatmári 2017 and Feranec et al. 2018b). Conceptions of landscape syntheses and landscape ecological planning are the appropriate base for the critical diagnoses of landscape environment and efficient interpretation of knowledge for landscape management and environmental planning (Otáhel' et al. 1997, Hreško et al. 2003 and Kozová et al. 2010). The theme of *quality of life* broadens the research of biophysical environment (landscape level) by the socio-economic sphere and requires an emphasis on human geographical syntheses (Ira et al. 2008 and Ira and Andráško 2008).

DISCUSSION OR WHAT ARE THE POSSIBILITIES OF DEVELOPMENT OF GEOGRAPHY?

The examples of acceptance and funding of geographical project exposed here point to the social interest. Physical state of landscape was analysed in relation to human as a core of the environment. Environmental problems are of key importance for humans and civilization although the environment does not have to be researched completely and comprehensively. The analysis of the relationship between "civilization" and "milieu" (Matlovič 2006) or the "environmental pivot" and "aspects of environment" (Weichart 1979) are determining for the solutions of problems of humankind and the living environment. It is also the dominant topic of the geographical research in the landscape-ecological or geoeological conception of physical geography (Paulov 2014).

New approaches to the research of biophysical reality and synthesis of the assessing knowledge are meaningful if engaged in the social and environmental processes (Tadaki et al. 2014). In this context, Lave et al. (2014, p. 6) appeal for a formal development of CPG as a subarea in the frame of geography where it supports "integrating of power relations and social processes at the heart of critical human geographic and physical geographical research" in order to find solutions to social and environmental transformation. In this frame the environment becomes a purely social or biophysical field and the interdisciplinary cooperation and reformulation are promoted as a worthwhile road ahead (Harden 2012, Ziegler et al. 2013 and Lane 2014).

Tadaki et al. (2014) support similar ambition of CFG as a political project for the engagement of all physical geographers to formalize the relationship between their science and the environment trying to solve the problems of this critical rela-

tionship in the frame of institutions and procedures of physical geography. These procedures should first of all reflect the proper methodological basis. Among the first internal construction are integrated approaches generated as geoecological methods (detailed geoecological research and mapping). This aspect was developed in Central European and East European conception of physical geography (Minár et al. 2001) and presented in several theoretical and methodological studies (Mičian and Zatkalík 1984, Miklós and Izakovičová 1997, Minár et al. 2001, Mičian 2008 and Tremboš et al. 2009).

Internal geoecological methodological basis should be linked with various kinds of environmental procedures so that the physical geographers would be able to join the social theory and practice. An appeal to physical geographers to assume responsibility for their philosophical decisions as environmental scientists has been also exposed in the book of Inkpen and Wilson (2013). In terms of cultivation of critical conception in physical geography Tadaki et al. (2014) point to three recognitions as activating spheres: *Environmental science as a political practice, organisational contingency and pedagogical practice*.

The first recognition is that the *environmental scientific conceptions, methods and procedures* represent an important bridge to active politics. Categories, metaphors, and techniques used for the solution of problems of this world carry all possible presumptions about processes and human values (Larson 2011). According to Tadaki et al. (2014) one solution is the modelling of environmental systems which requires scientists (modellers) who generate and process the models and end users (managers). In this context it is also possible to positively evaluate the development of Slovak physical geography. Environmental geographical approach to the assessment of the effect of designed motorway on landscape (Lehotský et al. 1989) also influenced the legal process of the environmental impact assessment (EIA) at least in Slovakia (Huba et al. 2017). A chapter apart was that of preparation of the law about EIA and the accompanying legislative rules and methodical guidebooks (Kozová and Drdoš 1995). Geographers added to the proper environmental dimension the economic, social, cultural and especially political aspects in the assessment of the developmental intentions in the concept of sustainability (Hanušin et al. 1997) and when conceiving the *National Strategy of Sustainable Development* (Huba a Ira 2000).

The second recognition which supports critical orientation in physical geography is that of *organisational contingency*. Configuration of organisational structures and incentives though, has some limiting features. Creation of departments and research groups or promotion of certain activities is influenced by the real possibilities of institutional structures (Oughton and Bracken 2009). It is a matter of concern how we imagine the interdisciplinary practice and differences between positivism and post-positivism, qualitative and quantitative research, performance assessment, etc. (Sharp et al. 2011 and Clark and Steelman 2013). Experience with the acceptance of many projects does not rule out interdisciplinary teams from several institutions which may be more operative than the new and often merely formal ones. Integrated teams motivated by calls for funds in formulation of projects and applications for grants from the VEGA, APVV and other agencies established themselves in Slovakia.

The third recognition concerns *pedagogical policy and practice*. The primary questions in pedagogy of physical geography concerned first of all skills and methods (Church 2005 and Parsons 2006). The answer to the question: "What physical

geographers do we want to train” was in this sense. Normative and political questions associated with these objectives were considered a matter of course. However, Tadaki et al. (2014) are convinced that physical geographers should be trained to use the methods that simply allow for better comprehension of the environment applying alternative approaches proper to the developing nature sciences and active participation in discussions about environmental issues.

Critical orientation in physical geography can be applied to the pedagogical practice, for instance, by the discovering tuition of *Inquiry Based Learning* (IBL). It is the way of tuition focused on the engagement of students in the problem solving process. The problem oriented tuition presumes the use of inter-subject relationships and integration of the content of education (Michaeli et al. 2014). The theme of a particular IBL project may be a socially important one which is topical, such as the slope deformation, the causes and consequences. The project makes use of the subject matter of physical geography and that of human geography and mathematics. It develops competencies of students in the field of the use of field research methods and information and communication technologies. One of the main objectives of the project is implementation of the methods of scientific research in geography into tuition emphasizing the space and synthesising nature of the theme as structural, as well as regional approach (Michaeli et al. 2014).

New possibilities of effective integration of physical geographical knowledge are also offered by the development of geographical information science, tuition how to apply the GIS and the remote sensing data (Hofierka 2003, Hofierka et al. 2014 and Burian et al. 2015). Modern education is connected with appropriate publications and text books and those used at the Faculty of Natural Sciences, Comenius University (Minár and Machová 2010 and Bedrna and Jenčo 2016) deserve a special appreciation. Several teaching textbooks at the Faculty of Humanities and Natural Sciences of the University of Prešov broadened the geoeological methodology by training in environmental sciences, landscape planning, and management (Drdoš 1999, Čech and Drdoš 2009 and Drdoš and Michaeli 2001). Publications devoted to the development of geographical thought (Matlovič and Matlovičová 2015), position of geography in the system of sciences (Michaeli and Ivanová 2015), or the classical geographical disciplines (Vilček and Zverková 2015, Matlovičová 2015 and Matlovičová et al. 2015), should be mentioned as they are the modern text books inspiring critical thinking in geographical education. Compilation of a team of authors from several university departments is also an effective approach (Kozová et al. 2010 and Falt'an et al. 2018).

CONCLUSION

Repeated calls for the integrated geographical research confirm the long year experience with the adoption of the reached results by social use. The most recent appeal of geographers introduced as CPG (Leave et al. 2014) emphasized that the power relationships (management) is an important critical approach to the evaluation of the knowledge of physical geography about the biophysical entity of landscape in service to social and environmental transformation with active inclusion of human geographers. Such research requires participation of human geographers in nature research and first of all the study of ways how the material environment forms social relationships. It steers the physical geographers to comprehension of the power relationships and human actions that influence natural systems and their

proper research procedures. Integration of research in the context of interdisciplinary approaches brings more efficient results of the topical social and environmental problems. The CPG challenge made us to realize that the alternation of integrating and differentiating tendencies in Slovak geography followed the development of the world thought and cognition but also the requests to solve the urgent problems of social practice. The present call for cooperation of physical and human geographers is especially topical in time of transformation processes, problems with funding the education and science but also the relevance of the research institutions and university curricula.

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KRITICKÉ PRÍSTUPY, INTEGRÁCIA VÝSKUMOV A RELEVANCIA GEOGRAFIE

Opakované výzvy na integrovaný geografický výskum potvrdzujú dlhodobé skúsenosti s akceptáciou dosiahnutých výsledkov pre spoločenské využitie. Najnovší apel geografov s názvom kritická fyzická geografia – KFG (Leave et al. 2014) zdôraznil, že pre mocenské vzťahy (manažment) je dôležitý kritický prístup zhodnotenia poznatkov fyzickej geografie o biofyzikálnej matérii krajiny v službách sociálnej a environmentálnej transformácie s aktívnym zapojením humánnych geografov. Takýto výskum ani neredukuje fyzickú geografiu na naivne pozitivistickú, ani sa ju nesnaží kritizovať zvonku. Skôr požaduje, aby sa kritickí humánni geografi zapojili do prírodovedného skúmania, najmä do štúdia spôsobov, ktorými materiálne prostredie formuje sociálne vzťahy. Od fyzických geografov zase vyžaduje, aby pochopili mocenské vzťahy a ľudské konanie, ktoré ovplyvňuje prírodné systémy, ako aj ich vlastné výskumné postupy. Širším cieľom je efektívnejšie riešenie súčasných problémov. To však nevyhnutne predpokladá kritické posúdenie pôvodu a histórie konceptov a termínov používaných vo fyzickej geografii (Sayre 2015). V tomto kontexte nám KFG pripomenula striedanie integračných a diferenciacnych tendencií a potrebu spolupráce fyzických a humánnych geografov, zvlášť v období transformačných procesov, problémov

financovania školstva a vedy, ale aj relevancie výskumných ústavov a univerzitných študijných programov.

Aj pre súčasné riešenie uvedených problémov bolo vhodné pripomenúť historické tendencie v slovenskej geografii. Jej protagonisti reflektovali svetový vývoj myslenia a výsledky bádania mali odraz a adekvátnu relevanciu v politickej, spoločenskej a pedagogickej sfére. Regionálne syntézy Bela, Hromádku a Lukniša patria k jedinečným integráciám poznania prírodných podmienok, hospodárskeho rámca a spoločensko-kultúrnych hodnôt. Zároveň tieto syntézy boli v našich podmienkach inšpiračnou bázou landšaftovej (krajinnokoologickej a geoekologickej) koncepcie poznávania.

Rozvoj samostatných disciplín vo fyzickej a humánnej geografii súvisel s konštituovaním univerzitných a výskumných pracovísk a prispel k profilovaniu vedeckých a pedagogických osobností v šesťdesiatych a sedemdesiatych rokoch minulého storočia (napr. Lukniš, Mazúr, Plesník, Krcho, Mičian, Drdoš, Bašovský, Ivanička a Verešík), vedných disciplín, ako aj k prezentácii medzinárodne uznávaných výsledkov.

Boli to však opäť spoločenské požiadavky na riešenie problémov životného prostredia, ktoré iniciovali integračné tendencie a formulovanie postupov vychádzajúcich z holistického prístupu k poznaniu krajiny a jej racionálneho využitia. Koncepcia krajinných syntéz reflektovala medzinárodný teoretický prínos Haggeta (1972) a postupy krajinnokoologického a environmentálneho plánovania predstavili praktický model syntetického hodnotenia vlastností krajiny až po návrhy jej optimálneho manažmentu a organizácie sociálno-ekonomických funkcií.

Transformácia spoločenského a politického vývoja u nás na prelome milénia ovplyvnila aj geografiu ako vedu. Nové možnosti medzinárodnej spolupráce, participácia na európskych projektoch, nové technológie a nástroje (napr. GIS a DPZ), ale aj nové možnosti zapojenia sa do domácich aktivít v rámci verejného života vytvárali široký priestor uplatnenia geografických pracovísk, tímov a jednotlivcov.

Pri týchto nových možnostiach účasti na rozsiahlych aktivitách akoby geografia stratila na istý čas jednotiacu syntetickú identitu. Hľadanie tmelu Matloviča (2006) ako reakcia na výzvy Buttimer (1990) pripomenuli aj túto podstatu vednej disciplíny. V tomto kontexte zohralo významnú úlohu zapojenie geografických tímov do domácich a medzinárodných projektov, ktoré podnietilo formulovanie aktuálnych tém a integračných koncepcií v snahe presadiť sa v zápase o finančné zdroje a získanie relevantných pozícií vo vedeckej sfére. Nakoniec aj tendencie v pedagogickej politike a praxi potvrdili nevyhnutnosť problémovo orientovanej výučby s predpokladom využívania interdisciplinárnych vzťahov a integráciou obsahu vzdelávania.

