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Published in:
European Journal of Geography

Publication date:
2013

Document Version
Early version, also known as pre-print

Citation for published version (APA):
Grindsted, T. S. (2013). From The Human-Environment Theme Towards Sustainability – Danish Geography and Education for Sustainable Development. *European Journal of Geography*, 4(3), 6-20.
http://eurogeographyjournal.eu/articles/1.FROM%20THE%20HUMAN-ENVIRONMENT%20THEME%20TOWARDS%20SUSTAINABILITY_DENMARK.pdf

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FROM THE HUMAN-ENVIRONMENT THEME TOWARDS SUSTAINABILITY – DANISH GEOGRAPHY AND EDUCATION FOR SUSTAINABLE DEVELOPMENT

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Abstract

Research on geography in relation to education for sustainable development (ESD), has only recently climbed the research agenda. The geopolitics of intended learning outcomes in the ESD debate, carries policy that produce dilemmas and challenges confronted with disciplinary traditions. In this article it is examined dialectically how the changing climate and the paradigm of sustainability have been dealt with in Danish geographical university education. It is shown how curriculum programs in higher geographical education have taken different approaches to address issues of sustainability and climate change and how geographers articulate their role and function as knowledge on human-environment interactions changes. The analysis of the geographical education reveal that geographers' find their discipline contribute considerably to ESD, and thus the human environment theme seems to be associated more closely with sustainability issues.

Keywords: 'higher geographical education', 'climate change', 'human-environment theme', 'education for sustainable development'.

1. INTRODUCTION

Imagining climate change often transforms into remarkable geopolitical agendas. In general consensus exists among scientific and geographical communities as to cause and effect of climate change and unsustainable production patterns. Controversy arises when dealing with strategic actions and solutions in educational settings since a given position legitimizes a given political agenda (Morgan, 2011). The geopolitics of education for sustainable development (ESD) therefore produces complex dilemmas, that immutable tends to frame education as a change agent that socializes students to accept new kinds of explanations and pre-analytic assumptions to deal with an academic problem than the previous ones (Lambert & Morgan, 2009). Yet, “*Global warming presents an enormous threat to humanity, but the response from academia, including geography, has been relatively slow (...). I find this surprising, indeed astonishing, for there could hardly be a more important geographical topic*” (Sayer, 2009:350). Sayer's statement is remarkable. The world's population is growing by 900 million people each decade and is expected to reach 9.1 billion when it stabilizes by 2050. The Rome Club (1962) prognoses still seem remarkably precise and even

the International Energy Agency which is considered to be rather conservative now recognizes the peak oil hypothesis and proposes it will occur within the 2020s (Urry, 2011:78). Education is needed to deal with future challenges and over the years education for sustainable development has gradually been reflected in educational policy. Since the Stockholm Conference on the Human Environment (1972) that first established a relation between education and sustainable development, the Rio Declaration (1992) and a number of subsequent declarations, policies and national strategies have promoted the idea of integrating ESD into all disciplines and academic traditions (Jahn et al., 2011). By way of example the European Ministers of Education decided to integrate sustainability into the Bologna process during a meeting in Bergen (2005), and in Louvain-la-Neuve (2009) it was repeated for the next decade. Also, the EU Commission has encouraged member states to use the UN Decade of Education for Sustainable Development (UNDESD) 2005-2014 as a point of reference in the development of national plans (EU Commission, 2009). In a Nordic context national strategies have been put forward and the Nordic Council of Ministers (NCM, 2011) has proclaimed its commitment to ESD. Also academia has responded to the challenges of climate change and more than 31 declarations on sustainability in higher education have been made signed by more than 1400 universities worldwide (Grindsted, 2011). In 2007 also the International Geographical Union (IGU) committed itself to the ESD agenda and developed the “Lucerne Declaration on Geographical Education for Sustainable Development” (IGU-CGE, 2007). How these developments influence various disciplines and academic traditions is in particular interesting in geographical education due to its strong tradition in the human-environment theme. Much research on society-environment interactions on climate change reduces human behaviour to economic rationality when construed in sophisticated climate models (GCM) and sometimes even in non-geographical representations (Urry, 2011). Geographical representations do matter and the need to comprehensively take methodological approaches into consideration in the interface of society-environment interactions seem highly relevant to contemporary and future challenges (Yarnal & Neff, 2004). But how are these problems dealt with in the case of Danish geography? What does it look like in practice and have these developments crystalized in geographical curricula? The aim of this paper is to examine to what extent Danish higher geographical education is organized around sustainability in accordance with the Lucerne Declaration. To do so, the following questions have been addressed. 1) Is the human- environment theme under reconfiguration in geography? 2) How do geographical education programs contribute to ESD? 3) How are issues of sustainability addressed in curricula? and 4) What is the influence of the Lucerne Declaration on Geographical Education for Sustainable Development? Answering these questions will reveal if and how sustainability themes have condensed into curricula. In the following we will first reflect upon what I shall call spatio-temporal tides and waves of the human environment theme to examine the hypothesis that the human-environment theme is under configuration in geography towards sustainability.

2. FROM THE HUMAN ENVIRONMENT THEME TOWARDS SUSTAINABILITY

Geography may be one of the most prominent and oldest disciplines in the conceptualization of human-environment interactions that integrates elements from natural and social sciences (Rasmussen & Arler, 2010). In fact, *“The theme of man-environment relation has never been far from the heart of geographical research, and for many it has functioned as the overriding theme”* (Harvey, 1969:115). Alexander von Humboldt may be one of the immediate forefathers e.g. by his advocacy of geognocny (today's Earth Science) and later Joachim Schouw, Vidal de la Blache, Carl O. Sauer, Harlan Barrows among others advocated that geographers should study human beings in relation to their geographical environment

(Turner, 2002). The history of the human environment theme however, has taken multiple forms and methodological approaches over the years. Some geographers conceptualize the human-environment theme more or less *ad hoc*, implicitly or explicitly whereas others organize it in constructs separating human and nature or build certain interfaces. Though assumptions of the human environment theme are sometimes implicit they hold “information” that is mediated through scientific and educational practice. Although implicit information neither is logical, consistent nor reflected methodologically it carries huge amounts of tacit knowledge that exists in the interface between subject and object, between human and nature (Demeritt, 2002). Therefore we must never ignore the nexus between (tacit) knowledge and power e.g. in the construction and use of climate models and future sustainability scenarios. Following Harvey geographers build explanation in the way a theme is constituted; “A theme acts as a directive by indicating the sort of facts the geographer ought to collect and by suggesting a mode of organization of those facts” (Harvey, 1969:116). A “theme gives rise to theorize” and how the human-environment theme is considered implicitly or explicitly in geographical educations can be examined through the way different kinds of explanations are perpetuated (Harvey, 1969).

Dialogue about these issues in ESD may not only better prepare students for dealing with wicked and controversial problems like sustainability, resilience or climate change, but may also make students better understand the geopolitics of scientific and educational practices that constitute the “object of study” and fundamentally shape questions asked and data collected. Turner (2002) illustrates how the interface between the spatial chorological approach and the human-environment theme has been the dominating source of (often) conflicting identities in geography for which reason we will briefly draw attention to how determinism, the quantitative revolution and the cultural turn reconfigured the human-environment theme. For centuries there has been much controversy, enthusiasm and vigor around core dimensions of human-environment interaction. Debates in the eighteenth and early nineteenth centuries have largely concerned environmental determinism (roots from Darwin) versus possibilism and whether culture or nature played a determining part in the relationship (Christiansen, 1967). Explanations of determinism are often causal and seek to demonstrate how bio-physical factors such as climate, soil and altitude determine social and economic activity. Nature is external, and the domination of nature thesis was in particular inscribed in the enlightenment tradition (Harvey, 1996:121). However, in its strictest form the historical-genetic model conceiving nature as the overruling determinant, never gained full recognition in geography partly because the human-environment theme is poorly understood within isolated and fixed categories that tend to form dichotomies of culture or economy opposed to nature. Environmental determinism suffers from the bias of dualist thinking as does much Western philosophy and such antagonisms has political implications because they involve an attitude of detachment while at the same time holding a perspective of scientific objectivism (Birkeland, 1998). Legitimation of geographical knowledge relate to how geographers construct their object of study. Within the enlightenment tradition geographers build explanations that objectified nature to be instrumentally used, tamed and exploited (Harvey, 1996:124-125). In the context of ESD the domination of nature thesis can hardly address anthropogenic processes or changes in socio-natural systems, but remain undisputed in the tradition of climate skepticism since we are assumed to live on a finite planet.

Another shift in the way geographers have dealt with human-environment interactions relates to the descriptive tradition and the quantitative revolution (Turner, 2002). During the early and mid-20th century positivism became a platform to combat what was regarded speculative science. Universal regularities became a focal point of study (Hansen & Simonsen, 2005:57). The move from ideographic toward a nomothetic approach in geography reconfigured the human-environment theme, since it could not also encompass

environmental determinism. “*This obviously implied that the traditional focus of Geography on Human-Environment relationships lost its defining status*” (Rasmussen & Arler, 2010:38). Subsequently, the Kantian geography emphasizing spatial or chorological topographies gained support in favor of the human-environment theme though focus on environmental problems from the 1960 gave inspiration to system ecology and human ecology (Rasmussen & Arler, 2010). Commitment to a theory of knowledge, according to which any phenomenon natural or social, is to be explained through systems of laws and causalities do not fit well with the social dimension of climate change or sustainability. To frame research as unbiased observation of nature as external is to ignore power relations that are inherent in any research agenda. Power relations form the very interpretative categories research questions is designed from or presented in curricula texts (Demeritt, 2002). In the context of ESD the gradualist perspective of climate change carries references to the quantitative revolution e.g. climate models. According to this perspective climate change can be instrumentally adjusted as a form of global technocratic climate management (Urry, 2011:28).

The cultural or linguistic turn is yet another spatio-temporal wave that influenced human-environment debates, though it never gained much attention in physical geography. According to Birkeland (1998) rediscovery of the importance of language led to a shift in the relationship between nature and culture favoring socio-spatial formations so that “*cultural geography has lost touch with its basic relationship to the concept of nature*” (Birkeland,1998:230). According to Fitzsimmons (1989) only few geographers show interest in the human-environment relationship during the 1980s, and by comparing conceptions of space with conceptions of nature Fitzsimmons demonstrates how geographical thought is imbalanced, not emphasizing the latter. Though discursive constructions favored the spatio-chorological tradition the theme never died as geography fractioned. Discursive constructions do share concern for the effects of power for which reason constructionism tend to be engaged in the critic of the way nature is construed. Constructions of nature nevertheless face the dilemma of the prison of language: that we can never know if our conceptual construction of nature corresponds to how nature actually appears. Yet, conceptualizations of culture are fundamental to environmental challenges (Demeritt, 2002). In the context of ESD discursive constructionists seem to be much more critical to technosciences and therefore call for a precautionary approach to deal with them. Though nature also becomes internalized in socio-environmental interaction, one of the problems of constructionism in climate change is how to deal with irreversible processes and tipping points - that cannot be construed back. This kind of mutual construction implies a rejection of classical divides of subject/object and society/nature dualisms central to anthropocentrism and essentialist assumptions of ESD. In recent years the human-environment theme seems to create much debate about sustainability agendas as will be demonstrated in the following section. In a historical perspective it is interesting to observe that invitations to upscale ecological themes have been numerous: “*the view of geography as human ecology has quite a long history*” (Harvey, 1969:115) and since Vidal de la Blache or Humboldt geographers like Fosberg (1962), Moss & Morgan (1965) or Stoddart (1967) have argued for up scaling ecological themes in geography, particularly around the concept of system ecology and human ecology (Christiansen, 1967). Today, this seems to be organized around sustainability due to the study of human-environmental interactions (Huckle, 2002; Yarnal & Neff, 2004; Whitehead, 2006; Morgan, 2008; Westaway, 2009; Zimmerer, 2010; Clarke & Button, 2011; Firth, 2011).

3. METHODOLOGY

A critical history-geographical approach is followed to analyze if the human environment theme is being transformed toward sustainability and in what ways sustainability themes has

materialized in Danish geographical education (Harvey, 1996). Therefore the issue of human-environment reconfigurations is addressed in the interface between identities that have dominated in geography seen as complex spatio-temporal tides and waves intersecting, overlapping and conflicting. The point of departure seeing geographical representations as a mosaic of understandings often in opposition to other representations, serve as a framework to examine the hypothesis that the human environment theme is under reconfiguration in geography. Smith (1982) formulates “the production of nature” as a concept that extends spatial theoretical work of “the production of space” and amalgamates the spatial chronological theme with the human environment theme. Massey grasps such methodological reflections and shows how nature and society interactions must be studied as “*endlessly, mobile, restless, given to violence and unpredictability*” (Massey, 2006:38). Within such a meta-theoretical framework, epistemology is based on an intra- and extra-discursive reality. This implies that elements independent of human perception are also formed through human practice. At the same time the framework rests on the assumption that habits of thought and societal development and habits of thought and the material world are closely interrelated (Elling, 2003). Methodological assumptions of determinism, possibilism or descriptive connotations provide radical different answers to such questions and hence different answers to analyse the same phenomena. To overcome such barriers, human-environment interactions in curricula can be studied (1) by asking what is related and how, (2) by unfolding concepts and (3) how they are formed and give rise to other interpretations (Harvey, 1996:69). The strength of a dialectical framework is that it splinters binary thinking, essentialism, and absolutism of human-environmental conceptualizations as illustrated in the history-theoretical section (Birkeland, 1998). Against this background key concepts of the human-environment theme and human environment interactions were first inductively identified in the Geographic Education Declaration (1992), International Declaration on Geographical Education for Cultural Diversity (2000) and Lucerne Declaration, (2007) to see if issues of sustainability have become important. Second, on the basis of the declaration analysis key concepts in geographical study regulations were categorized, coded, and condensed to analyze if and what “sustainability” themes have been introduced in curricula. Study regulations can be acknowledged as the “law” that constitutes the legal and administrative basis of the study. Therefore they are considered to be a useful analytical object because the development of courses, curricula and the core academic content are reflected in them (Roskilde University, 2006; Copenhagen University, 2009a, 2009b; Aalborg University, 2010a, 2010b, 2011). Study regulations are reformed independently of each other, why the method enables us to explore how the programs have taken different directions to deal with sustainability issues and makes it possible to comprehend how socially constructed ecosystems are represented in the study regulations. However, the topics covered were also categorized and condensed through an abductive method to explore if the human environment theme differentiates from the Lucerne Declaration. In this way it is possible to comprehend inclusion/exclusion of features and themes as a practice to build geographical explanation and how it affects analyses, practices or policies (Harvey, 1969:116).

The method of analyzing curricula was joined by in depth interviews of the chairs of the study boards on the basis of the findings of the Declaration analysis. Direct experiences are to be considered valuable contribution than purely comparison of curricula texts if also to see if the themes are joined in practices. During 2012, all fulltime associate professors and professors allocated the education of geographers at Copenhagen, Roskilde and Aalborg University were interviewed, except researchers that were either on fieldwork, visiting other universities or attending conferences. Thus, 31 of 42 research geographers were interviewed. In the interview the responders were asked if you find climate change and sustainability issues important to geographical education, what you think of the sustainability concept in

geography education, if you consider the dynamism of changes in the human environment theme to be associated sustainability challenges, and if you include sustainability themes in their own teaching. The interviews were processed by the same methodology as described above. Finally a literature study was conducted to discuss the findings against similar studies and Scandinavian geographical journals were reviewed if they have featured ESD.

4. IS THE HUMAN-ENVIRONMENT THEME UNDER RECONFIGURATION IN GEOGRAPHY?

Three interesting perspectives substantiate the hypothesis that the environment theme is under reconfiguration in geography, but do also suggest a discrepancy between the “role(s)” of ESD in geography. However this does not imply that all geographers working on human-environment interactions conceive their research activities with sustainability. Nothing could be more contradictory. Geography is much else than sustainability but, the following three tendencies suggest changes in discourse coalitions toward being associated sustainability. Firstly, the development of geographical declarations demonstrates a remarkable shift. Over the years the International Geographical Union (IGU), have developed three declarations. The International Charter on Geographical Education (1992), The International Declaration on Geographical Education for Cultural Diversity (2000), and The Lucerne Declaration (2007). The latter differs from the former in several respects. First of all it stresses a shift of the role of geography in a shrinking and globalized world, with spatial transformations of economic, social and political significance, toward a discipline performing a key role in solving sustainable challenges on Earth. By way of example The International Charter of Geographical Education (1992) represents the spatio-temporal tides and waves scarcely paying attention to the human-environment theme. Though human-environmental interactions are mentioned once “*concern for the quality and planning of the environment and human habitat for future generations*” (Geographical Charter, 1992) issues of globalization related to human rights remain the central focus. The Lucerne Declaration however, refers to the UN Decade of Education for Sustainable Development (UNDESD) 2005-2014, and expresses that the themes of the UNDESD are very much in common with geography’s objects of study; why “*the paradigm of sustainable development should be integrated into the teaching of Geography at all levels*” (Lucerne Declaration, 2007:243). In the declaration it is claimed that nearly all topics of the UNDESD 2005-2014 possess a geographic dimension, for which reason geography is bound to integrate the concept of ESD. In the below table a word search condenses key aspects of the human-environment theme in the Geographic Education Declaration (1992), International Declaration on Geographical Education for Cultural Diversity (2000) and Lucerne Declaration, (2007) sketching the role of geography.

Table 1. The human-environment theme in International Geographical Union Declaration

International Charter on Geographical Education (1992)	International Declaration on Geographical Education for Cultural Diversity (2000)	Lucerne Declaration on Geographical Education for Sustainable Development (2007)
Sustainable: 0 Pollution, Contamination, Hazards: 0 Climate change/ global warming: 0 Ecology: 0 Environment: 2 Emission, greenhouse gas: 0 Nature: 0 Energy: 0 Biodiversity: 0 Human-nature interaction: 1	Sustainable: 1 Pollution, Contamination, Hazards: 1 Climate change/ global warming: 1 Ecology: 0 Environment: 13 Emission, greenhouse gas: 0 Nature: 1 Energy: 0 Biodiversity: 0 Human-nature interaction: 6	Sustainable: 60 Pollution, Contamination, Hazards: 1 Climate change/ global warming: 2 Ecology: 7 Environment: 13 Emission, greenhouse gas: 0 Nature: 8 Energy: 3 Biodiversity: 1 Human-nature interaction: 14

As can be seen (table 1) sustainability was not mentioned in 1992, once in 2000 and 60 times in 2007 and marks a noteworthy difference in the quantification of “sustainable related content”. This illustrates that social-ecological and political-economic processes are not only intertwined, but also that the identity of geography is under reconfiguration. These three declarations illustrate a significant shift. For whatever reasons it might be, the content analysis of declarations illustrates the down scaling of the human environment theme during the late 1980s and early 1990s, as Birkeland (1998), Fitzsimmons (1989) and Stoddart (1987) among others have argued. Over a period of 15 years the human environment theme transforms significantly integrate human environment themes reflecting sustainability challenges (Firth, 2011; Morgan, 2011) to what Birkeland (1998) hypothesizes is the core of geography though in a context of sustainability: “*the relationship between culture and nature, the human world and the natural world, society and nature, represents the core of geography, both for human and physical geography*” (Birkeland, 1998:230).

Secondly, though the interviews demonstrate great variety they also reveal that sustainability issues are considered huge importance to geography. “*The concept of sustainability has huge importance to geography at Copenhagen University, but also related concepts as resilience, vulnerability or ecology*” (Interview, 2012). Thus, nearly all geographers interviewed found sustainability issues essential to geography, but remain critical to the concept itself. A major part of the teachers claimed that sustainability is important to geography as an implicit notion, but as explicitly articulated many related concepts may better address particular phenomena (Interview, 2012). Precisely the tacit or implicit underlying basis suggests that the human-environment theme is in transition. Correspondingly, the international review suggests it is not hard to find geographers pushing the agenda for up scaling sustainability though it was not to be identified as an immanent notion. This is featured in research politics, e.g. by the U.S. National Research Council Report (2010) that promotes the relevance of the nature-society issues, merely in the context of sustainability, as well as a huge number of geographers articulate that geography has a particular role for dealing with issues of climate change and sustainability. Bednarz (2006:239) is exemplary: “*It seems that non-geographers also think that geography has an important role to play in environmental education (...) many geographers have defined geography as a discipline with a major, if not primary, interest in human – environmental interactions*”. Also in the context of ESD a dozen of researchers e.g. (Huckle, 2002; Yarnal & Neff, 2004; Whitehead, 2006; Westaway, 2009; Firth, 2011; Grahn, 2011; Morgan, 2011), build an explanation why geography plays an indispensable role in ESD. Chalkley for example states that “*In pursuing this agenda [ESD red.], disciplines such as geography (with its strong interest in society—environment relationships) will obviously be expected to play a leading role; and geographers may also be encouraged to work outside the subject in trans- or inter-disciplinary initiatives*” (Chalkley, 2006:235). Also Jahn et al., (2011) and Clarke & Button (2011) may serve as examples of how geographers find the human-environment theme to be a platform for linking ESD and geography, “*The subject geography is of importance in the context of ESD due to the analyses of human-environment-interactions and their implications on a geographic area*” (Jahn et. al. 2011:22). The recognition that geographical knowledge has pivotal importance for sustainable development makes Westaway (2009:9) state that geography has a special role, maybe even above other disciplines: “*Sustainable development is the extrinsic educational purpose that geography is best, indeed almost uniquely, equipped to serve (...) There is little doubt that geography is the best place to take the lead on sustainable development in schools.*” Such claims are indeed controversial, but authenticate the human environment theme gives geography its *raison d’être* in the struggle for having a share in sustainability issues. The nature- society as well as

the spatial dimension of sustainability becomes a major pillar that geography seeks to patentee, due to its historical tradition.

Thirdly, environmental and sustainability issues are widely represented in Scandinavian Journals, as well as other international journals, from the late 1980s and have grown significantly since then. Zimmerer (2010) find that 175 articles have been published within the society-nature or human-environment theme in Annals of the Association of American Geographers during the past two decades and that *“The number of nature–society articles is estimated to have increased more than twofold in the 1990s alone”* (Zimmerer, 2010). Additionally, Lui (2011) and Kidman & Papadimitriou (2012) demonstrate how geographers’ research on sustainability has increased exponentially. However, I found no articles that dealt with ESD neither in the Norwegian, Danish nor Swedish Journals of Geography, nor in the Annals of the Association of American Geographers. However, Molin (2006), Sætre (2009), Grahn (2011) in their Ph.D. dissertations serve as examples of how ESD has been dealt with in secondary school and higher education geography in a Scandinavian context. Lui (2011) reveal how geographers’ research on sustainability has increased exponentially and contrasts a slow growth in integrating sustainable development into curriculum within the US. Thus Lui (2011) identifies an imbalance in the relationship between ESD in geography and geography’s contribution to sustainable research; *“An examination of publications in sustainability education journals also reveals geography’s lack of participation in sustainable education”* (Lui, 2011). This suggests a discrepancy between statements of the “role of ESD in geography” and geographers’ research activity. Hence, there appear to be little evidence that ESD is recognized a central concern in geography within the US (Haggitt et al., 2005). Also Bednarz (2006), Turner (2002), Yarnal & Neff (2004) among others argue that geography courses lag behind the growing environmental and sustainable research. Thus they identify difference between geographers’ involvement in environmental and sustainability research and education, concluding that the latter is not given priority. The declarations, research statements and review of journals indicate that the human-environment theme is under configuration toward issues of sustainability and climate change. But, what does it look like at Danish geographical education, and might a similar tendency be identified in curricula texts?

5. HOW DO GEOGRAPHICAL EDUCATION PROGRAMS CONTRIBUTE TO ESD?

Geography education shows its commitment to ESD in various ways, reflected in curriculum, interviews and courses. Examination of the study regulations and interviews with chairs of the study boards and researchers reveal that the importance of geography to ESD demonstrates similarities to the Lucerne Declaration: *“Geography has a major role on sustainability. Many disciplines are experts on relatively narrowed subjects, whereas geography possesses the broadness which is an important dimension of sustainability. Geography is particularly potent because of its interdisciplinary approach as many other disciplines do not encompass. Moreover, geography merges the natural sciences and social sciences”* (Interview, 2012). Interdisciplinary approaches which integrate economic, social and physical aspects of sustainability are not only well suited for geography that deals with interactions between the human ecosystem and the earth system, but a pre-condition to understand its multiple dimensions. Phenomena at global scales are caused by cumulative small scale activities in local places, and the impact of global processes exacerbates phenomena in specific localities. We may not appropriately understand sustainability issues if we ignore the climatological, hydrological or environmental processes that work in nature. Likewise, we misguide explanations of sustainability problems if we ignore social dynamics

and economic activities. Geography knowledge is important to ESD and distinguished from other disciplines, because a narrow disciplinary focus may not unfold problems of sustainability that operates at multiple scales (Interview, 2012). Another aspect found to be critical is that geography has a role in integrating perspectives from the natural and social sciences. *“Geography can contribute in a unique way to sustainable development, especially regarding the integration of knowledge between social and natural sciences. In this way, geography plays a crucial role in dealing with sustainable challenges that you do not find in the tradition of many other disciplines, e.g. Sociology. Secondly, sustainability has an immanent spatial dimension”* (Interview, 2012). Thus it is argued that current environmental problems not only call for research and education that epistemologically transcend traditional disciplinary divides, challenging the problems in its complexity, but also seek to bridge the gap between natural and social sciences in dealing with sustainability. To this may be added that geography has a distinct role being able to enrich related disciplinary discussions on ESD. *“I find that geography has a responsibility to deal with issues of sustainability. We range competences and skills from the social and natural sciences – a holistic approach is imperative for dealing with sustainability”* (Interview, 2012). Additionally, complex interaction between nature and society and the spatio-temporal dimension of sustainability, requires methodological approaches to grasp such interactions that may even be impossible without geographical knowledge. *“Before specialization, all students will acquire a holistic and broad basis of knowledge and approaches, about soil science, climate change, society and urban development. [1.5 years of study red.]. This broad foundation enables students to think critically and analyze side effects of a given phenomenon or human action. This body of knowledge is vital for sustainability, in order to understand side effects in very different areas and scales. Such questions I would say are only possible to deal with through geographical skills”* (Interview, 2012). Integrating the production of space and nature as a fundamental perspective of abstraction in e.g. area differentiation generates geographical knowledge and methodologies that make it possible to manage risks involved in the spatial distribution of problems. Non geographical methodologies fail to understand such dynamics of spatial distribution and thus, sustainability may even be seen as a common ground bridging the spatial chorological approach and the human-environment theme. The analysis of the study regulations and the interviews reveal that geographers find their discipline particularly contribute to ESD along three distinct dimensions: 1) human-environment theme that merges the natural and social sciences 2) spatio-temporal dimension of sustainability issues 3) and geographical methodologies and interdisciplinary approaches. These dimensions will be examined in further detail in curricula texts. Though the interviews reveal recognition of the importance of sustainability issues to geography it also demonstrates that most geography teachers remain critical to the concept of sustainability and/or find it better as an implicit basis for educating geographers (Interview, 2012). *“When I teach in accessibility for instance, then a sustainability aspect lies behind. If sustainability is there depends how explicit it should be mentioned. I do rarely mention the term, but implicitly sustainability is the main objective for what we do and why we study it in this way. Sustainability is part of all geographers mindset I would say; sometimes so penetrated that one may not need to explicate it”* (Interview, 2012). This may be one of the reasons why the analysis of study regulation reveals that sustainability has a limited status in geography educations in practice.

6. HOW ARE ISSUES OF SUSTAINABILITY ADDRESSED IN CURRICULA?

Examination of the preamble of the Aalborg, Copenhagen and Roskilde curricula indicates a methodological foundation in which interconnectedness, processes and flows are given a primary status rather than fixed objects, direct causalities and permanencies. It is obvious that

emphasis on processes and dynamics in study regulations undermines debates on environmental determinism e.g. in the context of finite resource constraints. In this way dealing with issues of sustainability reformulates previous deterministic concepts into ecological principles and balances, such as carrying capacity and environmental footprint (Interview, 2012). Ecological approaches often focus on environmental problems from an interdisciplinary angle, and are often normative and problem oriented (Rasmussen & Arler, 2010). By way of example the study regulation at Aalborg University requires that “*students should acquire knowledge on human influences on ecosystems and the most important anthropogenic changes in history. They should be able to critically reflect on different philosophical views upon nature and its implications (...) understand concepts of sustainability and ecosystems in relation to elasticity and robustness to be able to analyze interactions between human activity (demands) and nature’s capacity and limits*” (Study regulation, Aalborg University, 2010a:29).

Second, there seems to be only little distinction between encouragements of the Lucerne Declaration and geographical educations as to interdisciplinary approaches. Thus study regulation requires problem based group work so that “*Students should be able to look upon scientific problems and solutions in an interdisciplinary approach – not only from particular disciplinary premises, but also by including relevant theories, methods and philosophical interpretations from related disciplines*” (Study regulation, Roskilde University, 2006:23). Though study regulations do not go into detail in describing which methods to be used, it gives at least a basis for enriching methodological reflection. A holistic understanding of wicked problems like sustainability or climate change requires a reflective rather than an explanatory or commercial ambition (Interview, 2012). In terms of sustainability critical thinking is essential to understand different practices and agendas in play to be able to find possible solutions to sustainability challenges. However, though student driven project on sustainability themes have been limited as well as in teaching (Interview, 2012) similarities in learning objective and interdisciplinary approaches correspond to the Lucerne Declaration.

Third, the spatial-temporal dimensions of sustainability in curricula focus on processes in different time scales and spatial contexts. By way of example the graduate geographical qualification profile in *Ecological climatology and climate change, causes, effects, limitation and adaption* at Copenhagen University seeks to integrate the range from geological to economic time scales in its very complexity, processes and dynamics. The aim is to gain fundamental knowledge on climate change in history, relations between climate systems, ecosystems and land use, as well as relations between climate and the content of GHG gasses in the atmosphere. Thus the learning outcome is to be able to work with climate data and environmental observation in various scales to grasp complex relationship between physical and economic activities affecting the global climate. Moreover curricula favor analysis of mechanisms used to prevent climate changes, modeling of GCM’s to construe previous and future climate scenarios, and its consequences and limitations (Study regulation, Copenhagen University, 2009b:8). This specialization illustrates how curricula seeks to explain contemporary sustainability challenges and climate change (e.g. decertification and deforestation) in its interconnectedness, complexity spatio-temporal processes, between the earth system and the human ecosystem, that most profoundly are aligned with the gradual perspective on climate change. If it is assumed that a dialectic approach comprehends the complexity of socio-spatial and economic-ecological processes, this, in turn, will make us recognize that environmental/social problems mutually interact, are spatially distributed, and produce different effects in different spatial scales. Relational time-space configurations vary considerably in different sciences, from geologists (million to billions of years) to economists (month, years and decades), even between physical and human geography (Rasmussen & Arler, 2010). Geographical education programs emphasize how the matter of scale and the

analysis of environmental problems are inseparable. These pre-analytic assumptions are fundamental to the ESD debate and the interview suggest that geographers find their education programs emphasize how the matter of scale and the analysis of environmental problems are inseparable (Interview, 2012). Although the study regulation at Roskilde University, as the only one, does not mention neither sustainability nor climate change, the Chair of the Study Board explains *“students are given a body of knowledge on economic geography, natural processes and planning – also in an context of sustainability – so that they will be able to analyze the impact of a given plan or action in ecological, economic and social terms”* (Interview, 2012). However, it seems that Aalborg and Copenhagen Universities attach greater importance to the human environment theme as sustainability and environmental challenges than Roskilde University where the academic traditions to some extent favor the spatial-chorological approach. The reason may be that urban geography is dominant and has a strong spatial tradition. Whereas Aalborg and Copenhagen Universities require various courses and projects in which sustainability or climate change is central, Roskilde University does not address sustainability as a mandatory theme in its curriculum, except from one course in physical geography (Study regulation, Roskilde University, 2006:4). Aalborg University offers the most proactive geographical program dealing with issues of sustainability at BA level. At BA level, 80 of 180 ECTS (and similarly at MA level) are allocated to various themes of the human-environment theme, mostly within issues of sustainability, climate change and anthropogenic and environmental stress. Copenhagen University offers a similar curriculum in terms of sustainability, both at BA and MA level. Thus it is only the one of six qualification profiles (transformation of cities) that does not explicate sustainability, climate nor energy and resource themes (Study regulation, Copenhagen University, 2006:5). Here too, the reason may be that urban geography traditionally has identified itself closer to the spatial chorological theme.

Overall the curricula demonstrate a move from a mechanical view of nature as external toward more dynamic conceptualizations of human-nature interaction that claims a strong ontological position about the materiality of nature’s construction. Mutual construction implies a rejection of classical divides of subject/object and society/nature dualisms central to anthropocentrism. Though sustainability themes take various forms in geography at Copenhagen and Aalborg University the chairs of the study boards do not find it is necessary to enhance sustainability further; *“Well, I see no need for improving the sustainable content quantitatively. I would say it is saturated. Sustainability issues are filling out much of the education already, so I see no need of giving it more room, but sustainability will stay as a core dimension of geography also in the long run”*(Interview, 2012). Also at Aalborg University geography seems to be saturated: *“Sustainability is already integrated at many levels and has a strong critical mass. I do not see a point in enhancing it further. Environmental sustainability has the strongest position though, so in a way we could enhance aspects of social sustainability”* (Interview, 2012). Despite ESD at geography in Roskilde is given less priority, reconfiguration of the human-environment theme seems to undergo a process toward a resource turn whereby geographical analysis of society is also (certainly not definite) carried through in terms of resource dependency and the character of sustainability challenges. Thus the gradualist perspective of climate change is easily identified. In contrast the Lucerne Declaration resembles discourses of climate catastrophes and ESD as moral development as a form of environmental romantics (Elling, 2003).’

7. WHAT IS THE INFLUENCE OF THE LUCERNE DECLARATION IN GEOGRAPHY AT DANISH UNIVERSITIES?

Complementary elements have been identified between the Lucerne Declaration and study regulations. The interviews revealed that the declaration was unknown for geographers at Copenhagen, Roskilde and Aalborg Universities and has neither been dealt with in the study boards nor on any other occasion (Interview, 2012). *“I have never heard of the declaration and it has neither been discussed in the study board nor at teacher meetings”* (Interview, 2012). It therefore goes without saying that the Lucerne Declaration has not produced an impact on the development of geography at the Danish universities. Instead the declaration (and curricula) can be considered to be a product of specific history-geographical circumstances signalling geographical representations of human environment theme. The recognition that the carbon dependent society transforms the earth systems has gained acceptance and replaces the “finite construction of human-nature system, by another geomorphological and geographical period (Crutzen, 2002). Reconfiguration of the human environment-theme toward the paradigm of sustainability or related concepts seems further to form a culturally embedded understanding of human environment interactions as implicit educational preconditions. As the Chair of the Study Board at Copenhagen University explains; *“sustainability is not something we discuss, it is not necessary to discuss what you agree upon and which already is there”* (Interview, 2012). However, this does not imply that the human-environment theme undergoes transformations toward uniform conceptualizations, but that normative and methodological horizons changes as new knowledge emerge. Thus, the underlying basis to study a given phenomenon seems to change from a mechanistic toward an ecological worldview with a low-carbon society as the normative horizon. However, this varies significantly between geography at Aalborg, Copenhagen and Roskilde. While Aalborg and Copenhagen explicitly address ecological principles in their study regulations (as the Lucerne Declarations suggests) they are not to be identified explicitly in curricula at Roskilde. Nevertheless this does only signify that the study regulations differ and that it to a smaller extent orchestrates an underlying basis of sustainability as a platform for human-environment analysis.

8. CONCLUSION

Declarations as well the analysis of geographical education programs suggest that the human-environment theme is under reconfiguration toward being associated with sustainability. Interviews as well as analysis of study regulations reveal that Danish geography find the discipline to contribute to ESD in three different ways. First, geography’s strong tradition in the human-environment theme provides a methodological basis for dealing with issues of sustainability. Second, the spatio-temporal dimensions of sustainability call for geographical approaches to be able to understand the dynamics, complexity and interactions in various scales. Third, it is widely accepted that geography contributes by its interdisciplinary approaches to bridge the social and natural sciences, though it does not seem to be the case in practice. Although issues of sustainability and climate change have been materialized in Danish geographical curricula differently, sustainability is mainly an immanent contested representation. Danish geography education is reluctant to activate the concept of sustainability as an explicit notion, partly because of the criticism attached to it. Still nearly all geographers interviewed find sustainability themes or related concepts important to geography. At Aalborg and Copenhagen University sustainability themes are set to be saturated, whereas at Roskilde University curricula does not require students to deal with sustainability and student driven activities are limited.

Acknowledgement

I will like to thank Associate Professor, Henrik Toft Jensen and Professor Bo Elling at ENSPAC, Department of Environmental, Social and Spatial Change, Roskilde University, Denmark; and Annette Marie Grindsted, Associate Professor, Institute of Language and Communication, University of Southern Denmark, for insightful and valuable contributions.

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