Sustainability,

A Concept of Constructive or Confusing Ambiguity?

A Critical Discourse Analysis

Degree of Master of Science (Two Years) in Human Ecology: Culture, Power and Sustainability
30 ECTS

CPS: International Master's Programme in Human Ecology
Human Ecology Division
Department of Human Geography
Faculty of Social Sciences
Lund University

Author: Judith Kahle
Supervisor: Richard Langlais
Term: Spring Term 2012

Abstract:

This study resembles a critical discourse analysis on inter- and transdisciplinary research on sustainability. Through the overall lens of critical realism and constructivism understandings and representations of sustainability are examined. The study therefore investigates and compares the websites of five research institutes based on the theoretical concepts of post-normal science by Bateson, sustainability, power and knowledge in Foucault's sense and representation by Eisner.

The analysis of the websites not only confirms different understandings of the term among the five research institutes but also reveals a lack of clear and consistent explanation of the term within the websites themselves. This inconsistency in content is reflected and reinforced by the websites' language-in-use.

Furthermore this study investigates the subtle power dimensions woven into inter- and transdisciplinary research on sustainability and shows that the discourse on sustainability is essentially shaped by inter-institutional power relations.

Keywords: Sustainability, critical discourse analysis, inter- and transdisciplinarity, power, representation

Table of Contents

Acknowledgements

Abbreviations

CDA	Critical discourse analysis
CMK	Centrum Voor Milieukunde
COST	European Cooperation in Science and Technology
CPS	Master's Programme in Human Ecology: Culture, Power and Sustainability at Lund University
DA	Discourse analysis
ESF	European Science Foundation
ICIS	International Centre for integrated assessment and Sustainable development
IISD	International Institute for Sustainable Development
LUCID	Lund University Centre of Excellence for Integration of Social and Natural Dimensions of Sustainability
LUCSUS	Lund University Centre for Sustainability Studies
NCCR	National Centre of Competence in Research
NGO	Non-governmental organization
PNS	Post-normal science
RP(s)	Research project(s)
SD	Sustainable development
WCED	World Commission of Environment and Development

Prologue

The first time I heard about the term sustainability was in the ninth grade at school in the late 1990s and early 2000s. At that time the word itself was new to me and so was its meaning. In school we were mainly speaking about "Agenda 21", wasteful consumption and recycling as well as environmental pollution. Of course all these terms were not completely new to me but all of a sudden there was an overall term for them. However the initial idea I got about sustainability was apparently to think of it as ecological sustainability.

Later on when I studied biology and especially ecology in my undergraduate studies, sustainability was not the term that characterized the lectures. Although I had sustainability somewhere in mind when I studied physiology, evolution, ecology and so on, the picture remained limited to its ecological dimension.

At the beginning of my graduate studies in Human Ecology I hoped to learn more specifically about sustainability as well as ideas, techniques to approach the concept from the angle of natural, social sciences and humanities. However it did not take much time to realize that this endeavour was going to be more difficult than predicted. Firstly, I needed to realize the typical ways of knowledge production used and adopted in my biology studies. Secondly I needed to understand and learn a complete new approach to knowledge when I started my graduate studies. One that is much less separated from society and much more aware of the complexity of the term sustainability. At first dealing with this new approach was a curse. The more I dealt with the concept of sustainability the more blurred it became. Finally I abandoned my desire to find one distinct explanation of sustainability and it was then that I became aware of the discourse around it.

It is this personal relationship with sustainability and my experiences as an academic hybrid that informed and shaped this final paper. Knowing this about me, the author, hopefully makes it easier for you, the reader, to follow my reasoning.

1. Introduction

1.1. The clash of two conceptual giants of vagueness

Last year, on 31st October 2011, the 7th billion human was welcomed to planet earth by the UN. Although the exact number of people living on earth is unknown, the UN determined this day as a memorable date in human history. When skimming through the news the event was directly linked to public debates on *over*population, *over*consumption of limited resources, *over*pollution of natural ecosystems and the atmosphere as well as to growing disparities between the wealthy and the poor. Various news agencies[1] put the event into the greater picture of humankind "currently facing unprecedented and accelerating environmental and socio-economic changes" (Jäger et al. 2011, 9)[2].

From my point of view the news conveyed two not too subtle messages. On the one hand it was leaving me, the reader, with a picture of an uncertain future which quickly turned into a feeling of uneasiness and discomfort. On the other hand the way the event was contextualized created a certain sense of urgency for action, change and mitigation (Ziegler and Ott 2011, 35).

The number and diversity of scientific discussions that contain these two messages of a dark view into the future and of the urgency to act in the presence, is huge. In search for solutions there is one concept that many of such discussions repeatedly refer to: sustainability (Toman 1992, 3).

1.1.1. The concept of sustainability

Since the term sustainability entered the world stage in the 1980s it spread over the globe and has been widely discussed by countless scholars from various disciplines and points of view (Robinson 2004, 370). It is a highly contested concept that is embedded in a discourse

---

[1] BBC News http://www.bbc.co.uk/news/world-south-asia-15517259, National Geographic http://ngm.nationalgeographic.com/7-billion, Spiegel Online http://www.spiegel.de/panorama/gesellschaft/0,1518,794896,00.html, The Guardian http://www.guardian.co.uk/world/2011/oct/31/seven-billionth-baby-born-philippines, all accessed 2012-04-20

[2] This reference refers to a report which plays an important role regarding the choice of the objects of my study. I explain its role in greater detail in chapter 3.2. For more information on the report itself see http://www.esf.org/uploads/media/rescue.pdf, accessed 2012-04-03

about its actual meaning, function and power. Time and again scholars have made the effort to develop a proper explanation of the term. Cushman and his colleagues for instance make such an effort in order to demonstrate that sustainability can be understood in totally different ways:

> A sustainability agenda may be drawn very narrowly, as say low energy consumption, or it may go beyond, to consideration of environmental management and audit systems, or yet wider still to ecological sustainability, economic viability and social acceptability (…). (Cushman et al. 2002, 1)

Apparently the meaning of sustainability can enormously change depending on which function you chose to assign to it and at what scale and in which way you take power into account as an influencing factor. Consequently there is no universally valid explanation for sustainability (Ciegis, Ramanauskiene, and Martinkus 2009, 28). Among the scholars who participate in the academic discourse on sustainability two stances on sustainability are found; those that regard the concept's ambiguity as productive and constructive and those that regard it as frustrating and unhelpful: "[I]t is vague, attracts hypocrites and fosters delusions" (Sneddon, Howarth, and Norgaard 2006, 253; Robinson 2004, 369). For this reason I consider sustainability as one of two giants of vagueness in this study.

Due to sustainability's manifold meanings and understandings I abstain from any attempt to come up with a personal definition of the term. Instead I attempt to take a closer look at the scholarly discourse on sustainability in this paper. I am interested to see how scholars deal with these challenges and how they present and frame the term in order to give meaning to their research. More specifically, I focus on inter- and transdisciplinary research upon which I shed light on in the following paragraph.

1.1.2. The concept of inter- and transdisciplinarity

Beyond the growing but conflicting popularity of the sustainability concept there is another concept of increasing popularity that can hardly be ignored. I am addressing the numerous calls for more inter- and transdisciplinary research in research articles and reports in order to better "confront the dynamism and complexity" of the sustainability-concept (Sneddon, Howarth, and Norgaard 2006, 264). Sneddon and his colleagues for instance refer to such an approach in a rather positive and hopeful manner: "We argue that such an approach [a

pluralistic and transdisciplinary approach towards sustainability] can begin a conversation about critical aspects of sustainability that hitherto have been overlooked in the numerous debates about the subject" (2006, 262). Inter- and transdisciplinary research on sustainability is a specific mode of knowledge production and is often assigned promising potential when it comes to scholarly efforts to develop coping strategies for the challenges of global change (Wainwright 2010, 984). The following quote makes this clear:

> Many global change issues are by now well identified and to a certain extent individually understood. These include global warming, sea level rise, loss of biodiversity, intensification of extreme events, landscapes and land use changes, increasing water scarcity and pollution, ocean acidification, over-fishing, and altered distribution of certain infectious diseases. But it is their multiple combination at local and global levels that brings about a series of major and complex problems. Such complexity cannot be addressed by the traditional disciplinary scientific approach. (Jäger et al. 2011, 3)

Interestingly this kind of research on sustainability gets promoted over and over again as the scholarly strategy in the future to supplement disciplinary approaches (Hicks, Fitzsimmons, and Polunin 2010, 464). However it is a matter of fact that there already exists a vast and growing number of inter- and transdisciplinary research projects and institutes focussing on sustainability studies, e.g. Human Ecology Division at Lund University in Sweden[3]. The inherent contradiction to this phenomenon, meaning reinventing the wheel (of inter- and transdisciplinary research on sustainability) although the wheel obviously already exists, is the reason why I consider inter- and transdisciplinary research as the second giant of vagueness.

1.1.3. Where there are giants there is power…

So far I have introduced the two core concepts of sustainability as well as inter- and transdisciplinary research, both of which I labelled giants of vagueness, but spared the power element within and between them. In a study, as the one at hand, about the clash of two conceptual giants, one could guess that power and power relations play an essential role. My perspective on power in this context is based on Foucault's understanding of the term (Chapter 2.3.4). Casting a glance on scholarly literature[4] on either sustainability or

---

[3] For more information see http://www.hek.lu.se/o.o.i.s/11185, accessed 2012-04-26

[4] When using the term *scholarly literature* I refer to texts that were written by scientists coming from any academic discipline. I might also use *scientific literature* as a synonym. To me the expression

knowledge production reveals that they are both highly political issues where stakeholders from various backgrounds are involved and pursue differing interests on different levels (Jäger et al. 2011, 3). For this reason I argue that power and power relations are inherently part of the discourses on sustainability and knowledge production and even more constantly inform and shape the relation between the two. In this study I am looking at power as a relational concept that might operate at rather subliminal and indirect levels. I am not focusing on power as a research issue in studies on sustainability.

1.2. Aim and purpose of this study

In this study I illuminate the scholarly discourse on sustainability. I focus on the ways the sustainability concept gets framed and represented in inter- and transdisciplinary research institutes. Five selected websites on inter- and transdisciplinary research institutes on sustainability are explored. Thus I am doing research on research. In analyzing the websites' content I interpret existing interpretations of sustainability within the academic world. More specifically I investigate how sustainability is presented in trans- and interdisciplinary research institutes and how it is situated within a network of different stakeholders, interests and power relations that operate on various levels. I thereby attempt to illuminate the idea of inter- and transdisciplinary knowledge production in the field of sustainability studies, an idea which gets highly promoted but has been characterized by little interest for already existing projects so far. I therefore draw upon Bateson's theory of post-normal-science and use it as the theoretical basis to investigate the core concepts of sustainability and knowledge (Tognetti 1999, 689). Let me clarify at this point that I am using the concept of knowledge to explicitly address inter- and transdisciplinary scholarly knowledge production. Also, power serves as a key concept in my study. Sustainability, knowledge and power form a conceptual triangle in this study. Indeed each of the three has its own discourse but these discourses are also interlinked and mutually affecting each other. Finally representation, framed by Eisner, functions as one of my theoretical tools as well.

---

scientific does not distinguish between humanities, social and natural sciences and hence also does not valuate one over the other.

More generally the study aims at deepening the understanding of the scholarly discourse on sustainability and at creating awareness for research as a dynamic process that is affected by aspects of culture and power as all other aspects of social life, too.

1.3. Research questions

Three research questions lie at the core of this study. They are designed to help shed some light on research institutes in the realm of sustainability studies that trespass disciplinary boundaries:

I. What understandings of sustainability are conveyed to the reader on the websites of the research institutes?

II. How is this understanding and the inter- and transdisciplinary research on it represented on the websites of the research institutes?

III. What kinds of power relations are inscribed in the representations of sustainability research?

1.4. Overview

In the following chapter the theoretical background of the thesis is introduced, followed by Chapter 3 on the methodological approach to the websites of the five research institutes. In Chapter 4 the findings of the critical discourse analysis (CDA) are presented and discussed in Chapter 5. Finally Chapter 6 summarizes the answers to the three research questions.

2. Framework of the study

In order to contextualize the study within theory this section addresses both the general theoretical lens that informed my view (Chapter 2.1) and the specific theoretical framework (Chapter 2.2). In Chapter 2.3 the basic theoretical concepts are presented, accordingly.

2.1. Overall theoretical lens

The analysis in this study is based on a philosophical approach that combines both critical realism and constructivism (Fairclough 2010, 4). In this context I mostly agree with Fairclough's perspective on CDA:

> Note that this is a *realist* approach which claims that there is a real world, including the social world, which exists irrespective of whether or how well we know and understand it. More specifically it is a 'critical realist' approach (…), which means among other things a recognition that the natural and social worlds differ in that the latter but not the former depends upon human action for its existence and is 'socially constructed'. (2010, 4)

I adopt this perspective in my study. In fact it forms the basis for my engagement with the issue of sustainability in general. It informs and shapes my research theoretically, methodologically and practically throughout the study, not in a direct and explicit manner but as a guide constantly infusing my view.

However, I do not agree with the social aspect in constructivism which Fairclough's explanation includes. I understand social constructivism as a theory that assumes that each individual develops his or her own ideas, thoughts and beliefs to give meaning to the world around him or her. This individual truth does not exclude the possibility that there exists an overall truth. Instead social constructivists believe that a person's individual truth rather represents what he or she thinks at the moment might be true. However, the process of giving meaning to the world and making sense of it is seen as a dynamic one that is essentially shaped by the social network in which a person is embedded (Duit and Treagust 1998, 8). It is the way the social aspect in social constructivism is understood that concerns me. Goeminne and François in this context refer to Woolgar and Latour and state: "[T]hey argue that social constructivism discourse, in its one-sided social-contextual approach of scientific practice, does not allow for a symmetrical, critical analysis of the social constitutive elements of science (…); for them '*all* interactions are social' (…)" (2010, 117, italics as in the original).

Miller dedicated a whole book, titled "Stuff", to this issue, in order to demonstrate the mutual interactions between things, like clothes for instance, and people. He makes clear that things are no mere dead, passive objects we use as some sort of tool. Instead they actively affect our way of self-perception and social relations (Miller 2010, 13). I thus argue that it is both people and stuff that help construct our understanding and view upon the world. While Woolgar and Latour conclude from this insight to simply label all interactions between people and other people or stuff as social I am not convinced of the term *social* constructivism (2010, 117). So I abandon the tiny word *social* in social constructivism.

2.2. Specific theoretic framework

In this study I draw on a couple of theoretical concepts that I put into relation to each other and finally into an overall theoretical framework (Figure 1). These are post-normal science, sustainability, power, knowledge and representation. As stated in Chapter 2.1, my overall view as a researcher is mainly informed by critical realism and constructivism.
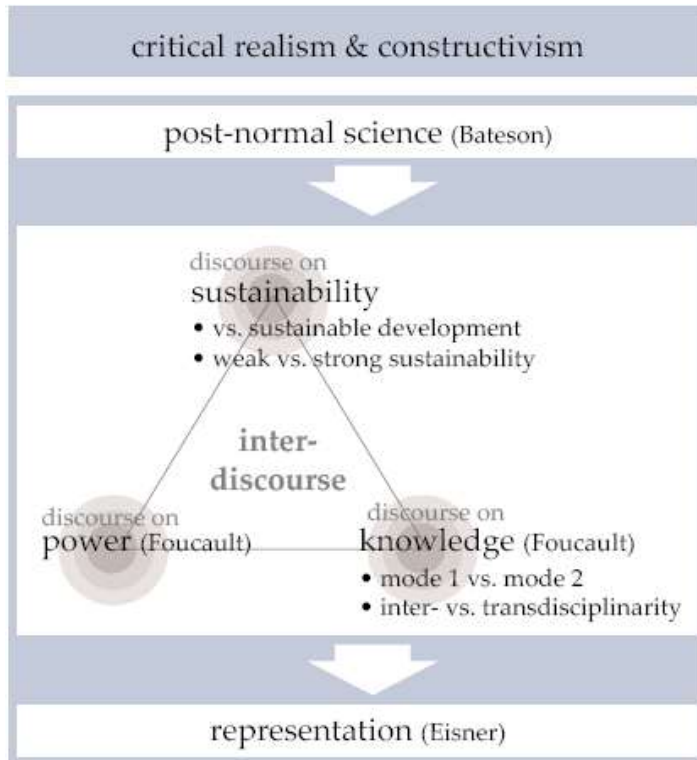
Figure 1: Scheme of the theoretical framework with my overall theoretical lens on top, followed by the theory of post-normal science, the triangle of sustainability, knowledge and power and finally concluding on the principle of representation (theorists in brackets)

However, it is this framework on which this study is based and through which my engagement with the issue at stake is shaped. I am also dealing with the concept of discourse. I pay greater attention to it in Chapter 3.1.

2.3. Key concepts

In the following paragraphs I briefly explain how the single theories or concepts are contextualized in scientific literature, how they are interconnected and how I use them in my thesis.

2.3.1. Post-normal science

Gregory Bateson's theory of post-normal science (PNS) forms the overall frame for my study of the sustainability discourse in the realm of inter- and transdisciplinary research. When working on coping strategies regarding environmental degradation Tognetti (1999) relies on Bateson's "principles for a new kind of science" (689). She provides a concise explanation of PNS and directly opposes it to the idea of "normal science, in the Kuhnian sense" (699):

> PNS can be characterized as a strategy for dealing with environmental issues in which there are high stakes and uncertainty, plural and conflicting value systems, and in which decisions are urgent. This is in contrast with "normal" science, characterized as an extension of laboratory, puzzle-solving approaches that externalize uncertainty and are not appropriate for addressing complex global environmental problems. (Tognetti 1999, 691)

To which other kind of strategy would the description of PNS fit so perfectly than to inter- and transdisciplinary research on sustainability issues? The sustainability concept is deeply concerned with the limited ecosystem services on earth on the one hand and humankind's growing demand of these services on the other (Costanza et al. 1998, 3). Dealing with environmental problems that endanger human well-being of present and future generations is thus a major concern of sustainability (Ring 1997, 239; Rotmans and Martens 2002, 117). This is not the only aspect in which inter- and transdisciplinary research on sustainability fulfils the criteria for PNS. Also in terms of the two criteria of uncertainty and urgency mentioned above parallels can be found:

> To encounter chronic and pervasive problems, a process oriented approach in environmental policy has to be developed. There is a need for an enlarged perspective of the interactions between ecological and economic systems, allowing for political decisions even under uncertain conditions. (Ring 1997, 239)

A final parallel between PNS and inter- and transdisciplinary research on sustainability can be found in their common approach to knowledge production. Time and again researchers promote pluralistic, integrative learning that crosses disciplinary boundaries and takes place in- and outside academia (Robèrt et al. 1997, 80; Sneddon, Howarth, and Norgaard 2006, 264).

Based on the PNS concept I would like to introduce the three interlinked theoretical concepts of sustainability, knowledge and power. This triangle forms the core of my

theoretic approach and links directly to the practical part of my study. I attempt to analyze the scholarly discourse on each of the three concepts and also attempt to illuminate their connections.

2.3.2. Sustainability

Sustainability is a term that is attached to an inconsistent popularity due to the manifold different interpretations of its meaning and function (Toman 1992, 3; Beckermann 1994, 191). As a consequence of the plural perspectives on and understandings of the sustainability concept I do not attempt to provide a concise universal explanation to it. Instead this section first puts sustainability briefly into a historical context and introduces different disciplinary approaches towards it. The next step explores the difference between the two terms sustainable development and sustainability. Finally strong versus weak sustainability are discussed.

Brundtland – a historical marker

Originally sustainability was used in ecological contexts to describe an environmentally friendly manner of harvesting natural resources, meaning harvesting natural resources in a way and pace that the ecosystem could quickly recover and compensate for the loss of natural capital (Toman 1992, 3). This original meaning of the term has significantly broadened in the last decades in terms of both its meaning and the number and variety of its users (Toman 1992, 3-4; Tognetti 1999, 690). It was in the early and mid-1980s that the concepts of sustainable society and sustainable development occurred (Robinson 2004, 370). In their report *Our Common Future*[5] the World Commission on Environment and Development (WCED) described sustainable development in 1987 as such: "Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987, http://www.un-documents.net/ocf-ov.htm). This description became known as the Brundtland-definition of sustainable development (SD) named after the commission's chairwoman Gro Harlem Brundtland[6] (Sneddon, Howarth, and Norgaard 2006, 253).

---

[5] Find the complete report using this link: http://www.un-documents.net/wced-ocf.htm, accessed 2012-04-27

[6] http://www.un-documents.net/ocf-cf.htm, accessed 2012-04-27

Sneddon and his colleagues examine how SD has been understood and incorporated in a world that has significantly changed in political and environmental terms since 1987 (253). However, the three scholars point out that the Brundtland-definition of SD still "is the most widely accepted starting point for scholars and practitioners concerned with environment and development dilemmas". They even label it as "a historical marker for several reasons" (255):

> Brundtland signals the emergence of "the environment" as a critically important facet of international governance. (…) Finally, we argue that *Our Common Future* is a critical temporal marker. It initiated an explosion of work on development and sustainability through which we chart the course of sustainability thinking and practice. (…) *Our Common Future* firmly established SD as a component of international development thinking and practice. It also helped set in motion what many now argue are the three mutually reinforcing and critical aims of sustainable development: the improvement of human well-being; more equitable distribution of resource use benefits across and within societies; and development that ensures ecological integrity over intergenerational timescales. (255-256)

This quotation contains two eye-striking aspects regarding sustainability. First of all sustainability or SD appears to be an issue of global concern. In order to cope with problems of global change which easily spread across nation-state borders institutions, e.g. states, have to cooperate. Apparently the concept is highly political in its nature. The second notable aspect in the quote above refers to the fact that the concept of sustainability is inextricably linked to the concept of development. Intuitively the latter has a positive connotation of constant progress towards the better. The question only is what needs to be developed and who determines what "better" means? In his article Robinson examines the discourse on SD and sustainability in the industrialized countries since the Brundtland report was published (2004, 369). Referring to the question above, Robinson points out that "[t]he term 'sustainable development' has been seen by some as amounting essentially to a contradiction in terms, between the opposing imperatives of growth and development, on the one hand, and ecological (and perhaps social and economic) sustainability on the other" (2004, 369-370). He then specifies his argument and states, "(…) on the part of NGO and academic environmentalists, that development is seen as synonymous with growth, and therefore that sustainable development means ameliorating, but not challenging, continued economic growth" (2004, 370). So far SD and sustainability have been used as synonyms although they do not exactly capture the same stance. The difference between them is discussed in the next chapter.

Sustainable development versus sustainability

The two concepts differ in their ideas of how a more ecologically resilient, social-economically fair and equal way of life on the planet can be achieved. While sustainable development represents "a more pragmatic and collective approach, oriented towards efficiency gains and improvements in technology", the sustainability concept believes that values as well as individual opinions and behaviour are the most important areas of concern (Robinson 2004, 371). According to Bagheri and Hjorth the latter is rather an ideal than "a 'state' of a social system (…) to be increased or decreased" (2007, 84). They argue that sustainability is not "a static goal or target to be achieved" but "a moving target, which is continuously evolving as we understand more about our socio-environmental system" (84).

However, the two stances on either SD or sustainability are often taken by different actors that can be divided into two groups. Most of all it is governments and the business sector who take up the perspective of sustainable development whereas non-governmental organizations and scientific institutions tend to capture the sustainability approach (Robinson 2004, 370).

I stick to the term sustainability throughout the thesis because my study is based on scholarly literature which mainly uses this term.

Weak versus strong sustainability

There are numerous attempts by scholars coming from different scientific disciplines to define sustainability. Bagheri and Hjorth for instance frame it in a rather general way when stating that "sustainability is the capacity to create, test, and maintain adaptive capability" (Bagheri and Hjorth 2007, 84). Callicott and Mumford are more precise and locate the term more in the realm of ecology: "As an alternative, we advance an ecological definition of sustainability that is in better accord with biological conservation: meeting human needs without compromising the health of ecosystems" (Callicott and Mumford 1997, 32). As opposed to this Toman points out that for economists "'sustainability' connotes (…) the maintenance and improvement of human living standards" (1992, 3). The diversity of understandings of the term sustainability might be confusing and disenchanting from time

to time. Thus it is helpful to recognize that these different approaches have something in common; an anthropocentric or social focus on sustainability (Neumayer 2003, 8).

In addition the distinction between weak and strong sustainability could help to clarify the confusion on the manifold understandings of sustainability as well (Neumayer 2003, 22-28; Ziegler and Ott 2011, 32). In his book "Weak versus strong sustainability: exploring the limits of two opposing paradigms" (2003) Neumayer distinguishes between those two paradigms by their perspective on the "substitutability of natural capital" (21). Weak sustainability follows the idea that there either are sufficient amounts of natural resources to be used, processed and consumed by humans or that "enough man-made capital is build up in exchange" (23). On the other hand strong sustainability assumes that natural capital cannot be substituted by other kinds of capital (Neumayer 2003, 24).

2.3.3. Knowledge

Ziegler and Ott argue that epistemological questions and questions on philosophy of science play an essential role in the scholarly discourse on sustainability (Ziegler and Ott 2011, 32). Hence this study is based on fundamental questions of what knowledge is, how we think knowledge on sustainability can be created and if or how we can truly know that we know about sustainability or not.

In this section I briefly illuminate the concept of knowledge and the cultural aspect of knowledge in scientific disciplines. Finally a distinction between mode 1 and mode 2-knowledge production is given. The latter includes a distinction between inter- and transdisciplinarity.

Understanding knowledge

In the introduction of his book "The Archaeology of Knowledge" (2002) Foucault addresses the issue of knowledge and knowledge production in a scholarly sense. In Foucault's point of view systematic analysis lies at the core of scholarly knowledge production, meaning it is the key to achieve a better understanding of an issue and how it is embedded in a wider context (2002, 2-3). He points out that knowledge and knowledge production can even be linked to learning about the truth of an issue as an overall goal (Foucault 2002, 4; Oliver

2010, 21). Furthermore Foucault states that over time the idea of how an issue should be approached in order to get a better understanding of it changes.

However, all of these aspects of knowledge or "systems of thought" give the impression of knowledge production as a conscious process (Oliver 2010, 20). In fact Foucault highly challenged this understanding of knowledge production:

> One of Foucault's interesting suggestions was that human beings do not specifically and intentionally create systems of thought. Rather, the latter are a product of the activities of human beings. In other words, particular ways of acting or thinking presuppose a specific pattern of knowledge, which then becomes characteristic of a particular historical period. (2010, 20-21)

According to Foucault the consensus a social group reaches about what is valid knowledge and what is not is depending on certain rules. These rules operate at a rather subtle level and shape the ways of thinking and of producing knowledge in a society. Foucault used the term episteme in this context (Oliver 2010, 21). In respect of the scholarly discourse on sustainability I argue that the current scholarly knowledge and knowledge production on sustainability is part of such an episteme, the episteme of sustainability.

Disciplinary culture

Scholarly knowledge production is organised by a system of scientific disciplines which Hicks and her colleagues define as such: "Disciplines are the intellectual and social structures through which knowledge is organized (…), where epistemological frameworks for classifying and understanding the world are themselves produced by political economics, institutional cultures and relationships of power" (2010, 464). When it comes to scientific disciplines, culture is apparently an essential issue. In her book "Interdisciplinary Conversations. Challenging Habits of Thought" Strober refers to Geertz's concept of "disciplinary cultures" and points out that scientific disciplines are based on thinking processes and that ultimately "thinking despite the fact that it is carried out by individuals, is a *cultural* phenomenon" (2011, 34). Strober's attempt to define "academic cultures as sets of taken-for granted values, attitudes and ways of behaving, which are articulated through and reinforced by recurrent practices" reveals the cultural aspect in scholarly work in an even clearer manner (35).

From this point of view it appears logical that scholars adopt specific sets of habits of perception, mind and action in order to fit themselves into the daily routine of the scholarly institution, e.g. the university or research centre. Above the institutional level scholars also need to integrate themselves into the habits of their scientific discipline in order to get their research acknowledged as valid. Although these habits may of course vary to a certain extent from person to person there exist different sets of "values, attitudes and ways of behaving" depending on the academic discipline. In this sense I consider inter- and transdisciplinary research as a field where different cultural habits clash and eventually form a new or at least supplementary kind of academic culture.

Interdisciplinarity versus transdisciplinarity

Inter- and transdisciplinary research is repeatedly presented as a hope- and powerful approach to knowledge production (Guggenheim 2006, 411; Mansilla, Feller, and Gardner 2006, 69). One that could develop methodological and theoretical tools to adopt more sustainable lifestyles (Jäger et al. 2011, 3). But what exactly is meant by these two terms and what is the difference between them? Unfortunately the meanings of the two are not totally clear according to scientific literature. However in this thesis interdisciplinarity and transdisciplinarity are consistently used as two different approaches to knowledge production. Interdisciplinary research is understood "as the capacity to integrate knowledge and modes of thinking drawn from two or more disciplines to produce a cognitive advancement (…) in ways that would have been unlikely through single disciplinary means" (Mansilla 2005, 16). Transdisciplinary research on the other hand is framed as "trans-sector, problem-oriented research involving a wider range of stakeholder in society" (Klein 2008, 117). The latter is addressed as Mode 2 in greater detail in the following chapter.

Mode 1 versus Mode 2

In their book "The new production of knowledge" Michael Gibbons and his colleagues explore the "changes in the mode of knowledge production in contemporary society" (Gibbons et al. 2005, 2). They rely on two concepts to describe these changes and label them as Mode 1 and Mode 2 of knowledge production. While Mode 1 refers to traditional disciplinary research, Mode 2 addresses a transdisciplinary approach towards research

(2005, 2). More specifically in Mode 1 "problems are set and solved in a context governed by the, largely academic, interests of a specific community" (3). In his article "Losing discipline" Guggenheim explains current concerns about Mode 1: "Disciplinary science is described as remote from societal needs, because it splits dense problems into disciplinary chunks, each missing the problem as a whole" (2006, 411). Thus Mode 1 is described as a homogenous and hierarchically organised approach to knowledge production whereas Mode 2 follows a more pragmatic approach that is organised in a decentralized and self-determined manner (Gibbons et al. 2005, 3). The latter is also explained as such: "Mode 2 is more socially accountable and reflexive. It includes a wider, more temporary and heterogeneous set of practitioners, collaborating on a problem defined in a specific and localised context" (3). In comparison to Mode 1 Mode 2 thus appears to be a rather revolutionary approach to knowledge production.

2.3.4. Power

At a glance power appears to be a concept that is abstract and hard to grasp as it seems "very subtle, difficult to recognize" and because it "operates by means of strategies that are difficult to identify" (Oliver 2010, 46). In the current chapter Foucault's understanding of power is briefly explored because it is his approach that mainly informs the focus on power in this study. At the end power is put into relation to the two key concepts of sustainability and knowledge, discussed above.

A concept powered by Foucault

In the afterword of the book "Beyond Structuralism and Hermeneutics" Foucault very generally describes "the exercise of power as a way in which certain actions may structure the field of other possible actions" (Dreyfus, Rabinow, and Foucault 1982, 222). In Oliver's introductory book to Foucault's key ideas it turns out that Foucault's understanding of the concept of power actually is rather concrete, practical and political:

> Foucault grasped the idea that the exercise of power was not necessarily about the overthrow of institutions, organizations, bureaucracies, or indeed the State. The exercise of true power was much more about the redistribution of influence and the ability to change the way people thought. Then, given time, and the appropriate circumstances, it was possible that institutions would be changed, too. (Oliver 2010, 34)

Power in this sense seems to base on an unequal relationship between two or more parties, e.g. individuals, institutions or systems. Thus it does not come as a surprise that power repeatedly gets associated to the term of domination (Foucault 2005, 25). Power is not to be understood as a privilege reserved for and exerted by just a few. Instead it is based on a bilateral relationship in which the dominated party accepts and therefore legitimates the dominating party (Foucault 2005, 25; Oliver 2010, 43). From this perspective power encompasses a set of subtle strategies that constantly shape and reshape social relations (Foucault 2005, 25). As a consequence Foucault suggests focussing on power relations. According to him power relations are both an integral part of social life and inherently political (Dreyfus, Rabinow, and Foucault 1982, 210; Oliver 2010, 46).

Power, knowledge and sustainability

Scholarly knowledge production is one such area of social life where power relations play an essential role. Hall investigates Foucault's understanding of how power and knowledge are interlinked and claims that Foucault "saw knowledge as always inextricably enmeshed in relations of power because it was always being applied to the regulation of social conduct in practice" (Hall 2001, 75). In addition the power-knowledge relation also links to issues of social status and institutional networks in which a variety of stakeholders with different backgrounds interact at multiple levels (Strober 2011, 156).

2.3.5. Representation

After having explored the triangle of the key concepts of sustainability, knowledge and power this section focuses on the representation concept by drawing upon Elliot Eisner's approach to it.

Representation is a concept that is linked to communication through language as a system of signs or symbols and to cognition or understanding of these signs. It is a concept that is deeply enrooted in culture and closely connected to semiotics. In his article "Cognition and Representation: A Way to Pursue the American Dream?" (1997) Eisner, a scholar of education, explains his fundamental idea of representation:

> In some ways it's an old idea. I'm talking about the idea that the forms we use to represent what we think - literal language, visual images, number, poetry - have an impact on how we think

and what we can think about. If different forms of representation performed identical cognitive functions, then there would be no need to dance, compute, or draw. Why would we want to write poetry, history, fiction, drama, or factual accounts of what we have experienced? (348)

So here Eisner is concerned with different types of means of communication that convey different kinds of messages or convey the same information in different ways. He also highlights the importance of the style of communication, meaning the selection of symbols or signs we use to impart information. Hence scholarly texts of inter- and transdisciplinary research institutes with a focus on sustainability are drawing on websites as their means of communication and are employing a certain style of language. To put it shortly they constitute a certain form of representation.

Eisner develops his idea a bit further and states that learning how to represent a research issue does not only affect how scholars convey information in the public but also what information they perceive as being important to describe that issue (Strober 2011, 45). Apparently the way a scholar understands and represents an issue to the public is not only closely connected to his or her personal experiences in general. Instead it is also related to his or her disciplinary background and his or her motivation to deal with a specific issue (Eisner 1982, 49).

3. Methodology

In this chapter I first explain the overall method of critical discourse analysis (CDA), why I chose it and how it is interlinked with my theoretical framework in the thesis (Chapter 3.1). Chapters 3.3 and 3.4 explain how I chose and analyzed my data.

3.1. Theoretical approach to CDA

In order to investigate which meanings and functions language has in the realm of inter- and transdisciplinary research on sustainability I chose to employ CDA as the methodological tool in this study.

But first of all what is meant by the word discourse? Fairclough explains that discourse "is not simply an entity we can define independently" but that it is shaped and informed by three aspects (2010, 3). These are social relations (I), meaning (II) and language (III). Thereby

the latter serves as the means to give, shift or take away certain meanings from social relations (Fairclough 2010, 3; Gee 2011, 11). Gee describes the different functions of language in his introductory book to discourse analysis (2011) and thereby uncovers two things. One is the (political) power aspect which is inherent in language. The other aspect is about language as not being a mere tool of exchanging information but as being closely linked to action (2011, 2). Thus analyzing language represents an opportunity to illuminate social power relations between the involved stakeholders of a discourse.

Discourse analysis (DA) is a qualitative and systematic research method which Gee frames as "the study of language-in-use" (2011, 8). Interestingly it is not simply a method to investigate a certain discourse, such as sustainability for instance. Instead DA is a scholarly tool to examine both the "relations between a discourse and other objects, elements or moments" as well as the relations within a discourse. Hence I could speak of an interdiscursive analysis: "This mode of analysis is based on the view that texts can and generally do draw upon and articulate together multiple discourses, multiple genres and multiple styles" (Fairclough 2010, 7). Inherently such an analysis is inter- and transdisciplinary (Fairclough 2010, 4, 10). Logically the outcome of such an analysis is strongly shaped by the perspective and focus of the researcher. For this reason I do not claim to provide objective or universally valid results in this paper.

As I am planning to do *critical* discourse analysis there is one last question to ask. What do I mean by critical? I attempt to not just describe what kind of words and language style is used on the websites which I want to study. Instead I support Gee's point of view: "My view (…) is that all discourse analysis needs to be critical, not because discourse analysts are or need to be political, but because language itself is, as we have discussed above, political" (Gee 2011, 9).

Another aspect is the political character of the concept of sustainability and my personal relation to it that makes it impossible to take a perspective that is free from norms and values. However, I do not assume the capability and right to assess the objects of my study in terms of right and wrong, black or white as Fairclough describes it (2010, 7). This is *not* how I understand the word critical in CDA. My goal is to thoughtfully examine and question the

language-in-use on the five websites examined in this study but not to be judgemental or to provide overall world-saving recommendations for the future.

3.2. Access to and choice of primary data sources

As an initial point of departure for the CDA I drew on the Responses to Environmental and Societal Challenges for our Unstable Earth-report (RESCUE-report). The report represents the results of a cooperation between the European Science Foundation (ESF) on the one hand and the European Cooperation in Science and Technology (COST) on the other (Jäger et al. 2011, 3). The following quote shows how this report presents itself:

> This report synthesizes the contribution from approximately 100 experts in 30 countries. It is based on the input of 5 working groups that, from autumn 2009 to spring 2011, focused on: contributions from social sciences and humanities with regard to the challenges of the Anthropocene; collaboration between the natural, social and human sciences in global change studies; requirements for research methodologies and data in global change research; step towards a 'revolution' in education and capacity building; and interface between science and policy, communication and outreach. (3)

I relied on this document for three reasons. First of all it concentrates on the two closely interlinked concepts of sustainability and knowledge production beyond disciplinary boundaries which are exactly the core concepts of my thesis. Secondly the report exemplifies a selection of ten projects in the world, mainly in Europe, that already exist and that allegedly connect the two concepts mentioned above in a paradigmatic manner. Thirdly, the report was published recently and thereby confirms the topicality of the whole issue. I therefore chose projects from the RESCUE-report for my study. Note that the thesis does not ideologically connect to the report. Instead the report has been used as a source that provides a selection of ten links to websites of inter- or transdisciplinary projects on sustainability. Due to time limits and consistency I solely rely on the projects that were exemplified in the report. In a first step I applied the following questions to each of the ten projects to see which ones would fit into my research frame:

a)   Do the websites understand themselves as representing research institutes?

b)   Do they understand themselves as being other than disciplinary regarding knowledge production?

c)   Do they understand their work as directly related to sustainability or SD?

d)   Do they provide information about the institute's research goals and projects?

A project was finally chosen for the CDA if all four questions could be answered positively. The design of the questions ensures clarity and ease of answering in order to make sure that the projects for my study were chosen according to easily understandable and replicable criteria.

Due to the purpose of this study and its research questions I constrained my focus to those parts of the websites in which the projects' self-understanding, research goal, organizational structure of the research team, approach to inter- and transdisciplinarity as well as to sustainability are addressed and links to other institutions and websites are made.

3.3. Practical approach to CDA

For the discourse analysis I drew upon the seven criteria which we, according to Gee, constantly incorporate into our language to communicate with each other. These seven criteria or as Gee puts it "the 'seven building tasks' of language" are significance, practices, identities, relationships, politics, connections as well as sign systems and knowledge (Gee 2011, 17-19). As a matter of fact the building tasks are interlinked and mutually affecting each other instead of being neatly isolated and static (25). However, Gee developed seven questions from those criteria. I picked up on those questions, revised and shortened them for the CDA of the websites and allocated this new set of questions as analyzing tools to the three research questions (Table 1).

Analysis and comparison of the websites with each other was hence done due to the three research questions and "the 'seven building tasks' of language" (Gee 2011, 17).

For the analysis the appropriate text passages were copied from the websites and saved as text files in Microsoft Word 2003. Then the genre ("narrative (…), persuasive, informative") and rhetorical structure ("collection or list, description, causal, comparative, and problem/solution") of each text of the five websites were determined (Goldman and Wiley 2011, 104 and 107).

Table 1: Overview of research questions and supplementary analytical questions adapted from Gee's "'seven building tasks' of language" (2011, 17-19)

Research question		Supplementary analytical questions
No.	Content	

1	Understanding of sustainability	What issues are connected to or disconnected from each other?
2 &	Representation of sustainability and inter- and transdisciplinary research on sustainability	What kind and style of language is used to render some information important or significant and others not?
		Which (re)actions are the websites attempting to stimulate in the reader's mind?
3	Power relations in sustainability research	What identity or role are the online texts asserting to the scholars and the audience, respectively?
		What kind of relationship(s) are the texts attempting to represent or to create with other actors?
		What issues are directly addressed and what issues are taken for granted?

In a third step the absolute and relative frequency (in relation to the total amount of words of a text) of the research project's name, as well as of the terms *sustainability* and *SD* were calculated. The same was done for the terms *ecology* (including allied terms such as ecological, ecologically, environment, environmental and environmentally), *economy* (including allied terms such as economy, economic, economics, economical, economically) and *society* (including allied terms such as social, socially, societal, socio, political, politically, politics, cultural, culturally and culture) (see Appendix I).

Finally I established a colour-coding system. Single words, phrases, whole sentences or paragraphs were colour-coded due to the three research questions on the one hand (red, turquoise and blue) and due to their language usage (yellow) on the other. In respect of language special attention was given to frequently used words, usage of adjectives, active or passive verb forms and abbreviations.

4. Findings

This chapter contains the results derived from the CDA. At the beginning the five research institutes (Chapter 4.1) and their websites (Chapter 4.2) are briefly presented. In a second step the five websites are analyzed due to the understandings of sustainability (Chapter 4.3), the representations of sustainability and sustainability research (Chapter 4.4) as well as due to the power dimension in such research (Chapter 4.5).

4.1. Five Research Institutes

The CDA focuses on the websites of *The Centre of Environmental Sciences* (CMK), *International Centre for Integrated assessment and Sustainable Development* (ICIS), *International Institute for Sustainable Development* (IISD), *Lund University Centre for Sustainability Studies* (LUCSUS) and *National Centre of Competence in Research* (NCCR)[7]. Basic information on the research institutes themselves were extracted from the institutes' websites and are summarized in Table 2. The key data presented there is given to illuminate what the institutes are working on (Activities) and how they work on it (Knowledge production). Furthermore three more categories were established in the table in order to put the institutes into a rough spatio-temporal context and to give an idea of their size. These categories show the research institutes' location, start dates and number of staff members.

Table 2: Key data of the five research institutes

Criteria	Projects				
	CMK	**ICIS**	**IISD**	**LUCSUS**	**NCCR**
Activities	research, education, consulting	research, education, consulting	research, consulting reporting	research, education	research
Knowledge production	multi-disciplinary	multi- & inter-disciplinary	inter- & trans-disciplinary	inter- & trans-disciplinary	inter- & trans-disciplinary
Location	Hasselt/ Belgium	Maastricht/ Netherlands	Winnipeg/ Canada (Head Office)	Lund/ Sweden	Bern/ Switzerland
Year of foundation	1997	1998	1990	2000	2001
Number of staff	~100	~35	> 100	~30	~350

4.2. Five research institutes make five websites

In order to facilitate the comparison between the five websites' content I singled out those texts from the websites that address the following six categories: *About*, *Vision/Mission*,

---

[7] For more information go to http://www.uhasselt.be/CMK-en, http://www.icis.unimaas.info/, http://www.iisd.org/, http://www.lucsus.lu.se/index.html and http://www.north-south.unibe.ch/content.php/, all accessed 2012-05-03

Research, *Funding*, *Networking/Partnerships* and *Others*. Table 3 depicts which categories are addressed by which research institutes and adds the original names of the headlines provided on the websites.

Last but not least the websites also differ in their degree of detail. Depending on the research project the six categories were addressed more or less thoroughly. This ultimately means that the texts greatly vary in their length. Whereas the NCCR-text is the shortest (1137 words) the IISD-website provides extensive information and thus makes a text of 6170 words available for the analysis. The texts from CMK (1898), ICIS (1573) and LUCSUS (2297) are located between these two extremes regarding length.

Table 3: Sections of the websites, with original titles, which were considered for the CDA

Website	Projects				
	CMK	**ICIS**	**IISD**	**LUCSUS**	**NCCR**
About	yes	yes	yes	yes	yes
Vision/ Mission	yes	yes	yes	none	none
Research	Core Competence	Current Research Projects	Our Knowledge	LUCSUS Research School	Research Topics
	Research Groups			Research Projects	Thematic Node 1, 2, 3
				LUCID	Integrative Node
Funding	none	none	yes	none	none
Networking/ Partnerships	Services	none	none	Right Livelihood College	Programme Structure
					Partnership Actions
Others	none	none	FAQ Timeline	none	none

(Research Question 1 and 2 spans the rows About through Research; Research Question 3 spans the rows Funding through Others.)

4.3. Understandings of sustainability

I developed two complementary approaches to get a first idea of the websites' understandings of sustainability. First I investigated if the websites distinguish between

sustainability and SD (Chapter 4.3.1). Secondly I examined whether the projects focus on the ecological, economic or social dimension of sustainability or SD (Chapter 4.3.2).

4.3.1. Sustainability or sustainable development?

In order to find out if the five research institutes prefer one of the two terms on their websites I first of all looked at the projects' names. It becomes apparent that two out of the five projects use the term sustainable development in their names, namely ICIS and IISD. Another two projects, namely CMK and NCCR abandon both terms in their names. And finally one out of five projects, namely LUCSUS, draws on the term sustainability in its name.

Secondly I calculated how often the terms occur in the websites' texts in relation to the total amount of words in the texts (Table 4). Additionally I considered how many times the projects' names were mentioned on their websites in proportion to the total number of words. This ratio allows for a better understanding of the relative frequencies of the terms sustainability and SD.

Table 4: Relative frequencies of the projects' names and the terms sustainability and SD in proportion to the total amount of words in the websites' texts presented for each project

	Projects				
Ratio	**CMK**	**ICIS**	**IISD**	**LUCSUS**	**NCCR**
project's name/word$_{total\ amount}$	1/79	1/105	1/43	1/88	1/162
sustainability/word$_{total\ amount}$	none	1/262	1/411	1/96	1/569
SD/word$_{total\_amount}$	none	1/131	1/96	1/383	1/379

In view of Table 4 it becomes clear that the websites mention the projects' names more often than they use the term sustainability or SD. Also it becomes evident that four out of five websites draw on both, sustainability and SD in their online texts. However, the table shows that three websites, namely the ones of ICIS, IISD and NCCR prefer the term sustainable development. The IISD-website has the lowest ratio which means that it uses SD most frequently. The LUCSUS-website favours the term sustainability instead which means that every 96th word on the website is sustainability. As opposed to this the NCCR-website uses the term sustainability the scarcest. The CMK-website on the other hand does neither include sustainability nor SD at all. Nevertheless it draws on the terms sustainable and sustainable management.

4.3.2. Ecological, economic or social sustainability? Or all three of them?

In respect of scientific literature three main perspectives on sustainability were identified in Chapter 2.3.2. These are either putting emphasis on the ecological, the economic or the social dimension of sustainability. Table 5 displays the relative frequencies of three categories of words that reflect the three perspectives on sustainability and have been summarized as ecology, economy and society. As explained in Chapter 3.3 each category covers several words that can be directly related to it.

Table 5: Relative frequencies of the terms ecology, economy and society in proportion to the total amount of words in the websites' texts presented for each project

Ratio	Projects				
	CMK	ICIS	IISD	LUCSUS	NCCR
ecology/word$_{total\_amount}$	1/73	1/197	1/121	1/328	1/126
economy/word$_{total\_amount}$	1/118	1/524	1/309	1/383	1/284
society/word$_{total\_amount}$	1/949	1/93	1/257	1/121	1/95

Table 5 reveals that the CMK-website clearly focuses on the ecological aspect of sustainability but hardly takes the social dimension into account. The IISD-website also puts emphasis on the ecological dimension but considers social aspects, too. The websites of ICIS, LUCSUS and NCCR on the other hand take up the opposite position. They concentrate on the social dimension to sustainability first and then address ecology.

With regard to the calculated ratios none of the projects highlight economic matters as most important.

4.4. Understandings and representations of …

As understanding and representation of an issue such as sustainability are inextricably linked to each other the two aspects can be presented separately only to a certain extent (Chapters 4.3.1 and 4.3.2). Therefore the following three chapters contain the findings on both the different understandings and representations of sustainability as presented on the five websites. The first chapter investigates the websites' slogans (Chapter 4.4.1). Chapter 4.4.2 examines how sustainability or SD is presented within the websites' texts. Chapter 4.4.3 focuses on the research institutes' ideas of ways towards a more sustainable way of living.

In all three chapters I cast a glance on how language is used on the five websites. Regarding Chapters 4.4.2 and 4.4.3 I also take the texts' structure into account.

4.4.1.   … slogans for sustainability

Four of the five research institutes at stake provide a slogan on their website. The slogan on the IISD-website for instance reads: "Better living for all – sustainably." The very first word of the slogan stands for the idea that our current living standard or way of living can still be improved no matter how satisfied we actually are with the situation at the moment. To put it differently the slogan creates the impression that the current situation is not good enough and generally suggests progress for everyone as the solution. The fact that the slogan includes everyone in this movement for progress reflects its visionary character. Finally the way in which the word "sustainably" is added via a hyphen emphasizes its importance. Altogether the slogan conveys the message that a satisfactory way of living is possible for everyone on this planet without depletion of its natural resources and without overusing nature's capacity for resilience.

ICIS on the other hand provides the following phrase: "Sustainability is a MUST." Indeed MUST in this context represents an abbreviation for the Graduate School of Sustainability Science at Maastricht University in which ICIS is involved. Nevertheless ICIS picks up on this abbreviation and creates a slogan that is supporting the sustainability concept as a necessity. As the reader knows that sustainability is not a state that has been globally achieved the slogan indirectly points out that not only "[s]ustainability is a MUST" but action towards it is a must, too.

NCCR and LUCSUS both provide slogans that are more connected to their project and work than to sustainability in general. NCCR's slogan reads: "Research Partnerships for Sustainable Development." LUCSUS' slogan reads "Bridging the gap between Nature and Society." Apparently both slogans promote an interdisciplinary kind of knowledge production.

4.4.2.   … sustainability in the text

Three out of five projects provide explanations of the sustainability concept but do so in text sections that are not of high priority to the overall picture of the project. For instance explanations are given in the FAQs-section (IISD) or in a section about the project's own research school (LUCSUS). In the case of the latter the concept is only indirectly described when an explanation of sustainability science is given:

> Sustainability science deals with persistent problems driving an unsustainable development. Such problems are often called wicked problems [15]. Wicked problems are persistent not only because the solutions are not yet there but because they have incomplete, contradictory, and changing requirements; and solutions to them are often difficult to recognize as such because of complex interdependencies. (LUCSUS)

The same is true for ICIS. On its website sustainability is explained in the vision/mission-section but is not directly discernible as such: "We have a vision of a world where individuals can make the most of their potential, where poverty no longer exists, and where people respect each other and nature. This vision is a goal we strive for day after day in our work as teachers, scientists and managers" (ICIS).

Another example for an explanation of sustainability that is not clearly denoted as such is given in the about-section of the IISD-website. Here sustainability is presented as the "well being of the world's environment, economy and society" (IISD). Furthermore the IISD-website represents the only case among the five websites that also provides a direct explanation of its understanding of sustainable development and, by using the question "What is sustainable development?", clearly marks it as such:

> Sustainable development is the notion that humanity should strive to develop the economy in a manner that does not damage the integrity of ecosystems and social well-being. It's about working toward a better life for all people for today and for the future. The most commonly accepted formal definition of SD is taken from *Our Common Future*, the landmark 1987 report of The World Commission on Environment and Development. (IISD)

The CMK-website forms a special case in this regard because it neither draws on the terms sustainability or SD (Table 4) nor does it provide a separate explanation of its perspective on one or both of the terms. However, the website's overall language and the links it makes to technology indicate a focus on SD and weak sustainability, respectively. Within the texts on the CMK-website research on sustainable technology gets closely linked to its valorisation potential: "In particular for the 'soft' decontamination techniques, the research into the valorisation of the biomass is crucial. The combination of phytoremediation and the

extraction of renewable energy from biomass is economically very relevant for the Flemish, national and European environmental policy" (CMK).

Another option to get an idea of the projects' conceptions of sustainability or SD is to take a look on their current research projects. The main research areas give some indication which dimensions of sustainability or SD are considered to be essentially important (Appendix II). On the CMK-website for instance five out of six listed research areas are dedicated to a natural science perspective on sustainability. This points to an ecological focus on sustainability and supports the findings presented in Table 5. The language used on the CMK-websites also reflects a natural science perspective on sustainability as words such as symbiosis and evolution indicate:

> The **CENTRE FOR ENVIRONMENTAL SCIENCES (CMK)** is a multidisciplinary research centre that opts for a well-considered combination and *symbiosis* between high-quality fundamental environment-related research and applied research (…). At present, the CMK research is concentrated in three core competence fields, taking the *evolutions* in the research of the different groups into account. (CMK, bold and capital letters as in the original, typesetting in italics added by the author)

With respect to the four research areas listed on the website of NCCR three of them focus on social aspects of sustainability, e.g. governance, livelihood and health. Again this supports the findings depicted in Table 5.

4.4.3. … inter- and transdisciplinary research on sustainability in the texts

First of all the texts of the five projects can be generally labelled as non-fictional, informative and descriptive. They provide information about the projects via describing the organizational structure, research activities, funding, networking and partnerships in- and outside academia. The text genre and rhetorical structure provide information about the texts' function. According to their character the texts intend to inform their readers more about the projects' history, way of working, ideology and goals than about sustainability or SD in the first place. As a consequence the texts represent their understandings of sustainability or SD in a more indirect manner. They especially do so when describing the current inter- and transdisciplinary research activities as well as the research history and vision. Interestingly there are certain words and phrases that occur time and again on the

five websites and which indicate a common way of how the projects contextualize and attempt to strive for sustainability or SD.

One such word is *complex* or *complexity*. The CMK-website for instance refers to the "complexity of the environmental problems" (CMK). In this context IISD adds: "The problems we face are complex and serious" (IISD). The website of ICIS relates to complexity as a phenomenon which humankind is passively confronted with: "ICIS addresses complex issues facing the planet and its inhabitants" (ICIS). The LUCSUS-website refers to "the MA in 2005, the Stern Review in 2006, the IPCC in Spring 2007 and (…) the GEO-4 in October 2007" and states that "the human impacts on global life support systems of the planet have reached a magnitude and complexity, unprecedented in human history, which may jeopardise the future well-being of humanity" (LUCSUS). As a consequence to the multilayered and difficult situation of the planet at least two websites arrive at the same conclusion which they identify as the urgent "call for action" (LUCSUS). On the website of the IISD this urgency reads like this: "The expressed urgency on the part of the international community to replace rhetoric with action fits well with IISD's mandate to promote sustainable development in decision-making" (IISD).

Although each of the research institutes follows its own approach to sustainability or SD their idea of how to strive for a more sustainable way of life shows some essential commonalities. Again certain words or phrases function as helpful indicators. One such phrase is *collaboration* or *cooperation* across nation-state, institutional, disciplinary and generational borders or constraints: "Sustainability research is developed mainly in the interfaces between existing areas of knowledge and is thus highly interdisciplinary and aims to create new forms of collaboration across disciplinary boundaries and diverse areas of knowledge" (LUCSUS). The cooperation between researchers of different age gets promoted as well: "**LUCSUS Research School** will offer scientific training and a fruitful learning environment where the exchange of knowledge between younger and more experienced researchers is emphasised and developed" (LUCSUS, emphasis as in the original).

Furthermore international collaboration between colleagues from the same research institute as well as from different institutes is also repeatedly mentioned on the websites: "The ICIS

organization is multidisciplinary; it has a mix of national and international, globalised, youthful people" (ICIS). The NCCR-website supports the same argument:

> The individual projects are co-led by post-doctoral researchers from the South and the North who jointly oversee an international team of post-doctoral and senior researchers, PhD and master's students. The teams conduct their research in at least two out of nine established Partnership Regions spread across four continents. (NCCR)

Another glance at the research institutes' names reveals that at least two of them contain the word *international* (ICIS and IISD).

Another word that links to the overall affirmation for various kinds of collaboration expressed on the websites is *participation*. On the one hand the projects address their own participation in networks or programmes that are related to either research in general, sustainability or SD or both: "CMK participates in European framework programmes, in research programmes for international bilateral cooperation (…)" (CMK). On the other hand the websites describe approaches to transdisciplinary research on sustainability. The description of one specific research project of NCCR reflects this ambition:

> The research projects in this category examine how to facilitate effective health and sanitation strategies through participatory planning. Their final aim is to aid the creation of interventions, health services and social programmes that are sustainable, equitable, reflect local conditions, meet the needs of local populations and reinforce their resilience (NCCR).

In summary it can be stated that the websites represent the current situation of global change and the concepts of sustainability or SD as difficult and complex: "The problems we face are complex and serious—and we can't address them in the same way we created them. But we *can* address them" (IISD). In addition to this tendency of taking responsibility there also exists an awareness regarding the limitations to research towards greater sustainability: "One of the objectives of the CMK as an institute is to concentrate the research of its different research groups on a limited number of common topics" (CMK). Besides the ICIS-website addresses the long-term and slow processes related to global change and state that their "interdisciplinary analyses complemented with participatory processes involving stakeholders usually form the basis for the development of visions and long-term strategies" towards sustainability (ICIS).

4.5. Power dimensions of inter- and transdisciplinary research on sustainability

There are two ways how power and power relations become apparent on the five websites. Either power issues are addressed in a direct manner or an indirect and subtle manner. The findings presented in the following chapters therefore include both the direct and the indirect way of addressing power and power relations. The findings on the power aspect assigned to knowledge and knowledge production on the websites are presented first (Chapter 4.5.1). Afterwards the topics of funding (Chapter 4.5.2), networking and partnerships (Chapter 4.5.3) are addressed.

4.5.1. Power of knowledge

On the five websites power is assigned to knowledge in two ways. On the one hand the websites of ICIS, LUCSUS and NCCR mainly give information about what the research institutes attempt to achieve through scientific knowledge production on sustainability or SD. The ICIS-website for example introduces one of its research projects on sustainable urban neighbourhoods and points to the expected outcome of the project: "Academic partners (…) are involved in the project in order to improve the quality of live of these neighbourhoods, reinforce participation to sustainable development and increase exchanges and synergies between (…) cities" (ICIS, spelling as in the original).

On the other hand the IISD-website provides information mainly about the actual achievements of its research projects. For instance it mentions that "IISD's collaboration with the Mining, Minerals and Sustainable Development – North America project draws to a close. The cooperative effort involved about 150 people and brought the issue of sustainable development to the attention of an entire sector" (IISD).

The only website which puts the power aspect in scientific knowledge production into perspective is the one of LUCSUS. It stresses the necessity to distinguish between scientific knowledge production as "problem-solving" or as "critical research". Furthermore the website states that "theories and methodologies for nature-society interaction (…) come with their own biases, strengths and weaknesses". The website further argues that "[m]ethods are rooted in a methodology and are therefore not neutral" (LUCSUS).

4.5.2. Funding

Table 3 depicts which of the five websites contain separate information about funding, networking and/or partnerships of the research institutes. It reveals that there is only the IISD-website that provides separate information about funding. However, a look at the websites' texts reveals that although four websites have no separate headline or section on funding at their disposal yet all five websites touch upon the issue of financing their research in some way. Concrete information on which institute or organisation is funding which projects is especially provided through descriptions of the research projects (see ICIS and LUCSUS). Therefore phrases such as "Sida funded for three years" or "[f]unded by FORMAS" or "funded by the EU Framework Programme 7" can be found on the LUCSUS-website. The ICIS-website contains similar phrases such as "funded by the EU" or "NOW funded research". In these examples the research projects are passively receiving funds. Money is given to them. In the following quote from the IISD-website IISD takes in a more active role regarding fundraising: "The Institute initiates a new Innovation Fund for its researchers, supported by several private sector and individual donors" (IISD).

In the overall description of its research the CMK-website gives an overview of funding institutions with which it cooperates. Interestingly none of these four websites specifies the amount of money which specific research projects or the whole research institute or organisation receive from funding organisations. Only the IISD-website constitutes an exception in this context. It openly communicates how much money the organisation has on hand. In the FAQ-section for instance the website reads: "IISD has a budget of roughly CDN\$ 12 million" (IISD). In the Timeline-section the initial amount of money with which the IISD started in the year of its foundation is given:

> At the Globe 90 Conference in Vancouver, Manitoba Premier Gary Filmon and Federal Environment Minister Lucien Bouchard signed the funding agreement that brought IISD to life. Major initial funding came from the federal government (CIDA and Environment Canada) and Manitoba, CDN\$ 25 million spread over five years. (IISD)

Beyond the identity of the funding organisations and the amount of money they provide for CMK, ICIS, IISD and NCCR the websites also address the effect those two criteria can have upon the research profile and the organizational structure of these five research institutes. The CMK-website describes the causal link between funding and the number and kinds of research topics the institute can deal with:

> One of the objectives of the CMK as an institute is to concentrate the research of its different research groups on a limited number of common topics. At the moment, the CMK research aims at three fields (core competence fields). On the one hand, this choice was made on the basis of a thorough inventory and evaluation of the available expertise, but on the other hand also on the basis of the national and international reputation in the different fields. Furthermore, CMK also looked at the future perspectives and financing possibilities of each research field. (CMK)

In order to maintain their research projects and goals, research institutes such as the five presented in this study are forced to develop creative fundraising strategies: "And, as the funding environment becomes more competitive, we will need to become increasingly innovative" (IISD). Networking and establishing partnerships with other organisations and institutes in the field of sustainability or SD can offer a way to conduct innovative research and increase the probability to obtain funding for it.

4.5.3. Networking and partnerships

Regarding networking and partnerships Table 3 shows that two out of five websites provide no extra information at all (ICIS, IISD), another two websites give some extra information (CMK, LUCSUS) and one website offers detailed descriptions on its networking activities and partnerships (NCCR). Again a look at the websites makes clear that these two topics might not be addressed in extra text sections by all five websites but are co-addressed in text passages about specific research projects (ICIS, NCCR) or the history of the research institute (IISD). Here the websites supply information which networks or partnerships they are part of. The CMK-website for example gives a list of institutions from the realm of research, politics and industry with which it collaborates. Typically such references contain many abbreviations. This is for instance the case for the research collaborations described on the LUCSUS-website: "The SUN (Sustainable Urban Neighbourhoods) project is part of the Interreg IVA Euregio Meuse-Rhine programme" (LUCSUS). Not for every abbreviation short explanations are given.

However, some research institutes collaborate with national and international governments (CMK, ISSD), the gas and oil industry, the WTO (ISSD) and other political and/or economic key players. In doing so they conduct applied research of political or economic relevance on the regional or global level:

> Noting slow progress of governments, IISD publishes a brief targeted to Canada's new Minister of Finance, an Action Plan: Protecting the Environment and Reducing Canada's Deficit. It details the

need to increase taxes for polluters, reduce taxes that undermine employment rates, and eliminate the subsidies that create environmental harm. (IISD)

The ICIS-website on the other hand points to a collaboration on a more local scale in order to strive for sustainable solutions on the local level:

> Furthermore, ICIS works closely with the UM Green Office, a body of Maastricht University that is managed by a team of employees and students, which, supervised by senior staff, addresses green interests of UM employees, UM students and visitors with the goal of higher sustainability standards within the University and its community. (ICIS)

Another point regarding networking and partnerships is the relation between the involved institutions or organisations. One aspect of this relationship relates to who initiates the collaboration. Either the research institute establishes a joint project and other organisations join:

> IISD launches a project that lets the world see through Inuit eyes the effects of climate change in the western Canadian Arctic. The video, *Sila Alangotok,* planned and produced in collaboration with the people of Sachs Harbour, creates a stir when launched in several centres around the world with visual and oral history documentations of dramatic arctic environmental change. (IISD)

Or the research institutes are asked by other organisations to start a joint project: "IISD is invited to advise the International Organization for Standardization on the feasibility of corporate social responsibility (CSR) standardization" (IISD).

5. Discussion

Based on the theoretical framework of this study (Chapter 2) this section interprets the results from the CDA presented in Chapter 4. In Chapters 5.1 to 5.4 I put the findings from the CDA into relation to the theoretical framework introduced in Chapter 3. Chapter 5.5 addresses the methodological limitations of this study and suggests further research possibilities.

5.1. Understandings of sustainability

The analysis and interpretation of the five websites' texts generally demonstrates that they express rather different conceptions of the term sustainability. On the other hand the

websites share the opinion that humanity entered a period of complex global change (CMK, ICIS, IISD, LUCSUS). Furthermore they agree that action is urgently needed and that inter- and transdisciplinary research on sustainability can essentially contribute to the development of strategies to cope with global change. Bateson's concept of PNS mentions the urgency for action as one essential component of "a strategy for dealing with environmental issues" (Tognetti 1999, 691).

Indeed the websites share a basic common idea of the current situation of the planet and the obligations this situation creates for inter- and transdisciplinary research on sustainability. They also share a basic common idea of how research on sustainability can contribute to a more sustainable future. However, their conceptions of what the term sustainability actually means vary to quite an extent. In fact these "plural and conflicting value systems" represent another parallel to Bateson's PNS-concept (Tognetti 1999, 691).

According to Robinson "academic and NGO sources have been more prone to use the term sustainability" whereas "government and private sector organizations have tended to adopt the term sustainable development" (2004, 370). As CMK, ICIS, LUCSUS and NCCR all conduct research and are directly associated to universities one could speak of an academic background. Thus a general preference for the term sustainability on their websites could be assumed. Interestingly, the results from the analysis prove otherwise (see chapter 4.3.1. and 4.4.2.). In fact a general preference for the term sustainability, as stated by Robinson (2004, 370), could not be found.

The IISD is the only organization among the five that is not part of a university. It even states that the Brundtland-report which provides a popular explanation of the SD-term (Sneddon, Howarth, and Norgaard 2006, 259), originally gave rise to the idea of founding the IISD-institute (IISD). Furthermore the information its website provides about the founders and funding organisations in the first years of the IISD argue for a preference of the term SD as well:

> At the UN in 1988, Prime Minister Brian Mulroney announced Canada's intention to establish an international institute devoted to advancing sustainable development (…). At the Globe 90 Conference in Vancouver, Manitoba Premier Gary Filmon and Federal Environment Minister Lucien Bouchard signed the funding agreement that brought IISD to life. Major initial funding

came from the federal government (CIDA and Environment Canada) and Manitoba, CDN$ 25 million spread over five years. (IISD)

At this point it has to be stated that there indeed is a preference for the term SD but that four out of five websites draw on the term sustainability as well. Especially the slogans "Better living for all – sustainably" and "Sustainability is a MUST" given on the IISD-website and the ICIS-website reveal a more idealistic perspective. According to Robinson this indicates a preference of the term sustainability (2004, 370). Beyond the ambivalent relation to the two terms of sustainability and SD the CDA uncovered that the websites stress the ecological, economic and social dimension of sustainability differently. Hence the websites reflect different perspectives on SD itself, as well. According to Robinson this does not come as a surprise: "One of the most striking characteristics of the term sustainable development is that it means so many different things to so many different people and organizations" (2004, 373). Whereas two websites highlight the ecological aspect, three websites put emphasis on the social aspect. In respect of the economic aspect of sustainability or SD the analysis reveals contradictory information. On the one hand it turns out that the websites do not use words such as *economic* or *economically* very often. On the other hand the explanation of IISD's understanding of SD indeed implies a strong focus on the economy: "Sustainable development is the notion that humanity should strive to develop the economy in a manner that does not damage the integrity of ecosystems and social well-being". Also the language-in-use on the CMK-website indicates a strong emphasis on the economic aspects of sustainable development. Besides the CMK-website provides extensive information about its research on innovative technology as a means to a more sustainable future but also as a means to greater economic benefits "for the Flemish, national and European environmental policy" (CMK). The CMK-website's positive attitude towards so called green technology could indicate that the CMK believes in weak sustainability. The ICIS-website on the other hand explains its research vision "of a world where individuals can make the most of their potential" in a rather idealistic way and with a focus on the single person (ICIS). This might be a hint to strong sustainability. However, a distinct conclusion is not possible.

5.2. Understanding of inter- and transdisciplinary research on sustainability

The analysis of the websites and the results that could be derived from it reflect a rather positive perspective of the research institutes on research that is conducted across nation-state, institutional, departmental, disciplinary and generational border and constraints: "An important strength, also for the future, are the possibilities to multidisciplinary approach (biological, chemical and economic/legal aspects) that exist within the CMK" (CMK). None of the websites takes in a critical point of view regarding inter- and transdisciplinary research. By contrast inter- and transdisciplinary science in general, meaning without the specific focus on sustainability or SD, are frequently scrutinized concepts in scholarly literature. Mansilla and her colleagues summarize the dilemma of the pros and cons of such kind of scientific knowledge production:

> BEING A MANTRA IN THE TREATMENT of contemporary knowledge production, 'interdisciplinarity' is ubiquitously invoked across federal funding agencies, journal editorial boards, university strategic plans and research centers as a sign of dynamism and creativity. Yet awareness of the vitality of interdisciplinarity is frequently accompanied by scepticism about the quality of research it yields and the profile of scholars it attracts. Central to the debates encountered in many of these settings is the ongoing problem of assessing interdisciplinary work. (Mansilla, Feller, and Gardner 2006, 69, capitals as in the original)

Apparently this dilemma is also known when it comes to inter- and transdisciplinary research on sustainability. Hicks and her colleagues state that "inconsistent or unclear use of interdisciplinary terminology hinders adequate assessment of progress or research effectiveness" (2010, 464). Indeed the websites interchangeably use the terms multi- and interdisciplinary and abandon to explicitly clarify how they understand such terms. However, an awareness of the dilemma described above is not expressed on the five websites. In fact the promotion of inter- and transdisciplinarity in research on sustainability as it can be found in the RESCUE-report reflects the very positive image on cross-border research that existing inter- and transdisciplinary research institutes create (Jäger et al. 2011, 3).

One reason why the websites do not scrutinize cross-border research is naturally to be found in the function the websites have and in the possibilities of the internet to make information accessible to a great audience. Which research institute would voluntarily address potential difficulties linked to their cross-disciplinary work on their website where the information is accessible to everybody (including future staffs, potential partners or funding organizations)?

Another reason why the websites strongly emphasize inter- and transdisciplinary as well as international and integrated research might be because it indeed facilitates innovative research projects in order to be better able to tackle the complex problems of global change. In their article "Interdisciplinarity in the environmental sciences: barriers and frontiers" Hicks and her colleagues support the argument that cross-border phenomena and problems require cross-border research: "Global environmental changes present unprecedented challenges to humans and the ecosystems upon which they depend. The need for interdisciplinary approaches to solve such multidimensional challenges is clear" (2010, 464).

Yet another reason could be that the competitive atmosphere which is mentioned on the IISD-website forces the research institutes into a certain kind of knowledge production if they want to survive, proceed or even expand.

In summary it can be said, that promotion of inter- and transdisciplinary research on sustainability seems to be motivated by multiple factors. The mono-causal motivation presented in the RESCUE-report thus appears to be rather idealistic:

> The world is currently facing major challenges and crises (…). Such complexity cannot be addressed by the traditional disciplinary scientific approach. An integrated knowledge base and a new set of common practices are required to address these issues. The tackling of the global change challenges must also be of wide societal and individual concern. For this to happen, a deeper and more open dialogue, and integrated cooperation between the research community, policy-makers, society and ultimately private individuals are required. (Jäger et al. 2011, 3)

5.3. Representations of sustainability and of inter- and transdisciplinary research on it

The five research projects all deal with problems of global change and potential ways towards more sustainable solutions in their work. However, finding out about their understanding of sustainability, as a key concept of their research, is not trivial. Although playing a major role in the work of the five projects the individual conception of sustainability is not addressed right away on the websites.

There are two options how understandings of sustainability are formulated. They are either directly or indirectly addressed. When being directly addressed the descriptions are often not immediately recognizable because no headlines characterize them as descriptions. Another option is that these descriptions are not that easy to find on the websites. When being indirectly addressed taking a closer look at the research ideology and goal, current

research projects as well as at language style, text genre and structure gives some indication on the understanding and representation of sustainability. Reading between the lines in the websites' texts makes clear that the perspective on sustainability or SD is not only shaped by ideological aspects but also by very practical ones. The information given on the issues of funding, networking and partnerships as well as reputation demonstrate that both aspects play an important role in shaping the perspective of a research institute on sustainability.

A closer look at the kind of language in the online texts reveals that there are certain phrases or words which get used time and again by different websites. Such phrases or words are for instance *international*, *interdisciplinary*, *integrated*, *collaboration*, *applied research*, *participatory approach* and *alternative* (CMK; IISD; ICIS; LUCSUS; NCCR). Their frequent use in different contexts by different websites indicates that the five research institutes share a basic understanding of how inter- and transdisciplinary research on sustainability should be characterized. Indeed the research institutes' perspectives on sustainability itself are quite different from each other, but they share a basic idea of how research can contribute to a more sustainable future. Apparently a knowledge production across nation state, institutional and disciplinary borders is considered to be the most efficient scholarly strategy to deal with issues of global change and sustainability. It also points to the fact that they draw on a common repertoire of words and phrases to represent and communicate this understanding to their audience. By using such a cluster of indicating words, as I would call them, the websites manage to convey essential messages in short texts.

Another option to keep the texts on the websites short but rather concise is reflected in the frequent usage of scientific terms and abbreviations. Especially the latter makes it harder for the reader to understand the actual meaning of the text or to grasp the information the website tries to convey. They are commonly used as nicknames for funding, political or other research organizations and companies in the private sector and diminish the readability of the text. Abbreviations represent a power element as the reader is required to be familiar with the abbreviations in order to fully understand the text's meaning.

With respect to the fact that the research institutes' names are given more often than the terms sustainability or SD on the websites a self-descriptive function of the websites can be assumed. In turn this function is reflected in the websites' and texts' structure. Already a

brief look at the websites uncovers their concise makeup due to a basic common structure and short text passages. This implies that the websites intend to provide introductory information about the research institutes and try to avoid overloading the reader with too many or complex details. The usage of indicating words and abbreviations supports this assumption. As a consequence information about the research institutes' understanding of sustainability occasionally appears to be rather general or unclear in its meaning. Confusion that is caused in this way adds to the overall ambiguity of the term sustainability.

5.4. Power dimensions of inter- and transdisciplinary research on sustainability

In the sense of Foucault's understanding of the term power occurs in unequal relationships and operates on rather concrete, practical and political levels (Oliver 2010, 34). The CDA of the five websites supports Foucault's argument that power is an inherent part of knowledge and knowledge production (Hall 2001, 75). On the one hand the research institutes present their research results and how politics, business and society benefit from them. The IISD-website represents the most prominent example in this context as it provides extensive information on its actual research achievements and for whom or what they are of greater use. Such information shows the direct power potential of scholarly knowledge production on sustainability to contribute to the development of strategies for a more sustainable future. On the other hand the websites frequently draw on describing potential future outcomes of research projects. In doing so the research institutes reveal how much power the researchers assign to their own research before it has even started. Such behaviour could also be interpreted as a strategy to create a positive image of the research institute. In fact the power-knowledge relation also links to issues of social status and institutional networks in which a variety of stakeholders with different backgrounds interact at multiple levels (Strober 2011, 156).

The LUCSUS-website is the only one of the five websites examined in this study that is cautious about the absolute power assigned to knowledge. In Hulme's book "Why We Disagree About Climate Change. Understanding Controversy, Inaction and Opportunity" this caution reads: "It is no longer possible to see science in the autonomous, self-governed way (…). Neither is it possible to see scientific knowledge unproblematically as the neutral outcome of a steadily advancing pursuit of an objective and universal truth" (Hulme 2009,

77). This basic caution regarding power and knowledge ultimately points to the context-specific aspect in power and takes in a more critical point of view on the power aspect in scholarly knowledge production.

The power dimension regarding funding and partner organisations and their motivations to support or collaborate with a research institute represent two important areas in which power operates. Ziegler and Ott highlight the fact that "[s]ustainability science has become a recognizable domain for scientific funding" (2011, 31). It turns out from the CDA that money is a limiting factor in terms of amount and kinds of research projects a research institute can maintain. The CMK-website for instance explains that it "also looked at the future perspectives and financing possibilities of each research field" before it made decisions about its future research profile. Another factor that greatly affects the research opportunities, profile and power of a research institute is represented by its partner organisations and the networks in which it is involved.

5.5. Methodological limitations of this study

As Goldman and Wiley point out "*written text* is far from monolithic" (2011, 104). Instead it is complex and rich of directly and indirectly communicated information. CDA of website texts is a tool to investigate how an issue is represented online to a global audience. However, the kinds of research method and research objects this study draws upon create a dilemma. This dilemma addresses the questionable validity and topicality of the websites' content. Questions about when the last update was made or who created the texts on the websites can neither be posed nor be (completely) answered by CDA of websites. This makes it difficult to estimate to what extent the perspective presented on the websites reflects the overall perspective of the research institute.

Conducting interviews or surveys with researchers from all five projects would therefore allow for more detailed material as a direct dialogue enables to ask specific questions. On the other hand the analysis of websites from disciplinary research institutes with a focus on sustainability might help to better understand the specific role of inter- and transdisciplinarity in research on sustainability. Such a broadened perspective allows for a more balanced understanding of how the kind of scholarly knowledge production (meaning

disciplinary, inter- or transdisciplinary) affects the understanding and representation of the sustainability concept. Another option in this context is to take websites from companies or private organizations into account that do not conduct inter- and transdisciplinary research but claim to follow a green or sustainable agenda.

6. Conclusion

The study at hand investigates how the three concepts of sustainability, knowledge and power are interlinked in the scholarly discourse on sustainability. As these three concepts are linked to broad and complex discourses this study can only be understood as a rather small and specific contribution to a better understanding of inter- and transdisciplinary research on sustainability. In the following two chapters I summarize the answers to the three research questions (Chapter 6.1) and explain more specifically what this study contributes to the discourse on sustainability (Chapter 6.2.).

6.1. Summary of the answers to the research questions

During the analysis of the websites' texts sticking to the colour-coding system which I established turned out to be very difficult. Using three different colours to highlight the text passages according to the three research questions in this study prove an almost impossible thing to do. In fact the discourses on sustainability, knowledge and power are inextricably linked to each other. The study shows that they only to a very little extent can be regarded separately. Besides the distinction between understanding and representation of sustainability and of inter- and transdisciplinary research on sustainability also turned out to be not trivial.

However, let me briefly summarize the answers to the three strongly interlinked research questions. The first research question addresses the understandings of sustainability expressed on the websites of the five research institutes.

The analysis and interpretation of the five websites' texts generally demonstrates that they express rather different conceptions of the term. Although a general preference for the term SD instead of sustainability becomes apparent the ideas of what SD means vary. Whereas two websites highlight the ecological aspect, three websites put emphasis on the social aspect

of SD. However, the perspective on the economic aspect of sustainability or SD is not totally clear. In fact the analysis revealed some criteria that indicate a strong emphasis on it and others that do not.

In respect of weak versus strong sustainability the websites provide rather little information to allow clear conclusions. As a matter of fact only a few bits of information were found on the CMK-website that might indicate a trend towards weak sustainability.

The second research question addresses the way sustainability as well as inter- and transdisciplinary research on sustainability is represented on the websites. In order to answer this question attention was mainly given to the websites' structure and the kind of language they draw upon.

The mainly descriptive and informative character of the websites' texts is reflected in the logically structured makeup of the websites, the rather short information given in the texts, the mainly sober choice of words and the frequent use of abbreviations and scientific terms. These criteria give some indication of the audience that the websites want to address and the image they intend to create of themselves. Apparently the websites approach a rather well-educated audience that is at least basically familiar with the discourse on sustainability and the institutional structure of scientific knowledge production. Besides the usage of slogans as well as the occasional usage of rather metaphorical language reminds of the style of advertisements. This implies an attempt of the websites to function as modern communicative means to recommend or even sell the research institutes' ideology, goals, projects and services to potential new staff, partner or funding organizations.

It turns out that the understanding of sustainability or SD itself are difficult to grasp as the websites either provide direct but hidden explanations or address their idea of the two terms mainly indirectly, so to speak between the lines.

The third research question aims at illuminating the power dimension in the scholarly discourse on sustainability. This question, in fact, turned out to reveal the most interesting insights in this study. The study examines the power that is assigned to knowledge as well as the power dimension associated to issues of funding, networking and internet communication. It comes to light that power relations are an inherent part of inter- and

transdisciplinary research on sustainability and an essential shaping factor in the discourse on sustainability.

As the selection of websites that this study examines is rather small and the research institutes it focuses on contain rather different understandings and representations of sustainability I abstain from drawing generalized conclusions.

6.2. Contribution of the study

Analyzing, understanding and displaying the interconnectedness between the ideas and representations of sustainability, of inter- and transdisciplinary research and of the power aspect in this study surely is its main contribution to the discourse of sustainability.

Concentrating on the research institutes' descriptions of their research projects and goals as well as organizational structure is a helpful approach to study the scholarly discourse on sustainability as it is embedded in the scientific and organizational practice of the research institutes. This study demonstrates that not only scientific results in the form of new, adapted or revised theories or methodologies contribute to the scholarly discourse on sustainability. Instead the discourse already continuously proceeds and develops in the phase of founding new research institutes, negotiating and establishing a research ideology and research goals as well as in the phase of planning and implementing research. What this study therefore also contributes to the discourse of sustainability is a perspective on the institutional and practical level of it.

Ultimately I would like to pick up on my conviction, expressed in Chapter 1, that there is no universally valid explanation of sustainability. Taking on a critical realist point of view and having analyzed the five websites I would like to rephrase this conviction: There might be a universally valid aspect to sustainability but thanks to our own situated knowledge and perspective on it our understanding of sustainability remains partial and biased.

Bibliography

Literature

Bagheri, Ali, and Peder Hjorth. 2007. Planning for Sustainable Development: a Paradigm Shift Towards a Process-Based Approach. *Sustainable Development* 15 (2):83-96.

Beckermann, Wilfried. 1994. 'Sustainable Development': Is it a Useful Concept? *Environmental Values* 3 (3):191-209.

Callicott, J. Baird, and Karen Mumford. 1997. Ecological Conservation as a Conservation Concept. *Conservation Biology* 11 (1):32-40.

Ciegis, Remigijus, Jolita Ramanauskiene, and Bronislovas Martinkus. 2009. The Concept of Sustainable Development and its Use for Sustainability Scenarios. *Engineering Economics* (2):28-37.

Costanza, Robert, Ralph d'Arge, Rudolf de Groot, Stephen Farber, Monica Grasso, Bruce Hannon, Karin Kimburg, Shahid Naeem, Robert V. O'Neill, Jose Paruelo, Robert G. Raskin, Paul Sutton, and Marjan van den Belt. 1998. The value of the world's ecosystem services and natural capital. *Ecological Economics* 25 (1):3-15.

Cushman, Mike, Will Venters, Tony Cornford, and Nathalie Mitev. 2002. Understanding Sustainability as Knowledge Practice. In *British Academy of Management Conference: Fast-Tracking Performance through Partnerships*. London.

Dreyfus, Hubert L., Paul Rabinow, and Michel Foucault. 1982. *Beyond Structuralism and Hermeneutics*. 2nd ed. Chicago: University of Chicago Press.

Duit, Reinders, and David F. Treagust. 1998. Learning in Science - From Behaviourism Towards Social Constructivism and Beyond. In *Iernational Handbook of Science Education Part One*. Great Britain: Kluwer Academic Publishers.

Eisner, Elliot W. 1982. *Cognition and Curriculum: A Basis for Deciding What to Teach.* London: Longman.

Eisner, Elliot W. 1997. Cognition and Representation: A Way to Pursue the American Dream? *Phi Delta Kappan* 78 (5):348-353.

Fairclough, Norman. 2010. *Critical Discourse Analysis: The Critical Study of Language*. 2nd ed. Harlow: Pearson Education Limited.

Foucault, Michel. 2002. *The Archaeology of Knowledge*. London: Routledge.

Foucault, Michel, ed. 2005. *The Body of the Condemned*. Edited by D. Egan and L. A. Chorbajian, *Power: A Critical Reader*. New Jersey: Pearson Education, Inc.

Gee, James Paul. 2011. *An Introduction to Discourse Analysis: Theory & Method*. 3rd ed. New York: Routledge.

Gibbons, Michael, Camille Limoges, Helga Nowotny, Simon Schwartzman, Peter Scott, and Martin Trow. 2005. *The New Production of Knowledge. The Dynamics of Science and Research in Contemporary Societies*. London: Sage Publications.

Goeminne, Gert, and Karen François. 2010. The Thing Called Environment: What It Is and How to Be Conncerned With It. *The Oxford Literary Review* 32 (1):109-130.

Goldman, Susan R., and Jennifer Wiley, eds. 2011. *Discourse Analysis: Written Text*. Edited by N. K. Duke and M. H. Mallette. 2nd ed, *Literacy Research Methodologies*. New York: Guilford Press.

Guggenheim, Michael. 2006. Undisciplined research: the proceduralisation of quality control in transdisciplinary projects. *Science and Public Policy* 33 (6):411-421.

Hall, Stuart, ed. 2001. *Foucault: Power, Knowledge and Discourse*. Edited by M. Wetherell, S. Taylor and S. J. Yates, *Discourse Theory and Practice*. London: Sage Publications Ltd.

Hicks, Christina C., Claire Fitzsimmons, and Nicholas V. C. Polunin. 2010. Interdisciplinarity in the environmental sciences: barriers and frontiers. *Environmental Conservation* 37 (4):464-477.

Hulme, Mike. 2009. *Why We Disagree About Climate Change. Understanding Controversy, Inaction and Opportunity*. Cambridge: Cambridge University Press.

Jäger, Jill, Gísli Pálsson, Michael Goodsite, Claudia Pahl-Wostl, Karen O'Brien, Leen Hordijk, Bernard Avril, Sierd Cloetingh, Poul Holm, Theo Toonen, Jonathan Reams, and Frans Berkhout. 2011. Responses to Environmental and Societal Challenges for our Unstable Earth (RESUCE). Strasbourg, Brussels: European Science Foundation (ESF) and European Cooperation in Science and Technology (COST).

Klein, Julie T. 2008. Evaluation of Interdisciplinary and Transdisciplinary Research. A Literature Review. *American Journal of Preventive Medicine* 35 (2):116-123.

Mansilla, Veronica B. 2005. Assessing Student Work at Disciplinary Crossroads. *Change: The Magazine of Higher Learning* 37 (1):14-21.

Mansilla, Veronica B., Irwin Feller, and Howard Gardner. 2006. Quality assessment in interdisciplinary research and education. *Research Evaluation* 15 (1):69-74.

Martin, Emily. 1991. The Egg and the Sperm: How Science Has Constructed a Romance Based on Stereotypical Male-Female Roles. *Signs* 16 (3):485-501.

Miller, Daniel. 2010. *Stuff*. Cambridge: Polity Press.

Neumayer, Eric. 2003. *Weak versus Strong Sustainability: Exploring the Limits of two Opposing Paradigms* 2nd ed. Northhampton: Edward Elgar Publishing Limited.

Oliver, Paul. 2010. *Foucault. The Key Ideas*. London: Hodder Education.

Ring, Irene. 1997. Evolutionary strategies in environmental policy. *Ecological Economics* 23 (3):237-249.

Robèrt, Karl-Henrik, Herman Daly, Paul Hawken, and John Holmberg. 1997. A compass for sustainable development. *International Journal of Sustainable Development and World Ecology* 4 (2):79-92.

Robinson, John. 2004. Squaring the circle? Some thoughts on the idea of sustainable development. *Ecological Economics* 48 (4):369-384.

Rotmans, Jan, and Pim Martens, eds. 2002. *Transitions in a Globalising World: What Does it all Mean?* Edited by J. Rotmans and P. Martens, *Transitions in a Globalising World*. Lisse: Swets & Zeitlinger B.V.

Sneddon, Chris, Richard B. Howarth, and Richard B. Norgaard. 2006. Sustainable development in a post-Brundtland world. *Ecological Economics* 57 (2):253-268.

Strober, Myra H. 2011. *Interdisciplinary Conversations: Challenging Habits of Thought*. Stanford: Stanford University Press.

Tognetti, Sylvia S. 1999. Science in a double-bind: Gregory Bateson and the origins of post-normal science. *Futures* 31 (7):689-703.

Toman, Michael A. 1992. The difficulty in defining sustainability. *Resources* 106 (Winter):3-6.

Wainwright, Joel. 2010. Climate Change, Capitalism, and the Challenge of Transdisciplinarity. *Annals of the Association of American Geographers* 100 (4):983-991.

Ziegler, Rafael, and Konrad Ott. 2011. The quality of sustainability science: a philosophical perspective. *Spring* 7 (1):31-44.

Websites

CMK. 2012. *Centrum Voor Milieukunde*. Hasselt University [cited 09.05. 2012]. Available from http://www.uhasselt.be/CMK-en.

ICIS. 2012. *International Center for Integrated assessment and Sustainable development (ICIS)* [cited 09.05. 2012]. Available from http://www.icis.unimaas.info/.

IISD. 2012. *International Institute for Sustainable Development (IISD)* [cited 09.05. 2012]. Available from http://www.iisd.org/.

LUCSUS. 2012. *LUCSUS Lund University Centre for Sustainability Studies* [cited 09.05. 2012]. Available from http://www.lucsus.lu.se/.

NCCR. 2012. *National Centre of Competence Research (NCCR North-South)* [cited 09.05. 2012]. Available from http://www.north-south.unibe.ch/.

Appendix

Appendix I:

Absolute and relative frequencies of the projects' names and of the terms sustainability, SD, ecology, economy and society in the websites' texts:

a)

CMK-text	
total amount of words	1898

CMK	24
CMK/word-ratio	1/79

sustainability	0
SD	0
sustainability/word-ratio	none
SD/word-ratio	none

ecology (including the terms ecological, environmental/al)	26
economics (including the terms economy/ic/al)	16
society (including the terms social, societal, socio, politic/al/s, culture/al)	2
ecology/word-ratio	1/73
economics/word-ratio	1/118
society/word-ratio	1/949

b)

ICIS-text	
total amount of words	1573

ICIS	15
ICIS/word-ratio	1/105

sustainability	6
SD	12
sustainability/word-ratio	1/262
SD/word-ratio	1/131

ecology (including the terms ecological, environmental/al)	8
economics (including the terms economy/ic/al)	3
society (including the terms social, societal, socio, politic/al/s, culture/al)	17
ecology/word-ratio	1/197
economics/word-ratio	1/524
society/word-ratio	1/93

c)

IISD-text	
total amount of words	6170

IISD	144
IISD/word-ratio	1/43

sustainability	15
SD	64
sustainability/word-ratio	1/411
SD/word-ratio	1/96

ecology (including the terms ecological, environmental/al)	51
economics (including the terms economy/ic/al)	20
society (including the terms social, societal, socio, politic/al/s, culture/al)	24
ecology/word-ratio	1/121
economics/word-ratio	1/309
society/word-ratio	1/257

d)

LUCSUS-text	
total amount of words	2297

LUCSUS	26
LUCSUS/word-ratio	1/88

sustainability	24
SD	6
sustainability/word-ratio	1/96
SD/word-ratio	1/383

ecology (including the terms ecological, environmental/al)	7
economics (including the terms economy/ic/al)	6
society (including the terms social, societal, socio, politic/al/s, culture/al)	19
ecology/word-ratio	1/328
economics/word-ratio	1/383
society/word-ratio	1/121

e)

NCCR-text	
total amount of words	1137

NCCR	7
NCCR/word-ratio	1/162

sustainability	2
SD	3
sustainability/word-ratio	1/569
SD/word-ratio	1/379

ecology (including the terms ecological, environmental/al)	9
economics (including the terms economy/ic/al)	4
society (including the terms social, societal, socio, politic/al/s, culture/al)	12
ecology/word-ratio	1/126
economics/word-ratio	1/284
society/word-ratio	1/95

Main research areas listed for each of the five research institutes, for CMK cited from http://www.uhasselt.be/UH/CMK-en/CMK-eng-Research/Research-groups.html, for ICIS revised from http://www.icis.unimaas.info/research-projects/current-projects/, for IISD cited from http://www.iisd.org/, for LUCSUS cited from http://www.lucsus.lu.se/html/research_projects.aspx, for NCCR cited from http://www.north-south.unibe.ch/content.php/page/id/265, all accessed 2012-05-08 (spelling inconsistencies were taken over from the original sources)

			Projects		
	CMK	ICIS	IISD	LUCSUS	NCCR
Research Areas	- environmental Biology - biodiversity, phylogeny & population studies - molecular & Physical Plant Science - cellular Physiology - economics-law - applied & analytical Chemistry	- Climate change & environmetal health risks - climate change & tourism - climate change & vulnerability, adaptation, mitigation - Sustainability & Technology & Mobility - Sustainability assessment - Sustainable water management - SD & governance - SD & urban development - Sustainability research & transdisciplinarity - Sustainability research & policy	- Adaptation and Risk Education - Climate Change and Energy - Economics and SD - Education, Learning and Leadership - Environment, Conflict and Peacebuilding - Gender Equity - Governance for Sustainable Development - Internet and Technology - International Trade - Investment and Sustainable Development - Measurement and Assessment - Natural Resources - Networks & Partnerships - Sustainable Markets	- Problematisation of Sustainability Science - Sustainability assessment tools - Sustainability & politics - Sustainable livelihoods	- Governance & Conflict - Livelihoods & Globalisation - Health & Sanitation - Resources & Sustainability