Business actions for biodiversity

A management proposal for attaining strategic benefits from improving performance on biodiversity
- the case of Givskud Zoo

Rasmus Meyer Andersen

Master thesis, M.Sc. (Eng.) in Environmental management
Aalborg University

Title:	Business actions for Biodiversity *- A management proposal for attaining strategic benefits from improving performance on biodiversity, the case of Givskud Zoo*
Theme:	Master Thesis,
Education:	M.Sc. Environmental Management, Aalborg University
Project started:	01-02-2010
Project finished:	09-06-2010
Pages:	64
Printed copies:	4
Annexes:	4
Supervisors:	Martin Lehmann and Per Christensen, both Aalborg University

Author: _____

Rasmus Meyer Andersen

Abstract

This project approaches how volunteer environmental actions should be taken strategic advantage. Multiple concepts for business engagement is adopted in the analysis of how biodiversity actions should be approached strategically, according to a) how the company is suited to take volunteer action, b) values and interests of its stakeholders, c) how the business could effectively improve its performance on biodiversity.

The key characteristics which should indicate if the company strategy is appropriate for obtaining strategic benefits from responsible actions are very much in place. However, weak correlation between company values of biodiversity conservation, and stakeholder values of experiencing direct interaction with exotic animals, means that biodiversity efforts are not recognised and appreciated by the guests, authorities and the employees.

To attain the strategic benefits from responsible actions, the actions must be visible to the stakeholders, which are most significantly the guests. In order to make actions visible to the stakeholders of Givskud, and in order to earn recognition from the performed actions, the actions for biodiversity should be taken in and around the park, where the stakeholders meet the business, and should relate to the values of stakeholders, which is the direct interaction.

Proposed actions for Givskud Zoo is derived through a planning exercise, which concludes that the most significant impacts on biodiversity happens through emissions to air, supply and use of consumptive resource, and through supply of electricity.

Table of Contents

Project background

The fundamental qualities for life on earth have been compromised throughout the extreme development, which the world has witnessed during industrialisation and heavy growth in the population of humans. Emphasis has been on maximising affluence and prosperity without considering the impacts enforced on nature's ecosystems through rise in demand, intensive practices with resource depletion and severe pollution as clear results. To many people, the affluence *has* increased. To even more, it *has not* and *will not,* in cases where the carrying threshold of deprived ecosystems has been exceeded.

My studies in Geography (B.Sc.) and Environmental Management (M.Sc.) have focused on understanding the drivers responsible for environmental deterioration on different scales, and how humankind can benefit from nature by causing the least possible impact; through recognition and integration of nature's true value into natural resource management. The previous projects, in which I have been enrolled on the masters program, are;

- a carbon footprint analysis of plastic packaging for food, with a special focus on the effect of waste management on different consumer markets,
- an analysis of the current management of the North Sea fishery, with special focus on how the plaice fishery corresponds to the biology of the fish and the decreasing stocks,
- a preliminary analysis of the potential for a carbon sequestration project in the terrestrial ecosystems of Namibia (internship assignment).

This report is the final thesis on my studies on the M.Sc. (Eng.) program in Environmental Management. The study takes form as a synthesis research, as it integrates aspects from natural as well social science; much alike most other projects I have participated in through my studies at Aalborg University. It focuses at engaging businesses in the environmental issue of biodiversity loss, and aims towards implementing strategic actions towards protecting biodiversity in a Danish company case.

Besides being the written documentation of the academic qualities, which I have acquired through my studies, my ambition for the project is to make an inspiration and proof of possibility to other companies. By presenting a proposal to how an environmental crisis and major threat to the global community can be approached; by stressing the needs for business participation in global environmental concerns; and by concretising what it takes for a company to step closer to its contribution to global sustainable development, I hope to clearly communicate that responsible actions towards environmental protection is an opportunity to attain mutual benefits for businesses as well the global community, and should be an integral part of corporate strategy.

I hope you will enjoy the reading!

Preface

This study is on seeking to explain how a Danish enterprise can participate on protecting biodiversity, and do this in a way, which provides value to the business itself. This report is the documentation of research performed in a business, which finds itself in the institutional context of the Danish society, and which is member of the Green Network for engaging in responsible actions for the environment.

It is the ambition that this project can potentially provide a scientific outset for how to implement biodiversity actions into businesses strategy in Denmark. The guidelines of Green Network for environmental reporting do not recommend actions for biodiversity, like many others. Despite this, Green Network is promoting responsible behaviour amongst businesses, and the members should therefore be provided with tools on how to engage in biodiversity.

This study is a case of Givskud Zoo, which has several unusual characteristics compared to many other businesses. However, the report is structured so that, the conceptual framework is applicable to businesses in general. The report provides a theoretical base, which might be valuable for considerations in many businesses.

Givskud Zoo is a type of company in which biodiversity plays a central role, and it has been engaging in responsible environmental actions for years. Still, its stakeholders do not have a better recognition of the biodiversity issue than the average. This report presents a proposal on how the company's performance for biodiversity could be improved, and how it should be done, in order to reach strategic benefits from doing so.

I want to thank Givskud Zoo for the openness and willingness to participate, they have demonstrated through this project. I hope the project comes in useful in future considerations in the environmental management within the company.

Focal questions

Questions appear in the introduction to each chapter. These questions indicate what the chapters will present, and will be answered during the same chapter – a simple exercise carried out to clearly state the purpose of each chapter.

Referencing

Referencing to literature is done according to the Chicago method throughout the report. All full references are found in the back of the report. When referring to primary data, the source will be provided, as well how to obtain the original data.

Figure 1.1 (or table 1.1b): The number refers to the sub-chapter in which the figure will be placed. The letter *a* refers to the order in which the figure will be placed, according to the alphabetical order. Thus this example will be referring to the second figure in sub-chapter 1.1.

When referring to somewhere in the report, these below terms are used. As the numbers indicate, chapters are the main parts of the report. These are subdivided into sub-chapters, and these comprise several sections.

1 Chapters

1.1 sub-chapters

1.1.1. sections

Expressions: Study, report and project.

Study: When referring to the research, which has been performed throughout the working process of this thesis, I refer to *the study.*

Report: The written documentation, which is the result of the research, i.e. this report, is referred to as *the report.*

Project: The aim of the study is to engage businesses in possible biodiversity projects. Whenever referred to *a project,* the meaning is a possible solution for how to fulfil the objectives as stated in this report.

Translation

The annex IV in the back have not been translated to English. It was controlled by Givskud Zoo, and only returned shortly before the deadline of the report. For that reason, translation has not been possible. Should anyone wish a translation, please establish contact to the author of the report on by email on meyerand@hotmail.com

Abbreviations

BLST	By og Landskabsstyrrelsen
DN	Danmarks Naturfredningsforening (Danish Society for the Conservation of Nature)
EMS	Environmental management system
EU	The European Union
GN	Green Network
ha	hectares (100 m * 100 m)
IUCN	International Union for Conservation of Nature
PES	Payment for Ecosystem Services
UNEP	United Nations Environment Program

Study design

Report section	Contents	Utilized methods	Aim for the chapter
1: Introduction			
Problem formulation	Introduction to concepts. Assess and define the foundation of the problem.	Literature review	Understand the reality of the problem, the history and concepts of business engagement in environmental issues.
3: Research question	Concise formulation of the problem and presentation of research question. Scoping and delimitation of research.		The backbone and revolving point of further research
4. Biodiversity, threats and current management	Review the theoretical and background for biodiversity projecting	Literature review	To understand the ecological concept of biodiversity, as well as the resource-concept of why we need it. Also to understand why it declines, and what is done for taking possible actions.
5. Business approaches for biodiversity engagement	Review the methodological background for effective biodiversity projecting	Literature review	To understand the background for taking possible actions, and to introduce applied concepts
Research approach: study design and applied methods	Present the methods and systematic application of theories		
The Case of Givskud Zoo	Interpretation of the society and company context	Media search, data interpretation	To introduce the current awareness of biodiversity in society, and to introduce the company, its mission and goals
Analysis: Biodiversity planning	Analysis of stakeholder relations and values with respect to company goals and biodiversity values.	Analysis of data	To derive how biodiversity should be protected in order to receive competitive advantages
Conclusion			Answer research question

1. Introduction

Despite the importance of ecosystems, they are being modified in extent and composition by people at an unprecedented rate, with little understanding of the implications this will have in terms of their ability to function and provide services in the future (UNEP, 2007).

"The environment" is a term as wide as the human understanding. The fact that the term is used to describe the sphere of human's interaction with other human beings, down to where microbiological processes is determined by physical conditions, indicates that whenever something is affecting living organisms, this is an "environmental" phenomenon. However, environmental issues are commonly known as when we make impact on our surroundings, or when our surroundings change or limit our actions.

Ecosystems make the resources, which add value to our society through food, clothes, clean water, medicine, building materials etc. Ecosystems comprise a variety of life, which has evolved for millions of years. Living organisms take up each their own place in the advanced interacting communities of ecosystems. Consequently, the functions of ecosystems depend on the diverse biological life of ecosystems. The capacity of an ecosystem to sustain the provision of its services relies on resilience, productivity and overall health; thus in many regards, biodiversity plays a crucial role on the natural environment, on which human well-being relies heavily (MEA, 2005).

Despite the overall importance of biodiversity, the quality measures of biodiversity show worrying figures (explained in section 2.1.3). Numerous human impacts on nature impose serious hazard to the inherent diversity, i.e. the rising demand for consumptive resource such as food crops, minerals and timber. The expansion of human activities is not limited to the land surfaces, but also heavy exploiting of the ocean resources, as well as overall pollution, leaves the battle against loss of biodiversity a great challenge. A challenge which should not be left only to conservationists and green organisations, but a challenge which should be lifted by everyone who's life and well-being depend on natural resources.

The responsibility for interacting with nature in a way which does not deprive the needs of future generations is in the hands of those who use and benefit from the services of the ecosystems. Special responsibility should be left to the powers which exploit, manage, distribute and gain economic profit on the planets' resources, through practices which are more or less friendly to the ecosystems of the planet. These are the corporations.

A new wave of green initiatives has emerged within the culture of business and marketing. The reasons for why businesses should engage in environmental actions are many, but the effort has until now considered biodiversity actions relatively little, compared to other areas such as e.g. climate related actions. The trend of how businesses have tried to manage environmental impacts is presented in section 2.3.2.

Nevertheless, the opportunity for businesses to meet their responsibilities and lift a share of the challenge is far from being just a romantic thought. Nor is the challenge of engaging businesses in responsible actions. The core challenge is to create awareness of the environmental

phenomenon *biodiversity*, to inform about the significance of their actions, and to encourage the business world to participate in this process of protecting biodiversity as the valuable asset, which the world and its inhabitants cannot afford to stay loosing.

1.1 Study objectives

The ultimate goal of the study is to provide a scientific foundation for implementing biodiversity considerations in the corporate strategy of companies within the study context. This will be attempted through

- raising awareness through communicating the importance of biodiversity to businesses as a strategic opportunity as well as a global need
- investigating the institutional appropriation for engaging in biodiversity actions from a business view,
- considering corporate values and priorities in proposing strategic changes in the favour of biodiversity concerns.

2. Problem formulation

Biodiversity as a natural phenomenon, and its values and appreciation by the human community as social phenomenon, implies some essential concepts and internal linkages, e.g. integration of ecosystems into the decision-making. This introduction seeks to introduce "the world of biodiversity and business", by taking its point of departure in the below listed focus questions. This chapter is divided into subchapters, in which each has the objective to answer the below listed questions.

2.1 What is biodiversity, how is it valuable to human society?
2.2 Why should businesses participate in biodiversity protection?
2.3 What are necessary considerations to make in relation to strategic responsible engagement?

2.1 Biodiversity and the socio-economic linkage

What is biodiversity and how is it valuable to human society? The fact that biodiversity is a valuable asset to humans, has made us want to understand how that is, as well as what are potential threats to its existence and occurrence.

2.1.1 Biodiversity in ecosystems

As mentioned in the introduction, biodiversity refers to the variety of biotic elements in ecosystems, and could at its simplest be described as *species richness* (Townsend et al., 2008). However, ecosystems - hence biodiversity - should be looked upon and understood on different scales.

This adds the perspective of molecular ecology, at the level of species populations or even single organisms, where the diversity of genes plays a great role - within same species as well as among different species. Also it adds the macro-level perspective, and emphasises the bio-geographic level by stating the importance of different ecosystem types with respect to the variety of the ecological processes which these present. The concise meaning of biodiversity should then be *"the relative variety of biotic elements represented on all ecological scales"*, which goes hand in hand with the most recognised attempts to define the term (CBD, 1992; Myers, 1995; Fromm, 1999 and Townsend et al., 2008).

2.1.2 Ecosystem services and the dependence of biodiversity

Ecosystem services as a term refer to the outcome of an ecosystems functioning, which humans may perceive beneficial (Myers, 1995). Consequently they may also be regarded as natural resources, because they mobilise valuable assets to society, hence they act as the main sources for all that which we traditionally understand as natural resources. The value representation is explained more thoroughly in chapter 4.

Ecosystem services emerge as results of complex interactions between the elements of ecosystems (MEA, 2005a; more thoroughly presented in section 4.1) and are responsible for numerous functions, which are valuable to humans, e.g. essential functions such as the water

cycle, the nitrogen cycle and the carbon cycle of our planet, as well as the ability to convert solar energy to biomass in vegetation, buffering gaseous contents in the atmosphere, climate regulations etc. (Mäler and Vincent, 2003 and Myers, 1995).

Genetic diversity is largely on demand by the medical industry. A large share of the drugs used in world today is derived from natural biotic material, e.g. aspirin. Other examples are the medical research, which is performed on certain species in order to understand diseases which are seen in humans (Townsend et al., 2008).

The ecosystem services are represented differently through different support to human society, like the examples above. A common division is made according to whether a service helps as a *providing, regulating* or as a *cultural* asset (MEA, 2005a). The providing mechanisms ensure products, which are easily recognisable as values, whereas regulating and cultural ecosystem services are less visible, hence harder to quantify the value of. For this reason, it is not clear to everyone how microbes which turn waste into usable products as well as insect populations that pollinate crops in agriculture represent immense value (UNEP, 2007). The examples are vast, though the essence is clear: The properties of ecosystems must be perceived as services when these facilitate functions somehow valuable to human society, but must be understood in order to manage sustainably.

Biodiversity holds a significant share of making ecosystems self-sustain and function resiliently (MEA, 2005a). It can be even argued that biodiversity thus underlies all ecosystem services (MEA, 2005), thus sustaining the ecosystem services from which humans benefit. It should be recognised that when humans interfere with the ecosystem and perform interventions in order to obtain valuable ecosystem services of all kind, the biological diversity is a fundamental requirement for ecosystems to maintain its functions and recover. Hence, well functioning ecosystems depend on its components to be diverse. Consequently, the dependence on various resources through ecosystem services in human societies does impose strict requirements on us to protect the biodiversity of ecosystems for everyone's advantage (Myers, 1995; MEA, 2005; Suneetha, 2009; UNEP, 2007).

The problem which has arisen is a conflict of land resources. On one hand, the human appropriation of land towards increased productivity and other land management is on growing demand. On the other hand, nature's ability to handle and recover after human intervention is a necessity for the natural environment to provide suitable conditions for living. MEA (2005) describes this as "the homogenisation of ecosystems which cause communities to be comprised of a smaller number of already widespread species, which have adapted to the humanly appropriated environment (MEA, 2005 p. 80), Therefore they often figure as strong competitors to other species.

Chapter 4 introduces an ecological scientific explanation on how ecosystems and their components interact, and which role biodiversity plays in that respect. This also concerns an ecological approach to what conditions enforce biodiversity richness, hence what actions should be emphasised in nature to avoid deterioration, and what can be done in order to enhance biodiversity.

2.2 The business link to biodiversity

Recognising that the official institutions (see sub-chapter 4.3) have failed to live up to the goals set by themselves, and at the same time to rethink how the biodiversity loss should be approached, alternative ways of meeting the challenge must be considered. The private sector is compelled to consider the environment through the compliance with different political acts. Many of these are addressed to avoid impacts, e.g. climate change. However, biodiversity protection has not reached the status of an ideal, which businesses should work towards. Nevertheless, many reasons prevail for why biodiversity protection is relevant for businesses to participate in.

The CBD drew attention to the responsibility of the private sector in a paper for the preparation for the "Business and the 2010 Biodiversity Challenge" meeting in London in 2005, as a mean to encourage engagement from businesses. The paper stresses the importance of private sector engagement for accomplishing the 2010 targets through four key points, which embrace this importance (CBD, 2005):

1) The direct impact on biodiversity from the use of biodiversity values and also distribution of them origin to a great extend from actors in the private sector. Engaging these in considering and changing negative impacts would thus contribute significantly in reaching the targets.

2) Stakeholders in the private sector have great influence on government decisions and public awareness and values. If the issue of biodiversity is adopted by businesses, the topic would enter the societal arena as a serious issue. Many policies introduced through the UNFCCC were requested by businesses for effective future planning.

3) The skills of the private sector would be extremely valuable as an integral part in the research, management, communication and development of the biodiversity issue.

4) The influence on environmental policies would help in constituting effective policies. Hence active involvement by businesses in political dealing with the issue would help to improve consensus and set realistic expectations from more effective political frameworks.

The fact that businesses have great importance with respect to the human interference with biodiversity underpins the reality that businesses have great responsibility when it comes to sustainable use of biodiversity (CBD, 2005). But the responsibility to engaging in biodiversity as a valuable asset to society does not figure as the only argument for why businesses should involve and contribute to solving the problem of deteriorating biodiversity. Hence businesses should not seek just to find philanthropic arguments for acting responsibly – it should be perceived a strategic corporate advantage.

2.2.1 Biodiversity as a risk and opportunity for the businesses

Running by business as usual does not only impose a risk in relation to societies but in fact also to businesses themselves. The decline in ecosystem services caused by decline in biodiversity affects societies as well as businesses (CBD, 2005). The close interaction with ecosystems and

biodiversity, which many businesses have, depending on their position in the supply chain, makes biodiversity and ecosystems a significant resource in the foundation of businesses.

A study[1] on the possible risk to encounter, and the benefits achievable from engaging strategically in biodiversity trough management, embraces the two-way relationship between businesses and biodiversity. In the same way as impacts on biodiversity from businesses are more or less direct, the dependency on biodiversity is more or less direct. To some leading companies in more direct interaction with biodiversity, biodiversity is thus already an important issue to address (F&C, 2004).

Regarding the whole biodiversity issue and its relevance to businesses, F&C (2004) draw direct links to climate change, which about 20 years ago was not considered by businesses. Part of the reason why that changed, was the measuring and recognition of the impact, which businesses have directly or indirectly on ecosystems. Similarly, CBD (2005) embraces the movement, which causes more companies to feel an obligation to participate in responsible actions in order to maintain market position or even obtain competitive advantage.

Hart (1995) asserts the constraints, which the deteriorating natural environment is likely to impose on business through his *natural resource based view of the firm.* The message initially focuses on the impacts, which businesses have had on the environment, causing crises in public health, resource abundance (fisheries, deforestation), and climate. He states the strong requirement for action - not legally but physically.

The material risk, which companies will face from biodiversity loss, depends partially on their direct dependency. F&C (2004) argues that resource extracting sectors (the primary sector) are at highest risk. More and more of these businesses, with major impacts on biodiversity feel obliged to spend company resources on biodiversity in order to sustain and improve profits (CBD, 2005). However, the risks are not only based on the direct dependency, but also appear severely through the recognition of the company's positive or negative indirect impacts on biodiversity. This recognition can be potentially influential in less direct ways than profit; e.g. with respect to market position and profit through key relations such as license to operate, disruption of external relations (e.g. in the supply chain), reputation loss, and increased production costs (F&C, 2004). In other words, all companies depending on their biodiversity dependency in production and delivery of their product or service are at high risk. Companies with high direct impact are beginning to feel compelled to act, whereas companies of less direct impact should engage for strategic reasons.

[1] A British study of 29 businesses and their engagement in biodiversity has been conducted by The British Asset Management Company F&C and Earthwatch Ins., with the support of the UK's Department for International Development (F&C, 2004).

The risks related to biodiversity will emerge more widespread on agendas, as biodiversity rises as an environmental as well as political issue. Some factors which can influence the risks to increase are; continuous decline in biodiversity, rising uncertainty for companies with relatively close interactions and dependency on ecosystems, emerging legislation on making companies responsible for their impact (e.g. section 4.3.1; EU proposals, e.g. on PES), and the increased research on impacts and harmful practises.

Eight risks presented in different studies illustrate examples on how businesses can potentially face risks or reach competitive advantage through impact on biodiversity:

1. *The legal and social license to operate* (CBD, 2005). This may well be affected by, e.g. previous record of protecting biodiversity and water resources through access to land (C&F, 2004). The license to operate relies increasingly on the company's capability to co-exist with natural ecosystems (Earthwatch et al., 2002).

2. *Reputation among stakeholders*. Stories of misconduct may result in lower confidence in the company, resulting in e.g. bad results on the stock markets or failure to sell goods (F&C, 2004 and Earthwatch et al., 2002). Welford (1996) provides the example of Norsk Hydro, which in the early 90's was the first company to present its environmental report, which "highly" enhanced its green image among stakeholders.

3. *Access to capital.* Investors are increasingly demanding high social and environmental standards (CBD, 2005 and Earthwatch et al., 2002). This became evident in Denmark, e.g. this year when the paper Kommunen (2010) published the results of research performed by DanWatch, which revealed how big pension funds were investing on behalf of major groups on the labour market without considering the ethical aspects. The story went on in the popular press, and created furore against these actions in the public, which made the funds replace their investments.

4. *Access to human capital.* High quality employees are attracted to well behaving businesses, and motivation sees a rise when employees feel proud to represent businesses, who make an effort in the bettering of the world (Welford, 1996; CBD, 2005 and Earthwatch et al., 2002).

5. *Access to markets*. Demands and specifications from buyers may limit profit in case of bad performance (F&C, 2004). Standards exist to some degree, and the numbers of certifications and standards are increasing. Consumers and retailers higher in the supply chain aim for "green", and the supply will have to comply (CBD, 2005).

6. *Security of supply*. Biodiversity loss depletes good conditions for essential materials, and/or destroys ecosystem stability; hence diminish supply of e.g. fish (Hart, 1995 and F&C, 2004).

7. *Relations with regulative agents.* Biodiversity management records or incredible surveys and plans may lead to permit delays or fines (Earthwatch et al, 2002 and F&C, 2004).

8. *Liabilities*. Unforeseen impacts on biodiversity could lead to financial liability (Hart, 1995 and F&C, 2004).

In addition to this concrete research, the paper by CBD (2005) also provides reasons for businesses to take up this challenge; along with the earlier publication "Handbook for corporate action" from Earthwatch et al. (2002).

The responsibility, which businesses share in respect to biodiversity, can and should be lifted by the businesses themselves. The CBD's objectives, i.e. conservation, sustainable use and equitable sharing of benefits, should according to the report "the business case for biodiversity" (EarthWatch et al., 2002) be met by businesses through good environmental, economic and social performance, respectively.

Above are mentioned 8 more or less concrete biodiversity risks, which are some among numerous examples. It should be clear how risks make up clear incentives for engaging in biodiversity, e.g. by acting reacting by decreasing risks and possible impacts. This is only one side of the reasoning for business participation, because a clear incentive could also be to seek increased competitive advantage by being proactive, and thereby raise mutual benefits for the environment as well for the business as competitive advantages. This concept of strategic engagement in responsible actions is further introduced in section 2.3.2, p. 10-12.

2.2.2 Corporate environmental engagement towards sustainable development

The era of considering the environment as part of the practice in businesses is rather modern. Environmental protection has since the 1970's been part of national legislation in most countries. Since then, business compliance has developed from focussing on preventing pollution by end-of-pipe solutions to more integration in business strategy and practise, which emphasises environmentally friendly solutions in the entire production chain. It has become a common corporate goal to work towards sustainable development, and the anticipated competitive advantage has been a driving force. This development has taken businesses from traditionally to work with environment, social and health and safety as separate issues, to consider and integratration of all aspects in their strategy. A certain part of this "movement" has been the increased global understanding and awareness of these issues (Kørnøv et al., 2007).

The understanding of environmental problems has changed. The idea back in the 1950's was much related to pollution that could immediately be seen or sensed. From the 1970's on, the awareness arise and technological solutions were implemented in business with the purpose of avoiding pollution (emissions and the direct impact on the local environment). The approach to environmental protection had the character of *end-of-pipe* solutions. This has since moved in a direction towards trying to *prevent* pollution ("cleaner production", e.g. by energy-efficient technology), instead of just holding it back (and to some degree offset it to somewhere else, e.g. filters). This has introduced a much wider approach to solutions, as technical optimisation has become only one aspect together with organisational issues, design and marketing of "green" products. The considerations have thus unfolded from controlling the outlets from own production in the 1970's, towards comprehensive considerations including resource use and impacts from products further along the product chain in the 1990's (Kørnøv et al., 2007).

A strategic approach to how businesses should deal with environmental problems has evolved as *environmental management systems* (EMS). Along with quality management, EMS has become a

widely known concept in businesses, which strategically aims towards continuous improvement of the performance. The way to contribute to sustainable development from a business perspective requires further engagement in the entire life cycle of products, thus how the product impacts environmentally on the whole. By analysing the life cycle of a product it becomes evident how environmental impacts can be addressed along the product chain. Sustainable development is not a well-defined goal to attain, but should be regarded as a direction to follow. From how the trends of corporate environmental management is at present, and to what can be regarded sustainable development, there are still several steps to take. Of these is corporate social responsibility (CSR) (Kørnøv et al., 2007).

Environmental management in businesses has evolved from focussing on controlling emissions and resource consumption for cost savings and compliancy with legislation, into considering impacts of much less direct relation to the business itself for obtaining new sorts of advantages, less direct than formerly known.

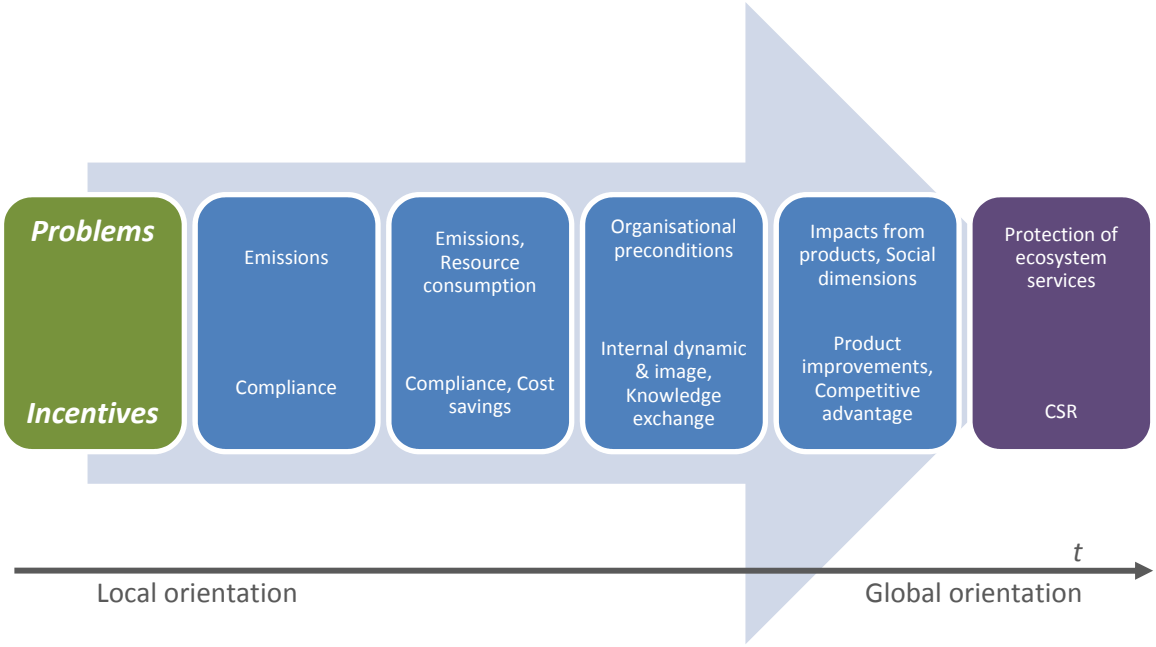


Figure 2.2a The evolving concepts of environmental engagement in businesses and a "purple" proposal to how the next step in corporate environmental engagement.

2.3 Business participation in environmental issues

This sub-chapter introduces some concepts about identifying environmental performance in businesses, obtaining strategic benefits from responsible engagement, developing an ecological strategy, and considering stakeholders. This helps to understanding the preconditions which set business engagement in environmental issues, hence to concretise and present the research question following.

2.3.1 Identification of the environmental performance in businesses recognised by stakeholders – the ROAST scale

When working with corporate environmental actions, it is useful to know the actual environmental performance of the business in focus. In order to identify these very aspects of a

company, a rating of the company with respect to its environmental performances can be performed according to the ROAST scale (Welford, 1996).

The exercise in improving environmental performance, should take outset in an ultimate goal for desired performance, set by the organization itself. This should reveal the environmental commitment. Welford (1996) argues that the performance can be identified to belong somewhere between the two extremes in the proposed taxonomy, i.e. the *resistant* organization and the *transcendent* organization. The taxonomy includes 5 stages, from which the term ROAST origins:

1. Resistance (Stage 1): The organisation demonstrates total resistance against environmental values and rules. The organisation would not respond to environmental initiatives.
2. Observe and comply (Stage 2): Environmental legislation is observed, but actions demonstrate lack of commitment and willingness to comply. Only strong regulative institutions enforce actions.
3. Accommodate (Stage 3): The organisation seems adaptive to change. Proactive and responsible behaviour occurs. Actions are performed beyond the regulative requirements, and volunteer commitment is demonstrated.
4. Seize and Pre-empt (Stage 4): Volunteer environmental actions and engagements are initiated on own initiative. Responses to many external stakeholders reveal priorities beyond profit generation. The virtues of sustainable development emerge in the organisations' strategy.
5. Transcend (Stage 5): Environmental concerns are displayed through the values, attitudes, culture and beliefs of the organisation. Responsibility will be shown and responsibly lifted with regard to all living things. Sustainable development is fully embedded in the strategy and actions of the organisation.

The five stages are used to describe the approximate stage, although it should be understood continuous. From when the volunteer action is adopted through stage 3 and 4, at stage 5 ideals of ecology are adopted in strategies that transcend targets from traditional commercial performance. Hence the company becomes very concerned in respect to whether it operates at the correct scale from an environmental perspective. The application of this scale can be a classification of environmental performance responses from by external stakeholders, and also internally in the organisation (Welford, 1998)

2.3.2 Achieving corporate benefits from strategic responsible engagement (CSR)

The general term for business engagement in things, which favour humans and nature is referred to as "corporate social responsibility" (CSR) or simply "corporate responsibility" (CR). The general philosophy behind this concept is that CR pays off for the business itself, its stakeholders, and for society in general (Burke and Logsdon, 1996).

The benefit for the business itself by acting responsibly is a common high priority. The purpose of this section is to work as a response to the previous sections on *why* to expect corporate

benefits, as this section seeks to explain *how* to aim for corporate benefits from commencing responsible actions.

The goal for this section is to explain that benefits, which are considered broader than just short-term economic profit, can be obtained through responsible actions. Benefits thus include less direct measurable and visible assets, although the fact that economic outcome plays a significant role is usually in focus. This is done, as the previous sections suggests, by avoiding risks, and/or by receiving positive response from being pro-active, or by gaining long term and strategic benefits to the organisation, which together with expected societal benefits should serve as inspiration and a driving force towards responsible actions.

The classical thought of CR is that although short-term cost from performing actions is an inevitable part to encounter, it brings home surplus in the long-term perspective. The argument relies on the emergence of a better society, which is a clear long term benefit. Also business legitimacy can be expected, which would leave more liberty to the company through less government regulation (Burke and Logsdon, 1996).

Because of the wide span of different CR activities, and the wide span of company figures and histories, it has been difficult to derive quantitative data on how profit correlates with CR activities. Burke and Logsdon (1996) assert that CR must be approached from the basis of a company strategy and not via single investments, which are expected to pay off instantly. *Strategic Corporate Social Responsibility* is the core if their publication, which is widely cited and used, and which - through the strategic approach – corresponds well with the *eco-enterprise strategic approach* introduced in next section and adopted to the analytical framework of this study.

CR activities are per definition strategic once they result in valuable benefits to the business (Burke and Logsdon, 1996). But the drivers of actions vary from being compliance based, i.e. obeying current requirements, to moving beyond that into proactive actions. The incentives for doing the latter are according to Welford (1996) the strategic move for competitive advantage. This advantage can be strived for, by e.g. moving beyond the requirement of regulations, and mitigate future investment costs.

On the way to gaining competitive advantage from environmental initiatives, Welford (1996) refer to five central strategies:

1. *Leading edge* means acting better than required by law, by perceiving environmental initiatives as a central role in good management. Advantages may arise from being ahead on future environmental challenges.
2. *Environmental management as part of the corporate strategy* means that environmental issues and impacts are not brought up as separate problems, but have an equal role in corporate planning practice. This is in opposition to when environmental issues and corporate interests are in conflict.
3. *Line driven* means that environmental management is an integral part of the business process, and not a separate assignment for designated staff members. This also enters in as opposed to the cases where the production and environmental work conflicts. This addresses environmental obligation to everyone.

4. *Short vs. Long term* addresses the problem of discounting environmental problem with economic profit. Short-term solutions are made in anticipation for immediate payback. A long-term environmental strategy is desirable, and large investments should be made instead of frequent changes of end-of-pipe solutions. The long-term environmental benefits may include increases in worker morale, public image, and avoid costs of sudden changes.
5. *Effective communication* should provide competitive advantage through good public and stakeholder relations.

The opportunity to create value along that path can be enhanced through considering five key elements in the business. Burke and Logsdon (1996) present these five key elements to be 1) centrality, 2) specificity, 3) proactivity, 4) voluntarism, and 5) visibility. Firstly, the primary stakeholders are critically important in achieving the objectives, missions, and goals of the company. These should be identified along with their needs.

Centrality refers to correspondence between a CSR program and the declared mission of the company. It is important that proposed actions relate to the company mission, objectives and goals. A high degree of centrality means that the proposed responsible actions will receive higher organisational priority and the chance for successful commitment in the sense of a valuable yield increases (Burke and Logsdon, 1996). For instance can centrality be related to the closeness, which means when a company is facing material risk, as presented in 2.2 “The business link to biodiversity”.

Specificity refers to internalising the benefits from a CSR program, rather than creating general public goods available to a broad community. Regarding biodiversity, this point is considered not valid, hence omitted for three reasons; 1) Biodiversity *does* provide services to a broad community as an externality. It is an urgent issue, which everyone should participate in, as everyone draws benefit from biodiversity. 2) When Burke and Logsdon (1996) recommend not “simply creating collective goods”, they do not comply with their own principles of advocating for long term benefits (where collective improvement eventually will mean corporate value), and 3) they do not consider the potential risks from not doing so, as presented in 2.2 The business link to biodiversity.

Proactivity considers the planning according to the contextual settings. If planning is done according to how economic, technological, social or political trends could emerge? New market opportunities, social issues or threats etc. are potential influential factors, which may influence the company (Burke and Logsdon, 1996). By recognizing critical emerging threats the company can obtain advantages by acting proactively very much in line with what is presented in 2.2.2.

Figure 2.3a: Key parameters for responsible behaviour in businesses (Burke and Logsdon, 1996)

Acting responsibly beyond what the company is obliged to, according to regulations is what *voluntarism* refers to. It has similarities with *proactivity*, but does not include the altruistic/philanthropic aspect, which characterises volunteer actions (Burke and Logsdon, 1996).

Visibility means that if strategic benefits should be obtained, actions must be visible. This way internal and external stakeholders will recognise the CSR initiatives commenced. Straining visibility, however, also puts certain demands on the performance, as not only the positive will be visible. Burke and Logsdon (1996) especially stress the importance of internal communication as external.

In the case of biodiversity it will be difficult for many companies to measure its overall performance from responsible behaviour. Economic benefits will especially be impossible to assess, but again by referring to section 2.2.2., it should be clear that conserving biodiversity has several long- as well as short-term potential benefits.

2.3.3 Stakeholder identification and involvement for environmental actions

Stakeholders are important to a company, as they present a deeper interest in a company than non-stakeholders will. This means that they will often provide a powerful response to any action a company engages in. A common way of understanding stakeholders is the one presented by Freeman (1984). It states that a person or group that affects and is affected by the achievement of the organization's objectives. The stake of a given stakeholder comes from ownership interests, market interests, employee interests, political interests and/or general interests. Stakeholder power is derived from a stakeholder's voting rights, economic influence, and/or political influence. The greater the power base, the greater the ability of a stakeholder to influence decisions and induce changes (Freeman, 1984).

This traditional understanding of stakeholders is in general recognised, however a more central concept for this study is relevant to include. This is a study of how stakeholders can exert pressure on Danish companies for making them engage in environmental actions.

According to the research of Madsen and Ulhøi (2000) stakeholders are also regarded a significant aspect in environmental management. Much in correlation with sub-chapter 2.3 in the beginning of the report, as well as in the eco-enterprise strategy, it is stated as significant for good management to improve stakeholder relations. Therefore the central stakeholders must be identified, and their influence must be known, and this is the central element in the research "Integrating Environmental and Stakeholder Management" by Madsen and Ulhøi (2000).

It is important to recognise that the affected parties of a company's environmental impacts are often more than expected. On the way towards sustainable environmental behaviour it thus makes sense to integrate as many stakeholders as possible. All stakeholders have specific priorities (values), expectations and strengths, and thus different possibilities for influencing the company's environmental engagement. In practise it is often impossible or very comprehensive and costly to consider all stakeholders. For the same reason, it is important to determine stake and power in order to try and predict potential conflicts arising from prioritising some interests and compromising others (Madsen and Ulhøi, 2000).

Stakeholders are usually divided into several groups depending on their common interest. Determined from the power of stakeholders, they are often divided into two groups, primary and secondary, when primary stakeholders are significant for the existence of the company. These are roughly specified as owners, investors, employees, suppliers, customers and competitors. Rarely seen, but sensible enough Madsen and Ulhøi (2000) include *nature* as a primary stakeholder. Secondary stakeholders are characterised as parties who may be affected by company activities, but are not directly significant for the existence of the company.

The SPOT-model (secondary-primary-opportunity-threat) can be used for effectively considering the attributes of stakeholders (stake and power) in a stakeholder-environmental management process. When stakeholders are identified and assigned primary or secondary status, groups should be made according to interests, which can be labelled as opportunities or threats to the business. Opportunities are understood as encouragement of new ideas, opening new ideas, market niches and knowledge. In order to seize the benefits from this pro-active approach, the dialogue with stakeholders are important. This helps to raise mutual awareness and understanding of individual interests, which not only allows knowledge sharing of ideas, but also knowledge of possible consequential reactions (Madsen and Ulhøi, 2000).

The result of the SPOT analysis should be evaluated in relation to the corporate values and policies. The main purpose of the SPOT analysis is this to keep the status of stakeholders and their attributes.

2.3.4 Value network from Eco-Enterprise Strategy

Eco-enterprise strategy by Stead and Stead (2000) presents an extended stakeholder analysis. The issue of biodiversity is difficult, because it is difficult to experience and recognise the actual functions of biodiversity. This will be introduced in chapter 4, but interesting from the eco-enterprise strategy is the approach to understanding environmental core values through instrumental values, which can be identified and compared with the values of stakeholders.

Classic strategy analysis includes stakeholder analysis, values analysis and issues analysis. The step further into eco-strategy is taken by considering *ecologically concerned stakeholders*, *eco-sensitive values* among stakeholders, and the system of *ecological issues* (Stead and Stead, 2000). Generically, enterprise strategy is useful in this regard though its potential to provide a framework for incorporating ethical components into strategic management processes. Stead and Stead (2000) proposes this eco-enterprise strategy as a reform of the classical enterprise strategy, by which they especially draw strong references to the stakeholder theory by Freeman (1984).

The practical application of enterprise strategy is supported by an analytical framework. Very much in accordance to the above listed three focus points, the components are analysis of *stakeholders*, *values* and *issues*.

a) Stakeholder analysis is proposed for understanding the power and stake held by each stakeholder (Stakeholder theory is described in section 2.3.4, page 14). Three aspects are central in this regard, that is a) a descriptive quality in explaining organisational behaviours, b) an instrumental quality which helps reaching certain objectives and c)

normative quality which helps to understand the moral foundations for actions. (Stead and Stead, 2000).

b) Values analysis is important for obtaining explicit knowledge of the values, which are central for possible responsible behaviour. A distinguishing is made between intrinsic values, which are core ideals of good behaviour in its essence, and instrumental values which should be strived for in order to achieve the intrinsic values (ibid.). If biodiversity is pursued as an intrinsic value, the instrumental values are desired actions with a positive effect on biodiversity.
c) Issues analysis has the purpose of providing an understanding of the social context in the company. It puts a time dimension on the stakeholder part, by identifying major impact from social issues today and likely in the future.

The link from primary stakeholder interests to actually commencing ethical behaviour in a company is simply the acceptance of the responsibilities to these stakeholders, and the compliance with these. The normative aspect, which implies the moral dimension of the stakeholder theory, is what makes the essence of considering eco-enterprise strategy (Stead and Stead, 2000).

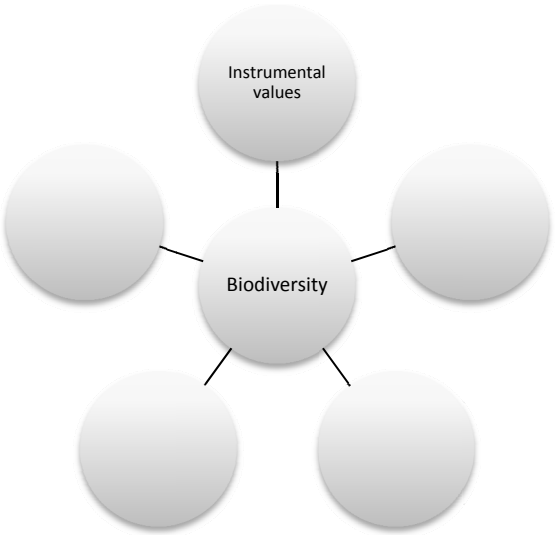


Figure 2.3b: The interrelationship between core values to instrumental values. (Stead and stead, 2000)

Figure 2.3b illustrates a values network. Given that biodiversity represents the core value in this study, this is at the centre, and the instrumental values are surrounding. By recognising interconnections, interrelations, and long-term underlying systemic patterns makes the goal of this, to overcome possible understandings of ecological efforts as being costly and not friendly to the economic success of the company. As instrumental values are usually more personal than the essential core value, common understanding of instrumental values is greater, and therefore will receive attention and recognition (Stead and stead, 2000).

2.4 Summary

Biodiversity contributes with valuable functions of ecosystem, which we cannot live without. It stabilises ecosystems, make them resilient, and enables human activity to use natural resources. Unfortunately humans have not managed to use ecosystems responsibly, which has caused

biodiversity, hence valuable features of the ecosystems, to decline. Businesses are engaging increasingly in environmental actions, as they realise their own impact, but also as they face risks from not doing so. Latter, by considering corporate values, strategy and stakeholders, responsible actions can turn out as a competitive advantage.

3. Research question

As a response to the problem formulated in the previous chapter, the study takes outset in the follow research question.

How can a Danish company effectively implement efficient initiatives for biodiversity?

This question implies a two-faced character. One questions how to effectively implement environmental actions in a company, and seeks to investigate the *company setup for biodiversity engagement*. The other questions how biodiversity can be managed efficiently through initiatives taken by a company, in terms of *identifying efficient solution for improved biodiversity performance.*

The reality of the problem, as introduced in chapter 2 prior to this, can be understood as in figure 3a below. The green arrows illustrate how societies as well as companies depend on ecosystems, therefore also biodiversity. Thus, both share great responsibility in using ecosystems in ways which does not cause deterioration. The green circle illustrates the responsibility of companies to take responsibility for biodiversity, which is the one part of the research. The red arrow illustrate how businesses depend upon society, hence are compelled to take responsibility for the well-being of societies in order to survive. That is the other part of the research.

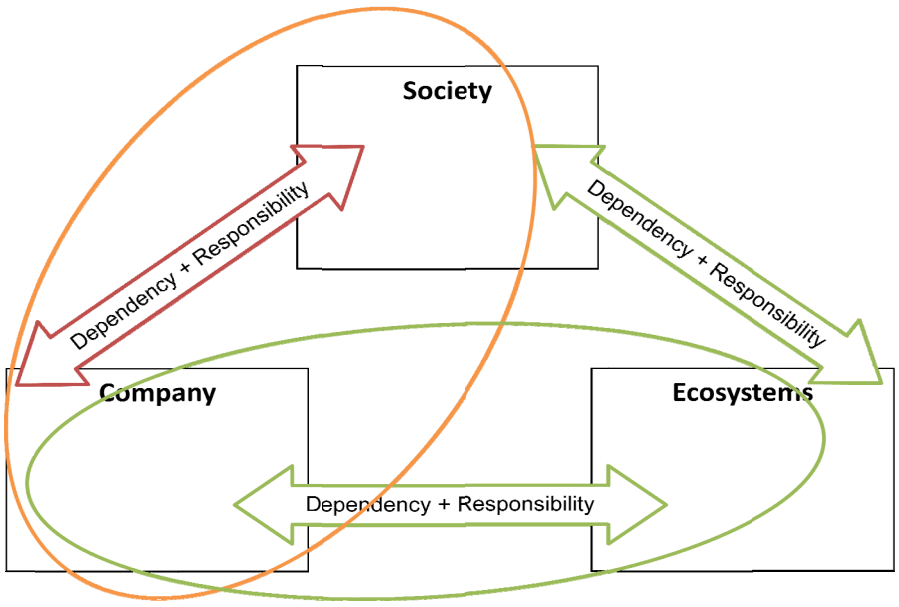


Figure 3a: The reality of the problem and the scoping of this study: The orange ring illustrates the responsibility to, and dependency of, companies on societies; the green ring illustrates the responsibility to, and dependency of companies on ecosystems, thus biodiversity.

4. Biodiversity, threats and current management

This chapter provides a theoretical foundation for understanding how biodiversity emerges in ecosystems, how biodiversity can and should be appreciated, what imposes threats on biodiversity, and how the biodiversity is managed on the organisational level.

What makes biodiversity, how is biodiversity valuable, what are the threats that causes biodiversity to decline, and how is it managed at the organisational level?

4.1 Ecosystems and biodiversity - functioning and value

In order to understand how biodiversity decline occurs, it is important to understand what determines biodiversity, and how humans can influence biodiversity in various ways. The first section introduces the ecology of biodiversity through explaining how ecosystems function, how the elements exist, co-exist, and how rich biodiversity is a significant quality in this regard. This ecological introduction to biodiversity in this section is to a large extend based solely on the literature of Townsend et al. (2008), which is the backbone of the ecology course taught in the biology program at Aalborg University.

The ecosystem consists of (Townsend et al., 2008):

a) Physical conditions, provided by abiotic phenomena such as weather conditions, climate, soil composition, elevation etc.

b) A community, which includes all biotic organisms within the ecosystem.

c) Populations which refers to the total number of individuals of one species in an ecosystem.

d) Individual organisms

The *physical conditions* vary across the planet. The term refers to all the abiotic factors, which influence the ecosystem, i.e. rain, evaporation, temperature variations, wind, and soil. What constitute the physical conditions are the geographical settings, which prevail in a specific location. Hence the physical conditions are highly determined by the latitude, altitude, and proximity to the coastal climate (Townsend et al., 2008).

The physical conditions determine which organisms can possibly exist here. Which organisms end up living in a given location is a completely other story, though. Because not only the prevalent physical conditions determine what organisms need in order to survive. Suitable conditions for a certain species, also referred to as its *niche*, depend on multiple factors; also set the other organisms in the community. In this way, it is clear also, that when these factors differ, the location may provide niches for some species, but not for others. For that reason, heterogeneous ecosystems provide a wider variety of needed factors for different species, e.g.

variations in microclimate and water bodies, which will result in different vegetation, and so forth (Townsend et al., 2008).

Interaction with other populations of species in a community occurs over time, through the evolution of an ecosystem towards reaching a certain stage of balance. This happens e.g. through invasion of individuals or whole populations from surrounding ecosystems, which leads to competition between different species (inter-specific competition) or between individuals of the same species (intra-specific competition) with similar resource needs (overlapping niches). In case of suitable conditions for a species in an ecosystem, and survival, the ecosystem will work as habitat for different populations (Townsend et al., 2008).

All organisms in ecosystems take part in the functioning of ecosystems, which result in valuable resources to human societies (see the following sections of this chapter). These functions emerge, e.g. for vegetation through the chemical transport and cycling which at the lowest level happens in the accumulation of plant cells in vegetation, which is the result of the sunlight energy driven photosynthesis, which exchanges atmospheric carbon-dioxide for oxygen, and the absorption of water with nutrients. This fundamental process reintroduces the idea of niches to different species of vegetation; because in order for vegetation to grow, adequate sunlight is needed, adequate water is needed, and required nutrients are needed. In the case of plants, as well as animals, inter-specific competition, adaption, and co-existence occurs (Townsend et al., 2008).

Vegetation is fundamental in all ecosystems and provides vital functions for the ecosystems community, both through is regulating and supporting properties as exemplified above, and via the function as the primary producer and food source. The vegetation which is present at a certain location may be part of the niche for certain herbivores. Those herbivores may be part of the niche for some predators, as well as all three levels may be sources of food to parasites. All parties live and grow as results of these biological interactions in the community food webs (Townsend et al., 2008).

Nutrition (e.g. food) makes up a certain part of the resource demand for organisms, hence to a certain degree determine the niche for living organisms. Along with physical conditions, the source for nutrition (minerals, plants, other animals) has to provide for multiple individuals. This results in competition for resources in places where resources are scarce. As previously mentioned, both competition within populations of the same species and across species occur. However, most species have a certain degree of resilience, and manage to live on many food sources (broad niche), although some are specialised (narrow niche).

In cases of scarce resources (or other unfavourable conditions), adaption through natural selection has over time enabled some organisms to live on resources better than their competitors. This has helped them to survive, and consequently passed on their favourable skills to their offspring.

Below is given an example of three bird species from three different locations in Southern Africa. The bird species are all integral parts of the ecosystem communities where they exist, and although their size and body structure seem alike, and their niches may overlap to some degree,

they inhabit three very different habitats. After this example, the above is concretised in the direction of how this determines biodiversity.

Figure 4.1a shows savannah-forest vegetation of the low land in the northeastern South Africa (24°S). 4.1b shows an aquatic ecosystem from where the Orange River intervenes in the deserted landscape of the southernmost Namibia (29°S). 4.1c shows the Fynbos vegetation of the Western Cape, which is regarded one of the world's biodiversity hotspots, in the coastal reserve of West Coast N.P. (33°S).

Three pictures of figure 4.2, underneath figure 4.1, show different bird species. Each of these birds are found in the ecosystem type shown above them: A) The Marabou Stork (and the vultures around it) are preying on a dead land mammal. The Marabou Stork lives in most of tropical Africa, mostly in dry open savannahs. This bird preys on any dead or living thing (including termites and eggs), and simply tries to keep within close distance of the largest concentrations of prey (Birds, 2010).

B) Shows the black-headed heron, which is a wading bird, much dependent on the characteristics, which the river contributes with to the otherwise arid landscape. This bird is also a sure predator and uses its long and sharp beak for catching frogs and fish in the water. It does also have a fair range to include in its habitat, and frequently hunts away from the aquatic environments, where it preys on everything from insects to small animals, such as lizards, mice, and birds (BirdLife International, 2009).

C) The cattle egret on the west coast is known worldwide, and is usually found on grasslands, on agricultural land, and by the seashore. This bird preys on much the same as the species presented above, e.g. insects, worms, other birds and nestlings. This picture is taken in September in the blossoming season for the daisies, which assumingly attracts insects (Biodiversityexplorer, 2010).


a)

b)

c)

Figure 4.1: Diverse ecosystems from the southern Africa; a) forest-savannah in the eastern lowland (24°S), b) aquatic environment in arid surroundings (29°S) c) Fynbos (Afrikaans for "fine bush") nature near the chilling west coast 33°S, respectively.


a)

b)

c)

Figure 4.2: Bird species found in the above biotopes; a) Marabou Stork, b) Black-headed heron and c) Cattle egret

Biodiversity exist on three levels, as introduced in the start of chapter 2: *Ecosystem diversity* refers to different ecosystems in the landscape, *species diversity* refers to the number of

different *active* species within an ecosystem, and *genetic diversity* is the diversity of genomes within a population in an ecosystem (Sand-Jensen, 2007).

It is difficult to determine the exact diversity. For that reason, approximations are often given, based on the diversity of species within certain groups. Plants are used for this, as the ecosystem structure is much depending on the abundance of plant species, and the energy exchange takes outset in the plants, and then continues along the food-web, as introduced previously in this section. Much indicates that high plant diversity is a condition for high diversity of other groups of organisms, e.g. herbivores (Sand-Jensen, 2007). For instance would the bird diversity in figure 4.1a probably increase if the physical conditions allowed denser vegetation, which would provide living conditions for more insects thus sustain broader niches.

Townsend et al. (2008) supports this above argument. When the conditions are right, and the primary productivity is high, the species richness in plants is high, which also allows the species richness of other organisms to be high. Below is seen by proving figures on how species richness correlates with potential evapotranspiration, which works as a measure for energy, hence potential productivity:

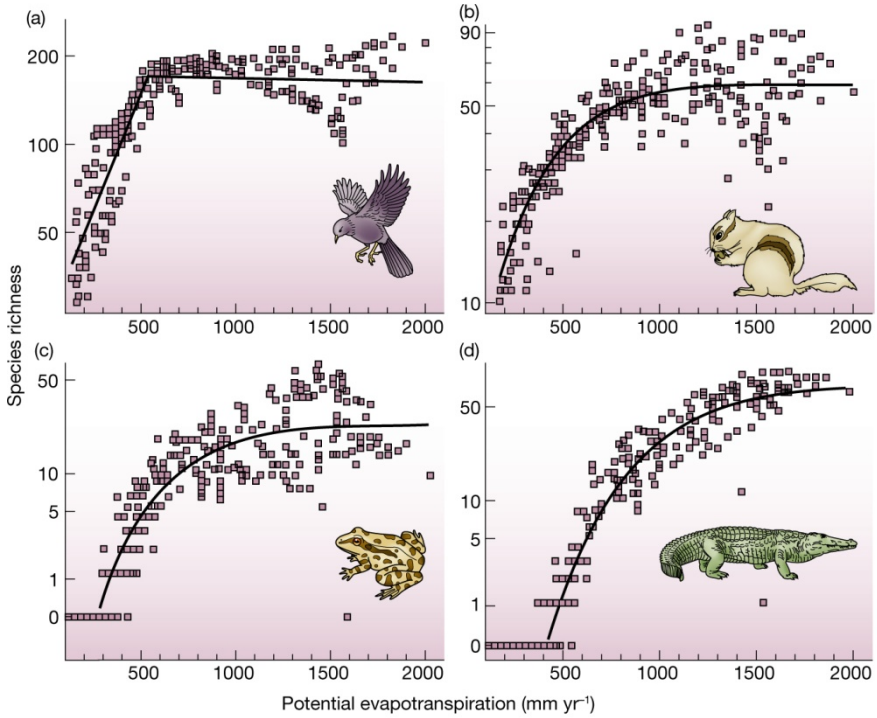


Figure 4.2d: Species richness of a) birds, b) mammals, c) amphibians and d) reptiles in North America tend to increase with rising productivity indicated by potential evapotranspiration (Townsend et al., 2008).

Species *diversity* and species *richness* are two closely related terms. The important difference is, however, that species *richness* considers only how many species exist, whereas *diversity* refers to the equitability in the abundance. The difference when it comes to the functionality of ecosystems is how these two terms each work as quality indicators for community structures in ecosystems. Using one attribute to indicate quality in so complex systems can be criticised, if it is species richness, diversity, or rank-abundance diagrams (which will not be further introduced). Diversity however is a more stable figure (Townsend et al., 2008).

Niches for many species cause high species richness. This can, however, be the case irrespective of the productivity. Figure 4.3 below illustrates some scenarios on how this can be; *R* illustrates the available resources in an ecosystem, *n* illustrates the niche of one species, and *o* illustrates the overlap of conditions, which are part of a niche. A) The species richness in the top scenario is greater simply because of a wider selection of resources thus there is a potential for more niches. B) The species here are more specialised, which leaves unused resources for more species. C) The niches demand of the species present are more overlapping, which forces species to co-exist. D) This scenario is simply an example of unused resources contra used resource potential (Townsend et al., 2008).

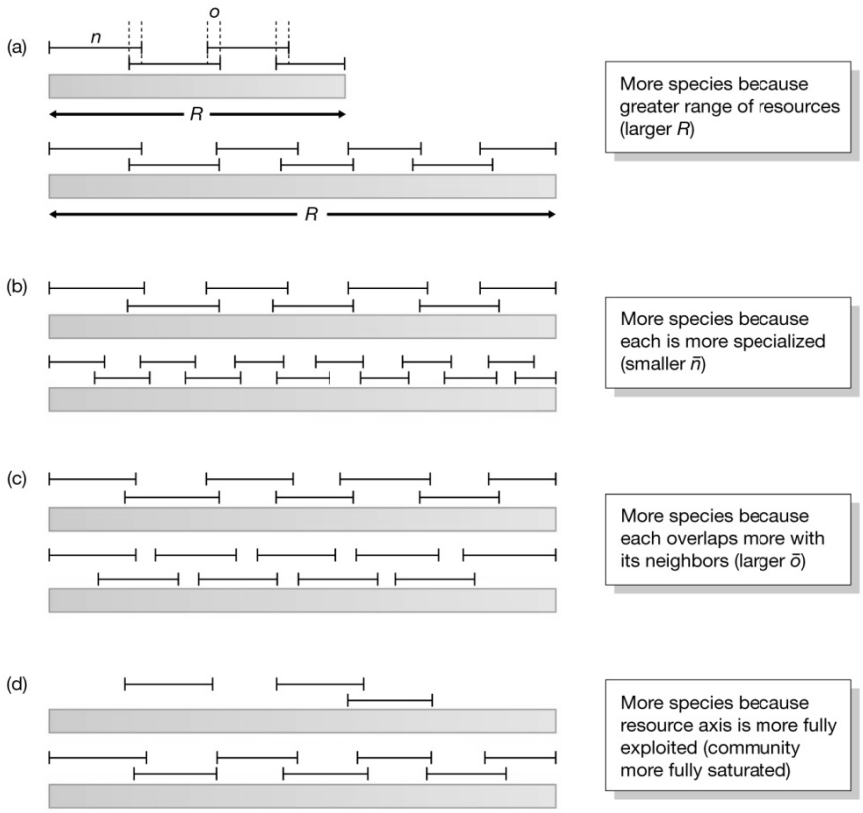


Figure 4.3: Four simple scenarios of how biodiversity can depend on habitat size, rich variety in resources, broad niches demands and diverse community distribution for effective use of the resources (Townsend et al., 2008).

As a final remark on the resource availability that the opposite is also the case: Harsh environments delimit R or prevent certain species from entering the ecosystems, which decreases species richness.

4.1.1 The interrelationship in ecosystem functions, services and values

The interactions within ecosystems occur between biotic as well as abiotic elements and are realised through energy flow and chemical cycling with sunlight as the driving force, as presented in the previous section. The ecosystem functions are results of the unique organisation of the many elements in the ecosystem (what King (1997) describes as *features*). Hence the ecosystem functions emerge as different properties - some which can be regarded beneficial to human societies. These are understood as services. Ecosystem services represent a certain value, derived from the importance which the particular ecosystem services has.

King (1997) briefly presents a hierarchy of how to understand the ecosystem as a valuable asset to the human constructed society:

- Ecosystem features; the organised, characteristics which compose the specific ecosystem.
- Ecosystem functions; the biophysical outcomes which emerge as results through emergent properties, caused by the organisation of ecosystem features (independent of human context).
- Ecosystem services; the beneficial outcomes appreciated by humans, and which can thus be identified and quantified.
- Ecosystem values; the importance of the ecosystem service to individuals determines its value.

The value term is commonly, and by King (1997), expressed as the economic term of individuals' willingness to pay (WTP) a certain monetary compensation in exchange for ecosystem services. This perception of ecosystem values is in this study regarded invalid. The reason is that the neo-classical economic theory, which believes the market balances the economy, resources and environmental problems. It is believed that the true external costs can be internalised in order to align private costs with society costs (Jespersen, 1998). Biodiversity is a good example why this cannot be. The functions of biodiversity are extremely difficult to identify, and impossible to quantify – and not even the entire world populations' willingness to pay would reflect anything near the true value of biodiversity and its related ecosystem services to human societies.

Methods for detecting WTP are still widely used for determining values in monetary terms, but imply biases in all cases.

4.1.2 Experiencing values from ecosystems

Ecosystem values can be divided into categories according to how the ecosystem services are each realised. A common system for performing this division (referred to by Myers, 1995; Turner et al., 2003 and Korsgaard, 2006; see table 4.1), concerns the degree of interaction required to facilitate the ecosystem value. The fundamental distinguish point in this regard is whether the value from the ecosystem service is realised through *use* or *non-use.* The values from *use* characterises the services that are actually experienced on first hand. *Direct use* values can be obtained from extracted goods (wood, food, water) or from recreational interaction (animal watching, scenery). *Indirect use* values can be seen as supporting the direct use values, in terms of providing conditions for human activity (FAO, 2008), e.g. through purifying functions (ensuring fresh water), regulation (carbon- and water cycling) and decomposition of waste. The *non-use* values are not actually experienced through first-hand interaction, but rather "perceived". This is realised through the appreciation of the ecosystem's potential for future use, by preserving the possibility of future direct or indirect use – this is referred to as *option value*. *Existence value* is the pure awareness of the existence of the ecosystem; with no regard to any potential for use by people, who are not receptors of the ecosystem services as such (Myers, 1995; Turner et al., 2003 and Korsgaard, 2006). The option value is sometimes added an extra time dimension, a *bequest value*, which defines the potential future benefits, but for future generations, while

option value is for whom it may actually benefit on a shorter sight. Therefore this may also be where the option value shifts from a *use* value to a *non-use value*, which is why the figure illustrates an overlap here (Korsgaard, 2006).

Interaction	Experienced value
Use	Direct – consumptive
	Direct – non-consumptive
	Indirect
	Option
Non-use	(Bequest)
	Existence

Table 4.1: Categorisation of ecosystem values (after Myers, 1995 and Korsgaard, 2006)

The purpose of introducing how the ecosystem values are experienced, is the relevance which this has, when trying to understand how different people realises how they appreciate biodiversity. This becomes relevant when analysing the values of stakeholders, in order to determine how they would understand different biodiversity actions.

4.2 Possible threats to biodiversity in ecosystems

The current state and future trend of our ecosystems have been assessed and communicated through studies of the planet's ecosystems, e.g. the Millennium Ecosystem Assessment (MEA, 2005), published by the World Resource Institute (WRI), and carried out in collaboration with several UN departments and conventions and numerous partner institutions[2]. Other studies of great relevance for comprehending the biodiversity health are the Global Environmental Outlook published by UNEP (2007) and the Global Biodiversity Outlook 2, carried out by the UN Convention on Biological Diversity (CBD, introduced in section 4.3) addressed towards assessing its 2010 targets on reducing loss of biodiversity. The outcome through the main messages of these studies, on the state of biodiversity and the key drivers for its loss, will now concisely be summed up in respect to how these studies conclude on how the three levels of biodiversity are developing. Latter in this section, insight in the state and trends of biodiversity in Denmark is given, and the last section sums up the problems from an ecosystem perspective.

4.2.1 Threats to biodiversity and global trends

It is evident that changes in biodiversity in the worlds' ecosystems, on land as in marine and aquatic ecosystems, are going on much faster than previously in the history of humankind. This causes loss of essential ecosystem services to all humans. UNEP (2007) presents estimates on

[2] See http://www.millenniumassessment.org/en/PartnerInstitutions.aspx

annual values of selected ecosystem services, and adds that about 60 % of the studied ecosystem services are degraded or used in a way, which will cause them to be degraded. The practices mentioned include fisheries, waste treatment, and water purification. Direct effects from increase in demand for specific provisioning services, such as fisheries, wild meat, water, timber, fibre, and fuel are greatly responsible for this degradation.

Although it is clear that changes in biodiversity happens at another pace than in previous times, many changes still happen due to natural variations. Natural variations happen as consequences of abrupt events, e.g. severe fires and climate variations, but human impact is what accelerates the changes (Suneetha, 2009).

As introduced, biodiversity covers different levels of biological systems, i.e. diversity of ecosystems, species, and genes. The definition of an ecosystem is rather difficult, as this can vary enormously in size depending on the scope of study. UNEP (2007) and MEA (2005) take outset in the term "eco regions", which refer *to "a large unit of land containing a geographically distinct assemblage of species, natural communities, and environmental conditions" (UNEP, 2007 p. 163).*

Different ecosystem types host habitats for different organisms, through representations of different niche compositions (Townsend et al., 2008). These more or less isolated "patches" represent clusters of specific preconditions, hence endemic organisms and diversity (MEA, 2005). Therefore, ecosystem diversity is fundamental for sustaining biodiversity on the species and genes levels, and local practices can have huge impact on endemic species and genes.

The tropical forests are the most remarkable ecosystems, in terms of hosting high species diversity. Scientific evidence also indicates that centres of high species diversity also have hosted evolutionary history. When it comes to species richness and richness of endemic species, these ecosystems are also "high scorers" (MEA, 2005).

Climate change imposes a major threat on ecosystems. This will change conditions within ecosystems across the world, hence change habitats for many organisms. The scattering of ecosystems by humans limit the possibility to migrate. Of the worlds 14 main biomes, which the EEA (2005) refer to, 20-50% of the original nature has been transformed to agricultural land in the 9 of them. In another 3 biomes 35% have been converted (MEA; 2005).

Figure 4.4 below illustrates how the land use of EU has been changed within only 10 recent years. It does show some positive changes, although mostly demonstrates how habitats are under prioritised and compromised for constructed elements in the landscape.

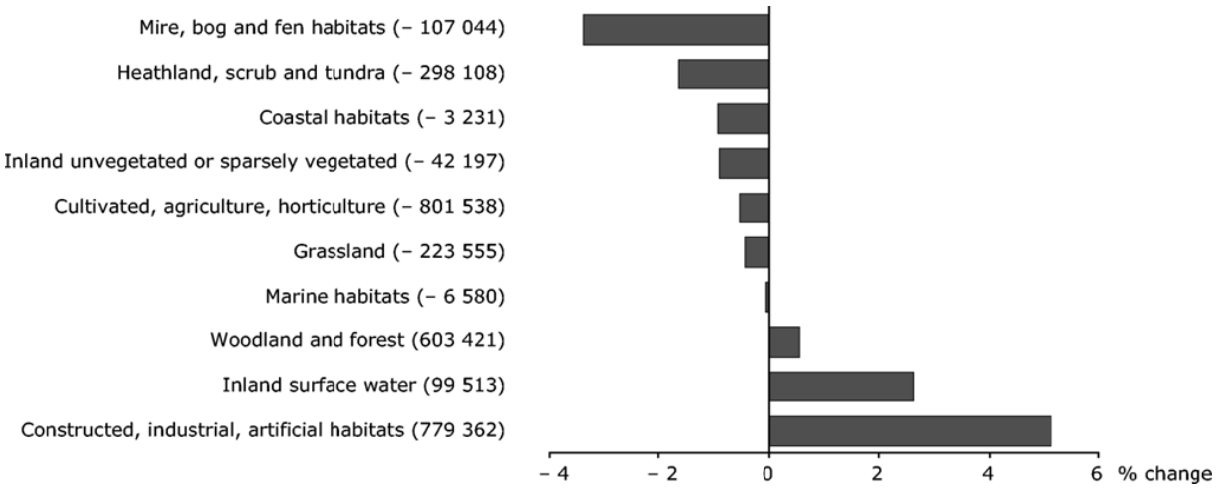


Figure 4.4: This graph shows the change in land use of specific categories from 1990 to 2000. Urban land (constructed, industrial and artificial) areas increased by more than 5 %, whereas the wetland habitats (mires, bogs and ferns) decreased by nearly 4 % in the period (EEA, 2005).

As a consequence of natural balances, competition etc. a natural estimated rate of species extinction exists. The present rates of species extinction at a global scale, determined on the recorded extinction of known species are about 100 as big as fossil records show (MEA, 2005). Most certainly this figure is exceeded, as we only know a little portion, and the extinction rate may well exceed the natural by between up to 1000 times, and lies on approximately 1% per century (Townsend et al., 2008).

The total number of species on Earth is estimated to range between 5 million and 30 million species (but could be even more). Of these, 2 million have been described formally (MEA, 2005). Below is seen figure 5.4 from Townsend et al. (2008) and based on the figure in MEA (2005 p. 90). The figure illustrates different species divided into groups, and how large a share of each group is known and named.

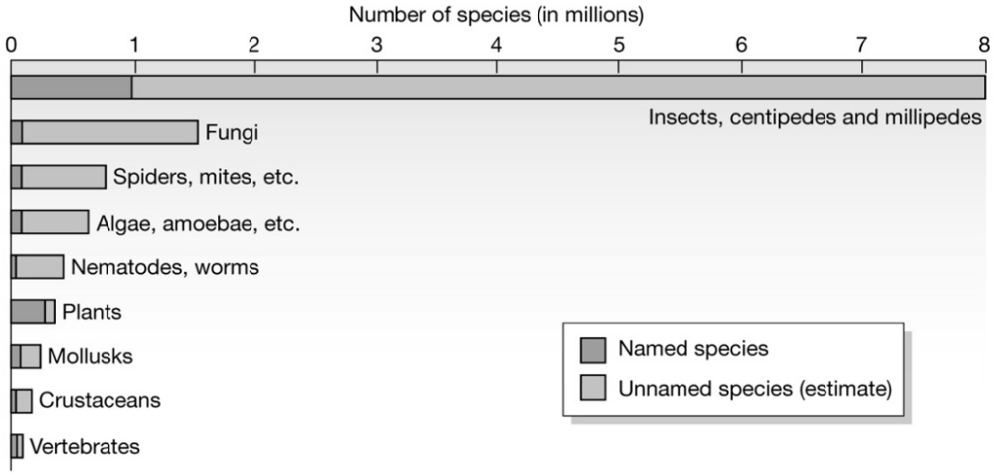


Figure 4.5: Groups of different species and the share of known versus assumed (Townsend et al., 2008 and MEA, 2005).

MEA (2005) asserts that loss of species is a more severe problem on a local scale than on a global scale, due to the misconduct in using ecosystems. This is a result of how the livelihoods in

places are build upon what is accessible and interaction with nature is culturally dependent, that is what people live off. Growing demands for particular resources happens to result in overexploitation, and then extinction. The causes of this heavy eradication are many, but a product of local endemic representations of species (the highest concentration of the terrestrial biodiversity on the planet is found in relatively small locations, mainly in the tropics) and different local cultures and needs has a strong impact (MEA, 2005).

The historical trend shows that extinction in previous times mainly occurred on islands (since year 1500), due to introduction of alien species and overexploitation. This trend has shifted, and extinctions on continents are now equally common (MEA, 2005). This illustrates the problem of human intervention and fragmentation of ecosystems, which in practise make them segregated like islands.

Regarding the threat on genetic diversity agriculture appears to be the most significant threat to genetic biodiversity, and is responsible for vast degradation of genetic variation through species loss and destruction and restructuring of natural habitats. This immediately is a tragic fact, as agriculture depends heavily on genetic diversity through its practices (UNEP, 2007).

MEA (2005) emphasises the species level as the most common understanding of biodiversity. This creates a gap in the knowledge and awareness of what biodiversity is in its whole sense. Especially large animals in temperate systems are recognised, whereas the status of some ecosystems and biological organisms and genetic diversity receive less attention.

4.2.2 Status of biodiversity in Denmark

The trends and current state of the biodiversity in Denmark does not promise a pioneering country with regard to conservation and biodiversity protection. According to the Danish Society for the Conservation of Nature (Danmarks Naturfredningsforening, DN) the country's nature is continuously suffering from extinction of species. DN emphasises the great need for a governmental management plan of Danish nature, and states the fact that the Minister of the Environment has already turned down the changes for the country to reach the goal of stopping degradation of biodiversity in the year of 2010 (DN, 2010). Instead, a reverse trend seems dominant in 2010, as the government in two cases will allow compromising unique and valuable nature in favour of economic interests in the energy industry (MIM, 2010a and MIM, 2010b).

During the period 2003-2009, 9,494 different species have been studied. 287 species have become extinct since 1850. 1,423 species are considered endangered, and 412 are reducing in presence and are on the way to becoming under the endangered category. 4,911 are considered "not threatened". In case of the remaining 2,461 species, no certain category can be assigned to them. Of these, 826 can be threatened, but lack of data leaves them on the border of being "not threatened" and "critically threatened". Of the species assigned a certain category (7,033), figure 4.6 illustrates the status (DMU, 2010).

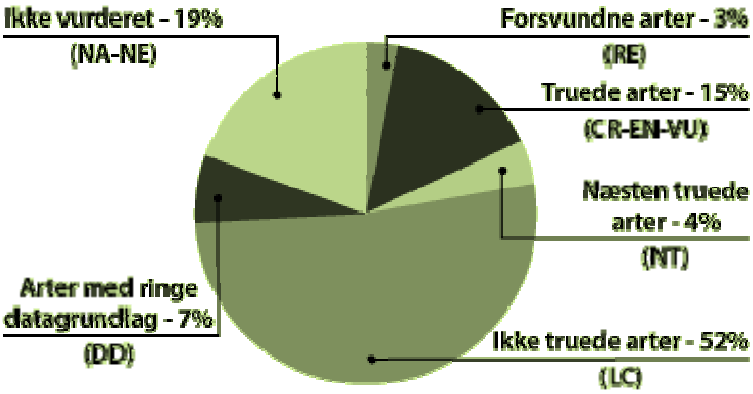


Figure 4.6. Procentvis fordeling på statuskategorier af 9.494 arter behandlet i perioden 2003-2009 (DMU, 2010)

The most significant reason why species become endangered or extinct is changing or diminishing of habitats. Isolated habitats in a scattered distribution are a great problem, which leaves seemingly minor incidents to be crucial. Direct impacts count cutting of vegetation and removal of dead organic matter, whereas indirect impacts are climate change, deposition of nitrogen from the atmosphere, and changed practices in surrounding agricultural and forestry landscapes (Pedersen and Wind, 2010).

A recent publication conducted by a group of experts for DN stating the state of biodiversity in Denmark. The document concludes the attempts to reach the targets set by committing to the CBD and EU targets of 2001 as disappointing failures. Especially the initiatives taken since 2001 have been scarce. The rate of decrease has not slowed down, and several biotopes as well as species are doing worse than previously. The main problems are according to the report: Farming practices are carried out with extensive use of pesticides; extensive use of manure and fertiliser causes eutrophication of water bodies; habitats which were earlier open are not managed sufficiently, e.g. wetland; and the forests are used intensively for forestry, which leaves little variation with old trees, dead wood matter and homogenous structure (Meltofte, 2010).

4.2.3 The ecological perspective

The major anthropogenic causes of biodiversity loss are, according to Townsend et al. (2008) overexploitation, disruption of habitats, invasion/introduction of alien species to the ecosystems and problems associated with small populations.

Overexploitation emerges as a problem when populations are caused to shrink at a rate, which exceeds the resilience of reproduction. History holds stories about how humans have depleted many great mammals on the continents and in the oceans. A severe problem exists by the overexploitation of many shark species. The heavy decline may have increasingly undesired consequences on the communities in which it is an integral part (Townsend et al., 2008).

Habitat disruption happens in three ways. The habitat of one or more species may be partly destroyed by land intake for construction, production of food, mineral mining or other purposes. Habitat destruction is most severely caused by cutting of forest on a global scale. Another hazard is pollution of habitats, which may cause the conditions to deteriorate to an extent, which makes the ecosystem unable to fulfil the niche demands (see 4.1). This can be because of changed pH

in the soil, or from direct extinction of species, e.g. pesticides often kill other than just target organisms. Acid rain or climate change should also be regarded serious changes caused by pollution. Thirdly, human activities may disturb the habitat e.g. by killing species or forcing them to migrate (Townsend et al., 2008).

Introducing species into different environment can be crucial to the existing community. Human caused introduction happens both intentionally or without knowing, as unknown consequence of e.g. transport. Some have very unforeseen and undesired consequences, as it can eradicate other species. Especially where endemic species are present, a danger for extinction occurs if new species are introduced. Endemic species have a great share in a high biodiversity on all levels, as similar living conditions and potential niches are occupied by different species in different locations (Townsend et al., 2008)..

Small populations are often subjects to problems, which would have no effect in larger populations. This could be the demographic problems such as the male/female ration, the death of a few individuals, the missing ability to reproduction, or bad genetic material. It could also be crucial environmental events locally where the population exists. Genetic problems may occur through loss of genetic variation after a few generations with no or very few new genes. The adaptive or evolutionary potentials will in this case decrease. Inbreeding is another threat, which rises when the genetic material within a population differs less and less. Often more of the above mentioned threats are real to threatened species. For small populations a combination of problems causes the risk for extinction to rise steadily (Townsend et al., 2008).

4.3 Management of biodiversity at the organisational level

The responsibility for the world to engage in conserving biodiversity was recognised at the same time as our obligations to manage climate change, on the 1992 UN conference in Rio de Janeiro. The Convention on Biological Diversity (CBD) was signed by 150 member parties stating the following objectives:

1. ”The conservation of biological diversity
2. The sustainable use of the components of biological diversity
3. The fair and equitable sharing of the benefits arising out of the utilization of genetic resources”, (CBD, 2009)

In 2002 on a Conference of the Parties, the member states committed to concrete goals to be achieved by 2010: *“To achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth”* (CBD, 2009). The year before, in 2001, the EU member states set as a target to *stop* the loss of biodiversity by 2010. By being committed to the UN and EU agreements, the EU developed a biodiversity action plan (BAP) in 2006 (EC, 2010).

4.3.1 Management by the European Union

Despite good intentions and severe official commitment, the EU recognises they are unable to reach the 2010 target (EC, 2010), just like the Danish Ministry of the Environment as introduced in 2.1.3. This failure forces the global society (as well as nation states and EU) to set new ambitions and make plans to reach the objectives previously stated. Already in April 2009 the

first conference was held in order to develop an updated plan, which is set to yield a new EU biodiversity strategy by the end of 2010.

The EC (2010) asserts its high prioritisation of biodiversity, and especially embraces the establishment of the conservation network Natura 2000, which includes 17% of the entire territory within EU. The implementation of this has encountered some gaps, so despite demonstrated efficiency of the Natura 2000, the effort towards making it work effectively is not yet completed. Besides the implementation gaps of Natura 2000, another 4 sources of immediate failure in the anticipated biodiversity effort exist and are potential areas of improvement, i.e. policy gaps, knowledge and data gaps, lack of integration into politics, financial needs and equity in solutions.

The *policy gaps* include major lacks such as invasive species and not least ecosystem services of which the values should also be embraced outside areas of conservation. This could be attempted by directing more finances towards so-called “green infrastructure”, which is an effective effort towards spatial planning of ecosystem structures and interconnectivity of nature in the open land, such as natural and agricultural land, parks, forests, wetlands, etc. This would enhance ecosystem services greatly, not least those of regulative character. At the same time it would work as global climate change mitigation (EC, 2010).

Regarding *knowledge and data gaps*, the main issues in this are set to be overcome by extensive data gathering of indicators of ecosystems and their services. This will lead to a “biodiversity baseline” for identifying changes, as well as the development of a “biodiversity information system for Europe”; initiatives which especially are needed for an enhanced understanding of changes in the marine environment. In respect to management at a global scale, EU advocates the establishment of a research platform - Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) - much like the IPCC, which should make research contribute to mainstreaming and integrating biodiversity and ecosystem services into policy making (EC, 2010).

Integration of biodiversity and ecosystem services into politics should be argued for rather simply, as many ecosystem values are not commonly recognised by politicians (EC, 2010). This should be supported by the initiatives mentioned above. Overcapacity in sectors like farming and fishery must be considered, and negative impacts on biodiversity from policies must be considered an important part of the final assessment, which should instead be pro-active towards enhancing ecosystem health. The integration of the true values of the ecosystem services from biodiversity into decision-making corresponds to the main messages of UNEP (2007). The *funding needs* should consider the values of ecosystem services when being assessed. The financing needs for conservation projects like Natura 2000 are only covered 20% by the member states. Finally the *equity* issue should overcome uneven responsibility, which might result from ecological unevenness in distribution of worthy efforts. This could possible require regionally market-based regulation, which suggests a wider application of Payment for Ecosystem Services (PES). Besides this EU needs to assess and recognise its impact outside the of EU countries (EC, 2010).

4.3.2 Management by the Danish authorities

Biodiversity is in Denmark managed by the Ministry of Environment, and controlled through the sub-division of *By- og Landsskabsstyrrelsen* (BLST). This agency has the executive responsibilities for the national commitment to biodiversity conservation, i.e. through the CBD, The Natura 2000 network, Countdown2010 and the national legislation.

On the largest scale, the commitment to the UN through the CBD is an official agreement, which has been introduced briefly initially in this sub-chapter.

The Natura 2000 is a network of protected areas in the EU. These areas include areas covered by the RAMSAR convention, as well as the EU Habitat Directive and Birds Directive, and have been selected by the Minister of Environment. The areas are managed by the same means as the Law on Nature Conservation (introduced two paragraphs below) (BLST, 2010).

The national nature protection is realised through the Law on Nature Conservation (*Naturbeskyttelsesloven),* of 1992. This law was put into force as a recognised consequence of severe deterioration of important biotopes throughout the 20th century, which caused much species of flora and fauna to disappear. The purpose of the law is hence to protect nature and its populations of wild plants and animals as well as their habitats. It is therefore also regarded a significant instrument in achieving the CBD. §3 in the law describes which nature types are the scope of the law, hence the nature types are commonly referred to as §3-nature types. This includes lakes, swamps, fresh meadows, salt marshes, shrub land, pastures, and streams. And at present 9,5% of the total area of Denmark falls under this regulation. The regulation simply prohibits performing any human intervention of the nature within the designated areas. However, dispensation can be obtained in cases of desired alternative use by privates or municipalities (BLST, 2010).

As a reaction to the targets for conservation of biodiversity according to CBD, CountDown 2010 was established as a European network for participating on reaching the goals. The initiative is hosted by the European regional office of IUCN (International Union for Conservation of Nature) in 2004. The network is established as a knowledge sharing base and addressed towards governments, local authorities, civil society, the private sector or any other organisation with a commitment to contribute towards reaching the goals of CBD. One third of the Danish municipalities and the Danish Ministry of the Environment have committed to participate (CountDown, 2010).

5. Business approach to biodiversity action

This chapter continues from the previous chapter. Having reading that, it should be clear how biodiversity contributes with essential values, but also how human activity impose risk on the continuous existence of diverse ecosystems. The previous chapter finishes off with introducing how businesses can decrease impact on biodiversity. In introducing this, it is clearly stated that the success of integrating biodiversity concerns in company strategy highly depends on the specific business, in terms of objectives, existing management.

How are responsible actions planned and implemented effectively into business strategy?

5.1 Review of previous experiences in corporate biodiversity actions

As a companion to the guidelines of Earthwatch introduced in section 5.2.3 further down this chapter, Earthwatch published a case study review presenting six very different business types and their biodiversity actions. One of these cases is a leisure operator for holiday villages. The impact on biodiversity of this business was assessed to be through occupation of land in an already poor landscape of coniferous trees. By developing a “mosaic” of habitat types in the landscape, the biodiversity in the area was improved. Noticed improvements count an increasing from 24 species of breeding birds to 48 species. This main incentive for engaging in this project was because of the centrality to the business. The company perceived biodiversity and exciting nature as a central part in the business concept. The company has developed its own landscape environmental management system as an integral part in the existing EMS, which is 14001 certified (Earthwatch, 2000).

This is an example of a project in the surroundings of the company, where impacts can be reduced or nature even improved for biodiversity. Businesses can also participate or initiate projects in other places. This can be of purely volunteer actions, or as part of a life cycle management initiative, where suppliers are supported in minimising impacts. Examples of remote projects can be many, and the role of businesses can be active, or just passive, e.g. via economic contributions to conservation organs. This type of engagement will not be introduced further, because of the size of the topic, which is difficult to narrow in. However, based on stakeholder preferences, the possibility of committing to projects outside the company premises will be considered in the analysis.

5.2 Biodiversity action planning in businesses

This sub-chapter introduces how to develop a biodiversity action plan. Earthwatch Institute (European dept.), The World Conservation Union and World Business Council for Sustainable Development have in collaboration published a "Business & Biodiversity, a Handbook for Corporate Action"[3] (Earthwatch et al., 2002), from which important key steps are taken.

5.2.1 Planning of local biodiversity actions

As introduced in section 2.3, businesses have engaged in environmental management increasingly during the past decades. A widespread tool for corporate environmental management is environmental management systems (EMS), which is strategically designed to the specific company, in order to identify, prioritise and manage risks, improve performance and reduce impacts – and learn to get better at it every year. Earthwatch Institute describes the EMS as a tool for reducing risks and optimizing opportunities (Earthwatch, 2002).

Biodiversity efforts can be implemented to be a part of an existing EMS, for which Earthwatch (2002) provides a possible approach. This procedure can also be useful regardless of the EMS, simply to understand existing biodiversity issues and take action.

Development of an EMS includes five stages, which a cycle of continuous improvements; *planning*, *implementation and operation, checking and corrective action, management review, environmental policy.* In this process, the stages of *planning* and *implementation and operation* help to understand concrete environmental issues and decide actions, through a five step procedure. For biodiversity this procedure should be carried out according to the following directions. The directions are to a high degree adopted from Earthwatch (2002), however modified in some places. Examples are, when end-of-pipe solutions are encouraged instead of minimising e.g. emissions to air, and also when waste handling focuses on land filling, which is in Denmark not a problem like in the United Kingdom.

Planning

Step 1 – List-building through identification of activities, products and services with possible biodiversity effects b) Identification of habitats and species, which may be affected, consider: - the broad habitat types within an appropriate area of company influence/responsibility - areas affected by specific regulations either because of their habitat or protected species within them

[3] This can be considered an updated issue of the 1997 report "Business & Biodiversity, A Guide for the Private Sector" by The World Conservation Union and World Business Council for Sustainable Development.

- information about other constraints/incentives such as specific designations, planning controls and grants.

Step 2 – Matrix and Review
c) identification of potential risks and impacts on habitats and species. This has character of interpretation of the data collected in step 1. By setting up a matrix with company activities on one axis and degree of environmental impacts on the other, this will help to create and overview of potential improvements, hence serve as a "qualitative record".

Step 3 – Setting priorities from assessing the significance of potential biodiversity impacts.

This serves as an "inventory" analysis.

Land intake - lost habitats

How much land is occupied? Which habitats and species are present? Do any of these have designated status (e.g. red listed, RAMSAR)? What proportion of habitat/population/species will be lost or significantly disturbed? Within which scale do possible similar ecosystems and species exist? Can other areas be used for enhancement?

Fragmentation

Are there any key habitats and/or species within the area of influence? How important are these regarded? Will company activities affect the size or shape significantly? Within which scale do possible similar ecosystems and species exist? Could management provide suitable compensation?

Disturbance of habitats

Are any habitats/species sensitive to disturbance? How severe is the disturbance (time and magnitude)? Will it have any possible effect? Within *which scale do similar ecosystems and species exist?*

Land management

Are there any key habitats or species within the area of influence? Is the land managed appropriately and are steps taken to enhance habitats/species*?*

Resource consumption - Extraction and use of resources that affect habitats

Where do e.g. fuels, water, electricity and raw materials come from? Are the resources regulated, or sourced from a regulated habitat? Are any recognised ecological values compromised? How are these values affected? To which degree does the company use or extract these resources? How significant is the affected habitat/species? Are the resources being managed sustainably?

Emissions to air – potential source of acid rain, nutrient enrichment, physical damage or global effects

What is emitted to the air and what are the quantities? Where are the emissions likely to fall, and in which form? Are there any habitats or species in these areas that may be sensitive to these emissions? Can you minimise emissions at the source?

Emissions to water - lakes, rivers, streams and groundwater by discharges and/or run-off

What type and quantities of substances are discharged? What are the possible ecological impacts? Are there any sensitive/important habitats/species in your area of influence? What is done to minimise the risks of a spillage? Is any effort taken to enhance lakes, rivers, streams or groundwater? Do you use any agrochemicals and do they reach watercourses?

Emissions to land - waste handling

Is some waste reused and/or recycled? Is any waste guilty in emissions to the environment? How does the waste handling have impact on ecosystems?

Summary

How valuable are the potentially affected environments in ecological terms? Have any habitats/species reached the limits of viability (or are they near these limits)? How likely is a biodiversity impact, and for how long? How does the law or regulation affect the situation? How costly would it be if the raw material source was no longer available? How could action/inaction affect the public image? How technically easy is it to decrease the impact, and is It affordable?

Implementation and Operation

Step 4 – Project planning
Development of a management program in order to address the identified issues. In case of an already implemented EMS, the planning for how to continuous manage impacts is in place. So when setting objectives for biodiversity, this would be a natural addition to the existing environmental management.

Objectives could be formulated through a table (see example below), which shows what causes existing impacts, what is needed in order to decrease impacts, how it should be carried out in practise, who is responsible, and by when improvements should be performed.

Possible impact	Cause, activity	Objective	Action	Who	When
Loss of habitat from coal mining for electricity production	High electricity demands supplied by coal fuelled power plant	Reduce consumption by 20% and/or consider different energy source	Change to 50% wind turbine based energy and invest in new technology	Responsible managers	Within 2 years

The objectives can have four characteristics, depending on how biodiversity impacts should be met, i.e. a) maintain or control the impact in a way which prevents the impact from getting worse, b) improve conditions for species (habitats) through changed operating or management

practices, c) demand improved environmental performance from suppliers, and d) educate customers in biodiversity implications through how they the product of the company is handled.

Step 5 – Action; integrate action plan into business process.

The management methods of the company and existing business objectives should be considered when making a realistic action plan.

5.2.2 The Green Network approach to environmental action planning

Green Network (GN) is an initiative for performing responsible actions in businesses and organisations in the southern part of Jutland, Denmark. If businesses decide to engage in responsible actions, GN works as a sharing centre for knowledge, which can provide the needed tools for getting started and making responsible behaviour part of the business plan. These tools are designed for environmental reporting, social engagement, and health & safety, through accessible guidelines for reporting on each single issue. The method on environmental reporting is briefly introduced below (Green Network, 2010).

Approximately 300 participants have joined GN with different ambitions, and out of these 10 companies have engaged in all three. When engaging in all three issues, the joint report is referred to as a sustainability report.

Since 1996 a written manual has been working as a benchmark tool for environmental engagement. The manual describes the requirements to the contents of environmental reports, and provides recommendations on how to initiate effective environmental management.

The objective of the manual, is to enhance the interests in committing to and reporting environmental responsibility, and also has shown an improved relationship between businesses and the public administrative agencies. The reporting has to a great extent lead to international certifications, such as ISO14001 and EMAS. The administrative regions of Denmark have adopted this manual into their communal network (Key2Green) for environmental reports. Hence, this manual communicates its contents to businesses nationwide (Green Network, 2006).

The approach to environmental reporting is, as the figure illustrates, by developing a project plan.

Figure 4.3a: The process of environmental reporting, according to the manual of Green Network (Green Network, 2006)

Environmental reports are suggested to include

a) An environmental policy
b) Key figures on essential environmental impacts
c) An Assessment and prioritization plan for the environmental affairs of the business
d) Targets and action plan for continuous improvements.

As the figure implies, the mapping is the backbone of the report, which makes the basis assessment and for how improvements should be attempted. In the report, the mapping focuses on resource consumption and emissions, and how these have previously caused possible issues.

The general manual for environmental reporting is addressed mainly towards industry, why a separate manual has been developed for agricultural purposes. This manual has some extended features, which can be useful when working with impact on the natural environment, e.g. biodiversity. The main point of difference is in the project planning and mapping fragment, where *business analysis* is an added feature. This gives the initial work, hence the rest of the "circle", a spatial dimension to how the surrounding land is affected by the performed activities. This includes a mapping exercise of how the business is located relative to, e.g. protected areas, landscape created values, and aqua-environmental features (Green Network, 2005)

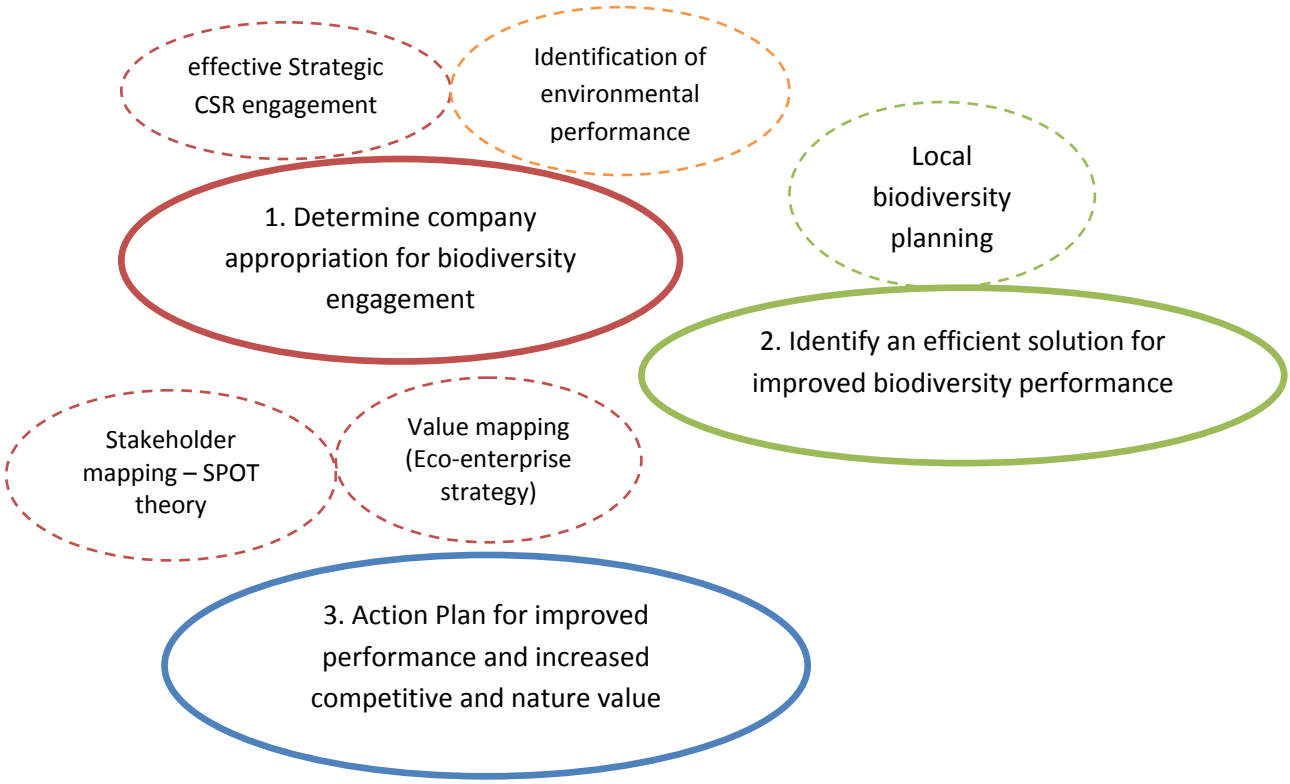
The proposed data inputs are much according to the common practices in agriculture, hence includes records on resource consumption and emissions on the land, e.g. pests, manure and medicine. However, the possible application of this could potentially be much broader. In construction this procedure is much similar to the biodiversity focused action plan as published by Earthwatch (2002).

6. Research design and methods

In order to answer the research question, which is set up as a response to the problem formulated in chapter 2, a problem oriented research is carried out. How this research is planning and designed will be introduced in this chapter. The research question has two faces; one that focuses on effective business participation, and one which focuses on efficient improvements in interaction with biodiversity.

6.1 Analytical approach

The research relies on the conceptual framework, which has been presented in the previous part of the project. This has introduced a span of concepts, which are seen below in relation to how the research question is approached



The scientific approach to answering the research question is constructed by these theoretical concepts and their application through data collection, interpretation and analysis. The illustration above simply illustrates how the concepts contribute to the red and green aspect of the research, based on the location in relation to. The chronology in the analysis starts from the top and goes down towards the blue ring, as the table on next page also illustrates.

Structured application of concepts for analysis

Theoretical concepts	Research method	Source
Company analysis: Business appropriation for biodiversity engagement		
"Identification of environmental performance"	Interpretation of semi-structured interview and reports	Company management
"effective Strategic CSR engagement"	Interpretation of semi-structured interview and reports	Company management
"Stakeholder mapping – SPOT"	Media search Structured interviews Explorative interview	Public mass media Employees, customers Company Management
Biodiversity action planning	Critical use of guidelines Direct correspondence with park management Analysis of spatial data	Danmarks miljøportal Givskud Zoo
Strategy analysis:		
Stakeholder analysis	Media search Structured interviews Explorative interview	Public mass media Employees, customers
Values analysis	Interpretation of semi-structured interview and reports	Business management

6.1.1 Qualitative interviewing

The first visit in Givskud Zoo was assigned to qualitative interviewing. The case presentation was yet not in place, thus the quantitative data needs could not be clarified. The purpose of the interviews are presented below in each sub-section.

Explorative interview (Annex I)

This interview is the first step in the empirical data collection for the research. It is thus outlined as an introductory explorative talk about the phenomenon of biodiversity, the company's position in the biodiversity issue, and its influence on biodiversity. The purpose of this is to get an impression of the company, their performance and engagement in environmental issues, and the knowledge and recognition of the biodiversity issue – and to seize points, which could have be overseen.

The outline for the interview and the resume can be found in the back of the report, marked "Annex I".

Semi-structured interview (Annex II)

A semi-structured interview with company representatives (the director and park manager) has been prepared on a theoretical background. In order to apply eco-enterprise strategy and strategic CSR theory methodologically, several aspects of the case must be clarified. The design of the interview is therefore very open and questions were designed strategically to yield desired information.

Questions related to Eco-Enterprise strategy.

- Company stakeholders: *"Who, which other companies, organisations and authorities have direct impact on your agenda?"*

- Stakeholder values and correspondence with current actions: *"How do you think of these stakeholders perceive "biodiversity"?", "Do you feel stress from any stakeholders to act towards certain ideas or initiate certain projects?", "Do you feel recognition for taking responsible actions?"* and *"How do you experience any value added to the company from the current actions published in the* sustainability report?"

- Issues and previous experience from commitment: *"How has the dialogue and process been during previous decisions and planning of responsible actions? Overall consensus or diverging opinions? Do any concrete examples exist?"*

Questions related to Strategic CSR

- Centrality: *"How would you grade yourselves in terms of environmental actions on a scale from 1 to 10, where 1 illustrates the poorest performance of Danish companies, and 10 the best? What could possible make you better?"* and "*The environmental policy of Givskud as declared in the sustainability report immediately seems very biodiversity-friendly. Is this policy realised, and if so through which initiatives?"*

- Proactivity: *"Are you considering how the society as a whole put requirements on businesses when you plan responsible actions?"* and *"Have you previously prepared yourself for upcoming requirements, e.g. restrictions in law or other, by taking actions prior to this?"*

- Voluntarism: *"Does the company participate with initiatives, which by no means are required or expected?"*

- Visibility: *"What are your experiences in communicating your environmental engagement?"*

Stakeholder survey (Annex III)

The purpose of conducting a survey is to perform a stakeholder analysis. After the first visit stakeholders were identified. The stakeholder analysis is applied in the design of the eco-enterprise strategy, based on the results of the company's and the stakeholders' commitment to

biodiversity project. The primary stakeholders, who are targeted in this survey, are company employees and customers (referred to as “guests”).

The survey has the objective of attaining a more precise understanding of how these stakeholders perceive the company, in terms of own potential influence and closeness, as well try to grasp stakeholder values in terms of corporate environmental engagement and familiarity with the biodiversity issue and business responsibility. The survey is designed as 7 relatively closed-ended questions, which are asked 10 respondents; 5 guests, 5 employees. The results of the survey are found in the back (Annex III), and they will part of the empirical basis in the analysis of stakeholders, together with the semi-structured interview, introduced above, and the media analysis of public awareness.

Employees

Closness: Givskud Zoo is an independent institution. Do you sometimes feel that it is "your" garden and business?

Influence: Have you previously made proposals for changes in the company? Do you feel that your proposed changes are heard?

Values: What influenced your choice of Givskud as a workplace?

Do you ever consider if your workplace are performing environmentally well? How important is this to you? Rating 0-5

Do you think anything needs changing in Givskud at present? If yes, what?

Familiarity: What are you thinking when hearing the term ”biodiversity”?

Would you expect of any company to engage in biodiversity?

Guests

Values: What influenced your choice of Givskud Zoo as a visitors?

Do you notice the initiatives which Givskud is doing for the environment? Could you possibly name some?

Do you consider whether those who sell something to you compromises the environment? How important is it for you? Rating 0-5

Is there anything you currently believe that Givskud should change? What?

Influence: Do you feel you influence the market in any direction as a consumer? Concrete examples?

Familiarity: What are you thinking when you hear the term "biodiversity"?

Would you expect you of some businesses that they protect biodiversity?

6.1.2 Media analysis of public awareness

A media search is performed according to how the media communicates issues with relation to biodiversity. People's appreciation and valuation of biodiversity, is relevant in the question of how the biodiversity issue is and can increasingly become a part of the public debate and gain interest.

A Japanese study on how increased newspaper coverage of the climate change issue in the period of 1998 to 2007 affected public concern, demonstrated a strong correlation between the increased coverage of the issue in the mass media and a rising public concern (Sampei and Aoyagi-Usui, 2008). Therefore it is assumed that media coverage and public concern is closely related in this study context as well. An exercise is thus performed on identifying possibly intensified use of chosen key words in the mass media, by performing a broad media search in the web-based search engine *infomedia* in a total of 580 sources, which includes national and regional daily papers, local weekly papers, magazines, news agents and radio- and TV-transmissions.

The scope of the search is chosen to be Danish media without regarding web sources. The search is performed for media within five different time frames, from the past ten years to the past six months. The number of articles found for each keyword is divided with the number of years, which gives an average yearly number of articles containing the keyword for the period. By letting this number for the past ten years work as an index, the ratio by which the media coverage has increased is expressed by a factor. Figure 6.1a below illustrates the method.

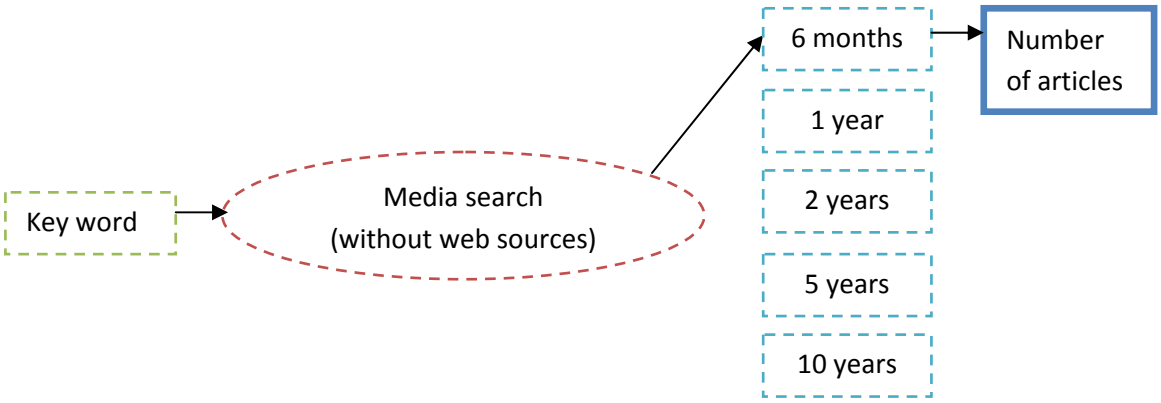


Figure 6.1b: Method for the analysis of media coverage, performed in infomedia.

The intensity of media coverage determined by the number of articles can vary depending on other factors than actuality for the receivers. E.g. can the number of media agents or general news production increase. For that reason, two always relevant keywords are entered; "vejret" (the weather) and "udenrigspolitik" (foreign policy). This way the media coverage of issues, which should assumingly not shift in relevance indicate how the general media production has developed over the period, thus help to ratify the results.

7. The case of Givskud Zoo

The analysis in chapter 8 is based on interpretation of information collected as secondary and primary empirical data. This is what this chapter seeks to present. The setup for the biodiversity link to businesses will be examined, in the institutional context and in the concrete case. This chapter serves as an interpretational precondition for the analysis in chapter 8.

How is the society concerning about biodiversity and responsible actions in businesses?
How is Green Network managing this, and what are the goals of Givskud Zoo?

7.1 Contextual introduction

7.1.1 Awareness of environmental issues in Denmark

The interests and values of the public are relevant in the analysis of stakeholders for any business. This relates to the eco-enterprise strategy, which suggests that communities comprise networks of individuals, organizations and institutions often with common values and goals. These guide the actions of other community members, e.g. actions performed by businesses (Stead and stead, 2000).

As introduced in 2.2.1, a clear incentive for engagement in biodiversity is shared stakeholder value. As introduced in section 2.2.2 the trends of engaging in the environment has developed from being oriented around e.g. pollution control, trough commencing actions with no direct relation to the company, but rather the society in which the company exists. For that reason, it is relevant to try and determine how the Danish society recognises its own interest in the biodiversity issue. The method for this analysis is described in section 6.1.2 in chapter of "research design and methods". Figure 7.1b below shows how the media production has included following keywords within the mentioned timeframes: "Biodiversitet" (biodiversity), "klimaforandringer" (climate change) and "virksomhed (and) samfundsansvar" (business and social responsibility).

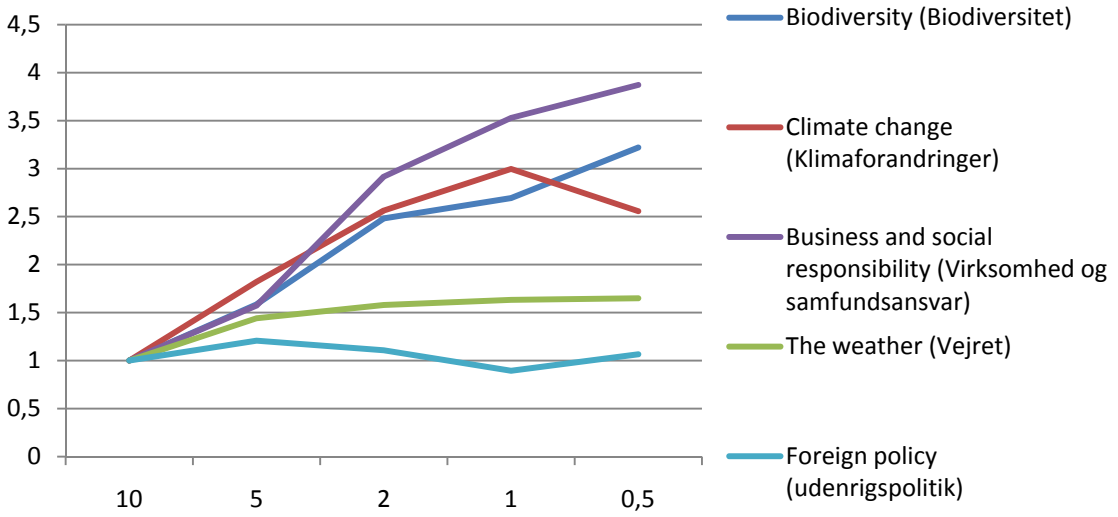


Figure 7.1a: The public interest in the issues of "biodiversity" and "social responsibility of businesses" seem to have increased in Denmark, the latter being the "top scorer", judged on the increased media coverage. As a comparison, "the weather" receives increased exposure, but to a much lesser degree. Foreign policy is not deviating significantly over the period. Climate change is the most popular issue within the last five years, but the intensity in media coverage has decreased relatively over the past six months.

The coverage of biodiversity has increased from being mentioned in 1987 articles during the past ten years, to 320 in the past six months. As the figure illustrates, this is an increase by just over factor 3. Climate change increases by being mentioned in 16616 articles over ten years, to 15131 over only five years. Most significant on that curve is the drop during the past six months.

The number of articles containing both "business" and "social responsibility" is over the past ten years 408, whereas 79 articles have focussed on this during only the six past months.

The increased coverage of the weather could be a result of increased media production, but as the foreign policy has not increased in frequency (and should not have decreased in public concern), another possibility may control the increased communication of the weather. It is likely that the word appears to a higher degree in relation with climate change related material. This "leakage" may also be the case with climate change, as this may likely be mentioned in articles concerning biodiversity as well business responsibility.

Although climate change appears nearly 10 times as frequent as biodiversity, the rough conclusion to draw from this exercise is that it seems the issues of biodiversity and social responsibility in businesses are of increased public concern. Important is also the media's capability of raising public awareness. As there is a positive feed-back on this, increased media coverage of these topics will therefore increase public awareness and concern (Sampei and Aoyagi-Usui, 2008).

7.1.2 Biodiversity concerns in Green Network

The conditions for biodiversity actions through Green Network are interpreted from the current environmental efforts taken by its members. The framework for working out environmental reports, which is the central tool for environmental actions, is introduced in section 5.2.4. How this tool makes businesses consider the values of biodiversity, directly or indirectly, is

interpreted from the contents of the environmental reports carried out by the businesses that demonstrate a leading role in responsible behaviour.

Out of the approximate number of 300 companies, who have enrolled in Green Network, only 10 companies have conducted sustainability reports. These companies can be regarded the front runners or pioneers within responsible actions in Green Network. For that reason, it is interesting to examine if any of these companies regard biodiversity as a serious core value in their reporting.

The main contents of environmental reports, even from the "sustainable" companies include audits on consumption, waste and emissions. The impacts that are mentioned are the ones which can be sensed by humans, i.e. noise, dust, and soil contamination. However, no impacts on the natural environment are considered and neither are any ambitions for future initiatives on impact reduction addressed. With reference to figure 2.3 in the end of chapter 2, which explains the development of the *concept of corporate environmental management*, this guide supports the companies in achieving environmental performances as illustrated by the second blue box. The focuses seems on problems related to emissions and resource consumption, and the overall incentive for conduction environmental reports is to comply with the guidelines, which corresponds with the requirements of other guidelines.

Through a search for the words "diversity", "nature quality", "ecosystem" and "habitat" and brief screenings, the above description is relevant to all of the sustainability reports. One place is mentioned *biodiversity*, although not under the environmental part. This is the section of social responsibility, in which the company goals of Givskud Zoo are mentioned.

Green Network has ambitions relating to the fourth step on the roast scale. Despite this, all encouragement lies in reactive actions, and once a company has committed to GN, little encouragement is provided for acting further pro-actively or even voluntarily.

7.2 Givskud Zoo

Givskud Zoo is a safari park, located on a 116 ha area in the village of Givskud in Vejle municipality, in the south of Jutland, Denmark. About half of the area is used for installations for the zoo, about 25 ha are reserved for forest and nature, and the rest is used for agricultural purposes. The park is not operated as a traditional zoo. Instead of caging, the animals are kept on open, natural areas where visitors make the experience from either their own vehicle or from busses run by the park. This has been the concept since the park opened in 1969. The main attractions are large mammals, such as lions, giraffes, antelopes, rhinos, buffalos and gorillas (Givskud Zoo, 2004).

The ownership relations of the company are untraditional for a company, as the company is run as a so-called self-owned enterprise. This means that no one owns the park and nobody profits from it. The economic income is to a large degree (about 75%) based on entrance fees, running special functions in the restaurant facilities, gifts, sponsorships, and with an approximate 13% of the yearly income from public subsidies from the cultural ministry. The operation costs for running Givskud Zoo can be financed by the income from entrance fees. The remaining part is necessary for investments in renewing and expanding the facilities (Givskud Zoo, 2004).

On a seasonal basis, from April until October, the number of visitor reaches and average of around 300,000-350,000. 80% of these are Danes; the other 20% come from Norway, Sweden and Germany (Givskud Zoo, 2004).

The organisation of Givskud Zoo is build from the top by 6 board members (who receive no compensation) pointed out by the Danish council of Lawyers, the Regional Council of Southern Denmark, University of Southern Denmark, Vejle Municipality, Tourism of Southern Denmark, and one pointed out by the employees. The management has one executive director, and four managers for economy, park, communication and sales, respectively. 44 employees are working in Givskud Zoo all year, whereas the number of staff members during the season is about 180 (Givskud Zoo, 2008).

7.2.1 Mission and goals

Givskud Zoo has a self-declared goal, i.e. *"to create fascination for, and understanding of animals and the biological world, and to create motives for and engagement in conserving its biological diversity. The most important instrument for attaining this goal is the exhibition of animals from around the world." (Givskud Zoo, 2004 p. 10).*

Holding animals in captivity is not optimal, so therefore it is important to have some ethical arguments for doing so. The motives for why this is done in Givskud Zoo is to promote *dissemination/communication*, *conservation* and *research*, in that order of prioritisation. This correlates with the requirements of Danish Zoos and Aquariums (DAZA). Also the EU requirement for approving Zoos in Denmark states conservation of biodiversity (Givskud, 2004).

a) *Dissemination* of knowledge is essential, as the factors of understanding, responsibility and motivation are preconditions for making people engage in biodiversity (Givskud Zoo, 2004). Experiencing large animals creates the fascination which can help to make people understand why nature needs protection. Dissemination is exercised in multiple ways, i.e. through written messages inside the park and through welcoming visitors from various educational institutions (Interview, annex II). Written communication related to biodiversity inside the park is found in the gorilla house, where posters explain about the human imposed threats on the gorillas in Central Africa (see figure 7.2a below).

Figure 7.2a: Posters in the gorilla house tell about the threats which humans cause on the gorilla populations in Africa. Wood products motivates the locals to cut and sell the forest, as well as poaching for meat and teeth act as drivers.

According to Givskud Zoo (2004) the dissemination is attempted through active and passive communication. The passive communication has greatest significance, and is based on "human meets animal". This good experience is what creates fascination and drive for seeking knowledge. Possible knowledge creation magnifies again the fascination and may lead to action, and this creates to need and benefit of active communication, which is realised through reading e.g. posters with information. However, signs are realised not to be very effective, and receive little attention from guests. Consequently, Givkud Zoo is introducing alternative media, as live presentations, cd-guides for the cars etc.

b) *Conservation* is the anticipated result of education and the creation of nature awareness among visitors and others. On the side of the park activities, the company runs a fund, which contributes with grants for conservation. Also, education is provided for a rural community in Cameroon on the importance of Gorillas (a species in rapid decline), thus why and how to conserve its natural habitats and avoid hunting it (Interview, Annex I).

Conservational efforts undertaken by zoos from keeping endangered species have rarely proved as optimal approach to this. In reality the conservational efforts should be taken where natural habitats exist. However, the populations in zoos around the world are managed comprehensively, in order to avoid inbreeding, and so in contrast with small populations in the nature, the populations in zoos do not face the hazards of inbreeding (Givskud Zoo, 2004).

c) *Research* in Givskud Zoo contributes to reaching the goal, as students and university researchers have access to animals, which would not be possible to the same degree in the open nature (Givskud Zoo, 2004).

The precondition for working towards the business goal is like any other place a healthy business economy. This is created through satisfied and paying guests, who receive a good experience. Therefore the goal of economic optimization is another high priority of the company (Givskud Zoo, 2004).

7.2.2 Environmental values and policy

The mission towards reaching the goal is attempted through the above presented instruments, and by minimal resource consumption and negative environmental impact. This is also exactly what is stated as the company's environmental policy in Givskud Zoo (2008). The environmental policy is approached by improving the performance on four key areas:

- Waste should be treated and returned to natural cycle,
- Guests and suppliers must be informed of our environmental policy,
- Reduce global impact by optimising the energy consumption,
- Resource consumption must with respect to optimal use.

8. Analysis: Biodiversity action planning

This chapter analyses the problem theoretically, in order to answer the research question. The previous chapter introduced the case of the study. This provides the basis for the analysis. As this case in many regards is not typical within the context, the analysis will also discuss briefly what should be expected different in the analysis of another type of case.

8.1 Business appropriation for biodiversity engagement

As introduced in chapter 6, the analysis takes its outset in analysing the business appropriation for engaging in biodiversity actions. *Appropriation* refers to how applicable a biodiversity project is on the company, based on an array of parameters of environmental performance and strategic setup; hence also what should possibly be changed in order for the company to engage effectively.

8.1.1 Identification of environmental performance

The environmental performance of Givskud Zoo is examined through the sustainability report and statements by the management in the interview, Annex II.

Givskud conducted in 2007 the first sustainability report, but the first experience with environmental auditing was in 1987 after request from the municipal authorities. The membership of Green Network was acquired in 2001 in the need for tools for conducting environmental reporting (Interview, Annex II). The improvements, as stated in the preface of the report, focused on energy consumption and caused emissions. The improvements therefore included a wood-fired boiler, and technology for better ventilation on this report (Givskud Zoo, 2008). Since then, within the recent year, heat pumps have been installed in three animal houses. Also solar cells are anticipated new energy source within the next few years (Annex II, Answer to question 9).

Both interviewees give the company a grade 8 of 10 on the own environmental performance. The high grade is given for the proactive performances that keep the company in front of requirements.

Arguments for not landing on 10 are the unrealised ambitions for reusing waste, and also the compromises that continuously exist, and which are needed in order to make the business run. Compromises count e.g. the water consuming installation in the gorilla yard (see answer to question 7, Annex II). Also the frequency of renewing technology, e.g. the vehicles used for various purposes could yield a higher grading. This relates to the economic precondition which is stated in the last paragraph of 7.2.1.

What is very interesting are the activities which are carried out, and which not remains good intentions in the environmental reporting. Also the life cycle thinking which is apparent through the interview, as well things like *"Last year we participated in a competition on decreasing GHG emission from the private households of the employees, and when we estimated the decrease after 6 months, all employees saved 132 tons CO_2"* (Annex II) demonstrates high commitment.

Summary
The attitude, as judged from the ROAST scale approach the stage four. Seize and Pre-empt (Stage 4): Volunteer environmental actions and engagements are initiated on own initiative. Responses to many external stakeholders reveal priorities beyond profit generation. The virtues of sustainable development emerge in the organisations' strategy.

The focus of actions, as introduced in section 2.2.2 seem to have moved up on the third box, which puts emphasis on *organisational preconditions for action* and demonstrate incentives of *Internal dynamic & image, Knowledge exchange.* This distinguishes Givskud from just acting according to the guidelines of GN, but also taking volunteer actions towards better performance, and even introducing life cycle thinking.

8.1.2 Company strategy analysis for biodiversity engagement

Givskud perceive environmental management to be Line driven (see 2.3.2), which means it is an integral part of everyone's assignments. Also long term management seems to characterise decisions, as they do not hesitate on investing in new technology and anticipate them to pay off. When analysing the four key elements of Burke and Logsdon theoretical concept of attaining corporate benefits from CSR (2.3.2), the elements are discussed according to the statements from the business management in the structured interview (see Annex II). Each element is graded form 1 to 10, where 10 means highest correlation (see figure 8.1 on the next page).

Centrality

Considering whether biodiversity as an issue to take up corresponds with the declared mission of the company, this is very much the case (see 7.2.1), which implies good chances for a project to attain a high organisational priority. Grading 10 of 10.

Proactivity

"The media has great power in setting the environmental agenda, when it comes to the actions of politicians as well as companies. We do want to respond to what the society asks from us, and we have to, but we do believe in realising many of our own ideas". (Annex II, question 9)

Taking environmental initiatives to not visitor numbers, thus revenue, but the energy saving technology are eventually cutting costs, which is a clear incentive for the company. Also, the company claims to usually be in front for when official requirements occur, but that is not the main reason for taking action.

Givskud Zoo do not experience economic profit from outside by doing this. Hence if the economy would not allow investments in responsible behaviour, we would have to take it off the agenda. We do prioritise it high, and other things are prioritised lower than these initiates, but a certain economic capacity is required (Annex II).

This field is graded 8 of 10. Clear proactive actions are taken, but proactivity is done for the reason of benefits. The benefits are not aimed towards, as the company does not care much about regulations, but are more focussed on own ideals.

Voluntarism

The Much of the initiatives we talked about in previous questions are volunteer initiatives, e.g. the idea of leaving put poison, which does not apply to agricultural businesses in general. The education undertaken by Givskud is not limited to the issue of nature conservation, but as a forerunner in the field of environmental initiatives, the company welcomes people from diverse fields of interests (Interview, Annex I).

Despite typically weaker incentives exist for acting voluntary, than for acting proactively or simply just comply, the voluntary actions are often prioritised lower. However, besides complying with the requirements and committing proactive actions, volunteer actions are seemingly not regarded less valuable. 10 of 10.

Visibility

The communication is one of the instruments for reaching the goal of biodiversity conservation. However, for much environmental communication the issue of biodiversity is left out. As introduced in previous chapter the depletion of one of the more popular species in Givskud is presented inside the park, and the written guide as well as the CD for the car mentions biodiversity. In the sustainability report, biodiversity is not mentioned in the environment part, but as part of the social responsibility.

The environmental engagement is according to the management visible in the reports, which are published on the internet. Besides this, the sustainability reporting and the GN achievements are published in the press. Some articles have been published on our work here in Givskud Zoo, mostly in magazines for environmental and business management. A few times a year I would say. But we agree that exposing our responsible actions to the guests do not matter much, anyhow does not change the visitor numbers.

It seems that the environmental engagement is communicated right to some stakeholders, but is not seen or appreciated by others. Graded 5.

Figure 8.1a: The numbers illustrate the determine existence of the relevant elements in the company strategy.

Summary

The company strategy is very appropriate to perform responsible actions. The visibility should be considered.

8.2 Biodiversity action planning

Management of biodiversity is realised more or less strategically through instrumental values integrated in the practices. The instrumental values exercised by Givskud in order to reach its mission, are dissemination, conservation and research. The question to rise is; how can these instrumental values be supplemented in order to move closer to the core value?

8.2.1 Inventory of biodiversity impacts

This assessment exercise is performed according to the proposed steps from Earthwatch (2002) and Green Network (2005). The exercise is carried out in correspondence with Givskud Zoo, and resulted in an inventory of impacts possible, which yield possibilities for improvement. The documented work is found in Annex IV in the back of the report, and summed up here.

The biodiversity assessment of the local area shows biodiversity impact on different scales, locally to globally.

Locally on site

Local impacts are realised through emissions to air and soil. The park area is intersected by fragile wetlands, which are protected according to Danish legislation. The land management of Givskud is very satisfying. The area can even be crossed on a footpath by guests in the park, which realised some of the recreational direct use value (see section 4.1.2) of the wetland ecosystem. However, the emissions from fossil fuel consumption in the park (by cars and machinery) may likely cause deposition of nitrogen on surrounding vegetation and in the wetlands, which may cause disruption of habitats for some species (4.2.3).

Global impacts

Impacts are realised through emissions of greenhouse gasses from the same sources as mentioned above. Besides these sources, also the electricity supply imposes hazards. Some share of the electricity supply comes from coal-fuelled power plants, which emits greenhouse gasses.

Givskud Zoo has, on own initiative, invested in hydropower supplied electricity in order to decrease greenhouse gas emissions. This is like to be produced from dams, which influence species in and around aquatic environments, where migration patterns are interrupted and habitats disrupted and fragmented.

Locally off site

Coal-fuelled powered electricity production emits pollutants to the local environment. Besides this, the coal mining has great impact on habitats on and around the mining location.

Fuel-wood, paper and food take up land for production. For a concrete overview of these impacts, life cycle analysis could be undertaken.

8.2.2 Possible solutions

Possible solutions to the impacts to the above mentioned impacts could be:

- Decrease fossil fuel consumption inside the park,
- Supply with solar panels as alternative electricity supply,
- Analyse impacts from resource production and consumption

8.3 Strategy analysis of corporate and stakeholder values

Based on the interview with the management (Annex II), the structured interviews with employees and guests (Annex III), and the media analysis carried out to determine the society level of concern in topics with relation to this research, this stakeholder analysis will map stakeholders. Following in 8.3.2 an analysis of corporate and stakeholder values will be the final analytical element which leads up to the conclusion.

8.3.1 Stakeholder mapping, interest and importance

The company stakeholders are identified to: Guests, employees, the public society (Annex II). These stakeholders will be analysed according to the theory Madsen and Ulhøi (2000). Each stakeholder will be analysed due to statements of their own, of the company management, assessments or literature. The stakeholders will initially be categorised according to *importance for company* and *biodiversity concern,* which determines their location in the matrix. Afterward this is argued for, where also these two relevant relations are considered:

- How are these affected by biodiversity impact (impact on the natural environment)?
- What are their primary interests? Are these a threat or opportunity to the business?

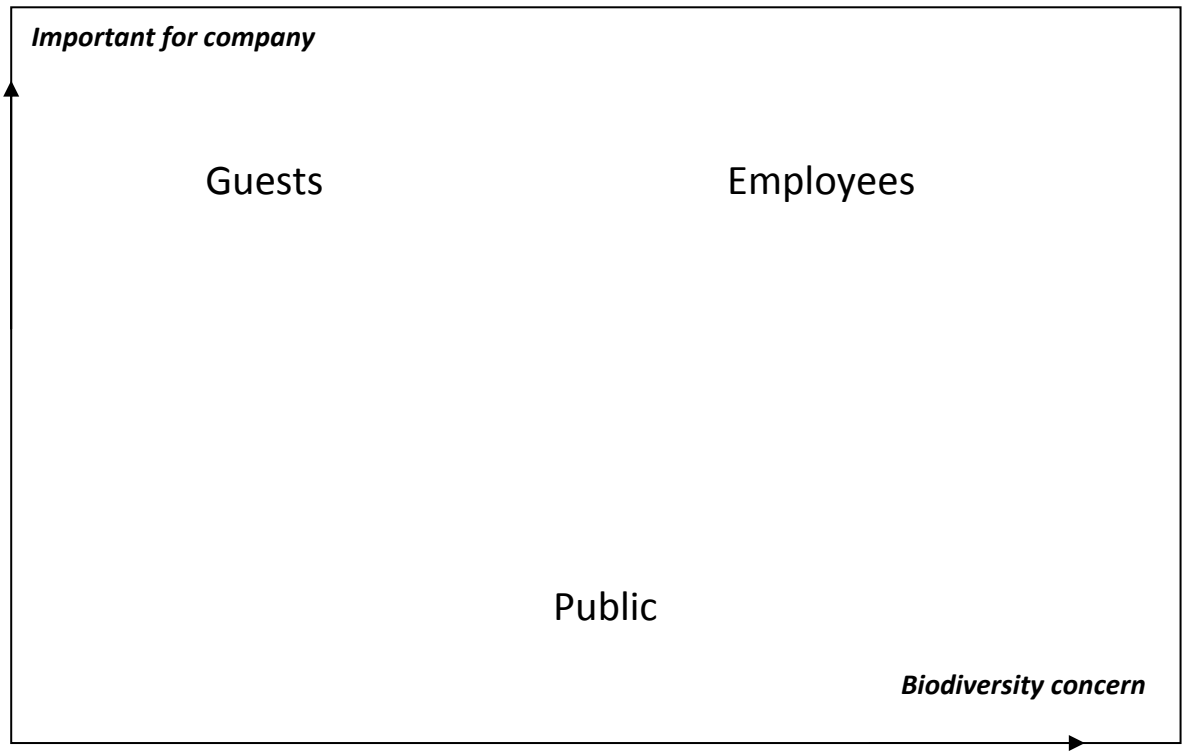
Identification: Actors with influence on the company are guests (customers), employees, the official authorities (Interview, Annex II), and the public society.

The primary stakeholders, who have a direct influence on the company, are the guests, the employees and the authorities (Annex II and Annex III). The society has no direct influence, but is important to the company, because it may potentially be affected by the company's environmental impact.

As seen in the media research of public awareness in chapter 7.1.1, the public society show increasing concern of biodiversity. Also responsible behaviour by companies is increasingly receiving attention. This may indicate a rising public demand for business engagement in biodiversity in a few years.

The guests are extremely important for the company. The concern for biodiversity (and environmental engagement in general) is not very present, which is indicated by the management (Annex II). The guests have direct influence on the company, as the company is economically dependent on them as costumers. The costumers however, do not feel that they as consumers have any potential power on the suppliers of what they buy (annex III). The assumed interests of the guests are fulfilled through working towards the best experience possible for the guest. The primary interests of the guests are good experiences (annex III and Givskud, 2008). The impacts from Givskud Zoo on biodiversity do not affect the guests significantly.

Employees have a great influence of the company, which they seem to be aware of. No owners have sovereign power, and proposals form employees in the interest of the company and within the economic threshold are often heard, and the fixed employees can feel ownership relation to the business (Annex III). The employees appreciate to work in an environmentally responsible company (management, Annex II), which is also confirmed by their own statements in Annex III. The primary interest by the employees is to have a job, which is indicated in the interviews (Annex III). Employees are not in significant danger for being affected by company impacts on biodiversity.



8.3.2 Values network

Considering the potential improvement on biodiversity, these possible changes can be considered instrumental values of biodiversity conservation (see figure 8.3a) – on the same level as the three instrumental values already practices by Givskud Zoo (communication, conservation and research)

If the centrality element (8.1.2) was smaller, and the central values of the company were somewhat more distant from biodiversity conservation, the great challenge would be to make these correlate.

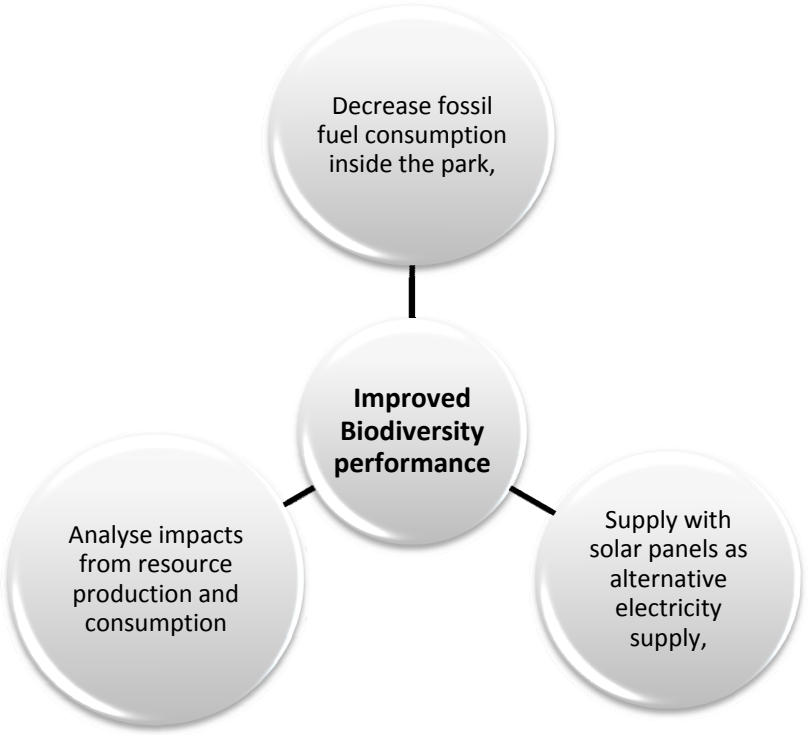
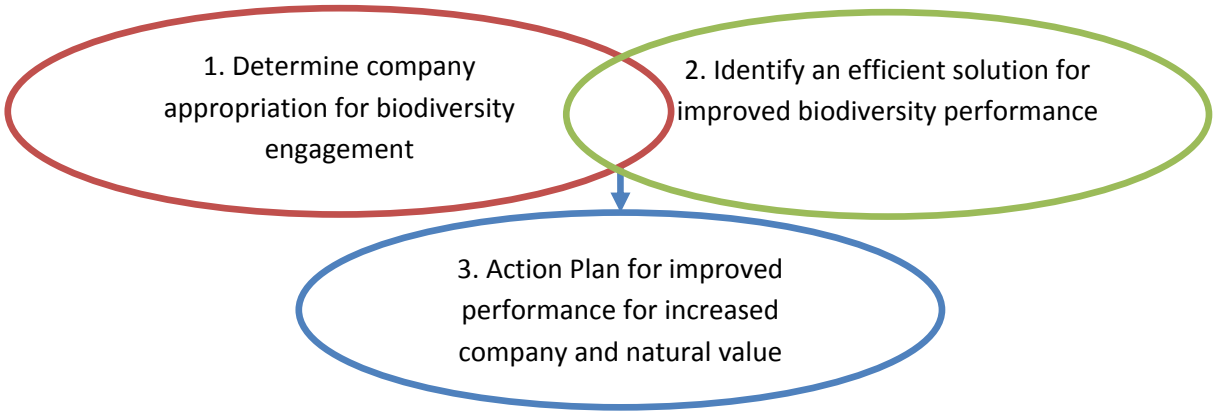


Figure 8.3a: The core value of biodiversity conservation, and the instrumental values, which should be implemented strategically.

9. Conclusion



The research question to answer is:

How can a Danish company effectively implement efficient initiatives for biodiversity?

Corporate responsible actions can very well be performed by Givskud Zoo. The environmental management of the company is partially built up around environmental reporting, where the guide and requirements for this are followed. On top of that, many initiatives are taken voluntarily, backed up by different incentives; cost savings and responsibility to the natural environment.

The environmental performance has improved steadily and proactively for the last 10 years, and own initiatives in the company often determine new projects.

The key characteristics which should indicate if the company strategy is appropriate for obtaining strategic benefits from responsible actions are very much in place. However, weak correlation between company values of biodiversity conservation, and stakeholder values of experiencing direct interaction with exotic animals, means that biodiversity efforts are not recognised and appreciated by the guests, authorities and the employees.

To attain the strategic benefits from responsible actions, the actions must be visible to the stakeholders, which are most significantly the guests. In order to make actions visible to the stakeholders of Givskud, and in order to earn recognition from the performed actions, the actions for biodiversity should be taken in and around the park, where the stakeholders meet the business, and should relate to the values of stakeholders, which is the direct interaction.

The core values of the company, and the instrumental values related to this, partially contribute to biodiversity conservation. Many environmental initiatives are taken, which are based on core values that differ from biodiversity. By realising how instrumental values may affect the environmental performance of the company positively, even stronger incentives exist for performing well.

The guidelines of Green Network provide tools for performing environmentally friendlier, by putting forward messages of decreasing resource consumption and emissions. By realising how these instrumental values contribute to the core values of the company and the stakeholders, the incentives for taking action will rise. The main requirement for this is to recognise impacts *outside* the company, i.e. on the natural environment.

Environmental reporting should include considerations of impact and not only inventory-based accounting. Businesses should be aware of their impacts, thus recognise which core values are behind the instrumental values, which goals and targets are based upon. This step, which must be taken, is exactly what characterises how the concept of environmental management is evolving.

9.1 Perspectives

The case of biodiversity is difficult, especially because of the difficulty which is caused by its "hidden" existence. It is impossible to experience diversity as direct use ecosystem value potentials, even though much literature claims it is. It is not possible to eat or watch biodiversity, only a few different species in an ecosystem. Biodiversity ensures regulative and supporting ecosystem services, and this is impossible to experience direct.

Therefore, the communication on what biodiversity brings us should be transparent, easy to understand, and honest. It is a challenge to explain why we should value stability in ecosystems, when intensively exploited ecosystems appear to bring much more directly valuable goods. In order to promote biodiversity conservation, honesty is a necessity if we should expect serious attitudes towards conserving it.

This study includes some extra dimensions, which could have been integrated. For instance, a comparative study with a typical business in production would have been interesting. Also investment perspectives of participating in projects away from the company location would be interesting.

Members of Green Network prove themselves environmentally responsible, thus practical applications of new initiatives should be considered possible. Green Network demonstrates clear interest in participating on enhancing their knowledge base and follows the trend of business engagement in environmental issues.

The integration of this project in Green Network seems feasible, by integration into the environmental reporting guidelines. The local land use management could be attractive to many types of companies. Natural elements do not occupy the land from alternative use, such as recreational spaces.

10. List of references

BirdLife International (2009), Species factsheet: Ardea melanocephala. Downloaded from http://www.birdlife.org/datazone/species/index.html?action=SpcHTMDetails.asp&sid=3720 on 18/5/2010

Birds (2010), Marabou Stork (Leptoptilos crumeniferus) available 18-05-2010 on http://www.birds.com/species/k-o/marabou-stork/

Biodiversityexplorer (2010), Bubulcus ibis (Cattle egret), available 18-05-2010 on http://www.biodiversityexplorer.org/birds/ardeidae/bubulcus_ibis.htm

BLST (2010), *Vejledning om naturbeskyttelseslovens §3 beskyttede naturtyper*, By- og Landskabsstyrelsen, http://www.blst.dk/NR/rdonlyres/73E0D501-88E2-4B27-99C1-9535318A4C23/0/1sidet246vejled3.pdf

Burke, L. and Logsdon, J. M.(1996), *How Corporate Social Responsibility Pays Off.* Long Range Planning, Vol. 29, No. 4, pp. 495 to 502, 1996 Copyright © 1996 Elsevier Science Ltd

Convention on Biological diversity (CBD)(2005), Business and The 2010 Biodiversity Challenge: *Exploring Private Sector Engagement In The Convention On Biological Diversity.* prepared for the Business and the 2010 Biodiversity Challenge meeting in London, 20-21 January 2005, available at http://www.cbd.int/doc/meetings/biodiv/b2010-01/official/b2010-01-02-en.pdf

Convention on Biological Diversity (CBD) (2009). www.cbd.int

Convention on Biological Diversity (2010), *Business and Biodiversity* http://www.cbd.int/business/, Updated on 2010-02-05

Countdown2010. *About Countdown 2010*, available 01-05-2010 on www.Countdown2010.net

DMU(Danmarks Miljøundersøgelser) (2004), *Den danske rødliste,* Fagdatacenter for Biodiversitet og Terrestrisk Natur (B-FDC). - Danmarks Miljøundersøgelser, [2004]-. Available o: http://redlist.dmu.dk

DMU (Danmarks Miljøundersøgelser) (2010), *Opdatering af Den danske Rødliste 2009,* Revised 09.04.2010, accessed 20.04.2010 on http://www.dmu.dk/Udgivelser/DMUNyt/2010/5/RodlisteUddybning.htm

Danmarks Naturfredningsforening (DN) (2010), *Biodiversitet er rig natur*, available 07-04-2010 on http://www.dn.dk/Default.aspx?ID=20630

The European Commission (EC) (2010), *Options for an EU vision and target for biodiversity beyond 2010,* Brussels, 19.1.2010 COM(2010) 4 final

Earthwatch (2002), Business and Biodiversity - A UK Business guide for understanding and integrating nature conservation and biodiversity into environmental management systems, Prepared by the UK Round Table on Sustainable Development, published by Earthwatch 2002

EEA (European Environment Agency)(2005), The European environment State and outlook 2005. EEA, Copenhagen. 2) EUNIS. http://eunis.eea.europa.eu/

Earthwatch (2000), *Case Studies in Business & Biodiversity*, Published by Earthwatch Institute (Europe), March 2000

Earthwatch Europe, IUCN (The World Conservation Union) and World Business Council for Sustainable Development (2002), *Business & Biodiversity – The Handbook for Corporate Action*, Copyright © 2002, ISBN 2-940240-28-0 Printed in Switzerland by ATAR Roto Presse SA

F&C (2004) *Is biodiversity a material risk for companies?,* F&C Asset Management Plc with contributions from DEFRA and the Earthwatch Business and Biodiversity Resource Centre, available at http://www.businessandbiodiversity.org/pdf/FC%20Biodiversity%20Report%20FINAL.pdf

Freeman, R. E. (1984), Strategic Management: A Stakeholder Approach. Pittman, Boston 1984

Green Network (2006), *Miljø Manual*, published by Green Network in 2006 (first time in 1996), www.GreenNetwork.dk

Green Network (2010). Official homepage, www.greennetwork.dk

Green Network (2005). *Manual til udarbejdelse af miljøredegørelse på landbrugsbedrifter*, published by Green Network in 2005. www.GreenNetwork.dk

Givskud Zoo (2004), *Perspektiv- og masterplan*. Published in 2004, available in Danish on www.givskudzoo.dk

Givskud Zoo (2008), *Bæredygtighedsredegørelse 2008, DSI Givskud Zoo, (Eng: Sustainability Report),* Givskud Zoo 2008, available on www.givskudzoo.dk

Hart, S. L. (1995), *A Natural-Resource-Based View of the Firm.* The Academy of Management Review, Vol. 20, No. 4 (Oct., 1995), pp. 986-1014. Academy of Management Stable URL: http://www.jstor.org/stable/258963, Accessed: 10/03/2010

Jespersen, J. 1998. *Miljøøkonomi*, Jurist- og Økonomforbundets Forlag © 1998

King, D. M. 1997. *Comparing ecosystem services and values*, Centre for environmental and estuarine studies, University of Maryland 1997.

Kommunen (2010), *Pensioner støtter diktatur, børnearbejde og miljøsvin.* Kommunen – avisen om det lokale Danmark, published March 18th 2010.

Korsgaard, L. 2006. *Water Resources Management: Linking Flows, Services and Values*, Institute of Environment & Resources Technical University of Denmark 2006.

Kørnøv, L., Thrane, M., Remmen, A. And Lund, H. (2007), Tools for sustainable development, Aalborg Universitetsforlag 2007.

Madsen, H. and Ulhøi, J. P. (2001). *Integrating Environmental and Stakeholder Management,* Business Strategy and the Environment Bus. Strat. Env. 10, 77–88 (2001).

Meltofte, H. 2010 *Danmarks natur 2010 - om tabet af biologisk mangfoldighed*, Published by Det Grønne Kontaktudvalg, c/o Danmarks Naturfredningsforening, 2010

Miljøministeriet (MIM)(2010a), *Nationalt testcenter for vindmøller i Østerild Klitplantage – idéoplæg,* available 09-04-2010 on http://www.blst.dk/Landsplan/Vindmoeller/Nationalt_testcenter_for_vindmoeller/

Miljøministeriet (MIM)(2010b), *Naturgaslager ved Ll. Torup - Forslag til kommuneplantillæg med VVM - Forlængelse af høringsperiode,* available 09-04-2010 on http://www.blst.dk/Annoncer/AARnaturgaslager270110.htm

Millennium Ecosystem Assessment (MEA)(2005), *Ecosystems and Human Well-being: Ecosystems and Human Well-being: Current State and Trends, Volume 1*. Island Press, Copyright 2005 Millennium Ecosystem Assessment.

Millennium Ecosystem Assessment (MEA)(2005a), Ecosystem*s and Human Well-being: Biodiversity Synthesis*. World Resources Institute, Washington, DC.

Millennium Ecosystem Assessment (MEA)(2005b), *Opportunity and Challenges for Businesses and Industry*. World Resources Institute, Washington, DC.

Myers, N. 1996. *Environmental services of biodiversity*, Proc. Natl. Acad. Sci. USA Vol. 93, pp. 2764-2769, April 1996

Mäler, K. and Vincent, J. R. 2003. *Handbook of Environmental Economics, volume 1: Environmental degradation and institutional responses,* ELSEVIER 2003.

Pedersen, J. and Wind, P. (2010), *Den danske Rødliste opdateret med 2.702 arter af planter og dyr,* Danmarks Miljøundersøgelser, available on: http://www.dmu.dk/Udgivelser/DMUNyt/2010/5/rodlisteNyhed.htm

Sampei and Aoyagi-Usui (2008), *Mass-media coverage, its influence on public awareness of climate-change issues, and implications for Japan's national campaign to reduce greenhouse gas emissions,* Global Environmental Change 19 (2009) 203–212 © 2008 Elsevier

Sand-Jensen (2007). *Naturen i Danmark, det åbne land.* Gyldendal 2007.

Stead, J. G. and Stead, E. (2000) *Eco-Enterprise Strategy: Standing for Sustainability*, Journal of Business Ethics 24: 313–329, 2000. © 2000 Kluwer Academic Publishers. Printed in the Netherlands

Suneetha, M. S. (2009) *Sustainability issues for biodiversity business*, Sustain Sci (2010) 5:79–87, Integrated Research System for Sustainability Science, United Nations University, and Springer 2009.

TEEB 2009. *The Economics and Ecology of Biodiversity for national and international decision-makers,* performed by UNEP et al., available on http://ec.europa.eu/environment/nature/biodiversity/economics/index_en.htm

ten Kate, K., Bishop, J., and Bayon, R. (2004), *Biodiversity offsets: Views, experience, and the business case*. IUCN, Gland, Switzerland and Cambridge, UK and Insight Investment, London, UK. ISBN: 2-8317-0854-0. Available from: IUCN Publications Services Unit, 219c Huntingdon Road, Cambridge CB3 0DL, UK Tel: +44 1223 277894 Fax: +44 1223 277175 E-mail: info@books.iucn.org www.iucn.org/bookstore and also: http://biodiversityeconomics.org/offsets

Townsend, C. R., Begon, M., and Harper, J. L. (2008), *Essentials of ecology, third edition.* Blackwell Publishing 2008.

Turner, R. K., Cooper, P., Paavola, J., Farber, P, Jessamy, V & Georgiou, S (2003). *Valuing nature: lessons learned and future research directions*. Ecological Economics 46, 493-510.

United Nations Environment Programme (UNEP) (2007), *Global Environmental Outlook (GEO) 4*. Published by the United Nations Environment Programme in 2007

Welford, R. (1996) *Corporate Strategy, Competitiveness and Strategy, chapter 2* in *Corporate Environmental Management 1, systems and strategies - Second Edition*, Earthscan Publications Ltd. London.

Annex I: Explorative interview with Givskud Zoo

Interviewees: Director Richard (R) and Park Manager Kaj (K), Thursday 6th of May 2010

Current influence on biodiversity

Introduction to the company, the routines and how it influences biodiversity. I would like to talk about biodiversity in regard to how you as a company relate to the topic, e.g. how is biodiversity perceived and experienced by Givskud?

Resume of the open dialogue:

The ultimate goal is to promote fascination and understanding for the biological world and to create engagement and motivation for protecting its diversity, through the declared mission of dissemination, conservation and research. In this way, you can say, the business objective itself is promotion of biodiversity through the application of the measures, which an animal park has in the regard.

Dissemination is exercised in multiple ways, i.e. through written messages inside the park and through welcoming visitors from various educational institutions. The education undertaken by Givskud is not limited to the issue of nature conservation, but as a forerunner in the field of environmental initiatives, the company welcomes people from diverse fields of interests.

Conservation is the anticipated result of education and the creation of nature awareness among visitors and others. On the side of the park activities, the company runs a fund, which contributes with grants for conservation. Also, education is provided for a rural community in Cameroon on the importance of Gorillas (a species in rapid decline), thus why and how to conserve its natural habitats and avoid hunting it.

The practices of running animal parks have changed radically since the 70's. Back then, when a need for animals emerged, one would go and get it in whatever way it might be possible. Some places that still happens but since the emergence of the CITES (Convention on International Trade in Endangered Species) that is decreased drastically, fortunately. Today Givskud and other Zoos is an integral part of an international breeding cooperation. Animals in the park are spending their lives within parks. This also means that for many species that are now in danger of becoming extinct in the nature, several individuals exist within parks around the world. Only in cases where illegal animals are imported and caught in customs, the park population is supplied with animals from outside. And in rare cases where the genetic material needs supplement and it seems reasonable to remove an individual from a natural population.

In terms of good practise, the ideals which characterise Givskud do exceed the ones of most other animal parks. Out of the 50 registered zoos in Denmark, only 16 actually follow these ecological ideals.

A doubt to rise in respect to the biodiversity performance of Givskud is “does the work contribute adequately to what is needed and desired?”

Annex II: Structured interview with Givskud Zoo

Interviewees: Director Richard (R) and Park Manager Kaj (K), Thursday 6th of May 2010

Questions related to Eco-Enterprise strategy

1. **Who, which other companies, organisations and authorities have direct impact on your agenda?**

R: There are only the authorities and the paying guests who have potential direct impact. The number of guests is usually between 300,000-350,000. The company has no shareholders, as the institution owns itself. The economic foundations (dkr. 50 millions annually) are purely based on entrance fees, and some donations from the Danish Ministry of Culture.

2. **How do you think of these stakeholders perceive "biodiversity"?**

R and K: They don't know what it is, and so they don't care much.

3. **Do you feel stress from any stakeholders to act towards certain ideas or initiate certain projects?**

R: The guests maintain a certain pressure through their expectations to what they get from visiting us. Givskud Zoo has a high recognition factor in Denmark. We usually say that people come to visit three times in their lives; as children, parents and grandparents.

   a. **Would the absence of clear responsible engagement inside the park be met by disappointment by the guests?**

R: Not at all! The communication of engagement in conservation, and the dissemination of animal extinction around the world is a side-effect, which we forward onto the guests. People come to enjoy themselves and get surprising experiences from being around exotic animals. Besides that many of them are affected from information, which they might not feel the need for.

R: I try to do the same when I make presentations different places. When introducing different natural environmental issues not everything is equally romantic, e.g. when talking about gorillas the poaching and killings of gorillas is a big issue and is part of the story. But that is usually not what people intend to hear about. So in general, many of the efforts that conservation is about involve issues, which destroy the romantic picture of some animals in the park. And our goal is to create awareness of these issues. We want this to be integrated in people's knowledge of the animals; both on how animals live in the nature, but also on aspects which put danger to the existence of these animals. Only a very little share of the species in the park is not threatened to some degree, which is an environmental disaster, and this message is part of the experience.

K: A big part of the experience in Givskud is that the humans are in the cage when driving through the savannahs with lions, giraffes, buffalos etc., which makes an impression on the people in terms of all the space which are left to the animals here, opposite other traditional zoos.

4. **Do you feel recognition for taking responsible actions?**

K: We have got that through Green Network and other guest, who have come to look into e.g. the new energy saving technology, but the great majority have no clue. Many people in other companies of GN are not introduced to the sustainability report concept, e.g. because they have not taken the step into doing this yet, but still work on the environmental report. I would say that in 5-10 years, nearly all GN companies are completing their sustainability reports.

R: We feel big recognition from GN, and they usually use us, among others, as pioneers when new initiatives are tested.

   a. **How about fellows from the same branch (other animal parks)?**

K: These know it, and we let ourselves inspire by each other. Everyone in this branch of business works on environmental initiatives.

5. **How do you experience any value added to the company from the current actions published in the sustainability report?**

R: Increasing visitor numbers is impossible, and visitor recognition is hard to increase. So we don't increase income. However, losing guests would be easy if no efforts were made on environmental issues.

R: We don't experience extra economic outcome from outside by doing this. Hence if the economy would not allow investments in responsible behaviour, we would have to take it off the agenda. We do prioritise it high, and other things are prioritised lower than these initiates, but a certain economic capacity is required.

K: Internally we experience good engagement among our employees in acting responsibly. Many of them show interest in heat pumps or new insulation in their houses, and talk to each other about these topics. Last year we participated in a competition on decreasing GHG emission from the private households of the employees, and when we estimated the decrease after 6 months, all employees saved 132 tons CO_2

R: Back to the economic benefits. We may not increase income from increased visitor numbers, but the energy saving technology are cutting costs. Some of these investments have been covered by sponsors.

K: Cost savings are also experienced through our waste treatment. By sorting and distributing waste to recycling etc., we save kr. 3200 for each container.

R: It all corresponds to our goals as stated in previous reports. It is here stated that waste contents should return to the natural cycles to the highest possible degree, decrease our global impact from consumption, and optimal use of resources. Also we have - and want to - radically

decrease the number of additives, which we use, and the products are most widely environmentally certified. In the daily practices we therefore motivate the employees to consider what they use and how they use it. We use degradable products as much as possible, and poison is not used at all. The only kind is medicine. And a very little rat poison.

6. **How has the dialogue and process been during previous decisions and planning of responsible actions? Overall consensus or diverging opinions? Do any concrete examples exist?**

R and K: We have not witnessed any diverging opinions in this respect. Everyone shows understanding for this. But in reality, animal parks are special, because in order to be here, you have a desire to engage in nature. That is quite an easy foundation for making consensus on this.

R: Practically, it may sometimes be difficult for some staff to understand why they should not go the shop and by a bottle of some chemical product, which is not in our range of products that we use. Also the green keepers sometimes try to argue for why they should not use poison, but they accept the decision. So the only constraints are in the practical understanding and application of our code of conduct.

R and K: As a response to that, we respect that weeds occur in the flower beds and between the tiles. It is a natural area, and even when we are asked about it from guests, they understand that argument.

Questions related to Strategic CSR

7. **How would you grade yourselves in terms of environmental actions on a scale from 1 to 10, where 1 illustrates the poorest performance of Danish companies, and 10 the best?**

K: 7 (8). Not 10, because one can always improve performance. We would probably not reach 10, because as we improve continuously, the boundary moves ahead as well.

   a. **Could you mention right now something which could be improved?**

K: Well yes always. E.g. we could reuse much of the waste ourselves, instead of removing it to somewhere else. At the time the regulation puts certain demands on the practices. This is often costly, but if other initiatives can be performed, which does not put us in excess economic pressure, or if we can even save on costs, then we prioritise this very high. These activities help to keep us in front most times, and this is thanks to our innovative minded management.

K: I think we are very good at this. And it is an integral part of the mind set. When we establish new buildings, for instance, we could start to consider how to effectively minimize resources and reuse the waste in connection with the establishment.

   b. **Does this indicate a certain attention to how life cycles could be better?**

K: Without a doubt! All staff members share thoughts and ideas all the time, which sometimes get real.

R: Back to the grade, we cannot score 10. 8 I would say as well. There will always be certain compromises which the business depend on. Here, in the gorilla's yard we have a great waterfall, which we have renewed. In the current case we have constructed the least energy consuming way of pumping the amount of water (350 m^3/h), which we think is important for the experience.

K: It could have been the half amount, but we decided to compromise for the good experience, and it has a cost of 14 entrance tickets a day. But we think it is worth it.

R: That is not all good from and environmental perspective. The pace at which we renovate would be greater as well. We still have a lot of old vehicles which we use in the park. There are multiple improvement potentials to start on, if we could just purely focus on that. We cannot do that, we have to consider the business as a whole.

R: In principle we could engage a person in only working on environmental improvements for the next 10 years. At this point, we came from a company where these aspects were not given a thought whatsoever. All it had to do was run. Now we are eliminated the "low hanging fruit", and it really shows results. Hereafter improvements become more complicated and the results may not be as apparent. The change to water generated power did a great shift in our CO_2 accounting, and also heat pumps saves a lot of money as well does the environment a favour as opposition to oil burners.

K: If we continue in the pace of the past few years, I am confident that we will not use oil and gas for heating much longer. Perhaps gas for the kitchens. Our general idea is that we will be CO_2 neutral in 2018.

R: This involves different problems though. E.g. we make our guests drive their car trough the park, and this responsibility needs to be addressed as well...

8. **The environmental policy of Givskud as declared in the sustainability report immediately seems very biodiversity-friendly. Is this policy realised, and if so through which initiatives?**

R: Yes, back to the values and visions of the company: Givskud zoos objective is to create fascination and understanding of the biological world, and well motives and engagement for conservation of the world's biodiversity.

   c. **Is this realised?**

R: I may be afraid off not reaching the goal the degree which we hope to do. I tend to think that our effect is smaller than we imagine. Something which can be quantified is the number of pupils and students which visit the park. They receive an environmental message. Also our school in Africa teaches 15,000 young people. This is in an area of heavy decline in biodiversity, and we know that the kids down there are much easier respondents to this topic; while Danish kids are more fed up with education in societal and environmental issues. So this part of the mission works to some extent.

But whether all visitors return home with the feeling that they ought to do something for biodiversity, I don't know. And it is hard to get a clue of the share, who takes active part in this as a consequence of what Givskud has provided. Some people know about it and make economic contributions to the funds inside the park. The big majority which has no clue and do not care much may be the people which are useful to make an impact on, because these are presumably the people who do not consider the environment in any terms. This is a great challenge to the dissemination part of achieving the goal.

K: In general the realisation is very hard to measure. We have a website also, but what the visitors derive from watching and reading on the different pages is also hard to know about.

R: Short summary on whether the mission is realised I would say yes. By considering all the improvements, which we talked about before, I think we can be proud. But the direct way of making achieving biodiversity conservation should be by raising awareness and understanding in people's minds. And how else can it be conserved from our perspective?

R: We definitely lack some tools for keeping biodiversity seriously on the agenda, in order to credible claim, that this is what we do. There is no doubt that we do create fascination. And this is an instinctive response, when e.g. standing in front of a giant elephant. But linking that onto making an impression that the Indian elephant is on decline and we have to do something about it. This implies some resource constraints as well, because the elephants live on the crops of the fields in places where the population density is bigger than anywhere else.

9. **Are you considering how the society as a whole put requirements on businesses when you plan responsible actions?**

K: The first experience with environmental auditing was in 1987 after request from the municipal authorities. The membership of Green Network was acquired in 2001 in the need for tools for conducting environmental reporting.

R: The belief in -and possible problem of- human induced climate change has been given a role in society, which makes it impossible to neglect for businesses as well for politicians. The media has great power in setting the environmental agenda, when it comes to the actions of politicians as well as companies.

We do want to respond to what the society asks from us, and we have to, but we do believe in realising many of our own ideas. Next steps in the energy question could easily be installing solar cells for electricity generation. And we would especially like to test the nitrogen technology, e.g. for new busses/trains inside the park.

10. **Have you previously prepared yourself for upcoming requirements, e.g. restrictions in law or other, by taking actions prior to this?**

K: When monitoring of the nutrient balances went into being a political demand for agriculture, we actually performed the monitoring in a way, which later on went on to being the standard.

We are usually in front for when requirements occur, but that is not the main reason.

11. Does the company participate with initiatives, which by no means are required or expected?

R: Much of the initiatives we talked about in previous questions are volunteer initiatives, e.g. the idea of leaving put poison, which does not apply to agricultural businesses in general. Also a little bit of extra nitrogen fertiliser is needed, but we manage it very carefully.

12. What are your experiences in communicating your environmental engagement?

R: The communication happens in the reports, which are published on the internet. Besides this, the sustainability reporting and the GN achievements are published in the press, in which we have been represented. Quite some articles have been published on our work here in Givskud Zoo, mostly in magazines for environmental and business management. A few times a year I would say.

K: The GN reports are also read by interested students etc. The guests can read about our funds, the school in Cameroon, and in front of the chimpanzees people can read about the energy savings, we attain by installing heat pumps.

R: We have talked about this issue with other zoos and aquariums, and basically we agree that exposing our responsible actions to the guests do not matter much, anyhow does not change the visitor numbers.

Annex III: Stakeholder survey

Employees

a. Dyrepasser
b. Dyrepasser
c. Formidling
d. Ungarbejder
e. Ungarbejder

1) Hvad havde indflydelse på dit valg af Givskud Zoo som arbejdsplads?

a. Forskelligt arbejde, dyrene, kollegaerne.
b. Udvalget af arbejdspladser som dyrepasser er ikke så stort. Og jeg havde altdig drømt om at blive dyrepasser i Givskud.
c. Jeg manglede et job, og jeg så en opslag i avisen. Ikke så overvejet, men jeg kendte stedet af navn og omtale.
d. Jeg manglede et job.
e. Jeg bor i Givskud og manglede et job.

2) Givskud Zoo er en selvejende institution. Kan du sommetider føle, at det er "din" have og virksomhed?

a. Ja, omtaker den jævligt som "min".
b. Ja bestemt, det er vores alles opgave at hjulene drejer.
c. Ja, jeg synes det berettiger vores eksistens. Ingen privatpersoner tjener på at have dyrene i fangenskab.
d. Nej, jeg arbejder for min chef.
e. Det føler jeg, men der er ofte lidt "langt" til toppen og ledelsen.

3) Overvejer du, om din arbejdsplads arbejder miljørigtigt? Hvor vigtigt er det for dig?

Aldrig 0 1 2 3 4 5 Ellers skifter jeg job

a. 4
b. Det er vigtigt, men det kunne ikke få mig til at stoppe. 4.
c. 4
d. 1
e. 3.

4) Er der noget, du på nuværende tidspunkt synes, at Givskud skulle ændre? Hvad?

a. Skaf nogle penge, f.eks. sponsorater; flere dyr, renovering af anlæg.
b. Jeg kunne godt tænke mig, at vi var mere konsekvente på alle områder.
c. Jeg tror på, at vi gør hvad vi klan indenfor de fysiske og økonomiske rammer, vi har.

d. Flere eksotiske arter
e. Jeg synes, de burde tænke på køretøjer, f.eks. hybrid eller el – vi bruger rigtig meget diesel!

5) Er du tidligere kommet med forslag til ændringer i virksomheden? Føler du, at dine forslag til ændringer bliver hørt?

a. Jeg bliver hørt, men der er ingen penge.
b. Ja og jeg bliver hørt, men der sker ikke altid ændringer.
c. Ikke på miljæområdet. Men ja, vi bliver hørt og taget alvorligt – forslag fører ofte til ændringer.
d. Ja.
e. Nej, men jeg tror det ville blive hørt, hvis det er besparende på den ene eller anden måde.

6) Hvad tænker du når du hører begrebet "biodiversitet"? Ville du forvente af nogle virksomheder, at de beskytter biodiversiteten?

a. Forskellige arter, biologisk forskel.
b. Mangfoldighed af dyr og planter. At vi passer på området omkring os.
c. Stor biodiversitet = rigtig mange dyr og planter osv. I et område.
d. Ved ikke!
e. Mangfoldighed i naturen.

7) Ville du forvente af nogle virksomheder, at de beskytter biodiversiteten?

a. Ja, igennem almindeligt, lovpligtigt miljøarbejde.
b. Nej, kun der hvor jeg selv arbejder.
c. Virksomheder som f.eks. påstår, at de sælger træ, som er FSC-mærket.
d. Nej og ja. Virksomheder påvirker jo miljøet, så derfor bør de også passe på det.
e. Ja – rigtig meget! Især virksomheder der arbejde med dyr og natur.

Guests

a. Mand 50 år
b. Kvinde 30 år
c. Et par på 30 år
d. Mand 40 år.
e. Mand 35 år.

1) Hvad havde indflydelse på dit valg af Givskud Zoo som besøgende gæst?

a. Afstand og pris for min gruppe, som får rabat. Det ville vi få ikke i Randers Regnskov.
b. Har årskort
c. En oplevelse for børnene.
d. Dyrene har det godt, man får en mere nær og direkte oplevelse. Vi kommer fra Lolland, hvor

Knutenborg Safaripark ligger, men denne er bedre.
e. For at give børnene en oplevelse.

2) Lægger du mærke til de ting, som Givskud gør for miljøet? Kan du evt. nævne nogle?

a. Nej, det har jeg ikke lagt mærke til.
b. Nej.
c. Dyrenes gode plads, frem for andre zoologiske haver, hvor der er i bur.
d. Ikke rigtigt, jo der var vist noget ved gorillaerne...
e. Ja, vi har hørt om det i bilen, på den CD-guide, vi fik med.

3) Overvejer du, om dine dem der sælger dig noget går på kompromis med miljøet? Hvor vigtigt er det for dig?

Ændrer ingenting 0 1 2 3 4 5 Så er jeg ikke interesseret!

a. 4
b. 3
c. 0
d. 0
e. 4.

4) Føler du, at du påvirker markedet i nogen retning som forbruger? Konkrete eksempler?

a. Nej.
b. Nej.
c. Nej.
d. Nej.
e. Det håber jeg, og jeg forsøger jeg når handler.

5) Er der noget, du på nuværende tidspunkt synes, at Givskud skulle ændre? Hvad evt.?

a. Nej.
b. Nej.
c. Flere toiletter.
d. Nej.
e. Nej.

6) Hvad tænker du når du hører begrebet "biodiversitet"?

a. Mangfoldighed. Plads til mange...
b. En masse forskellige dyrearter. Det naturlige kredsløb. Det er vigtigt at bevare igennem indsatser, måske mere en klima.
c. Ingenting!
d. Miljø.
e. En kvalitet ved miljøet, som er værd at værne om.

7) Ville du forvente af nogle virksomheder, at de beskytter biodiversiteten?

a. Ja.
b. Miljøindsatser ja, men ikke set biodiversitet nogen steder.
c. Nej.
d. Nej, men på min arbejdsplads begrænser vi forurening.
e. Ja, f.eks. energi-virksomheder. Virksomheder har et ansvar, når de påvirker miljøet.

Annex IV: Planning of biodiversity action plan

Step 1 – Identification af aktiviteter, produckter og ydelser med mulig indvirkning på biuodiversitet.

Identifikation af aktiviteter, produkter og service med mulig påvirkning på biodiveristeten. Denne kortlægningsprocess er udført i samarbejde med direktøren og parkchefen i Givskud Zoo, og tager udgangspunt i tallene, som er opgivet i bæredygtighedsredegørelsen i 2007. For et overblik over talene i perioden 2003-2007, se redegørelsen på Givskud Zoos hjemmeside (www.givskudzoo.dk) .

Forsyning af råvarer og naturressourcer, inkl. vand

Vand: (m^3): 50.034

Givskud	772
GZ vandboring, drikkevand	18.885
GZ vandboring, råvand	30.377

El: 650.641 kWh

El leveres fra elnettet, hvor elproduktionen leveres af % kulkraft, % vind, % naturgas. Givskud har dog investeret i % vandkraft fra Norge. Det betyder, at de gennemnitlige emissioner fra elproduktionen skal skalleres ned til. Vandkraften produceres i Norge.

Forbrug af råvarer og naturressourcer, inkl. vand

El: 650.641 kWh

Safarigrillen	61.570
First Stop	4.718
Safarikiosken	29.664
ZoOasen	82.500
Administration/billetsalg	16.852
Drift af	454.168
Pilerensningsanlæg	1.169

Naturgas: 20.568 m^3

ZoOasen (886 $m^{2)}$:	10.445
Administration/billetsalg (388 m^2)	2.544
Elefanthus 380 m2	7.579
Naturgasforbrug pr. m^2	12,44

Fyringsolie: 60.150 l

Chimpanser 272 m^2	7.175
Giraffer 680 m^2	9.415
Javaaber 72 m^2	4.048
Sydamerikastald 245 m^2	2.225
Næsehorn Gl. 220 m^2	2.495
Næsehorn Ny 754 m^2	9.392
Fuglegården 322 m^2	6.948
Løvehus 1, 147 m^2	0
Løvehus 2, 176 m^2	4.208
Ynglestation 300 m^2	0
Fanøgården 115 m^2	1.546
Dværgflodheste 118 m^2	5.007
Gorilla 450 m^2	7.691
Olieforbrug pr. m^2	15,50

Brændstof, intern transport

Dieselolie: 35.611 l

Drift	30.034
Safaribusser	5.577
Benzin:	2.356 l
Drift	1.210
Safaritog	1.145

Flaskegas: 1.721 kg

Træpiller: 12.000 kg

Løvestald 397 m^2	12.000
Forbrug træpiller, kg pr. m^2	30,23

Vand: 50.034 m3

Givskud Zoo har egen vandboring med 2-streng system med renseanlæg til drikkevandsystemet. Ufiltreret råvand anvendes til opfyldning af de 20 søer/vandgrave i parken, mens det rensede vand bruges til rengøring i staldene, sanitære formål m.m. ZoOasen og velfærdsbygning er tilsluttet Givskud Vandværk.

Foder: 809.981 kg

Kød	37.564
Kød, økologisk	8.270

Æg, økologisk	150
Frugt/grøntsager	78.536
Frugt/grønsager, økologisk	5.000
Korn/frø, ubehandlet	22.200
Vitaminer og mineraler	6.500
Foderstoffer, behandlet	250.215
Hø/halm/ensilage	336.546
Pil	65.000

Papirvarer: 15.794 kg

Brochurer:	11.290
Kopipapir m.m:	500
Toiletpapir:	4.004

Flydende udledninger

Spildevand (m^3):

Sanitært, offentligt rensningsanlæg: 4.285 m3

opsamlet I tanke	3.132
bortledt til kloak	1.153

Dyreanlæg, pilerensningsanlæg: 8.820 m3

Udledt næringsstof	N	P	K
kg	508	48	806
tilladt	612	108	792

Gødning (kg):	Kvælstof (N)	Fosfor (P)	Kalium (K)
Komposteret staldgødning	1.816	826	1189
Kunstgødning B	2.335	270	1006
Total kg	4.151	1096	2195

emissoner til atmosfæren

- CO2: 663.922 kg
- SO2: 71 kg
- NOX: 1.335 kg

Drift (kg)	CO_2	SO_2	NOx
El	299.295	58.558	514
Naturgas	46.977	247	34,55
Træpiller	0	5.340	19
Flaskegas	5.163	0	7,92
Diesel B	79.590	601	450
Fyringsolie	159.398	4.812	108
Benzin	2.783	24	2,42
kg i alt	*593.206*	*69.586*	*1.136,68*

Transport af parkens gæster	CO_2	SO_2	NOx
Personbiler	45.800	533	53,26
Turbusser	7.503	253	59,01
Safaribusser	14.779	112	83,66
Safaritog	2.634	23	2,29
Kg i alt	*70.716*	*920*	*198,21*

Fast of flydende affaldsbehandling

Affald: 149.002 kg

Dagrenovation	60.120
Brændbart	27.380
DAKA, kødaffald	26.755
Kemikalieaffald: M - - - - -	
Oliefase	0
Akkumulator/batterier	10
Kviksølvholdige lyskilder	36
Div. affald	181
Bekæmpelsesmidler	9
Elektronik	37
Glas	0
Lak/maling	134
Deponi	14.340
Metalskrot	6.240
Byggeaffald	1.900
Genbrug	
Pap og papir M	11.160
Plast	700

Affald, kg i alt	*149.002*

Støj, lugt, forstyrrelser mm.

I højsæsonen kan den omkringliggende miljø være belastet af støj fra bilkøer i forbindelse med ankommende gæster til parken. Virksomhedens aktiviteter giver ikke anledning til vibrationer. I varme, tørre perioder medfører trafikken i parken noget støv. Vi tilstræber at nedbringe støvgener ved at vande kørselsarealer. Der forekommer nogen lugtgener fra dyr og gødning (Bæredygtighedsredegørelsen, 2007).

Arealanvendelse og planlægning

Et areal på ca. ___ ha er inddraget til dyrehold af forskelliog art samt anlæg og bebyggelse. Land størestedelen af området (ca. ____ ha)anvendes til dyrehold. Disse er indhegnet, men forhindrer blot større pattedyr i at forlade arealerne. Derimod er der ikke opstillet hindringer for interaktion med og udbredelse af planter og anden fauna (Bæredygtighedsredegørelsen, 2007).

Distribution

Virksomheden leverer ikke varer eller ydelser ud af huset, som skal distribueres.

Anvendelse og afskaffelse af produkter

Se affald.

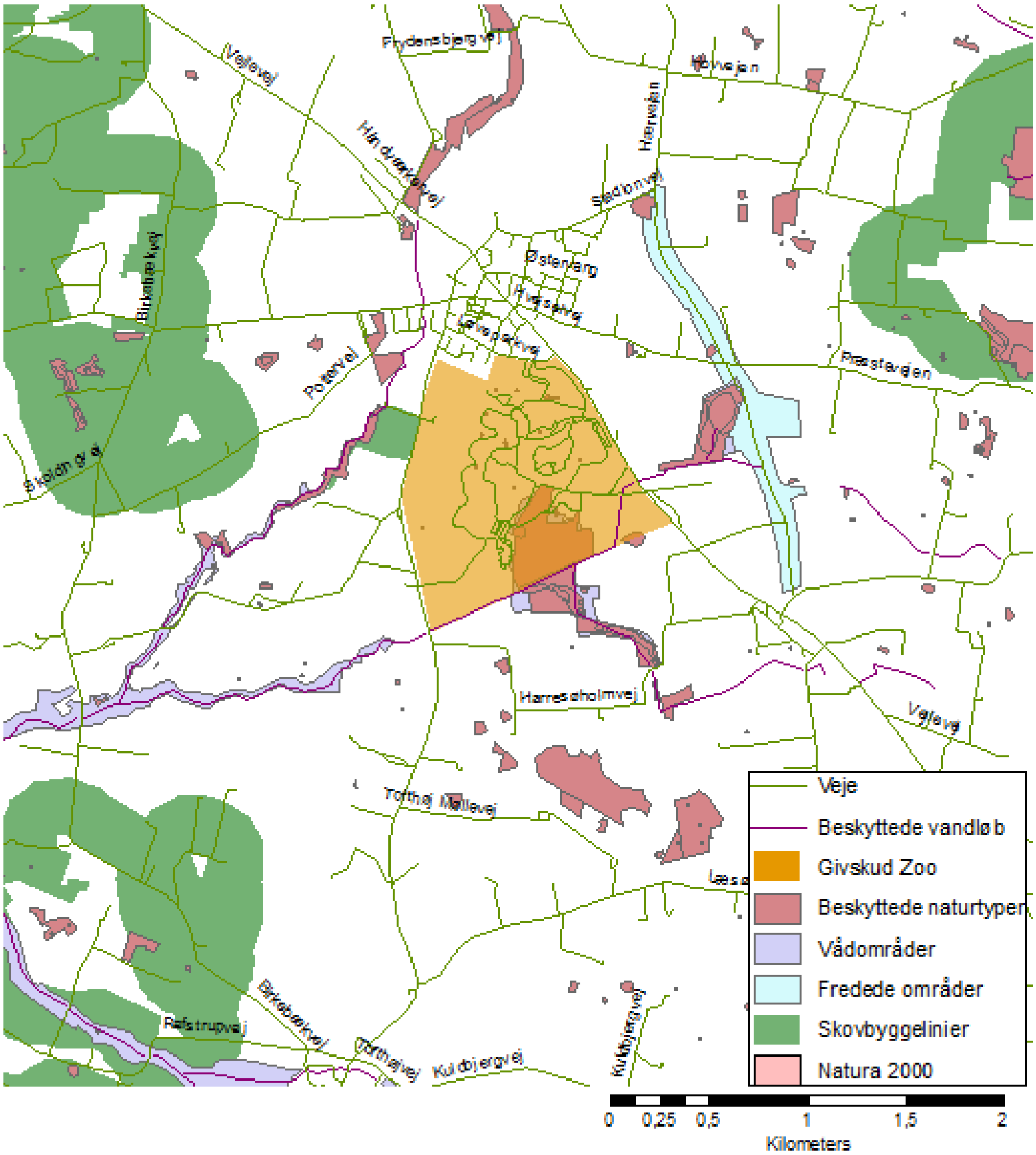
Step 2 – Setting priorities from assessing the significance of potential biodiversity impacts.

Arealer – mistede habitater

Hvor meget jord er besat? Hvilke naturtyper og arter er til stede? Har nogen af disse en udpeget status (fx rød listet, RAMSAR)? Hvor stor en del af habitat/population/art vil blive tabt eller forstyrret i væsentlig grad? Indenfor hvilkenskala gøre eventuelle lignende økosystemer og arter findes der? Kan andre områder bruges til forbedring?

Parken dækker et areal på ca. 120 ha. 25 ha består af devist uplejet natur, som er kendetegnet ved områdets natur generelt. Få arealer er bebyggede, mens langt den største del er holdt som den omkringliggende midtjyske natur (Perspektiv- og Masterplanen, 2004).

Parken overlapper et vådområde (ca. 10 ha), som falder under Naturbyeskyttelseslovens §3 (se kort næste side). Det betyder, at eventuel anvendelse vil skulle ansøges om, og herefter dispenseres for. Dette område har Givskud dog valgt at værne om, samt at lægge en gangsti i området, hvor naturen kan opleves af gæsterne. Billederne herunder er taget fra denne sti.



Kort udarbejde i ArcMap. (Datakilde for kortdata: Danmarks Miljøportal (2008).

Udover vådområdet løber et beskyttet vandløb igennem og ud på den anden side af virksomhedens areal. På vejen ind i arealet fra øst mod vest, løber vandløbet igennem det pilerensningsanlæg, der er spredt over ca 3,5 ha i det sydøstlige hjørne af området.

Der er ingen Natura 2000 områder indenfor parkens område eller i nærheden. Det nærmeste område beskyttet af EF's Habitatdirektiv ligger ca. 7,5 km mod sydøst.

De på kortet grønne områder illustrerer skovbyggelinier. Dette er kommunens guide for hvor nærtligggende skov sandsynligvis vil udbrede sig. Disse er oprettet for at sikre skovenes værdi, samt samt opretholde skovbrynene som værdifulde levesteder for plante- og

Dyrelivet. Som udgangspunkt er bebyggelse indenfor disse områder ikke tilladt, omend en dispensation dog kan søges. Da disse landskabselementer er under hensyn for bevaring af biodiversitet, er det derfor også naturligt at tage hensyn til disse markereringer i dette aktuelle henseende.

Fragmentering

Er der nogen nøglehabitater og/eller -arter inden for området under påvirkning? Hvor vigtige er disse? Vil virksomhedens aktiviteter påvirke størrelsen eller formen væsentligt? Inden hvilken skala findes eventuelle lignende økosystemer og arter? Kunne forvaltning levere passende erstatning?

Ja, der finds et beskyttet vådområde (§3). Aktiviteterne går ikke betydningsfuldt på kompromis med størrelse og form. Der er lavet en natursti igennem, som deler et mindre område fra størstedelen af vådområdet. Dette er dog ikke en forstyrrende korridor, og migration er mulig. Desuden findes lignende naturtyper i nærområdet (f.eks. omkring vandløbende mod sydvest, se kort).
Der forefindes en artsliste over området på http://www.fugleognatur.dk/lokalitet.asp?mode=unik&ID=27235, og i stikprøver der er kun fundet arter, der hører til kategorien ”Least concern”.

Forstyrrelse af habitater

Er der nogen habitater/arter følsomme over for forstyrrelser? Hvor alvorlig er den forstyrrelse (tid og omfang)? Vil det have nogen mulig påvirkning? Indenfor hvilken skala findes lignende økosystemer og arter?

Nej, umiddelbart ingen fysiske forstyrrelser. Se længere nede for kemiske påvirkninger.

Arealanvendelse

Er der nogen nøglenaturtyper eller -arter inden for området for påvirkning? Er jorden forvaltet hensigtsmæssigt og er der taget initiativ til at forbedre levesteder / arter?

Arealerne, der overlapper §3 vådområdet bevares og værnes om. Værdien af arealet øges oven i købet, da publikum har adgang til at nyde omgivelserne. Se desuden ”fragmentering” ovenfor.

Ressourceforbrug – Udvinding og forbrug

Hvor kommer f.eks brændstoffer, vand, elektricitet og råvarer fra? Er de ressourcer regulererede, eller stammer fra et reguleret levested? Er der nogen anerkendte økologiske værdier, der kompromitteres? Hvordan er disse ramte værdier? I hvilken grad bruger virksomheden eller udvinder disse ressourcer? Hvor markant er påvirkningen af naturtyper / arter? Forvaltes ressourcerne bæredygtigt?

Elektricitet producers i Danmark fra kraftværker, der drives af naturgas og kul. Begge brændstofkilder forårsager emission af CO_2, NO_x og SO_2. (se luftemissioner herunder). Energi producers I en mindre grad fra vindmøller, og importeres ligeledes fra nabolandende (se energinet.dk for aktuel produktion og udveklsing med nabolandene). Udover dette indkøber Givskud vandkraft. Dette bidrdrager ikke til drivhusgasemissioner til atmosfæren, men har en negativ virkning på habitater, hvor bl.a. migrationsmønstre for dyr, der lever i de akvatiske økosystemer opslittes, og levesteder udrydes.

Fossile brændsler som gas, fyringsolie og benzin/diesel medfører en påvirkning på økosystemer igennem hele livcyklus, fra udvinding til afbrænding. For et konkret overblik, må en livscyklusanalyse foretages

Vand udvindes af et kommunalt vandværk, mens der ligeledes udvindes fra egen boring.

Træpiller, papir og foder optager landarealer, og har derfor en vis påvirkning på biodiveristeten i andre områder. For et konkret overblik, må en livscyklusanalyse foretages.

Luftemissioner– potentiel kilde til syreregn, eutroficering, fysisk skade eller global ændringer

Hvad udledes til luften, og i hvilke mængder? Hvor er forventes de emissioner at falde, og i hvilken form? Er der nogen naturtyper eller arter i disse områder, der kan være følsomme over for disse emissioner? Kan emissioner minimeres ved kilden?

Vedvarende traffik i dagtimerne, tiltagene i sommerhalvåret, og med en fremherskende vindretning fra vest-sydvest.
Emissioner til luften kan komme i betragtning som atmosfærisk deposition i skove, marker og vådområder. Specielt NO_x deposition fra atmosfæren, forårsaget af fosile brændsler, har været et stigende problem op igennem 90'erne (http://www.videntjenesten.life.ku.dk/Skov_og_Natur/~/media/Videntjenesten/Rapporter/SkovOgNatur/SogN27.ashx, side 54)
Den årlige NO_x udledning fra Givskud er 1335 kg (Ved NO_2 svarer dette til (1335/(8+8+7)*7)=406 kg N). Dette betyder, at deposition indenfor et område af samme samme størrelse som parken ligger på ca. 3,4 kg N/ha/år. Dette er ikke til fare for det omkringliggende skov og landbrug, selvom der i nogle syddanske jorde er en særlig overfølsomhed overfor kvælstof. Der kan nogle steder forventes en artsforskydning i retningen af mere kvælstofelskende og –tolerante planter. Der kan tillige forekomme en forskydning af arter ved kvælstofdeposition i moser, hvor en tilgang af træer og buske kan forventes. I henhold til ovenstående kilde, er grænseværdien et sted imellem 2 og 7 kg. N/ha/år.

CO_2-emissioner er et problem fra samme kilde, hvilket formodes at bidrage til ændringer i klimaet. Desuden er det er potentiel kilde til syreregn.

Desuden er alle emissioner ligeledes relevate under ressource-sektionen længere oppe, hvor produktionen af elektricitet bidrager til emissioner.

Emissions to water - lakes, rivers, streams and groundwater by discharges and/or run-off

Hvilke typer og mængder af stoffer udledes? Hvad er de mulige økologiske konsekvenser? Er der nogen følsomme/vigtige levesteder/arter i område for påvirkning? Hvad er gjort for at minimere risikoen for et udslip? Er nogen indsats gjort for at forøge søer, floder, vandløb og grundvand? Bruges landbrugskemikalier og rammer de eventuelle vandløb?

Virksomhedens ideal med at forsøge at integrere sig i naturlige kredsløb er eksemplificeret ved et pilerensningsanlæg, som er lokaliseret i det sydøstlige hjørne af området. Her udledes spildevand. "Her laves konstant analyser fra 5 prøvebrønde i området. Næringstofferne omsættes fuldstændig, men på sigt kan der måske blive tale om ophobning af salte. Der er tilsyneladende ingen risiko for forurening. Virkningsgraden er dermed tæt på 100%" (Richard Østerballe; direktør, biolog).

Flere steder på området er der oprettet søer, for at variere landskabet i parken. Disse tiltrækker dyr fra området, der foretrækker vådområder

Gift anvendes ikke på området.

Med hensyn til kvælstofudledningen, er det vigtigt at bemærke, at grunden overlapper et nitratfølsomt indvindingsområde for grundvand.

Emissions to land - waste handling

Er noget affald der genbruges og/eller genanvendes? Er der affald som er skyld i emissioner til miljøet? Hvordan har affaldshåndtering indvirkning på økosystemerne?

Alt affald indsamles og distribueres i kommunal affaldshåndtering, hvor det genbruges, afbrændes eller deponeres miljørigtigt. Affald fra dyrene indsamles og anvendes til gødning for vegetationen på flere arealer.

Summary

Hvor værdifulde er de potentielt berørte miljøer i økologisk forstand? Har nogen naturtyper/arter nået grænsen for levedygtighed (eller er de i nærheden af disse grænser)? Hvor sandsynligt er en virkning på den biologiske mangfoldighed, og hvor længe? Hvordan påvirker eventuelle love eller forordninger situationen? Hvor dyrt ville det være, hvis råvarekilderne ikke længere var til rådighed? Hvordan kunne aktivitet/passivitet påvirke image i offentligheden? Hvor teknisk let er det at mindske virkningerne, og er det billigere?

Kvantitativ vurdering ikke foretaget.